The Relationship Between

Poverty and HIV/AIDS in Rural Thailand

A thesis
submitted in fulfilment
of the requirements for the degree
of

Doctor of Philosophy

at

The University of Waikato

by

Michael P. Cameron

The University of Waikato
2007

Abstract

HIV/AIDS is a global pandemic with critical demographic, economic, and social implications. The pandemic is widespread in poor regions of the world, including Southeast Asia where its long-term effects are potentially catastrophic. Despite the major impacts of the epidemic being already felt at the household level in many countries, a lack of recognition of the socioeconomic determinants of HIV infection and the economic and social impacts of HIV/AIDS and their relationship with poverty persists. This is due in part to the lack of systematic studies at the household, community, sectoral, and macro levels.

The thesis describes a 'vicious circle' between HIV/AIDS, poverty and high-risk behaviour at the individual level. In the poverty-HIV/AIDS cycle, HIV-infected individuals are especially vulnerable to poverty, the poor are more likely to engage in high-risk behaviour such as commercial sex work, and high-risk behaviour in turn makes people susceptible to HIV infection. The thesis examines whether rural Northeast Thailand exhibits characteristics that support the existence of such a cycle. Four key relationships are considered and tested: (i) the relationship between previous HIV infection and current wealth or poverty; (ii) the relationship betweem wealth or poverty and HIV/AIDS knowledge; (iii) the relationship between previous wealth or poverty and current HIV infection; and (iv) the relationship between previous migration and current HIV infection.

All four relationships are shown to hold using survey data from Khon Kaen province in Northeast Thailand. Poverty is shown to increase susceptibility to HIV infection, and HIV/AIDS is shown to reduce wealth and hence increase poverty. Under the circumstances, the hypothesis that rural Northeast Thailand exhibits characteristics that would suggest the existence of a poverty-HIV/AIDS cycle cannot be rejected.

This thesis also provides several key contributions to the literature on HIV/AIDS and poverty. First, it provides quantitative and qualitative empirical analysis of the impacts of HIV/AIDS on households in a moderately affected region of Thailand. Second, it provides empirical analysis both on whether wealth and poverty affect the risk of HIV infection, and whether HIV infection affects wealth and poverty. The results from this thesis also provide significant empirical evidence of the importance of rural-urban migration in the spread of HIV in Asia. Finally, the thesis investigates the potential effects on the poverty-HIV/AIDS cycle of an ongoing socio-economic intervention, namely breaking the poverty-HIV/AIDS cycle via intensive rural development.

Notes

Note on ethical issues

Conditional ethical approval for this research was granted by Waikato Management School of the University of Waikato on 27 May 2003. The conditions were duly fulfilled.

This thesis includes qualitative case studies taken from the field notes of the researcher. In these case studies, the names used are fictitious and villages are not identified, in order to protect the privacy of survey respondents and the confidentiality of their information.

Note on transliteration

There is no widely accepted convention for transliterating Thai words using the Western alphabet. In this thesis, transliterations and the use of Thai words has been limited to only circumstances where the use of an English translation might lead to confusion. The conventions used for transliterations are the same as those used by the U.S. Department of Defense.

Note on publications

A number of papers have been produced from this thesis. The abstracts of the papers appear in Appendix XIV. The full references of the papers are as follows:

1. Lim, S., and Cameron, M. P. (2003). The contribution of multinationals to the fight against HIV/AIDS. In R. Sullivan (Ed.), *Business and human rights: dilemmas and solutions*. Sheffield, U.K.: Greenleaf Publishing.

2. Lim, S., Cameron, M. P., Apinundecha, C., and Laohasiriwong, W. (2004). Economic interventions in the fight against HIV/AIDS: a case study of northeast Thailand. *Journal of GMS Development Studies, 1*(1), 67-88.

3. Lim, S., Cameron, M. P., Taweekul, K., and Askwith, J. (2007). Harnessing the private sector for rural development, poverty alleviation, and HIV prevention. *Submitted to International Development Planning Review*.

4. Lim, S., and Cameron, M. P. (2007). The business of social responsibility: Evidence from the garment industry in Northeast Thailand. *Submitted to Business Ethics: A European Review*.

5. Cameron, M. P. (2007). HIV/AIDS in rural Northeast Thailand: Narratives of the impacts of HIV/AIDS on individuals and households. *Submitted to New Zealand Journal of Asian Studies*.

6. Cameron, M. P., Lim, S., Apinundecha, C., and Laohasiriwong, W. (2007). Exploring the socio-economic impacts of HIV/AIDS: Evidence from Northeast Thailand. *Submitted to International Congress on AIDS in the Asia Pacific*.

An earlier version of paper 3 was released as Department of Economics Working Paper 01/07.

Acknowledgements

This work would not have been accomplished without the assistance and understanding of a number of people who I would like to thank. I owe my deep gratitude to my chief supervisor, Dr. Steven Lim, for all his supervision and continual support throughout the completion of this work. I also received valuable assistance and comments from Professor John Gibson, the other member of my supervising panel.

I gratefully acknowledge the Waikato Management School and the Asia 2000 Foundation for their funding of this research, and the Mekong Institute and the Population and Community Development Association, Thailand, for their logistical support for fieldwork. I would especially like to thank Krailert Taweekul, Yan Flint, Liu Dachang, Sanit Suwunsorn, Wongsa Laohasiriwong and Chupasiri Apinundecha for their generous assistance.

I am also grateful to the people living with HIV/AIDS, the villagers and workers at the Community Based Integrated Rural Development Centre who willingly agreed to be interviewed for this project. I also acknowledge the interview teams and supervisors through whose hard work and dedication the data were collected and verified, and Usakorn Apiwattananon, Chansit Siritanachot and others for their assistance with translation.

Finally, on a personal note, I would like to thank my family – Barbara, Darianne, Tyler, Sarah, and Ryan. The completion of this work is a tribute to their patience and understanding over the past four years and more, during which my capacity to contribute to family life was compromised.

Contents

List of Figures

List of Tables

Any mans death diminishes me, because I am involved in Mankinde; And therefore never send to know for whom the bell tolls; It tolls for thee.

(John Donne, 1624)

Chapter 1

Introduction

1.1 Introduction

HIV/AIDS is a global pandemic with critical demographic, economic, and social implications – it is already the fourth leading cause of death worldwide (Lamptey *et al.*, 2002). The distribution of the effects of the disease is shared unequally within the global community, both economically and demographically (Barnett and Rugalema, 2001). Poor societies are affected relatively more than rich societies, with sub-Saharan African societies being particularly affected by high prevalence. The pandemic is widespread in other poor regions of the world, including Southeast Asia where its long-term effects are potentially catastrophic. For example, an estimated 58,000 Thais died from AIDS-related causes in 2001 (UNAIDS *et al.*, 2004), the average age at death from AIDS-related causes in Thailand is 36, and the life expectancy at birth for 2000-2005 has been estimated at 71 years – three years less than it would have been without AIDS (Rhucharoenpornpanich and Chamratrithirong, 2001; United Nations Development Programme, 2004). Altogether in South and Southeast Asia an estimated 7.6 million people are infected with HIV (UNAIDS, 2006).

AIDS typically strikes the most economically productive sector of the population, and the consequences of the pandemic on the economic growth of affected regions is substantial at both the micro and macro levels (Collins and Rau, 2000; Forsythe, 2002; Lim, 2001). The impact is potentially devastating to national economies as the size of the labour force and its productivity decline, and costs of health provision rise. Countries' export capacity is reduced, as is their ability to earn foreign exchange and repay international debt (Haacker, 2004a; Lamptey *et al.*, 2002). The Government has reduced capacity to raise taxes to provide adequate healthcare and poverty alleviation measures, which worsen the problems (Greener, 2002). Economies that are based extensively on labour-intensive industries, such as export agriculture, stand to lose the greatest as the cost of replacement labour rises and the supply of skilled labour falls (Bollinger, 2002). Husain and Badcock-Walters (2002, p.84) conclude that “the vicious cycle of low growth, unemployment, low social and economic status, depression, and poverty will become increasingly virulent over the coming years as HIV/AIDS mortality and morbidity spirals in high prevalence countries”.

Despite the major impacts of the epidemic being already felt at the household level in many countries, a lack of recognition of the socioeconomic determinants of HIV infection and the economic and social impacts of HIV/AIDS and their relationship with poverty persists. This is due in part to the lack of systematic studies at the household, community, sector, and macro levels (Cameron, 2003; Husain and Badcock-Walters, 2002; Pisani *et al*., 2003). Research into the links between poverty and HIV/AIDS prevalence is both important and urgent. For example, Greener (2002, p. 53-54) identifies the urgency of improving both “our understanding of the impact of HIV/AIDS on household poverty, and the possible policy interventions that are required” and “our understanding of the relative importance of the different impact channels, in order to inform the policies required to counter them”. Further, Haacker (2004a, p.90) notes that “an understanding of HIV/AIDS is essential for economic analysts and policymakers”.

The interrelationships between poverty and HIV/AIDS have important policy implications. Policy interventions that seek to impact on rates of HIV/AIDS infection or the costs to society must then address the problem of poverty. In turn, policy interventions that seek to alleviate poverty or vulnerability must address the problem of HIV/AIDS (Lim and Cameron, 2003).

This thesis seeks to address the dearth of empirical data on the economic and social impacts of HIV/AIDS and their relationship to poverty. It proceeds as follows. Chapter 1 explains the rationale for this research, and the underlying background factors surrounding HIV/AIDS and Thailand. Chapter 2 discusses the economic theory of HIV/AIDS, introduces an individual decision-making model within the household, and discusses the nexus between poverty and AIDS as represented in the existing academic (and other) literature. Chapter 3 extends this analysis, introduces the HIV/AIDS-poverty cycle, and presents the hypotheses to be tested. Chapter 4 describes the research methods employed. Chapter 5 presents results exploring the relationship from AIDS to poverty at the household level, while Chapter 6 looks at the reverse relationship – from poverty to AIDS. Chapter 7 evaluates the potential for the Thai Business Initiative in Rural Development program to break the poverty-HIV/AIDS cycle. Finally, Chapter 8 concludes and presents policy implications and recommendations arising from this research.

1.1.1 The Contributions of this Thesis

An extensive literature review presented in Sections 2.5 and 2.6 explores the vast literature on both the determinants and impacts of the HIV/AIDS epidemic. However, as will be seen from that review, empirical work is almost exclusively drawn from sub-Saharan Africa and other regions of relatively high HIV prevalence and not from regions of moderate or low HIV prevalence such as Northeast Thailand. As Barnett and Clement (2005, p.240) note, “because of the difficulties, sensitivities and costs of this kind of research, the few available micro level studies of the effects of HIV/AIDS on rural households are almost always drawn from specific geographic sites purposely chosen because they were known to have high HIV infection rates”. The main literature to concentrate on Asia has presented only anecdotal evidence, or limited empirical analysis (e.g. see Desbarats, 2003; World Health Organisation, 2001).

The existing literature supports the importance of the analysis conducted in this thesis. For example, in a widely-cited review article Barnett *et al.* (2001, p. 166) provide a list of key issues “…with which social scientists must engage if they are to contribute to the fight against the long term impact of the epidemic…”, one of which is “the effects of income distribution, livelihood strategies on rates of infection and of rates of infection on the other two variables”. In follow-up review articles, Barnett (2002, p.224) notes that social scientists “need to be looking to the future of the epidemic – beyond Africa”, while Barnett and Clement (2005, p.244) further stress “the necessity for work on HIV/AIDS impact to look further than Africa”.

This thesis provides several key contributions to the literature on HIV/AIDS and poverty. First, this thesis provides quantitative and qualitative empirical analysis of the impacts of HIV/AIDS on households in a moderately affected region of Thailand. This partially addresses the significant bias towards heavily affected countries and regions that exists in the current literature as noted above and documented in Chapter 2. Second, this thesis provides empirical analysis that relates to the key issue identified by Barnett *et al.* (2001) noted above – analysis both on whether wealth and poverty affect the risk of HIV infection, and whether HIV infection affects wealth and poverty. Both analyses are conducted using the same data set which should allow relatively strong conclusions to be drawn about the co-incidence of these two sets of effects. This thesis is one of the first studies to attempt to link both of these analyses together within the same conceptual framework. The results from this thesis also provide significant empirical evidence of the importance of rural-urban migration in the spread of HIV in Asia – an empirical result which supports the existing policy initiatives of international organisations such as the United Nations Development Programme. Finally, the thesis investigates the potential effects on the poverty-HIV/AIDS cycle of an ongoing socio-economic intervention, namely breaking the poverty-HIV/AIDS cycle via intensive rural development.

1.2 Background

1.2.1 Thailand

The Kingdom of Thailand is located in the centre of Southeast Asia, and shares borders with Myanmar to the north, Laos to the northeast, Cambodia to the east, and Malaysia to the south. The country covers 511,770 square kilometres and is divided into four regions – the mountainous Northern region, the semiarid plateau of the Northeast region (known locally as Isan[1]), the fertile valley of the Central

[1] Hereafter the terms ‘Isan’ and ‘Northeast region’ are used interchangeably.

region, and the peninsular Southern region. The capital and largest city, Bangkok, is situated in the central region. Administratively, the country is divided into 76 provinces (*changwat*) that are further divided into districts (*amphoe*),[2] sub-districts (*tambon*), and villages (*ban*). The Thai population (approximately 64.8 million in 2004) is relatively homogeneous – it shares a common culture, and more than 85 percent speak a dialect of the Thai language. Theravada Buddhism is the official religion of Thailand and is practised by over ninety percent of the population (ICON Group International, 2000).

Historically, Thailand was the only country in South and Southeast Asia to avoid European colonisation. This did not come cheaply and the Bowring Treaty, signed in 1855 between Thailand (called Siam until 1939) and Great Britain, required Thailand to adopt relatively free trade policies, and represented a "substantial surrender of sovereignty by Siam" (Ingram, 1971, p. 34). The Bowring Treaty freed Western traders to import products such as manufactured goods into Thailand for sale. Traditional barter systems were replaced and locals who wanted to buy these products were forced to seek money income, most often through producing goods for export, of which rice was the most important. Thus rice production was increased, and it was through the development of an exchange economy that Thailand was forced to reform and modernise. However, the avoidance of colonisation preserved the uniqueness of Thai culture, and the people have retained a sense of unity and identification with their history not found to quite the same extent in other Asian countries (Warr, 1993). In 1932, Thailand's absolute monarchy was ended by a military coup. Occupation by the Japanese during World War II was followed by a series of military governments, interspersed with brief periods of democracy and semi-democracy. Since elections in 1992, Thailand has been a constitutional democracy with elected changes of government.

Intensive investment in public infrastructure during the 1950s and 1960s, including transport, communications, electricity, irrigation and public services, was supported by extensive United States military spending, particularly in the

[2] Data on Thailand often makes reference to 'sanitary districts'. 'Sanitary districts' typically include only district capitals and urban population centres.

Northeast region (Cohen, 1991). The expansion of the road network in the North and Northeast regions provided farmers in those regions with more direct access to external markets as well as improved access to previously uncultivated land (Warr, 1993).

The adoption of relatively free trade encouraged a large increase in the volume of agricultural exports. This was supported by increases in agricultural production that were achieved through an expansion of the cultivated land area, rather than improvements in productivity (Siamwalla *et al.*, 1993). The area of rice cultivation expanded from about 5.8 million rai[3] in 1850 to 9.1 million rai in 1905 and to 34.6 million rai in 1950 (Ingram, 1971). Large investment in irrigation was concentrated on the Chao Phraya River delta and the rest of the Central region and the southern part of the North region. For this reason, most of the increase in cultivated land area occurred initially in the Central region, with expansions in other areas occurring much later. The rice export trade was conducted almost solely through the ports of Bangkok, and as the city became more prosperous it grew considerably – from between fifty and one hundred thousand inhabitants in 1850 to 780 000 in 1947, and to possibly over 8 million by 1990 (Falkus, 1993).

Despite improvements in agricultural technology, including increasing mechanisation (hand tractors replacing buffalo- or ox-ploughs) and the introduction of modern productivity inputs such as chemical fertiliser, in many areas rice cultivation is still a predominantly labour-intensive task conducted using similar methods to 150 years ago. Increases in the availability of cultivated land increased the demand for rural labour and allowed agriculture to easily absorb increases in the size of the labour force, preventing rural unemployment. However, seasonal, rain-fed nature of agriculture means that it does not offer year-round employment for farmers or their families due to the correlated nature of local labour demand and supply. This creates problems of underemployment and significant seasonal unemployment (Sussangkarn, 1993), which led to increasing seasonal migration, particularly from the labour-surplus Northeast

[3] 1 rai = 1600 square metres = 0.16 hectares, or 1 hectare = 6.25 rai.

region to the labour-short sugarcane-growing areas in the Central region (Siamwalla *et al.*, 1993).

The high level of rural infrastructure investment, supported by relatively abundant and inexpensive labour and natural resources, supplied the base for an extended period of economic growth through the middle of the 20th Century (Warr, 1993). Rapid increases in tourism and manufacturing, openness to trade and foreign investment, and encouragement of private sector enterprise accelerated this growth trend through the late 1980s and early 1990s. Thailand's GDP growth averaged 4.3 percent between 1951 and 1991 (Warr, 1993), and an impressive 9.5 percent between 1987 and 1996.[4] In the 1950s Thailand was one of the poorest countries in the world (Warr, 1993), and the incidence of poverty was estimated at 31.7 percent in 1976, but had fallen to 21.2 percent by 1988 (Krongkaew, 1993). An alternative measure of poverty by Kakwani and Kronkaew (2000) estimated the incidence of poverty at 32.6 percent in 1988, and a fall to 11.4 percent by 1996. Despite these gains poverty remains a significant problem in Thailand, and is especially apparent in Northeast Thailand which has the highest incidence of poverty – estimated in 1996 at 19.4 percent (Kakwani and Krongkaew, 2000).

The Thai economy has extensively restructured over the last four decades. Agriculture's share of GDP fell from 38.9 percent in 1960 to 12.4 percent in 1990, while industry increased from 15.9 to 39.2 percent over the same period (Sussangkarn, 1995). Despite this and extensive rural-urban migration (see Section 1.2.3), most of the Thai population (approximately eighty percent) remains in rural areas, and more than sixty percent of the labour force is still employed in agriculture (ICON Group International, 2000).

Health indicators, including life expectancy, infant and child mortality, have improved over the last forty years as they have in many developing countries. Life expectancy increased from 56.2 years in 1960 to 69.2 years in 2002, while infant mortality fell from 103 per 1000 live births to 24 and under-five mortality fell from 148 per 1000 children to 28 per 1000 over the same period. As a result of a

---

[4] Source: World Bank, World Development Indicators Online: http://devdata.worldbank.org/dataonline/

government-sponsored family planning program, including contraceptive and condom promotion, Thailand’s population growth fell from about 3.1% in 1960 to around 1.1% in 2000 (ICON Group International, 2000). This complemented the growth in national income described above and has provided an extended period of sustained welfare improvement in the country.

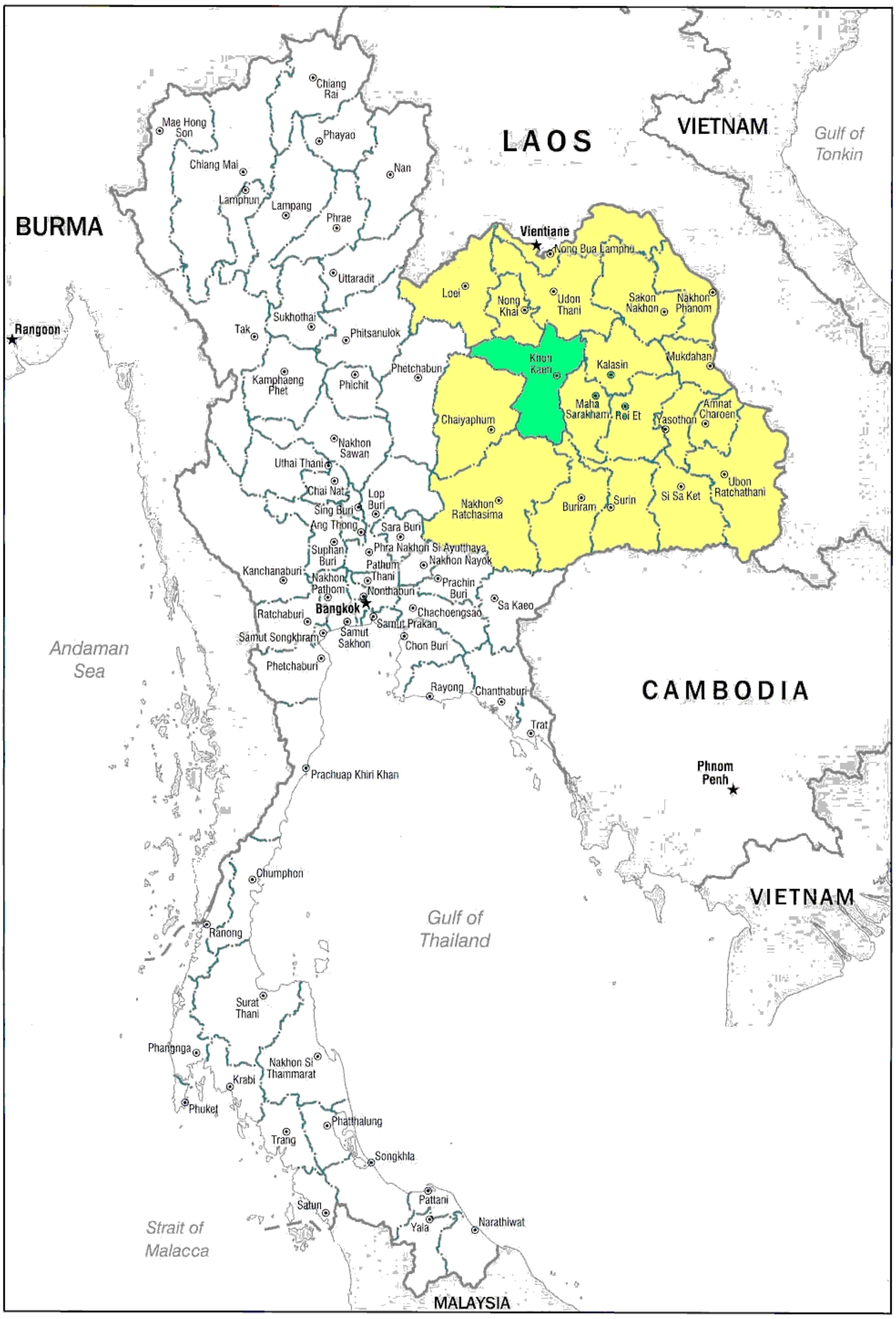
Health insurance cover has been universal in Thailand since October 2001, with all Thai citizens being covered under the Civil Servant Medical Benefit Scheme, the Social Security Scheme, or the Universal Coverage Scheme. The Civil Servant Medical Benefit Scheme covers civil servants, employees of government enterprises, and their family members. The Social Security Scheme covers employees of large private companies (with more than 19 employees), and the Universal Coverage Scheme covers the rest of the population, and is paid for from general taxes. As could be expected given universal insurance coverage, access to health care in Thailand is fairly equal across socioeconomic groups, but expenditure on healthcare is greatest for the highest and lowest income groups (Pannarunothai and Mills, 1997).

1.2.2 Khon Kaen Province, Isan (Northeast Thailand)[5]

Isan (the Northeast region) is ethnically and culturally distinct from the other regions of Thailand, with a culture and language more closely related to the Lao people (Cohen, 1991). Khon Kaen province is located near the centre of the Northeast region, 450 kilometres northeast of Bangkok (see Figure 1.1, where Isan is coloured yellow, with Khon Kaen province in green). The province covers a total area of 10,886 square kilometres (or 6.8 million rai), of which approximately 61.9% is utilised for agriculture, 7.5% is forested, and the remaining 30.6% is residential areas, pasture, unutilised land, ponds, roads or other public land. The population of Khon Kaen province was 1,750,078 in 2000, with an average population density of 161 per square kilometre.

[5] Data in this sub-section are largely taken from Lekuthai (2002).

Figure 1.1: Location of Khon Kaen province in Thailand

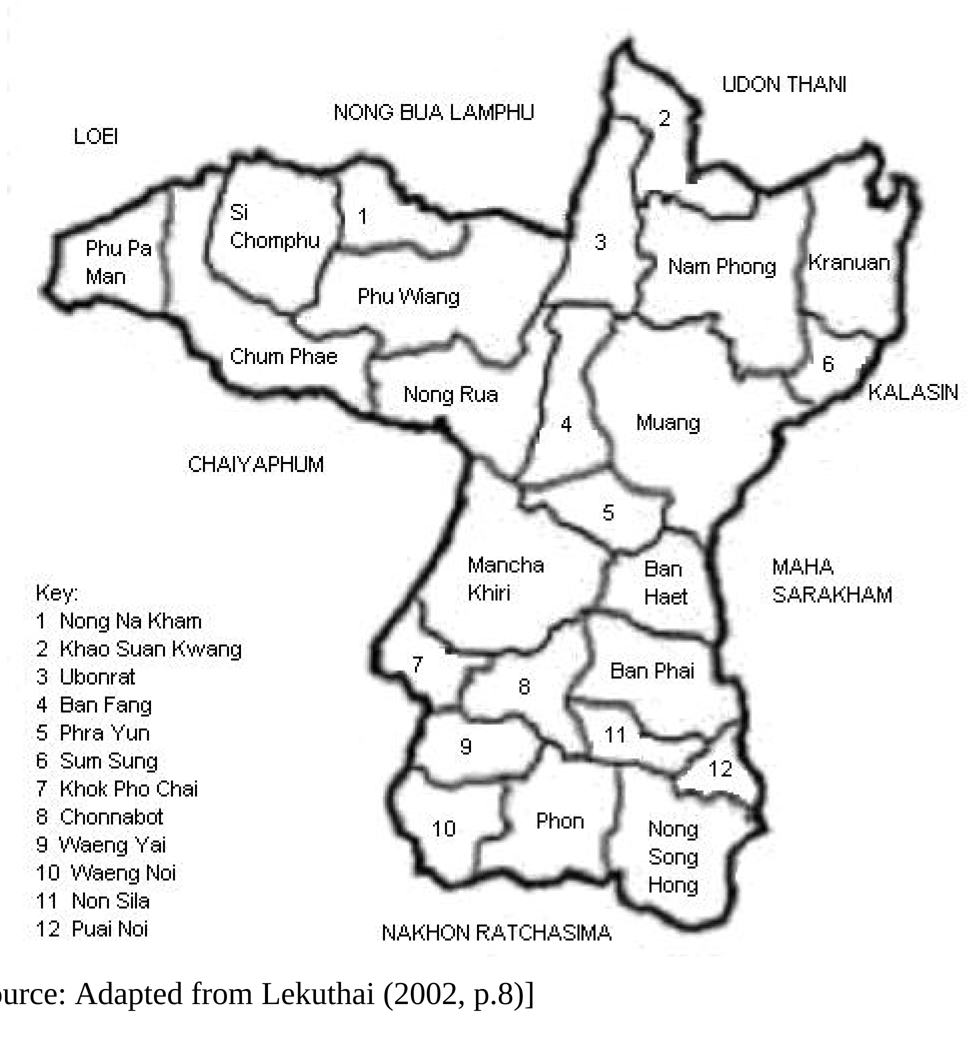


[Source: Adapted from Perry-Castaneda Map Collection, University of Texas]

Khon Kaen province is separated administratively into 25 districts as shown in Figure 1.2. It is bordered to the north by Loei, Nong Bua Lamphu and Udon Thani provinces, to the east by Kalasin and Maha Saarakham, to the south by Nakhon Ratchasima, and to the west by Chaiyaphum. Khon Kaen city itself is located in

Muang district, and the largest provincial towns are located at Ban Phai, Nam Phong, and Chum Phae. The main Northeastern road and rail links run through Khon Kaen province, from Phon district in the south to Khao Suan Kwang in the north. Ubonratana Dam in Ubonrat district creates a huge reservoir (not shown in Figure 1.2) that stretches from Nong Rua district into Nong Bua Lamphu province, and provides irrigation to many farms in the north of the province, while land in the south of the province is more arid.

Figure 1.2: Khon Kaen province

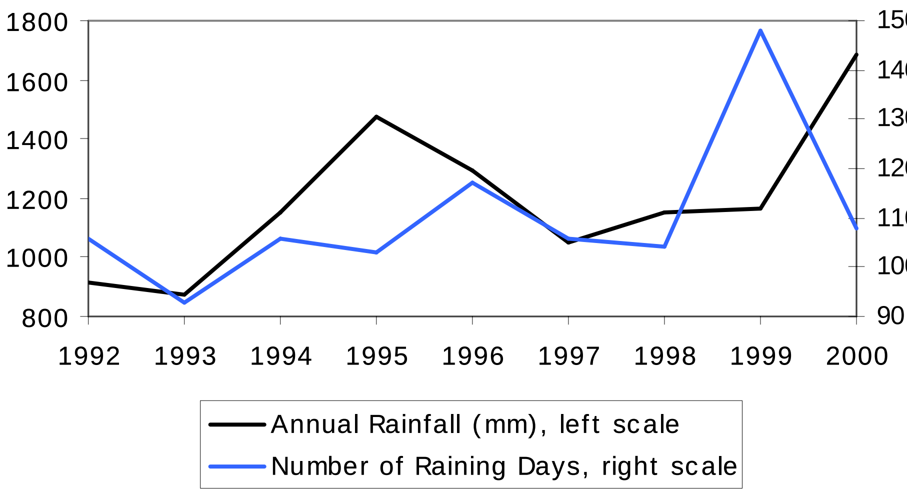


[Source: Adapted from Lekuthai (2002, p.8)]

The climate in Khon Kaen province depends heavily on the monsoon pattern. The rainy season generally runs from May to early October, with the heaviest rain concentrated in August and September. The dry winter season runs from December to February, and summer from February to May. Rainfall for the period

1992-2000 is presented in Figure 1.3. Khon Kaen province has suffered a period of prolonged drought, particularly when the rain-fed nature of rice cultivation is considered. The impact of the low rainfall on agriculture is exacerbated by the limited use of irrigation – less than 15% of agricultural land is irrigated, mostly concentrated around the large reservoirs in the north of the province.

Figure 1.3: Khon Kaen province rainfall, 1992-2000



[Source: Adapted from Lekuthai (2002, p.66). Additional data provided by personal communication with Krailert Taweekul]

Average rice yield per rai is 448 kilograms for non-glutinous (ordinary) rice, and 436 kilograms for glutinous (sticky) rice. This yield is slightly above average when compared to the mean for Thailand of approximately 368 kilograms per rai (or 2.3 tonnes per hectare). However in Isan most agricultural land is only used for one crop of rice per year, so the annual yield is much lower than much of the rest of the country. Apart from rice, the main agricultural products produced in Khon Kaen province are sugar cane, cassava, soybean and maize.

Most of the population of Khon Kaen province is engaged in agriculture, while approximately 100,000 people (accounting for less than 10 percent of the working age population) have formal employment.

1.2.3 Migration and Commercial Sex in Thailand

Section 1.2.1 noted large-scale rural-rural population mobility in Thailand due to the seasonality of demand for agricultural labour. The surplus of labour outside of the traditional planting and harvesting times is especially apparent in Isan (Richter *et al.*, 1997). However, during peak agricultural seasons (planting and harvesting) there may even be a shortage of labour resulting in women and children being solicited for agricultural work (Ogena and DeJong, 1999). This seasonal cycle permits Thais to migrate in search of income opportunities while maintaining their farming household. It has also provided Thailand with a highly flexible pool of migrant labour, while at the same time having the village homes bear at least part of the cost of maintaining and reproducing the labour force (Porpora and Lim, 1987).

In the 19th Century and first half of the 20th Century, rural-urban migration was uncommon (Ingram, 1971), and a substantial proportion of Bangkok's population growth was provided by Chinese immigrants (Falkus, 1993). However, growth in the rural population resulted in the use of increasingly marginalised land, particularly in the North and Northeast regions. Clearing of forest and the increased planting of cassava as a cash crop depleted the soil, reducing rice yields. The Thai government also artificially deflated the market price of rice in order to reduce inflationary pressure on urban wages. Falling rice income and rice output per capita, increasing indebtedness and landlessness, and the increasing use of expensive inputs such as tractors and fertiliser created the need for a ready source of alternative cash income (Porpora and Lim, 1987).

Thus rural-urban migration[6] became a major coping strategy of rural households, as they sought to take advantage of greater economic opportunities (Ritchey, 1976). Increasingly migration was undertaken by young women, whose labour supply was expendable and who felt a cultural moral obligation to assisting their family (Mills, 1997). These migrants would then support their rural family through remittances. Rapid and concentrated economic growth after 1950

[6] International migration is also common. By 1992, over 200,000 Thais were estimated to be working outside Thailand, mostly in neighbouring ASEAN countries or the Middle East (Sussangkarn, 1995).

provided the urban population with higher incomes, which offered increased incentives for the rural population to migrate. In 1970, the average income in Bangkok was double that of the national average and nearly three times that of Isan, and by 1986 it was over four times the average income in Isan (Falkus, 1993). Migration was facilitated by the investment in road infrastructure throughout the 1950s and 1960s. By the late 1980s, migrants accounted for about 30 percent of the population of Bangkok (Falkus, 1993).

Inequality of income between regions is an important source of incentive for internal migration. Most migrants in Bangkok and Central region originate from Isan, the poorest and most agriculturally-disadvantaged region (Richter *et al.*, 1997). Migration is an almost universal experience for young adults from the Northeast. By 1977, the Northeast contributed 45 percent of total in-migrants in Bangkok and by the early 1980s, migrants from Isan outnumbered internal migrants from all other regions combined (Porpora and Lim, 1987). From 1985-1990, the Northeast region had a net migration loss of 554 000 people (Sussangkarn, 1995). Men and women migrants from Isan exhibit different migration patterns – more men than women migrate within the region or seasonally, while more women migrate between regions and from rural areas to urban, including Bangkok (Porpora and Lim, 1987).

Migrants are attracted to Bangkok not only by the prospect of higher wages, but also because of perceived gains in social status and the opportunity to engage themselves in the desirable ‘modern’ urban culture (Lyttleton, 1994; Porpora and Lim, 1987). Most of these workers are recruited through social networks such as friends or relatives already working in the urban centre (Fuller *et al.*, 1990). They are often employed in the construction, transport or manufacturing sectors, where they can be offered lower wages than their urban peers. Ironically many rural-urban migrants, when faced with low-paid urban jobs and higher costs of living, find they have very little spare money to remit to their families (Richter *et al.*, 1997).

There are also significant opportunities for work in the informal sector, including commercial sex work. The commercial sex industry has thrived in Thailand for centuries (Boonchalaksi and Guest, 1998), and expanded greatly during and following the Vietnam War (Bamber *et al.*, 1993). Commercial sex work offers an opportunity for relatively high pecuniary rewards, which represents a compensating wage differential offsetting the high personal risk that commercial sex workers accept (Borjas, 2000; Gertler *et al.*, 2005; Rao *et al.*, 2003). These high pecuniary rewards, combined with cultural expectations that Thai daughters contribute to the support of their parents, ensure a steady supply of new workers into the commercial sex industry, particularly migrants who have made up approximately ninety percent of commercial sex workers (Archavanitkul and Guest, 1994). Boonchalaksi and Guest (1998, p. 131) suggest that "the poor income-earning opportunities for women with low levels of education, the desire to provide substantial support for their families and a relatively tolerant attitude towards prostitution in some segments of Thai society help to ensure that some of this labour supply will be directed towards the sex industry". The supply of commercial sex workers is also ensured by the increased purchasing power and relative individual freedom offered by participation in the industry (Lyttleton, 1994; Mills, 1997). It can also be linked to traditional Theravada Buddhist notions of karma and suffering (Keyes, 1984; Muecke, 1992). Keyes (1984, p.236) also notes that "prostitutes have never been stigmatised in Buddhist society because Buddhist doctrine allows for the possibility that they will alter their behaviour at some later time". This is consistent with the lack of lasting social stigma associated with commercial sex work described by Peracca *et al.* (1998), who found that former prostitutes did not face a significant reduction in their ability to marry.

As with many other migrant occupations, commercial sex workers in Bangkok and resort areas predominantly originate from the Northeast and North regions. Wawer *et al.* (1996) found that of 678 commercial sex workers in Bangkok, Saraburi and Udon Thani, 68 percent originated from the North region, and 27 percent from the Northeast. Most (nearly 75 percent) had only primary school education or less, and nearly 90 percent were under the age of 30.

While both the media and academic publications often stress the role of international tourism in the Thai commercial sex sector (e.g. see Thanh-Dam, 1983), this ignores the role of domestic demand in sustaining the industry, where the majority of clients are Thai (Boonchalaksi and Guest, 1998; Cohen, 1987; DaGrossa, 1989). Differences in sexual norms between genders in Thailand have contributed to the demand for commercial sex. Chitwarakorn *et al.* (1998, p.307) note that "…while there are strong social expectations of virginity at marriage and post-marital fidelity for women, no such restrictions apply for men… this creates a gender imbalance in which many men are seeking sexual encounters but few women are available". Increasing spending power and an expanding middle class due to sustained economic growth have stimulated domestic demand, as have changes in the urban population structure increasingly towards migrants, who are living away from their family and so are not subject to the strict social control of parents and community members.

Technically, prostitution in Thailand has been illegal since the Prostitution Suppression Act was passed in 1960 (later replaced by the Prostitution Prevention and Suppression Act of 1996). However, attempts at eradication have been effectively abandoned, and the authorities concentrate on controlling rather than preventing the sex trade. Such control is made possible due to the nature of sex work in Thailand. There are very few freelance commercial sex workers, and most commercial sex is negotiated in establishments such as brothels, massage parlours, restaurants or bars, making them easily detectable to the authorities (Ruxrungtham and Phanuphak, 2001). However over the last decade the commercial sex industry has become increasingly internally complex. Commercial sex services can now be purchased through a number of different arrangements and settings. Commercial sex services have been traditionally associated with 'direct' commercial sex workers who only provide sex services whether at brothels (a traditional venue in rural areas), massage parlours or nightclubs (more common in urban areas, such as Bangkok or Pattaya). Increasingly commercial sex services are being arranged in settings such as restaurants or bars, where waitresses may be solicited for 'indirect' commercial sex services. 'Indirect' commercial sex is often perceived as less risky – due to extensive media campaigns, there is a strong tendency to link brothel sex with HIV/AIDS (Boonchalaksi and Guest, 1998). Along with a shift towards 'indirect' commercial sex, there has been a proliferation of non-commercial sexual relationships, both pre-marital and extra-marital (Caldwell, 1995; Im-em, 1999a; Lyttleton and Amarapibal, 2002). The cultural acceptability of various extra-marital and commercial sexual relationships perhaps stems from the perceived higher need for men than women to demonstrate sexual prowess and the historical practice of wealthy Thai men taking minor wives (*mia noi*) (Muecke, 1992).

A wide range of 'solutions' have been proposed for the 'prostitution problem'. These solutions are mainly focused on reducing the supply of commercial sex workers through education, vocational training or income support, or even the closure of commercial sex establishments, and not on reducing demand through economic interventions (Boonchalaksi and Guest, 1998). Despite changes in the internal organisation of the industry and attempts to reduce the supply of sex workers, there is estimated to be 120 000 to 150 000 commercial sex workers (direct or indirect) in Thailand (Steinfatt, 2002). There can be little doubt that the nature and extent of commercial sex placed Thai society at a great risk of an extensive HIV/AIDS epidemic.

1.2.4 HIV and AIDS

Acquired Immuno-Deficiency Syndrome (AIDS) was first documented in the late 1970s, while the Human Immunodeficiency Virus, which causes AIDS, was discovered in the early 1980s.[7] There have been two types of HIV identified to date: HIV-1, which is predominant in most of the world, including Thailand; and HIV-2, which is primarily found in West Africa. Within these types there are several subtypes (Sharp *et al.*, 1994).[8]

HIV acts to damage the immune system of the host to the extent that it is no longer able to counteract opportunistic infections. Thus, those infected do not die of HIV, but of AIDS-related opportunistic infections, often tuberculosis. Ruxungtham and Phanuphak (2001, p. S5-S6) disaggregate the disease progression from the early acute HIV infection (primary HIV infection), to

[7] A detailed history of AIDS and its discovery can be found in (Grmek, 1990).
[8] For a detailed account of HIV, the disease mechanisms and transmission modes, see (Schoub, 1999).

asymptomatic HIV infection, early symptomatic HIV infection, and finally advanced symptomatic HIV infection (AIDS). In developed countries, the median time from infection with HIV to symptomatic AIDS is estimated at 11 years for those aged 15 to 24 years (Collaborative Group on AIDS Incubation and HIV Survival, 2000). However, this time could be much less in developing countries due to reduced access to public healthcare facilities, differences in immune responses and viral characteristics. It also varies considerably with age and health status at the time of infection (Munoz *et al.*, 1997). In Thailand the median time has been estimated at just 7.4 years for the same (15 to 24 years) age group (Rangsin *et al*., 2004). The median time from AIDS diagnosis to death has been variously estimated at between 56 days and 7.3 months in Thailand (Kilmarx *et al*., 2000a; Kitayaporn *et al*., 1996; Rangsin *et al*., 2004), and at up to 18 months in developed countries (Collaborative Group on AIDS Incubation and HIV Survival, 2000).

HIV is transmitted through contact with infected bodily fluids such as blood, semen or vaginal secretions, or breast milk. This makes the most common modes of transmission (i) sexual intercourse with an infected individual; (ii) contamination by blood, blood products, or materials that have come into contact with blood such as needles or tattooing implements; or (iii) transmission from mother to infant either before or during childbirth, or after childbirth through infected breast milk.

HIV is incurable but the symptoms of AIDS, including opportunistic infections, can be treated. Treatment regimens include maintaining a healthy diet and exercise, herbal or natural remedies, or drug therapy. When the HIV viral load (the amount of virus in the blood, semen, and other body fluid) begins to overwhelm the immune system, opportunistic infections occur with increasing regularity and severity. At this point, drug therapy remains the only option for the infected individual. In the early days of drug treatment, single antiretroviral drugs were used. However, HIV mutates quickly and drug-resistant strains of the virus began to appear (Grmek, 1990). Now, HIV can be treated successfully with a combination of three drugs – this is referred to as highly-active antiretroviral therapy – which reduces HIV infection to a chronic but manageable disease and substantially increases the life expectancy of the infected individual (Hogg *et al*., 1999). Despite the treatment options available, there is still no sign of an imminent HIV vaccine or cure being available for many years. Given this, the best means of controlling the pandemic must still be prevention.

Many interventions have been devised to reduce the transmission of HIV between individuals (Merson *et al.*, 2000). Screening of blood and blood products for HIV has become routine in virtually all countries, and many countries have now eliminated payment for blood donations (World Bank, 2000a). Harm reduction strategies such as community outreach and provision of clean needle exchanges for injecting drug users are used in many countries (Des Jarlais *et al.*, 1993; Des Jarlais *et al.*, 1995; Gibson *et al.*, 2001). Many health authorities, non-government organisations and donor organisations stress the ABC method of preventing HIV transmission – Abstinence, Being faithful, and using Condoms (Loconte, 2003). Transmission of HIV from mother to infant has been shown to be reduced by administering short courses of antiretroviral drugs before delivery to the mother and after delivery to the infant, and avoidance of breast feeding (replacement feeding) (Kanshana and Simonds, 2002). By contrast, in low prevalence settings such as most developed countries, mass media education campaigns are still most favoured as a prevention tool due to the low marginal costs and the perceived public health benefits of such campaigns (Mills, 2000). However, they may be much less successful at providing specific information for at-risk groups such as injecting drug users and commercial sex workers. Of the available interventions, Nagelkerke *et al.* (2001) show in simulation results for both high- and low-prevalence countries that targeted behavioural interventions and treatment of other sexually transmitted infections are the most effective interventions in terms of reducing the spread of the HIV epidemic.

Despite the development of successful evidence-based interventions for the prevention of HIV transmission, an estimated 4.9 million people were newly infected with HIV in 2004 (UNAIDS and World Health Organisation, 2004). The vast majority of new infections occurred in developing countries in sub-Saharan Africa and South and Southeast Asia, including an estimated 21 000 in Thailand in 2003 (UNAIDS, 2004).

1.2.5 HIV/AIDS in Thailand

The Thai HIV epidemic is one of the best documented in the world, due to its relatively late beginning and the early reactions of the government and other organisations. The experience of Thailand is similar to that of many other developing countries in South and Southeast Asia, and quite different from that of developed Western countries or countries in sub-Saharan Africa (Weniger *et al.*, 1991; World Bank, 2000a). Thailand's experience is often highlighted as a 'success story' in HIV prevention and is described below (Nelson *et al.*, 1996; UNAIDS, 2001b).

The first identified cases of AIDS in Thailand were reported in 1984 and 1985 (Limsuwan *et al.*, 1986; Phanuphak *et al.*, 1985), and the appearance of AIDS in Thailand "failed to attract much public attention" (Cohen, 1988, p.468). All early cases involved either foreigners or Thais who had lived overseas for several years and it was widely thought that the disease might remain largely contained within those groups (Cohen, 1988; Traisupa *et al.*, 1987; Wilde *et al.*, 1985). After it became clear that the epidemic was serious enough to warrant closer scrutiny, national sero-surveillance was introduced in 1989, to track changes in HIV prevalence in the general population and especially in key risk groups such as direct and indirect female commercial sex workers, male commercial sex workers, male patients at sexually-transmitted disease clinics, injecting drug users, blood donors, and pregnant women attending government antenatal clinics[9] (Frerichs *et al.*, 1995). Sero-surveillance surveys were conducted in June and December of each year from 1989 to 1995, and then yearly in June from 1996 onwards. From 1989 onwards each six-monthly intake of military conscripts was also tested by the Royal Thai Army (Mason *et al.*, 1998; Torugsa *et al.*, 2003). National sero-surveillance was supplemented by behavioural surveillance from 1995 (Punpanich *et al.*, 2004). These systems have provided reasonably good data on the progression of the epidemic and its' transmission dynamics in Thailand (Saengwonloey *et al.*, 2003).

---

[9] In 1998, sentinel surveillance was extended to deep-sea fishing boat crews in the South and Central regions (United Nations Development Programme, 2004).

In an early study of high risk groups in 1985, very low rates of HIV infection were detected in male homosexual commercial sex workers and thalassemia patients, although it was suggested that this might be indicative of the beginnings of a significant epidemic (Wangroongsarb *et al.*, 1985). From 1988, the epidemic spread in persistent and definable waves. The first such wave[10] was among injecting drug users, where HIV prevalence among in Bangkok rose from about one percent at the beginning of 1988 to 32-43 percent by September of that year (Choopanya *et al.*, 1991; Kitayaporn *et al.*, 1994; Suwanakool and Rojanapithayakorn, 1989). In June 1989, the first national sentinel serosurvey revealed similar high rates in fourteen other provincial capitals (Weniger *et al.*, 1991). Some researchers have suggested that this wave arose principally from a large release of prisoners (including a significant number of injecting drug users) in December 1987 (Wright *et al.*, 1994).[11]

The second wave then stuck female commercial sex workers, where previous serosurveys had detected rates of less than one percent. The first national sentinel serosurvey in June 1989 detected HIV infection in 44 percent of low-income brothel-based commercial sex workers in Chiang Mai. This was confirmed by follow-up surveys in 1989. In 1990, the same trend was detected in low-income brothel-based commercial sex workers throughout the country, with five provinces recording prevalence of more than 40 percent (Weniger *et al.*, 1991). The HIV infection rate rose to as high as 63 percent among brothel-based commercial sex workers in Chiang Rai in 1991 (Kilmarx *et al.*, 2000b; Ruxrungtham and Phanuphak, 2001). These first two waves of the epidemic were genetically dissimilar, resulting from distinctly different genotypes of the HIV virus,[12] suggesting that the two waves were not related (Ou *et al.*, 1993; Weniger *et al.*, 1994).

---

[10] Many authors consider the first wave of HIV infection to have been among homosexual men (e.g. see Ruxrungtham and Phanuphak, 2001). However, a few isolated cases (Limsuwan *et al.*, 1986; Phanuphak *et al.*, 1985) can hardly be considered a ‘wave’.

[11] However likely, this suggestion has been neither statistically nor epidemiologically validated.

[12] HIV-1 subtype A/E was initially most commonly found among female commercial sex workers and their clients, while HIV-1 subtype B was more commonly found among injecting drug users (Ou *et al.*, 1993; Ruxrungtham and Phanuphak, 2001), though more recently there have been

HIV rapidly became a generalised epidemic,[13] as it spread from female sex workers to their male clients (Sittitrai and Brown, 1994). By June 1991, the national median provincial HIV prevalence rate was five percent among male patients at public sexually transmitted disease clinics (Weniger *et al.*, 1991). Among military conscripts drafted by random lottery into the Royal Thai Army (who generally are representative of the lower socio-economic strata of the male population aged 21 years), HIV prevalence rose from 0.5 percent in November 1989 to 2.9 percent in May 1991 (Weniger *et al.*, 1991) and as high as 3.7 percent in 1993 (Mason *et al.*, 1995). In the Northern region, the prevalence rate was as high as 12.5 percent in 1993 (Nelson *et al.*, 1996). It is clear that unprotected sex with female commercial sex workers was the primary factor that contributed to the spread of HIV into the male general population (Brown *et al.*, 1994; Weniger *et al.*, 1991). Those infected undoubtedly included migrant workers attracted to cities by increasing wages as a result of Thailand's increasing economic prosperity (Fairclough, 1995; Morris *et al.*, 1996).

From there, extensive sexual networks (e.g. see Havanon *et al.*, 1993) spread HIV from female commercial sex workers to their clients and to their clients' wives and girlfriends, and their newborn children (Sittitrai and Brown, 1994). By June 1991, the median provincial rate of HIV prevalence among women attending public antenatal care clinics had reached 0.7 percent (Weniger *et al.*, 1991), and by 1995 it had reached 2.3 percent (Punpanich *et al.*, 2004). HIV was then a generalised epidemic characterised by increasing transmission outside 'traditional high-risk' groups. A survey in five villages in Chiang Mai province in 1992 found infection rates of 7 percent for men and 2.5 percent for women (Nelson *et al.*, 1994). By 2000, about half of new adult infections were women infected by their husbands or regular sexual partners (Ainsworth *et al.*, 2003). By October 2000, approximately one million Thais had been infected with HIV, a total of 156,309 AIDS cases had been reported, and approximately one third of those (43,069) had died from AIDS-related causes (Ruxrungtham and Phanuphak, 2001).

---

increases in the proportion of subtype A/E infections among injecting drug users (Ruxrungtham and Phanuphak, 2001; Wasi *et al*., 1995).

[13] Defined by the World Health Organization as an average prevalence rate of one percent.

The initial reaction of the Thai government to the AIDS epidemic was to play down the threat of the disease, including the presentation of highly selective statistics to understate the extent of the problem (Clements, 1992; Ungphakorn and Sittitrai, 1994). They feared that accurate knowledge of the spread of AIDS in Thailand might have a major negative impact on foreign investment and the developing tourism industry, or promote widespread panic among the Thai population (Cohen, 1988; Ungphakorn and Sittitrai, 1994). In the late 1980s, facing increasing public and media pressure, the government began to release accurate information about the epidemic (Anderson, 1990; Smith, 1990), and Thai NGOs and the government finally acted decisively. The government began by abandoning plans to introduce the controversial and draconian AIDS Bill which would have required testing of all high-risk individuals, with or without consent, and the reporting of new AIDS cases within 24 hours (United Nations Development Programme, 2004). The Ministry of Public Health then introduced short-term and medium-term plans for AIDS prevention and control in 1988 and 1989 (Ramasoota, 1991). These goals of these plans were (1) to raise awareness of the dangers of AIDS; (2) to reduce risky behaviour; and (3) to provide care to those suffering from AIDS. These plans resulted in the initiation of blood donation screening in 1988 (Chiewsilp *et al.*, 1993; Sawanpanyalert *et al.*, 1996), and the distribution of 19 million free condoms in 1989 and 26 million in 1990 (Weniger *et al.*, 1991), and also several unsuccessful policy initiatives such as "health cards" for female commercial sex workers (Muecke, 1990).

Finally in 1991, AIDS policy was given top priority and the National AIDS Prevention and Control Committee was brought under the co-ordination of the Office of the Prime Minister, with the Prime Minister as chairperson (World Bank, 2000a). This expression of political commitment provided an opportunity for the formal participation of nongovernmental organisations, such as the Population and Community Development Association, in the decision-making process (Viravaidya, 2001). Treatment programs for sexually transmitted diseases were expanded, especially in rural areas (Chitwarakorn *et al.*, 1998). A massive public information campaign was launched, with mandatory AIDS education spots every hour on both television and radio (Ainsworth *et al.*, 2001). AIDS education in schools began in 1990, and soon evolved to include life-skills empowerment to promote safer sexual behaviour (Phoolcharoen, 1998). Public spending on AIDS increased from US$684,000 in 1988 to US$10.1 million in 1991, and to US$82 million by 1997 – of which 96 percent was financed by the Royal Thai Government (Ungphakorn and Sittitrai, 1994; World Bank, 2000a). On top of this, private business was also mobilised, including the creation of the Thailand Business Coalition on AIDS (Thailand Business Coalition on AIDS, 2000). In 1991, business contributed more than $80 million, including $32 million for workplace education, and $48 million in free commercial air time (Viravaidya *et al.*, 1993).

The Ministry of Public Health adopted the highly successful 100 percent condom campaign nationwide in 1992, following successful program implementation in Ratchaburi province in 1989 and thirteen other provinces in 1990 (Rojanapithayakorn and Hanenberg, 1996). This included a large-scale media campaign to promote condom use (Lyttleton, 1996), the distribution of condoms to brothels and other sex establishments, rigorous enforcement to ensure compliance, and a vast increase in the availability of treatment for sexually transmitted infections (Rojanapithayakorn and Hanenberg, 1996). The effect of the program was both immediate and substantial. Before 1989, condoms were used only in approximately 14 percent of sex acts with commercial sex workers. By December 1994, this had risen to over 90 percent. At the same time, sexually transmitted disease infection among men declined by 85 percent (Rojanapithayakorn and Hanenberg, 1996).

Through the implementation of the interventions described above and others, Thailand was able to minimise the impact of the HIV/AIDS epidemic – by 2000 Thailand was below even the lowest projection of AIDS cases made in the 1990s (Surasiengsunk *et al*., 1998) and well below the pessimistic projections of up to four million cases made earlier in the decade (Viravaidya, 1990). HIV transmission through infected blood products was reduced to about 1 in 80,000 transfusions, among the lowest rates of any developing country (United Nations Development Programme, 2004). Prevalence among pregnant women in Thailand appears to have peaked at 2.4 percent in 1995 (UNAIDS, 1998b), and HIV prevalence among adults fell to an estimated 1.8 percent by 2001 (UNAIDS *et al.*, 2002). HIV prevalence among military conscripts began to fall in the early 1990s (Celentano *et al*., 1998b), and had fallen to 0.5 percent by 2003 (Punpanich *et al*., 2004).

Under the Thai government's commitment to universal access to healthcare, enshrined as the right to health care for all Thais in the 1997 Constitution, all treatment of opportunistic infections is covered (Kitajima *et al*., 2003; United Nations Development Programme, 2004). However, after the Ministry of Public Health scaled back early efforts at providing treatment to all affected people, antiretroviral treatment was not covered by the Universal Coverage Scheme (Kunanusont *et al.*, 1999). This is unsurprising – antiretroviral therapy is seen as beyond the reach of many developing countries without significant donor support, even at the reduced prices offered by generic products such as GPO-VIR produced by the Government Pharmaceutical Organisation in Thailand (Forsythe and Gilks, 1999). In contrast, the Civil Servant Medical Benefit Scheme covers the cost of prescribed antiretroviral treatment, even though the other schemes do not (Kitajima *et al*., 2005). In 2003, the Thai government committed itself to providing antiretroviral therapy to all those that need it by including it in the benefits package for the Universal Coverage Scheme ("AIDS conference: medicine vowed for all in need," 2003). This program, called the National Access to Antiretroviral Program for People Living with HIV/AIDS (Puthanakit *et al*., 2005), combined with the increase in capacity for treatment of chronic illness and provision of antiretroviral therapy described in Kunanusont *et al.* (1999), ensures a higher standard of care is now available for people living with HIV/AIDS in Thailand. This demonstrates how AIDS policy in Thailand has successfully evolved from being health-focused, to socially-focused, and finally to holistic and human development-focused encompassing prevention, treatment, and care and emphasising community and individual empowerment (Phoolcharoen *et al.*, 1998).

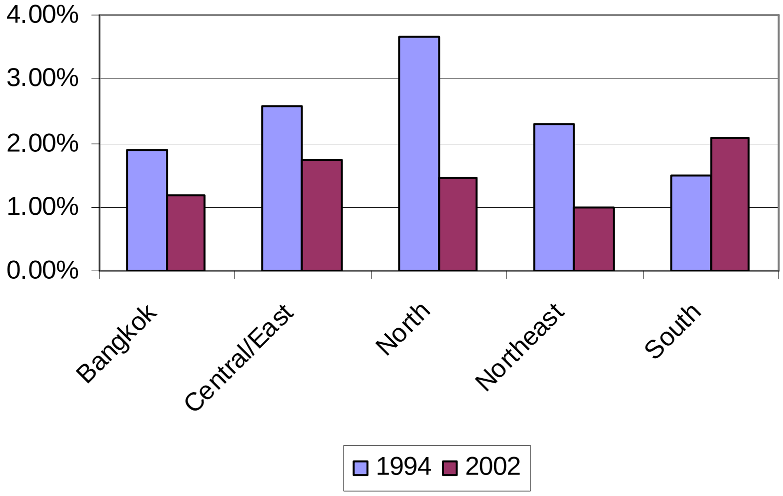
HIV/AIDS is not distributed evenly throughout Thailand. The Northern region has been particularly heavily affected, especially the Upper North, while the South had until recently maintained relatively low prevalence. The Northeast region is thought to have been the last region to be affected by HIV, and is now the least affected in terms of prevalence. HIV prevalence for pregnant women attending antenatal clinics in each region in 1994 and 2002 is given in Figure 1.4.[14] The success of the national AIDS control program may be apparent in these data with HIV prevalence falling in all regions except the South over this period.[15]

The aggregated nature of this data somewhat masks the geographic concentration of the epidemic in some regions. For instance, the HIV prevalence in this population group in the Northern province of Phayao was 10.63 percent in 1994. Figure 1.5 shows a histogram of the distribution of provincial HIV prevalence among pregnant women attending antenatal clinics in 2002, and Figure 1.6 illustrates this on a map of Thailand. As can be seen from these figures, most provinces had HIV prevalence rates for this population group of below two percent in 2002, but the distribution is right-skewed with Trat in the Central region having prevalence of over 4.5 percent. Most provinces with relatively low prevalence rates are located in the Northeast region.

[14] Pregnant women attending antenatal clinics provide a reasonable estimate of the underlying HIV prevalence in the female population, although biased towards the young and married. Further, it is likely that since HIV infection lowers fertility, HIV prevalence in this population group may underestimate HIV prevalence in the female population as a whole (Kigadye *et al.*, 1993; Wawer *et al.*, 1996). For further discussion on the potential differences, see Glynn *et al.* (2001) or Fylkesnes *et al.* (1998), or for Thai context see Bunnell *et al.* (1999).

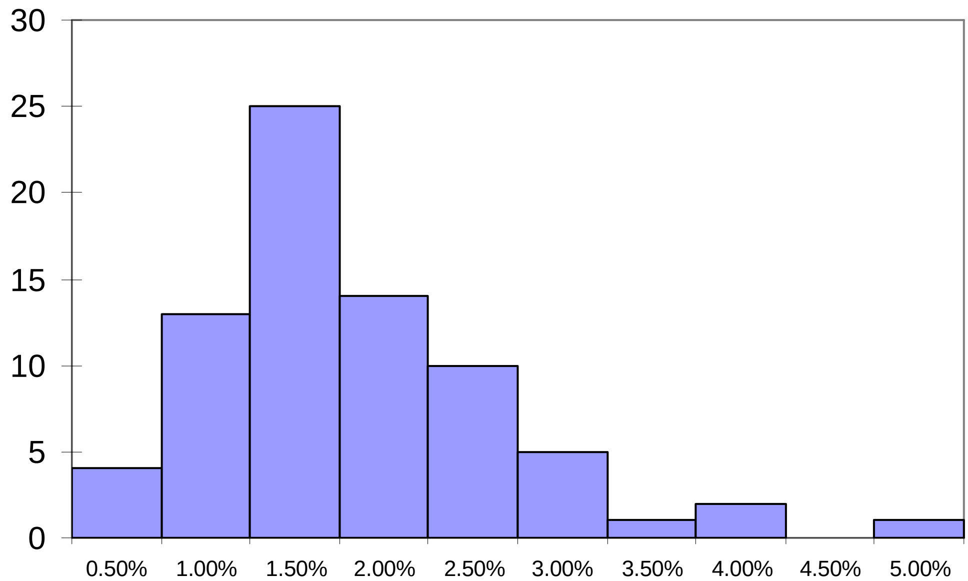
[15] Although it should be noted that the same decline in prevalence would be experienced any time there are more deaths from AIDS than there are new HIV infections, so these observed declines in prevalence may at least in part have resulted from large numbers of AIDS deaths.

Figure 1.4: HIV prevalence among pregnant women attending antenatal clinics, by region[16]



[Source: Adapted from UNAIDS *et al.* (2004).]

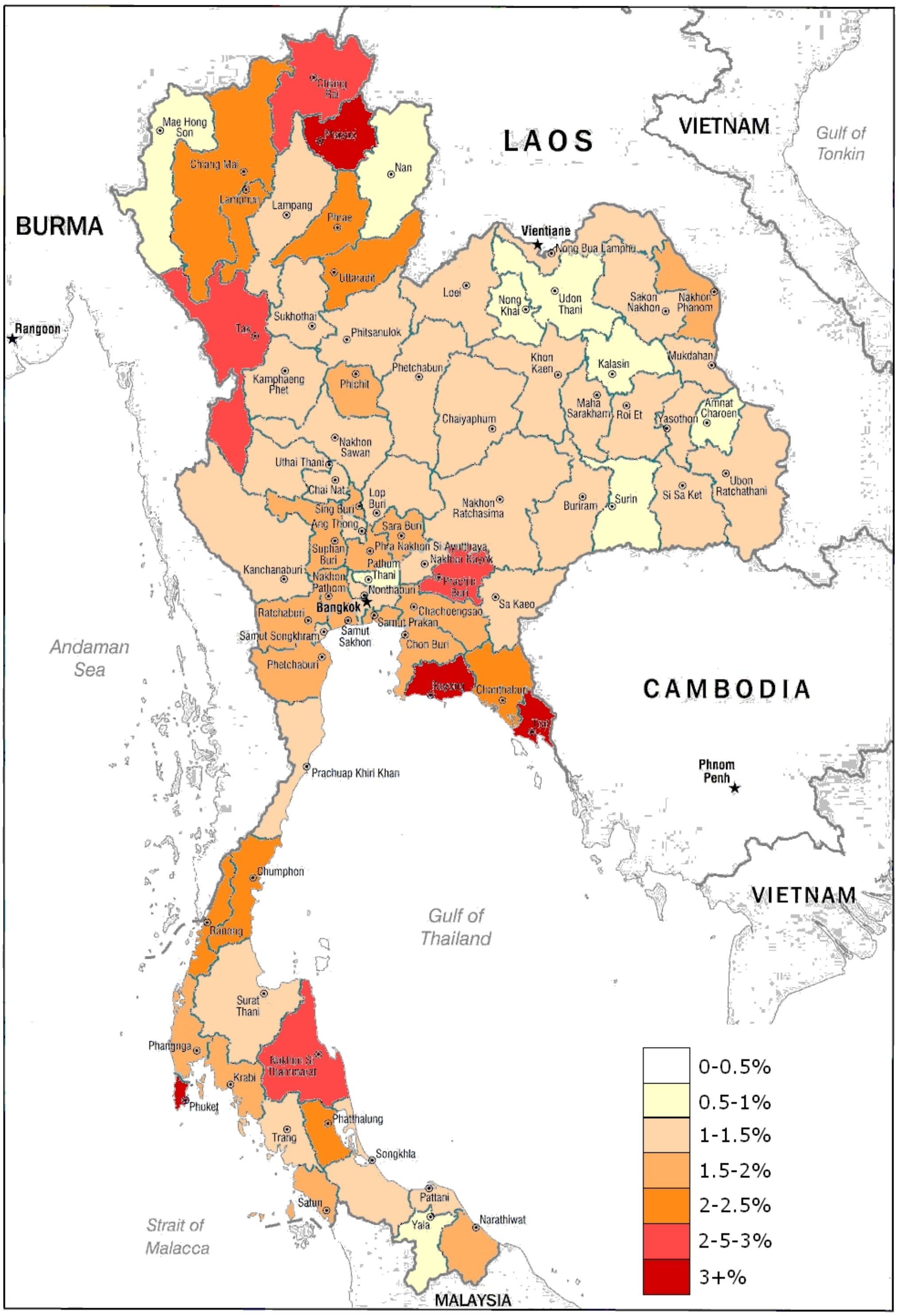
Figure 1.5: Histogram of provincial HIV prevalence among pregnant women attending antenatal clinics in 2002.



[Source: Adapted from UNAIDS *et al.* (2004).]

[16] The 'regional average' HIV prevalence was calculated, with the exception of Bangkok, by averaging the HIV prevalences of each province in the region.

Figure 1.6: HIV prevalence among pregnant women attending antenatal clinics in 2002, by province

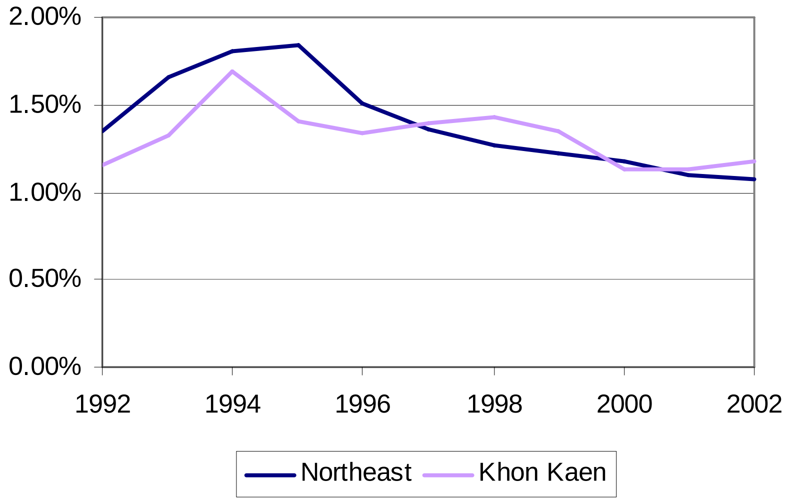


[Source: Data adapted from UNAIDS *et al.* (2004). Map adapted from Perry-Castaneda Map Collection, University of Texas]

The same geographic trends have been observed for other population groups studied. In Thai military conscripts nationwide, HIV prevalence peaked at approximately 3.7 percent in 1993, and at 12.4 percent in 1992 in the six provinces of the Upper North, but has since stabilised at lower levels (Kitsiripornchai *et al.*, 1998; Mason *et al.*, 1995; Nelson *et al.*, 2002).[17]

The Northeast region and Khon Kaen province have followed a similar trend in HIV prevalence over the last ten years to that observed for the nation as a whole. Figure 1.7 demonstrates the reduction in HIV prevalence using a three-year moving average[18] of the HIV prevalence among pregnant women attending antenatal clinics for both the Northeast region and Khon Kaen province.

Figure 1.7: Three-year moving average of HIV prevalence among pregnant women attending antenatal clinics for Khon Kaen and the Northeast region



[Source: Adapted from UNAIDS *et al.* (2004).]

However, trends in HIV prevalence might easily mask the incidence of new HIV infections (Strickler *et al.*, 1995; Wawer *et al.*, 1997). HIV prevalence will fall if

---

[17] See also Celentano *et al.* (1993), Nopkesorn *et al.* (1993), Beyrer *et al.* (1995), Sirisopana *et al.* (1996), and Nelson *et al.* (1996).

[18] A moving average is used here to remove some of the volatility in the recorded HIV prevalence. As HIV prevalence itself is unlikely to be so volatile, a moving average of the recorded HIV prevalence probably more accurately reflects the underlying unobserved HIV prevalence within this population group.

the number of deaths of HIV-infected individuals exceeds the number of new infections. This is true even if the number of new infections is very high. Also, when disaggregated geographically, changes in HIV prevalence will be affected by the migration of HIV-infected individuals. Few studies have estimated HIV incidence in Thailand, and a selection of these are summarised in Table 1.1 (either point estimates, or 95 percent confidence intervals are shown). HIV incidence in these population groups appears to be following a downward trend, although incidence remains high.

An important future challenge for Thailand will be maintaining the significant gains that have been made in HIV prevention and continuing the reduction of risk behaviour (e.g see United Nations Development Programme, 2004). AIDS-related causes are now the second leading cause of death in Thailand (behind cancer), and the leading cause of death among 15-44 year olds (United Nations Development Programme, 2004). Thailand faces many obstacles to its continued success. First, the Asian financial crisis in 1997 caused public expenditure on the national AIDS program to be reduced by 33 percent in real terms, and both the number of free condoms distributed by the government and total expenditure on HIV prevention reduced by more than half (Pothisiri *et al.*, 1999; Punpanich *et al.*, 2004; World Bank, 2000a). By 1999, Government spending on the national AIDS program budget had fallen to under $38 million (Ainsworth *et al.*, 2003), and it fell a further 31 percent between 2001 and 2003 (United Nations Development Programme, 2004). Although spending on the national AIDS program has since recovered, assisted by grants from the Global Fund to fight AIDS, Tuberculosis, and Malaria totalling over US$51 million from the first three rounds of funding, this spending is now dominated by expensive AIDS treatment, rather than the prevention of new HIV infections, with prevention programs receiving as little as 8 percent of the national AIDS budget (United Nations Development Programme, 2004; World Bank, 2000a).

Table 1.1: Selected studies of HIV incidence in Thailand

Source	Data Year	Population group	HIV incidence (per 100 person-years)
Celentano *et al.* (1996)	1991	Military recruits in northern Thailand	2.4
Carr *et al.* (1994)	1991-1992	Military recruits in Bangkok	0.48
		Military recruits in the lower North region	0.98
		Military recruits in the upper North region	3.23
Nopkesorn *et al.* (1998)	1991-1993	Military recruits in northern Thailand	0.6-1.8
Celentano *et al.* (1998b)	1991-1995	Military recruits in the Northern region	2.00-3.07 for 1991-1993 0.30-0.99 for 1993-1995
Xu *et al.* (2002)	1998-1999	Married women in Chiang Rai province	0.0-0.8
Kawichai *et al.* (2004)	1991	People in peri-urban communities in Chiang Mai province	Men: 0.47-1.97 Women: 0.37-1.18
Celentano *et al.* (1999)	1993-1995	Opiate users in northern Thailand	14.4-23.9
Jittiwutikarn *et al.* (2000)	1993-1997	Drug users in Chiang Mai province	9.87-13.01
Kitayaporn *et al.* (1994)	1987-1992	Drug users in Bangkok	18.2
Sawanpanyalert *et al.* (1999)	1989-1997	Drug users in Chiang Rai province	3.13-8.35
Des Jarlais *et al.* (1994)	1987-1989	Injecting drug users in Bangkok	7.6-17.4
Vanichseni *et al.* (2001)	1995-1996	Injecting drug users in Bangkok	4.8-6.8
Thaisri *et al.* (2003)	2001-2002	Male prisoners in a Bangkok prison	4.11-4.26
Sawanpanyalert *et al.* (1994)	1989-1990	Female commercial sex workers in Chiang Mai province	1.5-10.6 per person month
Kilmarx *et al.* (1998)	1991-1996	Female commercial sex workers in Chiang Rai province	2.9-6.2
Kunawararak *et al.* (1995)	1989-1994	Male commercial sex workers in Chiang Mai province	7.42-16.38

Second, there have been alarming increases in risk behaviour in some regions, particularly among young people (Bond *et al.*, 1999; Jenkins *et al.*, 2002; Punpanich *et al.*, 2004). This may be due to growing complacency about the epidemic (Cumming-Bruce, 2005; Valdiserri, 2004), as well as a movement away from commercial sexual encounters with direct sex workers to indirect sex workers and non-commercial sexual relationships, the risk of which is seriously underestimated (Lyttleton and Amarapibal, 2002; Punpanich *et al.*, 2004). This has also lead to much lower rates of condom use in acts with indirect commercial sex workers and non-commercial sexual partners (Ainsworth *et al*., 2003; Nelson *et al*., 1996).

Third, an unintended consequence of the extensive media campaign on HIV/AIDS has been widespread stigmatisation of both HIV-infected people and the 'high-risk' groups that were identified as the main sources of infection, such as commercial sex workers and injecting drug users (Ungphakorn and Sittitrai, 1994).[19] The stigmatising attitudes of the general population and in particular health workers make prevention of HIV infections within these high-risk groups, and treatment of AIDS-related illnesses, more difficult as most people are unwilling to be categorised as belonging to the 'high-risk' group. This is especially true of those whose HIV infection has not been diagnosed, leading to decreasing levels of HIV testing.

Fourth, there are significant epidemics in populations that have not been sufficiently addressed to date, such as injecting drug users (Celentano *et al.*, 1998a; Nelson *et al*., 2002; Razak *et al*., 2003) and men who have sex with men (van Griensven *et al*., 2005). Risk behaviour in these population groups has continued despite the general education campaign due to the lack of a nationwide targeted response (Perngmark *et al.*, 2003a, 2003b; Saelim *et al.*, 1998). Ainsworth *et al.* (2003, p. 28-29) suggest "Thailand's AIDS policy has never seriously addressed HIV transmission among [injecting drug users]". This has been exacerbated by a recent crackdown on injecting drug users in 2003 (Vongchak *et al*., 2005) – such crackdowns seriously hamper the ability of drug users to effectively practice harm reduction, including protecting themselves from HIV infection (Cooper *et al.*, 2005). Increasing rates of HIV-1 subtype B (more prevalent in injecting drug users in Thailand) among commercial sex workers suggests that transmission from injecting drug users to commercial sex workers is an increasing source of new infections (United Nations Development Programme, 2004).

---

[19] Although Peracca *et al.* (1998) have found that female commercial sex workers are not stigmatised once they leave the profession.

Fifth, Thai women lack the power to negotiate condom use within their relationships in order to protect themselves from HIV. This is evidenced by the rapid spread of HIV from the male clients of commercial sex workers to their wives, and is due to the traditional submissive role of Thai women within the relationship (Klunklin and Greenwood, 2005). This lack of negotiation power is a problem for women in many developing countries (Heise and Elias, 1995), and addressing this challenge will require more gender-focused policies directed towards long-term societal change.

In 2003 prevalence remained high in many high-risk groups including direct female commercial sex workers (10.9 percent) and drug users who attended treatment clinics (45 percent) (Punpanich *et al*., 2004). An increase in HIV prevalence among pregnant women attending antenatal clinics was recorded in 36 of the 76 provinces between 2001 and 2002 (UNAIDS *et al.*, 2004), following an increase in HIV prevalence among this group from 1.74 percent in 1997 to 2.02 percent in 1999[20] (Ainsworth *et al.*, 2003). Also, the continued effectiveness of the 100 percent condom campaign has been questioned (e.g. see Mastro and Limpakarnjanarat, 1995; Steinfatt, 2002), with some research showing condom utilisation among clients of commercial sex workers as low as 51 percent, and among Thai male clients as low as 27 percent (Buckingham and Meister, 2003; Buckingham *et al.*, 2004). Even if condom use is on average high, commercial and non-commercial sexual acts still have the potential to transmit HIV due to condom breakage or inconsistent use (Kilmarx *et al*., 1998). Thailand must now seek to urgently address these issues.

[20] In part this increase in prevalence may be due to a change in sampling procedure in 1997, whereby the sample size nearly doubled (World Bank, 2000a).

Chapter 2

HIV/AIDS and Poverty: Theory and Evidence

This chapter reviews the literature linking HIV/AIDS with poverty. It begins by providing definitions and a framework for understanding the economic determinants of HIV/AIDS. An individual decision-making model within a household context is then described with its links to poverty and HIV/AIDS. Finally, the literature on the socio-economic determinants of HIV infection and the impacts of HIV/AIDS is reviewed. This review highlights the relative lack of empirical work conducted outside heavily affected countries and regions, and the lack of an integrated approach to investigating HIV/AIDS and poverty.

2.1 Economic Theory of HIV/AIDS

The economic theory relating to HIV/AIDS has developed rapidly over the past several years, and a lot is now known about how the HIV epidemic has developed and the determinants of the spread of HIV at both the macro and micro levels.

2.1.1 Macro-level determinants of the HIV/AIDS epidemic

At the macro level, Barnett and Whiteside (1999; 2002) identify the main determinants of the epidemic using the following definitions.[21]

1. **Risk environment –** A risk environment is defined as an environment where the risk of infection (from HIV) is elevated. A risk environment takes into

[21] In this theory reference to 'the epidemic' can be taken to mean at the national or sub-national level, as it is predominantly social factors (which vary between and within nations) that result in variations in impact. The concepts of risk environment, susceptibility, and vulnerability could easily be applied at any level. However, in this thesis they are referred to only at the national or sub-national level.

account more than simply the immediate risk behaviour of individuals, and encompasses "the underlying factors that create an overall climate in which such risk-taking behaviours are encouraged, maintained and prove difficult to change" (Topouzis and du Guerny, 1999, p.9). A risk environment develops through a process that may take many years, or even decades or longer, and is formed by any number of factors that act together to increase risk, such as gender inequalities or social disruption.

2. **Susceptibility –** Susceptibility is as an increase in social predisposition to virus transmission, as occurs in a *risk environment*. Susceptibility may have its roots in wars, patterns of migration, cultural norms, gender inequalities or discrimination, or economic change. Other factors such as the availability of knowledge and skills required to avoid infection impact on susceptibility.
3. **Vulnerability –** While the combination of *risk environment* and *susceptibility* give the underlying conditions on which epidemics are founded, vulnerability determines the extent (depth and duration) of the epidemics' impact. A society is vulnerable to the extent that it is unable to resist or mitigate the impact of the epidemic. Susceptibility and vulnerability are independent concepts – if a society is susceptible, it might not necessarily be vulnerable. The societies that are most at risk are those that are both susceptible to the epidemic, and vulnerable to its effects. Vulnerability is determined by the coping mechanisms available to the society, such as healthcare facilities or the cost of treatment to reduce the impact of morbidity.

These concepts are perhaps best illustrated by the example of Thailand. We can note from the very brief history provided in Section 1.2 that many factors acted to increase the susceptibility of Thai society to HIV infection – rural-urban migration and an extensive commercial sex industry being the two most important aspects. This illustrates the creation of a risk environment in which HIV flourished, with prevalence peaking at as high as 2.4% in 1995 (UNAIDS, 1998b). The initial conditions, described in Section 1, also made Thai society vulnerable to impact, though through the actions of the PDA and government this vulnerability was reduced. Though some of the factors that resulted in a risk environment in Thailand have been present in other countries in the region, it is important to note that the susceptibility has emerged from different sources in other countries, for example from war and inequality in Cambodia, or from widespread injecting drug use in Myanmar.

The terms susceptibility and vulnerability might also be applied to describe the determinants and effects of the HIV epidemic at the micro level, i.e. for households or individuals.

2.1.2 The Microeconomics of HIV/AIDS

Unlike some other infectious diseases, such as malaria or tuberculosis, individuals may make rational decisions about risky behaviour that directly affects their risk of infection with HIV (Gersovitz, 2000). Philipson and Posner (1993; 1995) provide an economic interpretation for the transmission of HIV by means of a mutually beneficial sexual transaction (i.e. one that is Pareto-improving). In their model, "individuals who are contemplating sexual relations or other interactions that can transmit HIV compare the probability-adjusted costs and benefits of alternative practices, notably safe sex (for example, sex with condoms) and risky (unprotected) sex" (Philipson and Posner, 1993, p.218). Increasing risk of infection then leads rational individuals to substitute away from risky sex, reducing the rate of transmission. This model suggests the existence of a positive, non-zero steady state or "optimal" prevalence of AIDS in which less than the entire population is infected. The steady state prevalence depends on the reservation level for risky sex, which in turn depends on the relative "costs" of risky and safe sex – with the costs of risky sex being the costs (in terms of utility) of AIDS infection (mortality and morbidity) multiplied by the perceived probability of infection, and the costs of safe sex being largely the disutility of condom use. This model differs from open-population epidemiological models, which predict steady state prevalence when the fraction of the population that is uninfected equals the ratio of the exit rate (the rate at which individuals leave the at-risk population) to the transmission rate (the rate at which one infected individual infects uninfected individuals in the population). The epidemiological models overestimate steady state HIV prevalence as they make no allowance for the behavioural change occurring as a result of disease prevalence (Philipson and Posner, 1993).

As noted by Gaffeo (2003), the model developed by Philipson and Posner has particular application to the spread of HIV in sub-Saharan Africa and South and South East Asia, where the primary method of transmission has been heterosexual intercourse.[22] Kremer (1996) and Kremer and Morcom (1998), using a similar model combining rational behaviour and epidemiology, suggested that the HIV epidemic may be self-limiting due to low-risk individuals becoming less active, thereby reducing the amount of ‘mixing’ between high- and low-risk groups and decreasing the spread of HIV, but also might present multiple steady-state equilibriums.

A key implication in these models is the role of information. Information about HIV infection risk is critical for individuals to make rational decisions about high-risk behaviour, such as engaging in risky sex. In the absence of any information about HIV infection risk (such as in the early years of the epidemic in sub-Saharan Africa), individuals have little incentive to adjust their behaviour. Market failures may result, for instance in the markets for sex or drug injection equipment sharing, where not all market participants have complete information, or where only one partner has complete information about the risks (Lloyd, 1991). With some information such as HIV infection held privately, individuals may under- or over-estimate the risk of HIV infection resulting from sex. Lloyd (1991) likens the market failure problem to a negative consumption externality, but the comparison is flawed unless the externality considered is an increased risk of infection by HIV, such as in Over (1999).[23] An implied Coasean solution to this is compensation from the a priori uninfected individual with the highest preference for health to their partner, in exchange for reduced risk behaviour. This result may be extended to all uninfected individuals within the same risk network.

[22] This contrasts with North America, Europe and Central Asia, where the primary methods for the transmission of HIV have been needle-sharing among injecting drug users, homosexual sex, and unsafe blood donations. These patterns may be changing over time, and in Thailand injecting drug use is increasingly responsible for new HIV infections (United Nations Development Program, 2004).

[23] See also Parish (1992) for other criticisms of Lloyd’s approach, and Lloyd (1992) for a response.

Monitoring and enforcement problems mean that the private solution to this market failure is unlikely to be successful in most cases, providing a role for government in the prevention of HIV transmission (Over, 1999). A similar analysis was provided by Gaffeo (2003):

> "Let us start from the simplest case, in which an individual's behavioural response to HIV prevalence, measured in terms of the desired number of partners, is fixed. For example, take a married man (say, agent A), who regularly has sex with both his wife (agent B), and another partner (agent C), who in turn has a positive probability of being infected [with HIV]. Suppose A has unprotected sex with C. Then, A's behaviour imposes undesired costs on B – for example, a negative externality – in terms of the positive probability of B's becoming infected if she chooses to have unprotected sex with A. Note that if actions could be realistically monitored, or if A could credibly commit himself to the use of condoms in extra-marital sex, the famous result of welfare economics known as the Coase Theorem would hold, meaning that A and B could negotiate 'side payments' to achieve an efficient outcome… of course, efficient monitoring or credible commitments are practically impossible in the case in hand, so that actions that could help to curb the sequence of the epidemic, such as protected sex, will be under-provided for by the private market." (Gaffeo, 2003 , p.30)

As more complete information about the risk of HIV infection becomes available and is disseminated, individual behaviour may begin to change. Individuals will change their behaviour if the information that they receive is credible and sufficiently increases the probability-adjusted costs of risky sex. However, it is also possible that the accumulation of information in itself is insufficient to encourage a substitution of risky for safe sex (e.g. see Ford and Kittisuksathit, 1996; van Landingham *et al.*, 1997). For example, evidence suggests that the number of injecting drug users who share equipment in Bangkok may have increased from 1991 to 1995 despite extensive education campaigns (Vanichseni *et al.*, 2001). Similarly, Steinfatt (2002) suggested that condom use by commercial sex workers appeared to have peaked in 1994 in foreign-oriented bars and remained below 90% in Bangkok and Pattaya in 1999. This may be because low-risk individuals are unlikely to change their behaviour even in the presence of substantial knowledge, as the probability-adjusted cost of HIV infection is very low. Similarly, high-risk individuals likely belong to groups that have above-average discount rates, i.e. those for whom current utility is much more valuable than future utility. For these individuals, the cost of future death or disability from AIDS has a very low present value, such that they are unlikely to substitute away from risky behaviour (Becker and Kilburn, 1994; Philipson and Posner, 1993). Further, evidence suggests that individuals may be compensated for engaging in high-risk behaviour, such as in the market for commercial sex, where commercial sex workers may be compensated for higher risk in the form of an additional payment for unsafe over safe sex when the customer prefers unsafe sex, but can also compensate the customer in the form of lower prices when the sex worker prefers unsafe sex (Gertler *et al.*, 2005).

Similar models could be developed of transmission of the HIV virus through injecting drug use. Here, individuals who are contemplating injecting drugs compare the probability-adjusted costs and benefits of, for example, needle sharing with the alternative of new needles and effective disinfecting practices. Increasing risk of infection then leads rational individuals to substitute away from needle sharing, reducing the rate of transmission. Again, information is important as it provides incentives to adjust behaviour.

The microeconomic models of Philipson and Posner (1993), Kremer (1996), and Gaffeo (2003) suggest that behaviour is solely determined by the individual, and that they are able to rationally evaluate the choices available to them. Gaffeo (2003) suggested in his model that the power of incentives may be severely limited in that the party affected by the externality might not be in a position to pay a large ‘side payment’, or in fact may attempt to free ride on other affected parties. In this case risky behaviour might not reduce even in the presence of significant negative information (e.g. see Barden-O'Fallon *et al*., 2004).

In many circumstances there are constraints which directly reduce the individual’s ability to select the safe alternative. First, the individual might not have access to a ‘safe’ method – such as when condoms are not easily accessible. More importantly, there may be cultural or gender issues which prevent the individual from being able to completely exercise their rights over the decision-making with regards to safe behaviour. This is particularly true of married women in developing countries, who may not be in a position to choose safe sex behaviour due to power in the relationship being largely held by their husband (Gordon and Crehan, 1995; Gray *et al.*, 1999; van der Straten *et al.*, 1995); commercial sex workers, and in particular trafficked women and children, who are also unlikely to be in a position of power due to the relationship with their employer or clients (Ahlburg and Jensen, 1998; Archavanitkul and Guest, 1994); and injecting drug users, whose addiction suggests they have above-average discount rates and are more likely to choose risky behaviour when they 'need a fix' (Ghys *et al.*, 2001). These constraints need to be taken into account in any model of microeconomic behaviour, and are notably undervalued by the models presented above, and absent entirely from the model presented by Philipson and Posner (1993). The availability of safe behaviour methods might be simply modelled by much higher 'opportunity costs' of safe behaviour, but the same may not be true of the cultural or gender constraints.

Empirically, there is a large body of evidence that suggests the AIDS epidemic has resulted in significant behavioural change. Bollinger *et al.* (2002) present a large and comprehensive review of the literature relating to the impacts of behavioural interventions. Most studies, including more recent studies, have concluded that information about the AIDS epidemic has significantly lowered the incidence of risk behaviour (e.g. see Agha, 2003; Elkins *et al.*, 1997; Gregson *et al.*, 1998; Im-em, 1999a; Kawichai *et al.*, 2004; Lugalla *et al.*, 2004; Nelson *et al.*, 1996; UNAIDS, 1998a, 1998b), some of which is no doubt due to interventions other than the provision of public information. At least some of this behavioural change may have occurred even in the absence of any specific intervention.

Finally, another economic or rational behaviour model has also been developed in the context of HIV/AIDS by de Walque (2002). This mathematical model is discussed and further developed in Section 3.3.

2.2 Households and Individual Decision-Making

2.2.1 Households or Individuals as the Unit of Analysis

Before any discussion of households, it is useful to have a definition of the household as a unit of analysis. The empirical data for this thesis was collected at the household level, at least partly because of constraints on determining intra-household wealth allocation for the former households of AIDS patients (see Section 4.3). In social sciences such as anthropology, the difficulty of defining what a household is, due to the temporal instability and interconnectedness of family structures in many cultures, has been recognised for some time (Davidson, 1991; Wilk, 1989; Yanagisako, 1979). Hammel (1984, p.41) suggests a definition of the household as “the largest supraindividual (and perhaps named) group with the greatest multifunctional corporacy”. Davidson (1991, p.13) tentatively identifies a household as “a group of individuals (rarely one) associated with a particular domicile whose livelihood activities, in the broad sense, are directed toward some sort of ‘mutual’ survival”, while Hammel and Laslett (1974, p.78) describe the household as the “minimal domestic group”. Foster (1975, p.36) identifies that “in the ethnographic literature on Thailand, a family is usually defined as a group of kinsmen living in the same dwelling, preparing meals together, and mutually adjusting finances to some degree”. This last definition is important since ‘household’ and ‘family’ could be easily confused or used interchangeably, when in fact a household under the earlier definitions might contain more than one family. For the purposes of this thesis, the definition by Davidson (1991) will be utilised.

Under certain circumstances it might be appropriate to use the household as the primary unit of analysis, while in others it may be more appropriate to use the individual. This distinction is important. In early studies of the household, the household itself was treated as a wholly cooperative decision-making unit (e.g. see Chayanov, 1966). In both neoclassical and neo-Marxist theory, households are seen as pursuing a collective goal reflecting common interest of all household members (e.g. see Deere and de Janvry, 1979; Tilly and Scott, 1978).

Neoclassical theory and the so-called 'new household economics' suggest that decisions on resource allocation and division of labour are made by the household as a whole, i.e. they are household strategies (Ellis, 1993). This theory makes use of the assumption by Samuelson (1956) and Chayanov (1966) that the household acts as if to maximise a 'joint utility function'. Central to neoclassical theory is the concept of income and consumption pooling – individuals within the household pool their income to purchase common consumption goods such as food, utilities, housing, and other goods subject to economies of scale in acquisition. Income pooling may seem a reasonable assumption for a patriarchal nuclear family where central administration of income is feasible, but seems less likely to hold for families with several adult household members earning non-farm income (Wong, 1984). However, income pooling does indeed occur in some households, but not in other seemingly identical households even within the same culture (Wilk, 1989). It is likely that most households practise some combination of pooling and individual retention of income and resources (Wilk, 1989). The assumptions of a joint utility function and income pooling can be retained even when intra-household allocations are studied (e.g. see Rosenzweig and Schultz, 1982).

However, neoclassical theory is inconsistent with the conflicting motivations of individuals within the household, and ignores the reality that most decision-making is undertaken by individuals (Wolf, 1992). It does this in part to avoid the "problem of altruism" (Samuelson, 1956, p.9). If individual utility functions are indeed interdependent, then the individual behavioural responses to changes in income or prices cannot be determined (Folbre, 1986). Also, when presented with the possibility of dissenting free-riding individuals within the household, neoclassical economics uses a 'benevolent dictator' concept to explain the alignment of individual incentives towards household goals which is perhaps not consistent with the concept of household collectivism. In a similar sense Pollak (1985), in his discussion of a transactions cost approach to household analysis, appeals to social and psychological bases of 'family loyalty' to explain the alignment of motivations with the family. Neoclassical economics also suggests that household structure remains relatively stable, since changes in composition of the household (due to births, deaths, migration, etc.) might violate the assumption of a stable household joint utility function (Evenson, 1976; Wong, 1984). Finally, the collective household is likely to be unsatisfactory for any detailed study of intra-household inequality and resource allocation (Folbre, 1988; Rosenzweig, 1986).

In his seminal work on family economics, Becker (1981; 1991) uses altruism to justify the use of a joint utility function. Altruism is presented as the key factor that bonds the household and ensures that individual motives are aligned with maximisation of household welfare. The so-called “rotten-kid theorem” suggests that, since parents have the best interests of the children at heart, a child who acts against the wishes of the parents harms itself in the process (Becker, 1991; Hannan, 1982). However, this does not overcome the possibility of ‘rotten parents’, nor does it address the issue of when a child becomes an active participant rather than the object of household decisions (Folbre, 1986). Further, while it might be argued that parents could exercise some control over the actions of their adult children, who expect an inheritance in return for their acquiescence, this certainly would not hold for the majority of impoverished rural households (Wolf, 1990). Empirically, the neoclassical theory of the household does not perform well. For instance, Thomas (1990) rejected the common preference model in a study of intra-household resource allocation in a large sample of Brazilian households, as did Schultz (1990) when considering Thai data. However, despite its shortcomings, ‘new household economics’ is attractive in that it provides “a convenient framework in which to organise a slice of the world… in a manner that makes it easier to understand, to ask further questions, to generate data, and to formulate falsifiable hypotheses” (Ben-Porath, 1982, p. 58).

The household is also assumed to organise itself as a single decision-making entity in neo-Marxist theory (e.g. see Arizpe, 1982). Altruism again provides a problem, with households assumed to coexist in a state of pure altruism, even when the household itself participates in a capitalist economy (Folbre, 1988). Heterogeneity between households within the same class is also not considered, effectively abandoning the possibility that different households have different responses to the same stimuli (Wolf, 1990). The feminist literature has indicated the problems underlying the assumptions of both neoclassical and neo-Marxist theory (Folbre, 1986; Wolf, 1990).

Alternative theories of the household include the use of a bargaining framework, which explains intra-household inequality as a function of the relative bargaining power of individuals within the household and the existence of 'threat points'. This can be constructed as a struggle between generations, and between genders, seen as analogous to the struggle between the classes in neo-Marxist theory (e.g. see Hartmann, 1981), as a Nash bargaining process within the household (e.g. see Manser and Brown, 1980; McElroy and Horney, 1981), or as a collective making Pareto-efficient decisions within the household (e.g. see Chiappori, 1988).

Overall, and despite the objections noted above, the household provides a convenient unit of observation and analysis (Hammel, 1984). Further, Wood (1982, p.314) justifies the use of the household as a unit of analysis in migration research in order to provide "a more holistic approach that potentially identifies the complex interactions between the structural and behavioural factors". The decision to engage in risk behaviour, such as working as a commercial sex worker, is usually the result of an individual decision (although it may be a heavily constrained decision). The immediate impact of HIV infection is felt by the individual. The impact on other individuals within the household is dependent on their altruism – their decision to assist, or otherwise continue their close familial relationship with, the affected individual.

This thesis considers economic problems that include individual decision-making and impacts, but makes use of cross-sectional data collected at the household level. This relies on an implicit assumption that the intra-household distribution of wealth is either equal or has no substantial effect on the decisions of interest. An individual decision-making model is presented in Section 2.2.2 which has the flexibility to consider both the direct and indirect impacts of HIV infection on members of the household and their decision-making process. Davidson (1991, p.22) suggests that "as a criteria for household, residence as physical cohabitation merely establishes a working boundary with which to locate individuals", and this is the approach adopted in the empirical data collection for this thesis (see Chapter 4). In the empirical analysis, consumption-pooling and wealth-pooling within the household are assumed in order to simplify the relationships studied. Individual decision-making is therefore influenced by the household as a whole, but is not governed by it.

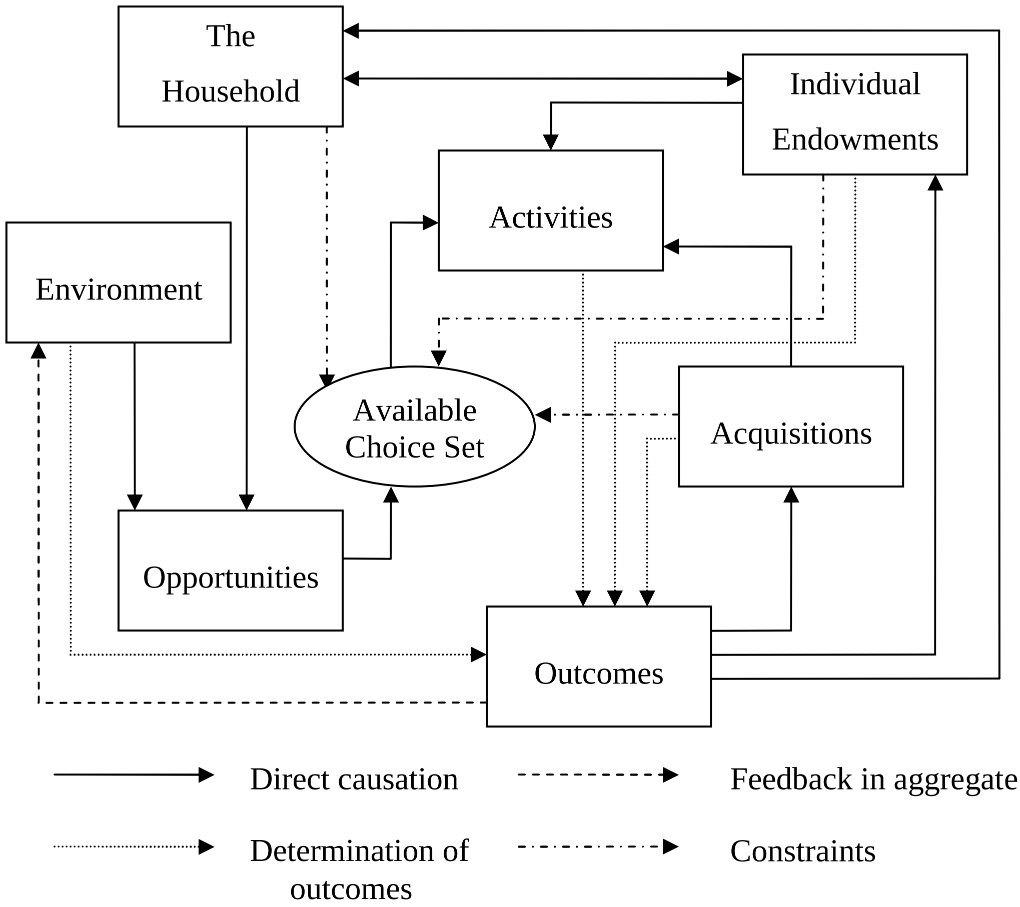
2.2.2 A Simple Framework of Individual Decision-Making within the Household

Desai (2000) provides a framework of a household decision-making system that may aid our understanding of the household and how both poverty and HIV/AIDS impact on the household. The system depicted in Figure 2.1 is a version of the Desai (2000) framework adapted to suit individual decision-making within the household. It differs from other individual decision-making models (e.g. see Penning and Garcia, 2005) in that it also looks at the process by which individuals convert opportunities into outcomes. The framework consists of six subsystems: individual endowments, environment, the household, and opportunities are exogenous subsystems, while activities and acquisitions are endogenous subsystems. Together these subsystems lead to outcomes.

The subsystems may be described as follows:

1. **Individual Endowments –** An individual is possessed of endowments such as physical attributes, health status, education level, and so on. The individual may hold physical endowments such as land or capital assets and intangible endowments such as social capital, cultural beliefs and traditions. Often physical and intangible endowments will be owned "in common" with other individuals who belong to the same *household*. Endowments might also be of a negative nature, such as social or legal obligations. These endowments constrain the subset of *opportunities* that the individual may take advantage of, and so largely determine the *activities* of the individual, including the quantity and quality of labour supply. Endowments are often the major determinant of the individual's *outcomes*. Endowments also undergo a continual process of degradation or depreciation, for example as the individual ages their ability to supply labour decreases.

Figure 2.1: A graphical systems representation of the household decision-making framework



[Source: Adapted from Desai (2000, p.21)]

2. **The Household –** The household is a collective of many individuals. It is both a store of *endowments* held in common for its members, and a source of *opportunities*. The household provides *endowments* for the use of its members, such as land and capital assets. Each member's share of household endowments (included in *individual endowments*) is not necessarily equal, or even fixed over time, and depends on negotiation and the power relationships between members of the household. The household provides *opportunities* to engage in *activities* for the benefit of the individual or other members of the household. The household might also constrain the subset of *opportunities* that the individual may take advantage of, through threat or action. The household does not directly determine the activities of the individual, but has

considerable influence through constraining the subset of *opportunities* that the individual may take advantage of, through threat or action.

3. **Environment –** The environment is an exogenous subsystem – the individual has little or no control over the environment they face. The environment consists of the natural environment – fertility of land, rainfall, pollution and climate – as well as the political and legal environment – guarantee of rights, degree of corruption, effectiveness of law and order – and the economic environment. The set of *opportunities* available to the individual is directly determined by the *environment* – for instance the opportunity to be employed and earn an income, the opportunity to be educated, and so on.

   The environment is unlikely to be significantly affected by the outcomes of a single individual. However, the decisions and outcomes of a great number of individuals, in aggregate, could have an impact on the environment and hence the set of *opportunities* available for future decisions.

4. **Opportunities –** The opportunities subsystem is also exogenous and represents the set of opportunities potentially available to the individual. The individual might only be able to take advantage of a smaller subset of these opportunities, due to constraints created by the limited *endowments* and *acquisitions* they possesses, or due to constraints imposed by other members of the *household*. The opportunities subsystem is affected by economic growth, the business cycle, and barriers to entry such as access to credit markets or age or gender discrimination. The individual may face both positive opportunities and negative opportunities (threats) created by the *environment*. After considering the constraints on the individual's opportunities, i.e. removing from consideration those opportunities that individuals are unable to take advantage of, the remaining opportunities are contained in the *available choice set*.

5. **Activities –** In the causal structure, activities is the crucial subsystem (Desai, 2000). Individuals must make decisions about what activities they engage in.

These decisions include the type of work they are employed in, investment decisions, education decisions, and so on. The decision about activities is limited by the 'available choice' set, which is the smaller set of *opportunities* that the individual can take advantage of, due to constraints imposed by their *endowments, acquisitions,* and the *household*. The activities of the individual result in *outcomes*. The decision that the individual makes involves selecting which opportunities from the available choice set they will take advantage of, and the activities chosen depend largely on preferences over the distribution of current and future expected *outcomes*.

6. **Outcomes –** The *activities* of the individual result in outcomes, including not only income, but also improved education, savings, creation of capital goods, improved health status, living time, and so on. The outcomes are affected by the selected *activity*, the individual's *endowments* and *acquisitions,* and by the *environment*. There are essentially four different types of outcomes. First, some outcomes are expended immediately by the individual (for example utility). Second, some outcomes become *acquisitions* that have a limited lifespan and are expended in the short run future activities of the individual (for example income). Third, some outcomes have an enduring lifespan and become *endowments* for the individual – long run determinants of the individual's future outcomes and available choices (for example physical, human or social capital). Finally, some outcomes affect other members of the *household* and do not accrue to the individual themselves, e.g. health care of other household members.

7. **Acquisitions –** Acquisitions are *outcomes* that have a limited lifespan and which the individual expends or significantly modifies in the short run in conducting future *activities*. Acquisitions might include income, nutritional status, and other short run capital assets of the individual. The creation of acquisitions is important because acquisitions also help to determine the available choice set for the individual, and improved acquisitions therefore improves the decision making options as well as *outcomes* for the household.

It is important to also understand that the linkages are not permanent. Random shocks might cause breaks in the system. For instance, an injury or illness (AIDS morbidity, perhaps) may prevent individuals from utilising all of their endowments. The most important source of such a break is the effect that random shocks from the environment might have on outcomes. This is depicted graphically as the environment affecting the linkage (for example the production function) rather than directly affecting the outcome.

This framework has the advantage that it may equally be applied to any individual regardless of their current situation, i.e. it applies to both poor and non-poor individuals. This framework will be important in analysing why individuals make decisions that may perpetuate poverty, or place themselves at risk of HIV/AIDS.

2.3 Decision-Making, Poverty, and Migration

2.3.1 Poverty Theory

The economic theory describing poverty has advanced remarkably over the past three decades. Key advances in the study of poverty can be attributed variously to Sen (1976; 1981; 1995; 1999), Foster *et al.* (1984), the Human Development Reports (United Nations Development Program, 1990-2003, annual), and World Development Reports (World Bank, 1990, 2000b). This literature has contributed to our understanding of poverty, its measurement and causes, and strategies for reducing its incidence. We now acknowledge that the key component of poverty is a reduction in available choices (Narayan, 2002). This corresponds well to the model described in the previous section, where poverty could be characterised by a reduced available choice set.

2.3.2 Measures of Poverty

Measures of poverty have progressed beyond simple income (expenditure) measures such as the head count ratio or Foster-Thorbecke Index (Foster *et al*., 1984) in recent years, especially with the introduction by UNDP of the Human Development Index (e.g. see United Nations Development Program, 1991). This index includes other factors beyond income poverty. It is the continuation of a process that may eventually recognise in a single measure that the dimensions of poverty (and of well being) extend beyond simply income (expenditure), literacy, health, and living time[24] to include more abstract dimensions such as freedom of choice or of association.

Desai (2000) describes three characteristics of poverty – insufficiency, insecurity and vulnerability. Insufficiency refers not only to a lack of income (spending power) or consumption, but also to a lack of other dimensions of poverty such as 'living time' for consuming social goods. Insecurity signifies both the insecurity of livelihood (from a high ratio of transitory to permanent income) and the insecurity of life (the poor are often subject to high rates of violence or crime). Finally, vulnerability signifies that the poor are more vulnerable to the effects of shocks – not only shocks at national or regional levels such as natural disasters, but also more concentrated shocks such as the death of an income-earning household member.

2.3.3 Decision-making, Optimisation and Poverty

We may be able to specify some measure of poverty, but this does not answer the fundamental question: "Why are the poor poor?" The individual decision-making framework presented in Section 2.2 might provide some insights into what makes individuals (and households) poor. Individuals select activities that optimise their current and future outcomes. However, the ability to select activities is constrained by the opportunities available to the individual, by their endowments and acquisitions, and by the actions of other household members. These constraints, or changes in the constraints, may create conditions that result in poverty.

The insufficiency characteristic of poverty occurs when the outcomes the individual generates are insufficient to meet their needs, and they are unable to

[24] Desai (2000) suggests that "living time – the spare time net of working time – is an important dimension of well being since it allows the production and consumption of social goods".

satisfy their needs through transfers from other individuals (whether from inside or outside the household). The individual's needs could be defined in terms of a poverty line (external measure) or defined by the individual themselves (internal measure), and might include any of the dimensions (such as income, health, or living time). An individual might suffer from insufficiency due to any number of factors, for example a lack of endowments which results in a small available choice set and hence prevents them from taking advantage of the wider range of opportunities. 'Insufficient' individuals may still be optimising their outcomes, but the constraints mean that the outcomes result in poverty.

The individual exhibits the insecurity characteristic of poverty where the variability in outcomes is such that the individual makes sub-optimal choices about the activities he or she engages in. If an individual is a rational risk-averse decision-maker, then it will be less likely to act on opportunities where the outcome is highly variable, even where the expected outcome is greater than that of the alternatives. 'Insecure' individuals might not optimise their outcomes where the risk of an extremely adverse outcome (for example death or malnutrition) is such that they would prefer a 'worse' expected outcome with less variability to a 'better' expected outcome with higher variability, and where the range of variation for the 'better' outcome includes an extremely adverse outcome such as death (Miracle, 1968).

Finally, the individual is vulnerable where the effects of adverse outcomes have a large impact on the future activities of the individual. To the extent that the individual is unable to convert outcomes into new endowments, they will remain poor, or their situation will deteriorate as their existing endowments depreciate. A vulnerable individual may be optimising, but random shocks could more easily result in future insufficiency or insecurity.

The main implication of the framework is that poverty is not usually determined solely by forces outside of the control of the individual. An obvious counter-example is where the individual has significant obligations to their household or others in the form of negative endowments. There is much that individuals can do themselves, in terms of activities, to improve their situation. It is up to the individual to take advantage of the opportunities that the environment provides, where they can. Desai (2000, p20) suggests, with reference to his household decision-making framework, that “there may not be much that a household can do to get out of poverty but it is not nothing”.

2.3.4 Migration Theory and Poverty

The literature on the modelling and explaining of migration is extensive, and generally separated into three fields. In the macroeconomic approach migration is modelled as the result of differences in incomes, employment opportunities, and amenity levels between two areas (typically rural-urban). Migration is then thought to be influenced by a range of macroeconomic factors. Examples of this type of modelling include Harris and Todaro (1970) and McNabb (1979). In the microeconomic approach migration is modelled as an individual choice where individuals maximise their expected net economic benefits. Migration is then influenced by a range of individual-specific factors. Examples of this type of modelling include DaVanzo and Morrison (1981). More recently, multilevel models have been developed (e.g. see Zhu, 1998).

The most recent theoretical and empirical work by Stark (2006), Stark and Wang (2000), and Stark and Taylor (1991b) model migration as a behavioural response to “relative deprivation”, i.e. being poor relative to their peers. Individuals compare themselves with a reference group and if they find themselves relatively worse off than the reference group they undertake to improve their situation or to change the reference group. Either of these situations could result in migration.

This relative deprivation theory is consistent with wealth being a determinant of migration, and provides a theoretical influence of poverty on migration. For a given reference group, a poorer individual is more likely to feel relatively deprived (than a wealthier individual), so they may be more likely to migrate. This may apply regardless of whether the individual is experiencing insufficiency, insecurity, or vulnerability. An insufficient individual may migrate in the hopes of higher incomes which would reduce their insufficiency. An insecure individual might migrate if they expect their outcomes in the destination would be less variable, perhaps even if on average they would be lower. A vulnerable individual might migrate to reduce their vulnerability to shocks.

Migration within a developing country such as Thailand is also facilitated by a number of other factors, many of which were noted in Section 1.2.3.

2.4 The Determinants of HIV Infection

The macro-level determinants of HIV infection were discussed briefly in Section 2.1.1, with a focus on Thailand.[25] The World Health Organisation has previously emphasised a purely biomedical explanation for the determinants of HIV transmission (e.g. see World Health Organisation, 2001). However, by the time of that report many academic authors had already recognised that the HIV epidemic spread as a result of a combination of biomedical, socio-cultural and socio-economic reasons (Caldwell and Caldwell, 1993; Cliff and Smallman-Raynor, 1992; Hunt, 1989). Most HIV infections occur as a result of human behaviour, often behaviour over which the infected person has control.[26] We are just beginning to understand how these behaviours occur as a result of the economic, environmental, and other factors (Gillespie and Kadiyala, 2005b). A number of the factors that contribute to risk behaviour in developing countries have been identified in the literature, including nutrition, gender, age, mobility and migration, education, and poverty. Some of these factors and supporting evidence from the literature are presented below.

2.4.1 Nutrition as a Determinant of HIV Infection

It has long been recognised that there is a vicious cycle between immune dysfunction, infectious disease, and malnutrition (Semba and Tang, 1999). This vicious cycle may apply especially to HIV/AIDS, since the disease directly attacks the immune system (Piwoz and Preble, 2000). Poor nutrition increases the susceptibility of individuals to HIV infection – it weakens the immune system

[25] An alternative discussion for Africa is provided by Poku (2002).
[26] There are obvious exceptions to this including infection via blood transfusions, or infection as a result of sexual or other violence.

reducing both the natural barriers against HIV infection in uninfected individuals and the natural suppression of virus replication in infected individuals, meaning that those infected with HIV carry higher viral loads and are more likely to transmit the virus (Friis and Michaelsen, 1998). This places those with inadequate nutrition at greater risk of acquiring HIV each time they share needles, give or receive blood, or have sexual contact with an infected person. Poor nutrition is one explanation that has been used to explain why poor tropical countries in Africa, Asia, and Latin America continue to experience high HIV infection rates (e.g. see Stillwaggon, 2005), and this has been shown in empirical studies employing regression analysis on countries in Latin America and the Caribbean (Stillwaggon, 2000) and a sample of 44 developing countries (Stillwaggon, 2002).

2.4.2 Gender as a Determinant of HIV Infection

Women are more susceptible to HIV infection – biologically, socio-culturally, and socio-economically (Gillespie and Kadiyala, 2005b; Gupta *et al.*, 2003) as well as more vulnerable to its effects (Kamal Smith, 2002). Biologically, male-to-female sexual transmission of HIV has been shown to be two to four times more efficient that female-to-male transmission, placing women at increased risk of infection per sexual act (Mastro and de Vincenzi, 1996).

As gender is a social construct, differences in the susceptibility of men and women to HIV infection as a result of gender are culture-specific. An individual's sexuality is influenced by the societal rules as defined by age and gender (Parker and Aggleton, 1999). In many cultures gender norms create a significant unequal balance of power between men and women, enforced by institutions such as schools, workplaces, families and health systems (Wingood and DiClemente, 2000). This imbalance of power becomes important in the context of HIV/AIDS when considering negotiation within sexual relationships with husbands or other partners – women may not have sufficient power within the relationship to adequately protect themselves from HIV infection, either through abstinence or through the use of condoms (Gordon and Crehan, 1995; Gray *et al.*, 1999; van der Straten *et al.*, 1995). In the extreme this imbalance in power might lead to sexual coercion and violence (Heise *et al.*, 1999).[27] This power imbalance and lack of negotiating power has also been described in Thailand (Klunklin and Greenwood, 2005).

The dominant ideology of femininity in many cultures, including Thailand, is that 'good women' are expected to be ignorant about sex and passive in sexual interactions (Chitwarakorn *et al.*, 1998; Gupta *et al.*, 2003). This contributes to higher susceptibility for women in that they may have less knowledge about both sexuality and HIV/AIDS. For instance, using demographic and health survey data from 23 developing countries, Gwatkin and Deveshwar-Bahl (2001) showed that women had significantly lower knowledge about HIV/AIDS.

Unequal access to productive resources such as land, capital, resources, and opportunities also place women at higher risk of HIV infection. This problem increases the likelihood of risky occupational choice for women, such as commercial sex (see Section 2.4.7), and risks of coerced sex and multiple sexual partners as found in a study in KwaZulu-Natal Province, South Africa (Hallman, 2004). This problem is exacerbated if there are issues with inheritance and other property rights for women (Strickland, 2004). This may be evidenced by some studies which show marital status as a significant factor in HIV infection in women,[28] while other studies have directly shown that *ceteris paribus* women are at significantly higher risk than men (e.g. see Shisana *et al.*, 2004). Nunn *et al.* (1994) found that in Uganda young women (under 21 years) were at significantly higher risk than men of the same age, but that older women (aged 25 or more years) were at significantly lower risk than men of the same age.

---

[27] For example, see Mahmood (2004) for a discussion of gender-based reasons for female susceptibility to HIV infection in Bangladesh.

[28] Divorced, widowed, and separated women have been shown to have a higher risk of HIV infection in The Gambia (Wilkins *et al.*, 1991), Rwanda (Bulterys *et al.*, 1994), Tanzania (Grosskurth *et al.*, 1995), Uganda (Smith *et al.*, 1999), and Zimbabwe (Boerma *et al.*, 2003; Nilses *et al.*, 2000; Quigley *et al.*, 1997). Similarly, Zuma *et al.* (2003) found single people in Carletonville district, South Africa to be significantly less likely to be infected than married people. Chao *et al.* (1994) found that, among pregnant women in Rwanda, those who were single were significantly more likely to be infected with HIV when compared to those who were married. Divorced or seperated women were also significantly more likely to be infected. In contrast, Shisana *et al.* (2004) found no significant association between marital status and HIV infection for a sample of 6090 men and women in South Africa. Similarly, no significant relationship between marital status and HIV infection was found in Tanzania (Barongo *et al.*, 1992; Boerma *et al.*, 2003).

2.4.3 Age as a Determinant of HIV Infection

The nature of the sexual transmission of HIV naturally places sexually active people at risk. However, arguments can be made towards almost any age group being at a relatively higher risk of HIV infection than others.

Fylkesnes *et al.* (1997) found in a survey of 10,000 people in Zambia that people under the age of 35 were significantly more likely to be infected with HIV, as did Auvert *et al.* (2001) in a sample of 4000 people from four cities with a wide range of HIV prevalence in Kenya, Zambia, Benin, and Cameroon.[29] Similarly, Abebe *et al.* (2003) studied 72,000 male army recruits in Ethiopia and found that younger recruits were significantly more likely to be infected. In contrast, another study found no relationship between age and HIV infection in Ethiopia (Fontanet *et al.*, 2000).[30]

Adolescent youths may be particularly susceptible to HIV infection. They must attempt to reconcile their own sexual feelings with the cultural norms of their society (Weiss *et al.*, 1996), and in many societies, including Thailand, youth are developing a more liberal attitude to sexual activities than has been seen in traditional society (e.g. see Paz-Bailey *et al.*, 2003; Ru, 2006). Similar to women (see Section 2.4.2 above), youth face a lack of economic options which makes them vulnerable to risky behaviours, and may be less knowledgeable about sexual behaviour and HIV risk. Young orphans are particularly susceptible to HIV infection, being more likely to be poor and less healthy than non-orphans (Ainsworth and Semali, 2000), and more likely to engage in risky sexual behaviour (Hallman, 2004). Evans (2002) describes the experiences of street children orphaned because of AIDS in Tanzania, highlighting their specific vulnerability to sexual abuse, violence and HIV infection.

---

[29] Other studies have found a similar association between young age and HIV infection for Rwanda (Bulterys *et al.*, 1994; Chao *et al.*, 1994), and Uganda (Berkley *et al.*, 1989; Smith *et al.*, 1999).

[30] See also studies in Malawi (Dallabetta *et al.*, 1993), and Tanzania (Quigley *et al.*, 1997; Senkoro *et al.*, 2000) which have also found no significant relationship between age and HIV infection. A significant positive relationship has even been reported in a study in Tanzania (Kapiga *et al.*, 1994), and a study in both Tanzania and Zimbabwe (Boerma *et al.*, 2003).

2.4.4 Mobility and Migration as Determinants of HIV Infection

Mobility and migration have traditionally facilitated the spread of infectious disease, including sexually transmitted diseases (Caldwell *et al.*, 1997; Hunt, 1989). In Thailand, the National Committee for AIDS Prevention and Control did not recognise the role of young migrants in the spread of HIV and the need for targeted prevention measures until 1994 (Ungphakorn and Sittitrai, 1994). However, mobility and migration are not themselves risk factors for HIV/AIDS, i.e. migrants are not more susceptible to HIV infection simply because they are migrants. Instead mobility and migration can be seen as lifestyle markers for HIV/AIDS risk behaviours which cause increased susceptibility to HIV infection.

When unmarried (or unpartnered) people move, or families are parted, the likelihood of risky sexual behaviour increases (Hope, 2001). Migrants may be lonely, sexually frustrated, no longer bound by as strong social controls as they faced in their home village, and they may face a lack of economic and social support (Caldwell *et al.*, 1997; Decosas and Adrien, 1997; Mills, 1997). The use of commercial sex services by migrants is not surprising, and might even be accepted by the spouse at home. For example, many married women in Northeast Thailand do not fear contracting HIV from their husbands because the husbands do not travel, implying that having commercial sex while travelling was expected of men (Maticka-Tyndale *et al.*, 1994).

Mobility and migration have been shown to be significant factors associated with HIV infection.[31] Zuma *et al.* (2003) found migrants in Carletonville district, South Africa to be significantly more likely to be infected with HIV when compared with non-migrants. Cross-sectional studies have also found mobility or migration to be significantly associated with HIV infection in Senegal and Guinea-Bissau (Lagarde *et al.*, 2003), and Tanzania and Zimbabwe (Boerma *et al.*, 2003). In a longitudinal study in Uganda, Nunn *et al*. (1995) found a significant positive

---

[31] Many studies have used 'recent travel' as a predictor of HIV infection, and found significant relationships, for example in Tanzania (Grosskurth *et al.*, 1995) and Uganda (Serwadda *et al.*, 1992).

relationship between migration and HIV infection. In contrast, Fontanet *et al.* (2000) found no association between migrant status and HIV infection in Ethiopia, and Quigley *et al.* (1997) reported a significant positive relationship between migration and HIV infection for women in rural Tanzania, but no significant relationship for men.

Bloom *et al.* (2002) showed that levels of migration at the community level were associated with risk of HIV infection in Tanzania, while Hunt (1989) confirmed a close geographical association between patterns of migration and HIV infection for Uganda. Further, Stillwaggon (2000) showed used regression analysis that international labour migration and urbanisation were significantly positively associated with the number of reported AIDS cases per 100,000 population in a cross-country study of twenty Latin American and Caribbean countries. Urbanisation was also significantly positively associated with national and urban HIV prevalence for a sample of 44 developing countries (Stillwaggon, 2002). Similarly, Bonnel (2000a; 2000b) showed that labour migration was associated with HIV prevalence with a regression on a range of macroeconomic indicators in sub-Saharan African countries.

In Thailand, migration has only been shown to be a significant risk factor for HIV infection among specific population groups such as commercial sex workers (Rehle *et al.*, 1992), long-distance truck drivers (Podhisita *et al.*, 1996), and fishermen (Thawatwiboonpol Entz *et al.*, 2000).

2.4.5 Education as a Determinant of HIV Infection

Hargreaves and Glynn (2002) conducted a meta-analysis of the association between educational attainment and HIV-1 infection in developing countries. They found conflicting evidence between studies in Africa and studies in Thailand. Some data, especially from early in the HIV/AIDS epidemic in Africa, has shown education to be positively associated with rates of HIV prevalence (e.g.

see Over and Piot, 1993; 1999).[32] This is thought to be due to more educated people having higher rates of sexual partner change due to being more economically independent and geographically mobile (Blanc, 2000). However, other studies found no significant relationship between education and HIV infection,[33] an ambiguous relationship,[34] or significant negative relationships.[35] Quigley *et al.* (1997) reported a significant positive relationship between education level and HIV infection for women in rural Tanzania, but no significant relationship for men. Glynn *et al.* reported no significant relationships for most of their sample from four African cities.[36]

As Over and Piot (1993) note, although more developed sub-populations may be more susceptible at early stages of epidemics, this may become less true as the epidemic matures. As the effects of morbidity and mortality become clear, information disseminated about HIV/AIDS becomes more credible, and more educated people may find it easier to adapt to safer lifestyles due to greater exposure to information (Gregson *et al.*, 2001), lower costs of assimilating information (Philipson and Posner, 1995), enhanced self-efficacy (Bandura, 1977), and greater readiness to use modern healthcare services (Blanc, 2000). Further, education is important in increasing the protective effects of community group membership (Gregson *et al.*, 2004; Jukes and Desai, 2006). Reduction over time in the relative risk for younger and more educated people has been reported in Uganda (Kilian *et al.*, 1999), Zambia (Fylkesnes *et al.*, 2001; Fylkesnes *et al.*, 1998; Michelo *et al.*, 2006), and Malawi (Crampin *et al.*, 2003b). However, no such significant risk reduction over time was found by Taha *et al.* (1998) in Malawi, while Kwesigabo *et al.* (1998) found ambiguous results for women from the Kagera Region of Tanzania.

---

[32] This positive association between education and HIV infection has also been reported for studies in Ethiopia (Abebe *et al.*, 2003), Rwanda (Chao *et al.*, 1994), Tanzania (Boerma *et al.*, 2003; Grosskurth *et al.*, 1995; Senkoro *et al.*, 2000), Uganda (Serwadda *et al.*, 1992; Smith *et al.*, 1999), Zambia (Fylkesnes *et al.*, 1997), and Zimbabwe (Boerma *et al.*, 2003).

[33] For example, studies in The Gambia (Wilkins *et al.*, 1991), Tanzania (Barongo *et al.*, 1992; Kapiga *et al.*, 1998), Uganda (Malamba *et al.*, 1994; Nunn *et al.*, 1994), and Zimbabwe (Nilses *et al.*, 2000).

[34] For example, a study in Tanzania (Kapiga *et al.*, 1994).

[35] For example, a study in Ethiopia (Fontanet *et al.*, 2000).

[36] Significant negative relationships were only found for women in Yaounde, Cameroon and men in Cotonou, Benin, while no significant relationships were found for men in Yaounde, women in Cotonou, or either men or women in Kisumu, Kenya or Ndola, Zambia.

In a mature epidemic, it is likely that the association between education and HIV infection risk becomes negative. Gregson *et al.* (2001) used a large population-based survey in Zimbabwe, and confirmed that for young people (aged under 25 years) the association between level of education and HIV infection was negative. They suggested that this was due to later initiation of sex and fewer casual sexual partners among more educated women. At the macro level, Bonnel (2000a; 2000b) used regression analysis on a sample of 60 countries and found that the secondary school enrolment rate was significantly negatively associated with national HIV prevalence.

Similar to the pattern in Africa, an early Thai study also found a significant positive relationship between education and HIV infection (Theetranont *et al.*, 1994), but more recent studies have found either no significant relationship (Celentano *et al.*, 1996; Dobbins *et al.*, 1999; Nopkesorn *et al.*, 1993) or a significant negative relationship (Carr *et al.*, 1994; Mason *et al.*, 1998; Nelson *et al.*, 1993; Sirisopana *et al.*, 1996).

Finally, the previous analyses concerned only the static relationship between HIV and education. Brent (2005) studied the impact of increasing levels of education on the HIV epidemic using longitudinal data from 20 regions of Tanzania over eight years, using a recursive framework for education, income and HIV infection based on two autoregressive equations. He estimated that a one percent increase in female primary school enrolment would result in a 0.15 percentage point reduction in female HIV prevalence, corresponding to 1408 fewer HIV infections over the period 1994 to 2001. He also found that the indirect effect working through income was larger than the direct positive effect of education on HIV infections, which suggests that education is effective in reducing HIV risk, but more through its association with higher incomes and lower levels of poverty. Similarly, de Walque (2002) found that in Uganda there was no relationship between education and HIV/AIDS early in the epidemic, and that the relationship has since become negative and significant. He suggested this was due to a greater responsiveness to HIV/AIDS education campaigns by the well-educated.

2.4.6 Poverty and Inequality as Determinants of HIV Infection

The 'obvious' links between poverty and HIV/AIDS have often been cited in economic and policy literature. For instance Beyrer *et al.* (1997), in a study of HIV infection and risk factors among ethnic minority communities in Northern Thailand, suggest that poverty may be a risk factor for HIV in more isolated communities. However, little attempt has been made to explicitly develop a theory of why poverty and HIV/AIDS might be closely related. Gaffeo (2003 , p.32) suggests that "a useful starting point in assessing the impact of HIV/AIDS on the economic conditions of sub-Saharan people… consists in analysing in broad terms how seropositivity interacts with the probability of a household being locked into a poverty trap". In terms of the decision-making framework presented earlier in this chapter, a poverty trap is a recurring cycle of outcomes that either provide no new endowments, or provide insufficient endowments to improve (or even maintain) the well-being of the individual in the long run (Dasgupta, 1997). HIV infection therefore contributes to both the formation and the persistence of poverty traps in vulnerable societies. Individuals might only escape the poverty trap through policy interventions or some extremely favourable shock, for example the environment providing a new and potentially rewarding opportunity that requires little in the way of endowments to be exploited.

Despite this theory, early findings were that 'higher socio-economic status' (using various measures) was positively associated with risk of HIV infection. For instance, Smith *et al.* (1999) found that HIV infection was positively associated with higher values of a composite socioeconomic status index, composed of asset ownership and other observable characteristics of the household. Dallabetta *et al.* (1993) found that husband's education (a marker of higher socio-economic status) was significantly positively associated with HIV infection for pregnant women in Malawi.[37] However, Chao *et al.* (1994) at first reported a significant relationship between income and HIV infection, but this proved to be insignificant in a follow-up study within the same population (Bulterys *et al.*, 1994).[38]

---

[37] Kapiga *et al.* (1994) found similar results for Tanzania, while Allen *et al.* (1991) reported higher partner's income as a significant risk factor for women from urban Rwanda.

[38] Another study in Zimbabwe found no significant relationship between income and HIV infection (Nilses *et al.*, 2000).

The contrary result, evidence that socioeconomic status was negatively related to HIV/AIDS infection, was also established early in the empirical literature (Curran *et al.*, 1988). Krueger *et al.* (1990) demonstrated a significant negative relationship between income and HIV infection for a sample of 3601 high-risk people in Seattle. More recently, Hallman (2004) reported sexual risk behaviours among young people in KwaZulu-Natal Province, South Africa, were significantly associated with relative economic disadvantage. Gritzman (2005), using data from South Africa, showed that lower wage income was separately a contributing factor to the probability that a household was affected by HIV/AIDS. Bachmann and Booysen (2004) found that poverty predicted household mortality and morbidity independent of other factors, suggesting that the poor are more likely to face the health-related impacts of HIV/AIDS earlier. Further, non-poor households may be able to mitigate the most severe impacts of HIV/AIDS by using coping mechanisms which are not available to households with less material wealth (Over, 1998).

In Thailand, Choopanya *et al.* (2002) showed a significant negative relationship between income and HIV infection for a sample of 1209 injection drug users in Bangkok. However, in a study of 600 households in Phayao Province in the northern region (described in more detail in Section 2.5.4), Kongsin *et al.* (2000) found no significant association between poverty and HIV-infection after controlling for age and sex, and concluded that "HIV/AIDS equally affects members of all socio-economic groups in Thailand… poverty is not a risk factor for the occurrence of the disease." It may be worth noting, however, that Phayao Province is a particularly heavily affected province in Thailand, with adult HIV prevalence of over 3 percent in 2003 (UNAIDS *et al.*, 2004), and this may have affected the results.

Poverty and inequality have been shown to be determinants of the national level of HIV prevalence. Stillwaggon (2000) performed multiple regression analysis using data from twenty countries in Latin America and the Caribbean, and found that GDP per capita was significantly negatively associated with number of reported AIDS cases per 100,000 population. However, when extending the analysis to 44 developing countries from Asia, Africa and Latin America the association between GDP per capita and national and urban HIV prevalence was not significant, although inequality was both significant and positive (Stillwaggon, 2002). Drain *et al.* (2004) found that inequality was significantly positively associated with HIV prevalence using demographic and health survey data for 122 countries.

2.4.7 HIV/AIDS Risk and Occupational Choice

In a previous section it was suggested that low levels of education might reduce individuals' ability to evaluate HIV/AIDS risk as it relates to activities or occupations such as commercial sex work. In this case individuals would be underestimating the risk in terms of probability of loss, or magnitude of loss, or both. However, individuals who have complete or near complete information (such as those who are already employed in the commercial sex industry) might still underestimate the risk due to 'cognitive dissonance', i.e. a psychological unwillingness to confront reality (Akerlof and Dickens, 1982; Booranapim and Mainwaring, 2002). Alternatively they might simply accept the higher risk due to a defeatist attitude to life. For example, poor villagers in Malawi were found not to change their risk behaviour even when they had significant knowledge about HIV/AIDS risk (Bryceson *et al.*, 2004).

The risk factors identified in Sections 2.4.1 to 2.4.6 might not be robust to risky occupational choice. In Thailand, there have been several studies of risk factors for HIV infection among female commercial sex workers. Rehle *et al.* (1992) found that migration to provinces with high levels of HIV among commercial sex workers was significantly associated with HIV infection among female commercial sex workers in Khon Kaen province. Siraprapasiri *et al.* (1991) found that education was not significantly associated with HIV infection among commercial sex workers in Chiang Mai,[39] and Kilmarx *et al.* (1998) found that education was not significantly associated with HIV infection for female

[39] Similarly, Celentano *et al.* (1994) found no association between HIV infection and either age or education for female commercial sex workers in Chiang Mai, and J. Gray *et al.* (1997) found no association between HIV infection and age or marital status for female commercial sex workers in Chiang Rai.

commercial sex workers in northern Thailand.[40] In Khon Kaen province, Ungchusak *et al.* (1996) found no association between age or education and HIV infection for a sample of 489 female commercial sex workers.

Despite the lack of demographic or socioeconomic risk factors within the group of female commercial sex workers, it is clear that socioeconomic factors affect whether a woman engages in commercial sex work. Limanonda *et al.* (1993) and Wawer *et al.* (1996) both found that female commercial sex workers in Thailand are typically young, relatively low educated migrants.

2.5 The Impacts of HIV/AIDS

One of the largest contributions that the field of economics has made in studying the HIV/AIDS epidemic has been in the investigation of its' socio-economic impacts. There is a vast literature on the potential and actual impacts of HIV/AIDS and the most salient contributions from the social sciences are summarised in a series of three articles in the Review of Development Studies (see Barnett, 2002; Barnett and Clement, 2005; Barnett *et al.*, 2001).

Theoretically at least, the economic implications of the HIV/AIDS epidemic seem clear. In the simplest sense at the household level, HIV infection both decreases the income generation capacity of the household (due to increasing morbidity, and eventually death, of the infected individual), and imposes increased medical treatment costs. At the macroeconomic level, demographic changes affect the structure of the population, productivity, the supply of labour, and the intergenerational transfer of human capital.

Barnett *et al.* (2001) provide a taxonomy for studies of the social and economic impacts of HIV/AIDS which will be used in this section. They suggest that impact studies can be separated into the following types: "(i) demographic modelling of the population impacts; (ii) economic modelling of the impact on health provision

[40] Limpakarnjanarat *et al.* (1999) showed similar results for female commercial sex workers in Chiang Rai province.

and on health related services; (iii) sectoral impact; (iv) social impact at the micro and meso levels; and (v) social effects at the level of the social system" (Barnett *et al*., 2001, p. 152). Many studies fall into more than one of the types – in these cases the following review categorises them according to their most important contributions.

2.5.1 Demographic Impacts of HIV/AIDS

Studies of the demographic impacts of HIV/AIDS have generally been concerned with estimating HIV prevalence and incidence, and using population projections to model the effects of HIV/AIDS on population growth, population structure, mortality, and life expectancy. There are many different methods employed – as early as 1989 a World Health Organisation workshop identified at least eight methods (United Nations and World Health Organisation, 1989). Stover (1998) provides an excellent review of demographic impact studies, suggesting that most studies only differ in the assumptions used to arrive at the population projections. A more recent review is provided by Zaba *et al.* (2004).

Some early studies concluded that population growth might become zero or negative in Sub-Saharan Africa (Anderson *et al.*, 1998; 1991; Garnett and Anderson, 1993; Rowley *et al.*, 1990). However, Bongaarts (1989) concluded that population growth rates in Central Africa would drop by less than fifty percent due to relatively high birth rates, and would not become negative. Similarly, Bos and Bulatao (1992) estimated that population growth would be reduced by less than one percentage point in sub-Saharan Africa.

Studies on population growth rely on crucial assumptions about the effects on fertility, mortality, marriage and household formation, and migration. The studies noted above assumed that high fertility rates would remain fairly constant, whereas studies in Zimbabwe (Gregson *et al.*, 1997; Terceira *et al.*, 2003), Uganda (Carpenter *et al.*, 1997; R. Gray *et al.*, 1997), and sub-Saharan Africa in general (Lewis *et al.*, 2004) have all demonstrated a decline in total fertility associated with HIV/AIDS.

All studies of the impact of HIV/AIDS on mortality and life expectancy have unsurprisingly found significant negative impacts, although the exact extent to which these are attributable to HIV/AIDS is not always clear (e.g. see Blacker, 2004; Dorrington *et al.*, 2004; Feeney, 2001; Nunn *et al.*, 1997; Shell, 2000; United Nations, 1994; Urassa *et al.*, 2001; Whiteside, 2001). Johnson and Dorrington (2006) estimated a significant demographic impact on South Africa, with prevention programs having little positive effect on mortality in the short term. The effects of HIV/AIDS on marriage patterns is unclear, although Mukiza-Gapere and Ntozi (1995) found that young people in Uganda were delaying marriage due to fear of HIV infection, as well as delaying both sexual initiation and fertility decisions. Studies on the impacts on household formation, household or family structure, and migration are reviewed in Section 2.5.4.

In the brief review above, most of the studies on demographic impact have concentrated on relatively heavily-affected regions of the world such as Sub-Saharan Africa.[41] There have been fewer studies in Asia, although Thailand has been relatively well studied compared to other countries. Nelson (1998) used demographic projections to estimate the number of new HIV infections at between 1.25-18.4 million by 2005, a number which has proven to be roughly accurate. Surasiengsunk *et al.* (1998) concluded that the direct and indirect effects of HIV/AIDS on the demographic structure of the Thai population would be small overall, but may be more severe in the Northern region. Conversely, Rhucharoenpornpanich and Chamratrithirong (1999; 2001) found that although HIV/AIDS would not reduce population size or the growth rate, when compared to an alternative scenario without the presence of HIV/AIDS its impact was very significant. Jones (2004) and Jones and Pardthaisong (2000) studied villages in the North region of Thailand, and concluded that HIV/AIDS would cause a significant future increase in the aged-dependency ratio, possibly placing the elderly at risk of poverty.

[41] Epstein (2004) provides a useful summary of the estimated impacts of HIV/AIDS on a range of demographic and mortality indicators, for countries in sub-Saharan Africa as well as Latin America and Vietnam.

2.5.2 Economic Impacts of HIV/AIDS on Health-related Services

Very early in the epidemic it was recognised that it would have a significant impact on the health sector. Most early studies and some more recent studies provided estimates of the cost of care of individual AIDS patients (e.g. see D. E. Bloom and Glied, 1993; Cordeiro, 1988; Nandakumar *et al.*, 2000). Other studies attempted to estimate the burden of the epidemic on the healthcare system as a whole (e.g. see Henry and Newton, 1994; Over *et al.*, 1988; Postma *et al.*, 1995), often using the direct and indirect costs method,[42] estimated a clinical impact of HIV/AIDS in terms of projecting the number of future HIV/AIDS patients (e.g. see World Health Organisation, 2001), or considered the impacts of increasing morbidity and mortality of the health workforce (e.g. see Marchal *et al.*, 2005).

However, most recent studies have instead concentrated on the impacts on the health sector in terms of the significant costs of up-scaling antiretroviral treatment (e.g. see Haacker, 2002a; Laguide *et al.*, 2003; Over, 2004). For instance, Kitajima *et al.* (2003) compared the costs of care for HIV/AIDS patients in Khon Kaen Province with and without antiretroviral treatment, finding that with antiretroviral treatment average cost per outpatient visit and per inpatient day were more than US$250 higher and $US300 higher respectively. Providing this treatment to all outpatients with AIDS in Thailand would cost over US$5.8 million, approximately 20 percent of the total universal care health budget for Khon Kaen Province. As this thesis does not directly consider the impacts on the healthcare system, we will move to the impact on other sectors.

2.5.3 Sectoral Impacts of HIV/AIDS

As well as the healthcare sector, there has been extensive study of the impact of HIV/AIDS on businesses and industry sectors.[43] Most of this research has been conducted by private firms and as such has not been published nor released into the public domain because of its commercial sensitivity (Barnett *et al*., 2001).

---

[42] This method was first proposed by Rice (1967), and applied to HIV/AIDS by Scitovsky and Rice (1987) and Scitovsky (1988).

[43] Many studies of the sectoral impacts of HIV/AIDS do not concentrate on a single sector, but are macroeconomic studies which consider all sectors simultaneously (e.g. see Arndt and Lewis, 2001). These studies are considered in Section 2.5.5.

Unsurprisingly then most published sectoral impact research has concentrated on the agriculture sector, and often only on subsistence agriculture (e.g. see Barnett and Blaikie (1990) for an early example). Gillespie (1989) concluded that farming systems most vulnerable to the impact of HIV/AIDS are those that exhibited highly seasonal demand for labour, high degrees of labour specialisation, increasing returns to scale of labour, and limited substitutability of labour for capital. Jayne *et al.* (2004) noted the impact of HIV/AIDS on the intergenerational transfer of agricultural knowledge, making agricultural systems increasingly vulnerable.[44] Mushala (2002) found that subsistence farming systems in Swaziland were especially vulnerable to the impact of HIV/AIDS, posing significant challenges for government policy. More recent studies in the agricultural sector have concentrated on estimating the impact of HIV/AIDS on food security at the regional or national level (e.g. see de Waal and Whiteside, 2003; Donovan *et al.*, 2003; Gillespie and Kadiyala, 2005a, 2005b; Kebede and Retta, 2004; Topouzis and du Guerny, 1999).

The impacts on other sectors have also been considered. Guinness *et al.* (2003) looked at the impacts on the Zambian business sector and confirmed staff shortages, reduced productivity, and increased costs. Matangi (2006) studied the impacts on the mining sector in Zimbabwe, and found increased rates of absenteeism and labour turnover and declining skills availability, particularly firm-specific skills. Bloom *et al.* (1997) estimated the impact on the tourism sector in Sri Lanka, estimating that tourist numbers would reduce by approximately one percent.

A brief review of the literature on impacts on the health and education sectors is provided by Whiteside (2002). Grassly *et al.* (2003) estimated the impacts of HIV/AIDS on the education sector in Zambia at US$1.3-3.1 million in 1999, and up to US$41.3 million over the period 1999-2010, mostly consisting of salaries paid to chronically morbid teachers, training costs, and funeral costs. Coombe (2000) described the likely impacts of HIV/AIDS on the education system in

[44] See also du Guerny (1999).

South Africa, stating between 88,000 and 133,000 educators would die of AIDS-related causes by 2010. Haacker (2004b) looked more generally at the impact of HIV/AIDS on the provision of government services including health and education, and found significant negative effects on government budgets due to increasing resource requirements and a reducing tax base (see also Section 2.5.5). Similar results have been found for a number of countries in sub-Saharan Africa (e.g. see Bennell, 2005a; Jukes and Desai, 2006).

In one of the few studies considering specific sectors of countries outside sub-Saharan Africa, Giraud (1993) considered the impact on the transport sector in Thailand, finding that transport firms would face significant direct and indirect costs of HIV/AIDS, mostly through increases in sick leave costs and replacement of workers. Also for Thailand, Shaeffer (1995) looked at the education system and concluded: "(i) the education provided in schools may become increasingly random; (ii) the teaching force in Thailand may also become less qualified; (iii) discrimination, ostracism, and, and isolation may also become characteristic of Thai classrooms and schools; and (iv) school life may be further complicated by links between sexual issues and school" (Shaeffer, 1995, p. 158).

Private firms have conducted a lot of research on the impacts of HIV/AIDS, but as noted above much of this research is protected by the firms themselves. However, some of it has been published and the results are in line with expectations. Whiteside (2001) notes that major concerns for firms include reduced productivity and increased costs due to absenteeism, morbidity[45], the training of replacement employees, and increased wages as the supply of skilled and unskilled labour falls. Similar conclusions are drawn by Forsythe (2002) and USAID (2004). Aventin and Huard (2000) extended their analysis of the effects on business to include deterioration of firm socialisation, reducing the transfer of firm-specific knowledge. An early World Bank study in 1994 found that HIV/AIDS raised firms' labour costs significantly in five African countries (World Bank, 1997). Rosen *et al.* (2002) estimated an increase in labour costs of 1-10 percent for several large African firms. Morris *et al.* (2000) studied the impact on male sugar

[45] See also Baggaley *et al.* (1994).

mill workers in South Africa and projected a tenfold increase in firm costs associated with HIV/AIDS by 2006, while Rosen *et al.* (2004) estimated the present value cost of HIV infection at 0.5-3.6 times the annual salary of a worker. For tea estate workers in Kenya, Fox *et al.* (2004) reported significantly lower productivity and more sick and annual leave days taken by HIV-positive workers in the eighteen months before death or retirement due to HIV/AIDS, when compared with other workers. Several other firms have undertaken institutional audits as detailed in Barnett and Whiteside (2000), and there have also been numerous case studies conducted on the specific responses of firms to the epidemic (e.g. see Barnett *et al.*, 2002; UNESCO Division of Higher Education, 2006; United States Agency for International Development, 2004; Whiteside, 2001).

However, as Rosen and Simon (2002; 2003) note, the private sector is generally able to shift the burden of HIV/AIDS impacts onto households and the government by pre-employment health screening, restructuring employee contracts, changing or eliminating health benefit schemes, outsourcing, and substituting capital for labour. This shifts many of the most significant impacts of HIV/AIDS onto individuals and households, studies of which are reviewed in the next section. However, many firms have recognised the potential long-run impacts on labour supply and assumed some of the financial burden, even offering antiretroviral treatment for their workers (e.g. see Eholie *et al.*, 2003).

2.5.4 Socio-Economic Impacts of HIV/AIDS at the Micro Level

There have been a large number of socio-economic impact studies employing a wide range of methodologies from quantitative or qualitative methodologies to cross-sectional descriptive analyses. However as will be seen from the review below (as well as the extensive recent review of over 150 studies in Gillespie and Kadiyala (2005a), and nearly 40 African studies in Murphy *et al.* (2005)), despite the extensive and growing base of evidence on the impacts of HIV/AIDS there has been surprisingly little empirical research on the socio-economic impacts of HIV/AIDS in moderately affected communities in countries such as Thailand. Most research has been conducted in heavily HIV-affected countries in sub-

Saharan Africa, in heavily affected regions of other countries (such as the Northern region in Thailand), or in well-defined high-risk groups such as men who have sex with men or commercial sex workers. Part of the reason for this is the lack of longitudinal household data with details about the causes of morbidity and mortality so that impacts of HIV/AIDS can be isolated from other concurrent effects on the household.

There are many difficulties associated with studying the impacts of HIV/AIDS at the household or individual level. First, many studies have not focused on the impacts of HIV/AIDS *per se*, but instead looked at the impacts of prime-age adult morbidity and/or mortality on households and individuals. This has been due to either ethical considerations (i.e. not wanting to draw attention to AIDS-affected households), or to pragmatic considerations (e.g. the difficulty in differentiating between AIDS-related and other deaths in vital registration data). For instance, Mather *et al.* (2004, p.47) conclude that, for panel data sets from Kenya, Malawi, Mozambique, Rwanda, and Zambia, adult mortality provides “a reasonable and cost effective way to identify households that are most likely affected by HIV/AIDS”. Second, as noted by Freire (2003), the use of coping strategies by households means that socio-economic impact studies actually measure the net impact (i.e. the gross impact of HIV/AIDS less any mitigation of that impact resulting from coping strategies). Further, it might not always be possible to determine whether the observed impact occurred as a result of HIV/AIDS or some other concurrent shock correlated between households, particularly in small samples (Murphy *et al.*, 2005). These problems have important implications for policy conclusions drawn from these studies. The use of case studies and small sample sizes in many studies can restrict the external validity or generalisability of their results (White and Robinson, 2000). Finally, as Barnett and Whiteside (2002) and Hosegood *et al.* (2004) note, the most severely affected households might dissolve and not be available to be studied thereby biasing downwards measures of the socio-economic impacts of HIV/AIDS. However, Mather *et al.*

(2004) reported that the actual rate of household dissolution was actually very low.[46]

The two most comprehensive early studies of the impact of HIV/AIDS on households were conducted in the Kagera region of Tanzania (Ainsworth *et al*., 1992) and Rakai district of Uganda (Serwadda *et al*., 1992). The main findings of the Kagera Demographic and Health Survey (1991-1994) were reported in World Bank (1997), and suggest that the economic impact of an adult death on surviving household members depends on (i) the age, gender, income, and cause of death of the deceased individual; (ii) the composition and assets of the household; (iii) the characteristics of the community. They also found that an AIDS death results in a lengthy period of depressed household resources, resulting in greater impact than other cases of death, and that there is evidence that women bear a particularly heavy burden from an AIDS death. Finally they suggested that the poor, having fewer assets to draw on, had more difficulty coping with the impacts of HIV/AIDS. The results of the Rakai study, reported in Menon *et al.* (1998) and elsewhere, were that households with an HIV-infected person incurred economic losses due to a depletion in durable goods, and coped with an adult death by altering in size and composition.

Following these early studies, there has been a large and growing literature which have confirmed and expanded the range of impacts considered, including impacts on household size and composition, migration, agricultural and non-agricultural livelihoods, income, consumption and expenditure, nutrition, education, poverty and inequality, and so on.

Household size and composition

Gillespie and Kadiyala (2005a) suggest that households experiencing adult mortality tend to become smaller than other households. Menon *et al.* (1998) found that household size fell by 1.7 people for households which suffered an

[46] Their panel data sets reported household attrition rates of up to 14 percent, of which very little was attributable to household dissolution. Also, they found that a majority of prime-age adult deaths occurred among adults who were not household heads, which would explain the low household dissolution rates.

adult death in Uganda, significantly more than for those that did not.[47] Yamano and Jayne (2002; 2004) also found households that suffered an adults death were significantly smaller in Kenya, and that the change in household composition depended on the gender and former position of the deceased household member. However, Bachmann and Booysen (2004) found that affected households in Free State, South Africa were larger than unaffected households, but did not differ in age or gender distribution.[48] Ntozi and Nakayiwa (1997) found a reduction in polygyny and delayed marriage as a result of the HIV/AIDS epidemic in Uganda. Dependency ratios might also increase, as observed by Mather *et al.* (2004) for five countries in sub-Saharan Africa and Menon *et al.* (1998) for Uganda.[49] Overall, Heuveline (2004) estimated that the household-level demographic effects of the HIV epidemic were actually quite small because they were becoming diffused throughout the entire population and all households.

Hosegood *et al.* (2004) found that households in Kwazulu Natal were four times more likely to dissolve following an AIDS-related death than other households after controlling for household and community level risk factors, while Mushati *et al.* (2004) reported that one tenth of affected households in their study in eastern Zimbabwe dissolved and one quarter relocated. Urassa *et al.* (2001) found that the death of a male household head in Tanzania was more likely to cause a household to dissolve that the death of a female household head, but the death of adults other than the household head did not cause households to dissolve and dissolution was more likely if the deceased was younger.

Migration and mobility

HIV/AIDS might result in increases in household mobility. In a study in Uganda, Ntozi (1997) found that 37 percent of widows and 17.3 percent of widowers migrated from their original homes, and younger spouses were significantly more

---

[47] A significant decreases in household size was also reported for a study in Tanzania (Urassa *et al.*, 2001).

[48] Mather *et al.* (2004) found similar results for panel data sets from Kenya, Malawi, Mozambique, Rwanda, and Zambia. They also found that the effects on the household are strongly conditioned by the gender and household position of the deceased household member.

[49] A significant increase in dependency ratio was also reported by Konde-Lule *et al.* (1997) for Uganda. Similarly, Nakiyingi *et al.* (1997) found that the number of extended family households increased significantly in Uganda between 1990 and 1995. Menon *et al.* (1998) also reported higher incidence of child-headed households as a result of adult deaths in Uganda.

likely to migrate. In a study of 333 households in Zambia, Nampanya-Serpell (2000) found approximately 61 percent of AIDS-affected families had moved from their original home, mostly to cheaper housing with less access to sanitation, electricity, and so on. Ntozi and Nakayiwa (1997) found that many people in Uganda coped with HIV/AIDS-related widowhood by migrating. However, Hosegood *et al.* (2004) found no association between adult mortality and migration for households in Kwazulu Natal, South Africa.

Agricultural and non-agricultural livelihoods

Subsistence agriculture, typically heavily dependent on household labour, is especially vulnerable to the impacts of HIV/AIDS. In ten in-depth case studies in Tanzania, Tibaijuka (1997) found labour reallocation (due to nursing the ill) and labour loss (due to morbidity and mortality) resulted in significant losses in agricultural production for households. In a study of 1584 households in rural Rwanda, Donovan *et al.* (2003) found that following a prime-age adult death most households experienced reduced farm labour. Following a male death, the area of cultivated land reduced, and households with a male death substituted cash crop production for food crops,[50] and following a female death all crop production was reduced. Prime age adult morbidity had qualitatively similar effects. Yamano and Jayne (2002; 2004) reported similar results for Kenya, with death of a prime age male household head associated with a 57 percent reduction in gross crop value.[51] However, only poor households suffered a reduction in farm income, with both poor and non-poor households suffering a reduction in non-farm income. In contrast, Mather *et al.* (2004) found no significant change in cropping patterns or crop income for adult mortality-affected households in panel data from five sub-Saharan African countries.

Income

Oni *et al.* (2002) reported income for HIV/AIDS-affected households in Limpopo Province, South Africa was 35 percent lower in affected households than in unaffected households. Similarly, Yamano and Jayne (2002; 2004) reported

---

[50] A result similar to that observed by Barnett *et al.* (1995) in Uganda, Tanzania, and Zambia.
[51] With a 68 percent reduction in net crop output, after taking into account the costs of fertilizer, seed, and land preparation.

declines in off-farm income for HIV/AIDS affected households in Kenya of about 79 percent. Bachmann and Booysen (2003) studied 404 households in Free State, South Africa and found income in the 202 HIV/AIDS-affected households was 25 to 40 percent lower than that of unaffected households over a six month follow-up period, and after controlling for household demography and employment. After controlling for morbidity and mortality there was no significant difference, suggesting that the income differential was due to HIV/AIDS-related causes. However in a later article they reported that, after 18 months of follow-up, the decrease in income was not apparent either in absolute and relative terms, and concluded that at baseline many affected households had already experienced decreased income as a result of HIV/AIDS-related morbidity. Kebede and Retta (2004) surveyed 408 households in two states of Ethiopia, and found that HIV/AIDS had greatest effect on families where only one person in the family had a job – this was due to the low labour participation rate amongst women.

Consumption and expenditure

Household consumption is similarly affected to income. Bechu (1998) studied 200 households in Cote d'Ivoire identified by local health facilities as containing at least one person living with HIV/AIDS over a period of up to 20 months. She compared the data from those households with data obtained from another study of 2064 (assumed) unaffected households, and found the structure of consumption was similar, but families with HIV/AIDS spent almost twice the proportion of their budget on health expenditure of the infected individual, substituting away from expenditure on health care for uninfected members and from other expenditure. Bachmann and Booysen (2003) found average per capita food expenditure was 22 to 32 percent lower in HIV/AIDS-affected households in Free State, South Africa. Using panel data sets from Indonesia and Mexico, Gertler *et al.* (2003) found the death of a prime age adult household member resulted in a significant reduction in consumption per capita in both countries.

Much of the change in consumption can be explained by significantly higher expenditure on health, confirmed by the empirical studies previously noted for Tanzania (Tibaijuka, 1997), South Africa (Bachmann and Booysen, 2003; Oni *et al.*, 2002), and Cote d'Ivoire (Bechu, 1998). Even some time following the death of the HIV-infected household member, household consumption per capita may not return to previous levels (Gertler *et al.*, 2003).

Nutrition

Changes in expenditure may also cause negative impacts on nutrition (Gillespie *et al.*, 2001; Haddad and Gillespie, 2001). Decreased nutrition reduces energy – an important endowment which impacts the individual's decision about labour supply – less energy, i.e. lower nutritional intake, means less energy for work. For an individual in a mainly agricultural household, this may mean less food is grown for themselves and for other household members. For an individual in an urban household, this may mean less labour supplied for income and therefore less food can be purchased. In either case, the individual (and household) may be trapped in poverty.

Mason *et al.* (2005) found significant increases in child underweight prevalence as a result of HIV/AIDS in Mozambique, Zambia, and Zimbabwe, and that nutrition was deteriorating most rapidly in areas that previously had better nutrition. Ainsworth and Semali (2000) showed that orphanhood resulted in significant reductions in nutritional outcomes, with significant reductions in child height-for-age in Tanzania, and with worse outcomes for maternal orphans than paternal orphans. Similar results have been reported for eastern Uganda (Aspaas, 1997) and Indonesia (Gertler *et al.*, 2003). These are particularly worrying results. There is considerable evidence of the nutritional status of children being a determinant of future well-being in terms of lifetime health and poverty (Harper *et al.*, 2003), and combined with the results described above this suggests a significant negative generational effect of HIV/AIDS, in the absence of any intervention.

Education

HIV/AIDS affects both the supply and demand for education. On the supply side, increasing numbers of teachers are succumbing to HIV/AIDS, placing financial burdens on education systems and increasing the ratio of students to teachers (Hamoudi and Birdsall, 2002). On the demand side, HIV/AIDS-related costs reduce the amount of money available for households to pay for school-related costs, meaning children in HIV/AIDS-affected households may be removed from school. Further, lower life expectancy reduces the lifetime returns to education even for those who are not *a priori* HIV-infected, leading to a reduction in school attendance. Yamano and Jayne (2005) report significant impacts of adult mortality on primary school attendance in Kenya for the lower half of the wealth distribution (but not for the top half), and that the negative impact is greater among girls than boys in the time before death, but greater among boys following death. Further, they found that school attendance was negatively correlated with HIV prevalence even after accounting for child fixed effects, suggesting that HIV/AIDS also indirectly affects school attendance in ways other than through the death of an adult household member.[52] Case *et al.* (2004) also found that orphans in ten sub-Saharan African countries were less likely to attend school, even after accounting for their relative poverty. Bicego *et al.* (2003) found that losing one or both parents was significantly associated with lower educational attainment by age for children from five sub-Saharan African countries. Nyamukapa and Gregson (2005) found significant negative impacts on school completion rates for maternal orphans in Zimbabwe, but not paternal orphans or double orphans.

Poverty and inequality

In addition to increasing susceptibility to HIV infection, household or individual poverty increases vulnerability to the impacts of HIV/AIDS. There have been several published studies which have looked directly at the impact of HIV/AIDS on the income distribution, including poverty. Greener *et al.* (2000) simulated the effect of HIV/AIDS on the Botswana economy over a ten year period using data collected in two earlier household income studies, and concluded that the percentage of households in poverty would increase by 5 to 7 percentage points, and that the poor will become relative poorer, with incomes among the poor falling by 13 to 18 percent.

Many studies have found clear differences in the impacts of HIV/AIDS between poor and non-poor households (e.g. see Mather *et al.*, 2004; Yamano and Jayne, 2004). Finally, socioeconomic status (including income and education) has been shown to be significantly positively associated with the time of progression from

[52] Gertler *et al.* (2003) also found similar results for Indonesia and Mexico, as did Nampanya-Serpell (2000) for urban (but not rural) households in Zambia.

infection with HIV to AIDS, i.e. higher incomes and education result in a longer non-symptomatic period of infection[53] (Schechter *et al.*, 1994). This implies that HIV-infected people from lower socio-economic groups will face the impact of symptomatic AIDS sooner than those from higher socio-economic groups.

Coping strategies

To reduce the negative impacts of HIV/AIDS, households and individuals employ 'coping strategies' (Sauerborn *et al.*, 1996). However, these coping strategies themselves may have negative effects on the household or individual, such as causing resources to be diverted away from long-term productive capital, and reducing human and social capital development. Mutangadura *et al.* (1999) categorised coping strategies as being either: (i) aimed at improving food security; (ii) aimed at raising and supplementing income to maintain household consumption patterns; or (iii) aimed at alleviating the loss of labour. Sauerborn *et al.* (1996) earlier provided a wider taxonomy of eleven distinct types of coping behaviour which have either the effect of avoiding the costs of disease, or minimising the impacts of costs on the household.

Dissaving and borrowing appear to be among the most common coping strategies. In Limpopo province, South Africa, Oni *et al.* (2002) observed that HIV/AIDS-affected households had 36 percent lower savings and 300 percent higher borrowings than unaffected households. Sales of land, livestock, or other assets are also common. Yamano and Jayne (2002; 2004) report significant decreases in agricultural asset and small livestock (e.g. goats, chickens) ownership, and the value of these assets, for HIV/AIDS affected households in Kenya.[54] Lundberg *et al.* (2000), using data from the Kagera study mentioned previously, studied the role of inter-household transfers in mitigating the impacts of adult death. They concluded that wealthier households relied on private transfers while poorer household relied on (largely private) credit, and that richer households trust each other more to repay loans. These results demonstrate the importance of social capital in mitigating the impacts of HIV/AIDS on households.

[53] These associations were robust to health care access since all study participants had universal health care coverage.
[54] Mushati *et al.* (2004) found similar results for Zimbabwe.

A wide range of other coping strategies in addition to those mentioned above have also been noted, including changes in labour allocation, and sending children and the elderly to live with relatives. These strategies have been reported in many countries, including Rwanda (Donovan *et al.*, 2003), and South Africa (Oni *et al.*, 2002). Young and Ansell (2003) looked specifically at the qualitative impacts on children of migration as a response to HIV/AIDS, and found significant temporal changes in the structure of families and the formation of inter-familial relationships for children from Malawi and Lesotho.

However, the explanation of household responses to HIV/AIDS using the concept of coping strategies has been criticised. Rugalema (2000) reviewed the literature on the impact of HIV/AIDS-related morbidity and mortality in rural Africa, and concluded that the concept was of "limited value in explaining household experience" (Rugalema, 2000, p. 537), while Baylies (2002, p.618) suggested that "coping… tends to divert attention from a reality which is often very different".

The socio-economic impact of HIV/AIDS on households in Thailand

There have been surprisingly few studies of the impact of HIV/AIDS on households or individuals conducted in Thailand and published in the international literature, especially given the extensive nature of the epidemic compared with other Asian countries (see Chapter 1). The first such study was conducted by Pitayanon *et al.* (1997), also reported in Kongsin (1997) and Janjaroen (1998). This study calculated the impacts of HIV/AIDS-related deaths on 116 households in five districts of Chiang Mai province in Northern Thailand that had suffered an HIV/AIDS-related death in 1992 or 1993. They identified households for the survey using hospitals' records of HIV/AIDS-related deaths, and surveys were conducted in March 1994. They also surveyed 100 households with a non-HIV/AIDS-related death (also identified by hospital records), and 108 households in which no death had occurred – this control group were randomly selected from the same villages as the other households (Kongsin, 1997). They used the direct and indirect costs method proposed by Scitovsky and Rice (1987) to categorise and examine costs, and found that households which had suffered an HIV/AIDS death were more likely to be poor at the time of the survey. Direct costs (including medical treatment, travel expenses, and funereal expenses) were approximately US$2,500, with medical costs of US$973 equivalent to about six months of the average household income. Indirect costs (including income loss of care providers and the deceased, and present value of income foregone by the deceased) totalled US$28,694 and US$47,652 for those with and without a supplementary job respectively. The present value of income foregone dominated the indirect costs and the total estimated costs of an HIV/AIDS death. While direct costs were not significantly different from those of a non-HIV/AIDS-related death, the indirect costs were significantly higher due to the lower average ages of the deceased in the HIV/AIDS-affected households. HIV/AIDS was also shown to have a significant effect on household labour supply (reduced by 50 percent on average), household income (reduced by 47 percent on average), and created problems for the care of dependents such as children and the elderly. HIV/AIDS-related deaths also had a significantly larger impact on household consumption than non-HIV/AIDS-related deaths. Among coping strategies identified by the study were households using savings (60 percent), selling assets (19 percent) or land (44 percent), or borrowing (11 percent).

The study by Pitayanon *et al.* (1997) provided an excellent overview on the impact of HIV/AIDS on households in Thailand. However, there were a number of possible sources of bias, only some of which were acknowledged in the published papers. First, the sample selection was not random. This is particularly important considering the possibility that a large number of HIV/AIDS-related deaths are actually reported as due to other causes because of stigma, life insurance incentives, or other reasons (Im-em, 1999b). Non-random sample selection was further apparent by the distribution of occupations of the survey participants, where no 'labourers' were included in the control group, despite 23 percent labourers in the HIV/AIDS death sample, and 19.7 percent in the 'other death' sample. Second, the results may be subject to recall bias, as the surveys were conducted up to two years following the death of the household member. Finally, it may be difficult for the remaining household members to estimate the income of the deceased or their medical expenses if they were not directly involved in the financial functions of the household.

A more recent study, which considered the impacts of chronic HIV/AIDS-related morbidity rather than mortality, was conducted by Kongsin *et al.* (2000; 2002a). The research method, described in Kongsin and Watts (2000), used the same direct and indirect costs method as the earlier study by Pitayanon *et al.* (1997). The study surveyed 600 households from two districts of Phayao province in Northern Thailand – 300 households which had an adult sufferer of chronic HIV-AIDS-related morbidity and no recent death, and 300 households which had suffered no adult illness or death as a control group. The sample was selected randomly from about 7000 households that were enumerated and asked about whether there had been an adult illness within the previous six months or death within the previous two years. Fieldwork was conducted from April to December 1999. Results of the impact of HIV/AIDS were reported in Kongsin *et al.* (2000) and Kongsin *et al.* (2002b), but have not otherwise been published internationally. Chronic HIV/AIDS morbidity was found to have a significant negative impact on asset ownership, although HIV/AIDS-affected households also had significantly less debt. HIV/AIDS-affected households were significantly less likely to have cash income, although for those that did have cash income chronic HIV/AIDS-related morbidity did not appear to reduce it. Total income per capita and total consumption per capita were reduced by 70.7 percent and 43.5 percent respectively. Households employed a range of coping strategies including dissaving, taking out loans, reallocating labour, and removing children from school. They also found significant indicators of discrimination, including significantly higher rents paid by HIV-affected households when compared with unaffected households, and cases where people were thrown out of villages or fired from jobs due to HIV/AIDS. This study overcame the sample selection biases of the earlier study, but still possibly suffered from recall bias. This study shared many features with the research conducted in this thesis, and should therefore be the most comparable.

Another study assessed the family situation of HIV-positive women who had given birth 18 to 24 months earlier at one of the two largest maternity hospitals in Bangkok (Manopaiboon *et al.*, 1998). This study was based on a convenience sample drawn of 129 women drawn from respondents to an earlier study (used as baseline for comparison in the study). They found that 10 percent of the women had lost their partner since giving birth, and a further 11 percent had chronic HIV-related illness. Many of the other women had separated from their partner due to relationship problems with the partner or partner's family, and a significantly higher number of women were then living alone. Family income was reported to have been reduced in 30 percent of the interviewed families, and 54 percent had moved house since the baseline interviews – although of those only 7 percent attributed the reason for the move as HIV/AIDS or related stigma.

Other impact studies at the micro level

In addition to studies already noted above, there have been many other studies on specific population groups, including women, children and orphans, and the elderly. The impacts of HIV/AIDS on women are particularly important in light of the literature presented earlier. In many parts of the world, including Southeast Asia, women make up the majority of the agricultural workforce engaged in food production. For instance, in Thailand in 1990 women made up more than 50% of the agricultural workforce, and over 69% of employed women were involved in agriculture (United Nations Economic and Social Commission for Asia and the Pacific, 1996). As more women become infected with HIV and begin to suffer from AIDS-related morbidity, food production is likely to fall, with a consequent negative impact on nutrition in rural areas. If decreased food production results in increases in the price of food, this may also have a negative impact on nutrition for poor urban people. Few studies noted earlier have explicitly considered the special impacts on women, although much has been written on gender-specific impacts of HIV/AIDS (e.g. see Ashraf and Godwin, 1998; Gupta *et al.*, 2003). Pradhan and Sundar (2006) studied the gender impact of HIV/AIDS in six high-prevalence states in India and found that women from HIV-affected households were disproportionately affected emotionally, physically and financially. Among other effects, these women had significantly less leisure time than those in unaffected households, typically due to the burden of care for others in the household falling on them. They also found that the income of both rural and urban widows was over 20 percent lower than other households, with significantly more of these households in poverty.

Hunter and Williamson (1997) studied children orphaned as a result of HIV/AIDS in 23 African countries, finding that "children in households affected by HIV/AIDS face loss of their family and their identity, psychosocial distress, increased malnutrition, loss of health care (including immunization), increased demands for labour, reduced opportunities for schooling and education, the loss of their inheritance, forced migration, homelessness, and exposure to HIV infection" (Hunter and Williamson, 1997, p.14).[55] Foster *et al.* (1995) found that orphans in Zimbabwe were being increasingly cared for by maternal relatives, in contrast to the traditional practice of care within the paternal extended family.[56] Crampin *et al.* (2003a) studied the mortality and physical well-being of children in rural Malawi, and concluded the HIV/AIDS orphans had significantly higher mortality rates than non-orphans, but not higher rates of stunting, wasting, or reported ill health.[57] Ainsworth *et al.* (2005) studied the impacts of parental death on orphan's schooling in Tanzania, and found that school attendance was delayed, or for those already attending school hours were significantly reduced in the months leading up to adult death, but seemed to recover after mortality. However, Kamali *et al*. (1996) found limited effects of orphanhood on school attendance for rural Uganda, while Bennell (2005b) found similar results for a range of countries in sub-Saharan Africa, and concluded that the impact of parental mortality on educational attainment had been overstated in earlier studies.

Brown *et al.* (1995) studied the impacts on children in Thailand using data from the previously mentioned Pitayanon *et al.* (1997) study, and found 15 percent of children were removed from school to help support the family – many of whom were forced get a job after the death of a household member. Orphans were often sent to be cared for by their grandparents, or other relatives, or temples. More than half of the children interviewed "felt their household economic status had declined after the death of the household member" (Brown *et al.*, 1995, p. 147).

---

[55] See also Subbarao *et al*. (2001) on the plight of orphans in Africa.
[56] Although the authors concluded that this is not evidence of the breakdown of extended family methods of caring, but simply a necessary change in the community coping mechanisms.
[57] See also Preble (1990) for an early study on the potential impacts of HIV/AIDS on child and infant mortality.

The burden of care for adults infected with HIV and for the children (including orphans) of HIV-infected individuals often falls on their parents, most of who are elderly. Also, as the HIV epidemic matures, more households that are caring for elderly household members need to divert resources from that care to the care of chronically morbid HIV-infected household members. There have been few studies directly on the impact of HIV/AIDS on the elderly. Zimmer and Dayton (2003) studied the living arrangements of older people in sub-Saharan Africa and found that the number caring for orphaned or double-orphaned grandchildren was strongly associated with levels of HIV/AIDS-related mortality, confirming the burden of care as a result of HIV/AIDS increasingly falling on the elderly. Ainsworth and Dayton (2003)[58] studied the impact of prime-age adult morbidity on the nutritional level (measured by BMI) of people aged over 50 in Tanzania. They found that prior to the death of a prime-age adult, the BMI of older people declined suggesting worse nutritional outcomes. However after the death the BMI typically recovered to its former level, suggesting that the worse nutritional outcomes do not persist in the long run.

In Thailand, the Population Studies Center at the University of Michigan has conducted an extensive research program investigating the quantitative and qualitative impacts of HIV/AIDS on elderly people. Initially in a survey of 963 adult HIV/AIDS-related deaths prior to 1999 they confirmed extensive use of elderly as final care and support for HIV-infected people, with over two-thirds of adults dying of HIV/AIDS-related causes doing so after living with or adjacent to their elderly parents (Knodel *et al.*, 2000). However, they also found that the economic impact on the elderly was slight, unless the elderly were wealthy enough to spend significant amounts of money on expensive antiretroviral therapy for their children (Knodel and Saengtienchai, 2002a), though these costs were mitigated in many cases by health insurance and welfare systems (Knodel and Im-em, 2002, 2004). However, poorer households were most likely to have lost an economically productive household member and to face economic hardship (Knodel and Im-em, 2002, 2004), and many elderly people suffer significant emotional and physical impacts (Knodel *et al.*, 2002). Overall the extent of the

[58] See also Dayton and Ainsworth (2004).

impact on the elderly in Thailand is likely to be greater than the impact on the elderly in other cultures due to the special social relationships in Thailand (Knodel and Saengtienchai, 2002b; Knodel and van Landingham, 2002).

Finally, stigma is a significant impact on the households of HIV-infected individuals, and few studies have accounted for the effects of stigma while estimating the socio-economic impacts on households or individuals. McGrath *et al*. (1993), in a study of 24 families in urban Uganda, concluded that people with HIV/AIDS and their families were afraid of rejection from those outside the household, and that as the disease progressed they increasingly avoided outside contacts. The impact of stigma has important implications for policies selected to address the HIV/AIDS epidemic, as was previously discussed in Section 1.2.5 in the context of the mass media campaign in Thailand.

2.5.5 Socio-Economic Impacts of HIV/AIDS at the Macro Level

Studies of the impacts of HIV/AIDS at the regional or national level have employed a wider range of methodologies, including estimating total economic costs, empirical studies with cross-sectional or panel data, theoretical work, demographic and other projections, and simulations and modelling studies that compare two or more scenarios with a base case involving the economy with no HIV/AIDS epidemic.[59] The conclusions drawn from these studies have varied widely (Gaigbe-Togbe and Weinberger, 2004).

The most rudimentary analyses of the impacts of HIV/AIDS on the economy involve simply adding the direct and indirect costs of HIV infections. These costs might include healthcare and treatment costs, losses in output and productivity, and so on. In one such study of the macroeconomic impact on Thailand, the aggregate costs of the epidemic were estimated at US$7-9 billion by the year 2000, not including reductions in tourism, foreign investment, and labour exports (Harvard AIDS Institute, 1994). Bloom *et al.* (1997) used this method and estimated the total costs of HIV/AIDS in Sri Lanka in 1993 at $4 million per

[59] The various methods are reviewed in detail in Haacker (2002b) and critiqued in Drouhin *et al.* (2003).

annum. Also using this method, Anand *et al.* (1999) estimated the annual cost to the Indian economy over the period 1986-1995 at between 0.1 and 1.1 percent of GNP.

An alternative to the direct and indirect costs approach is to estimate the economic cost of the HIV epidemic as the sum of the willingness to pay to avoid the burden of the epidemic of all people in the economy (Mishan, 1971). Using this approach, Bloom *et al.* (1997) estimated the value of averting each HIV infection in Sri Lanka in 1993 at between US$1.11 million and US$9.41 million, and the total aggregate costs of AIDS from 1994 to 2005 at between US$2.34 billion and US$7.96 billion.

Demographic projections have been an important focus of research (see Section 2.5.1 for a review of the demographic impacts of HIV/AIDS), and have been used to develop projections on the economy-wide impact of HIV/AIDS. For instance, Shapouri and Rosen (2001) projected the negative impact of HIV/AIDS on grain production and food security in Africa. Other studies have avoided attempts to quantify the epidemic, instead using demographic and other projections and explaining the susceptibility and vulnerability of the social system as a whole.[60]

Many studies have involved the use of empirical data or structural models to model the impacts of the HIV/AIDS epidemic on the macro-economy. The simplest empirical studies have involved the use of cross-sectional or panel data sets to investigate the impacts on macroeconomic variables. For instance, Bloom and Mahal (1997a; 1997b) used data from 51 countries and found that HIV/AIDS had had no significant effect on the growth rate of real GDP, and no evidence of reverse causality. Other similar studies have established negative impacts of HIV/AIDS on the macro-economy. Bonnel (2000a; 2000b) used two stage least squares and ordinary least squares regression analysis and a system of three equations to test whether HIV/AIDS had any effect on macroeconomic variables. He found that HIV prevalence had a significant negative impact on per capita GDP growth, e.g. for a typical sub-Saharan country with an HIV prevalence of 20

[60] For example see Barnett *et al.* (1998) for Ukraine, Shell (2000) for South Africa, or Srinivasan and Sukumar (2006) for Kerala, India.

percent, the per capita GDP growth rate would be 2.6 percentage points lower per year.

Another common method of modelling the macroeconomic impacts of HIV/AIDS has been to use extended Solow-style models of growth.[61] Cuddington (1993b) applied this approach and population projections to the Tanzanian economy over the period 1985-2010, and compared scenarios with AIDS and no-AIDS. He found average GDP growth rate would be lower by 0.6 percentage points in the AIDS scenario, but per capita GDP was only negatively affected under some sets of assumptions. Cuddington (1993a) later extended this analysis to a dual-sector model with surplus labour, and found similar results, with GDP 15 to 25 percent lower in 2010 in the AIDS scenario, and per capita GDP approximately the same or slightly lower. Similar results were also found for Malawi (Cuddington and Hancock, 1994, 1995). Cuddington *et al.* (1994) further extended the analysis to show that appropriate policies could be used to return the economy to the non-AIDS equilibrium. However, Bloom *et al.* (1997) estimated only a moderate impact for Sri Lanka using a similar method, with GDP per capita growth reduced by just 0.04 percentage points. A similar approach was adopted by World Bank in a series of studies on the impacts of HIV/AIDS on Lesotho (Sackey and Raparla, 2000), Swaziland (Sackey and Raparla, 2001), and Namibia (Sackey *et al.*, 2001), as did the Botswana Institute for Development Policy Analysis (2000). All these studies had results similar to those of the Cuddington studies above. Haacker (2002a) used a similar model for nine countries in sub-Saharan Africa and found HIV/AIDS resulted in long-run increases in GDP per capita of between 3.9 and 9.6 percent for a closed economy model, but long-run decreases in GDP per capita of between 1.2 and 3.2 percent for an open economy model. Nicholls *et al.* (2000) used a Solow growth model with three sectors, supplementing it with a network model of the epidemic spread, and applied it to study the impacts of HIV/AIDS on Jamaica and Trinidad and Tobago over the period 1997-2005. They found the epidemic would lead to a significant decrease in savings of between 10.3 and 23.5 percent and to negative GDP growth of between 4.2 and 6.4 percent. Cuesta (2001) used a partial equilibrium model of the Honduran economy and found that

[61] Extending the original Solow (1956) model to incorporate the key macroeconomic causes and consequences of HIV/AIDS. See Drouhin *et al.* (2003) for a detailed explanation.

GDP growth would be only between 0.007 and 0.027 percentage points lower as a result of HIV/AIDS.

Early studies that concluded either a positive impact or no significant impact on per capita output caused some disquiet within the development community, leading some people to begin to emphasise instead the "human cost" of HIV/AIDS while acknowledging a limited economic cost (e.g. see Ainsworth and Over, 1994). For instance, Cohen (1997) instead estimated the impact on the Human Development Index[62] (HDI) for Namibia and found a significant negative impact.

Dixon *et al.* (2001) criticised earlier studies that grouped all countries together in empirical analyses, and instead studied the relationship between HIV prevalence and per capita GDP growth separately in countries from southern and eastern Africa and the 'rest of Africa'. They used an augmented Solow model where growth in GDP per capita is partially determined by 'health capital', and found that in countries (within their sample) where HIV prevalence is relatively low, the economies appear able to absorb the shock of the HIV epidemic, while in countries with high HIV prevalence, typically in southern or eastern Africa, economic relationships become distorted. For instance, they found that economic growth would decline despite an increase in the capital/labour ratio in some countries. McDonald and Roberts (2006) used a similar model and found significant negative effects of HIV/AIDS on per capita income, e.g. in Africa the marginal impact of a one percent increase in HIV prevalence was a 0.59 percent decrease in income per capita.

Another common method of estimating the macroeconomic impacts of HIV/AIDS has been to use a computable general equilibrium (CGE) model, and use simple assumptions to simulate the impacts of HIV/AIDS on the various sectors and their interactions. This method provides a theoretically consistent approach to measuring both the sectoral and economy-wide impacts of HIV/AIDS. Kambou *et al.* (1993) used an eleven-sector model of the Cameroonian economy, with three

[62] See United Nations Development Programme (1990-2005, annual).

categories of labour. They assumed the impact of HIV/AIDS to result in a decrease in labour supply to each market of 10,000 workers (i.e. 30,000 in total) over the period 1987-1991, and compared an AIDS and non-AIDS scenario. They found significant macroeconomic impacts including higher wages, a loss in competitiveness of local industry and a decline in trade revenues, lower public saving, and a reduction in investment growth, while the GDP growth rate would fall by half. Arndt and Lewis (2000) performed a similar analysis using a CGE model of the South African economy containing 14 productive sectors over the period 1997-2010. Unlike earlier CGE analyses, such as Kambou *et al.* (1993), Arndt and Lewis took into account costs beyond those in the health sector and impacts beyond labour supply, and also included a time dimension. They concluded that GDP was 17 percent lower in the AIDS scenario, and that nearly half of the deterioration in performance was due to government substitution of expenditure into healthcare. Arndt and Lewis (2001) then extended the analysis to consider specifically the impacts on the labour market and unemployment, and found that HIV/AIDS would depress labour demand and have virtually no effect on unemployment of unskilled or semi-skilled labourers compared with a no-AIDS scenario. Arndt (2003; 2006) used a similar model with 19 sectors, but focussing on human capital accumulation through education, to analyse the impacts on the economy of Mozambique. He found real GDP growth would be between 2.8 and 4.3 percent lower by 2010. Quattek (2000) used an extensive model of the South African economy with ninety equations, and estimated that GDP growth would be 0.3-0.4 percentage points per annum lower than in the absence of HIV/AIDS, and that domestic savings as a percentage of GDP would be 2 percent lower.

Many researchers have criticised earlier methods for assessing macroeconomic impacts, arguing that methods such as the Solow framework systematically underestimate the full impact of HIV/AIDS on the population as, among other things, they do not adequately account for the impacts on human capital. This has resulted in a move to more complex macroeconomic modelling techniques. For instance, Over (1992) projected the economic growth of 30 countries in sub-Saharan Africa with and without AIDS by modelling the link between economic growth and the labour force, capital accumulation, and other growth determinants and applying demographic projections. He also modelled the effect on human capital and savings rates, and similar to the results of simpler Solow models described above, he found that the GDP growth rate was between 0.5 and 1.5 percentage points lower in the AIDS scenario, and GDP per capita growth could be lower or higher, depending on the assumptions employed. Young (2004; 2005) used a Beckerian household framework with a constant savings rate and endogenous participation, fertility, and education decisions to model the impacts of HIV/AIDS on the South African economy. He found that HIV/AIDS would cause reduced human capital investment (children born in 1995 would on average receive 1.5 fewer years of schooling), but significantly higher output per capita over a fifty year period (with output per capita lower than the no-AIDS scenario after that time) and increased living standards. Bruhns (2005) developed a similar household model for the Kenyan economy and found that, in the absence of intervention, GDP would be 54 percent lower by 2030 than the no-AIDS scenario and household incomes 63 percent lower. Government policies were found to only partially reduce the negative impacts of the epidemic. Drouhin *et al.* (2003) developed an exogenous growth model and showed theoretically that, if growth falls below an epidemiological threshold the economy could become trapped in a vicious downward spiral of lower productivity, lower production, and lower spending on human capital.

Bell *et al.* (2003; 2004) developed an overlapping generations model, which quantifies how HIV/AIDS affects the formation and transmission of human capital and the intergenerational returns to human capital. They considered three channels of impact on human capital: (i) parents' mortality affects the intergenerational transfer of human capital; (ii) loss of income causing reduced investment in schooling; and (iii) investment in education is made less attractive by the change that children will become infected with HIV. Their dynamic system can result in multiple equilibriums. Families with low human capital have low earning and low investment in the next generation, perpetuating a poverty trap as described in Section 2.4.6, while families with high human capital invest more in their children, who in turn have higher incomes upon adulthood. They calibrated their model using data from South Africa, and estimated three growth paths for the South African economy: a scenario without AIDS, and two scenarios employing different assumptions of parental expectations about future mortality. They found that investment in schooling and family incomes would fall dramatically as a result of HIV/AIDS. Parental expectations concerning their children's future and the returns to education were a key determinant of the extent of the impacts. For example, in a scenario where expectations about future mortality are rational the investment in schooling would fall to zero by 2020. Corrigan *et al.* (2005) used a similar overlapping generations model which ignored the third channel mentioned above, and calibrated their model for a 'typical sub-Saharan African country'. They found that for a range of different assumptions, and HIV prevalence of about 15 to 20 percent, the growth rate of per capita income is 30 to 40 percent lower than a no-AIDS scenario. Ferreira and Pessoa (2003) used a similar model for twelve sub-Saharan African countries and found that per capita income would be 15 to 46 percent lower and schooling up to 72 percent lower than a no-AIDS scenario.

Other recent studies have shifted from analysing the macroeconomic impacts on standard economic indicators such as labour and output, to measurement of the welfare impacts of HIV/AIDS. The rationale is that the most direct welfare effects of HIV/AIDS are associated with increases in mortality; therefore the value of the lost life expectancy can be evaluated using the value of statistical life. Crafts and Haacker (2004) evaluated the welfare costs using estimates of the value of statistical life for seven developing countries with different HIV prevalence, and estimated average welfare losses of between 92.9 percent (Botswana) and 2.9 percent (Vietnam) for 2004, projected to increase to 93.4 percent and 4.3 percent respectively in 2010. Crafts and Haacker (2003) presented similar results for a different set of countries including Thailand, where they estimated the average welfare impacts at 6.2 percent in 2003 and projected to be 6.5 percent in 2010.

Finally, micro-simulation has also been used to estimate the macro-level effects of the HIV epidemic. Cogneau and Grimm (2002) developed a demo-economic micro-simulation model of the Cote d'Ivoire economy, and estimated that the size of the economy would shrink by 6 percent after 15 years, but income per capita, income inequality, and poverty would be roughly unchanged.

Other studies have looked at further international or macro issues such as social security and social protection (Bonnerjee, 2003; MacQuene *et al.*, 2002; Plamondon *et al.*, 2004), public services (Haacker, 2004b), governance (de Waal, 2003), democracy (Manning, 2002; Nelufule, 2004), security (Bartels, 2003; Garrett, 2005; Heinecken, 2001), political stability (Elbe, 2003), peacekeeping (Tripodi and Patel, 2002), and humanitarian action (Harvey, 2004). Since these topics are well outside the scope of this thesis, we will move to a discussion of the dual relationships between HIV infection and poverty.

2.6 Recognising the Dual Relationships between HIV Infection and Poverty

As can be seen from Sections 2.5 and 2.6, there may be two significant relationships between HIV infection and poverty – poverty may be a determinant of HIV infection (Section 2.5), and HIV infection may be a cause of poverty (Section 2.6). This dual relationship has been recognised in published literature, but has rarely been studied empirically – the studies in Sections 2.5 and 2.6 mostly concentrate on only one of these relationships. However, understanding that both of these relationships occur simultaneously is important to our understanding of both HIV/AIDS and poverty, and to the implementation of effective policies to mitigate both. For instance, Gillespie and Kadiyala (2005a) conclude that a comprehensive approach to tackling HIV/AIDS will have positive effects on poverty, and that "together they represent a continuum or web of mutually reinforcing responses" (Gillespie and Kadiyala, 2005a, p. 81).

Chapter 3 describes how HIV infection and poverty affect the household decision making process, and develops this into a theory of the relationships between HIV infection and poverty. This culminates in the presentation of the poverty-HIV/AIDS cycle, similar to that previously described in Cameron (2003).

Chapter 3

Hypotheses

3.1 Poverty and HIV/AIDS in the Decision-Making Framework

Living in a risk environment makes a considerable difference to the individual's decision-making process. Some activities such as commercial sex work carry a significant risk of HIV infection and consequently a higher probability of adverse outcomes. Individuals make themselves susceptible to HIV infection to the extent that they are unable or unwilling to avoid these risky activities. An individual may also choose to engage in a risky activity where there is insufficient information available about the risks, where the information that is available is not seen as credible, or where the individual is unable to accurately assess the level of risk given available information. Even in the absence of these information problems, the individual might still choose the risky occupation if the compensating wage differential exceeds the expected cost (Borjas, 2000; Gertler *et al.*, 2005).

An individual's decision-making process is obviously impacted by HIV/AIDS. Where they, or another member of their household, are infected with HIV this affects both their endowments and outcomes. Further, the prevalence of HIV/AIDS in the social environment may also affect their decision making. As explained in Section 2.5, Freire (2003) recently expanded the definition of an affected household by considering status and temporal dimensions of impacts on households. In this thesis, that definition is modified by considering the impact on individuals rather than households. Under this modified definition, impacts of HIV/AIDS include both gross impacts imposed exogenously on the individual, as well as behavioural changes induced by the gross impact (coping mechanisms).

Note that behavioural changes as a result of HIV/AIDS do not necessarily require a direct gross impact on the individual, and this is a departure from the theory presented by Freire (2003). In this thesis, an adverse impact of HIV/AIDS will be defined as follows:

> *If an individual was optimising his/her outcomes prior to the intervention of HIV/AIDS, and HIV/AIDS in some way causes the individual to modify his/her behaviour thereby reducing his/her welfare (a Pareto-inferior change), then that individual has been adversely impacted by HIV/AIDS.*

By taking this broader definition of the impact of HIV/AIDS, a wider range of individuals, beyond those that simply live in a household with an HIV-infected individual, are found to be impacted by HIV/AIDS.[63] Under this definition a taxonomy of impacts can be described in which there are five ways in which an individual's decision-making behaviour is affected by HIV/AIDS. These impacts (Types I to V) are summarised in Table 3.1, and explained in Sections 3.1.1 to 3.1.5. These impacts include both the status and temporal dimensions identified by Freire (2003).

---

[63] A similar interpretation is taken by Kremer (1996).

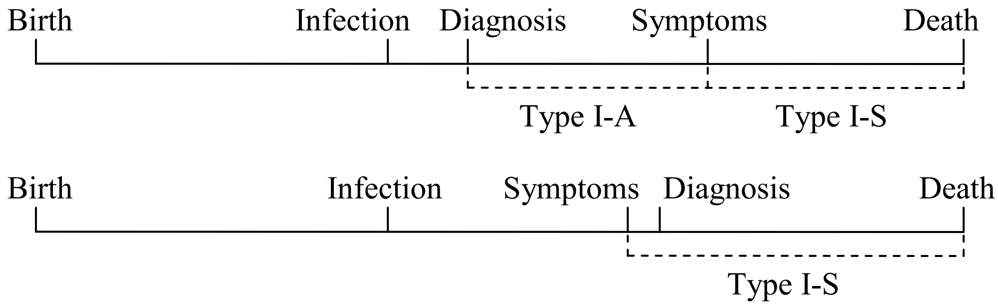
Table 3.1: Summary of the five types of impacts of HIV/AIDS

Impact Type	Who is affected	Examples of impacts
Type I impacts	HIV-infected individuals	• reduction in labour supply • higher medical expenditure • lower human capital investment
Type II impacts	Other members of HIV-infected individuals' households	• responsibility for medical expenditures of HIV-infected member • lower social capital accumulation • movement of household members to other households
Type III impacts	Members of households that care for former dependents of HIV-infected individuals' households	• common resources shared between more household members
Type IV impacts	Individuals whose preferences change as a result of HIV/AIDS	• behavioural change • lower social capital accumulation
Type V impacts	Individuals affected by macroeconomic changes brought about by HIV/AIDS	• market failures in public goods markets • changes in relative prices • changes in relative wages

3.1.1 HIV/AIDS, Decision-Making and Poverty with Type I Impacts

A Type I impact occurs as a result of the HIV infection of the individual and impacts the individual themselves. Their decision-making is impacted because they have either: (i) been diagnosed with HIV; or (ii) have begun to show symptoms of AIDS. In this thesis, the 'impact time' will be defined as the time when the individual was impacted by HIV/AIDS. This will not be the time when the individual became infected with HIV, as at that time they are unaware of their serostatus and therefore have no incentive to change their behaviour. The impact time will then be the earlier of: (i) when they are diagnosed with HIV; or (ii) when they begin to exhibit symptoms of AIDS; whichever occurs first. This can be illustrated with the aid of two simple typical life course timelines for HIV-infected individuals, as shown in Figure 3.1.

Figure 3.1: Two typical life course timelines for an HIV-infected individual[64]



An individual may exhibit different behavioural responses to HIV/AIDS depending on their health status. The impact on the individual's decision-making occurs from the moment they become informed of the infection, either through diagnosis of HIV infection or the beginning of AIDS symptoms, and continues until death. Decision-making is influenced through changes in the endowments of the individual, and through the implementation of coping strategies and the consequences of those strategies. If the individual knows they are infected with HIV, but are asymptomatic, the impacts on their behaviour will be Type I-A impacts as illustrated in Figure 3.1. If they begin to exhibit symptoms of AIDS, whether or not they know they are infected with HIV, the impacts on their behaviour will be Type I-S impacts.

Individuals who are informed of their serostatus but are asymptomatic are probably able to continue to be a productive member of their household as normal. The impacts (Type I-A impacts) on this individual may be very slight, but might include changes in sexual behaviour, increased medical costs to delay the onset of AIDS, and so on. This individual has time on their side – Type I-S impacts will occur in the future, when the infected individual eventually progresses to AIDS. However, the individual may still modify their behaviour to take into account the certainty that their future medical expenses will be higher (even if they are not now) and future labour endowment will be reduced as a result of their expected future morbidity. They can expect their future endowments to be reduced, and consequently their future outcomes to be less favourable. As a

[64] These timelines are not drawn to scale.

coping mechanism, this individual may even seek to protect and increase their existing endowments in anticipation of their future decline.

Type I-S impacts represent a significant shock for the individual. Firstly, the individual will face a reduction in their endowments due to increasing morbidity as they become ill from AIDS-related opportunistic infections. Along with significantly higher medical expenditure that probably accompanies illness, these Type I-S impacts result in significantly worse outcomes for the individual throughout the remainder of their life.

As the individual's life expectancy falls as a result of HIV/AIDS, the marginal returns to human capital investment fall, regardless of whether the individual is symptomatic or not. It is likely that they will modify their decision about investment in their own human capital in the face of reduced returns relative to current productive activities. This behavioural response to HIV infection is also a Type I impact and reduces their future endowments and hence also reduces future outcomes. AIDS-related morbidity and mortality is almost certain to also interrupt the accumulation of social capital by the HIV-infected individual. As they suffer AIDS-related morbidity, they become less able to maintain existing social connections or to create new connections with friends, neighbours and relatives. This impact may be even worse in areas where significant stigma is attached to HIV infection – in such areas HIV-infected individuals might find themselves isolated or ostracised by their household or community.

Asymptomatic infected individuals may seek out medical treatment before symptoms occur in order to delay the progression to AIDS (a Type I-A impact). This might include traditional medicine as well as public or private medical treatment, including antiretroviral treatment where available. If they are successful in getting effective treatment, then this will reduce the likelihood of other behavioural changes and delay the onset of Type I-S impacts.

Where an individual was vulnerable to poverty before the Type I impacts described above, then the effects of these impacts may cause both the insufficiency and insecurity characteristics of poverty. Even where an individual was not vulnerable before the health shock, then these impacts might cause them to be vulnerable to any future unrelated shocks. Clearly, in the absence of interventions, Type I impacts place the individual at a significantly greater risk of poverty.

3.1.2 HIV/AIDS, Decision-Making and Poverty with Type II Impacts

A Type II impact affects other household members living in the same household as the HIV-infected individual. While Type II impacts are less direct than Type I impacts, Type II impacts may have serious consequences on the effective functioning of the household unit. Type II impacts are more likely to occur in combination with Type I-S impacts, as shown by the example in Section 3.1.1 of medical expenses. If the HIV-infected individual is asymptomatic, other members of their household may not even know they are infected even if the individual themselves does. In these cases there would likely be no Type II impacts until the HIV-infected household member becomes symptomatic, i.e. there would be no incentive for the decision making of other members of the household to change.

As the infected household member becomes increasingly sick (a Type I-S impact), the household might collectively cover the individual's medical costs and eventually, funeral expenses. These obligations represent a Type II impact on the individuals in the household.

Type II impacts increase the vulnerability of the other members of the household to the insufficiency and insecurity characteristics of poverty. The household members may respond by increasing labour intensity, reducing leisure activity, capital investment in labour saving devices, and decreasing investment in human and social capital. Members of these affected households might reduce current consumption in favour of savings in anticipation of their obligation for higher future expenditures. While this may reduce their vulnerability to the future anticipated health shock of the infected household member's morbidity, it reduces the sufficiency of their current outcomes – i.e. it may only be possible for individuals (and households) that have sufficient outcomes to modify their savings behaviour appreciably.

As infected household members become increasingly affected by AIDS-related morbidity the other household members, particularly women household members who are typically the main caregivers to the sick, must increasingly transfer resources in terms of their labour supply to the care of the HIV-infected. This transfer of labour indentures women to their traditional role of caregiver, reducing their mobility and access to resources not provided by men, and reinforces previous gender inequality in labour supply and income. This reduced female labour supply also worsens the nutritional effects of food insecurity (see Chapter 2). Further, individuals who do not directly care for the HIV-infected individual may respond to the reduction in labour supply available to the household as a whole by increasing the intensity of their own labour supply. This is especially the case where the adult members of the household are suffering from AIDS-related morbidity, and their labour supply or food production must be replaced by the other formerly unproductive members of the household. This may involve a reduction in leisure activity by remaining adult members. It may involve formerly retired or infirm household members returning to active employment, or children may temporarily or permanently abandon education in order to earn income.

Human capital investment in uninfected members of the household might also be reduced. Not only is formal education affected by this reduction in investment, but the increasing morbidity and eventual mortality of adult household members also interrupts the natural transfer of production technology and know-how from adults to their children. This results in decreases in production efficiency and less-favourable future outcomes, either in terms of food or cash crop production, or income-earning potential. Lower human capital accumulation will have a lasting effect on the remaining members of the household after the death of the HIV-infected individual, by reducing their future endowments and ability to take advantage of opportunities. Of course, these reductions in human capital accumulation will be less for individuals that are already insufficient or insecure, as they were already less able to fund human capital investment and may well have not been doing so.

These behavioural responses assume that other household members are at least somewhat altruistic towards the infected individual. In reality, unfortunately, this is not always the case. In areas where HIV infection is highly stigmatised, it is possible that the uninfected household members might vilify or ostracise the infected household member, particularly if they are seen as some threat to the safety or security of the remainder of the household. In these cases, the flow of common household resources to the infected individual may be restricted, or the infected individual may even simply be ejected from the household (a Type I impact on the HIV-infected individual). The Type II impacts on these households would then be reduced, or limited to the loss of the inputs provided by the infected individual.

The reduction in social capital experienced by the HIV-infected household members themselves (see Section 3.1.1) possibly extends to the other members of their household. This situation is exacerbated where there exists significant stigma associated with HIV infection – other members of the community may refuse to associate with or to aid the household members due to perceived health risks or ‘social evils’ (Busza, 1999; Herek, 1999). Also, increasing labour supply by HIV-negative members of the household reduces their leisure time and investment in social capital. Social capital is an important endowment for the members of the household (Woolcock and Narayan, 2000), and any reduction makes them especially vulnerable to future shocks, including the eventual death of the HIV-infected household members to AIDS-related causes.

Another likely Type II impact is the movement of dependents into other households. These individuals, including children, the elderly, or the chronically sick or disabled (but excluding HIV-infected individuals), who were previously dependent on the now-affected household for support, may find themselves in a worse situation in their new household. Among other impacts, children may face lower human capital investment and hence slower endowment accumulation. Finally, members of the HIV-infected individual’s household may choose to break off and form a new household, which would otherwise not have existed (see also Section 3.1.6 below). These individuals may be faced with accumulating shared household resources from a low base level.

3.1.3 HIV/AIDS, Decision-Making and Poverty with Type III Impacts

A Type III impact is a step further removed from the HIV-infected individual. Where an individual accepts a responsibility to care for the former dependents of another household in which there are Type I or Type II impacts, then this creates Type III impacts. The dependents moving into the destination household may be AIDS orphans, other children, the elderly, or the chronically sick or disabled, whose 'origin' households were forced to find other means of caring for them, perhaps because of chronic insufficiency. Sometimes children or other dependents might be sent to live with relatives even if the household had the means to support them – this might be true if the AIDS infected person was seen as a threat to their wellbeing (a form of stigma). Any changes to the behaviour of individuals in this 'destination' household that result from this reallocation of care are Type III impacts.

The destination household is expanded by the inclusion of additional dependents, who may be unproductive or underproductive. This means that more favourable outcomes need to be generated by the productive individuals in the household from the same amount of endowments and acquisitions in order for them to maintain their level of well-being and maintain their prior risk of insufficiency. This may result in many changes in the decision-making of individuals, which are different from those changes resulting from Type I or Type II impacts.

In the short run, i.e. while the 'adopted' dependents remain dependent on the productive members of the destination household without themselves being productive, the impacts will be similar to Type I-S impacts, with the obvious exception that they do not face higher medical expenditures. Type III impacts, affecting those in the destination household, might include decreasing investment in human and social capital, and reinforcement of gender inequality. As women are generally the caregivers of dependents, regardless of whether they are HIV-infected or not, the reinforcement of gender inequality is the same as the Type I-S impact (see Section 3.1.1). Where the new dependent is a child, there may be a reduction in the human capital investment in other children in the destination household, as shared resources are spread across more recipients. The accumulation of social capital is unlikely to be affected, unless other households perceive the ‘adopted’ household member as a threat to the community, in which case the members of the destination household might find it increasingly difficult to maintain their existing level of social capital.

In the long run, the ‘adopted’ dependents will become independent (in the case of children), or will eventually die and no longer affect the members of this household. The remaining members of the destination household may well return to their previous state, although with perhaps less endowments than they would otherwise have accumulated. Due to their nature, Type III impacts make the members of the destination household vulnerable to poverty.

3.1.4 HIV/AIDS, Decision-Making and Poverty with Type IV Impacts

A Type IV impact is even more indirect than the other types previously described. This type of impact occurs where an individual modifies their decision-making in response to the perceived risks of living in a risk environment. The most common changes in behaviour are likely to be modifications to their leisure behaviour, reductions in social capital investment, and changes in work decisions as a result of changes in the individual’s risk perceptions. Unlike the types of impacts previously described, Type IV impacts are not necessarily welfare-reducing since they arise as a result of changes in preferences. Since the individual was optimising before the change in their behaviour, and these changes in behaviour arise as a result of changes in their preferences, any change in the individual’s utility is ambiguous.

Modifications to at-risk people’s leisure behaviour are probably desirable from a policy standpoint. In fact, many governments have concentrated their AIDS prevention efforts on behavioural modification. Individuals who perceive the probability-adjusted costs of certain behaviour (such as unprotected sex, or injecting drug use) as less than the benefits will avoid that behaviour. Changes in the perception of risk in their environment are critical to the change in behaviour. If behaviour is seen as more ‘risky’, that is higher cost, than previously this will induce a change. However, not all of the behavioural change is likely to be of benefit to the household or community. Often the leisure activities which will be affected by changes in risk perception are also activities that help to create enduring social capital between neighbours or within a village, particularly among groups of men. It is possible that a reduction in such behaviour will lead to a consequent reduction in social capital formation. However, it is also likely that men will substitute towards other leisure activities, and social capital formation might then be largely unaffected.

An even more likely result of the HIV/AIDS pandemic is that the spread of information on the risks of HIV/AIDS, unless carefully managed, could lead to paranoia from some individuals. These individuals may seek to avoid those that they believe are at high risk of HIV infection, and encourage other members of their community to do the same. This may result in decreasing social capital formation within the community – a serious Type IV impact. These individuals might even migrate to other regions where they may perceive themselves to be at lower risk, thereby forfeiting their accumulated social capital and incurring significant costs of relocation. These losses and costs make the individual vulnerable to poverty in their destination.

3.1.5 HIV/AIDS, Decision-Making and Poverty with Type V Impacts

Type V impacts are even further removed from 'direct' impacts of HIV/AIDS. Type V impacts on individual decision-making occur through the aggregate effects of changes in the decisions made by others in the economy. There may be market failures caused by changes in the aggregate behaviour of individuals or of government or non-government organisations. Rather than being affected by a reduction in endowments (as in Type I, II or III impacts), or a change in preferences (Type IV impacts), individuals facing type V impacts are affected by a reduction in opportunities presented by the environment.

Examples of market failures that would affect decision-making behaviour include the life insurance and health insurance markets. A risk environment exacerbates the adverse selection problems of these insurance markets as those in high-risk situations seek to spread at least some of the risk of their behaviour to insurance companies. The firms' initial response may be to exclude HIV/AIDS from policy coverage. HIV/AIDS policy exclusions raise incentives for life insurance policyholders to manipulate the cause of death, and this behaviour has been observed in many countries, including Thailand (Im-em, 1999b). Insurance firms may then resort to raising life (and health) insurance premiums to cover their added costs, thereby pricing many individuals out of the market.

There may also be failures in financial markets – including the provision of savings and loan services, whether through formal banks, savings groups or microfinance projects – as fewer customers increase the marginal transactions costs of these institutions. If the AIDS epidemic is widespread and the government is unable to maintain capacity, there may even be failures in the provision of important public goods such as healthcare, education, and national security (Garrett, 2005).

Changes in relative wages may occur if HIV/AIDS morbidity and mortality disproportionately affects different occupations, and labour demand and labour supply and labour productivity are likely to be affected. There may be changes in relative prices as Type I and Type II impacts begin to take hold throughout the economy.

Type V impacts are likely to be most severe where HIV prevalence is very high. It is unlikely that these effects will be separately distinguishable in a moderately-affected economy such as Thailand, and as such are not addressed further in this thesis.

3.1.6 Poverty, HIV/AIDS and the Creation and Dissolution of Households

Some Type I and Type II impacts, as well as Type III impacts in general, involve changes in the structure of households. Household members may move between households, form new households, combine households, or even eject members of the household in response to HIV/AIDS. The formation of two new households from one larger household may be the result of one or more household members striking out on their own and becoming much more independent (such is the case for young adults). However, in the context of HIV/AIDS, there are other possibilities. Other members of the household might see an HIV-infected individual as a threat and, when evaluating their outcomes, decide that their outcomes are more favourable if they belonged to a household that did not include that individual. This may be true whether or not the individual is symptomatic. Such household division will occur where the expected gains from joint residence (compared to division of the household) are negative (Foster and Rosenzweig, 2002). Such changes in households may make individuals in both the new household and in the origin household more vulnerable to poverty, and may even force members of one or both households into insufficiency. An extreme case of the division of a household is where the HIV-infected individual is cast out of the household. This is a manifestation of stigma that likely causes extremely adverse outcomes for the infected individual (a Type I impact).

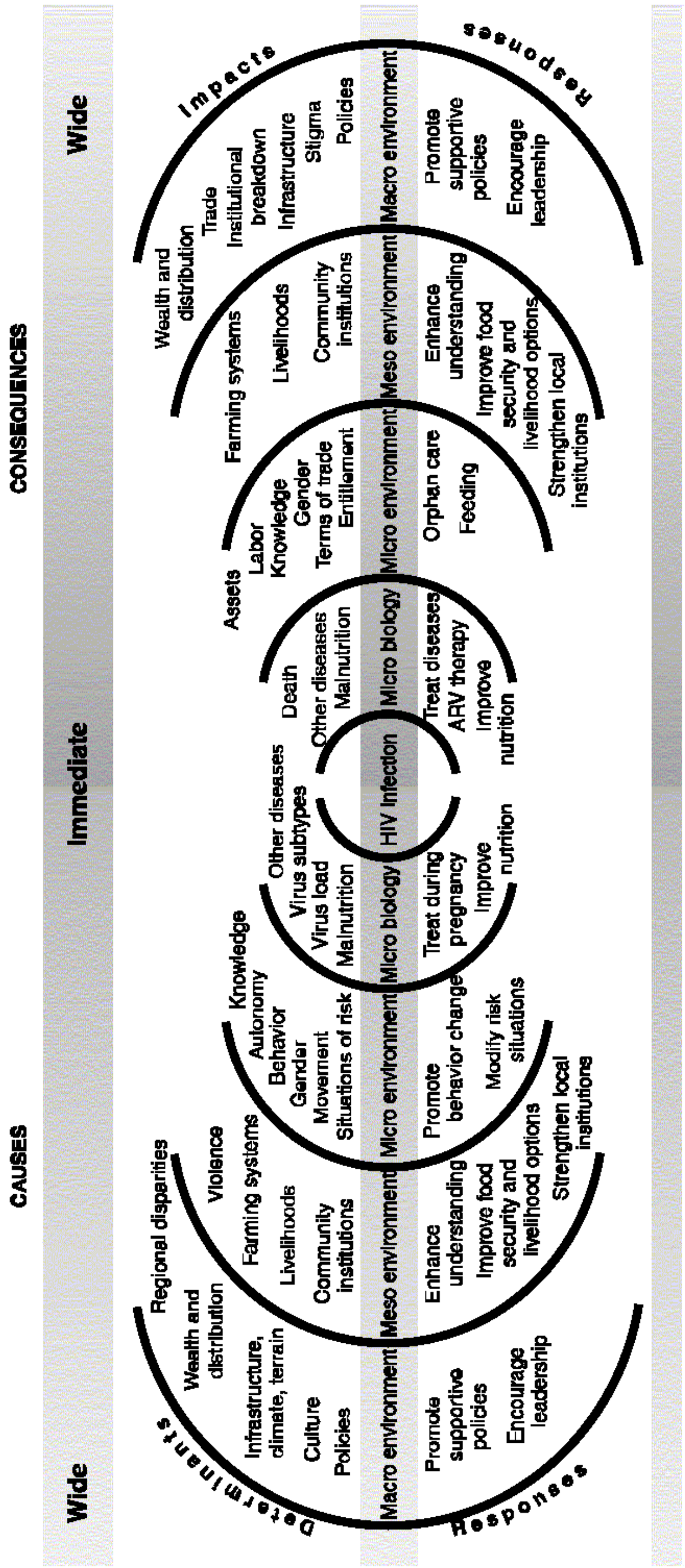
The opposite case is also possible. Two or more affected households might join together, or new household members may join an existing household, in order to pool resources and support the HIV-infected individual or individuals. There may be economies of scale in the provision of care for HIV-infected individuals which then provides incentives for two or more directly-affected households to combine, or for infected individuals to join an existing affected household. Households might also combine in order to reduce the average burden of the costs of care for an HIV-infected individual.

Finally, households may dissolve as a result of HIV/AIDS. This may be particularly true when the most productive members of the household die, leaving only dependent household members, such as children, the elderly, or the chronically sick or disabled. This likely results in often extremely adverse future outcomes for the remaining (formerly dependent) household members. The remaining members may attempt to continue as a household, may join other households (a Type II impact, and a Type III impact on members of the destination household), or may live alone. The remaining individuals are typically much less productive, either because of old age, sickness or disability, or in the case of children because they lack sufficient human capital to make them sufficiently productive. Members of these households are at greatest risk of insufficiency, insecurity and vulnerability – all the characteristics of poverty. For instance in a study on households in rural northern KwaZulu Natal in South Africa, Hosegood *et al.* (2004) confirmed that households where one or more adults died were significantly more likely to dissolve than comparable households without an adult death.

3.2 The Poverty-HIV/AIDS Cycle

As Section 3.1 describes, HIV/AIDS is a significant shock to individuals and households. It makes non-poor households and individuals vulnerable to poverty, or threatens already poor individuals with deeper poverty. Reductions in endowments affect the range of opportunities people can take advantage of, i.e. the available choice set, and hence the range of activities they can choose to perform. Outcomes are also vulnerable – with diminished endowments and acquisitions the resulting outcomes will be less favourable. In addition to lower utility, this might result in fewer or lower quality acquisitions and endowments, trapping the individual, and potentially other members of the same household, in poverty. Also, since the individual's choice of future activities is then constrained by limited endowments and acquisitions, occupational choices that increase his/her susceptibility to HIV infection, including migration or commercial sex work, may be more likely to be selected. When migrants or other high-risk individuals return to the household, they carry with them an increased risk of HIV infection, thereby increasing the susceptibility of other household members.

Figure 3.2: HIV/AIDS determinants, impacts, and responses



[Source: Loevinsohn and Gillespie (2003)]

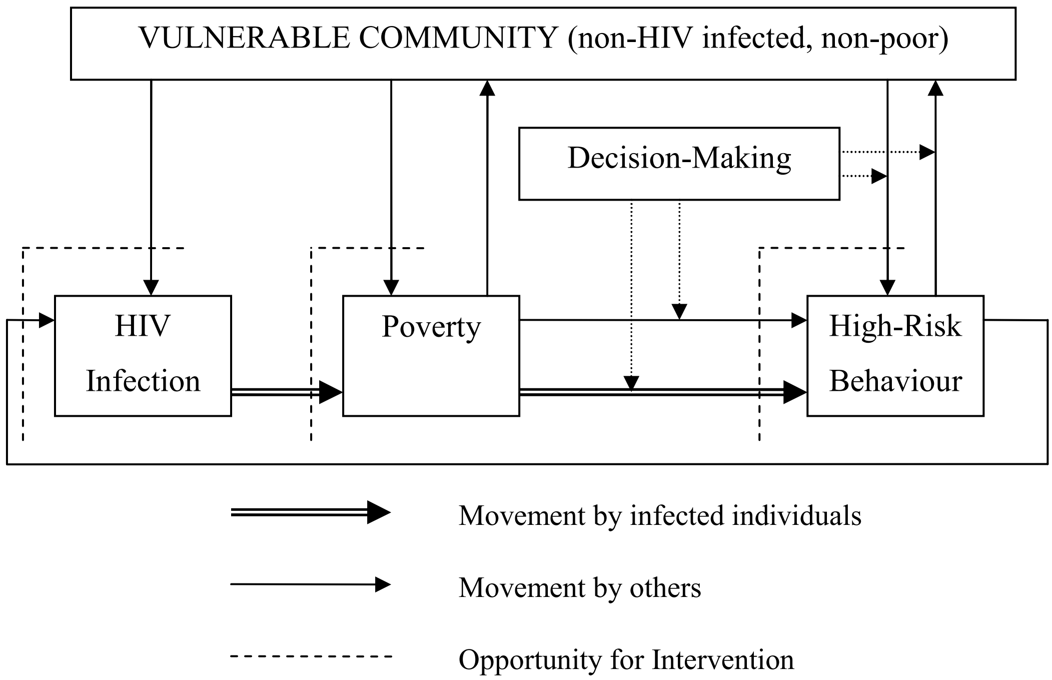
This suggests a perpetuating cycle from poverty to HIV infection and back to poverty. This theory of a poverty-HIV/AIDS cycle is the key theme of this thesis. Loevinsohn and Gillespie (2003) and Gillespie and Kadiyala (2005a; 2005b) describe this cycle at the wider level, and their cycle is presented in Figure 3.2. The top left quadrant of the figure describes the determinants of HIV infection, i.e. what makes people or communities susceptible to HIV. The bottom left describes resistance, or the actions that may be taken to reduce susceptibility. The top right quadrant describes the impacts of HIV, i.e. how HIV makes people or communities vulnerable to food insecurity. The bottom right describes resilience, or the actions that may be taken to reduce this vulnerability. Gillespie and Kadiyala (2005a) suggest that the cycle begins as impact waves begin to overlap and become causal waves, i.e. as vulnerability and individuals' responses to it begin to make them more susceptible to HIV infection.

However, Cameron (2003) further described a similar cycle as it applies to individuals and households. This 'vicious circle' between HIV/AIDS, poverty and high-risk behaviour at the individual level is illustrated in Figure 3.3.

The cycle begins with the vulnerable community, here defined as non-poor, non-HIV-infected individuals. These individuals are vulnerable to entering the 'vicious circle' – through their own choices, exogenous shocks, or a combination of both. Individuals may move from the vulnerable community into the 'vicious circle' either by becoming infected with HIV, by moving into poverty, or by engaging in high-risk behaviour (which is defined as any behaviour that increases an individual's susceptibility to HIV infection).

As noted in Section 3.1, HIV-infected individuals are especially vulnerable to poverty – even if they are not insufficient or insecure, economic shocks could often result in these characteristics of poverty for the individual, or other members of their household. This would move the individual from HIV infection to poverty.

Figure 3.3: The poverty-HIV/AIDS cycle



[Source: Adapted from Cameron (2003)]

The poor use coping mechanisms to reduce the impact of poverty. As previously described, one coping mechanism is to engage in high-risk behaviour such as commercial sex work – which gives the benefit of higher short-term incomes but at the risk of HIV infection. The information set of the poor is important in their estimation of the costs of high-risk behaviour. Individuals can choose high-risk behaviour – the fact that the HIV-infected, whether or not they are aware of their status, can choose this behaviour increases the risks to all. This would move the individual from poverty to high-risk behaviour. High-risk behaviour, by definition, makes people susceptible to HIV infection, moving some individuals from high-risk behaviour to HIV infection.

This 'vicious circle' framework has two important implications. First, once they have entered the 'vicious circle' only individuals who are not HIV-infected may escape the cycle. This illustrates the importance of prevention. Second, there are many opportunities for intervention, and some of these opportunities have already been identified and used in many countries (Jha *et al.*, 2001).

The interventions between high-risk behaviour and HIV infection are in widespread use – needle exchange programs and 100% condom programs for commercial sex workers being just two examples. These *susceptibility interventions* are key in this framework, since once a person has become infected, they may not escape the 'vicious circle', and they increase the risks to other members of their household and community as well.

Possible interventions between HIV/AIDS prevalence and poverty have been widely identified in the recent literature and mainstream media, including the provision of free or inexpensive treatment methods (e.g. see Lanjouw, 2002). Interventions designed to alleviate poverty or vulnerability will generally be of use here, and with little alteration. Development of expanded social networks, a common coping mechanism in developing countries, is one example. These *vulnerability interventions* mitigate the impact of the disease progression on the individual or household.

The final category is *behavioural interventions*, which seek to change the behaviour of the poor and make them less likely to engage in high-risk behaviour.[65] Current behavioural interventions are poorly targeted for the poor. They generally involve providing the poor with information on the risks of HIV infection. However, the poor are often less well-educated and may be least able to interpret the information they are presented with. Unless information programs are carefully constructed and targeted, the poor might not receive or act on the information, resulting in less-informed choices about high-risk behaviour. Alternative *behavioural interventions* must therefore be explored. For example, some studies suggest that over time the availability of alternative job opportunities tends to reduce the supply of commercial sex (Bond *et al.*, 1997). Another option may be the provision of micro-credit schemes, which allows poor individuals an affordable method to smooth their consumption, and reduces the incentives for individuals to engage in high-risk behaviour.

---

[65] For a review of behavioural interventions and their impact on behavioural change, see Bollinger *et al.* (2004).

Other interventions might be suggested by this framework, such as directly preventing the vulnerable community from becoming poor or from engaging in high-risk behaviour. However, elimination of poverty is improbable since unless society can achieve perfect equality, some proportion of households will remain poor relative to others. Prevention of high-risk behaviour is similarly unachievable – injecting drug use is apparent even in countries where it is both illegal and rigorously policed. Urgent research is therefore required at the household level to determine the most cost-effective susceptibility, vulnerability and behavioural interventions that will break the poverty-HIV/AIDS cycle.

3.3 A Microeconomic Model of HIV/AIDS

De Walque (2002) provides a two-period mathematical model of rational behaviour related to sexual activity and HIV/AIDS that will be of assistance in testing for the presence and implications of the HIV/AIDS-poverty cycle. An individuals' utility is determined by their consumption of goods (c_t) and the number of sexual partners they have (n_t),[66] and is separable in consumption and the number of sexual partners:

$$U(c,n) = u(c) + v(n) \qquad (3.1)$$

where *u(.)* and *v(.)* are increasing and concave in *c* and *n* respectively. Individuals maximise utility across two time periods, period 1 and period 2. The probability of survival from period 1 to period 2 is denoted Q, where $0 \le Q \le 1$. The probability of survival to period 2 is determined in period 1 multiplicatively by the number of sexual partners n_1, the proportion of the sexually active population that is infected with HIV γ_1, and the proportion of sexual encounters that were not protected (for example by using a condom) $(1-\pi_1)$:

$$Q = Q(\gamma_1 n_1 (1-\pi_1)) \qquad (3.2)$$

[66] The model assumes that each individual has the same number of sexual contacts with each of their n_t sexual partners.

where $Q(.)$ is a decreasing function. In this model, it is assumed that it is not possible for the individual to know whether he/she is infected or not. Only the overall proportion of the population that is infected is known to the individual,[67] i.e. γ_t is taken as given. Exposure to the HIV virus is zero if the individual abstains from sexual activity ($n_1 = 0$), if nobody in the sexually active population is infected with HIV ($\gamma_1 = 0$), or if the individual only has protected sexual encounters ($\pi_1 = 1$). The price of consumption goods is the same across both periods. The price of protection of sexual intercourse[68] is denoted as p_π. The price of a sexual partner[69] is denoted as p_n.

The model has two types of individuals: those with low human capital K_L, and those with high human capital K_H. The wage $w(K_i)$ is an increasing function of the level of human capital K_i with $i \in L, H$, and:

$$w(K_H) > w(K_L) \tag{3.3}$$

This means that the two types of individuals correspond to those with a high income (and high human capital), and those with a low income (and low human capital). Provided consumption goods are normal goods then:

$$c_1^H > c_1^L \tag{3.4}$$

That is, individuals with higher wages (and higher human capital) consume more goods. Since $u(.)$ is concave, then:

$$u'(c_1^H) < u'(c_1^L) \tag{3.5}$$

---

[67] This assumption may be reasonable given the long incubation period between when an individual becomes infected with HIV, and when they begin to exhibit symptoms of AIDS.

[68] Including the price of condoms, the cost of HIV testing, and the costs of monitoring the partner's fidelity.

[69] In the case of commercial sex, this would be the market price. In the case of non-commercial sex, this may be the shadow price, or determined by the cost of gifts, dowry, etc.

Assuming a perfect annuity market, the wealth of the individual, W, which is carried forward to the second period is:

$$W_2 = \frac{W_1(1+r)}{Q} \tag{3.6}$$

where r is the interest rate. For convenience we will define $\beta = 1/(1+r)$ as the discount factor. Agents will choose their level of consumption, the number of sexual partners they have, and the proportion of protection of sexual encounters, in order to maximise their utility. The maximisation problem can be described as:

$$MAX\, c_1, c_2, n_1, n_2, \pi_1, \pi_2 \quad u(c_1) + v(n_1) + \beta Q(\gamma_1 n_1 (1-\pi_1))[u(c_2) + v(n_2)] \tag{3.7a}$$

subject to the budget constraint:

$$\begin{aligned}[\lambda] \quad c_1 + (p_n + p_\pi \pi_1)n_1 + \frac{Q(\gamma_1 n_1(1-\pi_1))}{1+r}[c_2 + (p_n + p_\pi \pi_2)n_2] \\ = w(K_i)\left(1 + \frac{Q(\gamma_1 n_1(1-\pi_1))}{1+r}\right)\end{aligned} \tag{3.7b}$$

and subject to the following additional conditions:

$$[\theta] \quad n_1 \geq 0; \quad [\varphi] \quad \pi_1 \geq 0; \quad [\phi] \quad 0 \leq \pi_1 \leq 1 \tag{3.7c}$$

De Walque (2004) also shows that where there is no information about the HIV/AIDS epidemic then $Q = \overline{Q}$ and:

$$v'(n_1) = u'(c_1)p_n \tag{3.8}$$

However, using the more realistic function for the probability of survival, the first order conditions for solving equation (3.7a) include:

$$[c_1]: \quad u'(c_1) = \lambda \tag{3.9}$$

$$[n_1]: \quad v'(n_1) + \beta Q'(\gamma_1 n_1(1-\pi_1))(\gamma_1(1-\pi_1))\left[u(c_2) + v(n_2) + \lambda\left(\frac{W(1+r)}{Q(\gamma_1 n_1(1-\pi_1))}\right)\right]$$
$$-\lambda(p_n + p_\pi \pi_1) + \theta = 0 \tag{3.10}$$

$$[\pi_1]: \quad \varphi - \phi - \beta Q'(\gamma_1 n_1(1-\pi_1))(\gamma_1 n_1)\left[u(c_2) + v(n_2) + \lambda\left(\frac{W(1+r)}{Q(\gamma_1 n_1(1-\pi_1))}\right)\right]$$
$$-\lambda p_\pi n_1 = 0 \tag{3.11}$$

De Walque (2004) shows that, where all sexual encounters are protected (i.e. $\pi_1 = 1$), then:

$$\frac{[u(c_2) + v(n_2)]}{u'(c_1)} + \frac{W(1+r)}{Q(0)} < \frac{p_\pi}{-\beta Q'(0)\gamma_1} \tag{3.12}$$

Following equation (3.8) and noting that c_2, n_2, and W would be expected to be larger for those with higher incomes, then the left-hand side of equation (3.12) is higher for higher income earners. For the inequality in equation (3.12) to hold there must be a cut-off level of HIV infection, $\bar{\gamma}_1$, where the agents would decide to protect all sexual encounters, and:

$$\tilde{\gamma}_1^H < \tilde{\gamma}_1^L \tag{3.13}$$

That is, higher income earners would protect all of their sexual encounters at lower levels of HIV infection among the sexually active population. In this simple model, higher income earners have higher wealth and a higher level of utility in the second period, thereby providing greater incentives to avoid decreasing the probability of survival. This can be seen in equation (3.12) where the terms

$\frac{[u(c_2)+v(n_2)]}{u'(c_1)}$ and W are larger for higher income earners, meaning that they would face a higher shadow cost of unprotected sex with many partners. De Walque (2004) also shows an alternative result where higher income earners have fewer sexual partners than lower income earners in period 1. If this model holds, then it agrees with the existence of a poverty-HIV/AIDS cycle in that the poor (lower income earners) are at greater risk of HIV infection.

3.4 Hypothesis

The overall hypothesis that will be tested in this thesis is:

> *Rural Northeast Thailand exhibits characteristics that support the existence of a poverty-HIV/AIDS cycle.*

The testing of this hypothesis will rely on testing specific hypotheses relating to each section of the poverty-HIV/AIDS cycle. Specifically, the following will be tested:

(a) That there is a significant relationship between previous HIV infection and current wealth or poverty, i.e. that HIV infection significantly adversely affects the wealth of individuals (including Type I, Type II, Type III, and Type IV impacts) and places the individuals at a higher risk of poverty;

(b) That there is a significant relationship between wealth or poverty, and HIV/AIDS knowledge, i.e. that the poor are significantly less likely to have accurate information about HIV/AIDS on which to base behavioural decisions;

(c) That there is a significant relationship between previous wealth or poverty, and current HIV infection, i.e. that the poor are significantly more likely to be infected with HIV; and

(d) That there is a significant relationship between previous migration (of the individual or another adult member of their household) and current HIV infection, i.e. that members of migrant households are more likely to be infected with HIV.

Hypothesis (a) demonstrates the relationship from HIV/AIDS to poverty, and will be tested in Chapter 5. Hypotheses (b), (c), and (d) demonstrate the relationship from poverty to HIV infection (through high-risk behaviour), and will be tested in Chapter 6.

Chapter 4

Methods

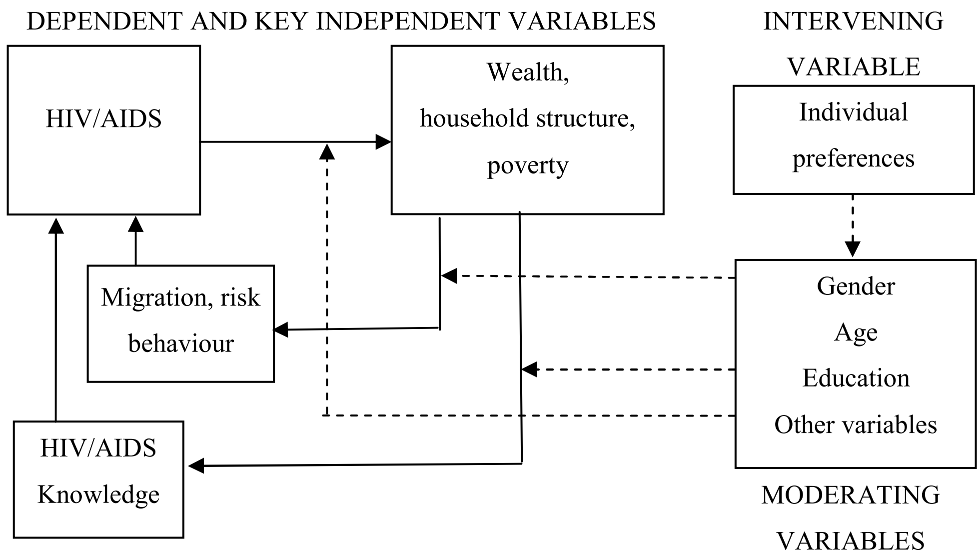
This chapter contains the conceptual framework and research methods employed in the thesis, including survey data collection, data transformation and descriptive statistics for each of the surveys conducted. Specific methods that were used for data analysis are described in the relevant chapters.

4.1 Conceptual Framework

The conceptual framework for this research is presented in Figure 4.1. The framework is based on the theory and model outlined in Chapter 3, particularly the poverty-HIV/AIDS cycle previously presented in Figure 3.3. The conceptual framework details the dependent and independent variables that will be used in testing the hypotheses described at the end of this chapter.

There is a complex interaction between the key variables, which can be either dependent variables or independent variables, depending on what is being considered. For this reason, each link (represented as a bold arrow from the key independent variable to the dependent variable) will be considered individually. Each of these relationships depends on the intervening variable, the preferences of the individual. However, since preferences cannot be observed, moderating variables such as age, gender, and education are included as proxies – their links to the relationships are represented by dotted arrows). The actual proxy variables used depended on the relationship considered (see the relevant chapters for details).

Figure 4.1: Conceptual framework underlying this thesis



4.1.1 From HIV/AIDS to wealth and poverty

The dependent variables in this relationship are various measures of household wealth, the probability of poverty, and the structure of the household (size and composition). Changes in these variables are expected to be significantly associated with the bivariate independent variable, HIV infection. From Hypothesis (a), HIV infection is expected to lead to a significant reduction in wealth and an increase in the probability of poverty. This relationship is tested in Chapter 5.

4.1.2 From wealth and poverty to migration and risk behaviour

The dependent variables in this relationship are migration and risk behaviour such as unprotected sex and injection drug use. They are expected to be negatively associated with measures of household wealth. The cross-sectional data collected for this thesis (see later in this Chapter) is clearly insufficient to adequately test for these links. As we have only observed *ex post* wealth for the households, we cannot determine whether members of *ex ante* poorer households are more likely to migrate. We also have no information on risk behaviour for migrants or individuals from the representative household survey. For the purposes of this thesis, it will therefore be assumed that this link is both present and significant.

These results have been documented in other research (see Section 2.4.1). Some corroborating evidence may be found if a significant link from migration to HIV infection is discovered, as tested in Chapter 6.

4.1.3 From education to HIV/AIDS knowledge

The dependent variable in this relationship is the level of correct HIV/AIDS knowledge possessed by the individual. It is expected to be positively associated with education. In considering this link, it may be necessary to control for differences in demographic variables of the individual, in particular household wealth. From Hypothesis (b), people with more education are expected to have significantly more accurate knowledge about HIV/AIDS. This relationship is tested in Chapter 6.

4.1.4 From wealth, poverty, and migration to HIV/AIDS

The dependent variable in this relationship is the bivariate variable, HIV infection. In considering this link, it will be necessary to control for demographic differences between respondents as well as differences in education (which are expected to be significantly associated with differences in accurate HIV/AIDS knowledge). HIV infection is expected to be positively associated with migration experience and negatively associated with wealth. From Hypothesis (d), individuals from a household with migrants (or themselves a migrant) are expected to be more likely to be infected with HIV, and from Hypothesis (c) wealthier individuals are expected to be less likely to be infected with HIV. This relationship is tested in Chapter 6.

4.2 Research Design

With the hypotheses this thesis will test, longitudinal data would be ideal. However, within the constraints placed by available funding for field work, it was decided to conduct cross-sectional surveys of households and HIV/AIDS patients rather than attempt to conduct a longitudinal study. A research design similar to that of Bechu (1998) was therefore employed. Two main surveys were undertaken, each with separate sample selection procedures (see Section 4.3). The first survey was a representative household survey. This survey would be used to establish the 'baseline' characteristics of households in the study area. A second survey was then conducted of HIV/AIDS patients, asking many of the same questions. To satisfy the need for longitudinal or historical data in analysing the impacts of HIV/AIDS, patients were asked about their household both at the time of interview, and at 'impact time'. The responses could then be compared with the responses from the representative household survey, and differences analysed in terms of the possible determinants of HIV infection. The responses of the HIV/AIDS patients to the questions about their household now and at 'impact time' could also be compared to determine whether there have been significant changes or impacts on their household.

The rationale for this survey design is underpinned by the criticisms by Murphy *et al.* (2005) of existing household-based surveys. They suggest that the burdens of a household in which an HIV/AIDS-affected individual lives may be quite different from the burden faced by the household into which an affected individual migrates as they become sick. This survey design allows a distinction to be drawn between those HIV/AIDS patients who have moved from one household to another (movers) and those who remained in the same household (non-movers) and determine whether the impacts of HIV/AIDS are different between them. The collection of additional qualitative data allows a deeper analysis of the impacts and determinants of HIV/AIDS, and its relationship with wealth and poverty, similar to a recent survey of villagers in Uganda conducted by Bolton and Wilk (2004).

4.3 Data Collection Method

Data for the thesis was collected in three surveys conducted in Khon Kaen province, Northeast Thailand, between June and October 2003. The first survey was a representative household survey, covering all sub-districts in Ban Phai and Phon districts. The second survey was of HIV/AIDS inpatients and outpatients at Northeast Regional Infectious Hospital in Ban Haet district, Ban Phai District Hospital, and Phon District Hospital. The third survey was a representative survey of the households of factory workers at the CBIRD centre in Ban Phai district. For details of the data that were collected, refer to the data inventory in Appendix VIII. Examples of the survey instruments are included as Appendices II-VII. The data collection method for each of the surveys is described in more detail below.

4.3.1 Representative Household Survey

The representative household survey[70] was conducted using a survey method substantially similar to that of the World Bank Living Standards Measurement Surveys (Grosh and Munoz, 1996). The sample frame was all households in rural subdistricts of Ban Phai and Phon districts, i.e. all households outside the municipal areas of Ban Phai and Phon districts. Sampling of villages was conducted prior to the commencement of fieldwork (see below), and each village was visited twice. On the first visit to each village, a Community Questionnaire was completed, with the village leader or their nominee as the respondent. The Community Questionnaire was designed to engage the interest and support of community leaders, as well as collecting information about the community's access to education, health, transport and communication, and the presence (or absence) of certain rural institutions. On the second visit to each village, price data was collected for a range of food and non-food items sold in the village.

Each household included in the sample was visited twice. The first visit collected data on who lived there, their characteristics, what they did for income, migration data, health data, and agricultural data. The second visit was conducted approximately fourteen days after the first visit. This was done to ensure bounded recall for respondents, which was seen as necessary in order to ensure the validity of the sample data (Deaton, 1997; Grosh and Munoz, 1996).

The household second visit questionnaire primarily focused on assessing the household's expenditure since the first visit, gift giving and receiving, remittances from (urban) family members, production, and level of wealth. The data collected

---

[70] In order to avoid any problems with officials or village leaders who might want to influence the data collected in order for their village or sub-district to compare favourably to others, the survey was identified to authorities as the "Ban Phai and Phon Districts Household Survey 2003", i.e. HIV/AIDS was not mentioned in its title.

on the two household questionnaires can be used to determine the household's level of consumption, nutrition, degree of food security, and ways in which it organises its income earning activities. They also collected data about 'observable' characteristics of the household such as what durable goods they possess, household size and composition, and so on. The second visit questionnaire also included two individual questionnaires, which were conducted with one randomly selected adult male and one randomly selected adult female from each household. These individual surveys collected information about the support networks of the household, the individual's hopes, their access to information, discrimination, and attitudes to 'at-risk' groups in the community.

All questions used in the representative household survey, with the exception of the individual questionnaires, were based extensively on modules used in previous World Bank Living Standards Measurement Survey questionnaires (Ainsworth and van der Gaag, 1988; Grootaert, 1986; Grosh and Munoz, 1996; Oliver, 1997). All questionnaires were first composed in English, and then translated into Thai by Thai undergraduate students at the University of Waikato. Translations were confirmed during discussions with senior Thai members of the research team, and further during training of the survey teams.[71] Despite this, one question in the household first visit questionnaire retained some ambiguity and results were discarded.[72] Also, the migration section of the household first visit questionnaire was significantly re-worded between the second and third rounds of data collection in order to better capture all migration movements involving current household members, particularly seasonal migration.

The representative household survey was conducted in two districts (Ban Phai and Phon) in southern Khon Kaen province from June to October 2003. Ban Phai district was selected because of the presence of the Community-Based Integrated Rural Development centre. Phon district was selected randomly from the eleven

---

[71] This 'triangular translation' was necessary to ensure that the Thai questionnaire asked identical questions to the English version of the questionnaire.

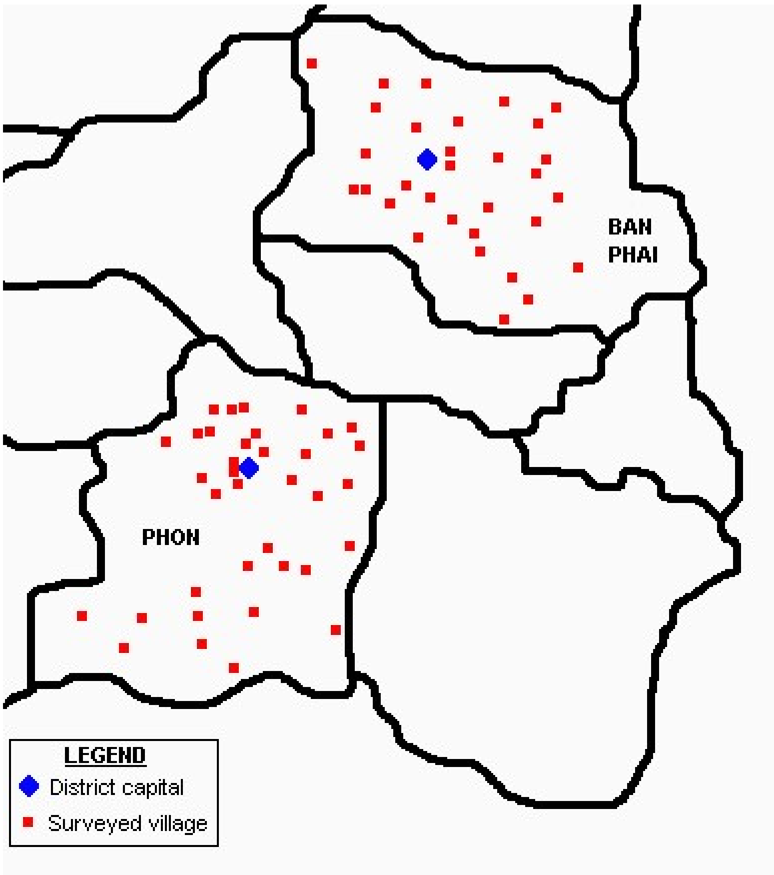
[72] This question considered whether students had completed the last (previous) year of school (as opposed to being withdrawn from school for various reasons). Unfortunately the question was translated as "has this person completed the *final* year of school" and this error was not discovered until surveying had been completed in several villages.

remaining districts in southern Khon Kaen province.[73] Phon proved to be an excellent choice because it was in many ways similar to Ban Phai district. Both districts lie on the main north-eastern road and rail routes, but Phon district lies significantly further from the provincial centre and does not have an extensive rural development centre.

Thai communities are reasonably well-organised administratively – individuals ‘belong’ to households, households ‘belong’ to villages, villages ‘belong’ to sub-districts, and so on.[74] This is a fortuitous situation for defining a research sample – much of the enumeration work (for instance, the enumeration of villages in each sub-district) has already been done by government authorities such as the Ministry of Interior. All non-municipal sub-districts in both districts (ten in Ban Phai, and twelve in Phon) were included in the sampling frame. Three villages were selected for the sample from each sub-district, using weighted random sampling. The village sizes (in terms of number of households) from the Basic Minimum Needs Survey 2002 undertaken by the Ministry of Interior were used to provide *a priori* weights for sampling. This provided a village sample of 66 villages, which when weighted appropriately (as detailed in Deaton (1997)), is a representative sample of the non-municipal areas of the two districts. The approximate geographical locations of the 66 sampled villages are shown in Figure 4.2. As can be seen they are relatively dispersed geographically, with some villages located very close to the municipal areas, and others very far away – this appears to provide a geographically representative mix that includes households with workers in urban occupations as well as more remote rural households.

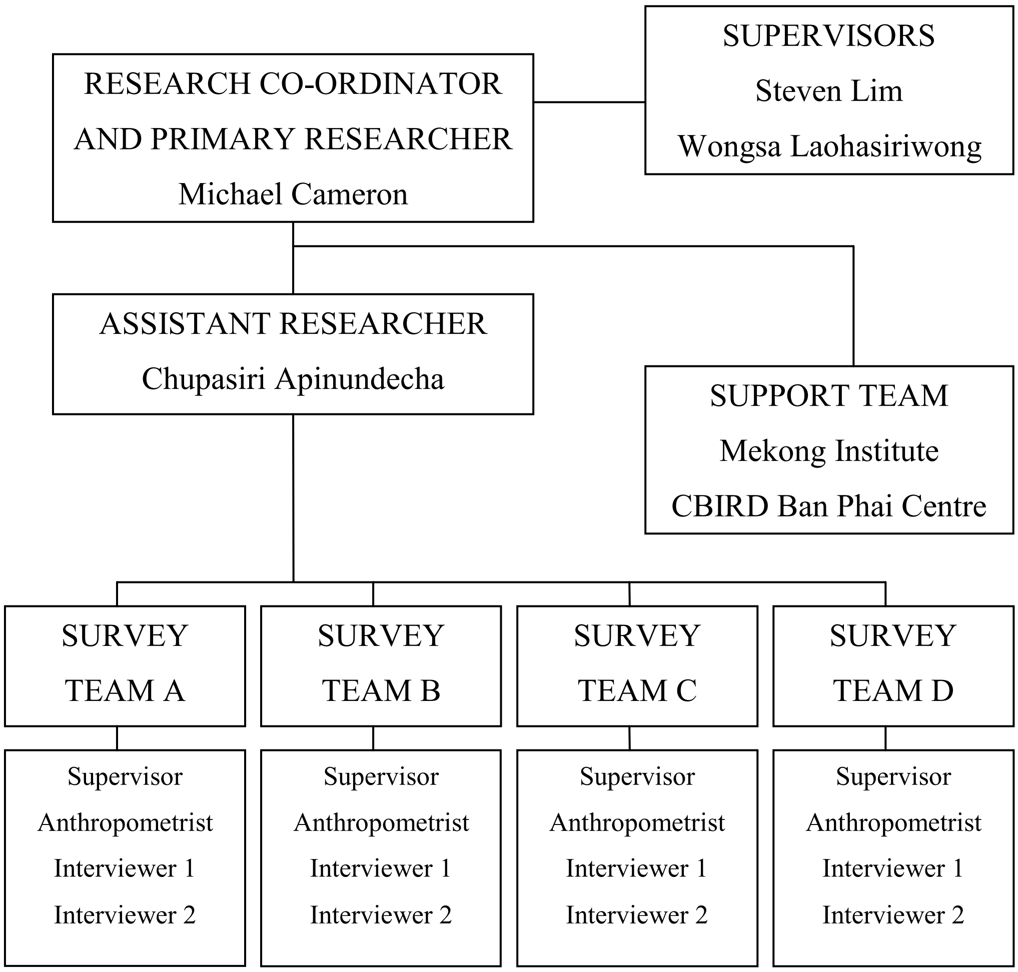
[73] The twelve districts in southern Khon Kaen province are Phra Yun, Mancha Khiri, Ban Haet, Khok Pho Chai, Chonnabot, Ban Phai, Non Sila, Puai Noi, Waeng Yai, Waeng Noi, Phon, Nong Song Hong.
[74] The problems of social organisation identified by Foster (1984) do not adversely affect this research since neither village organisation nor the intrarelationships within the village are considered in any detail.

Figure 4.2: Approximate location of sample villages



The structure of the research team used for data collection is presented graphically in Figure 4.3. The research was co-ordinated by Michael Cameron, with assistance from Chupasiri Apinundecha, a PhD candidate at the Faculty of Public Health at Khon Kaen University. Significant logistical and technical assistance was provided by the Mekong Institute, with additional assistance provided by the Population and Community Development Association's CBIRD Ban Phai Centre. Three teams of interviewers were recruited locally and trained in data collection methods and interview technique. Recruitment of local interviewers ensured that interpretations and language used for the survey were consistent with those in use in the survey area. Training was completed over a five-day period prior to data collection. Each survey team consisted of four members with specific roles and responsibilities, similar to those recommended by the World Bank for the Living Standards Measurement Survey (Grosh and Munoz, 1996). Each survey team had two interviewers, one anthropometrist, and one supervisor. The interviewers interviewed the household members, the anthropometrist weighed and measured household members and provided additional assistance to the interviewers, and the supervisor co-ordinated the activities of the survey team, provided initial quality control, and liaised with local authorities, including conducting the Community Questionnaire interview with the village leader.

Figure 4.3: The research team for the Ban Phai and Phon Districts Household Survey 2003



The data collection period was separated into four rounds of four weeks each, as illustrated in Table 4.1. The 66 villages were randomly distributed between the first three rounds with 24 villages visited in each of the first two rounds, and 18 villages visited in the third round. In the fourth round, twelve villages were re-surveyed using only the household questionnaires (and visiting the same households), in order to provide data for quality control purposes. In each four-week survey round, each village was visited twice, two weeks apart.

Table 4.1: Ban Phai and Phon Districts Household Survey 2003 timeline

Round	Dates	Teams involved	No. of Villages
1	28 June – 25 July	A, B, C, D	24
2	26 July – 22 August	A, B, C, D	24
3	23 August – 20 September	A, B, C	18
4	21 September – 17 October	A, B	12

A scheduled work plan for each survey round can be found in Appendix I. Each week the survey teams worked from Saturday to Thursday, with each survey team visiting one village for two consecutive days. Survey teams began by meeting in the morning at the CBIRD Centre near Ban Phai to ensure that all survey team members were present and to provide an opportunity to mitigate any absenteeism problems. From there, survey teams travelled to the survey villages by motorcycle or private car. At the end of each day the research co-ordinator collated all completed forms and checked that they were complete and internally consistent. If there were any problems, the survey team supervisor was sent back to the village to confirm details or complete any incomplete questions or sections. Friday was scheduled as a rest day each week.

In each village, all households (as defined in Section 2.2.1) were enumerated using the procedures recommended by the World Bank (Grosh and Munoz, 1996). Interview teams contracted a guide who led them around the village while they drew a simple map of the village and recorded the names of the head of each household. After enumeration was completed, a sample of ten households was selected by random sampling by the supervisor of the survey team. Sample selection used a simple method that applied a random starting point and evenly spaced the selected households through the sample. If a household could not be interviewed for whatever reason, an alternative (reserve) household was selected – this was typically the household immediately following the omitted household on the enumeration listing. This method was taught to supervisors during interviewer training. The location of each household was recorded on the village map, to assist with finding the household again on the second visit (or during the fourth round, if necessary). This provided an overall sample of 660 households which, when appropriately weighted, is representative of the two districts surveyed.

Sample selection for the respondents from each household (one male, one female) to the individual section of the survey was conducted by the research co-ordinator before the second visit to the household. Respondents for each gender were randomly selected from the available respondents of each gender aged 18 or over. These responses were weighted to take account of the differential selection probabilities for individuals from households of different sizes – the number of eligible males or females in the household provided the weighting for responses to the individual section of the survey.[75]

Participation in the survey was voluntary, but the refusal rate was extremely low (see below). Individual questionnaire and household questionnaire respondents were given packets of rice crisps (from the Population and Community Development Association's Cabbages & Condoms brand) as a gift for participating in the study. The research was conducted in accordance with the University of Waikato Human Research Ethics Regulations 2000, and was approved by the Ethics Committee of Waikato Management School. Informed consent was obtained verbally from all respondents to the household questionnaires prior to the interview, and separately for all respondents to the individual sections of the household questionnaires. This was confirmed with written consent after each interview.

Collaboration was encouraged in answering questions for the community and household questionnaires, but for the individual section each respondent was separated from their peers or other household members. This, when combined with the rapport established by the interviewers during their first visit to the household, helped to ensure respondents felt free to answer without being subjected to peer pressure or community norms or expectations.

The survey resulted in 660 household responses, and 1226 individual questionnaire responses. The numbers of reserve households and individuals included in the sample and the reasons for their use are summarised in Table 4.2.

[75] For an example of a survey which used a similar sample selection and weighting process, see Johnson *et al.* (1994).

Of the household sample, 55 households (or 8.3 per cent of the sample) were reserves. Reserves were typically used because all members of the original household were absent at the time of the interview, or because of sampling error. Sampling errors arose where the survey team supervisors made simple calculation errors in the starting point, or the interval between households to be selected in the household listing. These sample errors were not systematic and therefore should not affect the whether the sample as a whole is representative of the surveyed districts. Of the individual surveys, 46 responses (or 3.8 per cent) were by reserve respondents, with 19 individuals unable to be replaced by suitable reserves (due to there being no other adult of the same gender in the household). Again reserves were typically used when the selected respondent was absent at the time of the interview, or because of interviewer error. Here interviewer error generally arose where the interviewer did not make every reasonable effort to contact the selected respondent and instead used a reserve respondent.

Table 4.2: Use of reserves in the representative household survey

	Number	Proportion	
		Of reserves	**Of whole sample**
Households			
Reserves used			
Total	55	100.0%	8.3%
Reason:			
Absent at the time of the interview	22	40.0%	3.3%
Sampling error	31	56.4%	4.7%
Refusals	2	3.6%	0.3%
Individuals			
Reserves used			
Total	46	100.0%	3.8%
Reason:			
Absent at the time of the interview	31	67.4%	2.5%
Interviewer error	13	28.3%	1.1%
Refusals	2	4.4%	0.2%
Reserves unable to be used			
Total	19	100.0%	
Reason:			
Absent at the time of the interview	18	94.7%	
Interviewer error	0	0.0%	
Refusals	1	5.3%	

Quality control was conducted by the researcher and the survey team supervisors. Supervisors checked each questionnaire and signed it to confirm that it was complete and internally consistent. At the end of each day all questionnaires were collected and checked by the researcher. On the second day in each village, all questionnaires with omitted or inconsistent responses from the first day were returned to interviewers to check. Questionnaires with omitted or inconsistent responses from the second day were checked at the end of that day by the team supervisor. This iterative work between the researcher, research team supervisors and interview teams was important in ensuring effective quality control.

4.3.2 HIV/AIDS Patient Survey

The HIV/AIDS patient survey was conducted in three hospitals in southern Khon Kaen province in October 2003 (during the fourth round of data collection for the representative household survey). The questionnaire was developed by the researcher in consultation with members of the Faculty of Public Health at Khon Kaen University.

Respondents were selected randomly from HIV-infected patients attending one of three hospitals in southern Khon Kaen province – (i) the Northeast Regional Infectious Hospital in Ban Haet district; (ii) Ban Phai District Hospital; and (iii) Phon District Hospital. The Northeast Regional Infectious Hospital is a 540-bed specialised hospital for infectious diseases, including HIV/AIDS. It has a specialist HIV clinic that services all nineteen provinces of the Northeast region, and a dedicated inpatient ward for HIV-positive patients. Ban Phai District Hospital (approximately 90 beds) and Phon District Hospital (approximately 60 beds) are smaller hospitals that service only their district, and neither hospital has a dedicated inpatient ward for HIV-positive patients.

Data were collected by the assistant researcher, Ms Chupasiri Apinundecha, and other graduate students from the Faculty of Public Health at Khon Kaen University. The research co-ordinator attended many of the interviews to collect additional qualitative information where necessary, in order to build case studies on individuals' experiences. The data was collected from outpatients as they made their regular outpatient visit to the hospital, in order to not unintentionally disclose or indicate their HIV status to their community. Each respondent was interviewed in a consulting room in the hospital set aside for the purpose. The interviewers used for data collection were experienced in qualitative data collection and used interview techniques that placed respondents at ease. This ensured that respondents felt free to answer without being subjected to community norms or expectations.

Respondents were selected randomly from patients listed as HIV-infected outpatients or inpatients at the three hospitals. This non-random sampling means that the sample might not be generally representative of the HIV-infected population in southern Khon Kaen province (see discussion in Chapter 8), but was felt necessary to protect the privacy of individual HIV/AIDS patients. Also, since surveying was undertaken across the three main public hospitals that service southern Khon Kaen province, the sample is representative at least of HIV-infected patients who have chosen public healthcare. Respondents were intended to be aged 18 or over. One patient aged under 18 years was interviewed with the assistance of his mother. Participation in the survey was voluntary, and the refusal rate was low although no data on the number of refusals were collected. The research was conducted in accordance with the University of Waikato Human Research Ethics Regulations 2000, and was approved by the Waikato Management School. Informed consent was obtained verbally from all respondents prior to the interview, and confirmed with written consent after the interview. Respondents were paid B150 to cover transportation and opportunity costs associated with their participation in the study.

The questionnaire collected demographic and health data, data on the household that the patient lives in now (or lived in immediately prior to hospital admission in the case of inpatients), data on the household that the patient lived in prior to the earlier of diagnosis or symptoms appearing, healthcare costs and coping mechanisms, migration history, risk history and discrimination. The data collected could then be used to determine the factors that might have contributed to heightened risk of HIV infection, and the changes in lifestyle and household wealth that resulted from HIV infection.

The survey resulted in 71 useable responses, with one being discarded as the respondent was aged under 18 years at the time of the interview. The respondents are summarised by gender and hospital in Table 4.3. Further summary statistics for the HIV/AIDS Patient Survey are presented in Section 4.7.2.

Table 4.3: The HIV/AIDS patient sample

	Number	Proportion
Respondents		
Total Usable Responses	71	100.0%
Gender		
Male	25	35.2%
Female	46	64.8%
Hospital		
Northeast Regional Infectious Hospital	23	32.4%
Ban Phai District Hospital	24	33.8%
Phon District Hospital	24	33.8%

4.3.3 TBIRD Factory Worker Household Survey

The Thai Business Initiative in Rural Development (TBIRD) factory worker household survey was conducted from August to September 2003 (during the third round of data collection for the representative household survey). Two experienced survey team members from the representative household survey were used to collect the data. Factory management allowed interviews to be conducted during working hours, and interviews were conducted at the home of the respondent. Each interviewer interviewed 24 factory workers and their households, providing an overall sample of 48 households.

The Community Based Integrated Rural Development (CBIRD) Ban Phai Centre is described in detail in Section 7.2. Respondents were selected using simple random sampling from a list of all employees of the two largest manufacturing employers at the centre – Ban Phai Union Footwear and Ban Phai Union Garments. Ban Phai Union Footwear employs 866 workers, making shoes for Nike, while Ban Phai Union Garments employs 269 workers making uniforms for export mainly to Europe. Simple random sampling ensured that the sample was representative of all workers at the two firms. The sample is described in Table 4.4.

Table 4.4: The TBIRD factory worker sample

	Number	Proportion	
		Of sample	Of workforce
Households			
Total Sampled Households	48	100.0%	4.2%
Employer			
Ban Phai Union Footwear	37	77.1%	4.3%
Ban Phai Union Garments	11	22.9%	4.1%

The household questionnaire was identical to that of the representative household survey, but did not include the individual questionnaires. Instead, a different individual questionnaire was used for the factory worker themselves, collecting data on their work experience at the CBIRD Ban Phai Centre, their previous job, hopes for the future, and migration history. The data collected could then be used to determine whether households with TBIRD factory workers differ from other households in terms of wealth or consumption, and whether TBIRD factory jobs may provide a disincentive for migration.

Participation in the survey was voluntary, but there were zero refusals and no reserves were used. Respondents were not rewarded for their participation in the survey – however, the employers allowed us to take respondents from their work site, and paid them as normal for the time spent undertaking the survey, so the opportunity costs for their inclusion in the survey were very low. As with the representative household survey, the research was conducted in accordance with the University of Waikato Human Research Ethics Regulations 2000, and was approved by the Waikato Management School. Informed consent was obtained verbally from all respondents prior to the interview, and confirmed with written consent after the interview.

4.3.4 Translation of Qualitative Data

Qualitative data was collected in many sections of all three surveys. Qualitative data were recorded in Thai language, and then translated into English by experienced translators contracted through the Mekong Institute. In any case where the translation is ambiguous in meaning, the Thai original was referred to. However, due to the nature of the process (interview and interviewer notes recorded in Thai then translated into English), it is possible that some relevant questionnaire responses or other important information may have been distorted or omitted.

4.3.5 Data Entry

Responses to the representative household survey and the TBIRD factory worker household survey were entered in a custom-written data entry program using CSPro version 2.5 (US Census Bureau, 2004b), then exported to a tabular format. The CSPro data entry program was programmed by the researcher and included many automated data consistency checks which reduced the necessity for later manually-intensive data consistency checks (US Census Bureau, 2004a). A further selection of records was carefully checked for typographic, transcription, and other errors. Data from the HIV/AIDS patients survey were recorded directly into a Microsoft Excel spreadsheet and double-checked. As noted above, data from qualitative questions were translated and recorded in English.

4.4 Data Consistency Checks

In addition to the quality control performed during data collection and data consistency checks performed during data entry, there were a number of additional consistency checks performed for the representative household survey and CBIRC factory worker household survey. Some data was collected twice during these surveys, or collected in two different forms, as shown in Table 4.5.

Table 4.5: Data redundancy and consistency checks

Data	Consistency check
Age	Age data collected at the start of household first visit questionnaire, birth date (or birth year for those aged 15 or older) was collected at the end of the household first visit questionnaire
Gender	Gender data collected at the start and the end of the household first visit questionnaire
Height and weight	Each individual was measured and weighed on both the first and second visit, if possible
Household assets	Ownership of certain household assets was asked in the household first visit questionnaire, then confirmed with additional detail in the household second visit questionnaire (durable goods inventory)

In addition to the above data consistency checks, there were a number of households who listed among the household members people who clearly did not live in the household. This is unsurprising considering all Thais are required to be registered at their place of residence, and many migrants remain registered in their home village rather than their 'usually resident' home in Bangkok or elsewhere. Data on absence from the household during the previous two weeks and the previous year was used to determine whether a household member should be included as a household member the analysis. When a person were identified as having spent the entire twelve months of the previous year away from the village, and all days between the two visits to the household, they were excluded from analysis as part of the household and instead included as migrants. This re-classification was made prior to data entry. Further details of all data consistency checks or verifications, and all data transformations, is given in Appendix IX.

4.5 Data Transformation Method

The data collected from the three surveys are listed in Appendix VIII. These data had to be transformed into a suitable format for analysis. The most important data transformations included the calculation of total household (and individual share of) expenditure and consumption, and household (and individual share of) wealth.

4.5.1 Weighting of Survey Data

As noted earlier, the data collected in the Representative Household Survey were collected from a two-stage stratified sample, rather than a simple random sample.

To account for this, each data point needed to be appropriately weighted before final analysis (Deaton, 1997).

The sample selection was weighted *a priori* using the village size from the Basic Minimum Needs Survey 2002 undertaken by the Ministry of Interior. These weights were used to weight the data points for analysis, using the following process. First each household was weighted within the village it was representative of, then weighted again based on the size (in terms of number of households) of the sub-district, and again based on the size (in terms of number of households) of the district. The following formulae were used to provide a weighting for each household in the village, with l villages in the sub-district, m villages in the district, and n villages in the overall sample.[76]

$$w_i^h = \frac{w_i^v}{S_i^v \sum_{k=1}^{n} w_i^v} \tag{4.1a}$$

where:

$$w_i^v = \gamma_v \gamma_s \gamma_d \tag{4.1b}$$

$$\gamma_v = \frac{H_i^v}{S_i^v} \tag{4.1c}$$

$$\gamma_s = \frac{\sum_{j=1}^{n} H_j^v}{\sum_{i=1}^{l} S_i^v} \tag{4.1d}$$

$$\gamma_d = \frac{\sum_{j=1}^{m} H_j^v}{\sum_{i=1}^{m} S_i^v} \tag{4.1e}$$

and w_i^h is the weighting of each household in village i, w_i^v is the gross weighting for the village, S_i^v is the number of households surveyed in village i, and H_i^v is the total number of households in village i. The gross weightings w_i^v were summed, and each household was weighted by the proportion of the total gross

[76] These formulae are adapted from Deaton (1997), pp. 52-53.

weightings from that village, divided by the number of households surveyed in the village (ten in all cases). In this way, the total of the weightings of all households were standardised to sum to one, with the maximum weighting being 0.004535171 and the minimum weighting 0.000309223.

In addition to weighting the household sample, the responses to the individual section of the household second visit questionnaire were weighted to take account of the different selection probabilities for individuals from households of different sizes. Following the example of Johnson *et al.* (1994), each response was weighted according to the number of eligible males or females in the household, in addition to the weighting applied for the household, i.e.

$$w_j^f = w_i^h f_j^h \qquad (4.1f)$$

where w_j^f is the weighting of each female respondent in household *j* of village *i*, w_i^h is the weighting of each household in village *i*, and f_j^h is the number of adult females (aged 18 or over) in household *j*. An equivalent formula was used for male respondents.

The factory worker sample did not require weighting, as it was a simple random sample drawn from the population of factory workers (see Section 4.3.3).

4.5.2 Income, Expenditure and Consumption

This thesis uses consumption rather than income as a measure of the economic wellbeing of the household in the short run. Bachmann and Booysen (2004) note that expenditure is likely to be a more sensitive indicator of the economic impact of HIV/AIDS than is income. However, this study also considers poverty and McKay (2000, p.101) concluded that “there are serious limitations to the extent to which it is possible to understand poverty without data on income. Understanding the reasons for poverty and understanding its dynamics requires information not only on the economic activities of household members… but also on the income earned from these activities”. This thesis does not attempt to investigate the determinants of poverty for the representative household survey, nor the dynamics of poverty or inequality, so income data may not be necessary. Also, there are valid theoretical and practical reasons for using consumption in preference to income when dealing with rural households in developing countries.

Theoretically, although income allows people to purchase goods and services, it is not income which generates economic wellbeing but the goods and services themselves (Deaton and Grosh, 2000). This suggests consumption may be a better measure of current economic well-being than income. Also, it is likely that income is a noisy measure, and even the poor can to some extent save and borrow money within a year or over a lifetime so that consumption reflects a 'smoothed' value of income over that period (Musgrove, 1979; Paxson, 1993). Consumption may therefore be used to produce a more accurate estimate of living standards (Deaton and Grosh, 2000).

There are also practical considerations which favour the collection of consumption data over income data. Income is easy to estimate for wage earners, but notoriously difficult for self-employed business owners and farmers who may not be required to keep business accounts, particularly true in less developed countries where income taxes are seldom levied. As Deaton and Grosh (2000, p.94) note, "the only practical way to estimate income [for farmers and the self-employed] is to gather data on all transactions – business as well as personal – and to impose an accounting framework on the resulting information". The results are subject to significant variability and error, even in developed countries (e.g. see Branch, 1994). Further, income varies significantly by season, particularly in rural areas, which means that in order to collect accurate income data the survey must be conducted at several times throughout the year, requiring many visits to each household with consequent costs. These extra visits are not necessary if consumption is smoothed, as it would provide a reasonable estimate of smoothed living standards. Finally, it is believed that respondents may be less willing to share accurate information about their income than about consumption or expenditure, believing that the information gathered may be passed on to tax authorities (Deaton and Grosh, 2000). Also, Deaton (1997) notes that income measurement is subject to all of the same problems as consumption measurement

– including imputations, recall bias, seasonality, and respondent fatigue – with additional problems such as estimating the return on assets.

Given these considerations, only data necessary for the calculation of total consumption were collected in the surveys. Data were collected on expenditure, inward and outward gifts, and sales of food and non-food items for many different categories of spending. Household stocks of major non-perishable items were collected on both visits (in units, e.g. kilograms). Expenditure on major food and non-food items was calculated as follows (see Appendix IX for further details). For each good *i*:

$$C_i = p_i . q_i = p_i .(S_i^0 + q_i^p + q_i^r + q_i^o - q_i^g - q_i^s - S_i^1) \qquad (4.2a)$$

$$q_i^j = \frac{E_i^j}{p_i} ; j \in \{p, r, g, s\} \qquad (4.2b)$$

where C_i is the value of consumption of good *i* (in baht), p_i is the per unit cost of good *i* (in baht/unit), q_i is the quantity of good *i* consumed (in units), q_i^p is the quantity of purchases of good *i* (in units), E_i^p is the expenditure on good *i* (in baht), q_i^r is the quantity of good *i* received as gifts (in units), E_i^r is the value of good *i* received as gifts (in baht), q_i^o is the quantity own production of good *i* (in units), q_i^g is the quantity of good *i* given to others as gifts (in units), E_i^g is the value of good *i* given to others as gifts (in baht), q_i^s is the quantity of good *i* sold to others (in units), E_i^s is the value of good *i* sold to others (in baht, at cost price), S_i^0 is the household stock of the good on the first visit (in units), and S_i^1 is the household stock of the good on the second visit (in units).

In other words, the expenditure, inward and outward gifts, and sales of the item over the approximately two-week period between visits were converted into quantities using a standard per unit cost. The standard per unit cost was either the price at the major district market in Ban Phai or Phon, or the median village price from the price questionnaires for that district. Using the village median price or the central market price removed some of the variability in the price data and ensured per unit costs that reflected the actual cost to households (refer to Appendix X for a detailed list of the unit prices that were used).[77] For own production, estimated quantities rather than estimated value was used.[78] Then, the number of units' usage of the item was calculated for the period. Usage was then converted back into value of consumption using the standard per unit cost. Quantities were converted to daily average quantities, and expenditure was converted to annual expenditure, using the number of days between visits (fourteen or fifteen). For other expenditure (health, education, agricultural, annual expenses, and so on) the same procedure was followed, although no data on household stocks of these items were collected, and these expenditure items reflected annual or monthly expenditure.

Significant items of one-off expenditure (particularly building materials, home repairs, and financial expenses) appeared to create huge distortions in household expenditure. On average, these items made up 7.8 per cent of expenditure, but this masks the fact that for many households these expenditures exceeded 50 per cent of total expenditure for the year (and up to 89.8 per cent in one household). To minimise this distortion, expenditures in these three categories were discounted to 10 per cent of the actual expenditure, to better estimate the 'current' value of that expenditure (see Appendix IX for further details). Finally, annual expenditure data on 'funeral expenses', 'wedding expenses', and 'temple contributions' were excluded since it was believed that this data was subject to significant overstatement by respondents.[79] All expenditure categories (food and non-food)

---

[77] Based on notes made in the field diary of the primary researcher and discussions with the data collection teams, it is felt that the purchases data in baht was likely to be more accurate than the purchases data in units. The unit data was used only as a cross-checking tool (see Appendix IX). Further the per unit cost data collected from the villages showed little variation. Based on notes made in the field diary of the primary researcher and discussions with the data collection teams and local shopkeepers in several villages it was determined that, since most households made their purchases at the central markets in Ban Phai or Phon, that those prices should be used as the default per unit cost of each item.

[78] Based on notes made in the field diary of the primary researcher and discussions with the data collection teams, it is felt that the own production data was more accurate for quantities than values, since most respondents interpreted values as the farm-gate sale price, rather than purchase value.

[79] Funeral and wedding expenses appeared to have been interpreted as contributions to the weddings or funerals of other villagers. Along with temple contributions, it is not unreasonable to assume that these amounts may have been overstated by respondents to appear to their interviewers that they were making significant merit. In discussions with the data collection teams, considerable doubt was placed on the validity of the data collected for these expense categories.

were then summed together to give a total expenditure value for the whole household for the previous year.

In addition to expenditure, calorific consumption was calculated for each household. This was calculated by taking the quantities of food consumption in each of 76 food categories (including aggregate food categories[80]) and converting them into daily consumption quantities. These quantities were converted into calorie consumption using the ASEAN Food Composition tables for Thailand (Puwastien *et al.*, 2000) wherever possible. The specific food composition values used in this conversion are listed in Appendix XII. Data was also collected on the number of meals eaten away from the household (e.g. takeaway meals, restaurant meals, etc.). To allow for this, calorific consumption was increased to compensate for each meal eaten away from the household. For instance, if the household had consumed one 'meal away' over the two-week sample period, then calorific consumption was calculated then multiplied by 42/41, to allow for one additional meal.[81] Expenditure measures were not adjusted to account for the absence of household members during the period between the two visits, except where otherwise noted.

Total household expenditure could then be used to construct estimates of poverty for the representative household sample (see Section 4.5.4). However, total expenditure and consumption for the household are a poor measure of the economic means of the household, as total household expenditure is positively but less than proportionately related to household size. This means that using total household expenditure to distinguish between poor and non-poor households would result in an over-representation of small households within the 'poor' classification (Deaton and Muellbauer, 1986). Further, simply dividing household expenditure by the number of people in the household (to create household per capita expenditure) would result in an over-representation of large households within the 'poor' classification if there are economies of scale in the provision of

[80] See Appendix XI for details on the aggregate food groups.
[81] Note that using this method implicitly assumes that the calorific content of the meals consumed away from the household is the same as the average calorific content of one third of a day's consumption.

common household goods (such as housing), and this ignores differences in household consumption between different demographic groups, most notably adults and children (Dreze and Srinivasan, 1997). Several methods have been devised to overcome these problems (Gibson, 2005). All involve conversion of total household expenditure into household expenditure 'per adult equivalent'. In this study, three alternative methods were used for the conversion – the Engel method (Engel, 1895), the Rothbarth method (Rothbarth, 1943), and the Lanjouw-Ravallion method (Lanjouw and Ravallion, 1995).[82]

The Engel method assumes that the standard of living of adults is indicated by the share of household expenditure devoted to food. Therefore the 'cost' of the first child can be determined by calculating the amount of additional income that would be required to equalise the food share of household income between a household with no children and a household with a single child (Deaton and Muellbauer, 1986). To determine this we must estimate the Engel curve for food – we used the quadratic form of the Working-Leser equation (Leser, 1963; Working, 1943):

$$w_f = \alpha - \beta_1 \ln\left(\frac{x}{n}\right) - \beta_2 \left[\ln\left(\frac{x}{n}\right)\right]^2 + \gamma_a n_a + \gamma_c n_c + \varepsilon \qquad (4.3)$$

where n_a and n_c are the numbers of adults and children in the household respectively, x is total expenditure, ε is random error, and α, β, and γ are parameters. If we define w_f^0, x^0, and x^* as the food share and expenditure that would cause the household with one child and the reference household (with two adults and no children) to have the same welfare level, then (x^* - x^0) is the additional expenditure required and the equivalence scale is the ratio x^*/ x^0. As shown in Deaton and Muellbauer (1986) when the food shares are equal x^* is defined by:

[82] For an in-depth discussion of the first two methods, see Deaton and Muellbauer (1986).

$$
\alpha - \beta_1 \ln\left(\frac{x^*}{n^h}\right) - \beta_2\left[\ln\left(\frac{x^*}{n^h}\right)\right]^2 + \gamma_a n_a^h + \gamma_c n_c^h
$$
$$
= \alpha - \beta_1 \ln\left(\frac{x^0}{n^0}\right) - \beta_2\left[\ln\left(\frac{x^0}{n^0}\right)\right]^2 + \gamma_a n_a^0 + \gamma_c n_c^0 \qquad (4.4)
$$

Several studies have used a numeric iterative method to obtain the solution to equation 4.4 (e.g. see Lancaster and Ray, 1998). However Maltagliati (1999) provides an analytical solution to the quadratic form of the Working-Leser Engel curve allowing calculation of the equivalence scale E_E^h:

$$
E_E^h = \exp\left[\left[-k_1 - (k_2)^{0.5}\right]/2\beta_2\right] \qquad (4.5a)
$$

$$
k_1 = 2\beta_2 \ln\left(\frac{x^0}{n^0}\right) + \beta_1 \qquad (4.5b)
$$

$$
k_2 = \left(2\beta_2 \ln\left(\frac{x^0}{n^0}\right) + \beta_1\right)^2 - 4\beta_2\gamma_c n_c^h \qquad (4.5c)
$$

Obviously provided β_2 is significant, the equivalence scale will depend on the per capita expenditure of the reference household. Regression results for both the linear and quadratic models are included in Appendix XIII.

The Rothbarth method is similar to the Engel method, but assumes that the standard of living of adults is indicated by the share of household expenditure devoted to a class of ‘adult goods’ – goods purchased by the household which contribute utility only to adults. Studies have used various different collections of adult goods (Deaton and Muellbauer, 1986). The bundle of adult goods was first determined by finding a set of ‘adult goods’ using two methods.

The first (simple) method begins by finding a set of adult goods where expenditure on each included good is unaffected by the number of the children in the household, since the number of children should only affect the total expenditure on adult goods and not the allocation of expenditure within that category (Gibson, 1997). Following Deaton *et al.* (1989) this is done by first regressing the expenditure on each candidate adult good (p_iq_i) on total expenditure on adult goods (x_G) and the number of adults and children (n_A and n_C respectively), i.e.

$$p_i q_i = \alpha + \beta_o x_G + \gamma_A n_A + \gamma_C n_C + \varepsilon \tag{4.6}$$

Since total adult goods expenditure is not exogenous, instrumental variables estimation is used to estimate equation 4.6, with total expenditure used as the instrument for x_G. The results of these regressions are presented in Appendix XIII. Candidate adult goods were selected if the coefficient on the number of children was not significant, and the coefficient on the number of adults was positive (whether significant or not). The resulting set of adult goods contained expenditure on cigarettes and adult clothing.

An alternative method involves constructing the aggregate 'adult good' set by combining expenditure on goods with similar outlay equivalent ratios. The outlay equivalent ratio is the effect of an additional child on the demand for adult goods in terms of the percentage change in per capita expenditure that would be necessary to produce the same effect on demand. Following Deaton *et al.* (1989), first the Engel curve for each adult good *i* is calculated using:

$$w_i = \alpha - \beta_i \ln\left(\frac{x}{n}\right) + \eta_i \ln n + \gamma_i \left(\frac{n_c}{n}\right) + \varepsilon \tag{4.7}$$

where $\frac{x}{n}$ is per capit expenditure, n is household size, and $\frac{n_C}{n}$ is the proportion of the household members who are children. The outlay equivalent ratio (π_i) can be calculated using:

$$\pi_i = \frac{(\eta_i - \beta_i) + \gamma_i - \gamma_i\left(\frac{n_c}{n}\right)}{\beta_i + w_i} \tag{4.8}$$

Several potential adult goods were tested in this way, including alcohol and beer, tobacco, lottery tickets, other gambling, jewellery, adult clothing, and meals eaten away from the household. The results of these regressions and estimated outlay equivalent ratios are presented in Appendix XIII. The goods with outlay equivalent ratios closest to the mean outlay equivalent ratio were then selected, and expenditure on those goods was combined to create a category of adult goods expenditure. The resulting set of adult goods contained expenditure on cigarettes, lottery tickets, and jewellery.

Equation 4.7 was then re-estimated using the total adult goods expenditure defined by each method above (see Appendix XIII). The equivalence scale E_E^h can then be calculated as the ratio of the share of adult goods expenditure for the reference household to that of a household with one child, i.e. w_1/w_0.

The Lanjouw-Ravallion method assumes that there are economies of scale in the provision of jointly-consumed household goods, such as housing. The size elasticity can be calculated again using the Working-Leser Engel curve adjusted so that per capita expenditure is instead expressed as $\frac{x}{n^{\theta}}$, where θ is the size elasticity. Lanjouw and Ravallion (1995) found that the Engel curve can be approximated by n^{θ} with no adjustment for demographic composition, i.e.

$$w_f = \alpha - \beta \ln\left(\frac{x}{n^{\theta}}\right) + \varepsilon = \alpha - \beta_1 \ln x + \theta\beta_2 \ln n + \varepsilon \qquad (4.9)$$

The size elasticity is then simply the ratio of the two parameters from the estimated function 4.9, $\theta\beta_2/\beta_1$. The regression results for Equation 4.9 are presented in Appendix XIII.

The resulting estimates of equivalence scales and size elasticity using the three methods are presented in Table 4.6 (full regression results are included in Appendix XIII). Equivalence scales are evaluated at the mean per capita expenditure, and for the addition of a single child to a reference household containing two adults only. Children are defined as those aged 14 years or under.

Estimates of the adult equivalence of a child vary from 0.35 to 0.72, while the household size elasticity is estimated as 0.31. These estimates are similar to those in previous literature (e.g. see Gibson and Rozelle, 1998; Griffiths and Valenzuela, 2001; Lancaster *et al.*, 1999).

Table 4.6: Equivalence Scales and Household Size Elasticity Estimates

	Estimated equivalence scales[83]	**Adult equivalence of a child**	**Household size elasticity**
Engel method, linear model	0.276	0.55	0.31
Engel method, quadratic model	0.173	0.35	-
Rothbarth method, simple selection	0.326	0.65	-
Rothbarth method, OER selection	0.356	0.72	-

The Engel method has been heavily criticised as inaccurate for these purposes – for instance Deaton (1997, p. 255) concludes that "the method is unsound and should not be used". Gibson (2002) also shows that estimates of size elasticity using the Engel method are overstated due to measurement error. Total expenditure for each household was then converted into total expenditure per adult equivalent using an adult equivalence of 0.7 for each child aged 14 years or under. The resulting estimates, and per capita expenditure for comparison, are summarised in Table 4.7.

Table 4.7: Summary statistics for expenditure measures

	Mean	**Median**	**S.D.**	**Min.**	**Max.**
Household per capita expenditure	20 770	16 964	14 938	3864	162 535
Household per adult equivalent expenditure	22 093	18 107	15 039	4712	162 535

The households were then ranked according to their expenditure per capita and expenditure per adult equivalent, and the ranking of households created by these two alternative expenditure measures were compared with each other using Spearman rank correlation. The correlation between the two measures was 0.9884 ($p<0.0001$), suggesting that using either of these measures for expenditure comparisons will be robust.

[83] Estimated increase in costs for adding a single child to a reference household containting two adults.

4.5.3 Wealth

Data on household wealth was not explicitly collected from AIDS patients. This was due to the ethical standards which required the survey team not to visit the home of the AIDS patients to protect them from identification as HIV-infected in their home community. Also, obviously household wealth data for the household the AIDS patient lived in at 'impact time' could not be directly collected. Instead, household wealth was estimated using observable characteristics of the household, including household asset and land ownership, household size, and hedonic characteristics of the dwelling, when compared to the characteristics in the reference sample from the Representative Household Survey. Two methods were used to estimate the combined household wealth for AIDS patients, both at 'impact time' and at the time of the interview: (i) estimation using a hedonic multivariate model of household wealth; and (ii) estimation using a wealth index constructed from principal components.

The first method separated household wealth into three components: (i) land value; (ii) dwelling value; and (iii) household asset value; and estimated each component separately. Because there was little data available on the market for land in rural Khon Kaen province, and the number of land transactions recorded during data collection as happening within the past year did not provide enough data to estimate a hedonic model of land value,[84] a single value of B19162 per rai was assigned to land ownership for each household. This value was the average sale value of land sales recorded in the survey (see Appendix IX).

Least squares regression was used to construct a model of the log of summed value of household assets (in Baht) for the representative household sample, using asset ownership, household size and composition, and other household characteristics as explanatory variables. Household assets include all household appliances, vehicles, farm equipment, and livestock. Data were weighted as noted above to take into account the stratified nature of the sample. The final model is

[84] Only 18 purchases of land, and 9 sales of land were recorded from the 660 households in the Representative Household Survey.

described in Table 4.8. Since the model is to be used to provide point estimates of household asset value for the AIDS patients' households, the standard errors have not been corrected for the presence of heteroscedasticity. The model provides a good fit for the actual data, with the Spearman correlation between actual and predicted household asset value equal to 0.8163 ($p < 0.0001$).

Table 4.8: Hedonic model for household asset value estimates (dependent variable is log of total household asset value)

	Coefficient	Std. Error	t	P > |t|
Number of children	-0.0758	0.0382	-1.99	0.047**
Number of productive adults	0.0631	0.0330	1.92	0.056*
Number of elderly	-0.0009	0.0594	-0.01	0.988
Radio or stereo ownership (1 = yes)	0.2924	0.0809	3.61	< 0.001***
Television ownership	1.6101	0.2056	7.83	< 0.001***
Refrigerator ownership	0.3155	0.0914	3.45	0.001***
Computer ownership	0.5545	0.2617	2.12	0.034**
Electric fan ownership	0.1904	0.3065	0.62	0.535
VCD player ownership	0.1758	0.0776	2.27	0.024**
Bicycle ownership	0.0731	0.0755	0.97	0.334
Motorcycle ownership	0.6719	0.0848	7.92	< 0.001***
Car or truck ownership	1.6745	0.1096	15.28	< 0.001***
Income from rice (1 = yes)	0.5382	0.1044	5.15	< 0.001***
Income from corn	-0.1057	0.2686	-0.39	0.694
Income from sugar cane	0.2366	0.1028	2.30	0.022**
Income from cassava	0.0046	0.0997	0.05	0.963
Income from vegetables	-0.0352	0.1289	-0.27	0.785
Income from bananas	0.2165	0.2095	1.03	0.302
Income from papayas	0.3312	0.2236	1.48	0.139
Income from other food	-0.0183	0.1496	-0.12	0.903
Income from chickens	0.2376	0.0894	2.66	0.008***
Income from pigs	0.3837	0.2008	1.91	0.057*
Income from cattle	1.0707	0.0795	13.47	< 0.001***
Income from buffalo	0.6288	0.1420	4.43	< 0.001***
Income from fishing	-1.0407	0.2415	-4.31	< 0.001***
Income from firewood	1.3162	1.0735	1.23	0.221
Income from artefacts	-0.3901	0.3791	-1.03	0.304
Income from handicrafts	0.1010	0.1351	0.75	0.455
Income from shop or stall	0.0704	0.1128	0.62	0.533
Income from public motor vehicle	0.0123	0.2747	0.04	0.964
Income from other business	-0.1288	0.1402	-0.92	0.359
Public sector wage (1 = yes)	-0.3251	0.1379	-2.36	0.019**
Agricultural wage	0.0902	0.0768	1.17	0.241
Manufacturing wage	0.0021	0.1223	0.02	0.986
Other private sector wage	-0.2170	0.1311	-1.65	0.099*
Constant	6.8463	0.3267	20.95	< 0.001***

n = 659; Adjusted $R^2 = 0.6718$; $F(35,624) = 39.49$ ($p < 0.0001$)

* weakly significant at $p < 0.1$; ** significant at $p < 0.05$; *** significant at $p < 0.01$

Least squares regression was also used to construct a model of dwelling value as a function of the observable hedonic characteristics of the dwelling and the log of total household asset value. The final model is described in Table 4.9, and provides a good fit for the actual data, with the Spearman correlation between actual and predicted household asset value equal to 0.5463 ($p < 0.0001$).

Table 4.9: Hedonic model for dwelling value estimates (dependent variable is log of dwelling value)

	Coefficient	Std. Error	t	P > |t|
Separate cookhouse (1 = yes)	0.1038	0.0750	1.38	0.167
Main cooking fuel†:				
Wood	-0.3286	0.2206	-1.49	0.137
Kerosene or bottled gas	0.0916	0.2281	0.40	0.688
Electricity	0.2897	0.5766	0.50	0.616
Main walls material‡:				
Brick or concrete	-0.0379	0.2326	-0.16	0.871
Timber	0.2571	0.1922	1.34	0.181
Traditional materials	-0.2534	0.2998	-0.85	0.398
Main floor material§:				
Brick or concrete	0.7322	0.4161	1.76	0.079*
Ceramic tiles or marble	1.2967	0.4451	2.91	0.004***
Carpet	0.5562	0.6358	0.87	0.382
Timber	0.7937	0.3981	1.99	0.047**
Main roof material¶:				
Corrugated iron	-0.5129	0.1232	-4.16	< 0.001***
Main window covering◊:				
Glass windows	0.8416	0.1455	5.78	< 0.001***
Open windows (no shutters)	-0.1098	0.5377	-0.20	0.838
Wooden shutters only	0.5387	0.1303	4.13	< 0.001***
Number of rooms	0.1326	0.0330	4.03	< 0.001***
Log of total asset value	0.1903	0.0261	7.28	< 0.001***
Constant	8.5846	0.5529	15.53	< 0.001***

$n = 658$; Adjusted $R^2 = 0.3558$; $F(17,640) = 13.85$ ($p < 0.0001$)

† reference category is coal or charcoal; ‡ reference category is corrugated iron or sheet metal; § reference category is earth, mud or sand; ¶ reference category is other roofing materials; ◊ reference category is no windows

* weakly significant at $p < 0.1$; ** significant at $p < 0.05$; *** significant at $p < 0.01$

The two models were then used, along with the estimate of land value, to estimate household wealth for the AIDS patients sample, both at 'impact time' and at the time of the interview. Summary statistics for the wealth estimates are presented in Table 4.10.

Table 4.10: HIV/AIDS patient wealth (or total assets) estimates (in Baht) based on hedonic models

	Mean	Median	S.D.	Min.	Max.
Household before 'impact time'					
Land value	148 161	95 810	202 403	0	1 149 720
Household asset value	43 352	25 023	58 111	913	257 342
Dwelling value	143 829	129 165	85 155	28 807	468 636
Total estimated wealth	335 343	268 089	254 354	39 683	1 206 432
Household after 'impact time'					
Land value	149 609	95 810	171 039	0	689 832
Household asset value	43 352	25 967	56 227	1001	357 306
Dwelling value	154 270	122 192	104 361	29 015	638 154
Total estimated wealth	347 232	318 132	245 354	33 536	1 074 315

The second method used principal components analysis to create an index of wealth for the reference sample. The rationale for using principal component analysis to construct a linear index of wealth from a set of indicators is described and validated in Filmer and Pritchett (1999; 2001) and Filmer (2000). A linear index of wealth has an advantage over separately controlling for the ownership of assets when considering the effect of wealth on a variable of interest because asset ownership might be separately correlated with the variable of interest, e.g. water access and sanitation variables may be indicators of wealth, but also have independent effects on health outcomes. Further, the linear index may contain less measurement error than household consumption as a measure of long-run household economic status (Filmer and Pritchett, 2001).

The weights for the components of the linear index were determined using principal components analysis, which is a technique that extracts orthogonal linear combinations of variables that most effectively capture the common information.[85] The first principal component of a set of variables is the linear combination that explains the largest proportion of the common variation of the set of variables. The second principal component is the linear combination, orthogonal to the first principal component, which explains the largest proportion

[85] For a brief description of principal components analysis see Manly (1994). More detailed descriptions can be found in Dunteman (1989), Jackson (1991), or Jolliffe (2002).

of the remaining unexplained variance and covariance of the set of variables, and so on. In this analysis, only the first principal component was used to create an index of wealth for the representative household sample. This relies on a crucial assumption that household long-run wealth explains the maximum variance (and covariance) in the set of household characteristic variables, thereby corresponding with the first principal component. As described in Filmer and Pritchett (2001), there is no way to directly test this assumption. However, we can examine the results of the indexation to determine whether they are intuitive.

The resulting scoring factors from the principal components analysis of the household characteristic variables are reported in Table 4.11. Since each variable was first normalised using its mean and standard deviation, the scoring factor divided by the standard deviation of each dummy variable gives the amount by which that variable would change the index. For example, if the household owns a bicycle, *ceteris paribus* the wealth index would increase by 0.1438. The first principal component explains 13.26 per cent of the covariance, with the first eigenvalue equal to 4.774, and the second eigenvalue equal to 2.965.

To test the validity of the wealth index, the households were ranked based on the value of the wealth index, and separated by quartile. Comparing the ownership of different assets (see Table 4.12) confirms that households in the higher quartiles are more likely to own various household assets, more likely to derive income from a public sector wage, and more likely to have marble floors in their dwelling. Households in lower quartiles are more likely to share toilet facilities, use wood for cooking, and have a dwelling with no windows. The wealth index is therefore consistent with expectations about these and other indicators of household wealth.

Table 4.11: Scoring factors and summary statistics for the computation of a the linear index of wealth (first principal component)

	Scoring factor (*SF*)	Mean	Std. Dev. (*SD*)	$\frac{SF}{SD}$
Shared toilet (1 = yes)	-0.0729	0.0206	0.1422	-0.5128
Main cooking fuel:				
Wood	0.0000	0.7097	0.4542	0.0000
Coal or charcoal	0.1199	0.0273	0.1632	0.7347
Kerosene or bottled gas	0.5371	0.2585	0.4381	1.2260
Electricity	0.0695	0.0045	0.0669	1.0386
Main walls material:				
Brick or concrete	0.5851	0.2565	0.4370	1.3387
Timber	0.0000	0.6796	0.4670	0.0000
Corrugated iron	0.0497	0.0415	0.1996	0.2487
Traditional materials	-0.0118	0.0224	0.1481	-0.0794
Main floor material:				
Brick or concrete	0.6232	0.2507	0.4337	1.4369
Ceramic tiles or marble	0.3060	0.0471	0.2120	1.4434
Carpet	0.0462	0.0051	0.0713	0.6482
Timber	0.0000	0.6884	0.4635	0.0000
Earth, mud, or sand	0.0361	0.0087	0.0932	0.3872
Main roof material:				
Corrugated iron	-0.4643	0.8883	0.3153	1.4728
Other roofing materials	0.0000	0.1117	0.3153	0.0000
Main window covering:				
Glass windows	0.0000	0.2440	0.4298	0.0000
Open windows	-0.0611	0.0045	0.0670	-0.9123
No windows	-0.2994	0.1158	0.3202	-0.9349
Wooden shutters only	-0.2868	0.6357	0.4816	-0.5955
Number of rooms	0.1087	2.6590	1.1569	0.2280
Number of children	0.0005	0.9847	0.9618	0.0005
Number of productive adults	0.0414	2.4935	1.2485	0.0332
Number of elderly	-0.0819	0.3425	0.6246	-0.1312
Radio or stereo ownership (1 = yes)	0.1835	0.6517	0.4768	0.3848
Television ownership	0.1157	0.9646	0.1850	0.6255
Refrigerator ownership	0.2152	0.7550	0.4304	1.1632
Computer ownership	0.0856	0.0205	0.1418	0.6032
Electric fan ownership	0.0451	0.9866	0.1151	0.3919
VCD player ownership	0.1782	0.4542	0.4983	0.3576
Bicycle ownership	0.0708	0.5877	0.4926	0.1438
Motorcycle ownership	0.1785	0.6828	0.4657	0.3834
Car or truck ownership	0.1752	0.1557	0.3629	0.4828
Income from rice (1 = yes)	-0.0309	0.8409	0.3661	-0.0844
Public sector wage (1 = yes)	0.1247	0.0775	0.2676	0.4659
Agricultural wage	-0.0223	0.3363	0.4728	-0.0471
Wealth Index	-	0.0000	2.1850	-

Table 4.12: Variable means by wealth index quartile

	Variable Means			
	Q1	**Q2**	**Q3**	**Q4**
Shared toilet (1 = yes)	0.0242	0.0121	0	0
Main cooking fuel:				
Wood	0.9939	0.9212	0.5152	0.3636
Coal or charcoal	0.0061	0.0121	0.0606	0.0242
Kerosene or bottled gas	0.0000	0.0606	0.4242	0.6061
Electricity	0.0000	0.0061	0.0000	0.0061
Main walls material:				
Brick or concrete	0.0000	0.0121	0.1818	0.7879
Timber	0.8848	0.9273	0.8121	0.2061
Corrugated iron	0.0667	0.0545	0.0061	0.0061
Traditional materials	0.0485	0.0061	0.0000	0.0000
Main floor material:				
Brick or concrete	0.0000	0.0182	0.2303	0.7333
Ceramic tiles or marble	0.0000	0.0000	0.0364	0.1515
Carpet	0.0121	0.0000	0.0061	0.0061
Timber	0.9758	0.9758	0.7152	0.1091
Earth, mud, or sand	0.0121	0.0061	0.0121	0.0000
Main roof material:				
Corrugated iron	1.0000	0.9818	0.8848	0.6545
Other roofing materials	0.0000	0.0182	0.1152	0.3455
Main window covering:				
Glass windows	0.0545	0.1273	0.2121	0.4121
Open windows	0.0121	0.0061	0.0061	0.0000
No windows	0.2848	0.0545	0.0303	0.0061
Wooden shutters only	0.6485	0.8121	0.7515	0.5818
Number of rooms	2.2121	2.7758	2.9152	3.0545
Number of children	0.9818	0.9697	0.9939	0.9758
Number of productive adults	2.1212	2.7394	2.5636	2.5879
Number of elderly	0.5273	0.3818	0.2970	0.2303
Radio or stereo ownership (1 = yes)	0.2909	0.6848	0.7758	0.8485
Television ownership	0.8727	0.9879	0.9818	1.0000
Refrigerator ownership	0.3455	0.8727	0.9212	0.9515
Computer ownership	0.0000	0.0000	0.0182	0.0667
Electric fan ownership	0.9697	0.9818	1.0000	0.9939
VCD player ownership	0.1091	0.5091	0.5394	0.6545
Bicycle ownership	0.4788	0.5636	0.5879	0.6909
Motorcycle ownership	0.3576	0.8182	0.7758	0.8970
Car or truck ownership	0.0242	0.0667	0.2182	0.3758
Income from rice (1 = yes)	0.8364	0.9333	0.8182	0.7758
Public sector wage (1 = yes)	0.0182	0.0364	0.0788	0.1939
Agricultural wage	0.3879	0.3697	0.3333	0.3394
Wealth Index	-2.2932	-1.0813	0.3751	3.0812

To test the robustness of the above wealth index (Index I), the index was re-estimated using two subsets of the components: (i) including only dwelling characteristics and household asset ownership variables (Index II); and (ii) including only household asset ownership variables (Index III). The ranking of households created by these two alternative indices, and the ranking created using total household wealth (see above), were compared with Index I using Spearman rank correlation, and these results are presented in Table 4.13. The ranking based on the overall wealth index is highly correlated with that of the two alternative indices, confirming that the Index I is robust to the inclusion of different sets of variables. It is also highly correlated with the ranking based on total household wealth, confirming that the wealth index is a plausible alternative measure of long-run household economic status.

Table 4.13: Correlation between final wealth index (Index I) and alternative wealth estimates

	Spearman's Rank Correlation Coefficient	p-value
Index I – Index II	0.9965	$< 0.0001^{***}$
Index I – Index III	0.6640	$< 0.0001^{***}$
Index I – Total wealth	0.2834	$< 0.0001^{***}$

*** significant at $p < 0.01$

Using the scoring factors from Table 4.9, wealth index values were then estimated for the AIDS patients sample, both at 'impact time' and at the time of the interview. Summary statistics for the wealth index estimates are presented in Table 4.14.

Table 4.14: HIV/AIDS patient wealth index estimates

	Mean	Median	S.D.	Min.	Max.
Household before 'impact time'	0.2403	0.2124	2.0868	-3.8699	5.1681
Household after 'impact time'	-0.1001	-0.3066	2.0505	-4.0884	4.9706

4.5.4 Poverty

As with wealth, data enabling a direct assessment of poverty could not be collected from AIDS patients. Instead, following a similar method to the wealth estimates in Section 4.5.3, the probability that a given household was in poverty was estimated using a regression model of the observable characteristics of the household, including household asset and land ownership, household size, and hedonic characteristics of the dwelling, when compared to the characteristics in the reference sample (from the Representative Household Survey).

The expenditure and consumption data (see Section 4.5.2) was first used to estimate several poverty lines for the households from the Representative Household Survey. Current best practice when using household expenditure is to create a model of household expenditure and use predicted data from that model rather than actual household expenditure (e.g. see Behrman and Knowles, 1999). However, to do so in this context would result in a loss of some of the information necessary to construct the poverty line. Instead actual expenditure and consumption values were used (see Section 4.5.2).

Two poverty lines were estimated for each expenditure measure (household per capita expenditure and household per adult equivalent expenditure), a relative poverty line and an absolute poverty line (Boltvinik, 1998). Following Lanjouw (1997), the relative poverty line was determined at half of the mean per capita expenditure (or mean per adult equivalent expenditure). To determine the absolute poverty line based on a minimum standard of living for households in the representative household sample, the following method was employed. The two expenditure measures were first used to create expenditure-based food poverty lines for the representative household sample, using the method described in Lanjouw (1997).[86] A 'food bundle' representing the average consumption of food for the poorest 25 per cent of households (lowest per capita expenditure or lowest per adult equivalent expenditure) was determined.[87] The total calories per capita or per adult equivalent were then scaled up to 2200 calories,[88] and then the cost of this bundle was calculated to estimate a food poverty line.

The non-food component of the poverty line was then estimated using the actual consumption patterns of the poor in the representative household survey.

[86] A least-cost food poverty line was not estimated because a poverty line estimated using the least-cost method is unlikely to represent the actual food consumption activity of poor people, and probably underestimates the lowest cost actual consumption of the minimum number of calories (Lanjouw, 1997).

[87] Using only the poorest 25 per cent of households ensures that luxury food items, unlikely to be consumed by poor households in large quantities, are not overly represented in the food basket.

[88] This minimum calorie requirement was based on calculations from National Research Council (1992), adjusting for the lower average weight from the representative household sample. Food consumption per adult equivalent (or per capita) was also adjusted to account for the absence of some household members between the two survey visits, which would otherwise have understated the per adult equivalent consumption for those households.

Following Ravallion (1994), if a household whose total expenditure is exactly equal to the food poverty line diverts some of its expenditure away from food to non-food items, then those non-food items can be considered as basic needs for the household. The share of total expenditure which is devoted to food (w_f) can be estimated using the equation:

$$w_f = \alpha + \beta \ln\left(x_i / z^F\right) + \gamma_A n_A + \gamma_C n_C + \gamma_E n_E + \varepsilon \qquad (4.10)$$

where z^F is the food poverty line, n_C is the number of children in the household, n_E is the number of elderly people (over age 60) in the household, and n_A is the number of other adults in the household. The mean food share of those households with mean demographic variables who can just afford the food poverty line, is given by:

$$\alpha_j = \hat{\alpha} + \gamma_A \overline{n}_A + \gamma_C \overline{n}_C + \gamma_E \overline{n}_E \qquad (4.11)$$

The non-food share is therefore $(1-\alpha_j)$, and the total poverty line is given by the sum of the food and non-food expenditures:

$$z = z^F + z^F\left(1 - \alpha_j\right) = z^F\left(2 - \alpha_j\right) \qquad (4.12)$$

The estimated models 4.10 for both per capita expenditure and per adult equivalent expenditure are included in Appendix XIII. The variable α_j was estimated to be equal to 0.6852 for per capita expenditure, and 0.6987 for per adult equivalent expenditure. Calculated food and total poverty lines for each expenditure measure are summarised in Table 4.15.

Table 4.15: Estimated poverty lines (in Baht/year)

	Food poverty line	**Total poverty line**
Per capita expenditure		
Relative poverty line (PL1)	-	B 10 385
Absolute poverty line (PL2)	B 8234	B 10 826
Per adult equivalent expenditure		
Relative poverty line (PL3)	-	B 11 046
Absolute poverty line (PL4)	B 8205	B 10 676

Using the total poverty lines from Table 4.15 (labelled hereafter as PL1-PL4 as noted in Table 4.15), each household from the representative household survey was categorised as either poor or non-poor, depending on the comparison between the expenditure measure for that household and the corresponding poverty line. The three estimated Foster-Greer-Thorbecke poverty indices (Foster *et al.*, 1984) and associated standard errors for the four poverty lines are summarised in Table 4.16. The standard errors are adjusted to take into account the stratified nature of sampling (Jolliffe and Semykina, 1999). Depending on the measure employed, between 10.03 and 17.30 per cent of the people in the sample are classified as poor. The poverty lines based on per capita expenditure (PL1 and PL2) result in higher poverty estimates than the poverty lines based on per adult equivalent expenditure (PL3 and PL4). For per capita expenditure the absolute poverty line (PL2) results in higher poverty indices, while for per adult equivalent expenditure the absolute poverty line (PL4) results in lower poverty indices. All measures of poverty show that the proportion of households in poverty, the depth, and the severity of poverty are all higher in Ban Phai district than in Phon district.

Table 4.16: Measures of poverty for households in the representative household sample

Poverty line measure	Headcount Index (P_0)		Poverty Gap Index (P_1)		Poverty Severity Index (P_2)	
	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error
Full Sample						
PL1	0.1525	0.0192	0.0274	0.0045	0.0086	0.0019
PL2	0.1730	0.0199	0.0329	0.0049	0.0103	0.0021
PL3	0.1287	0.0173	0.0232	0.0042	0.0074	0.0017
PL4	0.1003	0.0151	0.0202	0.0039	0.0064	0.0016
Ban Phai District						
PL1	0.1816	0.0295	0.0324	0.0067	0.0098	0.0026
PL2	0.1983	0.0302	0.0389	0.0073	0.0118	0.0029
PL3	0.1457	0.0264	0.0279	0.0064	0.0089	0.0025
PL4	0.1126	0.0226	0.0247	0.0060	0.0077	0.0022
Phon District						
PL1	0.1139	0.0207	0.0208	0.0054	0.0070	0.0027
PL2	0.1396	0.0227	0.0251	0.0058	0.0083	0.0029
PL3	0.1062	0.0196	0.0170	0.0046	0.0054	0.0022
PL4	0.0842	0.0180	0.0144	0.0043	0.0047	0.0021

In order to estimate the poverty characteristics of the AIDS patients' households (i.e. the probability of their household being in poverty), a regression model was employed to explain the probability of a given household being in poverty. The probabilities could be estimated using a probit or logit model, depending on the assumptions about the distribution of errors.[89] However, Ravallion (1996) points out that there is no need for a binary response estimator since the probabilities can be reliably estimated directly from a regression of the welfare ratio[90] (the log of per capita expenditure, or per adult equivalent expenditure, deflated by the value of the poverty line), while employing weaker assumptions about the distribution of the error term. The regression equation would then be of the form:

$$\ln\left(\frac{x_i}{z}\right) = \beta y_i + \varepsilon_i \qquad (4.13)$$

where y_i is a vector of household characteristics (similar to those employed in the hedonic model of wealth in Section 4.5.3). Since normalising consumption by the poverty line means that for poor households the welfare ratio will be negative, the probability of a given household being poor can be estimated using the vector of parameters and the standard error of the regression of equation 4.13. Following Gibson and Rozelle (2003), the probability that a given household i is poor is given by:

$$\Pr\left[\ln\left(\frac{x_i}{z}\right) < 0\right] = \Phi\left[\frac{\left(-y_i\hat{\beta}\right)}{\hat{\sigma}}\right] \qquad (4.14)$$

Least squares regression was used to estimate equation 4.13, with a set of explanatory variables similar to those used in the hedonic wealth models in Section 4.5.3. Standard errors were corrected for the presence of heteroscedasticity using MacKinnon-White corrections (MacKinnon and White, 1985). The final models for all four poverty line measures are described in Appendix XIII.

---

[89] For example, see Gaiha (1988).
[90] See Blackorby and Donaldson (1987).

Out-of-sample prediction was then used to estimate the probability of the AIDS patients' households both at 'impact time' and at the time of the interview. Summary statistics for all four estimates (effectively the estimated head count index and standard error in each case) are presented in Table 4.17, both for the representative household sample and the AIDS patients' households. The estimated head count indices for the four poverty lines are very similar to the actual head count indices for the representative household sample (see Table 4.16). The difference is much greater for the per adult equivalent measures (PL3 and PL4) than for the two per capita measures (PL1 and PL2). Poverty rates in the AIDS patients' households appear to be much higher than in the representative household survey, both before and after 'impact time'.

Table 4.17: Poverty probability estimates for representative household sample and AIDS patients

	Mean	S.D.	Min.	Max.
Representative household sample				
PL1	0.1504	0.1906	0.0000	0.9860
PL2	0.1694	0.2026	0.0000	0.9895
PL3	0.1395	0.1729	0.0000	0.9857
PL4	0.1252	0.1629	0.0000	0.9821
AIDS patients - Household before 'impact time'				
PL1	0.2185	0.2171	0.0002	0.8767
PL2	0.2431	0.2300	0.0002	0.8979
PL3	0.2075	0.2054	0.0002	0.8713
PL4	0.1887	0.1946	0.0001	0.8512
AIDS patients - Household after 'impact time'				
PL1	0.2318	0.2147	0.0002	0.9829
PL2	0.2582	0.2242	0.0003	0.9871
PL3	0.2205	0.2054	0.0003	0.9531
PL4	0.2004	0.1969	0.0002	0.9434

4.6 Sample Statistics

4.6.1 Representative Household Survey Statistics for Respondents to the Individual Survey

The representative household survey collected data from 660 households, which included 2536 individuals. The age-sex distribution (weighted to account for the stratified nature of the sample) of the representative household survey households is presented in Figure 4.4, with the comparable distribution from the 2000 Population and Housing Census (National Statistical Office, 2000) presented in Figure 4.5.

As can be seen from Figures 4.4 and 4.5, there is an apparent difference between the age-sex distribution observed in our representative household survey, and that from the Population and Housing Census 2000, concentrated in the age groups 15-29. This difference is most likely due to differences in the definitions of who is a ‘member’ of a given household. The Population and Housing Census 2000 defines a household member as someone who is registered as a member of the household, regardless of whether they are actually present at the household on the day of the Census (National Statistical Office, 2000). However, our survey defined a member of the household as someone who has been ‘usually resident’ in the household over the month prior to the interview date. Differences between the two definitions are most likely to arise because of migration of household members. Many migrants would remain registered in their origin village and would then be counted in the Census as living in the village and not in the city. This explains why the largest differences are observed in the 15-39 age groups – the age groups most likely to migrate away from the village to work (and at least temporarily live) in Khon Kaen city, Bangkok, or elsewhere. The difference may also be due to the difference in sampling frame – our representative household sample was representative only of the two districts sampled (Ban Phai and Phon), whereas the data from the Population and Housing Census 2000 is for the entire province of Khon Kaen. If there are any significant differences between the age-sex distributions of the province and that of the two districts sampled, this will also be reflected in Figure 4.4.

Figure 4.4: Weighted age-sex distribution for the representative household survey

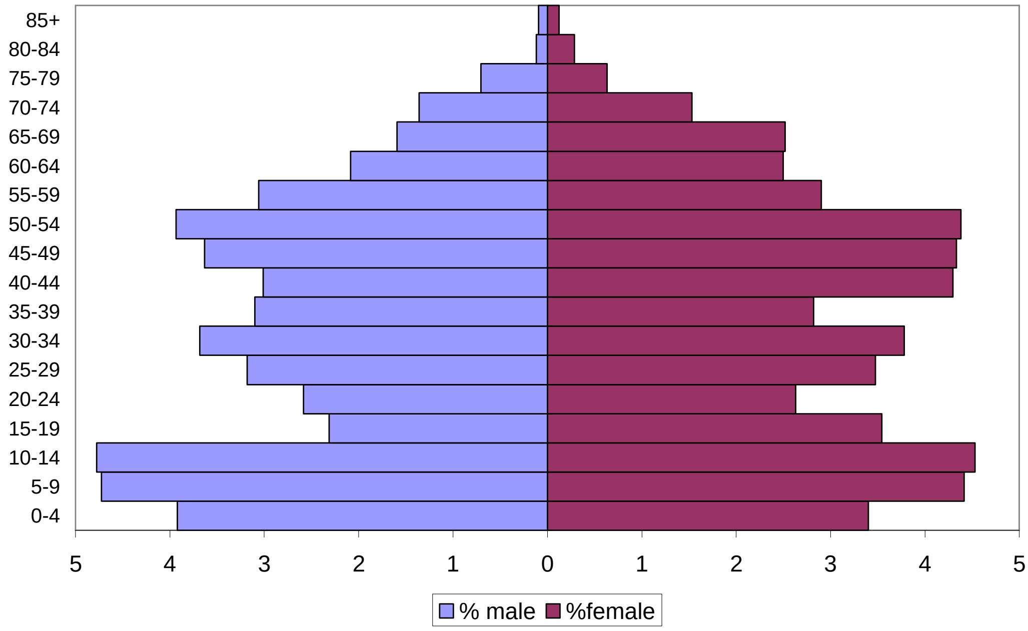
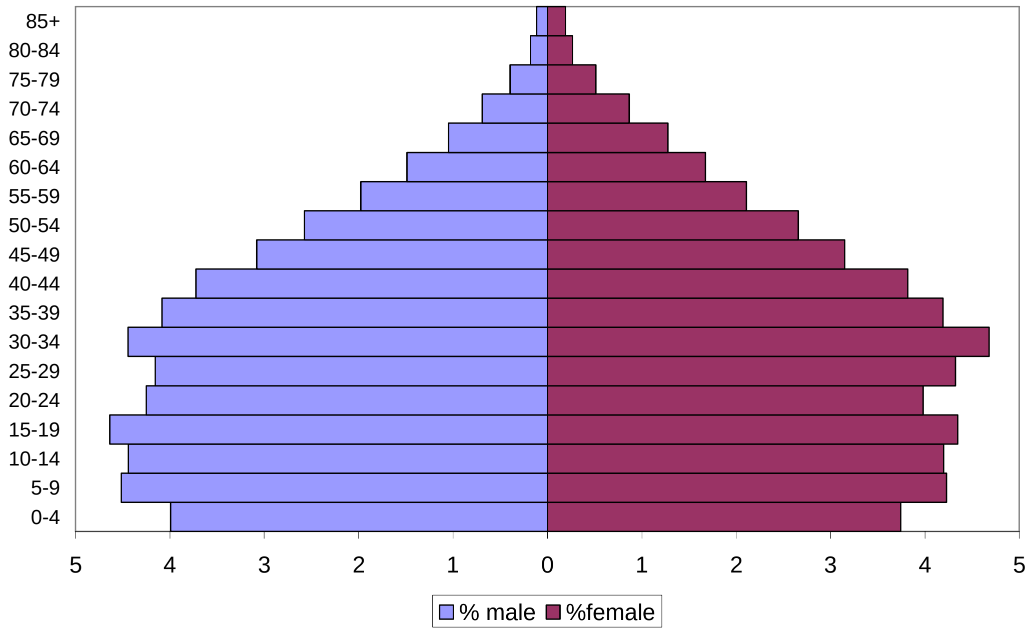


Figure 4.5: Age-sex distribution for Khon Kaen province



[Source: 2000 Population and Housing Census]

Of the 2536 individuals in the representative household survey, 1784 were aged 18 years or older and hence eligible for inclusion in the individual survey. As described in Section 4.3.1, one male and one female respondent were selected from each household. This resulted in 1226 individual questionnaires being completed. All sample responses were then weighted to account for the differential probabilities of a given respondent being selected in the sample (see Section 4.5.1). The age-sex distribution (weighted to account for the probability of selection for a given individual) of the individual survey respondents is presented in Figure 4.6, with the comparative distribution for all adults aged 18 years or over from the representative household survey presented in Figure 4.7.

From the age-sex distributions in Figures 4.6 and 4.7, it would appear that the individual survey has slightly under-surveyed males, and under-surveyed older people, particularly those in the 45-59 age groups. However, the difference in the weighted proportion of males surveyed (46.7%) and the weighted proportion of males in the adult population (47.2%) is unlikely to be statistically significant. The apparent difference in age profile is possibly due to the nature of household formation and dissolution – many of those aged 45-59 will also have adult children living in their home, necessarily reducing the probability of their being selected as part of the sample. The sample weighting procedure should compensate for this, but it appears the compensation may have been slightly insufficient for those age groups. Table 4.18 summarises the sample statistics for the individual survey respondents and the adult sample population from which they were drawn. From this table it also appears that the age profile could be slightly different for respondents to the individual survey from that of the sample from which they were drawn. However, the high variance of age suggests this difference is statistically insignificant. The respondents to the individual survey might have also been slightly more educated, but again the difference is much smaller than the variance. There appears to be no difference in wealth index values between the respondents to the individual survey and the adult population as a whole.

Figure 4.6: Weighted age-sex distribution for respondents to the individual survey

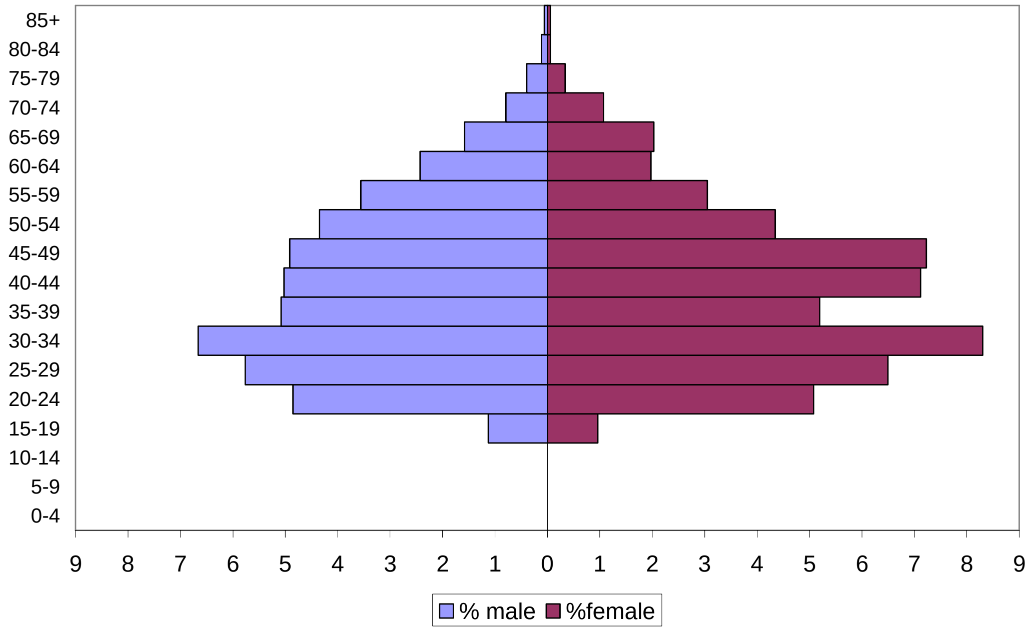


Figure 4.7: Weighted age-sex distribution for the adults from the representative household survey

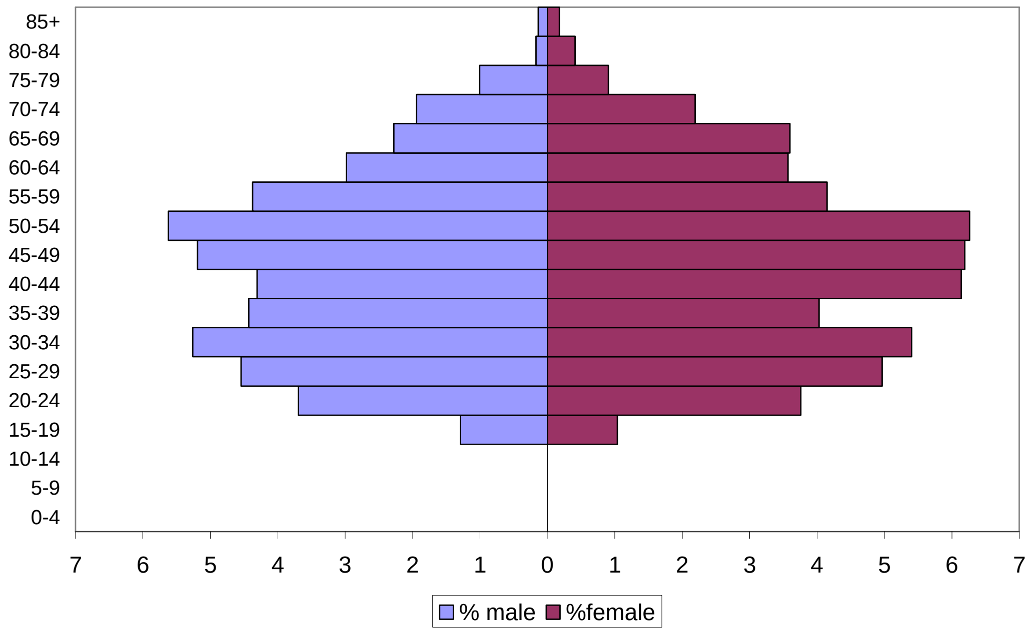


Table 4.18: Descriptive statistics for the adult population from the representative household survey (RHS) and respondents to the individual survey (IS)

	Mean	S.D.	Min.	25%	Median	75%	Max.
Age							
RHS	45.1	15.4	18	32	45	56	92
IS	40.8	13.8	18	30	40	50	88
Education							
RHS	5.7	3.3	0	4	4	6	17
IS	6.2	3.4	0	4	6	6	17
Wealth Index							
RHS	0.0032	2.1891	-3.3647	-1.7487	-0.5547	1.4709	7.1281
IS	0.0436	2.0973	-3.3092	-1.5432	-0.5039	1.4350	7.1281

The younger, slightly better educated profile of respondents to the individual survey probably does not represent a significant problem for the conclusions. The HIV/AIDS knowledge and perceptions of young sexually-active people are likely to have the greatest impact on the future course of the HIV/AIDS epidemic, since it is their future sexual behaviour and drug use which will contribute to the HIV/AIDS epidemic. Understanding their knowledge and perceptions would seem to be important in understanding the future directions and impact of the epidemic.

4.6.2 HIV/AIDS Patient Survey Statistics

The summary statistics from the HIV/AIDS Patient Survey are presented in Tables 4.19 and 4.20, with comparative (weighted) sample statistics from the representative household survey for 1784 people aged 18 or over.

Table 4.19: HIV/AIDS patient survey sample summary statistics I (Weighted sample statistics from the representative household survey in brackets)

	Mean	Median	S.D.	Min.	Max.
Age	33.3 (46.4)	32 (46)	6.9 (14.8)	20 (18)	60 (92)
Time since 'Impact Time' (months)	49.2	36	35.0	1	156
Time Community has known (months)	35.2	36	23.6	1	96
Formal Education (years)	6.1 (5.5)	6 (4)	2.8 (3.2)	0 (0)	15 (17)
Father's Education (years)	3.5 (3.5)	4 (4)	1.8 (1.9)	0 (0)	12 (16)
Mother's Education (years)	3.5 (3.1)	4 (4)	1.8 (1.8)	0 (0)	12 (16)

The mean age of the patients surveyed was 33.3 years (median age 32 years, standard deviation 6.9 years), which is substantially lower than the equivalent age of adults in the representative household survey (mean age 46.4). Nearly two-thirds were women, and all but two were outpatients. About equal numbers were interviewed in each of the three hospitals visited, and more than two-thirds of the patients lived in Ban Phai district (36.6 per cent) or Phon district (35.2 per cent), with the remainder living in other districts in Khon Kaen province. Only 16.9 per cent of the patients had never been married, and most (43.7 per cent) were widowed (often as a result of AIDS). This rate of widowhood was much higher than among adults from the representative household survey (10.6 per cent). Nearly all (91.5 per cent) had been infected with HIV by sexual contact, and only two patients (2.8 per cent) did not know how they contracted HIV. The median time since impact time for the patients was 36 months (mean time 49.2 months, standard deviation 35.0 months), and for 59.2 per cent of patients this was the time since diagnosis rather than the time since AIDS symptoms arose. The AIDS patients had a mean 6.1 years of formal education (median 6 years, standard deviation 2.8 years), slightly more than adults from the representative household survey (mean 5.5 years). However, a lower proportion was literate, numerate, or could use a computer. Most (49.3 per cent) were currently employed in agriculture, and significantly more were unemployed (29.6 per cent) than adults in the representative household survey (3.6 per cent). Of the patients' communities, 85.9 per cent knew of the patients HIV status and on average those communities had known for a median of 36 months (mean 35.2 months, standard deviation 23.6 months).

Table 4.20: HIV/AIDS patient survey sample summary statistics II (Weighted sample statistics from the representative household survey in brackets)

	Number	Proportion
Respondents		
Sample Size	71	100.0%
Gender		
Male	25	35.2% (44.9%)
Female	46	64.8% (55.1%)
Patient type		
Outpatient	69	97.2%
Inpatient	2	2.8%
Hospital		
Northeast Regional Infectious Hospital	23	32.4%
Ban Phai District Hospital	24	33.8%
Phon District Hospital	24	33.8%
Home District		
Ban Phai District	26	36.6%
Phon District	25	35.2%
Ban Haet District	10	14.1%
Muang District	3	4.2%
Other District	7	9.9%
Other Province	0	0.0%
Current marital status		
Never married	12	16.9% (11.0%)
Married	18	25.4% (75.1%)
Divorced	5	7.0% (1.7%)
Separated	5	7.0% (1.6%)
Widowed	31	43.7% (10.6%)
Current occupation		
Agriculture or fishing	36	50.7% (68.9%)
Trade	3	4.2% (6.4%)
Transport	0	0.0% (0.7%)
Technical or professional	1	1.4% (2.8%)
Public sector	0	0.0% (3.5%)
Industry	4	5.6% (5.5%)
Unemployed	21	29.6% (3.6%)
Other occupation	6	8.5% (8.6%)
Occupation at ‘impact time’		
Agriculture or fishing	35	49.3%
Trade	4	5.6%
Transport	2	2.8%
Technical or professional	7	9.9%
Industry	7	9.9%
Commercial sex worker	1	1.4%
Unemployed	5	7.0%
Other occupation	10	14.1%

	Number	Proportion
Method of contracting HIV		
Sexual contact with infected person	65	91.5%
Sharing needles with infected person	2	2.8%
Infected blood transfusion	1	1.4%
Other	1	1.4%
Don’t know	2	2.8%
Impact time caused by:		
Symptoms	29	40.8%
Diagnosis	42	59.2%
Health status known by community	61	85.9%
Can read	67	94.4% (94.4%)
Can write	67	94.4% (95.8%)
Can do mathematics	64	90.1% (93.2%)
Can use a computer	4	5.6% (6.1%)
Father is alive	37	52.1% (33.6%)
Father’s occupation:		
Agriculture or fishing	62	87.3% (95.1%)
Trade	1	1.4% (0.5%)
Transport	2	2.8% (0.7%)
Technical or professional	2	2.8% (0.7%)
Public sector	0	0.0% (2.1%)
Industry	1	1.4% (0.8%)
Other occupation	3	4.2% (0.1%)
Mother is alive:	37	52.1% (45.2%)
Mother’s occupation:		
Agriculture or fishing	60	84.5% (95.2%)
Trade	4	5.6% (1.9%)
Transport	0	0.0% (0.2%)
Technical or professional	1	1.4% (0.2%)
Public sector	0	0.0% (0.2%)
Industry	1	1.4% (0.3%)
Other occupation	5	7.0% (2.0%)

4.6.3 TBIRD factory Worker Household Survey Statistics

The summary statistics from the TBIRD factory Worker Survey are presented in Tables 4.21 and 4.22, with comparative weighted sample statistics from the representative household survey for 1784 people aged 18 or over.

Table 4.21: TBIRD factory worker survey sample summary statistics I (Weighted sample statistics from the representative household survey in brackets)

	Mean	Median	S.D.	Min.	Max.
Age	28.0 (46.4)	27 (46)	6.5 (14.8)	19 (18)	45 (92)
Formal Education (years)	8.5 (5.5)	6 (4)	3.4 (3.2)	4 (0)	14 (17)
Father's Education (years)	4.0 (3.5)	4 (4)	0.3 (1.9)	4 (0)	6 (16)
Mother's Education (years)	4.0 (3.1)	4 (4)	0.3 (1.8)	2 (0)	4 (16)

The mean age of the factory workers surveyed was 28.0 years (median age 27 years, standard deviation 6.5 years), which is substantially lower than the equivalent age of adults in the representative household survey (mean age 45.4). Over eighty percent were women, and most were married. The factory workers had a mean 8.5 years of formal education (median 6 years, standard deviation 3.4 years) which is three years more than the mean for adults from the representative household survey. This probably reflects the fact that the factory workers are younger and the number of years of compulsory education in Thailand has increased over time. All factory workers were literate and numerate, and a higher proportion of them could use a computer compared to adults from the representative household survey. The parents of the factory workers had on average four years of education, and almost all had been mainly employed in agriculture, possibly reflecting a rural bias in employment at the CBIRD centre factories.

Table 4.22: TBIRD factory worker survey sample summary statistics II (Weighted sample statistics from the representative household survey in brackets)

	Number	Proportion
Respondents		
Sample Size	48	100.0%
Gender		
Male	8	16.7% (44.9%)
Female	40	83.3% (55.1%)
Current marital status		
Never married	12	25.0% (11.0%)
Married	34	70.8% (75.1%)
Divorced	2	4.2% (1.7%)
Separated	0	0.0% (1.6%)
Widowed	0	0.0% (10.6%)
Can read	48	100.0% (94.4%)
Can write	48	100.0% (95.8%)
Can do mathematics	48	100.0% (93.2%)
Can use a computer	7	14.6% (6.1%)
Father's occupation:		
Agriculture or fishing	44	91.2% (95.1%)
Trade	1	2.1% (0.5%)
Transport	2	4.2% (0.7%)
Technical or professional	0	0.0% (0.7%)
Public sector	0	0.0% (2.1%)
Industry	0	0.0% (0.8%)
Other occupation	1	2.1% (0.1%)
Mother's occupation:		
Agriculture or fishing	47	97.9% (95.2%)
Trade	1	2.1% (1.9%)
Transport	0	0.0% (0.2%)
Technical or professional	0	0.0% (0.2%)
Public sector	0	0.0% (0.2%)
Industry	0	0.0% (0.3%)
Other occupation	0	0.0% (2.0%)

Chapter 5

Socio-Economic Impacts – From HIV/AIDS to Wealth and Poverty

5.1 Type I, Type II, and Type III Impacts from the HIV/AIDS Patient Survey

5.1.1 Introduction

This chapter examines the relationship from HIV/AIDS to poverty. Outlined in Section 3.4, Hypothesis (a) suggests that there is a significant relationship between previous HIV infection and current wealth or poverty, i.e. that HIV infection significantly adversely affects the wealth of individuals (including Type I, Type II, Type III, and Type IV impacts) and places the individuals at a higher risk of poverty. Recall that Type I impacts are those that affect the HIV-infected individual directly, Type II impacts are those that affect the other members of the HIV-infected individual's household, and Type III impacts are impacts on members of households that care for former dependents of the HIV-infected individual's household. The most easily recognised Type I and Type II impact are the medical and funereal expenses incurred by the household as a result of the morbidity and eventual mortality of the AIDS-infected individual. The extent and payment for medical expenses and other treatment and care are analysed in Section 5.1.3.

The movement of the patient between households will result in Type II impacts on both the members of the origin household and on those of the destination household, and these impacts may be significant. They are evaluated quantitatively in Section 5.1.4. Stigma and discrimination have a potentially significant impact on both HIV-infected individuals and other members of their household, and the extent of these effects is explored in Section 5.1.5. Section 5.1.6 expands on the analysis of the preceding sections by looking at qualitative results. Finally, an examination of the data obtained from a survey such as the HIV/AIDS patient survey is unlikely to reveal the human dimension of the impacts of HIV/AIDS on the AIDS-infected individual and others. Section 5.1.7 presents several case studies, which explore in greater detail the lives of some of the interviewed patients, both at impact time and at the time of interview.

5.1.2 Summary Statistics by Mobility Status

Summary statistics for the HIV/AIDS Patient Survey were presented in Section 4.6.2. However, there are key differences between two groups of patients – those who remained in the same household at the time of interview as they lived in at impact time (50 patients) who will hereafter be referred to as non-movers, and those that have moved from one household into another household during that time (21 patients) who will be referred to as movers. The summary statistics, separated for each of these two groups, are presented in Tables 5.1 and 5.2.

Table 5.1: HIV/AIDS patient survey sample summary statistics, by mobility status I

	Non-movers Mean	Movers Mean
Age	33.0	34.0
Time since impact time (months)	44.1	61.4
Time since symptoms began (months)	16.4	44.4
Time Community has known (months)	0.8	0.9
Formal Education (years)	5.9	6.4
Father's Education (years)	3.5	3.3
Mother's Education (years)	3.3	4.1

Table 5.2: HIV/AIDS patient survey sample summary statistics, by mobility status II

	Non-movers	Movers
Respondents		
Sample Size	50 (70.4%)	21 (29.6%)
Gender		
Male	12 (24.0%)	13 (62.9%)
Female	38 (76.0%)	8 (38.1%)
Marital status		
Never married	5 (10.0%)	7 (33.3%)
Married	15 (30.0%)	3 (14.3%)
Divorced	1 (2.0%)	4 (19.0%)
Separated	2 (4.0%)	3 (14.3%)
Widowed	27 (54.0%)	4 (19.0%)
Current Occupation		
Agriculture or fishing	28 (56.0%)	8 (38.1%)
Trade	3 (6.0%)	0 (0.0%)
Technical or professional	1 (2.0%)	0 (0.0%)
Industry	1 (2.0%)	3 (14.3%)
Unemployed	14 (28.0%)	7 (33.3%)
Other occupation	3 (6.0%)	3 (14.3%)
Occupation at impact time		
Agriculture or fishing	29 (58.0%)	6 (28.6%)
Trade	4 (8.0%)	0 (0.0%)
Transport	0 (0.0%)	2 (9.5%)
Technical or professional	5 (10.0%)	2 (9.5%)
Industry	3 (6.0%)	4 (19.0%)
Commercial sex worker	0 (0.0%)	1 (4.8%)
Unemployed	5 (10.0%)	0 (0.0%)
Other occupation	4 (8.0%)	6 (28.6%)
Impact Time Caused by:		
Symptoms	30 (60.0%)	12 (57.1%)
Diagnosis	20 (40.0%)	9 (42.9%)
Health Status known by Community:	42 (84.0%)	19 (90.4%)
Can read	46 (92.0%)	21 (100.0%)
Can write	46 (92.0%)	21 (100.0%)
Can do mathematics	43 (86.0%)	21 (100.0%)
Can use a computer	3 (6.0%)	1 (4.8%)
Father is alive	28 (56.0%)	9 (42.9%)
Father's occupation:		
Agriculture or fishing	43 (86.0%)	19 (90.5%)
Trade	0 (0.0%)	1 (4.8%)
Transport	2 (4.0%)	0 (0.0%)
Technical or professional	2 (4.0%)	0 (0.0%)
Industry	1 (2.0%)	0 (0.0%)
Other occupation	2 (4.0%)	1 (4.8%)
Mother is alive	40 (80.0%)	18 (85.7%)
Mother's occupation:		
Agriculture or fishing	42 (84.0%)	18 (85.7%)
Trade	2 (4.0%)	2 (9.5%)
Technical or professional	1 (2.0%)	0 (0.0%)
Industry	1 (2.0%)	0 (0.0%)
Other occupation	4 (8.0%)	1 (4.8%)

Of the patients surveyed, significantly more time had elapsed since impact time for movers than non-movers ($p = 0.0277$), and movers had been symptomatic for significantly longer ($p < 0.0001$). This probably reflects that, over time, patients are more likely to develop symptoms and require care from others. Movers were much more likely to be male and never married, and much less likely to be widowed or currently married. Other summary statistics were similar between the two groups. However, given the difference in the types of impacts that might occur for movers and non-movers, the remainder of the analysis will consider the two groups both together and separately.

5.1.3 Medical Expenses, Treatment and Care

Once the HIV-infected individual becomes symptomatic, the biggest direct cost to the household (and hence a Type I and Type II impact) of HIV/AIDS may be the cost of treatment and care, including medical expenses. With the development of antiretroviral treatment, medical expenses have become a significant direct cost for asymptomatic HIV-infected individuals as well (or at least for those who obtain treatment for asymptomatic HIV infection), as well as increasing the costs of treatment for symptomatic HIV-infected individuals and their households. In this section we explore the recent costs of treatment and care experienced by the HIV/AIDS patients surveyed.

According to the Northeast Regional Infectious Hospital, the standard course of antiretroviral treatment cost 1440 Baht per month at the time of the survey. This can be seen as prohibitively expensive, considering that the weighted mean per capita consumption from the representative household survey was just 1731 Baht per month (or 1841 Baht per month in adult equivalent terms; see Section 4.5.2). These costs are significantly lower than the estimates by Kitajima *et al*. (2003), who estimated the costs of antiretroviral treatment to outpatients in 2001-2002 at approximately $US280 (about 11,000 Baht) per visit. The costs of antiretroviral treatment have since reduced due to the availability of generic drugs. Also, many of the HIV/AIDS patients were able to access inexpensive subsidised treatment at the hospital or their district hospital due to their participation in a pilot program increasing the coverage of antiretroviral treatment in rural areas. Many patients were also eligible for the Free Medical for the Poor or the 30 Baht Healthcare programmes, both of which reduce the cost of treating opportunistic infections associated with their HIV infection.

All patients were asked about the number of days in which they were too sick to carry out their normal daily activities and their medical expenses in the month before the interview – the results are summarised in Table 5.3. The table also decomposes the results between those patients who were asymptomatic at the time of interview and those who were not, and comparative statistics from adults in the representative household survey.

Table 5.3: Summary statistics for health expenditure and sickness for the month prior to interview

	Mean	Median	S.D.	Min.	Max.
Total sample					
Number of days sick in the month before interview	2.51	0	6.71	0	30
Total health expenditure in the month before interview (Baht)	452.4	10	1009.7	0	5440
Symptomatic patients					
Number of days sick in the month before interview	3.11	0	7.38	0	30
Total health expenditure in the month before interview (Baht)	562.8	30	1100.7	0	5440
Asymptomatic patients					
Number of days sick in the month before interview	0.07	0	0.27	0	1
Total health expenditure in the month before interview (Baht)	2.9	0	8.3	0	30
Representative household survey*					
Number of days sick in the month before interview	0.45	0	2.44	0	30
Total health expenditure in the month before interview (Baht)	43.9	0	303.4	0	10 029

*Includes adults only, weighted to account for the stratified nature of the sample.

Unsurprisingly, the data in Table 5.3 suggest that symptomatic patients are more often too sick to carry out their usual daily activities and face higher medical expenses than asymptomatic patients. It also implies that patients in general are sick more often and face higher medical expenses than the general adult population. These differences were tested using unpaired one-sided *t*-tests and the results are presented in Table 5.4.[91]

Table 5.4: Results of tests of the equality of distribution functions for days of sickness and medical expenditure

Test	t	p-value
Symptomatic vs. asymptomatic patients		
Number of days sick in the month before interview	-1.53	0.0653*
Total health expenditure in the month before interview (Baht)	-1.89	0.0313**
All patients vs. general adult population		
Number of days sick in the month before interview	-8.49	< 0.0001***
Total health expenditure in the month before interview (Baht)	-12.35	< 0.0001***
Asymptomatic patients vs. general adult population		
Number of days sick in the month before interview	1.13	0.1295
Total health expenditure in the month before interview (Baht)	1.13	0.1290

* weakly significant at $p < 0.1$; ** significant at $p < 0.05$; *** significant at $p < 0.01$

The difference in the number of sick days in the month prior to interview was weakly significantly higher for symptomatic than asymptomatic patients. However, overall patients were sick significantly more often than the general adult population. Symptomatic patients had significantly higher medical expenses than asymptomatic patients, and overall patients also had significantly higher medical expenses than the general adult population. While none of this is particularly surprising, it confirms that patients and their households face significantly increased direct costs in the form of higher medical expenses than households and individuals who are not directly affected. It also confirms that these households and individuals face higher indirect costs in the form of reduced labour supply due to significantly higher morbidity among HIV/AIDS patients than among the general adult population. However, these results only hold for the comparisons of symptomatic patients to the general population. Patients who had not yet developed symptoms of AIDS had morbidity and healthcare expenditure

[91] Non-parametric tests using the Kolmogorov-Smirnov test of the equality of distribution functions (Conover, 1999) showed qualitatively the same results in terms of statistical significance, although these nonparametric tests were run on un-weighted data and are, as such, unreported.

that were not significantly different from the general population. Again this result is not particularly surprising.

As discussed, all patients interviewed were receiving treatment at the Northeast Regional Infectious Hospital, Ban Phai District Hospital, or Phon District Hospital. However, for many patients this was not the only source of treatment and care for HIV/AIDS or for opportunistic infections resulting from HIV. Five of the patients received care from more than one hospital – often this was both the Northeast Regional Infectious Hospital and their local district hospital. Local or hospital support groups provided additional treatment and care for twenty of the patients, and Phon district offered a special support project for HIV/AIDS patients in which an additional 22 patients were enrolled. These support groups and project were all free for the patients, typically receiving funding from the local hospitals or directly from the Ministry of Public Health or Office of the Prime Minister. In addition to medical expenses and other treatment, patients were also asked about the person or organisation that most provided them with (i) mental support; (ii) advice; (iii) treatment and care; and (iv) financial support. The results of these questions are presented in Table 5.5.

Table 5.5: Major sources of advice, care, and support for HIV/AIDS patients

Source*	Mental support	Advice	Treatment and care	Financial support
No-one	2 (2.8%)	8 (11.3%)	5 (7.0%)	14 (19.7%)
Spouse	5 (7.0%)	1 (1.4%)	9 (12.7%)	1 (1.4%)
Mother	39 (54.9%)	11 (15.5%)	32 (45.1%)	18 (25.4%)
Father	5 (7.0%)	3 (4.2%)	2 (2.8%)	7 (9.9%)
Sibling or sibling-in-law	6 (8.5%)	4 (5.6%)	8 (11.3%)	13 (18.3%)
Child	11 (15.5%)	–	4 (5.6%)	4 (5.6%)
Other family member	5 (7.0%)	8 (11.3%)	11 (15.5%)	8 (11.3%)
Friend or neighbour	3 (4.2%)	4 (5.6%)	1 (1.4%)	1 (1.4%)
Health care workers	3 (4.2%)	31 (43.7%)	2 (2.8%)	3 (4.2%)
Other government officials	–	1 (1.4%)	–	–
Other HIV/AIDS patients	–	1 (1.4%)	–	–
Village fund or similar	–	–	–	6 (8.5%)

*Percentages may not sum to 100 as patients were encouraged to give all applicable major sources.

As can be seen from Table 5.5, patients received support and care from a variety of sources which they considered to be "major sources" – often this support and care illustrates Type II or Type III impacts on others. Mental support was most often provided by the patient's mother, and often by the patient's children (invariably their daughters). Advice was most often given by health care workers, but mothers were also an important source of advice. Treatment and care (other than treatment at the hospital itself) was most often provided by the patient's mother, though the spouse or other family members were also important sources of treatment and care – only five patients had no source of treatment and care other than the hospital. Fourteen patients had no source of financial support, and six patients had to rely on money lent by the village fund or a similar institution. Most patients received financial support from family members, and three patients received financial support from health care workers.

The significant cost of medical expenses, when considered with the sources of financial and other support received by the patients illustrate the significance of Type II and Type III impacts on non-HIV-infected individuals – those individuals who also bear the costs of the HIV-infected individual's illness. Even if they are not directly affected by HIV (i.e. themselves infected), the close and extended families of the patient are often called upon to meet the significant financial and emotional costs of treatment and care.

5.1.4 Quantitative Evaluation of Type I, Type II, and Type III Impacts

To further illustrate the effects of Type I and Type II impacts on the households of HIV-infected individuals, changes in observable characteristics of the household in which the patient lived between impact time and the time of interview were considered. The changes considered included changes in asset ownership, economic activities, size and composition of the household, and the range of wealth and poverty measures developed in Sections 4.5.3 and 4.5.4. The range of variables tested for significant differences, and the statistical tests used, are listed in Table 5.6.

Table 5.6: Variables tested for significant differences as the result of Type I and Type II impacts of HIV infection

Variable	Type of test
Proportion of non-productive household members[92]	*t*-test for equality of mean.
Household economic activities	X^2-test for the equality of proportions.
Land ownership	*t*-test for equality of mean.
Household asset ownership	X^2-test for the equality of proportions.
Estimated total household wealth	*t*-test for equality of mean.
Wealth index	*t*-test for equality of mean.
Estimated probabilities of poverty	*t*-test for equality of mean.

Table 5.7 shows the proportion of AIDS-impacted individuals' households that had various observable characteristics at impact time and at the time of interview, and the results of statistical tests (one-tailed) of the difference in proportion between the 'before-impact' and 'after-impact' proportions.[93] Tables 5.8 and 5.9 further disaggregate these results by mobility status.

As shown in Table 5.7, on average the patients now live in households with a significantly higher proportion of non-productive household members, though the household size and number of productive adults are not significantly different. This suggests that productive adults in the household at the time of the interview must produce more in order to maintain the same standard of living compared to at impact time. Their household is significantly more likely to own a VCD player or bicycle, probably reflecting general improvements in the standard of living of the average rural household in the Thai economy. However they are significantly less likely to own a car or truck. The household is significantly more likely to have a shop or stall than the household the patient lived in at impact time, and significantly less likely to run a public motor vehicle like a motor taxi or tuk-tuk. The rate of agriculture is not significantly different between impact time and the time of interview. The patient themselves are significantly less likely to be

[92] This measure is the number of children and elderly household members, as a proportion of the total number of household members. This measure is probably better than a dependency ratio (the ratio of non-productive household members to productive household members) because of the number of households that include only children and elderly (and would thus have an undefined dependency ratio).

[93] Only statistically significant results, and results of some of the most important variables, are shown. Full results of these statistical tests are given in Appendix XIII.

involved in transport, a technical or professional occupation, or ‘other work’, and significantly more likely to be unemployed than at impact time.

Table 5.7: Changes in household characteristics of the household HIV/AIDS patients live in

Variable / Household Characteristic	Mean at time of interview	Mean at impact time	p-value†
Household characteristics			
Household size	4.254	4.169	0.3919
Number of productive adults	2.718	2.873	0.1964
Proportion of non-productive household members	0.322	0.273	0.0492**
Wealth and poverty[94]			
Total assets per adult equivalent	96 703	95 078	0.4264
Total household assets per adult equivalent	11 300	11 771	0.3833
Wealth index	-0.1001	0.2403	0.0866*
Poverty estimate PL1	0.2312	0.2185	0.3455
Sending remittances	0.113	0.295	0.0386**
Asset Ownership			
VCD player	0.323	0.197	0.0427**
Bicycle	0.535	0.408	0.0651*
Car or truck	0.056	0.127	0.0728*
Economic Activities			
Rice	0.563	0.549	0.4329
Shop or stall	0.099	0.028	0.0425**
Public motor vehicle	0.014	0.099	0.0145**
Other private wage	0.214	0.366	0.0235**
HIV/AIDS Patient Occupation			
Agriculture	0.507	0.493	0.4334
Trade	0.042	0.056	0.3491
Transport	0.000	0.028	0.0772*
Technical or professional	0.014	0.085	0.0263**
Other work	0.084	0.155	0.0981*
Unemployed	0.296	0.070	0.0003***

† p-values are for a one-sided test of the equality of proportions, or a one-sided paired *t*-test
* weakly significant at $p < 0.1$; ** significant at $p < 0.05$; *** significant at $p < 0.01$

The wealth index values are significantly lower for the household at the time of interview than at impact time. However, total assets and total household assets per adult equivalent (and other similar measures, shown in Appendix XIII) show no

---

[94] Hereafter household assets include only assets within the household such as refrigerators, televisions, motorcycles, etc. and livestock. By contrast, total assets include the value of all household assets as well as the value of land (estimated at 19162 Baht per rai) and the self-reported market value of the dwelling. For HIV/AIDS patients, these measures are both estimates based on the hedonic models described in Section 4.5.3.

significant difference, possibly reflecting the offsetting effects of a general improvement of living standards and a decline relative to other households for the AIDS-affected households. The patients' households are no more likely to be in poverty at the time of interview than at impact time, but are significantly less likely to be sending remittances to (typically elderly) family members living elsewhere.

Table 5.8: Changes in household characteristics of the household HIV/AIDS patients live in, for non-movers

Variable / Household Characteristic	Mean at time of interview	Mean at impact time	p-value†
Household characteristics			
Household size	4.18	4.72	0.0206**
Number of productive adults	2.68	3.22	0.0020***
Proportion of non-productive household members	0.339	0.313	0.0492**
Wealth and poverty			
Total assets	368 918	376 600	0.3897
Total assets per adult equivalent	105 472	92 465	0.0979*
Total household assets per adult equivalent	12 393	12 203	0.4578
Wealth index	0.0382	-0.2698	0.0855*
Poverty estimate PL1	0.211	0.253	0.0532*
Sending remittances	0.120	0.320	0.0079***
Asset Ownership			
VCD player	0.380	0.220	0.0404**
Economic Activities			
Other private wage	0.180	0.320	0.0530*
HIV/AIDS Patient Occupation			
Technical or professional	0.020	0.100	0.0461**
Unemployed	0.280	0.100	0.0109**

† p-values are for a one-sided test of the equality of proportions, or a one-sided paired *t*-test

* weakly significant at $p < 0.1$; ** significant at $p < 0.05$; *** significant at $p < 0.01$

When the sample of patients is restricted to non-movers (see Table 5.8), the current household is now significantly smaller, in terms of both the total number of inhabitants and the number of productive adults, and had a significantly higher proportion of non-productive members, when compared to the same household at impact time. This possibly reflects the death of the spouse of the patient at some time since impact time. The household was significantly less likely to obtain income from a private wage other than factory or agricultural wages, and the patients themselves were significantly less likely to be involved in a technical or professional occupation than at impact time, and significantly more likely to be unemployed.

The value of total assets per adult equivalent was significantly higher at the time of interview than at impact time though the value of total assets was not significantly different. This probably reflects roughly the same household wealth being split among fewer household members in the now significantly smaller household. The wealth index values are significantly lower for the household at the time of interview than at impact time, though the patients' households are no more likely to be in poverty. As with the overall sample, the household is significantly less likely to be sending remittances.

Looking only at movers (see Table 5.9), the destination household (at the time of interview) is significantly larger, both in terms of the total number of inhabitants and the number of productive adults. The destination household also has a significantly larger proportion of non-productive members, possibly reflecting a move into a household with elderly household members who can care for the patient without severely adversely affecting the household's productive activities. The destination household also has significantly more total land (but not land per adult equivalent) and is significantly more likely to grow rice or vegetables for income, probably reflecting a movement from urban to rural households for these patients. The destination household is significantly more likely to have a shop or stall, and significantly less likely to operate a public motor vehicle, such as a motor taxi. This also appears consistent with urban to rural migration. Despite the move into more agricultural households, the patients who moved household were not significantly more likely to be involved in agriculture. However they were significantly less likely to now be involved in the transport industry or 'other work', and significantly more likely to be unemployed. This may reflect that HIV/AIDS patients who move households are more likely to be chronically morbid and unable to productively contribute to the household.

Table 5.9: Changes in household characteristics of the household HIV/AIDS patients live in, for movers

Variable / Household Characteristic	Mean at time of interview	Mean at impact time	p-value†
Household characteristics			
Household size	4.43	2.86	0.0252**
Number of productive adults	2.81	2.05	0.0267**
Proportion of non-productive household members	0.322	0.273	0.0492**
Land			
Land (rai)	7.04	4.02	0.0707*
Land per adult equivalent	1.43	1.01	0.1501
Wealth and poverty			
Total assets	295 596	237 111	0.1081
Total assets per adult equivalent	71 869	97 602	0.0701*
Total household assets	75 823	101 299	0.0701*
Total household assets per adult equivalent	8 696	10 740	0.2701
Wealth index	-0.4294	1.4548	0.0008***
Poverty estimate PL1	0.2821	0.1362	0.0593*
Sending remittances	0.0952	0.2381	0.1071
Asset Ownership			
Bicycle	0.571	0.333	0.0606*
Car or truck	0.000	0.095	0.0736*
Economic Activities			
Rice	0.571	0.286	0.0307**
Vegetables	0.095	0.000	0.0736*
Shop or stall	0.095	0.000	0.0736*
Public motor vehicle	0.000	0.286	0.0041***
HIV/AIDS Patient Occupation			
Agriculture	0.381	0.286	0.2563
Transport	0.000	0.095	0.0736*
Other work	0.143	0.333	0.0736*
Unemployed	0.333	0.000	0.0019***

† p-values are for a one-sided test of the equality of proportions, or a one-sided paired *t*-test

* weakly significant at $p < 0.1$; ** significant at $p < 0.05$; *** significant at $p < 0.01$

The patients also moved into households with significantly lower assets per adult equivalent despite the larger landholding. Although this may reflect the larger size of the destination household, the wealth index values were also significantly lower and the household was significantly more likely to be classified as poor. As with the overall sample, the destination household is significantly less likely to be sending remittances. This may be due to the destination household being the household that was receiving remittances from the origin household of the patient – particularly if the patient has joined the household of their elderly parents.

It is interesting to note that the wealth index values are significantly lower for the sample as a whole as well as both the sub-samples of non-movers and movers. This appears to confirm the theory that HIV infection has a significant negative impact on household wealth. Total assets and total household assets have similar results, although when expressed in per capita and per adult equivalent terms the results are variable due to changes in the composition of the HIV/AIDS patients' households.

The above statistical tests simply compare the distribution of the variable before and after the impact of HIV infection. It is possible that the length of time elapsed since impact time, or since symptoms began, is important in determining the extent of impact. This would determine whether this change in the wealth status of HIV/AIDS patients resulted from the medical expenses that the patient has incurred since developing symptoms, or independently as a result of other coping mechanisms of the household. To test for these possibilities the following regression model was used:

$$\Delta W_i = \alpha + \beta X_i + \varepsilon_i \tag{5.1}$$

where: ΔW_i is the first difference in the variable expected to be impacted by HIV/AIDS

X_i is the vector of explanatory variables, evaluated at impact time

ε_i is the error term

The dependent variables were the first difference of each of the variables considered earlier. The explanatory variables used in the analysis of Model 5.1 are listed in Table 5.10. The key explanatory variables of interest were the length of time since symptoms began,[95] and whether the patient had moved household – other explanatory variables were included to remove any confounding effects.

Table 5.10: Explanatory variables used in the analysis of Type I impacts of HIV infection

Explanatory variable	Measure
Age	Age of the HIV/AIDS patient at the time of interview
Time since symptoms began	–
Moved household	Whether the HIV/AIDS patient has changed household since impact time
Wealth (evaluated at impact time)	Wealth index value; Log of total assets (including per capita and per adult equivalent); Log of total household assets (including per capita and per adult equivalent)

Table 5.11 shows the estimated models for the change in total land, total assets, and poverty estimate PL3, using the log of total household assets as the measure of wealth in the explanatory variables. The variables which had significant effects on the change in key household variables are summarised in Table 5.12 (full details of the regression models are included in Appendix XIII).

As shown in Table 5.11, the change in land and the change in wealth are significantly negatively associated with the time since the beginning of AIDS symptoms. This is not unexpected – as time progresses and the patient becomes progressively more ill, we would expect that the costs of medical expenses would increase relatively and that those costs would begin to impact on the wealth of the household. One of the coping mechanisms could be the sale of land. However, according to Table 5.12 the time since symptoms began does not consistently affect wealth and depends on the measure of wealth used. Whether a patient moved from one household to another since impact time is the variable that most consistently affects these key household variables. It has a significantly positive effect on household size, consistent with earlier findings that movers move into significantly larger households. It also has a significant positive effect on total land, again consistent with movers moving from urban to rural households as previously discussed. However, it only significantly negatively affects some measures of wealth and not others but is significantly positively associated with

[95] The length of time since impact time was also included in initial analyses. However, it was later dropped due to significant correlation with the length of time since symptoms began.

an increased probability of the patient living in a household in poverty. Again these were results that were expected and discussed in the earlier analysis. Wealth at impact time does not appear to consistently significantly affect any of the key household variables, although it should be noted that the results from using wealth index at impact time are the only ones where wealth is not a significant negative predictor of the change in wealth. This may suggest that wealthier suffer a significantly greater decline in absolute wealth, which is intuitive in that wealthier households should be more able to afford expensive medical care as the patient becomes progressively more ill from AIDS-related symptoms.

Table 5.11: Selected estimated models explaining the change in key household variables between impact time and the time of interview

	Coefficient	Std. Error	t	P>|t|
Δ[Land (rai)]				
Age	-0.0254	0.1657	-0.15	0.879
Time since symptoms began	-0.0819	0.0449	-1.82	0.073*
Moved household	6.4791	2.7127	2.39	0.020**
Log of total household assets at impact time	-0.0214	0.8355	-0.03	0.980
Constant	1.2414	10.2201	0.12	0.904
		Adjusted R^2 = 0.0373		
Δ[Total assets]				
Age	-197.319	3501.14	-0.06	0.955
Time since symptoms began	-1686.90	949.265	-1.78	0.080*
Moved household	100 116	57318.9	1.75	0.085*
Log of total household assets at impact time	-23282.7	17654.2	-1.32	0.192
Constant	261 179	215 949	1.21	0.231
		Adjusted R^2 = 0.0282		
Δ[Poverty estimate PL3]				
Age	-0.0003	0.0046	-0.06	0.956
Time since symptoms began	-0.0011	0.0012	-0.85	0.401
Moved household	0.2304	0.0754	3.05	0.003***
Log of total household assets at impact time	-0.0002	0.0232	-0.01	0.995
Constant	-0.0191	0.2841	-0.07	0.947
		Adjusted R^2 = 0.0759		

* weakly significant at $p < 0.1$; ** significant at $p < 0.05$; *** significant at $p < 0.01$

Table 5.12: Significant explanatory variables in models explaining the change in key household variables between impact time and the time of interview

Model	Significant explanatory variables (p < 0.1)	Adjusted R^2
Δ[Household size]	Moved household (+)*, Wealth at impact time (+)	0.1277 – 0.1706
Δ[Proportion of household members who are non-productive]	–	-0.0276 – 0.0068
Δ[Land (rai)]	Time since symptoms began (-)*, Moved household (+)*, Wealth at impact time (-)	0.0373 – 0.1445
Δ[Land per capita]	Time since symptoms began (-), Wealth at impact time (-)	-0.0187 – 0.0384
Δ[Land per adult equivalent]	Time since symptoms began (-), Wealth at impact time (-)	-0.0191 – 0.0445
Δ[Total assets]	Time since symptoms began (-), Moved household (+), Wealth at impact time (-)	0.0074 – 0.1241
Δ[Total assets per capita]	Age (+)*, Moved household (-), Wealth at impact time (-)	0.0558 – 0.1773
Δ[Total assets per adult equivalent]	Age (+)*, Moved household (-)	0.0584 – 0.1845
Δ[Total household assets estimate]	Wealth at impact time (-)	-0.0320 – 0.1047
Δ[Total household assets per capita]	Wealth at impact time (-)	-0.0261 – 0.1451
Δ[Total household assets per adult equivalent]	Wealth at impact time (-)	-0.0314 – 0.1521
Δ[Wealth index]	Moved household (-)*, Wealth at impact time (-)	0.2139 – 0.3488
Δ[Poverty estimate PL1]	Moved household (+)*	0.0573 – 0.0930
Δ[Poverty estimate PL2]	Moved household (+)*	0.0574 – 0.0937
Δ[Poverty estimate PL3]	Moved household (+)*, Wealth at impact time (-)	0.0759 – 0.1189
Δ[Poverty estimate PL4]	Moved household (+)*, Wealth at impact time (-)	0.0754 – 0.1198

* Significant in all models, regardless of wealth measure

The low R^2 values indicate that only a small proportion of the variation in the dependent variable is explained by the explanatory variables. This is indicative of the wide range of possible strategies for households to cope with the impacts of HIV/AIDS – few households and individuals react to HIV/AIDS in the same way. Further, it is important to note that the models used above may suffer from multicollinearity,[96] particularly if there is significant association between the decision to move household and the other explanatory variables such as wealth and the time since symptoms began. Further, the decision to move household is

[96] Although multicollinearity does not violate any of the assumptions underlying the unbiasedness or efficiency of the ordinary least squares estimator, it might cause standard errors to be overstated, making *t*-statistics lower and more likely to be insignificant (Ramanathan, 2002).

also important to investigate in its own right – to do this a standard probit model was estimated with whether the patient had moved household or not as the dependent variable. This model used the same set of explanatory variables described in Table 5.10 with whether the patient was ever married as an additional explanatory variable. The resulting estimated marginal probabilities and coefficients of the probit model are presented in Table 5.13.

Table 5.13: Probit model of the determinants of the HIV/AIDS patient's decision to move from one household to another

	Marginal Probability	Coefficient	Std. Error†	z	P > |z|
Gender (1 = male)	0.3325	1.0277	0.4085	2.52	0.012**
Age	-0.0127	-0.0424	0.0310	-1.37	0.171
Ever married	-0.0909	-0.3230	0.4494	-0.72	0.472
Time since symptoms began	0.0081	0.0269	0.0095	2.82	0.005***
Wealth index at impact time	0.0957	0.3190	0.1072	2.98	0.003***
Constant	–	-0.3627	0.9654	-0.38	0.707
		Pseudo R^2 = 0.3801			

* weakly significant at $p < 0.1$; ** significant at $p < 0.05$; *** significant at $p < 0.01$

† reported standard errors are for the coefficient, not the marginal probability

From the estimated model in Table 5.13 it can be seen that the time since the beginning of symptoms was significantly related to whether or not the patient had moved household. As mentioned previously, if the patient requires increasing amounts of care as they become progressively affected by AIDS-related morbidity, then they may seek care from family members living elsewhere. This would be particularly true if the patient were widowed and left without a caregiver following the death of their spouse – although whether the patient had ever been married is shown to be insignificant. Surprisingly, the wealthy were significantly more likely to move household. This may reflect that poorer households also have lower social capital and therefore be less able to call upon the assistance of relatives elsewhere, or that there are costs associated with moving household which are unable to be adequately covered by the less wealthy. It could also reflect that those who moved from one household to another were most likely to move from a relatively wealthier urban household to a relatively poorer rural household. Men were also significantly more likely to move household than women, although this may simply reflect the generally higher mobility of the male population in Thailand.

In addition to changes in the household variables mentioned above, many of the other members of households with HIV/AIDS patients experienced other Type II impacts as a result of coping strategies employed by members of the household, such as the sale of productive assets or land, days taken off work to care for morbid HIV-infected individuals, children or elderly sent to live elsewhere, a reduction in remittances sent to other family members, and so on. The latter two of these also indicate a Type III impact on members of another household, who must now care for a former dependent of the HIV/AIDS patient's household, or who no longer receive remittances from the HIV/AIDS patient's household. These coping strategies were not evaluated by comparison between the current household and the household at impact time – instead the survey included direct yes/no questions related to these changes. The results of these questions are summarised in Table 5.14.

Table 5.14: Summary of other changes to HIV/AIDS patient's household

	Yes	No
Used savings to pay for medical expenses	21 (29.6%)	50 (70.4%)
Received money from others for medical expenses	33 (46.5%)	38 (53.5%)
Sold household assets	11 (15.5%)	60 (84.5%)
Sold farm or business assets	3 (4.2%)	68 (95.8%)
Sold land	5 (7.0%)	66 (93.0%)
Other household member/s took days off work to care for HIV/AIDS patient	1 (1.4%)	70 (98.6%)
Other household member/s changed job because of HIV/AIDS patient (for care or some other reason)	1 (1.4%)	70 (98.6%)
Other household member/s stopped work to care for HIV/AIDS patient	2 (2.8%)	69 (97.2%)
Children removed from school*	1 (2.0%)	47 (98.0%)
Children sent to live elsewhere*	3 (6.3%)	45 (93.8%)

* Only 48 of the HIV/AIDS patients lived in households with children at impact time

The responses of the households of the HIV/AIDS patients surveyed demonstrate the wide range of coping strategies employed by these households to deal with the impact of having an HIV-infected household member. No single strategy was universally employed, and some households employed none of the strategies that were investigated.

Even within the categories of strategies listed above, there was significant variation. Of the 21 patients who had used savings to pay for their healthcare, eight used savings from a bank account while the remaining 13 used savings from some other source. Money for care and treatment was also received from a variety of other sources including relatives (27 households), friends (one household), moneylenders (two households), and village or special hospital funds (three households). In over half of cases (19), there was no expectation to repay the money received. The use of savings or money gifted (or lent) by others to pay for medical expenses were strategies used by only 39 households (54.9%) in total – the remaining patients have relied on the Universal Coverage Scheme of the Royal Thai Government, and programmes such as the Free Medical for the Poor (FMP) programme or the 30 Baht healthcare program, to provide treatment and care (see Section 5.1.3).

Several households sold assets to cover the costs of treatment and care. Of the five households which sold land, the average amount of land sold was 1.25 rai (which would be worth approximately 23 952 Baht based on the average land value used in Section 4.5.3). Farm or productive assets sales included cows (two households) and buffalo (one household) – the average sale price of cows and buffalo were 16 655 Baht and 14 442 Baht respectively (see Appendix IX). Household asset sales varied widely. Of the eleven households that sold household assets, eight sold jewellery, one sold a motorcycle, and the remaining two sold a car or pickup truck.

The labour arrangements of several households were also rearranged to accommodate the patient. In one case, a household member had taken a month off work in agriculture to care for the patient. In two households, a household member stopped work entirely in order to care for the patient – in both cases the carer was previously employed in a technical or professional field. Finally, a member of one household was forced to change job because the HIV infection status of her husband was revealed to her employer.

The care of children was also affected in some households. In one household, a child was removed from school and instead got a job at an electronics store, in order to reduce the financial burden on the household. In three households, children were sent to live elsewhere – the average age of the three children was seven years. In all cases the children were sent to live with their grandparents, and there was no expectation of them returning to the patient's household.

Using the same explanatory variables as the household variable changes above, these household coping strategies were analysed using a standard multiple regression model.[97] The significant results from these models are summarised in Table 5.15 (complete results are included in Appendix XIII).

Table 5.15: Estimated models explaining other key changes in HIV/AIDS patients' households

Model	Significant explanatory variables ($p < 0.1$)	Adjusted R^2
Used savings to pay for medical expenses	Wealth at impact time (+)	-0.0451 – 0.0319
Received money from others for medical expenses	–	-0.0218 – -0.0211
Sold household assets	Age (+)*, Moved household (-), Wealth at impact time (+)	0.1081 – 0.1620
Sold farm or business assets	–	0.0029 – 0.0137
Sold land	Wealth at impact time (+)	-0.0254 – 0.0876
Other household member/s took days off work to care for HIV/AIDS patient	–	-0.0495 – -0.0221
Other household member/s changed job because of HIV/AIDS patient (for care or some other reason)	Wealth at impact time (+)	0.0022 – 0.0505
Other household member/s stopped work to care for HIV/AIDS patient	Age (-)*, Wealth at impact time (-)	0.0014 – 0.0424
Children removed from school	–	0.0615 – 0.0786
Children sent to live elsewhere	Wealth at impact time (-)	0.0037 – 0.0872

* Significant in all models, regardless of wealth measure

As can be seen from Table 5.15, most models had very low adjusted R^2 values, probably resulting from the small sample size and the very low number of positive responses in some of the models (see Table 5.14). Overall only the sale of household assets was adequately explained among these models. That the explanatory variables used in earlier analysis generally had little explanatory power for the other changes to the patients' households confirms that these coping

[97] The small number of positive responses (see Table 5.14) precluded the use of logit or probit models for this estimation.

strategies are likely to be highly individualised for each household's specific circumstances.

Older patients were more likely to report the sale of household assets, and this result was robust to the choice of wealth measure used. Presumably this is because older patients felt less need for these non-productive possessions. Older patients were significantly less likely to report that other household members had stopped work to care for them, which is a somewhat more surprising result – this is significantly different from the 'normal' experience of the elderly in Thailand, who can often call on the assistance of younger family members (usually the youngest daughter) when they become ill (Lux, 1969). The effect of wealth on these key changes in HIV/AIDS patients' households depended on the wealth measure. The results implied that wealthier households were more likely to use savings to pay for medical expenses, or to sell household assets or land (but not farm or business assets). This is probably because wealthier households have more value stored in these possessions – often the assets sold included jewellery. Wealthier households were also significantly more likely to have household members change job because of the HIV/AIDS patient. Surprisingly, patients who moved household were significantly less likely to report the sale of household assets.

5.1.5 Stigma and Discrimination

Stigma and discrimination are important negative effects frequently experienced by those with communicable diseases and those in their household (Busza, 2001). Consider leprosy, which was in centuries past thought to be contagious – lepers were excluded from society, and the disease was viewed as divine punishment for moral misconduct (Valdiserri, 1987). The response to those suffering from HIV/AIDS has in many respects been similar.

One coping mechanism that the HIV-infected have to deal with stigma and discrimination is to avoid disclosing their HIV infection status either to their family or to the community in general. If others do not know about their status then the HIV-infected individual is much less likely to face the adverse consequences of stigma or discrimination. To reveal information about whether they had disclosed their HIV infection status to others, surveyed HIV patients were asked about the person to whom they first spoke about HIV/AIDS after their diagnosis, and the person they first revealed their HIV-positive status to (if any), and the reasons for revealing their status to that person. Patients were also asked whether their HIV infection status was known to "many members of their community" and for how long their status had been known. The disclosure status of the patients surveyed and the responses to these other questions are summarised in Table 5.16; the final column summarises the average time between impact time and the time of disclosure (rather than the average time since disclosure).

The HIV infection status of the patients was almost universally known by the families of the patients, and most (85.9 per cent) of the patients' communities knew of their status also. On average, patients had disclosed their HIV infection status to their family three months after impact time and to their community 14 months after impact time. Most patients had first spoken about HIV/AIDS to their spouse or mother, with only 11.3 per cent first speaking to a health care worker. Similarly, most patients had first revealed their HIV-positive status to their spouse or mother. The reasons given[98] for revealing their status to this person first rather than any other person were predominantly trust or feeling close to that person, or because that was the person who took them to their diagnosis or health check. For patients whose status was revealed because the person suspected the patient was infected due to their symptoms, the patients' status was revealed substantially longer after impact time than other reasons. These patients had delayed revealing their status to others, including their close family, until it became readily apparent from their symptoms that they were infected. This may have been due to fear of stigma or being ostracised from the family group.

[98] Note that the reasons given were obtained from an open-ended question and are not absolute. If a patient did not mention a particular reason for revealing their status, this does not necessarily indicate that the reason was apparent.

Table 5.16: HIV disclosure status of patients

	Number	Proportion	Average time (months)… since disclosure	Average time (months)… between impact time and disclosure
HIV positive status known by family[99]	69	97.2%	–	–
HIV positive status known by community	61	85.9%	30.2	14.1
Person first spoken to about HIV/AIDS:				
No-one	2	2.8%	–	–
Spouse	20	28.2%	–	–
Mother	21	29.6%	–	–
Father	2	2.8%	–	–
Sibling or sibling-in-law	8	11.3%	–	–
Child	1	1.4%	–	–
Other family member	2	2.8%	–	–
Friend or neighbour	6	8.5%	–	–
Health care workers	8	11.3%	–	–
Other HIV/AIDS patients	1	1.4%	–	–
Person first revealed HIV-positive status to:				
No-one	2	2.8%	–	–
Spouse	30	42.2%	48.0	1.0
Mother	27	38.0%	47.6	6.7
Father	3	4.2%	28.7	0.0
Sibling or sibling-in-law	6	8.5%	26.2	0.0
Other family member	2	2.8%	49	0.0
Friend or neighbour	1	1.4%	48	0.0
Any of the above	71	100.0%	43.9	3.1
Reasons for revealing to this person first*:				
Close to or trust that person	37	52.1%	51.4	3.1
They were the person who took them to their health check/diagnosis	19	26.8%	37.2	0.9
To ask them for help	7	9.9%	45.7	0.0
Suspected due to symptoms	6	8.5%	27.7	15.6
They were the person who infected the patient	5	7.0%	50.4	0.0
Revealed by hospital or healthcare worker	1	1.4%	2.0	0.0

*Percentages may not sum to 100 as patients were able to give more than one answer.

Patients were asked a number of questions to reveal the extent of stigma and discrimination which they and other members of their households suffered. This included discrimination in the provision of eleven essential services including healthcare, medicines, education, public transport, communication, drinking water, fresh produce or other markets, financial services, insurance, employment,

[99] Where at least one close family member knows the HIV-positive status of the patient

and voting or enrolment to vote. Surprisingly, very little discrimination was reported by the patients – those instances are summarised in Table 5.17 along with the results of the same questions asked of the 1226 respondents to the individual questionnaire in the representative household survey.

Table 5.17: Instances of discrimination in the provision of essential services[100]

	Discrimination - Patients		Discrimination – General population	
Service	**Extent**	**Reasons given**	**Extent**	**Reasons given**
HIV/AIDS patient				
Healthcare	–	–	5 (0.45%)	No reason
Medicines	–	–	4 (0.40%)	No reason
Education	–	–	3 (0.22%)	No reason
Public transport	–	–	2 (0.11%)	No reason
Communication	–	–	2 (0.11%)	No reason
Drinking water	1 (1.6%)	Health concerns	2 (0.11%)	No reason
Fresh produce or other markets	1 (1.6%)	Health concerns	2 (0.11%)	No reason
Financial services	–		3 (0.23%)	No reason (2); Poverty (1)
Insurance	3 (4.9%)	Health concerns	3 (0.23%)	No reason (2); Poverty (1)
Employment	2 (3.3%)	Health concerns	3 (0.17%)	No reason (2); Health concerns (1)
Voting or enrolment to vote	–	–	–	–
Other household members				
Employment	1 (1.6%)	Frequent absence to care for the patient	–	–

One patient was denied access to both drinking water and local markets in their village. Three other patients were denied employment. In all cases when the patient was discriminated against, the reason given for the discrimination was health concerns (of the discriminating party). By comparison, the representative household survey revealed only 29 instances of discrimination in the provision of essential services, for 8 respondents. In most cases in the general population, no reason was given for the discrimination, and only once was health concerns given as a reason for the discrimination. It is obvious from these comparative statistics

100 Only affirmative responses are shown for other household members. Percentages shown for patients are percentage of those patients whose HIV infection status is known in their community.

that the extent of discrimination against those with HIV (where their status is known to the community) is significantly higher than the extent in the general population. It is important to note that where no reason was given for the discrimination, this may represent discrimination that resulted from reasons other than the HIV-infection status of the patient. For this reason, these results should be considered an upper bound on the actual HIV-related discrimination experienced by patients.

The patients were also asked six specific questions regarding some other expected effects of stigma and discrimination – these questions and results are summarised in Table 5.18.

Table 5.18: Questions on selected specific expected effects of stigma and discrimination[101]

Service	Extent of discrimination	Reasons given for discrimination
Were you ever pressured to leave a job?	4 (6.6%)	No reason given (3); other workers gossip (1)
Were you ever pressured to leave a village?	–	
Were you ever pressured to remove the children of your household from school?	1 (1.6%)	Health concerns
Were your children ever prevented from playing with other children?	3 (4.9%)	Health concerns (2); no reason given (1)
Have other people in your village avoided dealing with you?	19 (31.1%)	Health concerns (10); no reason given (9)
Have other people in your village avoided dealing with other members of your household?	6 (9.8%)	Health concerns (4); no reason given (2)

When asked about the specific expected effects of discrimination listed in Table 5.17, it was clear that many of the patients or their household had experienced some discrimination from others in their village. Four patients were pressured into leaving their job, and the children of three patients were prevented from playing with other children. The biggest form of discrimination appears to be the

[101] Percentages shown are (i) percentage of those patients whose HIV infection status is known in their community; or (ii) weighted proportion of respondents from the representative household survey.

avoidance of dealing with the patient of their family. Over 30 per cent of the patients whose communities knew of their status had experienced this form of stigma, and other members of the household of nearly 10 per cent of patients had also. In over half of these cases, the reason given was health concerns. Again as above where no reason was given for the discrimination, this may represent discrimination that resulted from reasons other than the HIV-infection status of the patient, and results should be considered as upper bounds of the actual levels of discrimination.

These results clearly illustrate the likely impact of HIV infection on the social capital of the HIV-infected individual, their household, and the wider community. When HIV/AIDS patients and other members of their household experience stigma or discrimination, whether explicitly in discrimination in the provision of essential services, or implicitly in the avoidance of dealing with the infected individual or their family, social capital suffers. The HIV-infected individual will find that their existing social capital, including ties with friends and neighbours and the community in general, diminishes rapidly. If they have moved to a new village (as was the case for nearly 30 per cent of the patients surveyed) then they will find it difficult to accumulate new social capital in their destination community. The social capital of other members of the HIV-infected individual's household also diminishes if they are ostracised from the community. Children and new household members might find it difficult to develop new social capital. The feelings of the patients in terms of major changes in the way other people have treated or interacted with them were further explored using an open-ended question in the interview. The results of this question, along with other qualitative results, are presented in Section 5.1.6.

5.1.6 Qualitative Evaluation of Type I, Type II, and Type III Impacts

In addition to the quantitative questions and questions about household characteristics in the HIV/AIDS patient survey, patients were asked two open-ended questions: (i) "what have been the major changes to who lives in your household, what they do, or how members of your family (living in this household or elsewhere) are cared for?"; and (ii) "how have members of other households living in your village or elsewhere helped with your care, or helped your household in other ways?”. Respondents were also asked to elaborate on their relationship with others in the village, with the question: “what have been the major changes in the way other people have treated you or interacted with you?”. Respondents were prompted to evaluate their answers to these three questions over the period between impact time and the time of interview. These questions were designed to prompt the patients to either highlight other changes in their household or other households which were not considered by other questions, or to provide additional insight and detail on the questions which they were already asked.

Most patients surveyed had little to add in terms of changes to their household or family. Many also mentioned that they were cared for by family members and that the standard of care had improved over time (perhaps as a result of the carers learning what works best in caring for an HIV-infected individual) – some added that family members had moved from elsewhere in order to care for the patient or their family, or that family members were sending food or money to help more frequently than they had in the past. In one case the eldest son of the patient had left to work in Bangkok, but did not remit any of his income – the patient was unsure of the exact reason no remittances were sent. In another case the patient’s 14-year-old son was preparing to stop studying in order to get a job in Bangkok and support the patient. Several of the patients expressed concern at their inability to earn income and the financial strain it placed on their household. Many said that the household was much poorer than before they learnt of their HIV status.

Many patients related that their family did not reject or ostracise them, and that they were not blamed for their infection. However, this level of acceptance from the patient’s family was not universal, and friends or neighbours appeared much less likely to offer their immediate support. In many cases the patient had felt it was necessary not to reveal his/her HIV status to other villagers or even to his/her own family, for fear of the stigma associated with HIV infection. While most families were eventually accepting of the patient, some of the patients were removed from the decision-making of their household, or kept away from cooking or serving food (including eating their meals separated from the rest of the household). In one case, the patient's siblings tried to keep the patient away from their sibling's children for fear of infection. Also, the husband of one patient blamed her for the infection and divorced her (she has since re-married).

Where their HIV status had been revealed, some patients were ignored by other villagers, and in some cases this attitude extended to other members of the patients' households. Even previously close friends ostracised or ignored some patients. In one case the children of the patient were mercilessly teased by their schoolmates. In other cases, the villagers learnt of the HIV status of the patient and offered sympathy, care and support for the patient and their family. One patient was offered a job in order to help provide for their family after they moved back to the village. In a couple of cases, the patients mentioned the positive responses achieved after the local women's group had spoken to villagers about HIV/AIDS. Despite the positive response that some patients received, some of them admitted to becoming increasing moody or depressed as a result of their infection and the actions of others. One of the patients even feared to leave her home because of the response of others.

5.1.7 Case Studies

The additional qualitative information provided in Section 5.1.6 helps to construct a clearer picture of the problems and lifestyle changes that the patients and their households have experienced as a result of the HIV infection. However, the human dimension can be further revealed by looking in detail at several of the patients who were interviewed. This section provides six case studies drawn from the questionnaires completed during the interview of the patient, as well as additional contextual information and notes made by the interviewer and the researcher both at the time of the interview and immediately afterwards. In each case the name of the patient has been changed to protect the patient's identity.

Case Study 1 – Noi

Noi: Key Statistics	
Age:	24
Gender:	Female
Marital status:	Separated
Education:	6 years
Mover:	No
Time since impact:	7 years
Symptomatic:	2 months
Household size:	↓
Wealth:	↓
Poverty probability:	↑

Noi discovered she was HIV-positive as a result of a routine HIV test at an antenatal clinic seven years ago. Her husband, a construction worker, had been an occasional drug user, and had apparently been infected when sharing a needle with some workmates. When she was diagnosed with HIV, she immediately told her mother though she kept this information from other members of the community for as long as she could. Her parents convinced her to separate from her husband, and he and his sister's family moved out of their home.

Noi now lives alone but in the same village as her parents, who care for her and offer support and advice. She has no land, few household assets, and her income is limited to what she can earn by raising and selling chickens and occasionally working for the agricultural daily wage. She finds agricultural work difficult to come by as her HIV-positive status is known to the other villagers. They found out following a home care visit by a health worker which, in combination with her illness, implicitly revealed to them that Noi was infected with HIV. Even when work is available, Noi finds it difficult to sustain. She spent three nights of the last month in hospital as a result of a secondary infection. Fortunately, her medical expenses have been covered by the 30 Baht Healthcare programme and she has also received money from her family to cover the costs of her treatment and care.

Noi is often too sick to adequately care for herself – she mainly relies on food prepared by her grandmother. Noi's only child, now seven years old, was fortunately born uninfected with HIV. However, he now lives with his grandparents as Noi finds it too difficult to care for him – it is unlikely that he will ever return to live with her, though she does get to see him often. Noi has not experienced significant discrimination or stigma as a result of her HIV infection other than that noted above – most villagers offer sympathy although some avoid speaking to or interacting with her and seem afraid of her. When she eats with her family, they isolate her dishes for fear that HIV might spread to them.

Noi is quite obviously significantly worse off as a result of her HIV infection. Before impact time Noi was pregnant with her first child, and living in a shared home with her sister-in-law's family. Her husband was working as a construction worker. Since impact time she has experienced a significant change in family situation and now lives alone with no land, very few assets, and low income prospects. Her wealth has decreased substantially, and the estimated probability that she is poor is much higher. She is also increasingly sick, and unable to adequately care for herself or her son. Noi's case illustrates significant Type I impacts (on Noi), Type II impacts (on Noi's son, and on her family who have the burden of care for her), and Type III impacts (on Noi's parents, who must now care for and raise her son).

Case Study 2 – Ping

Ping: Key Statistics	
Age:	42
Gender:	Female
Marital status:	Widowed
Education:	4 years
Mover:	No
Time since impact:	4 years
Symptomatic:	No
Household size:	↓
Wealth:	↑ slightly
Poverty probability:	↑

In 1996, Ping's husband spent six months working in Bangkok. Four years before the interview (in 1999), he was admitted to hospital with a serious illness, and was diagnosed with HIV. He then admitted to Ping that he had injected drugs during his time in Bangkok, sharing needles with a friend. Ping was tested for HIV and found to also be positive. She immediately told her parents because it really was no secret about her husband's condition, and she hoped for their help and support. They were supportive, and continue to support her (although her mother has since died).

Ping's husband died in 2001, leaving Ping to care for herself and their two children. She remains in the family home, which includes a plot of land of five rai, large enough to provide rice for the family with some small surplus available for sale. Ping's health is good enough that she can tend to the plot of land with minimal help from others. In addition to income from surplus rice, Ping takes on some agricultural wage work, and weaves silk for sale to traders. She has even managed to save enough money to buy a bicycle for her children.

Ping has been fortunate in that her CD4 count[102] has been very high, and she has not yet had to take any medication to treat HIV or any opportunistic infections. Her medical expenses are minimal, and not significantly different to what they were before she was infected with HIV. Her HIV-positive status has been known to other people in her village ever since she was diagnosed, and yet she says she has not experienced any recent stigma or discrimination. She comments that nothing has really changed in the way she interacts with other villagers – they still get along with her and eat food together as usual.

Ping has been extraordinarily lucky (at least relative to other HIV-infected people) in her experience with HIV. She has neither faced increasing medical costs nor decreasing labour supply since impact time because her symptoms have not materialised. However, the death of her husband certainly created some Type I and Type II impacts on his family, Ping has managed to cope extremely well and kept the family well above the poverty line. Their wealth has even increased slightly since impact time. However, while it appears from the measurable variables that this household is no worse off now than before impact time, it is likely to be significantly worse off than it was before Ping's husband died if qualitative changes are considered. There is now one less productive household member providing for the household, and the children are now being raised without a father.

[102] The CD4 count measures the number of CD4 cells in each cubic millimeter of blood, and is used as a measure of the extent of HIV infection (HIV infection lowers the CD4 count). People begin to get opportunistic infections or cancers more often as the count drops.

Case Study 3 – Mai

Mai: Key Statistics	
Age:	38
Gender:	Female
Marital status:	Married
Education:	6 years
Mover:	No
Time since impact:	1 year
Symptomatic:	No
Household size:	Same
Wealth:	↑↓
Poverty probability:	↑

Mai and her husband are both HIV-positive, and were only diagnosed one year before the interview. Mai's husband had applied for a new work visa for a Middle Eastern country, and part of the visa process included an HIV test – Mai was also tested at the same time. It is likely that Mai's husband was infected with HIV while working in Singapore a few years earlier – he has since admitted to Mai that he paid for commercial sex services using some of his higher disposable income in Singapore. He then passed the virus to Mai because she trusted him and never thought a condom or other protection was necessary. Mai's village know of their HIV-positive status – it would have been difficult to keep from them the reason that her husband's planned overseas job had fallen through.

Mai and her husband live with their adult daughter and her husband, and their youngest son (14 years old) – none of them are infected with HIV. Their daughter, who works in a local factory, gives them money whenever she can and their oldest son (now 16 years old) moved to Bangkok for work and to support them – however he has never sent any remittances and they have rarely been contacted by him since then. Their youngest son is also preparing to leave school and work in Bangkok.

In addition to the small amount of money given to them by their daughter, their village fund recently provided them with a loan of B10 000 to cover medical expenses. However neither Mai nor her husband are experiencing any symptoms of AIDS. It has not directly affected their ability to work or to earn an income. Mai's husband is now unemployed, having been previously employed as a mechanic – they believe that his job loss was unrelated to his HIV infection status. They own ten rai of land – enough land to produce rice for income as well as for the household.

Mai's case again demonstrates a household that has yet to experience the full impact of HIV/AIDS. They appear to be not significantly worse off than they were before impact time – some measures of wealth have increased slightly while others have decreased. The adverse impacts on the household – the need for a loan of B10 000, and the out-migration of the eldest son and impending out-migration of the youngest son – may well have occurred even in the absence of the HIV infection of Mai and her husband. However, there are likely to be future Type I and Type II impacts, particularly affecting Mai's daughter and her husband who will no doubt face the burden of care for the increasing morbidity of their parents.

Case Study 4 – Lek

Lek is just 20 years old, and was diagnosed with HIV two years ago during a routine antenatal blood test. She has thalassemia, a genetic defect that results in abnormal blood cells. People with thalassemia require regular blood transfusions, and it is almost certain that Lek contracted HIV through either infected blood products or unsafe needle practices associated with one of the many blood transfusions she has received during her life. She has never engaged in any other high-risk behaviour, other than sex with her uninfected husband.

Lek: Key Statistics	
Age:	20
Gender:	Female
Marital status:	Married
Education:	6 years
Mover:	No
Time since impact:	2 years
Symptomatic:	No
Household size:	↑
Wealth:	↑↓
Poverty probability:	↑

Lek's child is fortunately not infected with HIV. Lek and her husband continue to live with Lek's parents and her adult brother. The family has six rai of land and engages in work for the agricultural wage to supplement their income from rice production. The only person who knows of Lek's infection is her husband – they have not informed any other members of the family or their community and as such the household remains relatively unaffected by Lek's HIV infection (the other household members have had no incentive to change their behaviour). Lek is asymptomatic, and has not experienced any significant medical expenses (other than those related to her thalassemia). While total wealth has increased for her household, the birth of her child has decreased per capita and per adult equivalent measures.

Lek and her husband have not changed their behaviour – they even continue to engage in unprotected sex, which puts the husband at an extreme risk of HIV infection.[103] They cited a lack of convenience (condoms are not available in their village and must be purchased from the market in town), and the cost (around B15 per unit) as the main reasons they did not use protection.

Lek's case illustrates the informational and risk evaluation problems that many villagers may face in their decisions surrounding HIV/AIDS risk and behaviour. Despite knowing that Lek was infected with HIV, the couple continued to evaluate the benefits of unprotected sex as outweighing the costs of protection. Since the direct costs of protection are relatively small, it is difficult to believe that this decision is rational unless the couple have either seriously underestimated the potential health and mortality costs of AIDS, or have an extremely high preference for the present (a high discount rate, thereby heavily discounting the future costs of the morbidity and mortality due to AIDS for the husband).

[103] It is important to note that following the interview the researchers counselled Lek and her husband about the importance of protection methods such as the use of condoms – at this point they agreed to reduce their risk behaviour.

Case Study 5 – Sanga

Sanga: Key Statistics	
Age:	34
Gender:	Male
Marital status:	Separated
Education:	6 years
Mover:	Yes
Time since impact:	3 years
Symptomatic:	3 years
Household size:	↓
Wealth:	↓
Poverty probability:	↓

Sanga was probably infected with HIV during the several years he spent working as a construction worker in Bangkok and Phuket. He left his wife and two children behind in the village seven years ago and migrated first to Bangkok, then to Phuket. In Bangkok he found a regular girlfriend, and also purchased commercial sex services when going out with friends and had several casual non-commercial sexual partners in both cities. It is probable that his extramarital sexual activity resulted in his infection with HIV.

Three years ago he became symptomatic (while working in Phuket) and was tested and confirmed HIV-positive. He returned to his family in Khon Kaen, afraid that his wife and children might also be infected. After they were tested and confirmed uninfected, Sanga separated from his wife and became a monk at the local temple – his reasoning was partly that he did not want to infect his wife and children, and partly to 'make merit' to compensate for the ills of his life. His wife continues to work their small farm (of six rai) and also raises cows. His family visits him often at the temple, bringing gifts of food and clothing.

Sanga is occasionally sick from AIDS-related opportunistic infections, and spent one day in the previous month in hospital. He pays his medical expenses himself, but also receives some support from the temple and from a local government project. Unsurprisingly, measures of wealth are now substantially lower for Sanga. His local community knows of his HIV infection and they provide money and gifts to his wife and children, including helping to pay for their education. Some of the villagers could not believe that he is infected with HIV because he 'does not look like an HIV/AIDS patient' and 'these things could not happen to monks'. Sanga is hoping that he can use his experience and illness to teach young men from his village valuable lessons about HIV/AIDS.

This case study illustrates all of Type I, Type II and Type III impacts. Sanga himself is facing higher medical expenses and has changed occupation and left his family home as a result of AIDS. His family faces Type II impacts, as they no longer receive his income (whether direct income from when he was working at home, or remittances from when he was working in Bangkok or Phuket). Other households in the village have taken on some responsibility to care for Sanga's children and pay for the education expenses, representing a Type III impact on those households.

Case Study 6 – Kannika

Kannika: Key Statistics	
Age:	34
Gender:	Female
Marital status:	Never married
Education:	6 years
Mover:	Yes
Time since impact:	13 years
Symptomatic:	13 years
Household size:	↓
Wealth:	↑↓
Poverty probability:	↑

Kannika found out that she was infected with HIV thirteen years ago, when she became sick while working in Yala province on the southern border with Malaysia. Over the three years prior to becoming symptomatic of AIDS, Kannika had worked as a commercial sex worker, firstly in Bangkok and Chon Buri province, then in a border town in Yala province. Kannika also had a casual sexual partner and she did not use protection with either her commercial clients or her casual partner because she did not realise that there were communicable diseases that could not be cured, such as HIV. She also was an infrequent user of methamphetamine, mostly to keep herself awake during long nights of working.

After being diagnosed with AIDS, Kannika returned to her home in Khon Kaen province. Then after three years living with her parents, Kannika again migrated back to Bangkok to work as a waitress. During her two years in Bangkok Kannika had another casual sexual partner and she did not tell him of her HIV infection status. However she did try unsuccessfully to use protection with him, though when he was drunk he would not consent to using a condom, placing him unknowingly at risk of HIV infection. Eventually another illness forced Kannika to return home to Khon Kaen.

Five years after she was initially diagnosed and shortly before she returned home from Bangkok, Kannika finally revealed her HIV-positive status to her family, by sending them a letter. She was afraid to tell them in person because of the perception they might get of her – her family did not know she had been working as a commercial sex worker. The local community also discovered her HIV infection status on her return to Khon Kaen because her symptoms became easily distinguishable, and over the last five years she has faced significant stigma and discrimination within her village. Though the villagers did not know for sure she had been a commercial sex worker during her time away, she was labelled as such and endures the additional stigma associated with commercial sex work. Many villagers try to avoid contact with her, and the other members of her family have also experienced similar stigma because the other villagers are afraid of them. Kannika has never married, owns no land and few household assets, but was able to set up a small village store on her return to the village, using the money she had saved from commercial sex work and her later job as a waitress. However, due to stigma her shop has been quite unsuccessful, with most villagers avoiding both her and the shop.

A recent opportunistic infection made Kannika sick for over a month, costing around B700 in medical expenses including expensive medicines. To pay for this she sold the last of her jewellery (a common form of non-monetary savings for poor villagers) and borrowed B500 from her neighbour, who works as a teacher in the village. With no remaining savings and continuing and worsening morbidity, Kannika must now rely on gifts from her family and neighbour in order to pay any future medical costs. However, measures of wealth show an inconsistent pattern with some showing an increase since impact time and others showing a decrease.

Kannika has experienced significant Type I impacts, forcing her to move back to her home village earlier than she had planned. Her medical expenses are high and she is experiencing significantly reduced ability to earn income. Her family, if they begin to provide additional care for her or pay her medical expenses are incurring Type II impacts.

5.2 Type IV Impacts from the Representative Household Survey

5.2.1 Type IV Impacts

Recall that Type IV impacts occur where individuals modify their decision-making in response to the perceived risks of living in a risk environment. These types of behavioural changes may take place gradually or irregularly, and as such are unlikely to be accurately measurable quantitatively in a cross-sectional survey such as that conducted in this study. However, qualitative data collection through the use of open-ended questions allows these changes to be explored.

5.2.2 Qualitative Evaluation of Type IV Impacts[104]

The representative individual survey of the adult (aged 18 years or over) population described in Section 4.3.1 resulted in 1226 responses. The descriptive statistics for the respondents were presented in Section 4.6.1. As part of this survey, all respondents (n = 1226) were initially asked two questions to explore the changes in their household and village as a result of the HIV epidemic: (i) "has your village done anything to minimize the risk to villagers of contracting HIV?"; (ii) "has your household done anything to minimize the risk to its members of contracting HIV?". A third open-ended question was added to later respondents (n = 793) to the survey: (iii) "what do you think have been the most important changes in the way that people live in this village since the beginning of the AIDS epidemic?". This question was added in order to de-personalise the questions about changes in the lifestyle of household members. It appeared to be successful, with respondents to the three questions giving generally more detailed answers to

[104] As noted in Section 4.3.4, the original interviews were conducted in Thai and questionnaire responses and additional interviewer notes were later translated into English for analysis. It is possible that some relevant responses may have been distorted or omitted.

all questions when compared to those who answered only the first two questions. The responses to these questions explore the features and the extent of Type IV impacts on households from the general population, as well as identifying Type I, Type II, or Type III impacts. It is likely that many of these households are not directly affected by the latter three impacts since the adult HIV prevalence in Khon Kaen province is less that one percent (UNAIDS *et al.*, 2002).

The responses were categorised into broad categories, and the number of responses falling into each category are summarised in Table 5.19. The categories are grouped together according to the type of impact they indicate. Type IV impacts are further grouped into three subtypes – impacts on behaviour, impacts on social capital accumulation, and other impacts. Obviously since the questions were open-ended, responses were allowed to fall into more than one category – these numbers should be regarded as a lower bound on the number of people who have experienced or observed these particular changes in lifestyles since the beginning of the AIDS epidemic.

It is obvious from the responses that respondents did not believe that some of the changes which they have experienced merited a mention in answering this question. This is evidenced by the small number of respondents who mentioned HIV/AIDS education campaigns, despite such campaigns having been conducted in all villages in the region since the early 1990s. However, some clear themes did emerge from the responses to these open-ended questions.

Table 5.19: Qualitative data on the experiences or observations of impacts of the HIV/AIDS epidemic on the lifestyles of villagers[105]

Experience or observation	Number of respondents (proportion)
The village conducted an HIV/AIDS or related education campaign	797 (65.2%)
People are afraid of getting HIV/AIDS	140 (11.2%)
Type I, II, or III impacts	
People avoid contact/interaction with HIV-infected people	170 (13.2%)
HIV-infected people are not allowed to participate in village activities, etc.	24 (2.3%)
HIV/AIDS has caused poverty / family problems / emotional problems in this village	59 (4.4%)
If someone dies it is assumed they died of AIDS / If someone returns from working elsewhere they are assumed to have HIV	6 (0.5%)
Type IV impacts – behavioural change	
Changes in sexual behaviour	410 (34.5%)
Increased use of condoms	269 (22.9%)
Trust their spouse / Not be promiscuous	142 (11.6%)
People avoid sex entirely	9 (0.9%)
Changes in drug use behaviour	49 (4.9%)
Type IV impacts – social capital impacts	
People avoid suspected prostitutes / People visit prostitutes less often	124 (10.3%)
People take care of/look after themselves (rather than helping others)	50 (3.7%)
People no longer go to night life, karaoke bars, etc.	47 (4.0%)
People won't touch or use others clothing or other items	6 (0.6%)
People won't share meals / drink from the same glass as others	3 (0.3%)
It is harder to keep or make new friends	1 (0.1%)
Type IV impacts – other impacts	
People are more careful about how they live	73 (4.9%)
People have health checks more frequently	37 (2.7%)
Villagers have moved away to escape HIV/AIDS	13 (1.1%)

First, the extent of stigma attached to HIV/AIDS appears to be much greater when the general population is asked about it than when the HIV-infected themselves are asked (see Section 5.1.5 for comparison). Just over 15.2% percent of individual respondents mentioned either that people avoided contact or interaction with known HIV-infected people, or that the HIV-infected were ostracised within the village and excluded from village activities such as fairs or weddings. Second, other villagers have recognised the financial and emotional problems that have affected not only the HIV-infected individual themselves, but also their household

[105] Percentages shown are weighted proportion of respondents from the representative household survey. They may not sum to 100 percent since respondents could give more than one answer.

and other related households. These factors were mentioned by 4.4 percent of respondents. The evidence of stigma goes beyond that attached to those who are known to be HIV-infected. People returning from periods working away from the village are sometimes suspected of returning with HIV. Also when someone dies, unless the cause is known it is often assumed that they died of AIDS – this is particularly true where the deceased had been ill for some time. Either of these two stigma-related factors was reported by 0.5 percent of respondents. Third, there has been significant behavioural change as a result of the AIDS epidemic, including both sexual behavioural change and changes in drug use. These factors were described by 37.7 percent of respondents. Respondents also described increased care in how they live (4.9 percent), increased frequency or intensity of health checks (2.7 percent), and even that some villagers had migrated in order to 'escape from HIV/AIDS' (1.1 percent). This is important in that increased frequency of health checks imposes additional costs on those being checked than they would have experienced without the HIV/AIDS epidemic. Further, migration as a result of trying to 'escape' from HIV/AIDS places costs on all migrants including financial costs as well as emotional costs and loss of social capital.

Perhaps the most important result from this analysis was the apparent impacts on social capital. Beyond those respondents who identified households migrating to 'escape' from HIV/AIDS, some (3.7 percent) related that villagers increasingly looked after themselves (rather than others). Some respondents even suggested that villagers would not share meals or touch or use other villagers' clothing or other items, for fear of contracting HIV. These changes in behaviour will almost certainly result in a depreciation of existing social capital. Further, it appears that new social capital is becoming more difficult to acquire. Villagers are reluctant to go out to meals at restaurants or to karaoke or other bars, in case they contract HIV from serving staff. This removes an important source of social capital formation – where villagers share drinks or meals at bars or restaurants. One respondent even mentioned directly that since the HIV/AIDS epidemic began, it is harder to keep existing friends or to make new friends.

All qualitative responses were further analysed by considering differences in the responses by gender, age, education, and wealth index value. To complete this, the categories of experience or observation described in Table 5.19 were aggregated into eleven response categories (see Appendix XIII for details on the aggregation). Standard probit models were then estimated with the response variable as the dependent variable and gender, age, education, and wealth[106] as explanatory variables. Those variables that had significant effects on the responses received for the open-ended questions are summarised in Table 5.20 (full details of the probit regression models are included in Appendix XIII).

Table 5.20: Significant explanatory variables in probit models explaining the likelihood of a given response to the three open-ended questions of impacts of HIV/AIDS

Response category	Significant explanatory variables ($p < 0.1$)	Pseudo R^2
Education campaign	Male gender (+)*, Age (-)*, Education (-), Wealth (+)	0.0143 – 0.0181
Fear	Age (-), Education (-),Wealth (+)	0.0038 – 0.0148
Direct stigma	Wealth (+)	0.0011 – 0.0047
Poverty	Male gender (+)*	0.0171 – 0.0228
Stigma of association	–	0.0395 – 0.0525
Sexual behavioural change	Male gender (+)*, Age (-)*, Education (-), Wealth (+)	0.0232 – 0.0256
Drug use change	Education (+)*, Wealth (-)	0.0191 – 0.0506
Social capital impacts	Male gender (+)*, Age (-)*, Wealth (+)	0.0254 – 0.0281
Health checks	Male gender (+)*, Age (+), Wealth (-)	0.0146 – 0.0229
More careful	Wealth (-)	0.0019 – 0.0132
Migration to escape	–	0.0297 – 0.0416

* Significant in all models, regardless of wealth measure

A common theme emerges when considering the significant explanatory variables in Table 5.20. Men appear to be significantly more likely to have given the stated response in five of the eleven categories, regardless of the wealth measure used in the analysis. Women were not significantly more likely to give the stated response for any combination of response category and wealth measure. This suggests that men may have given more complete or comprehensive answers to these open-ended questions. Similarly, age appears to have had a similar but weaker effect, with younger respondents significantly more likely to give the stated response for three of the categories with all wealth measures, and one other category with some of the wealth measures, while older respondents were significantly more likely to

[106] Different models were run, each using a different wealth measure. Full details are included in Appendix XIII.

have stated "more frequent health checks", but this was only significant with some of the wealth measures and not others. The effects for education and wealth are much more mixed; and depend on the measure of wealth which is used (full details of the probit regression models using alternative measures of wealth are included in Appendix XIII).

5.3 Summary and Discussion

This chapter examined the relationship from HIV/AIDS to poverty, by considering the different types of impacts on individuals, whether they are themselves infected with HIV or not. Outlined in Section 3.4, Hypothesis (a) suggests that there is a significant relationship between previous HIV infection and current wealth or poverty, i.e. that HIV infection significantly adversely affects the wealth of individuals (including Type I, Type II, Type III, and Type IV impacts) and places the individuals at a higher risk of poverty.

This chapter presented data, quantitative analysis with qualitative support, and specific case studies on Type I, Type II, and Type III impacts for the HIV/AIDS patients and their immediate households. Qualitative analysis of responses from the representative household survey was used to demonstrate the existence of Type IV impacts in the general population. Several key results have appeared in the analysis, both confirming the previous literature and providing new insights into the impacts of HIV/AIDS on individuals in Thailand.

HIV/AIDS patients experienced significantly higher medical expenditure in the month prior to interview when compared to the general adult population (mean B452.4 vs. B42.4, $p < 0.001$). However, this difference only appears to hold true for symptomatic patients. There was no significant difference between the medical expenditures for asymptomatic HIV patients and the medical expenditures of the general population, and similarly insignificant differences were found for the number of days a person was sick in the month before interview. There were significant differences between the HIV/AIDS patients as a group when compared to the general population (mean 2.51 days vs. 0.41 days, $p = 0.001$), but no significant difference between the asymptomatic patients and the general population. These results confirm that patients and other members of their households (who may be responsible for paying for their treatment and care, or who face opportunity costs associated with the patient paying for their treatment and care) face significantly increased direct costs in the form of higher medical expenses than individuals who are not directly affected. It also confirms that these households and individuals face higher indirect costs in the form of reduced labour supply due to significantly higher morbidity among symptomatic HIV/AIDS patients than among the general adult population.

These results are consistent with those from much of the previous literature (see Section 2.5.4) such as Bechu (1998), who found significantly higher medical expenditure on individuals with HIV/AIDS in Cote d'Ivoire. However, this result is slightly different from the results of Pitayanon *et al.* (1997), who reported that for households in northern Thailand that had suffered an adult death, direct medical expenditure was not significantly different between those that had suffered an AIDS-related adult death and those which had suffered a non-HIV/AIDS-related adult death. The difference between the Pitayanon *et al.* studies and the results here is probably due to a number of factors, most importantly that treatment for HIV/AIDS has progressed significantly in the nine years between the two studies but at a significantly higher cost to the affected patients and their households. In particular at the time of the study in northern Thailand (1994), antiretroviral treatment was unavailable, whereas during this study many of the AIDS patients were receiving life-extending antiretroviral treatment. This treatment not only has a direct cost, but it also extends the life of the patient and therefore increases the length of time during which they are subjected to various opportunistic infections, all of which require additional treatment, often at a cost to the patient and their household.

The patients interviewed relied on a variety of sources for mental support, advice, treatment and care, and financial support. Mental support was most often provided by the patient's mother, or their children. Advice was most often given by health care workers, but mothers were also an important source of advice. Treatment and care was also often provided by the patient's mother, and their spouse or other family members were also important source of treatment and care. Financial support was most often received from family members. These results represent Type II impacts on these non-HIV-infected individuals, i.e. those who provide care and support for the HIV-infected individual. While there is no specific data to support this, it is likely that these individuals may face lower wealth outcomes as they give up financial resources for the HIV-infected individual, or face opportunity costs in providing them with treatment and care.

There were several key changes to the households that the patients lived in between impact time and the time of interview, representing Type I and Type II impacts of HIV/AIDS. The nature and extent of these impacts were dependent on whether the HIV-infected individual remained in the same household at the time of interview as they lived in at impact time (i.e. non-movers), or if they moved from one household to another (i.e. movers).[107]

At the time of interview compared with at impact time the household of non-movers was significantly smaller, had fewer productive adults, and had a significantly higher proportion of non-productive household members. These changes appeared generally to represent the death of one of the adult household members, often the spouse of the patient, due to AIDS. This death would generate a significant impact on the members of this household. The smaller household must now provide for itself with fewer productive household members and a greater dependency ratio. These changes in household size and composition are similar to those reported in the previous literature (see Section 2.5.4). Among non-movers the patient themselves were now significantly more likely to be unemployed, which exacerbated the problems suggested by the change in household size. While we might expect these effects to result in lower measures of wealth, total wealth was not significantly different at the time of interview from impact time for these households, and hence some measures of wealth were significantly larger. These households were also less likely to be in poverty (0.253 vs. 0.211, $p = 0.0532$).

[107] The importance of difference between movers and non-movers was confirmed by the regression analyses – see Tables 5.11 and 5.12

For movers many of the household changes were qualitatively as well as quantitatively different from those experienced by non-movers. The household the patients lived in at the time of interview (the destination household) was significantly larger, had significantly more productive adults and a significantly higher proportion of non-productive household members, than the household they lived in at impact time (the origin household). The change in household size is consistent with a movement to the familial home; probably to be cared for by the patients' parents and siblings as the patient becomes increasingly sick with AIDS-related symptoms. This change represents a significant impact on the members of the destination household, who must now care for one additional household member who may be initially productive but will certainly become increasingly unproductive over time. The destination household had more land, and was significantly more likely to grow rice or vegetables for income, than the origin household. Again these results are consistent with a move from an urban household to the rural familial home. The destination household was significantly less likely to run a public motor vehicle for income, and was also significantly less likely to possess a car or truck. This last finding is consistent with the previous literature including the literature from Thailand (see Section 2.5.4) which finds that households are likely to dispose of durable goods in response to having an HIV-infected individual. Measures of wealth were typically significantly lower in the destination household, and the probability that the household was in poverty was significantly higher. Again these results are probably consistent with the move from an urban origin household which would appear from the data collected to be wealthy, to a rural destination household with an older dwelling and fewer assets (note that financial wealth was not included in any of the measures of wealth in this study).

The wealth and poverty results for movers were exactly as expected by Hypothesis (a). However, the wealth and poverty results for non-movers are the opposite of those that might be expected. There may be two explanations for how the results for non-movers might remain consistent with Hypothesis (a). First, the non-mover patients had experienced a significantly shorter time since impact time (44.1 months vs. 61.4 months, $p = 0.0277$) and a significantly shorter period of symptoms at the time of interview (16.4 months vs. 44.4 months, $p < 0.0001$).

Since it could be expected that the households of symptomatic patients would have experienced greater wealth and poverty impacts of HIV/AIDS, it is perhaps unsurprising that these impacts are not as apparent for a group of patients that, on average, has experienced only 16.4 months of symptoms. Second, our measures of wealth and poverty take into account only asset ownership and ignore financial assets such as savings. It is likely that households first make use of savings (see coping strategies discussed below) before reducing their holdings of other assets such as land, which would be picked up in the wealth measures. Further the wealth measures ignore important social impacts on these households. The households of non-movers may have greater wealth in per adult equivalent terms at the time of interview when compared with impact time, but in most cases this is due to the death of an adult household member. It would be somewhat insensitive to describe these households as significantly better off – they have experienced the death of a loved one who is not only a productive member of the household, but important for the social cohesion and well-being of the household.

The households appeared to employ a wide range of coping strategies to deal with having an HIV-infected household member. These included using savings to pay for medical expenses, or receiving money from relatives, friends, or moneylenders or the village fund, to pay for medical care. Using savings or obtaining loans obviously has long-run implications for the other members of the household who then had less financial means in the future. Similarly many households sold household or farm assets, or land, in order to pay for medical care. Labour arrangements were changed for some households (days off work to care for the patient, changing jobs, or stopping work entirely), and one child left school prematurely in order to work. All of these represent Type II impacts on other members of the patients' household – these impacts reduce the resources available to these other household members in the future and therefore reduce the endowments for their future decision-making. While there is no specific quantitative data to support this, these changes represent a reduction in household wealth, and to the extent that they reduce the future activities of the household, they place the household at greater risk of poverty. Finally three children were sent to live with relatives, representing a Type III impact on the members of the household to which the children were sent. Since that household must now use resources to care for additional dependants, its members also face a reduction in endowments for future decision-making, decreases in household wealth and are at greater risk of poverty.

Stigma and discrimination are important negative social effects and were found in this study to have been experienced by several of the patients themselves and by other members of their households. While little stigma and discrimination was noted in the survey of HIV/AIDS patients, the representative household survey noted widespread stigma of HIV-infected individuals which suggest under-reporting by the patients surveyed. The effects noted by the patients included discrimination in the provision of essential services such as drinking water, access to markets, insurance, and employment for the patients themselves, and one case of discrimination in employment of another member of the patient's household due to frequent absence to care for the patient. Four patients were pressured to leave a job, one was pressured to remove children from school, and three had children who were prevented from playing with other children. Many had experienced other villagers avoiding dealing with them, and this extended to other members of their household in six cases.

These social effects are important Type I and Type II impacts since they represent constraints on the household members in their 'normal' conduct of daily activities. If the household members experience undue difficulties in accessing essential services such as access to markets, then this reduces the range of activities that members of that household can choose to engage in, placing them at greater risk of poverty. Further, social effects such as stigma and discrimination demonstrate the difficulties that AIDS-infected individuals and their households experience in developing and maintaining the social capital that is necessary to protect the household members from negative shocks. For example, if the household experienced a bad harvest, they might be less able to call on the assistance of others due to the lower social capital they have available. This further places the household members at greater risk of poverty.

Significant social impacts of HIV/AIDS, including stigma and discrimination, were also noted from qualitative data collected in the representative household survey. Individual respondents to the survey noted people avoided contact or interaction with HIV-infected people or not allowing them to participate in village activities. These social impacts represent significant barriers to the formation and maintenance of social capital for HIV-infected people and other members of their household, i.e. Type I and Type II impacts. Type IV impacts on social capital included decreases in people sharing meals, being unwilling to touch or use other's clothing or items, and reductions in social and nightlife behaviour. Many respondents also mentioned that people prefer to take care of themselves (rather than helping others), and some mentioned that villagers had moved away in order to 'escape from HIV/AIDS'. These responses illustrate that the social capital impacts of HIV/AIDS extended beyond the impacts felt by the HIV-infected individual and other members of their household. Reductions in social capital as a result of Type IV impacts might reduce the 'circle of friends' that an individual might be able to call on following an adverse shock, placing the individual at an increased risk of poverty. The households that moved away in order to escape HIV/AIDS may have lost most or all of their accumulated social capital and be forced to begin over in their destination in a time when, as one respondent suggested, "it is harder to keep or make new friends".

5.4 Conclusions

Recall Hypothesis (a) from Section 3.4:

> "That there is a significant relationship between previous HIV infection and current wealth or poverty, i.e. that HIV infection significantly adversely affects the wealth of individuals (including Type I, Type II, Type III, and Type IV impacts) and places the individuals at a higher risk of poverty"

In this chapter Type I, Type II, Type III, and Type IV impacts have been clearly demonstrated with quantitative data and qualitative support. It has been shown that patients as a group faced significantly higher medical expenditure and significantly more days sick than the general population. Further, patients who moved household between impact time and the time of interview had significantly lower wealth, and weakly significantly higher probability of being in a poor household. Households employed a wide range of coping mechanisms to overcome the short-run impacts of HIV/AIDS. However these coping strategies may place the household members in the long run at greater risk of poverty. Social impacts such as stigma and discrimination are also significant negative impacts on many HIV-infected individuals and other members of their households. These social impacts also extent to other members of the general population (Type IV impacts), as evidenced by qualitative data.

Given the extensive quantitative and qualitative support for the negative effects of HIV/AIDS on wealth presented in this chapter, in terms of Type I, Type II, Type III, and Type IV impacts, Hypothesis (a) can clearly not be rejected. That is, it is likely that there is a significant relationship between previous HIV infection and current wealth or poverty.

Chapter 6

From Wealth and Poverty to HIV/AIDS

6.1 Introduction

This chapter examines the relationship from poverty to HIV/AIDS, through two channels. In Section 6.2 the relationship between wealth and accuracy of HIV/AIDS knowledge is examined. If a significant negative relationship is identified, then this would suggest that the wealthy have better access to, or better means to interpret, the available information on HIV/AIDS, thereby placing the poor at elevated risk of HIV infection. In Section 6.3 migration is investigated as a risk factor or as a behavioural marker for other risk factors in HIV infection. Wealth and poverty are also considered in this analysis.

If either the relationship between wealth and accuracy of HIV/AIDS knowledge or the relationship between migration or wealth and HIV/AIDS holds then this would suggest there is a link between poverty and HIV infection. If both relationships are significant, then the suggested link between poverty and HIV infection is particularly strong. The last section provides a discussion of and conclusions for the chapter.

6.2 Wealth or Poverty as a Determinant of Accurate HIV/AIDS Knowledge

6.2.1 Introduction

One of the main HIV/AIDS prevention methods employed in developing countries like Thailand since the beginning of the epidemic has been the provision of information about HIV/AIDS through the mass media (Aheto and Gbesemete, 2005; Lyttleton, 1996). It is assumed that by simply providing people with information about the risks and consequences of HIV/AIDS, that this would encourage behavioural change and reduce the spread of HIV. However, this assumes that the people who are most at risk of contracting HIV will change their behaviour (if only low-risk people change their behaviour, the intervention will have little impact at all).

As described in Section 2.4.3, there is likely to be a negative relationship between education and HIV infection, i.e. those with lower education are at elevated risk of contracting HIV. One reason for this may be that those with less formal education are less able to assimilate health messages from the mass media and consequently adjust their behaviour.

Recall Hypothesis (b): "That there is a significant relationship between wealth or poverty, and HIV/AIDS knowledge, i.e. that the poor are significantly less likely to have accurate information about HIV/AIDS on which to base behavioural decisions". This section will test this hypothesis using data from the individual respondents to the representative household survey.

6.2.2 HIV/AIDS Knowledge Data[108]

The Royal Thai Government and nongovernmental organisations have gone to considerable lengths to promote HIV/AIDS knowledge since the early 1990s, including but not limited to mass media campaigns, village-level campaigns, and sexual health programs in schools (see Section 1.2.5). Given this, it could be expected that villagers, who have had over a decade of exposure to HIV/AIDS messages, have accurate information about HIV/AIDS and the modes of transmission. As part of the individual questionnaire in the representative household survey, respondents were asked: "To the best of your knowledge, what are the main ways in which HIV/AIDS is transmitted?" Respondents were probed to give all answers that they thought were appropriate. Respondents' knowledge

[108] All data in this section is weighted to account for the stratified nature of the sample, and the sample selection of individuals for the individual questionnaire.

about HIV/AIDS was then scored on the following basis: one point for each correctly identified mode of transmission, and minus one point for each mode of transmission that was identified but is not actually a mode of transmission (e.g. sharing meals, clothes, etc.). Respondents who answered "I don't know" to the question were allocated a score of zero. Table 6.1 summarises these scores, and also decomposes the results by gender and age.[109]

Table 6.1: Summary of HIV/AIDS Knowledge Scores

	Mean	Median	S.D.	Min.	Max.
Full sample	2.11	2	0.68	0	4
Men	2.20	2	0.64	0	4
Women	2.03	2	0.71	0	4
Aged 18-34	2.22	2	0.66	0	4
Aged 35-49	2.13	2	0.65	0	4
Aged 50+	1.89	2	0.71	0	3

Respondents to the individual survey had reasonable knowledge of the modes of transmission of HIV, correctly identifying on average two modes of transmission. Men were able to identify more modes of transmission than women, and a one-way ANOVA test confirms that the difference is statistically significant ($F = 20.72$, $p < 0.0001$). Knowledge of the modes of transmission of HIV appears to decline with age, with younger respondents correctly identifying more modes of transmission. Again, a one-way ANOVA test confirms that the differences are statistically significant ($F = 23.87$, $p < 0.0001$). However, a multiple comparison test using Bonferroni normalisation (Hochberg and Tamhane, 1987) can only confirm significant differences between the youngest and oldest groups ($p < 0.001$) and middle and oldest groups ($p < 0.001$), but not between the youngest and middle groups ($p = 0.183$).[110]

Table 6.2 summarises the proportions of respondents who gave suggested answers to the question, the proportion who answered "I don't know" to the question, and the proportion that had some misconceptions about the modes of transmission of

[109] Three age bands with approximately the same sample size are used: 18-34 years (n=375), 35-49 years (n=386), and 50+ years (n=399).

[110] Performing the multiple comparison test using Scheffe normalisation (Scheffe, 1953) or Sidak normalisation (Sidak, 1967) provides qualitatively similar results.

HIV. The table also decomposes the results by gender and age. Table 6.3 reports the results of statistical tests (one-way ANOVA test, or multiple comparison test using Bonferroni normalisation[111]) on the differences between sub-samples.

Table 6.2: Proportion of respondents who answered "I don't know" and proportion of respondents who had misconceptions about HIV/AIDS

	Full Sample	Men	Women	Aged 18-34	Aged 35-49	Aged 50+
Proportion who answered "sexual contact", etc.	0.980	0.990	0.970	0.987	0.992	0.955
Proportion who answered "sharing needles", etc.	0.798	0.842	0.761	0.833	0.809	0.718
Proportion who answered "blood transfusion", etc.	0.323	0.371	0.281	0.404	0.311	0.205
Proportion who answered "I don't know"	0.013	0.004	0.021	0.007	0.004	0.035
Proportion who had misconceptions about HIV/AIDS	0.010	0.011	0.010	0.019	0.002	0.009

Table 6.3: Results of statistical tests between sub-samples

	Men vs. Women	All Age Groups	Age 18-34 vs. Age 35-49	Age 18-34 vs. Age 50+	Age 35-49 vs. Age 50+
Test type	One-way ANOVA	One-way ANOVA	Multiple comparison test	Multiple comparison test	Multiple comparison test
Proportion who answered "sexual contact", etc.	F = 6.14 p = 0.013	F = 7.23 p < 0.001	p = 1.000	p = 0.004	p = 0.001
Proportion who answered "sharing needles", etc.	F = 12.55 p < 0.001	F = 8.29 p < 0.001	p = 1.000	p < 0.001	p = 0.004
Proportion who answered "blood transfusion", etc.	F = 11.52 p < 0.001	F = 18.18 p < 0.001	p = 0.016	p < 0.001	p = 0.004
Proportion who answered "I don't know"	F = 7.37 p = 0.007	F = 7.31 p < 0.001	p = 1.000	p = 0.003	p = 0.001
Proportion who had misconceptions about HIV/AIDS	F = 0.06 p = 0.815	F = 2.85 p = 0.059	p = 0.073	p = 0.394	p = 0.657

Tables 6.2 and 6.3 highlight a number of trends. Nearly all respondents were able to identify "sexual contact" or similar as a mode of transmission for HIV, with

111 As above, substituting Bonferroni normalisation for either Scheffe normalisation or Sidak normalisation provides qualitatively similar results.

fewer identifying “sharing needles”, and fewer still identifying “blood transfusions” or similar. This trend was consistent across gender and across the three age groups considered. More than one percent of respondents answered “I don’t know”, and about one percent had some misconceptions when asked about the modes of transmission of HIV, which are surprisingly high considering the mass media and other information campaigns which have been undertaken.[112]

Table 6.3 shows significant differences in HIV/AIDS knowledge by gender, with men showing significantly higher knowledge of all three modes of transmission (which contributed to the significantly higher knowledge scores from Table 6.1), and significantly lower incidence of answering “I don’t know”. There was no significant difference between the proportion of men and women who had misconceptions about HIV transmission. We have no *a priori* expectation about differences in the level of correct HIV/AIDS knowledge between men and women. However the difference in the extent of answers to this open-ended question between men and women is similar to the differences in the extent of responses to the qualitative questions about changes in village life (see Section 5.2.2). In both cases men have answered more extensively than women, i.e. they have been more likely to give multiple answers, resulting in significant positive relationships with the various answers that were analysed. Within the individual questionnaire respondent sample, men had significantly more education than women (on average 6.54 vs. 5.95 years, $p = 0.002$) and this may have contributed to the apparent difference in HIV/AIDS knowledge. Alternatively, it is possible that women were reluctant to answer the HIV transmission modes question to the fullness of their knowledge. They may have done this consciously in order to seem less knowledgeable than the male members of their family, i.e. not wanting to display greater knowledge than their partner or household head. Alternatively they may have done this in order to seem less knowledgeable about sexual matters, a cultural expectation within traditional Thai society (Keyes, 1984). Untangling these alternative explanations for differences in HIV/AIDS knowledge by gender with the effects of the gender-specific difference in education is best done through a structural model (see Section 6.2.3 below).

[112] Note that it is possible that respondents who answered “I don’t know” may have refused to answer in spite of being knowledgeable because of the sensitivity of the topic.

By age group there are significant differences in the level of knowledge of HIV transmission modes. However, there appears to be little difference in the HIV/AIDS knowledge between the youngest age group (18-34 years) and the middle age group (35-49 years). Although a significantly greater proportion of the younger age group were able to identify blood transfusion or similar as a mode of HIV transmission, as noted above there was not significant difference in HIV/AIDS knowledge score. However, the youngest age group had a greater proportion with misconceptions about HIV transmission, and the difference between the youngest and middle age groups was weakly significant. The oldest age group (50+ years) had significantly lower levels of HIV/AIDS knowledge in all the categories in Table 6.2, and they were significantly more likely to answer "I don't know" to the question. However, they were not significantly more likely to have misconceptions about the modes of HIV transmission. The HIV/AIDS information campaigns during the 1990s and to date have been mostly targeted at people of reproductive age (i.e. those that are most sexually active and therefore considered to be at highest risk of contracting HIV). At the time of this survey, the people who were targeted with these information campaigns would still mostly be under the age of 50. This may be the explanation for the significant differences in HIV/AIDS knowledge between those over and those under the age of 50. What is surprising is the weakly significantly higher proportion of young people who had misconceptions about HIV/AIDS transmission. This younger age group has significantly more education that even the middle age group (on average 8.09 vs. 5.72 years, $p < 0.001$) and should therefore be expected to have greater HIV/AIDS knowledge and fewer misconceptions. Further, most of these people are likely to have been exposed to a significant amount of material on HIV/AIDS, and many will have also received information at secondary school. This will be explored further following the econometric models in Section 6.2.3.

6.2.3 The Econometric Models and Results

Given the analysis in Section 6.2.2, it appears that age and gender are important determinants of the level of HIV/AIDS knowledge. It could be expected that the level of education is important in determining the level of accurate HIV/AIDS knowledge. However, the key explanatory variable of interest, as noted in Hypothesis (b) is wealth. To investigate whether wealth is a significant determinant of HIV/AIDS knowledge, independent of the other explanatory variables noted above, several models were specified – to explain each of HIV/AIDS knowledge score, the probability of answering "I don't know" to the question about modes of HIV transmission, and the probability of having misconceptions about the modes of HIV transmission.

The data on HIV/AIDS knowledge score is a variable with a range from zero to four.[113] As noted above, respondents who answered "I don't know" to the question were allocated a score of zero, when in fact they could have held significant misconceptions about the modes of transmission of HIV. Therefore this data is effectively left-censored at zero. Further, although it was theoretically possible to score higher than four, no respondent did so.[114] Therefore the data is also effectively right-censored at four. Given the censored nature of the data, a tobit model was used to explain the HIV/AIDS knowledge score. A further data problem here is the possible correlation between education and wealth, and the multicollinearity problems that such a correlation would cause. Fortunately, there is not a strong correlation between the measures of wealth and the level of education of respondents (correlations between 0.1220 and 0.2612), suggesting that multicollinearity between those variables might not be a serious problem in these estimations.

The results of the tobit estimation, using log of total household assets[115] as the measure of wealth, are presented in Table 6.4. The coefficients for alternative measures of wealth are presented in Table 6.5.[116]

[113] While it was possible for respondents to obtain a negative HIV/AIDS knowledge score (by not correctly identifying any of the true modes of transmission of HIV, and identifying an incorrect mode of transmission), no respondent did so and so the lowest score obtained was zero.
[114] It is likely that interviewers only coded the first response when the respondent answered several additional modes of transmission which were not explicitly noted on the questionnaire.
[115] Recall that "total household assets" includes assets such as refrigerators, televisions, motorcycles, etc. and livestock, while "total assets" includes the value of all household assets as well as the value of land (estimated at 19162 Baht per rai) and the self-reported market value of the dwelling.
[116] The results for other variables were qualitatively and approximately quantitatively the same between the estimations with different measures of wealth. Full details of these estimations are provided in Appendix XIII.

Table 6.4: Tobit model of HIV/AIDS knowledge score

	Coefficient	Std. Error	z	P > |z|
Sex (male = 1)	0.1654	0.0388	4.26	< 0.001***
Age	-0.0080	0.0016	-4.93	< 0.001***
Education	0.0174	0.0067	2.59	0.010**
Log of total household assets	0.0406	0.0153	2.65	0.008***
Constant	1.7962	0.1933	9.29	< 0.001***

n = 1223; Pseudo $R^2 = 0.0347$; LR $X^2(4) = 94.55$ ($p < 0.0001$)

* weakly significant at $p < 0.1$; ** significant at $p < 0.05$; *** significant at $p < 0.01$

Table 6.5: Coefficients for alternative measures of wealth from tobit models of HIV/AIDS knowledge score

	Coefficient	Std. Error	z	P > |z|
Wealth index	-0.0111	0.0096	-1.16	0.245
Log of total household assets	0.0406	0.0153	2.65	0.008***
Log of total assets	0.0397	0.0238	1.67	0.095*
Log of total household assets per capita	0.0260	0.0154	1.69	0.091*
Log of total household assets per adult equivalent	0.0280	0.0155	1.80	0.072*
Log of total assets per capita	0.0037	0.0226	0.17	0.869
Log of total assets per adult equivalent	0.0072	0.0230	0.31	0.756

* weakly significant at $p < 0.1$; ** significant at $p < 0.05$; *** significant at $p < 0.01$

The earlier analysis suggested that age is significantly negatively related to HIV/AIDS knowledge score, and that men have significantly higher HIV/AIDS knowledge scores than women. The tobit results in Table 6.4 confirm these results even after accounting for wealth and education. Education, as expected, has a significantly positive effect on HIV/AIDS knowledge score.

The results for wealth are less consistent. With the exception of the wealth index, all measures of wealth suggest that the association with HIV/AIDS knowledge score is positive. However, only the log of total household assets is significant, with three of the remaining six measures weakly significant. These results provide some weak support for the hypothesis that wealth has a significant and positive effect on HIV/AIDS knowledge.

The data on whether a respondent answered the HIV transmission modes question “I don’t know” is a bivariate variable. Therefore a standard probit model specification was employed to investigate whether any of the explanatory variables were significant. The results of the probit estimation, using the log of total household assets as the measure of wealth, are presented in Table 6.6. The coefficients for alternative measures of wealth are presented in Table 6.7.[117]

Table 6.6: Probit model of "I don't know" answers to HIV transmission modes question

	Coefficient	Std. Error	z	P > |z|
Sex (male = 1)	-0.7033	0.3005	-2.34	0.019**
Age	0.0202	0.0084	2.41	0.016**
Education	-0.0029	0.0483	-0.06	0.952
Log of total household assets	-0.2319	0.0640	-3.62	< 0.001***
Constant	0.5110	0.8821	-0.58	0.562

n = 1223; Pseudo R^2 = 0.2287; LR $X^2(4)$ = 38.83 ($p < 0.0001$)

* weakly significant at p < 0.1; ** significant at p < 0.05; *** significant at p < 0.01

Table 6.7: Coefficients for alternative measures of wealth from probit models of "I don't know" answers to HIV transmission modes question

	Coefficient	Std. Error	z	P > |z|
Wealth index	-0.0069	0.0535	-0.13	0.897
Log of total household assets	-0.2319	0.0640	-3.62	< 0.001***
Log of total assets	-0.3372	0.1017	-3.32	0.001***
Log of total household assets per capita	-0.2331	0.0689	-3.38	0.001***
Log of total household assets per adult equivalent	-0.2361	0.0689	-3.43	0.001***
Log of total assets per capita	-0.2697	0.1043	-2.59	0.010**
Log of total assets per adult equivalent	-0.2796	0.1046	-2.67	0.008***

* weakly significant at p < 0.1; ** significant at p < 0.05; *** significant at p < 0.01

The earlier analysis suggested that men were significantly less likely to answer "I don't know" than women, and that the eldest respondents were significantly more likely to answer "I don't know". The probit results in Table 6.6 confirm these results even after accounting for wealth and education. Education has no significant effect on the probability that a respondent answered "I don't know".

[117] As with the tobit model of HIV/AIDS knowledge score, the results for other variables in this model were qualitatively and approximately quantitatively the same between the estimations with different measures of wealth. Full details of these estimations are provided in Appendix XIII.

The results for wealth much more consistent than for HIV/AIDS knowledge score. Estimations using all the measures of wealth, with the exception of wealth index, suggest that there is a significant negative relationship between wealth and answers of "I don't know", i.e. wealthier respondents were significantly less likely to answer "I don't know" than poorer respondents. These results provide some support for the hypothesis that wealth has a significant effect on HIV/AIDS knowledge.

The data on whether a respondent had misconceptions about HIV transmission is also a bivariate variable. Therefore a standard probit model specification was again employed to investigate whether any of the explanatory variables were significant. The results of the probit estimation, using log of total household assets as the measure of wealth,[118] are presented in Table 6.8.

Table 6.8: Probit model of misconceptions about HIV transmission modes

	Coefficient	**Std. Error**	**z**	**P > |z|**
Sex (male = 1)	0.0256	0.2161	0.12	0.906
Age	-0.0080	0.0098	-0.81	0.416
Education	0.0189	0.0335	0.57	0.572
Log of total household assets	0.0863	0.0929	0.93	0.353
Constant	-3.1355	1.1748	-2.67	0.008***

n = 1225; Pseudo R^2 = 0.0280; LR $X^2(4)$ = 3.89 (p = 0.4211)

* weakly significant at $p < 0.1$; ** significant at $p < 0.05$; *** significant at $p < 0.01$

The earlier analysis suggested no significant difference in misconceptions between men and women, and provided some evidence that younger people had greater misconceptions than older people. The probit results in Table 6.8 suggest that none of the explanatory variables have any significant impact on the probability that a respondent has misconceptions about the modes of transmission of HIV – even education is strongly insignificant. This may be due to the very low level of misconceptions observed (about one percent of respondents). It is also possible that respondents' misconceptions about HIV/AIDS have been randomly determined through people's interactions and discussions with others. Under these circumstances if the interactions are not correlated with the explanatory variables

[118] Full details of estimations using alternative measures of wealth are provided in Appendix XIII.

above, we might not expect any significant relationship between them and misconceptions.

Overall it appears there is some evidence to support Hypothesis (b) from the probit results on respondents who answered “I don’t know” to the question about HIV transmission modes, supported by much weaker evidence from the HIV/AIDS knowledge scores tobit models.

6.3 Migration and Wealth or Poverty as Determinants of HIV Infection

6.3.1 Introduction

Whether migration and poverty contribute to an elevated risk of HIV infection are open empirical questions (see Section 2.4). Migration itself is likely not a risk factor for HIV/AIDS, but may be a lifestyle marker for other HIV/AIDS risk behaviours such as unprotected commercial sex or injection drug use. Wealth or poverty might work through many channels to place an individual at an elevated risk of HIV infection (Section 6.2 above provides one such example).

Recall Hypothesis (c): “That there is a significant relationship between previous wealth or poverty, and current HIV infection, i.e. that the poor are significantly more likely to be infected with HIV”, and Hypothesis (d): “That there is a significant relationship between previous migration (of the individual or another adult member of their household) and current HIV infection, i.e. that members of migrant households are more likely to be infected with HIV”. This section will test these hypotheses using data from both the representative household survey and the HIV/AIDS patient survey.

6.3.2 The Migration Variable

In this study, individual-specific data on migrants themselves is not available. For two main reasons it was not possible to gather complete information on all migrants during the representative household survey. First, where an entire household had migrated away from the village (whether temporarily or seasonally), they were not enumerated and therefore could not be selected as part of the sample. Second, where some members of the household were present but others were not, we had to rely on information provided by the household members who remained behind.

Therefore it is not possible to compare directly migrants' and non-migrants' risk of HIV infection with the available data. However, migrants themselves are not the only people at elevated risk as a result of migration. Consider a male migrant who becomes infected with HIV during one of his migrations. He returns home, and passes the virus to his wife. Now the wife would not be classified as a migrant (since she always remains home in the village) and yet she is also at an elevated risk of contracting HIV due to the risky behaviour of her migrant husband. It would seem reasonable then to consider other members of the migrants' household to also be at elevated risk if the migrants themselves are.

The migration variable to be used in the following analysis is therefore whether an individual belongs to a 'migrant household'. A 'migrant household' is defined as a household which has had one or more recent permanent or seasonal migrants. The variable was constructed as follows. During the survey first visit, respondents were asked to provide a list of all the individuals who 'usually live' in the household. They were also asked for how many months each person was absent from the household in the last year. This provided the first check for recent migrants from the household. There was also a section on migration in the household first visit questionnaire which asked "since 1998, how many people who were once members of this household have moved out from this household to live in another district?" and "have any of the people who are now members of this household moved out from this household to live in another district in the past year?". The second of these questions proved to be most unsatisfactory in that it seemed to only generate positive responses from respondents who had already answered affirmatively in the permanent migration section (however it was designed to pick up seasonal migration by household members who were back in the household by the time of the survey). For the third and fourth rounds, the following question was instead asked, for each person on the household roster: "In the past year, has [name] spent one month or more living outside this district, for work or study or any other reason?". This change in question resulted in very few additional positive responses. However, the critical time period of one month was certainly too long to pick up frequent short-term migrants and it is also not clear that respondents correctly interpreted what either of the two alternative questions asked of them.

However, by combining the information from the two alternative migration sections with the information from the household roster and long-term absences, it is possible to determine whether a household has experienced recent migration, i.e. whether one or more members of a household have migrated out during the recent past (note this is an indeterminate amount of time as it is unclear how long people may have been living away from the household before respondents would no longer list them on the household roster). Households can therefore be characterised as migrant households (i.e. those with recent migration), or non-migrant households using this data.

6.3.3 Other Data Issues

The first issue is HIV infection. There is no data available to determine which people, if any, from the representative household survey were infected with HIV. As there were 2536 people in the 660 households visited, and the underlying HIV prevalence in Khon Kaen province is approximately one percent, it is likely that at least some of those surveyed were HIV-positive. However, none were tested and the number of HIV-positive people is unlikely to be many. Therefore for the purposes of this section it will be assumed that the representative household survey represents people *uninfected* with HIV. We will then compare this population with the 71 patients surveyed, who we know for sure are infected with HIV.

The second issue is weighting. The representative household survey is weighted to preserve its representativeness of the population from which it was drawn. The HIV/AIDS patients' data are unweighted. In pooling the HIV/AIDS patient data with the representative household survey data, a weighting equal to the mean of the weights for adults from the representative household survey was assigned to each HIV/AIDS patient's data.[119]

The third issue is the wealth variable. Data were collected in the HIV/AIDS patients survey on household characteristics at impact time, and these data were used to construct estimates of their wealth at impact time. It is these wealth estimates which are closest to the wealth of the HIV/AIDS patient at the time they were infected with HIV. However, there is no comparative past wealth data for the representative household sample. In effect, we will be comparing past wealth data for the HIV/AIDS patients with current wealth data for the representative household sample. If there has been economic growth since the time of infection of the HIV/AIDS patients, then incomes and wealth will likely have risen in rural areas. This would cause current wealth to be higher than previous wealth, meaning that the current wealth estimates for the representative household sample might be higher than the wealth estimates of the HIV/AIDS patients at impact time simply due to increases in rural incomes. This may result in wealth exhibiting a significant and negative association with HIV infection, simply due to the HIV/AIDS patients' wealth estimates being lower as they were evaluated at an earlier time. To test for the robustness of our estimates to this effect, a sensitivity analysis was therefore undertaken. Current wealth estimates for the representative household sample were discounted to examine the effect on the significance of the coefficients. If current wealth estimates have to be significantly discounted (i.e. by much more than Thailand's average growth rate) before the coefficients become insignificant, this would suggest that the results are fairly robust.

6.3.4 The Econometric Model and Results

Given that the dependent variable is bivariate, i.e. either the individual is infected with HIV or not, both a standard probit model specification and a standard logit model specification were employed. The two specifications were employed in order to reveal the marginal probabilities (from the probit model) and the odds ratios (from the logit model), enabling deeper analysis of the results. The

[119] That is, each HIV/AIDS patient's data was given a weighting of 0.00151515, the mean weighting of the adults from the representative household survey.

explanatory variables included in the model are summarised in Table 6.9. Wealth was included as an explanatory variable as it was suspected to have a separate direct effect on risk of HIV infection, as well as the indirect effect through migration that is being investigated.

Table 6.9: Explanatory variables used in the model of HIV infection risk[120]

Explanatory variable	Measure
Gender	1 = male
Age	–
Education	Years
Migration status	Whether the individual currently lives in a 'migrant household'
Wealth	Wealth index value; Log of total assets (including per capita and per adult equivalent); Log of total household assets (including per capita and per adult equivalent)

The sample used in the estimations was restricted to only the adults from the representative household survey, in order to match with the adults-only sample of HIV/AIDS patients. The results of the probit estimation, using the log of total household assets as the measure of wealth, are presented in Table 6.10. The marginal probabilities and coefficients for probit models using alternative measures of wealth are presented in Table 6.11.[121]

Table 6.10: Probit model of HIV infection

	Marginal Probability	Coefficient	Std. Error†	z	P > |z|
Gender (1 = male)	-0.0194	-0.2703	0.1015	-2.66	0.008***
Age	-0.0044	-0.0604	0.0054	-11.24	< 0.001***
Education	-0.0038	-0.0522	0.0185	-2.82	0.005***
Migrant household	0.0759	0.8448	0.0997	8.47	< 0.001***
Log of total household assets	-0.0205	-0.2789	0.0317	-8.80	< 0.001***
Constant	–	3.9471	0.4292	9.20	< 0.001***
		Pseudo R^2 = 0.2819			

* weakly significant at $p < 0.1$; ** significant at $p < 0.05$; *** significant at $p < 0.01$

† reported standard errors are for the coefficient, not the marginal probability

[120] Alternative explanatory variables which were included in some specifications, but eventually excluded as insignificant, included land ownership, household size, number of adults, and number of children.

[121] The results for other variables were qualitatively and approximately quantitatively the same between the estimations with different measures of wealth. Full details of these estimations are provided in Appendix XIII.

Table 6.11: Marginal probabilities and coefficients for alternative measures of wealth from probit models of HIV infection

	Marginal Probability	Coefficient	Std. Error†	z	P > |z|
Wealth index	0.0026	0.0294	0.0215	1.37	0.171
Log of total household assets	-0.0205	-0.2789	0.0317	-8.80	< 0.001***
Log of total assets	-0.0362	-0.4950	0.0554	-8.93	< 0.001***
Log of total household assets per capita	-0.0223	-0.3034	0.0341	-8.89	< 0.001***
Log of total household assets per adult equivalent	-0.0225	-0.3073	0.0341	-9.00	< 0.001***
Log of total assets per capita	-0.0363	-0.4810	0.0569	-8.45	< 0.001***
Log of total assets per adult equivalent	-0.0374	-0.4975	0.0574	-8.67	< 0.001***

* weakly significant at $p < 0.1$; ** significant at $p < 0.05$; *** significant at $p < 0.01$

† reported standard errors are for the coefficient, not the marginal probability

The results of the logit estimation, using log of total household assets as the measure of wealth, are presented in Table 6.12. The odds ratios and coefficients for logit models using alternative measures of wealth are presented in Table 6.13.[122]

Table 6.12: Logit model of HIV infection

	Odds Ratio	Coefficient	Std. Error†	z	P > |z|
Gender (1 = male)	0.6270	-0.4668	0.1885	-2.48	0.013**
Age	0.8922	-0.1140	0.0104	-10.92	< 0.001***
Education	0.8872	-0.1197	0.0370	-3.23	0.001***
Migrant household	4.7006	1.5477	0.1874	8.26	< 0.001***
Log of total household assets	0.6086	-0.4967	0.0570	-8.72	< 0.001***
Constant	–	7.4201	0.7954	9.33	< 0.001***
		Pseudo R^2 = 0.2757			

* weakly significant at $p < 0.1$; ** significant at $p < 0.05$; *** significant at $p < 0.01$

† reported standard errors are for the coefficient, not the odds ratio

[122] The results for other variables were qualitatively and approximately quantitatively the same between the estimations with different measures of wealth. Full details of these estimations are provided in Appendix XIII.

Table 6.13: Odds ratios and coefficients for alternative measures of wealth from logit models of HIV infection

	Odds Ratio	Coefficient	Std. Error†	z	P > |z|
Wealth index	1.0683	0.0661	0.0399	1.66	0.098*
Log of total household assets	0.6086	-0.4967	0.0570	-8.72	< 0.001***
Log of total assets	0.4066	-0.9000	0.1011	-8.91	< 0.001***
Log of total household assets per capita	0.5768	-0.5503	0.0627	-8.77	< 0.001***
Log of total household assets per adult equivalent	0.5726	-0.5576	0.0627	-8.90	< 0.001***
Log of total assets per capita	0.4095	-0.8927	0.1066	-8.38	< 0.001***
Log of total assets per adult equivalent	0.3953	-0.9281	0.1080	-8.60	< 0.001***

* weakly significant at $p < 0.1$; ** significant at $p < 0.05$; *** significant at $p < 0.01$

† reported standard errors are for the coefficient, not the odds ratio

Unsurprisingly the results for the probit and logit estimations are qualitatively the same, and seem intuitively correct. Men appear to be at significantly lower risk than women (odds ratio = 0.6270, p = 0.013). This is likely to be simply a result of the characteristics of the HIV/AIDS patient sample, which was predominantly composed of women. Of the sample, nearly 65 percent (46 out of 71) were women, many of whom had been infected by their husbands who had already died of AIDS-related causes. However, this is controlled for in the models and all other variables were highly significant. Risk of HIV infection decreases significantly with age (marginal probability = -0.0044, p < 0.001). This is consistent with younger, sexually active people being at higher risk of contracting HIV.

The three key variables of interest were also highly significant. First, education is significantly negatively associated with HIV infection, i.e. higher educated people are significantly less likely to be infected with HIV (marginal probability = -0.0038, p = 0.005). This provides additional support for the contention in Section 6.2 that low education contributes to HIV infection risk. It is further important to note that this significant association between low education and HIV infection is robust to the inclusion of a range of wealth measures and whether the individual was a member of a migrant household.

Second, adult members of migrant households[123] appear to be at significantly higher risk of HIV infection ($p < 0.001$). The odds ratio of over 4.7 indicates that an adult member of a migrant household is at nearly five times greater risk of HIV infection than an adult member of a non-migrant household. This is consistent with the prior that migrants place themselves at higher risk of HIV infection due to a combination of factors including their remoteness from the social norms of their home village.

Finally, most of the measures of wealth have a significant and negative effect on the risk of HIV infection (e.g. the log of total household assets has a marginal probability of -0.0205, $p < 0.001$). The exception is the wealth index which has a positive effect which is weakly significant in the logit model. However, given the highly significant (and negative) estimates of the marginal effects of the other wealth measures, it is likely that the wealth index result can be discounted in this instance. These results are important in that wealth appears to be a significant determinant of HIV infection, even after accounting for education and migration status.

In the previous section a problem with the comparison between current wealth estimates of uninfected individuals and past wealth estimates of the HIV/AIDS patients was acknowledged. To test for whether this had a significant distorting effect on the significance of results, sensitivity analysis was applied. The wealth estimate used in the analysis was log of total household assets. This variable was discounted[124] and the effect on the significance of the coefficient for wealth was examined. The results, which are included in Appendix XIII (Tables XIII.6.6 and XIII.6.7), showed that current wealth would need to be discounted by at least 59 percent before the coefficient for wealth became insignificant in both the logit and probit estimations. Given that the estimated average time between infection with HIV and the time of interview for the HIV/AIDS patients was 49.2 months, the average annual growth rate of wealth in the representative household sample

[123] Recall from Section 6.3.2 that a migrant household is defined as a household which has had one or more recent permanent or seasonal migrants.
[124] Obviously, total household assets was discounted, then the natural logarithm of the discounted value was used in the analysis.

would have to have been approximately 24.3 percent for the wealth coefficient to become insignificant.[125] The growth rate of gross regional product for the Northeast region was on average 6.2 percent over the period 1990-2000 (Intarachai, 2003), and the whole Thai economy grew by no more than seven percent in any year between 2000 and 2003 (Asian Development Bank, 2004) which is similar to its average growth rate over the last fifty years (Jitsuchon, 2001). These comparisons suggest that it is extremely unlikely that the wealth of rural villagers would have grown by 24.3 percent per year over the period since impact time for the HIV/AIDS patients. It is therefore unlikely that economic growth caused the difference in wealth between HIV/AIDS patients at impact time and the representative household sample now, so the results which suggest wealth as a significant and negative factor in HIV infection appear to be robust.

Overall it appears there is evidence to support Hypothesis (c) from the probit and the logit results, i.e. wealth does appear to have a significant negative effect on the likelihood of an individual being infected with HIV. However this evidence is somewhat weakened by the results when using the wealth index as the measure of wealth. Despite concerns about the comparability of current wealth for the representative household sample with past wealth of the HIV/AIDS patients, sensitivity analysis reveals that it is unlikely that this has caused the coefficients to appear negative.

There is also very strong evidence to support Hypothesis (d) from the estimations in this chapter. Migration of the individual or another adult member of their household has a highly significant and positive effect on the likelihood of the individual being infected with HIV. Following Stark and Taylor (1991a) and Stark and Wang (2000), and as discussed in Section 2.4.1, the “relatively deprived” poor are more likely to migrate. This suggests additional support for Hypothesis (c), even after considering that wealth was already included in the estimations.

[125] Assuming growth compounding at the end of each year.

6.4 Summary and Discussion

This chapter examined the relationship from poverty to HIV/AIDS, through two channels: (i) the relationship from wealth to accuracy of HIV/AIDS knowledge; and (ii) the relationships from wealth, migration, and education to HIV infection. The chapter presented data and quantitative analyses on HIV/AIDS knowledge and investigated whether key variables were associated with HIV infection. The results highlighted the significance of the association between poverty, migration and low education and HIV infection, suggesting that poverty and low education are risk factors for HIV and that migration is a lifestyle marker for HIV infection.

Recall Hypothesis (b) from Section 3.4, which suggests that there is a significant relationship between wealth/poverty and HIV/AIDS knowledge, i.e. that the poor are significantly less likely to have accurate information about HIV/AIDS on which to base behavioural decisions. Univariate and multivariate analyses were used to investigate whether several measures wealth (and hence poverty) had a significant effect on the accuracy of responses to a question about the modes of transmission of HIV. In multivariate analysis HIV/AIDS knowledge score was found to be significantly positively associated with the log of total household assets ($p = 0.008$), and weakly associated with three other measures of wealth, after controlling for age, gender, and education. Three other measures of wealth, including the wealth index, were insignificant. This provided some weak support for Hypothesis (b). Similar analyses were performed on the probability of whether a respondent answered “I don’t know” to the question about the modes of transmission of HIV. Six of the seven measures of wealth were found in multivariate analysis to have highly significant negative relationships with the probability of answering “I don’t know”. The exception was the wealth index measure.

Hypothesis (c) from Section 3.4 suggests that there is a significant relationship between previous wealth or poverty, and current HIV infection, i.e. that the poor are significantly more likely to be infected with HIV. This was tested, in combination with Hypothesis (d), using probit and logit models with HIV infection as the dependent variable, with gender, age, education, and migration as other explanatory variables. Even after allowing for these other explanatory variables, six of the seven measures of wealth were found to have a highly significant and negative relationship with HIV infection. The exception was again the wealth index measure. Despite the insignificance of the wealth index measure, these results provide strong support for Hypothesis (c), particularly considering that education and migration were also separately and independently strongly associated with HIV infection.

As outlined in Section 3.4, Hypothesis (d) suggests that there is a significant relationship between previous migration (of the individual or another adult member of their household) and current HIV infection, i.e. that members of migrant households are more likely to be infected with HIV. The same probit and logit models were used to test Hypothesis (d) and Hypothesis (c). The migration variable (whether the individual belonged to a household with a recent permanent or seasonal adult migrant) was significantly and positively associated with HIV infection ($p < 0.001$ in all estimations). This provides very robust support for the contention that migration is a significant risk factor for HIV, or at least that it is a lifestyle marker for other risk factors such as unprotected or commercial sex, or injection drug use. It also confirms the previous literature which suggests that migration is significantly associated with HIV infection (see Section 2.4.1). This may provide additional support for Hypothesis (c). Following Stark and Taylor (1991a) and Stark and Wang (2000), and as discussed in Section 2.4.1, the "relatively deprived" poor are more likely to migrate. If this theory holds for rural Northeast Thailand and if migrants are at higher risk of HIV infection and the poor are more likely to migrate, then this provides additional support that the poor are more likely to be at risk of HIV infection.

However, a caveat on the migration results should be noted. Migrants may be at higher risk of HIV infection, but the true extent of their additional risk might not be as strong as that stated here. The reason is as follows. If migrants become infected with HIV and become aware of their status, either through a positive HIV test or by exhibiting symptoms (i.e. if impact time occurs), they may be more likely to return to their home village for care and support. Migrants who are uninfected might stay in Bangkok and continue to work. If this is true, then former migrants observed in rural villagers will have a higher rate of HIV prevalence than the entire population of migrants. Consider this: there are four population groups that would be observed in a rural village: (i) uninfected non-migrants; (ii) infected non-migrants; (iii) uninfected migrants; and (iv) infected migrants. If the number of migrants who are infected is biased upwards relative to the number of uninfected migrants, then when we consider migrants against non-migrants (as we have done in this chapter) the association between migration and HIV infection will be biased towards significance. The extent of this bias is unclear, or even whether the bias is significant in our data. The reason this is unclear is that, rather than using the individual's migration history as an explanatory variable in our analysis, we used 'member of a migrant household'. This definition includes adult members of the household who are not themselves migrants within the migrant population group and the reasons for this definition are noted in Section 6.3.2 – other members of the migrant's household are also likely to be at an elevated risk of contracting HIV. Given this, it is hard to determine whether the results in this chapter in terms of migration have been adversely affected by bias, and they should therefore be treated with due caution.

Finally, it should be noted again from Section 2.4.1 that migration itself is unlikely to be a risk factor for HIV infection, i.e. the act of migration itself does not place the individual at a higher risk of HIV infection. Instead, migration should be seen as a lifestyle marker for other risk factors such as commercial sex (whether as client or as commercial sex worker), drug use, reduced access to essential services, or social disconnection and reduced social capital.

6.5 Conclusions

Recall Hypothesis (b) from Section 3.4:

> "That there is a significant relationship between wealth or poverty, and HIV/AIDS knowledge, i.e. that the poor are significantly less likely to have accurate information about HIV/AIDS on which to base behavioural decisions."

In this chapter it has been demonstrated that, for individual respondents from the representative household survey, wealth has some positive effect on the accuracy of HIV/AIDS knowledge, and a highly significant negative effect on the probability of a given respondent answering “I don’t know” when asked about the modes of transmission of HIV. These results were robust to the inclusion of education, age and gender as additional explanatory variables in multivariate analysis, and provide support for the positive effects of wealth (and hence the negative effects of poverty) on HIV/AIDS knowledge. Given this support, Hypothesis (b) cannot be rejected. That is, it is likely that there is a significant relationship between previous HIV infection and current wealth or poverty.

Recall Hypothesis (c) from Section 3.4:

> “That there is a significant relationship between previous wealth or poverty, and current HIV infection, i.e. that the poor are significantly more likely to be infected with HIV.”

In this chapter wealth was demonstrated to have a highly significant and negative effect on the probability of a given individual being infected with HIV. This result was robust to the inclusion of age, gender, education, and migration status as additional explanatory variables. Sensitivity analysis confirmed that the different temporal nature of the wealth variables between the HIV/AIDS patients and the representative household survey was unlikely to have had a significant effect on the results. Given these strong results Hypothesis (c) cannot be rejected. That is, it is likely that there is a significant relationship between wealth or poverty, and current HIV infection.

Recall Hypothesis (d) from Section 3.4:

> “That there is a significant relationship between previous migration (of the individual or another adult member of their household) and current HIV infection, i.e. that members of migrant households are more likely to be infected with HIV.”

This chapter provided strong evidence to support this hypothesis. Migration status was found to have a highly significant and positive effect on the probability of a given individual being infected with HIV. This result was robust to the inclusion of age, gender, education, and all measures of wealth as additional explanatory variables. However, it should be noted that these results may be subject to bias if migrants are more likely to return to the village after impact time. The extent of any such bias or even whether the bias could be significant is clouded by the use of migrant household rather than individual migration as the explanatory variable in the analysis in this chapter. Given these results Hypothesis (d) cannot be rejected. That is, there may be a significant relationship between previous migration (of the individual or another adult member of their household) and current HIV infection.

Chapter 7

Breaking the Poverty-HIV/AIDS Cycle

7.1 Interventions to Break the Poverty-HIV/AIDS Cycle

An initial discussion of interventions to break the poverty-HIV/AIDS cycle will now be considered. Specifically a case study of an ongoing socio-economic intervention in the study area will be presented along with data analysis and a discussion of its potential effects on the poverty-HIV/AIDS cycle. Section 3.2 presented a short discussion of three types of intervention: (i) susceptibility interventions; (ii) vulnerability interventions; and (iii) behavioural interventions. A combination of all three of these interventions would be required in order to effectively break the poverty-HIV/AIDS cycle. Susceptibility and vulnerability interventions have been introduced as part of public health programs in many countries, including Thailand. However, behavioural interventions (defined here as interventions that reduce the incidence of high-risk behaviour due to poverty, see Section 3.2) have been sadly lacking (e.g. see Bollinger *et al.*, 2002).

One example of an initiative that has the potential to provide a lasting and effective behavioural intervention is the Thai Business Initiative in Rural Development (TBIRD) program, which focuses on improving rural livelihoods and reducing both poverty and rural-urban migration. This makes TBIRD an intervention with the potential to interrupt the poverty-HIV/AIDS cycle. The project's success in breaking the poverty-HIV/AIDS cycle will be evaluated here by investigating whether it (i) employs the rural poor rather than the rural wealthy; (ii) increases the incomes of its workers relative to other jobs; and (iii) reduces rural-urban migration. If TBIRD raises incomes it may reduce a key pull factor associated with migration – the rural-urban wage differential. Since migration is a factor associated with HIV infection (as evidenced by the analysis in Chapter 6), even if not directly a risk factor itself, reducing rural-urban migration provides an important behavioural intervention in the poverty-HIV/AIDS cycle. The strength of the impact of TBIRD on the cycle is likely to depend on the extent to which the project employs the rural poor rather than the rural wealthy. Since employment of the rural poor raises incomes and reduces inequality, and perceived income and other inequalities contribute to migration (Stark, 2006), it would appear that the TBIRD should reduce susceptibility of the rural population to HIV infection.

7.2 Case Study - TBIRD

7.2.1 Introduction

The Thai Business Initiative in Rural Development (TBIRD) program is an initiative of the Population and Community Development Association of Thailand (PDA), and was launched in 1988. TBIRD is a program that encourages large private companies (sponsors), such as foreign multinationals, to collaborate in activities with rural villagers that benefit both the sponsor and the rural community. Each sponsor adopts a village and assists in its development through a range of activities including expanding income generation opportunities, improving education, strengthening local institutions, and improving the natural environment. One important activity of TBIRD has been to encourage companies to shift manufacturing of products such as clothing and footwear away from the congested central region of Thailand to rural areas. This distinguishes TBIRD from other rural development projects that have been used to combat HIV/AIDS, which have generally focussed on agricultural development (e.g. see Topouzis and du Guerny, 1999). The first rural industry projects for TBIRD were established in 1994 (Population and Community Development Association, 2000). The TBIRD program is co-ordinated through the PDA’s Community Based Integrated Rural Development (CBIRD) Centres, one of which is located in Ban Phai district, in a rural area approximately five kilometres north of Ban Phai township (described in more detail in the following section).

The benefits to rural villagers are numerous. These rural industry projects create employment for otherwise under-employed rural villagers and encourage skilled and semi-skilled migrants to return from Bangkok to work near their home village. Further, the sponsor has access to a diverse range of resources which poor rural villagers may not otherwise access including technical knowledge, market knowledge and contacts, as well as financial resources. Leveraging these resources is the key to long-term benefit for the rural villagers. By accessing new markets for their products, building relationships with suppliers and customers, and learning how to conduct business, the villagers develop key skills that will serve them long after the sponsor ceases their involvement in the program. These benefits potentially last much longer than financial resources provided by the sponsor.

The PDA describes the objectives of TBIRD as follows (Population and Community Development Association, 2000, p. 4):

a. "To encourage businesses to contribute to improving the quality of life of rural people;
b. To transfer business skills including production, marketing, financial management and creative problem-solving to villagers, especially women;
c. To establish income generating activities for the rural poor; and
d. To reduce urban migration as well as to encourage migrants to return home".

Included in two of those objectives are behavioural interventions that could act to break the poverty-HIV/AIDS cycle by: (i) establishing income generation for the poor; and (ii) reducing urban migration.

The sponsors also benefit from their involvement in the program. Companies involved in the TBIRD program have an opportunity to display their social responsibility, thereby improving public relations – this may be especially important for multinational companies, which are often seen as predatory when operating in developing countries. However, as Lim and Cameron (2003) note, good public relations is hardly the only benefit which sponsors gain from their involvement when their activities include employment generation by moving factories to rural areas. The multinational gains access to relatively cheaper labour in the rural areas, which more than compensates for the increase in transport costs when shipping factory products from rural areas to Bangkok for export. Overall, wages may be more than 20% lower and land rentals about 30% lower in rural areas than in Bangkok (Lim and Cameron, 2003). They may also receive tax relief from the government for locating away from Bangkok and the central region of Thailand.

Despite being lower than in Bangkok, the wages paid by the TBIRD sponsors exceed on average those paid by local firms in the same area. In 2001, while other factories in Khon Kaen province were paying as little as 70-80 Baht per day (a rate that was illegal under Thailand's minimum wage laws), workers at the TBIRD factories earned a wage of at least 133 Baht per day plus bonuses of up to 22 Baht per day[126] (Lim and Cameron, 2003). For the firm, these wages compared favourably with the minimum unskilled wage for workers in Bangkok of 167 Baht per day at that time. The CBIRD centre itself provides other benefits, both pecuniary and non-pecuniary. For example, meals are provided at a break-even price of 10 Baht per meal, and an on-site clinic provides basic health services for free. Pregnant women are assigned light work and their jobs are kept open for them for a period of ninety days after giving birth (Lim and Cameron, 2003). In some of the TBIRD factories, employees and other local villagers and cooperatives have been given the opportunity to become shareholders in the factory, thereby further sharing the benefits of profitability and performance of the factories with the local community (Population and Community Development Association, 2000).

The wage and worker benefits provided by the firms operating from the CBIRD centre form an important source of competitive advantage for the firms. Higher wages and better working conditions relative to other firms competing for the same labour will reduce moral hazard problems. These problems arise when,

[126] Bonuses include up to 2 Baht per day if the worker maintains good work habits such as punctuality and reliability, and additional bonuses tied to group performance.

having signed an employment contract, an employee's performance changes to the detriment of the employer. All factories face common moral hazard problems such as worker laziness and absenteeism. However, there is evidence that the higher wages offered at the TBIRD factories actually raise work effort. In effect, the high wage acts as an efficiency wage (Brickley *et al.*, 2000), encouraging a larger number of job applications from higher quality employees, and decreasing worker turnover and absenteeism. Lim and Cameron (2003) report that depending on the season, in the first half of 2001 each vacancy at the TBIRD factories attracted up to nine or ten applicants and the labour turnover rate averaged less than 2.5 percent for the factories. The efficiency wage provides strong incentives for workers to perform well (and keep their jobs) and lower turnover reduces labour-related costs such as hiring and training for the firms.

Finally, the PDA uses the CBIRD centre as a focal point from which to engage rural villagers in various education and social development programs and to disseminate information. Workers at the TBIRD factories are encouraged to participate in a wide range of training courses facilitated by the PDA. These include family planning, HIV/AIDS prevention, team building, business skills development, and interpersonal workplace relations (Lim and Cameron, 2003). Training courses further the goals of the PDA in family planning and health promotion, and are particularly well targeted given the young and predominantly female workforce at the TBIRD factories (see Section 4.6.3). Team building and other work and interpersonal skills workshops build the human capital of the rural villagers, providing them with key skills which benefit not only the employer, but the worker themselves. They can leverage their increased human capital for increases in wages (whether in the TBIRD project or elsewhere), or to develop their own business. As described in Section 7.2.3 below, this is exactly what many of the workers are doing.

7.2.2 TBIRD at the CBIRD Ban Phai Centre

The CBIRD Ban Phai centre is located close to the main road and rail links joining Bangkok to the Northeast region and to Laos. The centre is compact and includes many large factory/warehouse buildings laid out along a short road.

Many trees and ponds provide workers with a relaxing atmosphere and shelter from the heat during breaks. The ponds also provide a means of recycling water used in the centre. The centre is home to several manufacturing firms, ranging in size from just a few employees to several hundred. The two largest of these firms are Ban Phai Union Garments and Ban Phai Union Footwear.

Ban Phai Union Garments joined TBIRD in October 1996, recruiting 105 local villagers and training them in garment manufacture. The factory opened one month later in a converted warehouse at the CBIRD Ban Phai Centre. Another two factory buildings were added in 2000, and the number of workers expanded by 130. At the time of the survey Ban Phai Union Garments employed 269 workers. The factories produce uniforms, such as medical uniforms or cleaners' uniforms, almost exclusively for export to Europe.

Ban Phai Union Footwear joined TBIRD in October 1997 with one factory at the CBIRD Ban Phai Centre, and added two more factories in 2000. At the time of the survey Ban Phai Union Footwear employed 866 workers, producing shoe parts for Nike. The shoe parts are transported to another TBIRD factory in Nakhon Ratchasima province for final assembly.

7.2.3 TBIRD Factory Worker Data

As described in Section 4.3.3, a representative survey of 48 factory workers from the two largest manufacturing employers at the CBIRD Ban Phai Centre was undertaken. As part of this survey, data were collected from the factory workers on demographic and household details, work experience at the CBIRD Ban Phai Centre, their previous job, hopes for the future, and migration history. Sample statistics are included in Section 4.6.3. The results provide an interesting comparison with the representative household sample, as well as providing additional detail about the workers themselves.

However, there is an important issue with the weighting of data when it is pooled. The representative household survey is weighted to preserve its representativeness of the population from which it was drawn. The factory workers' data are unweighted. To overcome this, in pooling the factory workers' data with the representative household survey data a weighting equal to the mean adult weight was assigned to each factory worker's data.

7.2.4 Comparisons between TBIRD Factory Workers and the General Population

Table 7.1 presents a comparison of the demographic and household characteristics of the factory workers and adults from the representative household sample, and the results of a *t*-test of whether the two means are the same.

Table 7.1: Comparisons of TBIRD factory workers (FW) demographic and household characteristics with those of adults from the representative household sample (RHS)

	FW Mean	RHS Mean	t	P > |t|
Age	28.0	46.4	13.68	< 0.001***
Gender (% male)	16.7%	44.9%	6.16	< 0.001***
Education (years)	8.5	5.5	10.43	< 0.001***
Can read (%)	100.0%	94.4%	2.72	0.007***
Can write (%)	100.0%	95.8%	2.34	0.019**
Can do mathematics (%)	100.0%	93.2%	3.02	0.003***
Can use a computer (%)	14.6%	6.1%	3.66	< 0.001***
Father's Education (years)	4.0	3.5	3.22	0.001***
Mother's Education (years)	4.0	3.1	5.31	< 0.001***
Household size	4.08	3.82	1.75	0.080*
Number of productive adults	3.13	2.36	6.49	< 0.001***
Proportion of non-productive household members	0.2299	0.3634	5.09	< 0.001***
Migrant household	49.8%	37.7%	0.87	0.383
Wealth index	1.3860	< 0.0001	6.91	< 0.001***
Total household assets (Baht)	82 839	113 890	2.06	0.040**
Total assets (Baht)	484 181	653 804	3.83	< 0.001***
Total household assets per capita (Baht)	18 754	33 651	2.78	0.005***
Total household assets per adult equivalent (Baht)	19 643	35 382	2.90	0.004***
Total assets per capita (Baht)	115 151	201 519	5.08	< 0.001***
Total assets per adult equivalent (Baht)	120 729	212 483	5.33	< 0.001***

* weakly significant at $p < 0.1$; ** significant at $p < 0.05$; *** significant at $p < 0.01$

As can be seen from Table 7.1 there are many significant differences between the factory workers and adults from the representative household sample, and their households. The factory workers are significantly younger, and there appears to be a significant bias towards the employment of women. These results are not surprising, given that manufacturing firms in developing countries often target the employment of young women, who are though to be more docile and loyal workers (Wolf, 1992). Perhaps more importantly, young women more closely match the skills profiles required in the garment industry by generally possessing smaller, more dextrous hands. The results also confirm the earlier findings of Lim and Cameron (2003), although the gender bias observed in this data (83 percent female) is lower than that observed in 2001 (94 percent female). The factory workers are significantly better educated than adults from the representative household survey, with a greater mean number of years of formal education, and greater rates of literacy and numeracy. Again, this is not surprising given the younger age of the factory workers and increases in the level of compulsory basic education in Thailand over the last two decades. It is to be expected that younger people would be better educated than older people. Since the representative household sample contains a significant number of elderly people who are not present in the factory worker sample, this could have resulted in the observed significant difference in the mean level of education between the two groups.

The factory workers come from households that are significantly larger, with more productive-age adults, and lower dependency ratios. This may again reflect the age and gender profile of the workers, since traditionally in Thailand daughters remain at home with their parents even after marriage. They leave the household only when a younger daughter marries, and the youngest daughter eventually inherits the house and land (Lux, 1969). Given that the factory workers are generally young and female, they might be expected to mostly still be living with their parents, i.e. in households with often at least three productive-age adults. Using the same definition of migrant household used in Section 6.2, there is no significant difference in the number of migrant households between the factory worker sample and the representative household sample.

The wealth of factory workers' households is significantly lower than that of the representative household sample for all measures of wealth except wealth index (where factory workers' households have higher wealth – a result that is weakly significant). This result is somewhat surprising. We might expect that factory workers, who have been working at the factory and earning a higher than average wage for some time, may have increased their wealth significantly relative to other households, while the data shows this is not the case. However, despite the apparent lower wealth of the factory workers' households, the incidence of poverty among those households (using any of the four poverty lines calculated in Section 4.5.4) was zero (data not shown). This reveals that, although on average the households had low wealth, their expenditure was much higher than poor households from the representative household sample. This suggests that the factory workers' households were not income poor, in comparison with households from the representative household sample. Since factory workers' households are not income poor, but may be asset poor, it suggests that they may be accumulating wealth slowly, or have used the additional income to repay debts or increase financial assets rather than physical assets, which were not included in the measures of wealth.

It is likely that many of the observed differences between factory workers' households and households from the representative household sample are closely related. As noted above, the difference in education may be related to the differences in age and gender between the two samples. Similarly the differences in wealth may be related to the differences in the level of education of the two samples. To test for this, two regression models were used. The first model had as the dependent variable the number of years of formal education of adults, with age, sex, wealth (using total household assets per capita as the measure), and a dummy variable for whether the individual was a TBIRD factory worker, as explanatory variables. The second model had as the dependent variable the wealth of the adult's household (again using total household assets per capita as the measure), with age, sex, education, and the TBIRD factory worker dummy variable, as explanatory variables. These models were used to determine whether the observed differences in education and wealth between the factory worker sample and the representative household sample were the result of differences in age and gender, education or wealth. The estimated models are presented in Table 7.2 and Table 7.3.

Table 7.2: Regression model of education level of adults, comparing factory workers with others

	Coefficient	Std. Error	t	P > |t|
TBIRD factory worker dummy variable	1.2764	0.2621	4.87	< 0.001***
Age	-0.1148	0.0043	-26.63	< 0.001***
Gender (1 = male)	0.6894	0.1267	5.44	< 0.001***
Log of total household assets	< 0.0001	< 0.0001	6.54	< 0.001***
Constant	10.2167	0.2225	45.92	< 0.001***
		Adjusted R^2 = 0.3421		

* weakly significant at $p < 0.1$; ** significant at $p < 0.05$; *** significant at $p < 0.01$

The regression results shown in Table 7.2 confirm that younger adults have significantly more years of formal education ($p < 0.001$) and that adult males also have significantly more education ($p < 0.001$). Wealth is highly significant, i.e. the wealthy have significantly more education, although the size of the effect is very small. Even after allowing for differences in age, sex, and wealth, the results show that TBIRD factory workers are significantly better educated than other adults ($p < 0.001$). This result is perhaps not surprising – it could be expected that the factory firms would employ workers who are better educated than other applicants drawn from the same population. Indeed it would be in their best interest to do so.

Table 7.3: Regression model of wealth of adults, comparing factory workers with others

	Coefficient	Std. Error	t	P > |t|
TBIRD factory worker dummy variable	-17770.5	5658.42	-3.14	0.002***
Age	372.552	108.892	3.42	0.001***
Gender (1 = male)	1180.11	2746.71	0.43	0.668
Education	3254.89	497.412	6.54	< 0.001***
Constant	-1853.55	7023.41	-0.26	0.792
		Adjusted R^2 = 0.0257		

* weakly significant at $p < 0.1$; ** significant at $p < 0.05$; *** significant at $p < 0.01$

The regression results shown in Table 7.3 show that older adults belong to households with significantly more wealth than households of younger adults ($p = 0.001$), and that higher education is also significantly associated with greater wealth ($p < 0.001$). Gender has no significant effect on wealth. Even after allowing for differences in age, sex, and education, the results show that TBIRD factory workers live in households with significantly less wealth than other adults' households from the representative household survey ($p = 0.002$). This confirms the somewhat surprising results about wealth noted previously in the section.

The regression results confirm that the factory workers are significantly different from adults from the general population, in that they are younger, better educated, come from less wealthy households, and are more likely to be female.[127]

7.2.5 Other Survey Results

As noted in Section 7.2.3, the factory workers were interviewed and data was obtained about their work experience at the TBIRD factory, previous job, their hopes for the future, and migration history. Results from these questions are summarised in Table 7.4 and Table 7.5.

Table 7.4: Additional data from TBIRD factory workers I

	Mean	Median	S.D.	Min.	Max.
Months working at TBIRD	38.7	39.5	22.3	5	96
Monthly income at previous occupation (Baht)	3650	4000	2278	0	9250
Previous two weeks income from TBIRD (Baht)	2489.5	2350	576.1	1600	3800

On average the TBIRD factory workers had spent over 38 months working at the TBIRD factories, with the longest current period of employment being eight years. Surprisingly, despite the young average age of the workers, only four of the 48 factory workers surveyed had been hired immediately out of secondary school. There were a significant number of workers who had previously been employed in agriculture, however most of the workers (33.3 percent) had previously been employed in some other factory or in the trade industry (22.9 percent). Many of those with industry or trade experience had been employed in Bangkok. Just over half of the factory workers surveyed had recent migration experience (within five years before beginning their job at CBIRD). Nearly all of those had migrated to Bangkok, with three having migrated to Khon Kaen, and one to Surin Province (also in the Northeast region). Apart from one migrant who was returning home,

[127] These results are also confirmed by a probit model of factory work, using data pooled between the factory worker survey and the representative household survey (data not shown).

and one who migrated for study, the remainder migrated for work, where jobs were relatively evenly split between trade and industrial jobs.

Table 7.5: Additional data from TBIRD factory workers II

	Number	Proportion
Respondents		
Sample Size	48	100.0%
Previous occupation		
Student	4	8.3%
Agriculture or fishing	14	29.2%
Trade	11	22.9%
Transport	1	2.1%
Industry	16	33.3%
Unemployed	2	4.2%
Previously a migrant		
Yes	25	52.1%
No	23	47.9%
Migrated to:		
Bangkok	21	84.0%
Khon Kaen	3	12.0%
Elsewhere in Northeast region	1	4.0%
Reason for migration		
Work	23	92.0%
Study or school	1	4.0%
Returning home	1	4.0%
Migrant work		
Trade	11	47.8%
Industry	12	52.2%
Reason for getting a job at CBIRD		
Location / Proximity to home	28	58.3%
Income	15	31.3%
Other reasons	6	12.5%
Considered another job		
Yes	21	43.8%
No	27	56.3%
Other type of job considered		
Agriculture	1	4.8%
Trade	2	9.5%
Technical or professional	2	9.5%
Industry	10	47.6%
Other	1	4.8%
Not specified	5	23.8%
Other job involves migration		
Yes	19	90.5%
No	2	9.5%
Reason for considering that other job		
Income	17	81.0%
Recommended by friend	1	4.8%
Work for themselves	2	9.5%
Not specified	1	4.8%

The two main reasons given for working at CBIRD were proximity to the worker's village (58.3 percent) and higher income (31.3 percent). Other reasons included to gain work experience or because the worker simply wanted to change job. The wages earned by the TBIRD factory workers are significantly higher than for their previous job. In the two weeks prior to interview, the workers had earned on average 2489.5 Baht (which equates to a monthly wage of approximately B5390), compared with an average earning of 3650 Baht per month at their previous job. If the four students (with zero earnings) are excluded, the average earnings from the previous job were 3981.8 Baht per month. A paired *t*-test confirms that the earnings from the TBIRD factory job were significantly higher than that earned in the workers' previous job (p = 0.0103).[128]

Previous earnings and current earnings might not be directly comparable due to the effects of inflation. To investigate whether this is likely to have had an effect, current earnings were discounted and the effect on the significance of the paired *t*-test was examined. The results, which are included in Appendix XIII, showed that current earnings at CBIRD would need to be discounted by 24 percent before the *t*-test became insignificant. Given that the estimated average time that CBIRD workers had worked at CBIRD was 38.7 months, the average annual increase in earnings would have to have been approximately 7.2 percent to make the *t*-test insignificant.[129] Richter (2006) notes that, although the growth rate of hourly real wages averaged seven percent over the period 1991 to 1997, it fell by three percent from 1997 to 2004, and monthly wages remained fairly constant over that period. It is therefore unlikely that the observed significant difference between current wages of TBIRD factory workers and their earnings from their previous job can be attributed to wage growth. The *t*-test results would therefore appear to be robust.

Despite the significantly higher earnings, nearly half (43.8 percent) of the factory workers surveyed were considering some other job at the time they were interviewed. Of these, most (47.6 percent) were considering getting another factory job. Nearly all were considering jobs which would require them to migrate away from their rural village – the two who did not were considering setting up their own village store. The reason given for considering another job was almost

[128] Excluding the four former students with no previous income.
[129] Assuming growth compounding at the end of each year.

always higher perceived income in the other job. This is interesting considering the significantly higher earnings of the TBIRD factory workers when compared to their previous job (see Table 7.4).

To determine whether there was any association between workers' characteristics and whether they had considered another job during their time working at TBIRD, a probit model was used. The explanatory variables included age, gender, education, wealth (using log of total household assets per capita as the measure), whether the worker had been a migrant, their previous two weeks earnings at CBIRD, and the number of months they had worked at the TBIRD factories for. The resulting probit model is presented in Table 7.6.

Table 7.6: Probit model of considering other jobs

	Coefficient	Std. Error	z	P > |z|
Age	0.0005	0.0454	0.01	0.991
Sex (male = 1)	0.8867	0.7104	1.25	0.212
Education	0.2457	0.0910	2.70	0.007***
Log of total household assets	< 0.0001	< 0.0001	-1.02	0.307
Migrant	0.4471	0.5009	0.89	0.372
Previous two weeks' TBIRD income	< 0.0001	0.0004	0.06	0.954
Number of months working at TBIRD	-0.0304	0.0147	-2.07	0.039**
Constant	-1.2311	2.0987	-0.59	0.557

n = 48; Pseudo R^2 = 0.3816; LR $X^2(6)$ = 25.10 (p = 0.0003)

* weakly significant at p < 0.1; ** significant at p < 0.05; *** significant at p < 0.01

The probit model shows that there is little association between whether a factory worker was considering another job and their age, sex, or current wealth. Previous migration experience and the factory workers' prior two weeks income were also not significant. However, education was positive and highly significant indicating that higher educated factory workers were significantly more likely to be considering a change in job. The number of months spent working at TBIRD had a negative and significant effect on whether the workers had considered a change in job. These results have important implications provided that thinking about a change in job is indicative of the workers' future actions. The results suggest that the TBIRD factories are more likely to lose their most educated (and likely most productive) workers to other jobs, but that this effect lessens as the worker spends more time in their TBIRD factory job.

Finally, to determine whether the factory workers themselves perceived changes in their lifestyle as a result of their TBIRD factory job, workers were asked an open-ended qualitative question – "what have been the most important changes in your household since you began working at TBIRD?". Responses to this question are summarised in Table 7.7.

Table 7.7: Important changes in the TBIRD factory workers' households since they began working at TBIRD[130]

Perceived change	**Number of respondents (proportion)**
More income, more purchasing power	29 (60.4%)
Have purchased household assets (e.g. motorcycle)	1 (2.1%)
Increased savings	11 (22.9%)
Reduced debts	4 (8.3%)
Better living standards	2 (4.2%)
Happier, more satisfied	10 (20.1%)

Financial changes appeared to be the main changes in their household considered important by the TBIRD factory workers. A majority (60.4 percent) mentioned increased income, while 22.9 percent mentioned increased savings and 8.3 percent mentioned reduced debts. Better living standards (4.2 percent) and a happier or more satisfied family (20.1 percent) were also important changes. These results confirm the earlier quantitative findings that incomes are much higher for the TBIRD factory workers. Most workers perceived this as positive, and there were no negative responses.[131]

7.2.6 Comparison between Factory Workers and HIV/AIDS Patients

At the beginning of this chapter, it was suggested that the TBIRD program has the potential to provide a lasting and effective behavioural intervention to break the poverty-HIV/AIDS cycle. In fact, to the extent that its current employees are similar to the profile of those at highest risk of HIV/AIDS, it is already providing this intervention. To investigate this, a statistical comparison between the

[130] Percentages shown may not sum to 100 percent since respondents could give more than one answer.

[131] Although two respondents did mention that their family was still poor, despite the higher income.

demographic and household characteristics of the TBIRD factory workers and those of the HIV/AIDS patients sample was undertaken. The results of these comparisons and *t*-tests of whether the two means are the same are presented in Table 7.8.

Table 7.8: Comparisons of TBIRD factory workers (FW) demographic and household characteristics with those of the HIV/AIDS patients sample (HAP)

	FW Mean	HAP Mean	t	P > |t|
Age	28.0	33.3	4.21	< 0.001***
Gender (% male)	16.7%	35.2%	2.24	0.027**
Education (years)	8.5	6.1	4.35	< 0.001***
Can read (%)	100.0%	94.4%	1.68	0.096*
Can write (%)	100.0%	94.4%	1.68	0.096*
Can do mathematics (%)	100.0%	90.1%	2.27	0.025**
Can use a computer (%)	14.6%	5.6%	1.66	0.100
Father's Education (years)	4.0	3.5	2.25	0.026**
Mother's Education (years)	4.0	3.5	1.65	0.103
Household size	4.08	4.17	0.28	0.781
Number of productive adults	3.13	2.87	1.05	0.296
Proportion of non-productive household members	0.2299	0.2728	1.19	0.236
Migrant household	49.8%	67.6%	2.88	0.005***
Wealth index	1.3860	0.2403	3.12	0.002***
Total household assets (Baht)	82 839	43 352	2.98	0.004***
Total assets (Baht)	484 181	335 343	2.59	0.011**
Total household assets per capita (Baht)	18 754	11 026	2.52	0.013**
Total household assets per adult equivalent (Baht)	19 643	11 771	2.45	0.016**
Total assets per capita (Baht)	115 151	89 121	1.92	0.058*
Total assets per adult equivalent (Baht)	120 729	95 078	1.82	0.071*

* weakly significant at $p < 0.1$; ** significant at $p < 0.05$; *** significant at $p < 0.01$

As can be seen from Table 7.8 there are many significant differences between the TBIRD factory workers and the HIV/AIDS patient sample, and their households. The factory workers are significantly younger and within the factory worker sample there was a significantly higher proportion of women. The factory workers were significantly better educated, and both more literate and more numerate than the HIV/AIDS patients. The HIV/AIDS patients were significantly more likely to come from a migrant household. Finally, measures of wealth show that the households of the factory workers sample were significantly wealthier than the households of the HIV/AIDS patients' sample.

Some of these differences could simply be the result of the factory workers' employment at the TBIRD factories. For instance, one of the goals of the TBIRD program is to reduce rural-urban migration, and another is to increase rural incomes (and hence wealth creation). Therefore the results that factory workers are significantly less likely to migrate, and their households are significantly wealthier, when compared with the HIV/AIDS patients may simply show that the TBIRD program is having the desired impacts rather than any *a priori* bias in the selection of factory workers. However, factory workers are clearly significantly better educated than the HIV/AIDS patients. This difference is potentially important since TBIRD has no effect on the measured level of formal education. This result may suggest that these factory jobs may currently not be well targeted to those who are most at risk of HIV infection (particularly given the significance of education as a predictor of HIV infection, as shown in Chapter 6).

7.3 Summary and Discussion

This chapter presented an example of a rural industrialisation project, the TBIRD project, which aims to improve the living standards of the rural poor, provide income generating opportunities, and reduce rural-urban migration. Among other things, the project encourages businesses to relocate to rural areas, thereby providing industrial jobs to local villagers, most of whom are women. If successful, the project may have the potential to provide a critical intervention in the poverty-HIV/AIDS cycle. This potential success will depend on whether the project (i) employs the rural poor rather than the rural wealthy; (ii) increases the incomes of its workers relative to other jobs; and (iii) reduces rural-urban migration.

First, it is clear from the data in this chapter that the TBIRD factories do employ the rural poor rather than the rural wealthy. When compared with adults from the representative household survey, the TBIRD factory workers were significantly poorer both in terms of household assets and total assets. However, they were also significantly better educated than adults from the representative household survey. Regression results confirmed that the difference in wealth was robust after accounting for differences in gender, age, and education. This result confirms the assertions in Lim and Cameron (2003), Lim *et al.* (2004), and Lim *et al.* (2006), that rural employment at the TBIRD factories is targeted at the poorest households and is therefore of direct benefit to the rural poor. Regression results also confirmed that the factory workers were significantly higher educated than adults from the representative household survey, even after accounting for age, gender, and household wealth. This may represent the factories targeting the employment of better educated women, possibly return migrants already with factory experience (see below), for jobs in the TBIRD factories.

Second, by targeting the rural poor this intervention increases rural incomes for the segment of the population most vulnerable to external shocks, and at higher risk of HIV infection (see Chapter 6). This is confirmed by the higher wages earned by TBIRD factory workers when compared with their previous job. The difference in income was highly significant, and sensitivity analysis revealed that it was unlikely to have arisen purely due to growth in average wages throughout Thailand. Further, in qualitative results many factory workers emphasised the importance of financial changes in the household since they took their job at the TBIRD factories.

The observed higher incomes of TBIRD factory workers are likely to continue even after they cease their employment at the factory. They are likely to have developed new important skills in factory work, skills that are non-specific, i.e. they are transferable to other factories or even to other jobs. The skills learned on-the-job are further supplemented by the additional workshops facilitated by the PDA which the worker attends. The skills, workshops, and experience translate to an increase in human capital endowment for the worker. This greater human capital endowment and its non-specific nature are likely to generate significant additional income for the worker in the future. For instance, they may be able to leverage this to negotiate for higher pay at the TBIRD factories or to apply successfully for higher paying jobs elsewhere – the skills and experience developed at CBIRD are desired both in the local factory labour market and the labour market in Bangkok and elsewhere.

Third, the data suggest that the TBIRD factory jobs may reduce or reverse rural-urban migration. Nearly all the factory workers surveyed came from a migrant household, i.e. a household where at least one adult was a recent migrant. A high proportion of the factory workers were themselves former migrants, and many had factory work experience, suggesting that the availability of factory jobs in rural areas may attract return migration, i.e. encouraging migrants to return to their home village. Alternatively, given that the factory workers were predominantly women, they may return home for other reasons such as marriage or pregnancy and obtaining a factory job near their home village allows them to remain in the village rather than returning to the city for work. Either way, this data suggests that the TBIRD project reduces the push factors for rural-urban migration (see Section 2.4.1). Further, since TBIRD appears to be employing the rural poor rather than the rural wealthy, this should reduce inequality in the village. Reductions in perceived income inequality should lead to a reduction in migration by those who previously were 'relatively deprived', i.e. poorer (Stark, 2006).

There is one key caveat to the improvements in income and reduction in rural-urban migration described earlier. It is also possible that, in addition to reducing the push factor associated with rural-urban migration by increasing rural incomes, TBIRD factory jobs also increase the pull factor by increasing the employability of the workers in factory jobs in Bangkok. In effect, if the increase in skills and experience increases the prospects of a successful job application in Bangkok or results in a higher paying job, it increases the expected wage of potential migrants and thereby increases the pull factor for rural-urban migration. TBIRD factory jobs appear not to be considered a long-term employment option for many of the women. Nearly half of the surveyed factory workers were considering another job. While this might not indicate that the women will definitely change job in the future, it does indicate a desire to change. The lack of a long-term option is confirmed by the relatively short tenure of the women surveyed – on average they had worked at the TBIRD factories for just over three years. Further, only one of the workers surveyed had been working at the factories since they began operating at the CBIRD centre seven years prior to the survey (in fact, this employee began work before the TBIRD factories opened). Of concern may be that the workers who appeared to be considering a move to another job were significantly better educated than those who were not, suggesting that higher human capital is indeed associated with a desire to change job. The workers who were considering moving job were mostly considering a new job that would involve migration – the only exceptions being two women who were intending to go into self-employment. This poses a key challenge for improving the TBIRD program – loss of these women represents a significant loss in human capital for the TBIRD factories and results in hiring and re-training costs and well as lower productivity from newly-hired workers likely with lower human capital endowments. Further, it may reduce the positive income and migration impacts of the project.

In addition to possibly encouraging the future migration of the factory workers, the availability of employment at TBIRD factories encourages former migrants to return to their home village when they otherwise may not. If migrants are at a significantly higher risk of HIV infection, and the analysis in Chapter 6 strongly suggests that they are, then encouraging return migration may in fact increase the spread of HIV from Bangkok to rural areas.[132] This problem may be most important during the early stages of the epidemic, when communities in rural areas have not been extensively exposed and are under-prepared for the health crisis to follow. In Thailand, where HIV/AIDS is already a generalised epidemic, this pattern of migrants spreading HIV to new areas is unlikely to cause major concern. Further, rural areas in Thailand have good access to medical facilities which are well organised at the village, sub-district, and district levels.

There may be other negative effects associated with the project. For instance, it is important to consider how the additional income which the CIBRD centre factory workers receive is distributed within their household. While we have no data on this, some alternative scenarios can be considered. If the additional income is retained by women (or given to women in the case of male factory workers) then this is likely to be generally good for the household. Women have been shown to

[132] In fact, this is the most likely cause of the original spread of HIV from urban to rural areas in Thailand and elsewhere.

be more likely to spend additional income on improvements in nutrition, education, and so forth (Aromolaran, 2004; Haddad and Hoddinott, 1994). However, if the additional income is claimed by men, then it is less likely to be beneficial to the household as it is more likely to be spent on adult goods such as tobacco or alcohol. Further, additional income in the hands of men could increase the demand for commercial sex (a 'normal good') in these rural villages, potentially further exacerbating the spread of HIV. The higher demand for commercial sex also raises the price and hence the returns to commercial sex, potentially encouraging more women to engage in this occupation and placing themselves and others at risk of HIV infection (Lim, 2001).

Finally, the current job creation at the TBIRD factories appears to be currently imperfectly targeted with respect to those at high risk of HIV infection. A comparison between HIV/AIDS patients and factory workers reveals that the factory workers are significantly better educated than the HIV/AIDS patients. As shown in Chapter 6, education is significantly negatively associated with HIV infection, so that better educated people (such as those currently employed at the TBIRD factories) are at lower risk of HIV infection.

7.4 Conclusions

The Thai Business Initiative in Rural Development (TBIRD) program is one example of a project that has the potential to provide a lasting and effective intervention to break the poverty-HIV/AIDS cycle. This chapter described the program and evaluated its' potential for success on three dimensions: whether it (i) employs the rural poor rather than the rural wealthy; (ii) increases the incomes of its workers relative to other jobs; and (iii) reduces rural-urban migration.

It was found that the data seem to clearly indicate that the TBIRD factories involved in the TBIRD program do employ the rural poor rather than the rural wealthy. Regression results confirmed this even after accounting for other variables, and this result is consistent with earlier assertions by Lim and Cameron (2003), Lim *et al.* (2004), and Lim *et al.* (2006). The factory workers' incomes were also shown to be significantly higher at their CBIRD job than at their previous job, and this result was further confirmed by qualitative results. Since many of the workers were former migrants, it appears that the TBIRD program may reduce the push factors for migration, either reducing rural-urban migration or encouraging return migration from urban areas such as Bangkok. The combination of these results suggests that the TBIRD program would indeed be an effective tool in the fight against HIV/AIDS and poverty, by breaking the poverty-HIV/AIDS cycle.

However, there must remain concerns with the program. Despite reducing the push factors for rural-urban migration, rural employment might actually increase the pull factors as well. By improving the human capital of rural factory workers their job prospects in Bangkok increase, thereby increasing the expected wage and hence the expected returns from migration. Also, by providing higher paying jobs in rural areas, TBIRD might increase the flow of people from urban to rural areas, increasing the spread of HIV and other diseases in the early stages of the epidemic (note that this may be less of a problem for HIV now). Further, if the higher rural incomes are claimed by men, this may increase the demand for commercial sex, further fuelling the spread of HIV. Finally, the current employment opportunities created by TBIRD appear to be imperfectly targeted with respect to those at highest risk of HIV infection, i.e. the jobs are currently being taken by higher educated employees who are already at lower risk of HIV infection than their less-educated peers. These reasons mitigate the potential positive impacts of the TBIRD program on migration, poverty, and HIV/AIDS.

A key challenge for the TBIRD program must be retaining their highest quality workers. The results suggest that those workers who are highest educated are more likely to be considering alternative employment opportunities. Ironically it is likely that experience working at TBIRD provides these workers with a greater opportunity for work elsewhere. The loss of these workers may represent a significant loss in human capital for the TBIRD factories, as well as increasing hiring and training costs and reducing average productivity.

Chapter 8

Conclusions and Suggested Policy Implications

8.1 Conclusions

The overall hypothesis that was considered in the thesis was:

> *Rural Northeast Thailand exhibits characteristics that support the existence of a poverty-HIV/AIDS cycle*.

Recall that in the poverty-HIV/AIDS cycle, HIV-infected individuals are especially vulnerable to poverty, the poor are more likely to engage in high-risk behaviour such as commercial sex work, and high-risk behaviour in turn makes people susceptible to HIV infection. This hypothesis was tested by considering four specific relationships: (i) the relationship between previous HIV infection and current wealth or poverty; (ii) the relationship between wealth or poverty and HIV/AIDS knowledge; (iii) the relationship between previous wealth or poverty and current HIV infection; and (iv) the relationship between previous migration and current HIV infection.

The relationship between previous HIV infection and current wealth or poverty was clearly demonstrated, with a range of impacts on individuals and households being observed (see Chapter 5). The relationship between wealth or poverty and HIV/AIDS knowledge was also clearly demonstrated, with wealth shown to have a positive effect on the accuracy of HIV/AIDS knowledge (see Chapter 6). The relationship between previous wealth or poverty and current HIV infection was clearly demonstrated. Wealth was shown to have a robust and highly significant and negative effect on the probability of a given individual being infected with HIV (see Chapter 6). Finally, the relationship between previous migration and current HIV infection was also clearly demonstrated. Previous migration was shown to have a robust and highly significant and positive effect on the probability of a given individual being infection with HIV (see Chapter 6).

Given that all of these relationships appear to hold, then it appears likely that rural Northeast Thailand does exhibit characteristics that support the existence of a poverty-HIV/AIDS cycle. Poverty (or low wealth) has been shown to increase susceptibility to HIV infection, and HIV/AIDS has been shown to reduce wealth and hence increase poverty. Under the circumstances, the hypothesis cannot be rejected.

Further, this thesis has contributed to an expanding literature on HIV/AIDS and poverty. The extensive literature review presented in Sections 2.5 and 2.6 highlighted a number of areas within the literature which are inadequately covered, including the limited empirical analysis on the HIV/AIDS epidemic in Asia. Investigating the HIV/AIDS epidemic outside Africa has become an issue of critical importance (Barnett, 2002; Barnett and Clement, 2005). This thesis has therefore made several important contributions to the literature on HIV/AIDS and poverty.

First, the thesis provides a quantitative and qualitative empirical analysis of the impacts of HIV/AIDS on households in a moderately affected region of Thailand. This partially addresses the significant bias towards heavily affected areas that exists in the current literature (see Chapter 2). A taxonomy of five types of impacts was employed. Overall, the impacts of HIV/AIDS were demonstrated for four of the types described, including (i) impacts on the HIV infected individuals themselves; (ii) impacts on other members of the HIV-infected individual's household; (iii) impacts on members of households that care for former dependents of HIV-infected individuals' households; and (iv) individuals whose preferences change as a result of HIV/AIDS. With available data, results impacts on individuals affected by macroeconomic changes brought about by HIV/AIDS could not be demonstrated.

The quantitative results showed that symptomatic HIV/AIDS patients had significantly higher medical expenditures and sick days than the general population. This result was similar to that already found in the literature on many countries (e.g. see Bechu, 1998), but not the early literature on Thailand (e.g. see Pitayanon *et al.*, 1997). It is likely that expensive antiretroviral therapy has caused a significant increase in the medical expenses of HIV/AIDS patients in Thailand. Other quantitative impacts depended on the mobility status of the HIV/AIDS patient, with movers and non-movers experiencing different impacts. Compared with impact time the household of non-movers was significantly smaller, had fewer productive adults, and had a significantly higher proportion of non-productive household members, results that are similar to those reported in the previous literature (see Section 2.5.4). For movers, the destination household was significantly larger, had significantly more productive adults and a significantly higher proportion of non-productive household members, than the household they lived in at impact time (the destination household). The destination household also had more land, was significantly more likely to grow rice or vegetables for income, and was significantly less likely to possess a car or truck. These changes are consistent with a movement to the rural familial home, and the previous literature from Thailand which found that households are likely to dispose of durable goods in response to having an HIV-infected individual (e.g. see Pitayanon *et al.*, 1997).

Qualitative results revealed that HIV/AIDS patients relied on a variety of sources for mental support, advice, treatment and care. Households employed a wide range of coping strategies, including using savings to pay for medical expenses, receiving money from relatives, friends, moneylenders or the village fund, selling household or farm assets and land, and changing labour or schooling arrangements. Stigma and discrimination are important negative social effects. Widespread stigma was suggested by the results from the representative household survey and was probably underreported by the HIV/AIDS patients themselves. These social impacts demonstrate the difficulties that AIDS-infected individuals and their households experience in developing and maintaining the social capital that is necessary for protection against negative shocks.

Second, the thesis provides empirical analysis on the key issue of whether wealth and poverty affect the risk of HIV infection, and whether HIV infection affects wealth and poverty. Both analyses were conducted using the same data set making this one of the first studies to attempt to link both of these analyses together within the same conceptual framework. The effects of HIV infection on wealth and poverty depend on the mobility status of the HIV/AIDS patient, as do other impacts. Among non-movers, some measures of wealth were not significantly different at the time of interview from impact time, while others were significantly larger. These households were also less likely to be in poverty. For movers, measures of wealth were typically significantly lower in the destination household, and the probability that the household was in poverty was significantly higher. This might suggest that the impacts of HIV/AIDS on wealth and poverty are only negative for non-movers. However, non-mover patients had experienced a significantly shorter time since impact time and a significantly shorter period of symptoms at the time of interview. Also, the measures of wealth and poverty take into account only asset ownership and ignore financial assets such as savings which are more likely to be used first in coping with the impacts of HIV/AIDS. Either of these might account for the effects for non-movers being the opposite of what was expected.

There was weak support showing that wealth had an indirect impact on HIV infection. HIV/AIDS knowledge was found to be significantly positively associated with wealth for some measures of wealth, but not others. Results were more consistent for the probably of an individual not knowing the transmission methods of HIV, with wealth having a significant negative effect. The evidence for a direct impact of wealth on HIV infection (after accounting for other variables including education and migration) was stronger. Six of the seven measures of wealth were found to have a highly significant and negative relationship with HIV infection.

The combination of these two results was important in demonstrating the existence of the poverty-HIV/AIDS cycle described in Chapter 3. HIV/AIDS does appear to have a significant impact on wealth for at least some individuals, leading to higher incidence of poverty. Low wealth, and hence poverty, does appear to have a significant impact on the probability of HIV infection.

The results from the thesis also provide significant empirical evidence of the importance of rural-urban migration in the spread of HIV. Migration was highly significant and positively associated with HIV infection. This provides very robust support for the contention that migration is a significant risk factor for HIV, or at least that it is a lifestyle marker for other risk factors such as unprotected or commercial sex, or injection drug use. It also confirms the previous literature which suggests that migration is significantly associated with HIV infection (see Section 2.4.1). However, the possibility of bias in these results was noted and they should therefore be treated with due caution.

Despite the caveat, this empirical result is important in that it supports the existing policy initiatives of international organisations such as the Joint United Nations Programme on HIV/AIDS and the United Nations Development Programme, which have increasingly turned their attention to the susceptibility of migrants to HIV infection, and their vulnerability to its impacts (e.g. see CARE International, 2004; UNAIDS, 2001a; UNDP South East Asia HIV and Development Programme, 2002).

Finally, the thesis investigated the potential effects on the poverty-HIV/AIDS cycle of an ongoing socio-economic intervention. This investigation provides important insights into how the poverty-HIV/AIDS cycle might be broken using an intensive rural development project. The Thai Business Initiative in Rural Development (TBIRD) program was used as a case study. The data seem to indicate that the TBIRD factories involved in the TBIRD program do employ the rural poor rather than the rural wealthy, consistent with earlier assertions by Lim and Cameron (2003), Lim *et al.* (2004), and Lim *et al.* (2006). The factory workers' incomes were also shown to be significantly higher at their CBIRD job than at their previous job, and this result was further confirmed by qualitative results. Since many of the workers were former migrants, it appears that the TBIRD program may reduce the push factors for migration, either reducing rural-urban migration or encouraging return migration from urban areas such as Bangkok. The combination of these results suggests that the TBIRD program would indeed be an effective tool in the fight against HIV/AIDS and poverty, by breaking the poverty-HIV/AIDS cycle.

8.2 Suggested Policy Implications

The conclusions to the thesis suggest many policy implications that should be further explored. These implications occur in three main areas: (i) the extent of the impacts of HIV/AIDS may well be larger than previously thought; (ii) the links between poverty and HIV/AIDS are important; and (iii) targeted interventions may be successful in combating the HIV/AIDS-poverty cycle. These policy implications are not fully developed here. They are suggestive only and their impacts have not been and could not be tested with available data. Any policy derived from the analysis and conclusions from the thesis should be subjected to thorough piloting and empirical testing to verify its effectiveness.

8.2.1 The Extent of Impacts of HIV/AIDS

The thesis has demonstrated that the financial impacts of HIV/AIDS are significantly higher than previously estimated in Thailand. These larger financial impacts may have resulted from the introduction of expensive antiretroviral treatments to the package of care available for HIV/AIDS patients. One policy option may be to consider programs to reduce these costs. This type of policy had already been implemented – in fact the patients surveyed as part of this research were involved in a pilot program increasing the coverage of antiretroviral treatment in rural areas and many of the patients were also eligible for the Free Medical for the Poor or the 30 Baht Healthcare programmes. Despite this, the patients faced significantly higher medical expenses, which may suggest that the government should provide more targeted assistance for HIV/AIDS patients.

However, care should be taken in implementing additional support programs for HIV-infected individuals or their households. Patients received care and support from a variety of sources and it is possible that any additional government support would simply crowd out the private provision of assistance, resulting in no net welfare gain for the HIV-infected individual or their household. To minimise the likelihood of crowding out, assistance could be targeted on the basis of living arrangements or household wealth or some other metric, although such targeting may create perverse incentives for the HIV-infected individual or others.

The thesis has also demonstrated the extent of the impacts of HIV/AIDS beyond just the HIV/AIDS patients themselves (Type I impacts) and their immediate households (Type II impacts) to include the impacts on other households who care for the former dependents of directly-affected households (Type III impacts) and individuals who change their preferences as a result of HIV/AIDS in the environment (Type IV impacts). The extent of Type II and Type III impacts suggest some immediate policy solutions, which are to provide some form of subsidy to families who (i) give up their jobs to care for HIV-infected family members; or (ii) care for additional dependents that were formerly part of an HIV-infected person's household. This type of subsidy would at least reduce the financial impacts of these household changes.

Further, because few studies have previously considered Type III impacts, and to date no studies have directly considered Type IV impacts, this suggests that previous estimates of the welfare impacts have systematically underestimated the impacts of HIV/AIDS. This systematic underestimation has a significant policy implication. If limited development or public health resources are being distributed on the basis of the ratio of benefits to costs, then HIV/AIDS programs that indirectly or directly address Type IV impacts are likely being systematically under-funded due to a systematic underestimation of their benefits. For instance, community-based programs that reduce stigma and discrimination, such as a recent pilot program in Nakhon Ratchasima Province in Northeast Thailand (Apinundecha *et al.*, 2007 forthcoming), will provide significant decreases in Type IV impacts due to increasing the understanding of the general population towards HIV-infected individuals. To date, in evaluating these programs no regard has been made of the positive welfare impacts associated with reducing the Type IV impacts on community members.

Quantitative estimates of the welfare effects of Type IV impacts were not able to be evaluated in this thesis, but were demonstrated strongly by qualitative results from the representative household survey. Further work should be conducted in order to estimate the size of the welfare impacts of Type IV impacts, so that these may be included in the benefits estimates for some programs and interventions.

8.2.2 The Links Between Poverty and HIV/AIDS

The thesis has demonstrated that poverty and HIV/AIDS are related through the poverty-HIV/AIDS cycle. This suggests another important policy implication – that efforts to combat either poverty or HIV/AIDS should consider both together. The failure to include poverty alleviation into HIV/AIDS programs or to include HIV/AIDS mitigation or prevention into poverty programs has a number of consequences.

First, given the close relationship between poverty and HIV/AIDS, synergies may exist between HIV/AIDS programs and poverty alleviation programs. Programs that fail to take advantage of these synergies are therefore making an inefficient use of allocated development or public health funding. This also suggests the poverty and HIV/AIDS programs could be integrated in order to take advantage of the complementary nature of their activities. However, this type of integration would likely require high-level political backing – government ministries charged with development and public health goals may be unwilling to give up part of their responsibilities and the associated funding. Committed non-government organisations and new government agencies charged with integrated poverty-HIV/AIDS programs may well be in a better position to deal with interventions that combine poverty alleviation, HIV/AIDS mitigation and prevention.

It is important to note that many major donor organisations have already noted these relationships, although with limited empirical support. For instance, the International Monetary Fund and the World Bank have begun to include

HIV/AIDS in their poverty alleviation and development work, and the World Health Organisation now include poverty in their HIV/AIDS programs (United Nations, 2005; World Bank, 2000b; World Health Organisation, 2002). However, Cohen (2000) cautions that the process may become a token gesture, with HIV/AIDS formally included in programs but otherwise effectively ignored. Further, as Ainsworth and Teokul (2002) note, little is known about appropriate strategies for mitigating the impact of AIDS on poverty, or who should be targeted by a poverty alleviation program. However the thesis does not contribute to solving this problem. Finally, due caution should be exercised in incorporating poverty alleviation into HIV/AIDS programs, and HIV/AIDS into poverty programs. Baylies (2002) notes that there is a danger in assuming that HIV/AIDS is similar to other shocks on households and treating it the same as, for example, droughts. She argues that 'mainstreaming' of HIV/AIDS should go beyond simply adding an HIV/AIDS component to existing programs and that "programmes of poverty alleviation and food security should be built around and address the factors which drive the epidemic and determine its impact at the household level" (Baylies, 2002, p. 627).

Finally, the relationship between poverty and HIV/AIDS and the synergies between interventions that affect both suggest that existing programs systematically underestimate the benefits of these programs and result in misallocations of resources similar to those described in Section 8.2.1. However the misallocations here are potentially larger since the welfare impacts of poverty alleviation programs that include their impacts on reductions in HIV/AIDS incidence are likely to be substantial. Again, the thesis provides no quantitative estimates of the size of these welfare impacts. This would be a fruitful area for future research.

8.2.3 Targeted Interventions

Finally, the results of the thesis provide evidence that interventions that target the poor or the less educated may be effective in reducing the incidence of HIV. In particular, migrants and their families left behind are at significantly elevated risk of HIV infection and programs should be introduced in order to reduce that risk.

Effective programs might include providing HIV/AIDS information targeted at migrants, to improve their access to accurate information and hopefully reduce their likelihood of engaging in high risk behaviour. Alternatively, programs could improve social networks for migrants at their destination or even facilitate the movement of whole families to Bangkok (rather than just the migrants themselves). These programs would reduce the social disconnection between the destination and origin communities, reducing feelings of loneliness for the migrants that might result in their engaging in high risk behaviour.

Programs could also be targeted at the households left behind by migrants, such as improving their access to accurate HIV/AIDS information or providing female non-migrants with better negotiation skills and empowerment to improve the likelihood that they are able to negotiate condom use with their returned migrant husband. However, in developing such targeted interventions, care should be taken in case perverse incentives are created. For instance, if aid is targeted at female-headed households, it creates an additional incentive for husbands to migrate in search of work, while their spouse claims the benefits of the aid package.

Finally, the thesis described an integrated intervention that uses rural development and the provision of jobs in rural areas to improve income generation for the poor and reduce rural-urban migration. This type of intervention was shown to provide jobs targeted at the poor but possibly not at those at the highest risk. Despite this it has potential for breaking the poverty-HIV/AIDS cycle.

The Thai Business Initiative in Rural Development project could easily be extended to further rural areas. However, there is a key constraint which may need to be addressed – it is constrained by the number of available sponsoring organisations. The project requires a relatively large investment to be made by the sponsor and few organisations are willing and able to make that investment. To increase the number of organisations willing to make the investment, central government may need to offer further support, especially for those firms that will operate far from the main arterial road and rail networks in Thailand.

8.3 Looking Forward

HIV/AIDS is one of the greatest development challenges that the global community is facing. This thesis has provided empirical evidence of the existence of the relationship between HIV/AIDS and poverty. To successfully address HIV/AIDS, the global community must also address the problems of poverty. This thesis has also raised many questions that must be addressed in combating both poverty and HIV/AIDS, including to what extent development and public health interventions complement each other, i.e. what are the potential welfare gains of combining poverty and HIV/AIDS programs. It is only by recognising that poverty and HIV/AIDS are closely related problems that we can find effective solutions in the future.

Bibliography

Abebe, Y., Schaap, A., Mamo, G., Negussie, A., Darimo, B., Wolday, D., and Sanders, E.J. (2003). HIV prevalence in 72 000 urban and rural male army recruits, Ethiopia. *AIDS, 17*(12), 1835-1840.

Agha, S. (2003). The impact of a mass media campaign on personal risk perception, perceived self-efficacy and on other behavioural predictors. *AIDS Care, 15*(6), 749-762.

Aheto, D. W., and Gbesemete, K. P. (2005). Rural perspectives on HIV/AIDS prevention: a comparative study of Thailand and Ghana. *Health Policy, 72*(1), 25-40.

Ahlburg, D. A., and Jensen, E. R. (1998). The economics of the commercial sex industry. In M. Ainsworth, L. Fransen and M. Over (Eds.), *Confronting AIDS: evidence from the developing world* (pp. 147-170). Luxembourg: European Commission.

AIDS conference: medicine vowed for all in need. (2003, 8 July). *The Nation*.

Ainsworth, M., Beegle, K., and Koda, G. (2005). The impact of adult mortality and parental deaths on primary schooling in north-western Tanzania. *Journal of Development Studies, 41*(3), 412-439.

Ainsworth, M., Beyrer, C., and Soucat, A. (2001). Success and new challenges for AIDS control in Thailand. *AIDScience, 1*(5).

Ainsworth, M., Beyrer, C., and Soucat, A. (2003). AIDS and public policy: the lessons and challenges of 'success' in Thailand. *Health Policy, 64*(1), 13-37.

Ainsworth, M., and Dayton, J. M. (2003). The impact of the AIDS epidemic on the health of older persons in northwestern Tanzania. *World Development, 31*(1), 131-148.

Ainsworth, M., Koda, G., Lwihula, G. K., Mujinja, P., Over, M., and Semali, I. (1992). *Measuring the impact of fatal adult illness in sub-Saharan Africa : an annotated household questionnaire*. Washington, D.C.: World Bank.

Ainsworth, M., and Over, M. (1994). AIDS and African development. *World Bank Research Observer, 9*(2), 203-240.

Ainsworth, M., and Semali, I. (2000). The impact of adult deaths on children's health in Northwestern Tanzania, *Policy Research Working Paper 2266*. New York: World Bank.

Ainsworth, M., and Teokul, W. (2000). Breaking the silence: setting realistic priorities for AIDS control in less-developed countries. *Lancet, 356*(9223), 55-60.

Ainsworth, M., and van der Gaag, J. (1988). Guidelines for adapting the LSMS living standards questionnaires to local conditions, *Living Standards Measurement Survey Working Paper No. 34*. Washington, D.C.: World Bank.

Akerlof, G. A., and Dickens, W. T. (1982). The economic consequences of cognitive dissonance. *American Economic Review, 72*(3), 307-319.

Allen, S., Lindan, C. P., Serufilira, A., Van de Perre, P., Rundle, A. C., Nsengumuremyi, F., Carael, M., Schwalbe, J., and Hulley, S. (1991).

Human immunodeficiency virus infection in urban Rwanda - demographic and behavioral correlates in a representative sample of childbearing women. *Journal of the American Medical Association, 266*(12), 1657-1663.

Anand, K., Pandav, C. S., and Nath, L. M. (1999). Impact of HIV/AIDS on the national economy of India. *Health Policy, 47*(3), 195-205.

Anderson, J. (1990). AIDS in Thailand. *British Medical Journal, 300*(6722), 415-416.

Anderson, R. M., May, R. M., Boily, M. C., Garnett, G. P., and Rowley, J. T. (1991). The spread of HIV-1 in Africa: sexual contact patterns and the predicted demographic impact of AIDS. *Nature, 352*(6336), 581-589.

Anderson, R. M., May, R. M., and McLean, A. R. (1988). Possible demographic consequences of AIDS in developing countries. *Nature, 332*(6161), 228-234.

Apinundecha, C., Laohasiriwong, W., Cameron, M. P., and Lim, S. (2007 forthcoming). A community participation intervention to reduce HIV/AIDS stigma, Nakhon Ratchasima Province, Northeast Thailand. *AIDS Care*.

Archavanitkul, K., and Guest, P. (1994). Migration and the commercial sex sector in Thailand. *Health Transition Review, 4*(Supplement), 273-295.

Arizpe, L. (1982). Relay migration and the survival of the peasant household. In H. I. Safa (Ed.), *Towards a political economy of urbanization in Third World countries* (pp. 19-46). Delhi: Oxford University Press.

Arndt, C. (2003). *HIV/AIDS, human capital, and economic growth prospects for Mozambique*. Washington, D.C.: World Bank.

Arndt, C. (2006). HIV/AIDS, human capital, and economic growth prospects for Mozambique. *Journal of Policy Modeling, 28*(5), 477-489.

Arndt, C., and Lewis, J. D. (2000). The macro implications of HIV/AIDS in South Africa: a preliminary assessment. *South African Journal of Economics, 68*(5), 856-889.

Arndt, C., and Lewis, J. D. (2001). The HIV/AIDS pandemic in South Africa: sectoral impacts and unemployment. *Journal of International Development, 13*(4), 427-449.

Aromolaran, A. B. (2004). Household income, women's income share and food calorie intake in South Western Nigeria. *Food Policy, 29*(5), 507-530.

Ashraf, S., and Godwin, P. (1998). Gender differentials and the special vulnerability of women. In P. Godwin (Ed.), *The looming epidemic - the impact of HIV and AIDS in India* (pp. 171-183). London: Hurst and Company.

Asian Development Bank. (2004). *Asian development outlook 2004*. Manila: Asian Development Bank.

Aspaas, H. R. (1997, 3-6 February). *AIDS and orphans in Uganda: a geographical and gender interpretation of household resources.* Paper presented at the Conference on the Socio-Demographic Impact of AIDS in Africa, Durban.

Auvert, B., Buve, A., Ferry, B., Carael, M., Morison, L., Lagarde, E., Robinson, N.J., Kahindo, M., Chege, J., Rutenberg, N., Musonda, R.M., Laourou, M., Akam, E., and Study Group on Heterogeneity of HIV Epidemics in African Cities. (2001). Ecological and individual level analysis of risk factors for HIV infection in four urban populations in sub-Saharan Africa with different levels of HIV infection. *AIDS, 15*(Supplement 4), S15-S30.

Aventin, L., and Huard, P. (2000). The cost of AIDS to three manufacturing firms in Cote d'Ivoire. *Journal of African Economies*, *9*(2), 161-188.

Bachmann, M. O., and Booysen, F. L. R. (2003). Health and economic impact of HIV/AIDS on South African households: A cohort study. *BMC Public Health, 3*(14), 1-8.

Bachmann, M. O., and Booysen, F. L. R. (2004). Relationships between HIV/AIDS, income and expenditure over time in deprived South African households. *AIDS Care, 16*(7), 817-826.

Baggaley, R., Godfrey-Faussett, P., Msiska, R., Chilangwa, D., Chitu, E., Porter, J., and Kelly, M. (1994). Impact of HIV infection on Zambian businesses. *British Medical Journal, 309*(6968), 1549-1550.

Bamber, S. D., Hewison, K. J., and Underwood, P. J. (1993). A history of sexually transmitted diseases in Thailand: policy and politics. *Genitourinary Medicine*, *69*(1), 148-157.

Bandura, A. (1977). Self-efficacy: towards a unifying theory of behavioral change. *Psychological Review, 84*(2), 191-215.

Barden-O'Fallon, J. L., deGraft-Johnson, J., Bisika, T., Sulzbach, S., Benson, A., and Tsui, A. O. (2004). Factors associated with HIV/AIDS knowledge and risk perception in rural Malawi. *AIDS and Behavior, 8*(2), 131-140.

Barnett, T. (2002). HIV/AIDS impact studies II: Some progress evident. *Progress in Development Studies*, *2*(3), 219-225.

Barnett, T., and Blaikie, P. (1990). *AIDS in Africa: its present and future impact*. London: John Wiley and Co.

Barnett, T., and Clement, C. (2005). HIV/AIDS impact: so where have we got to and where next? *Progress in Development Studies*, *5*(3), 237-247.

Barnett, T., Fantan, T., Mbakile, B., and Whiteside, A. (2002). *The Private Sector Responds to the Epidemic: Debswana - A Global Benchmark*. Geneva: UNAIDS.

Barnett, T., and Rugalema, G. (2001). HIV/AIDS - a critical health and development issue. In P. Pinstrup-Andersen and R. Pandya-Lorch (Eds.), *The unfinished agenda - perspectives on overcoming hunger, poverty, and environmental degradation* (pp. 43-47). Washington, D.C.: International Food Policy Research Institute.

Barnett, T., Tumushabe, J., Bantebya, G., Ssebuliba, R., Ngasongwa, J., Kapinga, D., Ndelike, M., Drinkwater, M., Mitti, G., and Haslwimmer, M. (1995). The social and economic impact of HIV/AIDS on farming systems and livelihoods in rural Africa: some experience and lessons from Uganda, Tanzania and Zambia. *Journal of International Development, 7*(1), 163-176.

Barnett, T., and Whiteside, A. (1999). HIV/AIDS and development: case studies and a conceptual framework. *European Journal of Development Research, 11*(2), 200-234.

Barnett, T., and Whiteside, A. (2000). *Guidelines for studies of the social and economic impact of HIV/AIDS*. Geneva: UNAIDS.

Barnett, T., and Whiteside, A. (2002). *AIDS in the Twenty-First Century - disease and globalisation*. Basingstoke, U.K.: Palgrave Macmillan.
Barnett, T., Whiteside, A., and Desmond, C. (2001). The social and economic impact of HIV/AIDS in poor countries: a review of studies and lessons. *Progress in Development Studies, 1*(2), 151-170.
Barnett, T., Whiteside, A., Khodakevich, L., Kruglov, Y., and Steshenko, V. (1998). *The HIV/AIDS epidemic in Ukraine: its potential social and economic impact*. Durban: Health Economics and HIV/AIDS Research Division, University of Natal.
Barongo, L. R., Borgdorff, M. W., Mosha, F. F., Nicoll, A., Grosskurth, H., Senkoro, K. P., Newell, J.N., Changalucha, J., Klokke, A.H., Killewo, J.Z., Velema, J.P., Hayes, R.J., Dunn, D.T., Muller, L.A.S, and Rugemalila, J.B. (1992). The epidemiology of HIV-1 infection in urban areas, roadside settlements and rural villages in Mwanza Region, Tanzania. *AIDS, 6*(12), 1521-1528.
Bartels, P. B. (2003, May 2-5). *HIV/AIDS, state capacity, and security in Africa.* Paper presented at the Workshop in Political Theory and Policy Analysis, Bloomington, In.
Baylies, C. (2002). The impact of AIDS on rural households in Africa: a shock like any other? *Development and Change, 33*(4), 611-632.
Bechu, N. (1998). The impact of AIDS on the economy of families in Cote d'Ivoire: changes in consumption among AIDS-affected households. In M. Ainsworth, L. Fransen and M. Over (Eds.), *Confronting AIDS: evidence from the developing world* (pp. 341-348). Luxembourg: European Commission.
Becker, G. S. (1981). *A treatise on the family*. Cambridge, Ma.: Harvard University Press.
Becker, G. S. (1991). *A Treatise on the Family*. Cambridge, Ma.: Harvard University Press.
Becker, G. S., and Kilburn, M. R. (1994). *The economics of misery*. Chicago: Department of Economics, University of Chicago.
Behrman, J. R., and Knowles, J. C. (1999). Household income and child schooling in Vietnam. *World Bank Economic Review, 13*(2), 211-256.
Bell, C., Devarajan, S., and Gersbach, H. (2003). *The long-run economic costs of AIDS: theory and an application to South Africa*.Unpublished manuscript.
Bell, C., Devarajan, S., and Gersbach, H. (2004). Thinking about the long-run cconomic costs of AIDS. In M. Haacker (Ed.), *The Macroeconomics of HIV/AIDS* (pp. 96-132). Washington, D.C.: International Monetary Fund.
Bennell, P. (2005a). The impact of the AIDS epidemic on teachers in sub-Saharan Africa. *Journal of Development Studies, 41*(3), 440-466.
Bennell, P. (2005b). The impact of the AIDS epidemic on the schooling of orphans and other directly affected children in sub-Saharan Africa. *Journal of Development Studies, 41*(3), 467-488.
Ben-Porath, Y. (1982). Economics and the family - match or mismatch? A review of Becker's a treatise on the family. *Journal of Economic Literature, 20*(1), 52-64.
Berkley, S. F., Widy-Wirski, R., Okware, S. I., Downing, R., Linnan, M. J., White, K. E., and Sempala, S. (1989). Risk factors associated with HIV infection in Uganda. *Journal of Infectious Diseases, 160*(1), 22-30.

Beyrer, C., Celentano, D. D., Suprasert, S., Sittitrai, W., Nelson, K. E., Kongsub, B., Go, V.F.L., and Phanuphak, P. (1997). Widely varying HIV prevalence and risk behaviours among the ethnic minority peoples of northern Thailand. *AIDS Care, 9*(4), 427-439.

Beyrer, C., Eiumtrakul, S., Celentano, D. D., Nelson, K. E., Ruckphaopunt, S., and Khamboonruang, C. (1995). Same-sex behavior, sexually transmitted diseases and HIV risks among young northern Thai men. *AIDS, 9*(2), 171-176.

Bicego, G., Rutstein, S., and Johnson, K. (2003). Dimensions of the emerging orphan crisis in sub-Saharan Africa. *Social Science & Medicine, 56*(6), 1235-1247.

Blacker, J. (2004). The impact of AIDS on adult mortality: evidence from national and regional statistics. *AIDS, 18*(Supplement 2), S19-S26.

Blackorby, C., and Donaldson, D. (1987). Welfare ratios and distributionally sensitive cost-benefit analysis. *Journal of Public Economics, 34*(3), 265-290.

Blanc, A. (2000). *The relationship between sexual behaviour and level of education in developing countries*. Geneva: UNAIDS.

Bloom, D. E., and Glied, S. (1993). Who is bearing the cost of the AIDS epidemic in Asia? In D. E. Bloom and J. V. Lyons (Eds.), *Economic implications of AIDS in Asia* (pp. 161-181). New Delhi: United Nations Development Programme.

Bloom, D. E., and Mahal, A. S. (1997a). AIDS, flu, and the Black Death: impacts on economic growth and well-being. In D. E. Bloom and P. Godwin (Eds.), *The economics of HIV and AIDS - the case of South and South East Asia* (pp. 9-52). Delhi: Oxford University Press.

Bloom, D. E., and Mahal, A. S. (1997b). Does the AIDS epidemic threaten economic growth? *Journal of Econometrics, 77*(1), 105-124.

Bloom, D. E., Mahal, A. S., Christiansen, L., de Silva, A., de Sylva, S., Dias, M., Jayasinghe, S., Jayaweera, S., Mahawewa, S., Sanmugam, T., and Tantrigama, G. (1997). Socio-economic dimensions of the HIV/AIDS epidemic in Sri Lanka. In D. E. Bloom and P. Godwin (Eds.), *The economics of HIV and AIDS - the case of South and South East Asia* (pp. 155-263). Delhi: Oxford University Press.

Bloom, S. S., Urassa, M., Isingo, R., Ng'weshemi, J. Z. L., and Boerma, J. T. (2002). Community effects on the risk of HIV infection in rural Tanzania. *Sexually Transmitted Infections, 78*(4), 261-266.

Boerma, J. T., Gregson, S., Nyamukapa, C., and Urassa, M. (2003). Understanding the uneven spread of HIV within Africa: comparative study of biologic, behavioral, and contextual factors in rural populations in Tanzania and Zimbabwe. *Sexually Transmitted Diseases, 30*(10), 779-787.

Bollinger, L. (2002). HIV/AIDS and its impact on trade and commerce. In S. Forsythe (Ed.), *State of the art: AIDS and economics*: International AIDS Economics Network.

Bollinger, L., Cooper-Arnold, K., and Stover, J. (2002). Literature database for evaluating HIV/AIDS interventions (Version 1.0). Glastonbury, Ct.: Futures Group International.

Bollinger, L., Cooper-Arnold, K., and Stover, J. (2004). Where are the gaps? The effects of HIV-prevention interventions on behavioral change. *Studies in Family Planning, 35*(1), 27-38.

Bolton, P., and Wilk, C. M. (2004). How do Africans view the impact of HIV? A report from a Ugandan community. *AIDS Care, 16*(1), 123-128.

Boltvinik, J. (1998). Poverty measurement methods - an overview, *SEPED Poverty Reduction Series*. New York: United Nations Development Programme.

Bond, K. C., Celentano, D. D., Phonsophakul, S., and Vaddhanaphuti, C. (1997). Mobility and migration: female commercial sex work and the HIV epidemic in northern Thailand. In G. Herdt (Ed.), *Sexual cultures and migration in the era of AIDS - anthropological and demographic perspectives* (pp. 185-215). Oxford: Clarendon Press.

Bond, K. C., Valente, T. W., and Kendall, C. (1999). Social network influences on reproductive health behaviours in urban northern Thailand. *Social Science & Medicine, 49*(12), 1599-1614.

Bongaarts, J. (1989). A model of the spread of HIV infection and the demographic impact of AIDS. *Statistics in Medicine, 8*(1), 103-120.

Bonnel, R. (2000a). HIV/AIDS and economic growth: a global perspective. *South African Journal of Economics, 68*(5), 820-855.

Bonnel, R. (2000b). *HIV/AIDS: does it increase or decrease growth in Africa?* Washington, D.C.: World Bank.

Bonnerjee, A. (2003). *The impact of HIV/AIDS on social security*.Unpublished manuscript.

Boonchalaksi, W., and Guest, P. (1998). Prostitution in Thailand. In L. L. Lim (Ed.), *The sex sector: the economic and social bases of prostitution in Southeast Asia*. Geneva: International Labour Office.

Booranapim, Y., and Mainwaring, L. (2002). Risk and reward in the Thai sex industry. *International Journal of Social Economics, 29*(10), 766-780.

Borjas, G. J. (2000). *Labor economics* (2nd ed.). Boston, Ma.: McGraw Hill.

Bos, E., and Bulatau, R. A. (1992). The demographic impact of AIDS in sub-Saharan Africa - short- and long-term projections. *International Journal of Forecasting, 8*(3), 367-384.

Botswana Institute for Development Policy Analysis. (2000). *Macroeconomic impacts of the HIV/AIDS epidemic in Botswana*. Gaborone: Botswana Institute for Development Policy Analysis.

Branch, E. R. (1994). The consumer expenditure survey: a comparative analysis. *Monthly Labor Review, 117*(12), 47-55.

Brent, R. J. (2005). *A cost-benefit analysis of female primary education as a means of reducing HIV/AIDS in Tanzania*.Unpublished manuscript, New York.

Brickley, J. A., Smith, C. W., and Zimmerman, J. L. (2000). *Managerial economics and organizational architecture* (2nd ed.). Boston, Ma.: McGraw-Hill.

Brown, T. F., Sittitrai, W., and Obremskey, S. A. (1995). Economic impacts of the epidemic and children. In T. F. Brown and W. Sittitrai (Eds.), *The impact of HIV on children in Thailand* (pp. 138-150). Bangkok: Program on AIDS, Thai Red Cross Society.

Brown, T. F., Sittitrai, W., Vanichseni, S., and Thisyakorn, U. (1994). The recent epidemiology of HIV and AIDS in Thailand. *AIDS, 8*(Supplement 2), S131-S141.

Bruhns, R. (2005). *The long-run effects of HIV/AIDS in Kenya: fertility, education and economic growth*. Heidelberg, Germany: South Asia Institute, University of Heidelberg.

Bryceson, D. F., Fonseca, J., and Kadzandira, J. (2004). *Social pathways from the HIV/AIDS deadlock of disease, denial and desperation in rural Malawi*. Washington, D.C.: International Food Policy Research Institute.

Buckingham, R. W., and Meister, E. (2003). Condom utilization among female sex workers in Thailand: assessing the value of the health belief model. *Californian Journal of Health Promotion, 1*(4), 18-23.

Buckingham, R. W., Meister, E., and Webb, N. (2004). Condom use among the female sex worker population in Thailand. *International Journal of STD and AIDS, 15*(3), 210-211.

Bulterys, M., Chao, A., Habimana, P., Dushimimana, A., Nawrocki, P., and Saah, A. J. (1994). Incident HIV-1 infection in a cohort of young women in Butare, Rwanda. *AIDS, 1994*(8), 11.

Bunnell, R. E., Yanpaisarn, S., Kilmarx, P. H., Rhodes, P. H., Limpakarnjanarat, K., Srismith, R., Mastro, T.D., and St. Louis, M.E. (1999). HIV-1 seropravelence among childbearing women in northern Thailand: monitoring a rapidly evolving epidemic. *AIDS, 13*(4), 509-515.

Busza, J. R. (1999). *Literature review: challenging HIV-related stigma and discrimination in Southeast Asia: past successes and future priorities*. New York: The Population Council.

Busza, J. R. (2001). Promoting the positive: responses to stigma and discrimination in Southeast Asia. *AIDS Care, 13*(4), 441-456.

Caldwell, J. C., Anarfi, J. K., and Caldwell, P. (1997). Mobility, migration, sex, STDs, and AIDS: an essay on sub-Saharan Africa with other parallels. In G. Herdt (Ed.), *Sexual cultures and migration in the era of AIDS - anthropological and demographic perspectives* (pp. 41-54). Oxford: Clarendon Press.

Caldwell, J. C., and Caldwell, P. (1993). The nature and limits of the sub-Saharan African AIDS epidemic: Evidence from geographic and other patterns. *Population and Development Review, 19*(4), 817-848.

Caldwell, P. (1995). Prostitution and the risk of STDs and AIDS in Nigeria and Thailand. *Health Transition Review, 5*(Supplement), 167-172.

Cameron, M. P. (2003). *Breaking the poverty-HIV/AIDS cycle in Southeast Asia: a research agenda.* Unpublished Masters dissertation, University of Waikato, Hamilton.

CARE International. (2004). *A hard road - the experiences of mobile populations in accessing HIV/AIDS care and support services within the Greater Mekong Subregion countries of Cambodia, Laos, Vietnam and Thailand*. Bangkok: CARE International.

Carpenter, L. M., Nakiyingi, J. S., Ruberantwari, A., Malamba, S. S., Kamali, A., and Whitworth, J. A. G. (1997, 3-6 February). *Estimates of the impact of HIV-1 infection on fertility in a rural Ugandan population cohort.* Paper presented at the Conference on the Socio-Demographic Impact of AIDS in Africa, Durban.

Carr, J. K., Sirisopana, N., Torugsa, K., Jugsudee, A., Supapongse, T., Chuenchitra, C., Nitayaphan, S., Singharaj, P., and McNeil, J.G. (1994). Incidence of HIV-1 infection among young men in Thailand. *Journal of Acquired Immune Deficiency Syndromes, 7*(12), 1270-1275.

Case, A., Paxson, C., and Ableidinger, J. (2004). Orphans in Africa: parental death, poverty, and school enrolment. *Demography, 41*(3), 483-508.

Celentano, D. D., Akarasewi, P., Sussman, L., Suprasert, S., Matanasarawoot, A., Wright, N. H., Theetranont, C., and Nelson, K.E. (1994). HIV-1 infection among lower class commercial sex workers in Chiang Mai, Thailand. *AIDS, 8*(4), 533-537.

Celentano, D. D., Hodge, M. J., Razak, M. H., Beyrer, C., Kawichai, S., Cegielski, J. P., Nelson, K.E., and Jittiwutikarn, J. (1999). HIV-1 incidence among opiate users in northern Thailand. *American Journal of Epidemiology, 149*(6), 558-564.

Celentano, D. D., Jittiwutikarn, J., Hodge, M. J., Beyrer, C., and Nelson, K. E. (1998a). Epidemiology of HIV-1 infection in opiate users in northern Thailand. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology, 17*(1), 73-78.

Celentano, D. D., Nelson, K. E., Lyles, C. M., Beyrer, C., Eiumtrakul, S., Go, V. F. L., Kuntolbutra, S., and Khamboonruang, C. (1998b). Decreasing incidence of HIV and sexually transmitted diseases in young Thai men: evidence for success of the HIV/AIDS control and prevention program. *AIDS, 12*(5), F29-F36.

Celentano, D. D., Nelson, K. E., Suprasert, S., Eiumtrakul, S., Tulvatana, S., Kuntolbutra, S., Akarasewi, P., Matanasarawoot, A., Wright, N.H., Sirisopana, N., and Theetranont, C. (1996). Risk factors for HIV-1 seroconversion among young men in northern Thailand. *Journal of the American Medical Association, 275*(2), 122-127.

Celentano, D. D., Nelson, K. E., Suprasert, S., Wright, N. H., Matanasarawoot, A., Eiumtrakul, S., Romyen, S., Tulvatana, S., Kuntolbutra, S., Sirisopana, N., Akarasewi, P., and Theetranont, C. (1993). Behavioral and sociodemographic risks for frequent visits to commercial sex workers among northern Thai men. *AIDS, 7*(12), 1647-1652.

Chao, A., Bulterys, M., Musanganire, F., Habimana, P., Nawrocki, P., Taylor, E., Dushimimana, A., and Saah, A.J. (1994). Risk factors associated with prevalent HIV-1 infection among pregnant women in Rwanda. *International Journal of Epidemiology, 23*(2), 371-380.

Chayanov, A. V. (1966). *The theory of peasant economy*. Homewood, Il.: Irwin.

Chiappori, P.-A. (1988). Rational household labor supply. *Econometrica, 56*(1), 63-89.

Chiewsilp, P., Isarangkura, P., Tanprasert, S., Nuchprayoon, C., Chaimongkol, B., Suvatte, V., Kulapongs, P., and Intragumtornchai, T. (1993). Risk of transfusion associated AIDS by seronegative blood in Thailand: a multicenter report. *Southeast Asian Journal of Tropical Medicine and Public Health, 24*(Supplement 1), 139-140.

Chitwarakorn, A., Sittitrai, W., Brown, T. F., and Mugrditchian, D. (1998). Thailand. In T. F. Brown (Ed.), *Sexually Transmitted Diseases in Asia and the Pacific* (pp. 304-338). Armidale, NSW, Australia: Venereology Publishing Inc.

Choopanya, K., Des Jarlais, D. C., Vanichseni, S., Kitayaporn, D., Mock, P. A., Raktham, S., Hireanras, K., Heyward, W.L., Sujarita, S., and Mastro, T.D. (2002). Incarceration and risk for HIV infection among injection drug users in Bangkok. *Journal of Acquired Immune Deficiency Syndromes, 29*(1), 86-94.

Choopanya, K., Vanichseni, S., Des Jarlais, D. C., Plangsrigarm, K., Sonchai, W., Carballo, M., Friedmann, P., and Friedman, S.R. (1991). Risk factors and HIV seropositivity among injecting drug users in Bangkok. *AIDS, 5*(12), 1509-1513.

Clements, A. (1992). Thailand stifles AIDS campaign. *British Medical Journal, 304*(6837), 1264.

Cliff, A. D., and Smallman-Raynor, M. R. (1992). The AIDS pandemic: global geographical patterns and local spatial processes. *The Geographical Journal, 158*(2), 182-198.

Cogneau, D., and Grimm, M. (2002). AIDS and income distribution in Africa: a micro-simulation study for Cote D'Ivoire, *Paper submitted to IAEN for the 2nd IAEN Economic of HIV/AIDS in Developing Countries Symposium, 6-7 July 2002*. Barcelona.

Cohen, D. (1997). Socio-economic causes and consequences of the HIV epidemic in southern Africa: a case study of Namibia, *UNDP HIV and Development Programme Issues Paper No. 31*. New York: United Nations Development Programme.

Cohen, E. (1987). Sensuality and venality in Bangkok: the dynamics of cross-cultural mapping of prostitution. *Deviant Behavior, 8*, 223-234.

Cohen, E. (1988). Tourism and AIDS in Thailand. *Annals of Tourism Research, 15*(4), 467-486.

Cohen, E. (1991). *Thai society in comparative perspective - collected essays*. Bangkok: White Lotus.

Collaborative Group on AIDS Incubation and HIV Survival. (2000). Time from HIV-1 seroconversion to AIDS and death before widespread use of highly-active antiretroviral therapy: a collaborative re-analysis. *Lancet, 355*(9210), 1131-1137.

Collins, J., and Rau, B. (2000). *AIDS in the context of development*. Geneva: United Nations Research Institute for Social Development.

Conover, W. J. (1999). *Practical nonparametric statistics* (3rd ed.). New York: John Wiley and Sons.

Coombe, C. (2000). Keeping the education system healthy: Managing the impact of HIV/AIDS on education in South Africa. *Current Issues in Comparative Education, 3*(1), 14-27.

Cooper, H., Moore, L., Gruskin, S., and Krieger, N. (2005). The impact of a police drug crackdown on drug injectors' ability to practice harm reduction: a qualitative study. *Social Science & Medicine, 61*(3), 673-684.

Cordeiro, H. (1988). Medical Costs of HIV and AIDS in Brazil. In A. F. Fleming, M. Carballo, D. W. FitzSimons, M. R. Bailey and J. Mann (Eds.), *The Global Impact of AIDS*. New York: Alan R. Liss, Inc.

Corrigan, P., Glomm, G., and Mendez, F. (2005). AIDS crisis and growth. *Journal of Development Economics, 77*(1), 107-124.

Crafts, N., and Haacker, M. (2003). Welfare implications of HIV/AIDS, *IMF Working Paper 03/118*. Washington, D.C.: International Monetary Fund.

Crafts, N., and Haacker, M. (2004). Welfare implications of HIV/AIDS. In M. Haacker (Ed.), *The macroeconomics of HIV/AIDS* (pp. 182-197). Washington, D.C.: International Monetary Fund.

Crampin, A. C., Floyd, S., Glynn, J. R., Madise, N., Nyondo, A., Khondowe, M. M., Njoka, C.L., Kanyonoloka, H., Ngwira, B.M.M., Zaba, B., and Fine, P.E.M. (2003a). The long-term impact of HIV and orphanhood on the mortality and physical well-being of children in rural Malawi. *AIDS, 17*(3), 389-397.

Crampin, A. C., Glynn, J. R., Ngwira, B. M. M., Mwaungulu, F. D., Ponnighaus, J. M., Warndorff, D. K., and Fine, P.E.M. (2003b). Trends and measurement of HIV prevalence in northern Malawi. *AIDS, 17*(12), 1817-1825.

Cuddington, J. T. (1993a). Further results on the macroeconomic effects of AIDS: the dualistic, labor-surplus economy. *World Bank Economic Review, 7*(3), 403-417.

Cuddington, J. T. (1993b). Modeling the macroeconomic effects of AIDS, with an application to Tanzania. *World Bank Economic Review, 7*(2), 173-189.

Cuddington, J. T., and Hancock, J. D. (1994). Assessing the impact of AIDS on the growth path of the Malawian economy. *Journal of Development Economics, 43*(2), 363-368.

Cuddington, J. T., and Hancock, J. D. (1995). The macroeconomic impact of AIDS in Malawi: a dualistic, labour surplus economy. *Journal of African Economies, 4*(1), 1-28.

Cuddington, J. T., Hancock, J. D., and Rogers, C. A. (1994). A dynamic aggregative model of the AIDS epidemic with possible policy interventions. *Journal of Policy Modeling, 16*(5), 473-496.

Cuesta, J. (2001). *AIDS, economic growth and the HIPC initiative in Honduras*. Tegucigalpa, Honduras: UNDP Honduras Country Office.

Cumming-Bruce, N. (2005, November 27). Thailand faces new AIDS threat. *International Herald Tribune*.

Curran, J. W., Jaffe, H. W., Hardy, A. M., Morgan, W. M., Selik, R. M., and Dondero, T. J. (1988). Epidemiology of HIV infection and AIDS in the United States. *Science, 239*(4840), 610-616.

DaGrossa, P. S. (1989). Kamphaeng Din: a study of prostitution in the all-Thai brothels of Chiang Mai City. *Crossroads, 4*(1), 1-7.

Dallabetta, G. A., Miotti, P. G., Chiphangwi, J. D., Saah, A. J., Liomba, G. N., Odaka, N., Sungani, F., and Hoover, D.R. (1993). High socioeconomic status is a risk factor for human immunodeficiency virus type 1 (HIV-1) infection but not for sexually transmitted diseases in women in Malawi: implications for HIV-1 control. *Journal of Infectious Diseases, 167*(1), 36-42.

Dasgupta, P. (1997). Poverty traps. In D. M. Kreps and K. F. Wallis (Eds.), *Advances in economics and econometrics: theory and applications* (Vol. II, pp. 114-159). Cambridge: Cambridge University Press.

DaVanzo, J. S., and Morrison, P. A. (1981). Return and other sequences of migration in the United States. *Demography, 18*(1), 85-101.

Davidson, A. P. (1991). Rethinking household livelihood strategies. In D. Clay and H. K. Schwarzweller (Eds.), *Household survival strategies: research in rural sociology and development* (Vol. 5). Oxford: JAI Press.

Dayton, J. M., and Ainsworth, M. (2004). The elderly and AIDS: coping with the impact of adult death in Tanzania. *Social Science & Medicine, 59*(10), 2161-2172.

de Waal, A. (2003). How will HIV/AIDS transform African governance? *African Affairs, 102*(406), 1-23.
de Waal, A., and Whiteside, A. (2003). New variant famine: AIDS and food crisis in southern Africa. *Lancet, 362*(9391), 1234-1237.
de Walque, D. (2002). How does the impact of an HIV/AIDS information campaign vary with educational attainment? Evidence from rural Uganda, *World Bank Working Paper*. Washington, D.C.: World Bank.
de Walque, D. (2004). *How Does the Impact of an HIV/AIDS Information Campaign Vary with Educational Attainment? Evidence from Rural Uganda*. Washington, D.C.: World Bank.
Deaton, A. S. (Ed.). (1997). *The analysis of household surveys - a microeconometric approach to development policy*. Washington, D.C.: World Bank.
Deaton, A. S., and Grosh, M. (2000). Consumption. In M. Grosh and P. Glewwe (Eds.), *Designing household survey questionnaires for developing countries* (Vol. 2, pp. 91-133). Washington, D.C.: World Bank.
Deaton, A. S., and Muellbauer, J. (1986). On measuring child costs: with applications to poor countries. *Journal of Political Economy, 94*(4), 720-744.
Deaton, A. S., Ruiz-Castillo, J., and Thomas, D. (1989). The influence of household composition on household expenditure patterns: theory and Spanish evidence. *Journal of Political Economy, 97*(1), 179-200.
Decosas, J., and Adrien, A. (1997). Migration and HIV. *AIDS, 11*(Supplement A), S77-S84.
Deere, C. D., and de Janvry, A. (1979). A conceptual framework for the empirical analysis of peasants. *American Journal of Agricultural Economics, 61*(4), 601-611.
Des Jarlais, D. C., Choopanya, K., Vanichseni, S., Plangsrigarm, K., Sonchai, W., Carballo, M., Friedmann, P., and Friedman, S.R. (1994). AIDS risk reduction and reduced HIV seroconversion among injection drug users in Bangkok. *American Journal of Public Health, 84*(3), 452-455.
Des Jarlais, D. C., Friedman, S. R., and Ward, T. P. (1993). Harm reduction: a public nealth response to the AIDS epidemic among injecting drug users. *Annual Review of Public Health, 14*(413-450).
Des Jarlais, D. C., Hagan, H., Friedman, S. R., Friedmann, P., Goldberg, D., Frischer, M., Green, S., Tunving, K., Ljungberg, B., Wodak, A., Ross, M., Purchase, D., Millson, M.E., and Myers, T. (1995). Maintaining low HIV seroprevalence in populations of injecting drug users. *Journal of the American Medical Association, 274*(15), 1226-1231.
Desai, M. (2000). *Poverty and governance*. New York: United Nations Development Programme.
Desbarats, J. (2003). HIV/AIDS and poverty: the impact of HIV/AIDS in the ESCAP region. In United Nations Economic and Social Commission for Asia and the Pacific (Ed.), *Fifth Asian and Pacific Population Conference: selected papers*. New York: United Nations.
Dixon, S., McDonald, S., and Roberts, J. (2001). AIDS and Economic Growth in Africa: A Panel Data Analysis. *Journal of International Development, 13*(4), 411-426.

Dobbins, J. G., Mastro, T. D., Nopkesorn, T., Sangkharomya, S., Limpakarnjanarat, K., Weniger, B. G., and Schmid, D.S. (1999). Herpes in the time of AIDS: a comparison of the epidemiology of HIV-1 and HSV-2 in young men in northern Thailand. *Sexually Transmitted Diseases, 26*(2), 67-74.

Donovan, C., Bailey, L., Mpyisi, E., and Weber, M. (2003). *Primage-age adult morbidity and mortality in rural Rwanda: effects on household income, agricultural production, and food security strategies*. Kigali, Rwanda: Food Security Research Project, United States Agency for International Development.

Dorrington, R. E., Bradshaw, D., Johnson, L. F., and Budlender, D. (2004). *The demographic impact of HIV/AIDS in South Africa - national indicators for 2004*. Cape Town: Center for Actuarial Research, South African Medical Research Council and Actuarial Society of South Africa.

Drain, P. K., Smith, J. S., Hughes, J. P., Halperin, D. T., and Holmes, K. K. (2004). Correlates of national HIV seroprevalence - an ecologic analysis of 122 developing countries. *Journal of Acquired Immune Deficiency Syndromes*, *35*(4), 407-420.

Dreze, J., and Srinivasan, P. V. (1997). Widowhood and poverty in rural India: some inferences from household survey data. *Journal of Development Economics*, *54*(2), 217-234.

Drouhin, N., Touze, V., and Ventelou, B. (2003). AIDS and economic growth in Africa: a critical assessment of the 'base-case scenario' approach. In J. Moatti, B. Coriat, Y. Souteyrand, T. Barnett, J. Dumoulin and Y. Flori (Eds.), *Economics of AIDS and access to HIV/AIDS care in developing countries - issues and challenges* (pp. 383-412). Paris: Agence nationale de recherches sur le sida.

du Guerny, J. (1999). AIDS and agriculture in Africa: can agricultural policy make a difference? *Food, Nutrition and Agriculture, 25*, 12-19.

Dunteman, G. H. (1989). *Principal components analysis*. Newbury Park, Ca.: Sage Publications.

Eholie, S.-P., Nolan, M., Gaumon, A. P., Mambo, J., Kouame-Yebouet, Y., Aka-Kakou, R., Bissagnene, E., and Kadio, A. (2003). Antiretroviral treatment can be cost-saving for industry and life-saving for workers: a case study from Cote d'Ivoire's private sector. In J. Moatti, B. Coriat, Y. Souteyrand, T. Barnett, J. Dumoulin and Y. Flori (Eds.), *Economics of AIDS and access to HIV/AIDS care in developing countries - issues and challenges* (pp. 329-346). Paris: Agence nationale de recherches sur le sida.

Elbe, S. (2003). HIV/AIDS and political stability. *The Adelphi Papers, 43*(357/10), 45-61.

Elkins, D. B., Maticka-Tyndale, E., Kuyyakanond, T., Miller, P., and Haswell-Elkins, M. R. (1997). Toward reducing the spread of HIV in northeastern Thai villages: evaluation of a village-based intervention. *AIDS Education and Prevention*, *9*(1), 46-69.

Ellis, F. (1993). *Peasant economics - farm households and agrarian development*. Cambridge: Cambridge University Press.

Engel, E. (1895). Die lebenkosten Belgischer Arbeiter-Familien fruher und jetzt. *International Statistical Institute Bulletin*, *9*(1), 1-74.

Epstein, B. G. (2004). The demographic impact of HIV/AIDS. In M. Haacker (Ed.), *The macroeconomics of HIV/AIDS* (pp. 1-40). Washington, D.C.: International Monetary Fund.

Evans, R. (2002). Poverty, HIV, and barriers to education: street children's experiences in Tanzania. *Gender and Development, 10*(3), 51-62.

Evenson, R. E. (1976). On the new household economics. *Journal of Agricultural Economics and Development, 6*(1), 87-103.

Fairclough, G. (1995). Doing the dirty work - Asia's brothels thrive on migrant labour. *Far Eastern Economic Review, 158*(50), 27-28.

Falkus, M. (1993). Bangkok: from primate city to primate megalopolis. In T. Barker and A. Sutcliffe (Eds.), *Megalopolis: the giant city in history* (pp. 143-165). New York: St. Martin's Press.

Feeney, G. (2001). The impact of HIV/AIDS on adult mortality in Zimbabwe. *Population and Development Review, 27*(4), 771-780.

Ferreira, P. C., and Pessoa, S. (2003). *The long-run economic impact of AIDS*. Rio de Janeiro: Graduate School of Economics, Fundacao Getulio Vargas.

Filmer, D. (2000). The structure of social disparities in education: gender and wealth, *World Bank Policy Research Working Paper 2268*. Washington, D.C.: World Bank.

Filmer, D., and Pritchett, L. H. (1999). The effect of household wealth on educational attainment: evidence from 35 countries. *Population and Development Review, 25*(1), 85-120.

Filmer, D., and Pritchett, L. H. (2001). Estimating wealth effects without expenditure data - or tears: an application to educational enrollments in states of India. *Demography, 38*(1), 115-132.

Folbre, N. (1986). Cleaning house - new perspectives on households and economic development. *Journal of Development Economics, 22*(1), 5-40.

Folbre, N. (1988). The black four of hearts: toward a new paradigm of household economics. In D. Dwyer and J. Bruce (Eds.), *A home eivided - women and income in the Third World*. Stanford, Ca.: Stanford University Press.

Fontanet, A. L., Woldemichael, T., Sahlu, T., van Dam, G. J., Messele, T., Rinke de Wit, T., Masho, W., Yeneneh, H., Coutinho, R.A., and van Lieshout, L. (2000). Epidemiology of HIV and schistosoma mansoni infections among sugar-estate residents in Ethiopia. *Annals of Tropical Medicine & Parisitology, 94*(2), 145-155.

Ford, N. J., and Kittisuksathit, S. (1996). *Youth Sexuality: The Sexual Awareness, Lifestyles and Related-Health Service Needs of Young, Single, Factory Workers in Thailand*. Nakhom Pathom, Thailand: Institute for Population and Social Research, Mahidol University.

Forsythe, S. (2002). How does HIV/AIDS affect African businesses? In S. Forsythe (Ed.), *State of the art: AIDS and economics*: International AIDS Economics Network.

Forsythe, S., and Gilks, C. F. (1999). Economic issues and antiretroviral therapy in developing countries. *Transactions of the Royal Society of Tropical Medicine and Hygiene, 93*(1), 1-3.

Foster, A. D., and Rosenzweig, M. R. (2002). Household division and rural economic growth. *Review of Economic Studies, 69*(4), 839-869.

Foster, B. L. (1975). Continuity and change in rural Thai family structure. *Journal of Anthropological Research, 31*(1), 34-50.

Foster, B. L. (1984). Family structure and the generation of Thai social exchange networks. In R. M. Netting, R. R. Wilk and E. J. Arnould (Eds.), *Households: comparative and historical studies of the domestic group* (pp. 29-43). Berkeley, Ca.: University of California Press.

Foster, G., Shakespeare, R., Chinemana, F., Jackson, H., Gregson, S., Marange, C., and Mashumba, S. (1995). Orphan prevalence and extended family care in a peri-urban community in Zimbabwe. *AIDS Care, 7*(1), 3-17.

Foster, J., Greer, J., and Thorbecke, E. (1984). A class of decomposable poverty measures. *Econometrica, 52*(3), 761-766.

Fox, M. P., Rosen, S. B., MacLeod, W. B., Wasunna, M., Bii, M., Foglia, G., and Simon, J.L. (2004). The impact of HIV/AIDS on labour productivity in Kenya. *Tropical Medicine and International Health, 9*(3), 318-324.

Freire, S. (2003). HIV/AIDS affected households: status and temporal impacts. In J. Moatti, B. Coriat, Y. Souteyrand, T. Barnett, J. Dumoulin and Y. Flori (Eds.), *Economics of AIDS and access to HIV/AIDS care in developing countries - issues and challenges* (pp. 365-381). Paris: Agence nationale de recherches sur le sida.

Frerichs, R. R., Ungchusak, K., Htoon, M. T., and Detels, R. (1995). HIV sentinel surveillance in Thailand - an example for developing countries. *Asia-Pacific Journal of Public Health, 8*(1), 20-26.

Friis, H., and Michaelsen, K. F. (1998). Micronutrients and HIV Infection: A Review. *European Journal of Clinical Nutrition, 52*(3), 157-163.

Fuller, T. D., Kamnuansilpa, P., and Lightfoot, P. (1990). Urban ties of rural Thais. *International Migration Review, 24*(3), 534-562.

Fylkesnes, K., Musonda, R. M., Kasumba, K., Ndhlovu, Z., Mluanda, F., Kaetano, L., and Chipaila, C.C. (1997). The HIV epidemic in Zambia: socio-demographic prevalence patterns and indications of trends among childbearing women. *AIDS, 11*(3), 339-345.

Fylkesnes, K., Musonda, R. M., Sichone, M., Ndhlovu, Z., Tembo, F., and Monze, M. (2001). Declining HIV prevalence and risk behaviours in Zambia: evidence from surveillance and population-based surveys. *AIDS, 15*(7), 907-916.

Fylkesnes, K., Ndhlovu, Z., Kasumba, K., Musonda, R. M., and Sichone, M. (1998). Studying dynamics of the HIV epidemic: population-based data compared with sentinel surveillance in Zambia. *AIDS, 12*(10), 1227-1242.

Gaffeo, E. (2003). The economics of HIV/AIDS: a survey. *Development Policy Review, 21*(1), 27-49.

Gaigbe-Togbe, V., and Weinberger, M. B. (2004). The social and economic implications of HIV/AIDS. *African Population Studies, 19*(2), 31-59.

Gaiha, R. (1988). On measuring the risk of rural poverty in India. In T. N. Srinivasan and P. Bardhan (Eds.), *Rural poverty in South Asia* (pp. 219-261). Irvington, N.Y.: Columbia University Press.

Garnett, G. P., and Anderson, R. M. (1993). No reason for complacency about the potential demographic impact of AIDS in Africa. *Transactions of the Royal Society of Tropical Medicine and Hygiene, 1993*(Supplement 1), 19-22.

Garrett, L. (2005). *HIV and national security: where are the links?* New York: Council on Foreign Relations.

Gersovitz, M. (2000). A preface to the economic analysis of disease transmission. *Australian Economic Papers, 39*(1), 68-83.

Gertler, P., Martinez, S., Levine, D., and Bertozzi, S. M. (2003). *Losing the presence and presents of parents: How parental death affects children*. Berkeley, Ca.: Haas School of Business, University of California.

Gertler, P., Shah, M., and Bertozzi, S. M. (2005). Risky business: the market for unprotected commercial sex. *Journal of Political Economy, 113*(3), 518-550.

Ghys, P. D., Bazant, W., Monteiro, M. G., Calvani, S., and Lazzari, S. (2001). The epidemics of injecting drug use and HIV in Asia. *AIDS, 15*(Supplement 5), S91-S99.

Gibson, D. R., Flynn, N. M., and Perales, D. (2001). Effectiveness of syringe exchange programs in reducing HIV risk behavior and HIV seroconversion among injecting drug users. *AIDS, 15*(11), 1329-1341.

Gibson, J. G. (1997). Testing for boy-girl discrimination with household expenditure data: results for Papua New Guinea. *Applied Economics Letters, 4*(10), 643-646.

Gibson, J. G. (2002). Why does the Engel method work? Food demand, economies of size and household survey methods. *Oxford Bulletin of Economic and Statistics, 64*(4), 341-359.

Gibson, J. G. (2005). *Statistical tools and estimation methods for poverty measures based on household surveys*.Unpublished manuscript, Christchurch.

Gibson, J. G., and Rozelle, S. (1998). *Results of the household survey component of the 1996 poverty assessment for Papua New Guinea*. Washington, D.C.: World Bank.

Gibson, J. G., and Rozelle, S. (2003). Poverty and access to roads in Papua New Guinea. *Economic Development and Cultural Change, 52*(1), 159-185.

Gillespie, S. (1989). Potential impact of AIDS on farming systems. *Land Use Policy, 6*(4), 301-312.

Gillespie, S., Haddad, L., and Jackson, R. (2001). HIV/AIDS, food and nutrition security: impacts and actions. In United Nations Administrative Committee on Co-ordination/Sub-Committee on Nutrition (Ed.), *Nutrition and HIV/AIDS*. Geneva: United Nations Administrative Committee on Co-ordination/Sub-Committee on Nutrition.

Gillespie, S., and Kadiyala, S. (2005a). *HIV/AIDS and food and nutrition security - from evidence to action*. Washington, D.C.: International Food Policy Research Institute.

Gillespie, S., and Kadiyala, S. (2005b). HIV/AIDS and food and nutrition security: interactions and response. *American Journal of Agricultural Economics, 87*(5), 1282-1288.

Giraud, P. (1993). The economic impact of AIDS at the sectoral level: developing an assessment methodology and applying It to Thailand's transport sector. In D. E. Bloom and J. V. Lyons (Eds.), *Economic implications of AIDS in Asia* (pp. 71-96). New Delhi: United Nations Development Programme.

Glynn, J. R., Buve, A., Carael, M., Musonda, R. M., Kahindo, M., Macauley, I., Tembo, F., Zekeng, L., and Study Group on Heterogeneity of HIV Epidemics in African Cities. (2001). Factors influencing the difference in HIV prevalence between antenatal clinic and general population in sub-Saharan Africa. *AIDS, 15*(13), 1717-1725.

Gordon, P., and Crehan, K. (1995). Gender, sexual violence and the HIV epidemic, *SEPED Conference Paper Series 1*. New York: United Nations Development Programme.

Grassly, N. C., Desai, K., Pegurri, E., Sikazwe, A., Malambo, I., Siamatowe, C., and Bundy, D. (2003). The economic impact of HIV/AIDS on the education sector in Zambia. *AIDS, 17*(7), 1039-1044.

Gray, A., Punpuing, S., Yoddumnern-Attig, B., Chongsatitmun, C., Thongkrajai, E., and Singsungchai, P. (1999). *Gender, sexuality and reproductive health in Thailand*. Nakhom Pathom, Thailand: Institute for Population and Social Research, Mahidol University.

Gray, J. A., Dore, G. J., Li, Y., Supawitkul, S., Effler, P., and Kaldor, J. M. (1997). HIV-1 Infection among female commercial sex workers in rural Thailand. *AIDS, 11*(1), 89-94.

Gray, R. H., Serwadda, D., Wawer, M. J., Sewankambo, N. K., Paxton, L., Wabwire-Mangen, F., Kiwanuka, N., Li, C., McNairn, D., Kigozi, G., and Konde-Lule, J.K. (1997, 3-6 February). *Reduced Fertility in Women with HIV Infection: A Population-Based Study in Uganda.* Paper presented at the Conference on the Socio-Demographic Impact of AIDS in Africa, Durban.

Greener, R. (2002). AIDS and its macroeonomic impact. In S. Forsythe (Ed.), *State of the art: AIDS and economics*: International AIDS Economics Network.

Greener, R., Jefferis, K., and Siphambe, H. (2000). The impact of HIV/AIDS on poverty and inequality in Botswana. *South African Journal of Economics, 68*(5), 888-915.

Gregson, S., Terceira, N., Mushati, P., Nyamukapa, C., and Campbell, C. (2004). Community group participation: Can it help young women to avoid HIV? An exploratory study of social capital and school education in rural Zimbabwe. *Social Science & Medicine, 58*(11), 2119-2132.

Gregson, S., Waddell, H., and Chandiwana, S. K. (2001). School education and HIV control in sub-Saharan Africa: From discord to harmony? *Journal of International Development, 13*(4), 467-485.

Gregson, S., Zhuwau, T., Anderson, R. M., and Chandiwana, S. K. (1997, 3-6 February). *HIV-1 and Fertility Change in Rural Zimbabwe.* Paper presented at the Conference on the Socio-Demographic Impact of AIDS in Africa, Durban.

Gregson, S., Zhuwau, T., Anderson, R. M., and Chandiwana, S. K. (1998). Is there evidence for behaviour change in response to AIDS in rural Zimbabwe. *Social Science & Medicine, 46*(3), 321-330.

Griffiths, W. E., and Valenzuela, M. R. (2001). Estimating costs of children from micro-unit records: a new procedure applied to Australian data, *Department of Economics Working Paper 795*. Melbourne: University of Melbourne.

Gritzman, S. (2005). Is AIDS a rational disease? Some evidence from household data. *South African Journal of Economics, 73*(1), 149-169.

Grmek, M. D. (1990). *History of AIDS - emergence and origin of a modern pandemic* (R. C. Maulitz and J. Duffin, Trans.). Princeton, N.J.: Princeton University Press.

Grootaert, C. (1986). Measuring and analysing levels of living in developing countries: an annotated questionnaire, *Living Standards Measurement Survey Working Paper No. 24*. Washington, D.C.: World Bank.

Grosh, M., and Munoz, J. (1996). A manual for planning and implementing the living standards measurement study survey, *Living Standards Measurement Survey Working Paper No. 126*. Washington, D.C.: World Bank.

Grosskurth, H., Mosha, F. F., Todd, J., Senkoro, K. P., Newell, J. N., Klokke, A. H., Changalucha, J., West, B., Mayaud, P., Gavyole, A., Gabone, R., Mabey, D., and Hayes, R.J. (1995). A community trial of the impact of improved sexually transmitted disease treatment on the HIV epidemic in rural Tanzania: 2. Baseline survey results. *AIDS, 9*(8), 927-934.

Guinness, L., Walker, D., Ndubani, P., Jama, J., and Kelly, P. (2003). Surviving the impact of HIV-related illness in the Zambian business sector. *AIDS Patient Care and STDs, 17*(7), 353-363.

Gupta, G. R., Whelan, D., and Allendorf, K. (2003). *Integrating gender into HIV/AIDS programmes*. Geneva: World Health Organization.

Gwatkin, D. R., and Deveshwar-Bahl, G. (2001). *Inequalities in knowledge of HIV/AIDS prevention*.Unpublished manuscript.

Haacker, M. (2002a). The economic consequences of HIV/AIDS in southern Africa, *IMF Working Paper 02/38*. Washington, D.C.: International Monetary Fund.

Haacker, M. (2002b). Modelling the macroeconomic impact of HIV/AIDS, *IMF Working Paper 02/195*. Washington, D.C.: International Monetary Fund.

Haacker, M. (2004a). HIV/AIDS: the impact on the social fabric and the economy. In M. Haacker (Ed.), *The macroeconomics of HIV/AIDS* (pp. 41-95). Washington, D.C.: International Monetary Fund.

Haacker, M. (2004b). The impact of HIV/AIDS on government finance and public services. In M. Haacker (Ed.), *The macroeconomics of HIV/AIDS* (pp. 198-258). Washington, D.C.: International Monetary Fund.

Haddad, L., and Gillespie, S. (2001). Effective food and nutrition policy responses to HIV/AIDS: What we know and what we need to know. *Journal of International Development, 13*(4), 487-511.

Haddad, L., and Hoddinott, J. (1994). Women's income and boy-girl anthropometric status in the Cote d'Ivoire. *World Development, 22*(4), 543-553.

Hallman, K. (2004). Socioeconomic disadvantage and unsafe sexual behaviors among young women and men in South Africa, *Population Council Working Paper No. 190*. New York: Population Council.

Hammel, E. A. (1984). On the *** of studying household form and function. In R. M. Netting, R. R. Wilk and E. J. Arnould (Eds.), *Households: comparative and historical studies of the domestic group* (pp. 29-43). Berkeley, Ca.: University of California Press.

Hammel, E. A., and Laslett, P. (1974). Comparing household structure over time and between cultures. *Comparative Studies in Society and History, 16*(1), 73-109.

Hamoudi, A., and Birdsall, N. (2002). HIV/AIDS and the accumulation and utilization of human capital in Africa, *Center for Global Development Working Paper 2*. Washington, D.C.: Center for Global Development.

Hannan, M. T. (1982). Families, markets, and social structures: an essay on Becker's a treatise on the family. *Journal of Economic Literature*, *20*(1), 65-72.

Hargreaves, J. R., and Glynn, J. R. (2002). Educational attainment and HIV-1 infection in developing countries: A systematic review. *Tropical Medicine and International Health, 7*(6), 489-498.

Harper, C., Marcus, R., and Moore, K. (2003). Enduring poverty and the conditions of childhood: lifecourse and intergenerational poverty transmissions. *World Development, 31*(3), 535-554.

Harris, J. R., and Todaro, M. P. (1970). Migration, unemployment and development: a two-sector analysis. *American Economic Review, 60*(1), 126-142.

Hartmann, H. (1981). The family as a locus of gender, class, and political struggle: the example of housework. *Signs, 6*(3), 366-394.

Harvard AIDS Institute. (1994). *The social and economic impact of HIV on Thailand*. Boston: Harvard School of Public Health AIDS Initiative.

Harvey, P. (2004). *HIV/AIDS and humanitarian action*. London: Overseas Development Institute.

Havanon, N., Bennett, A., and Knodel, J. E. (1993). Sexual networking in provincial Thailand. *Studies in Family Planning, 24*(1), 1-17.

Heinecken, L. (2001). HIV/AIDS, the military and the impact on national and international security. *Society in Transition, 32*(1), 120-147.

Heise, L. L., and Elias, C. J. (1995). Transforming AIDS prevention to meet women's needs: a focus on developing countries. *Social Science & Medicine*, *40*(7), 931-943.

Heise, L. L., Ellsberg, M., and Gottemoeller, M. (1999). Ending violence against women, *Population Reports Series L No. 11*. Baltimore, Md.: Johns Hopkins University School of Public Health.

Henry, R., and Newton, E. (1994). AIDS costs in Trinidad and Tobago. *Studies in Comparative International Development*, *29*(4), 68-89.

Herek, G. M. (1999). AIDS and stigma. *American Behavioral Scientist, 42*(7), 1106-1116.

Heuveline, P. (2004). Impact of the HIV epidemic on population and household structure: the dynamics and evidence to date. *AIDS, 18*(Supplement 2), S45-S53.

Hochberg, Y., and Tamhane, A. C. (1987). *Multiple comparison procedures*. New York: John Wiley & Sons.

Hogg, R. S., Yip, B., Kully, C., Craib, K. J. P., O'Shaughnessy, M. V., Schechter, M. T., and Montaner, J.S.G. (1999). Improved survival among HIV-infected patients after initiation of triple-drug antiretroviral regimens. *Canadian Medical Association Journal, 160*(5), 659-665.

Hope, K. R. (2001). Population mobility and multi-partner sex in Botswana: implications for the spread of HIV/AIDS. *African Journal of Reproductive Health*, *5*(3), 73-83.

Hosegood, V., McGrath, N., Herbst, K., and Timaeus, I. M. (2004). The impact of adult mortality on household dissolution and migration in rural South Africa. *AIDS*, *18*(11), 1585-1590.

Hunt, C. W. (1989). Migrant labor and sexually transmitted disease: AIDS in Africa. *Journal of Health and Social Behavior, 30*(4), 353-373.

Hunter, S., and Williamson, J. (1997). *Children on the brink - strategies to suppot a generation isolated by HIV/AIDS*. Arlington, Va.: United States Agency for International Development.

Husain, I., and Badcock-Walters, P. (2002). Economics of HIV/AIDS impact mitigation: responding to problems of systemic dysfunction and sectoral capacity. In S. Forsythe (Ed.), *State of the art: AIDS and economics*: International AIDS Economics Network.

ICON Group International. (2000). *Thailand economic studies*. San Diego: ICON Group International.

Im-em, W. (1999a). Changing partner relations in the era of AIDS in upper-north Thailand. In J. C. Caldwell, P. Caldwell, J. K. Anarfi, K. Awusabo-Asare, J. P. M. Ntozi, I. O. Orubuloye, J. Marck, W. Cosford, R. Colombo and E. Hollings (Eds.), *Resistances to behavioural change to reduce HIV/AIDS infection in predominantly heterosexual epidemics in Third World countries* (pp. 157-170). Canberra: Health Transition Centre, National Centre for Epidemiology and Population Health, Australian University.

Im-em, W. (1999b). Mortality trends and levels to verify the AIDS epidemic in Thailand: analysis from death registration statistics, 1984-1997, *Institute for Population and Social Research Publication 239*. Nakhom Pathom, Thailand: Institute for Population and Social Research, Mahidol University.

Ingram, J. C. (1971). *Economic change in Thailand 1850-1970*. Stanford, Ca.: Stanford University Press.

Intarachai, T. (2003). Toward a knowledge-based economy: Northeastern Thailand. In M. Makishima and S. Suksiriserekul (Eds.), *Human resource development toward a knowledge-based economy: the case of Thailand* (pp. 227-267). Chiba, Japan: Institute of Developing Economies, Japan External Trade Organization.

Jackson, J. E. (1991). *A user's guide to principal components*. New York: John Wiley & Sons.

Janjaroen, W. S. (1998). The impact of AIDS on household composition and consumption in Thailand. In M. Ainsworth, L. Fransen and M. Over (Eds.), *Confronting AIDS: evidence from the developing world* (pp. 349-354). Luxembourg: European Commission.

Jayne, T. S., Villarreal, M., Pingali, P., and Hemrich, G. (2004). Interactions between the agricultural sector and the HIV/AIDS pandemic: implications for agricultural policy, *MSU International Development Paper No. 25*. East Lansing, Mi.: Department of Agricultural Economics and Department of Economics, Michigan State University.

Jenkins, R. A., Manopaiboon, C., Samuel, A. P., Jeeyapant, S., Carey, J. W., Kilmarx, P. H., Uthaivoravit, W., and van Griensven, G.J.P. (2002). Condom use among vocational school students in Chiang Rai, Thailand. *AIDS Education and Prevention*, *14*(3), 228-245.

Jha, P., Nagelkerke, N. J. D., Ngugi, E. N., Prasada Rao, J. V. R., Willbond, B., Moses, S., and Plummer, F.A. (2001). Reducing HIV transmission in developing countries. *Science*, *292*(5515), 224-225.

Jitsuchon, S. (2001). *Thailand's economic growth: a fifty-years perspective (1950-2000)*. Bangkok: Thailand Development Research Institute.

Jittiwutikarn, J., Sawanpanyalert, P., Rangsiveroj, N., and Satitvipawee, P. (2000). HIV incidence rates among drug users in northern Thailand, 1993-7. *Epidemiology and Infection, 125*(1), 153-158.

Johnson, A. M., Wadsworth, J., Wellings, K., and Field, J. (1994). *Sexual attitudes and lifestyles*. London: Blackwell Scientific Publications.

Johnson, L. F., and Dorrington, R. E. (2006). Modelling the demographic impact of HIV/AIDS in South Africa and the likely impact of interventions. *Demographic Research, 14*(22), 541-574.

Jolliffe, D., and Semykina, A. (1999). Robust standard errors for the Foster-Greer-Thorbecke class of poverty indices: SEPOV. *Stata Technical Bulletin, 51*, 34-36.

Jolliffe, I. T. (2002). *Principal component analysis* (2nd ed.). New York: Springer.

Jones, H. (2004). Demographic and developmental contexts of AIDS in northern Thailand. In J. White (Ed.), *Development, spatial mobility and HIV/AIDS* (pp. 15-27). Bangkok: UNDP South East Asia HIV and Development Programme and Comite International de Cooperation dans les Recherches Nationales en Demographie.

Jones, H., and Pardthaisong, L. (2000). Demographic interactions and developmental implications in the era of AIDS: findings from northern Thailand. *Applied Geography, 20*(3), 255-275.

Jukes, M., and Desai, K. (2006). *Education and HIV/AIDS*. Paris: United Nations Educational, Scientific and Cultural Organization.

Kakwani, N., and Krongkaew, M. (2000). Analysing poverty in Thailand. *Journal of the Asia Pacific Economy, 5*(1-2), 141-160.

Kamal Smith, M. (2002). Gender, poverty and intergenerational vulnerability to HIV/AIDS. *Gender and Development*, *10*(3), 63-70.

Kamali, A., Seeley, J. A., Nunn, A. J., Kengeya-Kayondo, J. F., Ruberantwari, A., and Mulder, D. W. (1996). The orphan problem: experience of a sub-Saharan African rural population in the AIDS epidemic. *AIDS Care, 8*(5), 509-515.

Kambou, G., Devarajan, S., and Over, M. (1993). The economic impact of AIDS in an African country: simulations with a computable general equilibrium model of Cameroon. *Journal of African Economies, 1*(1), 109-130.

Kanshana, S., and Simonds, R. J. (2002). National program for preventing mother-child HIV transmission in Thailand: successful implementation and lessons learned. *AIDS, 16*(7), 953-959.

Kapiga, S. H., Lyamuya, E. F., Lwihula, G. K., and Hunter, D. J. (1998). The incidence of HIV infection among women using family planning methods in Dar es Salaam, Tanzania. *AIDS, 12*(1), 75-84.

Kapiga, S. H., Shao, J. F., Lwihula, G. K., and Hunter, D. J. (1994). Risk factors for HIV infection among women in Dar-es-Salaam, Tanzania. *Journal of Acquired Immune Deficiency Syndromes, 7*(3), 301-309.

Kawichai, S., Beyrer, C., Khamboonruang, C., Celentano, D. D., Natpratan, C., Rungruengthanakit, K., and Nelson, K.E. (2004). HIV incidence and risk behaviours after voluntary HIV counselling and testing (VCT) among adults aged 19-35 years living in peri-urban communities around Chiang Mai City in northern Thailand, 1999. *AIDS Care, 16*(1), 21-35.

Kebede, D., and Retta, S. (2004). Gender, HIV/AIDS and food security - linkage and integration into development interventions, *DCG Report No. 32*. As, Norway: Drylands Coordination Group.

Keyes, C. F. (1984). Mother or mistress but never a monk: buddhist notions of female gender in rural Thailand. *American Ethnologist, 11*(2), 223-241.

Kigadye, R.-M., Klokke, A. H., Nicoll, A., Nyamuryekung'e, K. M., Borgdorff, M. W., Barongo, L. R., Laukamm-Josten, U., Lisekie, F., Grosskurth, H., and Kigadye, F. (1993). Sentinel surveillance for HIV-1 among pregnant women in a developing country: 3 years' experience and comparison with a population serosurvey. *AIDS, 7*(6), 849-855.

Kilian, A. H. D., Gregson, S., Ndyanabangi, B., Walusaga, K., Kipp, W., Sahmuller, G., Garnett, G.P., Asiimwe-Okiror, G., Kabagambe, G., Weis, P., and van Sonnenburg, F. (1999). Reductions in risk behaviour provide the most consistent explanation for declining HIV-1 prevalence in Uganda. *AIDS, 13*(3), 391-398.

Kilmarx, P. H., Limpakarnjanarat, K., Kaewkungwal, J., Srismith, R., Saisorn, S., Uthaivoravit, W., Young, N.L., and Mastro, T.D. (2000a). Disease progression and survival with Human Immunodeficiency Virus type 1 subtype E infection among female sex workers in Thailand. *Journal of Infectious Diseases, 181*(5), 1598-1606.

Kilmarx, P. H., Limpakarnjanarat, K., Mastro, T. D., Saisorn, S., Kaewkungwal, J., Korattana, S., Uthaivoravit, W., Young, N.L., Weniger, B.G., and St. Louis, M.E. (1998). HIV-1 seroconversion in a prospective study of female sex workers in northern Thailand: continued high incidence among brothel-based women. *AIDS, 12*(14), 1889-1898.

Kilmarx, P. H., Supawitkul, S., Wankrairoj, M., Uthaivoravit, W., Limpakarnjanarat, K., Saisorn, S., and Mastro, T.D. (2000b). Explosive spread and effective control of Human Immunodeficiency Virus in northernmost Thailand: the epidemic in Chiang Rai Province, 1988-99. *AIDS, 14*(17), 2731-2740.

Kitajima, T., Kobayashi, Y., Chaipah, W., Sato, H., Chadbunchachai, W., and Thuennadee, R. (2003). Costs of medical services for patients with HIV/AIDS in Khon Kaen, Thailand. *AIDS, 17*(16), 2375-2381.

Kitajima, T., Kobayashi, Y., Chaipah, W., Sato, H., Toyokawa, S., Chadbunchachai, W., and Thuennadee, R. (2005). Access to antiretroviral therapy among HIV/AIDS patients in Khon Kaen province, Thailand. *AIDS Care, 17*(3), 359-366.

Kitayaporn, D., Tansuphasawdikul, S., Lohsomboon, P., Pannachet, K., Kaewkungwal, J., Limpakarnjanarat, K., and Mastro, T.D. (1996). Survival of AIDS patients in the emerging epidemic in Bangkok, Thailand. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology, 11*(1), 77-82.

Kitayaporn, D., Uneklabh, C., Weniger, B. G., Lohsomboon, P., Kaewkungwal, J., Morgan, W. M., and Uneklabh, T. (1994). HIV-1 incidence determined retrospectively among drug users in Bangkok, Thailand. *AIDS, 8*(10), 1443-1450.

Kitsiripornchai, S., Markowitz, L. E., Ungchusak, K., Jenkins, R. A., Leucha, W., Limpitaks, T., and Sangkharomya, S. (1998). Sexual behavior of young men in Thailand: regional differences and evidence of behavior change. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology, 18*(3), 282-288.

Klunklin, A., and Greenwood, J. (2005). Buddhism, the status of women and the spread of HIV/AIDS in Thailand. *Health Care for Women International, 26*(1), 46-61.

Knodel, J. E., and Im-em, W. (2002). The economic consequences for parents of losing an adult child to AIDS: evidence from Thailand, *PSC Research Report No. 02-504*. Ann Arbor, Mi.: Population Studies Center, University of Michigan.

Knodel, J. E., and Im-em, W. (2004). The economic consequences for parents of losing an adult child to AIDS: evidence from Thailand. *Social Science & Medicine*, *59*(5), 987-1001.

Knodel, J. E., Im-em, W., Saengtienchai, C., van Landingham, M. J., and Kespichayawattana, J. (2002). The impact of an adult child's death due to AIDS on older-aged parents: results from a direct interview survey, *PSC Research Report No. 02-498*. Ann Arbor, Mi.: Population Studies Center, University of Michigan.

Knodel, J. E., and Saengtienchai, C. (2002a). AIDS and older persons: the view from Thailand, *PSC Research Report No. 02-497*. Ann Arbor, Mi.: Population Studies Center, University of Michigan.

Knodel, J. E., and Saengtienchai, C. (2002b). Older aged parents: the final safety net for adult sons and daughters with AIDS in Thailand, *PSC Research Report No. 02-503*. Ann Arbor, Mi.: Population Studies Center, University of Michigan.

Knodel, J. E., and van Landingham, M. J. (2002). The impact of the AIDS epidemic on older persons. *AIDS, 16*(Supplement 3), S77-S83.

Knodel, J. E., van Landingham, M. J., Saengtienchai, C., and Im-em, W. (2000). Older people and AIDS: quantitative evidence of the impact in Thailand, *PSC Research Report No. 00-443*. Ann Arbor, Mi.: Population Studies Center, University of Michigan.

Konde-Lule, J. K., Wawer, M. J., Nalugoda, F., Gray, R. H., and Menon, R. (1997, 3-6 February). *HIV infection in rural households, Rakai district, Uganda.* Paper presented at the Conference on the Socio-Demographic Impact of AIDS in Africa, Durban.

Kongsin, S. (1997). Economic impacts of HIV/AIDS mortality on households in rural Thailand. In G. Linge and D. Porter (Eds.), *No place for borders - the HIV/AIDS epidemic and development in Asia and the Pacific* (pp. 89-101). Sydney: Allen & Unwin.

Kongsin, S., Lerttchayantee, S., Jiamton, S., and Watts, C. (2000). Socio-economic determinants of HIV/AIDS in Thailand, *International AIDS Conference, Abstract No. MoPeD2516*. Durban.

Kongsin, S., Sirinirund, P., Jiamton, S., Boonthum, A., and Watts, C. (2000). The economic impact of HIV/AIDS on households in rural Thailand: The analysis of household coping strategies, *International AIDS Conference, Abstract No. TuOrD379*. Durban.

Kongsin, S., and Watts, C. (2000, 7-8 July). *Conducting a household survey on economic impact of chronic HIV/AIDS morbidity in rural Thailand: methodological issues.* Paper presented at the AIDS and Economics Symposium, Durban.

Kongsin, S., Watts, C., and Jiamton, S. (2002a). The impact of chronic HIV/AIDS morbidity on the economic well being of households: Evidence from Phayao, Thailand, *International AIDS Conference, Abstract No. TuPeE5180*. Barcelona.

Kongsin, S., Watts, C., and Jiamton, S. (2002b, 7-12 July). *The impact of chronic HIV/AIDS morbidity on the economic well being of households: Evidence from Phayao, Thailand.* Paper presented at the International AIDS Conference, Bangkok.

Kremer, M. (1996). Integrating behavioral choice into epidemiological models of AIDS. *Quarterly Journal of Economics, 111*(2), 549-573.

Kremer, M., and Morcom, C. (1998). The effect of changing sexual activity on HIV prevalence. *Mathematical Biosciences, 51*(1), 99-122.

Krongkaew, M. (1993). Poverty and income distribution. In P. G. Warr (Ed.), *The Thai economy in transition* (pp. 401-437). Cambridge: Cambridge University Press.

Krueger, L. E., Wood, R. W., Diehr, P. H., and Maxwell, C. L. (1990). Poverty and HIV seropositivity: the poor are more likely to be infected. *AIDS, 4*(8), 811-814.

Kunanusont, C., Phoolcharoen, W., and Bodaramik, Y. (1999). Evolution of medical services for HIV/AIDS in Thailand. *Journal of the Medical Association of Thailand, 82*(5), 425-434.

Kunawararak, P., Beyrer, C., Natpratan, C., Feng, W., Celentano, D. D., de Boer, M. A., Nelson, K.E., and Khamboonruang, C. (1995). The epidemiology of HIV and syphilis among male commercial sex workers in northern Thailand. *AIDS, 9*(5), 517-521.

Kwesigabo, G., Killewo, J. Z., Godoy, C., Urassa, W., Mbena, E., Mhalu, F., Biberfeld, G., Wall, S., and Sandstrom, A. (1998). Decline in the prevalence of HIV-1 infection in young women in the Kagera region of Tanzania. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology, 17*(3), 262-268.

Lagarde, E., Schim van der Loeff, M., Enel, C., Holmgren, B., Dray-Spira, R., Pison, G., Piau, J.P., Delaunay, V., M'Boup, S., Ndoye, I., Coeuret-Pellicer, M., Whittle, H., and Aaby, P. (2003). Mobility and the spread of human immunodeficiency virus into rural areas of West Africa. *International Journal of Epidemiology, 32*(5), 744-752.

Laguide, R., Elenga, N., Fassinou, P., Atta, H., Foiryolo, S., and Msellati, P. (2003). Direct costs of medical care for HIV-infected children before and during HAART in Abidjan, Cote d'Ivoire, 2000-2002. In J. Moatti, B. Coriat, Y. Souteyrand, T. Barnett, J. Dumoulin and Y. Flori (Eds.), *Economics of AIDS and access to HIV/AIDS care in developing countries - issues and challenges* (pp. 311-327). Paris: Agence nationale de recherches sur le sida.

Lamptey, P., Wigley, M., Carr, D., and Collymore, Y. (2002). Facing the HIV/AIDS pandemic. *Population Bulletin, 57*(3).

Lancaster, G., and Ray, R. (1998). Comparison of alternative methods of household equivalence scales: the Australian evidence on unit record data. *The Economic Record, 74*(224), 1-14.

Lancaster, G., Ray, R., and Valenzuela, M. R. (1999). A cross-country study of equivalence scales and expenditure inequality on unit record household budget data. *Review of Income and Wealth, 45*(4), 455-482.

Lanjouw, J. O. (1997). Demystifying poverty lines, *SEPED Poverty Reduction Series*. New York: United Nations Development Programme.

Lanjouw, J. O. (2002). Intellectual property and the availability of pharmaceuticals in poor countries, *Center for Global Development Working Paper 5*. Washington, D.C.: Center for Global Development.

Lanjouw, P., and Ravallion, M. (1995). Poverty and household size. *Economic Journal, 105*(433), 1415-1434.

Lekuthai, P. (2002). Local wisdom and modern approach on rural development: a case study of Khon Kaen province in Thailand, *Graduate School of International Development Discussion Paper NO. 106*. Nagoya: Graduate School of International Development, Nagoya University.

Leser, C. E. V. (1963). Forms of Engel functions. *Econometrica, 31*(4), 694-703.

Lewis, J. J. C., Ronsmans, C., Ezeh, A., and Gregson, S. (2004). The Population Impact of HIV on Fertility in Sub-Saharan Africa. *AIDS, 18*(Supplement 2), S35-S43.

Lim, S. (2001). Poverty, rural women and HIV: implications for project appraisal. *Monthly Bulletin of the Institute of Humanities, Japan*.

Lim, S., and Cameron, M. P. (2003). The contribution of multinationals to the fight against HIV/AIDS. In R. Sullivan (Ed.), *Business and human rights: dilemmas and solutions*. Sheffield, U.K.: Greenleaf Publishing.

Lim, S., Cameron, M. P., Apinundecha, C., and Laohasiriwong, W. (2004). Economic interventions in the fight against HIV/AIDS: a case study of northeast Thailand. *Journal of GMS Development Studies, 1*(1), 67-88.

Lim, S., Cameron, M. P., Taweekul, K., and Askwith, J. (2006). *Harnessing the private sector for rural development, poverty alleviation, and HIV prevention*.Unpublished manuscript.

Limanonda, B., Chongwatana, N., Tirasawat, P., and Auwanit, W. (1993). Summary report on the demographic and behavioural study of female commercial sex workers in Thailand, *IPS Publication 210/93*. Bangkok: Institute of Population Studies, Chulalongkorn University.

Limpakarnjanarat, K., Mastro, T. D., Saisorn, S., Uthaivoravit, W., Kaewkungwal, J., Korattana, S., Young, N.L., Morse, S.A., Schmid, D.S., Weniger, B.G., and Nieburg, P. (1999). HIV-1 and other sexually transmitted infections in a cohort of female sex workers in Chiang Rai, Thailand. *Sexually Transmitted Infections, 75*(1), 30-35.

Limsuwan, A., Kanapa, S., and Siristonapun, Y. (1986). Acquired immune deficiency syndrome in Thailand: a report of two cases. *Journal of the Medical Association of Thailand, 69*(3), 164-169.

Lloyd, P. J. (1991). AIDS: an economic approach to the choice of policies. *The Economic Record, 67*(197), 126-138.

Lloyd, P. J. (1992). AIDS and 'market failure': a reply. *The Economic Record, 68*(202), 281-282.

Loconte, J. (2003). The White House initiative to combat AIDS: learning from Uganda. *Backgrounder*(1692).

Loevinsohn, M., and Gillespie, S. (2003). HIV/AIDS, food security and rural livelihoods: understanding and responding, *RENEWAL Working Paper No. 2*. Washington, D.C.: International Food Policy Research Institute.

Lugalla, J., Emmelin, M., Mutembi, A., Sima, M., Kwesigabo, G., Killewo, J. Z., and Dahlgren, L. (2004). Social, cultural and sexual behavioral determinants of observed decline in HIV infection trends: lessons from the Kagera region, Tanzania. *Social Science & Medicine, 59*(1), 185-198.

Lundberg, M., Over, M., and Mujinja, P. (2000). Sources of financial assistance for households suffering an adult death in Kagera, Tanzania. *South African Journal of Economics, 68*(5), 947-984.

Lux, T. E. (1969). The Thai-Lao family system and domestic cycle of northeastern Thailand. *Journal of the National Research Council of Thailand, 5*(1-4), II-1-II-17.

Lyttleton, C. (1994). The good people of Isan: commercial sex in Northeast Thailand. *Australian Journal of Anthropology, 5*(3), 257-279.

Lyttleton, C. (1996). Messages of distinction: the HIV/AIDS media campaign in Thailand. *Medical Anthropology, 16*(4?), 363-389.

Lyttleton, C., and Amarapibal, A. (2002). Sister cities and easy passage: HIV, mobility and economies of desire in a Thai/Lao border zone. *Social Science & Medicine, 54*(4), 505-518.

MacKinnon, J. G., and White, H. (1985). Some heteroskedasticity-consistent covariance matrix estimators with improved finite sample properties. *Journal of Econometrics, 29*(3), 305-325.

MacQuene, K., Samson, M. J., van Niekerk, I., and McCarthy-Johnson, T. (2002). Poverty, HIV/AIDS and social security, *Economic Policy Research Institute Research Paper 30*. Cape Town: Economic Policy Research Institute.

Mahmood, S. A. I. (2004). The socio-economic impact of HIV/AIDS in Bangladesh: the role of public administration in response to HIV/AIDS. *Southern Business Review, 30*(1), 25-32.

Malamba, S. S., Wagner, H.-U., Maude, G., Okongo, J. M., Nunn, A. J., Kengeya-Kayondo, J. F., and Mulder, D.W. (1994). Risk factors for HIV-1 infection in adults in a rural Ugandan community: a case-control study. *AIDS, 8*(2), 253-257.

Maltagliati, M. (1999, 10-18 August). *An analytical solution to determine equivalence scales from single equation models.* Paper presented at the 52nd Conference of the International Statistical Institute, Helsinki, Finland.

Manly, B. F. J. (1994). *Multivariate statistical methods - a primer* (2nd ed.). London: Chapman & Hall.

Manning, R. (2002). *AIDS and democracy: what do we know?* Durban: Health Economics and HIV/AIDS Research Division, University of Natal.

Manopaiboon, C., Shaffer, N., Clark, L., Bhadrakom, C., Siriwasin, W., Chearskul, S., Suteewan, W., Kaewkungwal, J., Bennetts, A., and Mastro, T.D. (1998). Impact of HIV on families of HIV-infected women who have recently given birth, Bangkok, Thailand. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology, 18*(1), 54-63.

Manser, M., and Brown, M. (1980). Marriage and household decision-making: a bargaining analysis. *International Economic Review, 21*(1), 31-44.

Marchal, B., De Brouwere, V., and Kegels, G. (2005). HIV/AIDS and the health workforce crisis: What are the next steps? *Tropical Medicine and International Health, 10*(4), 300-304.

Mason, C. J., Kitsiripornchai, S., Markowitz, L. E., Chanbancherd, P., Supapongse, T., Jugsudee, A., Sirisopana, N., Chuenchitra, C., Torugsa, K., VanCott, T.C., Michael, R.A., and Nitayaphan, S. (1998). Nationwide surveillance of HIV-1 prevalence and subtype in young Thai men. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology, 19*(1), 165-173.

Mason, C. J., Markowitz, L. E., Kitsiripornchai, S., Jugsudee, A., Sirisopana, N., Torugsa, K., Carr, J.K., Michael, R.A., Nitayaphan, S., and McNeil, J.G. (1995). Declining prevalence of HIV-1 infection in young Thai men. *AIDS*, *9*(9), 1061-1065.

Mason, J. B., Bailes, A., Mason, K. E., Yambi, O., Jonsson, U., Hudspeth, C., Hailey, P., Kendle, A., Brunet, D., and Martel, P. (2005). AIDS, drought, and child malnutrition in southern Africa. *Public Health Nutrition, 8*(6), 551-563.

Mastro, T. D., and de Vincenzi, I. (1996). Probabilities of sexual HIV-1 transmission. *AIDS, 10*(Supplement A), S75-S82.

Mastro, T. D., and Limpakarnjanarat, K. (1995). Condom use in Thailand: how much is it slowing the HIV/AIDS epidemic? *AIDS, 9*(5), 523-525.

Matangi, C. N. (2006). Skills under threat: The case of HIV/AIDS in the mining industry in Zimbabwe. *Journal of International Development, 18*(5), 599-628.

Mather, D., Donovan, C., Jayne, T. S., Weber, M., Mazhangara, E., Bailey, L., Yoo, K., Yamano, T., and Mghenyi, E. (2004). *A cross-country analysis of household responses to adult mortality in rural sub-Saharan Africa: implications for HIV/AIDS mitigation and rural development policies*. East Lansing, Mi.: Department of Agricultural Economics and Department of Economics, Michigan State University.

Maticka-Tyndale, E., Kiewying, M., Haswell-Elkins, M. R., Kuyyakanond, T., Anursorntearakul, S., Chantapreeda, N., Choosathan, R., Sornchai, S., Theerasobhon, P, Supornpun, A., Siriwattanametanont, J., and Elkins, D.B. (1994). Knowledge, attitudes and beliefs about HIV/AIDS among women in northeastern Thailand. *AIDS Education and Prevention, 6*(3), 205-218.

McDonald, S., and Roberts, J. (2006). AIDS and economic growth: a human capital approach. *Journal of Development Economics, 80*(1), 228-250.

McElroy, M. B., and Horney, M. J. (1981). Nash-bargained household decisions: toward a generalization of the theory of demand. *International Economic Review*, *22*(2), 333-349.

McGrath, J. W., Ankrah, E. M., Schumann, D. A., Nkumbi, S., and Lubega, M. (1993). AIDS and the urban family: its impact in Kampala, Uganda. *AIDS Care*, *5*(1), 55-78.

McKay, A. (2000). Should the survey measure total household income? In M. Grosh and P. Glewwe (Eds.), *Designing household survey questionnaires for developing countries* (Vol. 3, pp. 83-104). Washington, D.C.: World Bank.

McNabb, R. (1979). A socio-economic model of migration. *Regional Studies, 13*(3), 297-304.

Menon, R., Wawer, M. J., Konde-Lule, J. K., Sewankambo, N. K., and Li, C. (1998). The economic impact of adult mortality on households in Rakai district, Uganda. In M. Ainsworth, L. Fransen and M. Over (Eds.), *Confronting AIDS: evidence from the developing world* (pp. 325-339). Luxembourg: European Commission.

Merson, M. H., Dayton, J. M., and O'Reilly, K. R. (2000). Effectiveness of HIV prevention interventions in developing countries. *AIDS, 14*(Supplement 2), S68-S84.

Michelo, C., Sandoy, I. F., and Fylkesnes, K. (2006). Marked HIV prevalence declines in higher educated young people: evidence from population-based surveys (1995-2003) in Zambia. *AIDS, 20*(7), 1031-1038.

Mills, M. B. (1997). Contesting the margins of modernity: women, migration, and consumption in Thailand. *American Ethnologist, 24*(1), 37-61.

Mills, S. (2000). Back to behavior: prevention priorities in countries with low HIV prevalence. *AIDS, 14*(Supplement 3), S267-S273.

Miracle, M. P. (1968). "Subsistence agriculture": analytical problems and alternative concepts. *American Journal of Agricultural Economics, 50*(2), 292-310.

Mishan, E. J. (1971). Evaluation of life and limb: a theoretical approach. *Journal of Political Economy, 79*(4), 687-705.

Morris, C. N., Burdge, D. R., and Cheevers, E. J. (2000). Economic impact of HIV infection in a cohort of male sugar mill workers in South Africa. *South African Journal of Economics, 68*(5), 933-946.

Morris, M., Podhisita, C., Wawer, M. J., and Handcock, M. S. (1996). Bridge populations in the spread of HIV/AIDS in Thailand. *AIDS, 10*(11), 1265-1271.

Muecke, M. A. (1990). The AIDS prevention dilemma in Thailand. *Asian and Pacific Population Forum, 4*(4), 1-27.

Muecke, M. A. (1992). Mother sold food, daughter sells her body: the cultural continuity of prostitution. *Social Science & Medicine, 35*(7), 891-901.

Mukiza-Gapere, J., and Ntozi, J. P. M. (1995). Impact of AIDS on marriage patterns, customs and practices in Uganda. *Health Transition Review, 5*(Supplement), 201-208.

Munoz, A., Sabin, C. A., and Phillips, A. N. (1997). The incubation period of AIDS. *AIDS, 11*(Supplement A), S69-S76.

Murphy, L. L., Harvey, P., and Silvestre, E. (2005). How do we know what we know about the impact of AIDS on food and livelihood insecurity? A review of empirical research from rural sub Saharan Africa. *Human Organization, 64*(3), 265-275.

Musgrove, P. (1979). Permanent household income and consumption in urban South America. *American Economic Review, 69*(3), 355-368.

Mushala, H. M. (2002). *The impact of HIV/AIDS on subsistence agriculture in Swaziland: some policy implications*. Kwaluseni, Swaziland: University of Swaziland.

Mushati, P., Zvidzai, C., Lewis, J. J., and Gregson, S. (2004). Adult mortality and the economic sustainability of households in towns, estates and villages in AIDS-afflicted eastern Zimbabwe, *International AIDS Conference, Abstract No. TuPeD5294*. Bangkok.

Mutangadura, G. B., Mukurazita, D., and Jackson, H. (1999). *A review of household and community responses to the HIV/AIDS epidemic in the rural areas of sub-Saharan Africa*. Geneva: UNAIDS.

Nagelkerke, N. J. D., Jha, P., de Vlas, S. J., Korenromp, E., Moses, S., Blanchard, J. F., and Plummer, F.A. (2001). *Modelling the HIV/AIDS epidemics in India and Botswana: the effect of interventions*. Boston: Commission on Macroeconomics and Health.

Nakiyingi, J. S., Malamba, S. S., Kamali, A., Carpenter, L. M., Nunn, A. J., and Whitworth, J. A. G. (1997, 3-6 February). *Household composition and the HIV-1 epidemic in a rural Ugandan population.* Paper presented at the Conference on the Socio-Demographic Impact of AIDS in Africa, Durban.

Nampanya-Serpell, N. (2000, 7-8 July). *Social and economic risk factors for HIV/AIDS-affected families in Zambia.* Paper presented at the IAEN AIDS and Economics Symposium, Durban.

Nandakumar, A. K., Schneider, P., Bhawalker, M., and Butera, D. (2000). *Use of and expenditures on outpatient health care by a group of HIV positive individuals in Rwanda*. Bethesda, Md.: Partnerships for Health Reform Project, Abt Associates Inc.

Narayan, D. (Ed.). (2002). *Empowerment and poverty reduction - a sourcebook*. Washington, D.C.: World Bank.

National Research Council. (1992). *Recommended dietary allowances* (10th ed.). Washington, D.C.: National Academy Press.

National Statistical Office. (2000). *Preliminary report - the 2000 population and housing census*. Bangkok: National Statistical Office.

Nelson, K. E. (1998). The demographic impact of the HIV epidemic in Thailand. *AIDS, 12*(7), 813-814.

Nelson, K. E., Celentano, D. D., Eiumtrakul, S., Hoover, D. R., Beyrer, C., Suprasert, S., Kuntolbutra, S., and Khamboonruang, C. (1996). Changes in sexual behaviour and a decline in HIV infection among young men in Thailand. *New England Journal of Medicine, 335*(5), 297-303.

Nelson, K. E., Celentano, D. D., Suprasert, S., Wright, N. H., Eiumtrakul, S., Tulvatana, S., Matanasarawoot, A., Akarasewi, P., Kuntolbutra, S., Romyen, S., Sirisopana, N., and Theetranont, C. (1993). Risk factors for HIV infection among young adult men in northern Thailand. *Journal of the American Medical Association, 270*(8), 955-960.

Nelson, K. E., Eiumtrakul, S., Celentano, D. D., Beyrer, C., Galai, N., Kawichai, S., and Khamboonruang, C. (2002). HIV infection in young men in northern Thailand, 1991-1998: increasing role of injection drug use. *Journal of Acquired Immune Deficiency Syndromes, 29*(1), 62-68.

Nelson, K. E., Suriyanon, V., Taylor, E., Wongchak, T., Kingkeow, C., Srirak, N., Lertsrimongkol, C., Cheewawat, W., and Celentano, D.D. (1994). The incidence of HIV-1 infections in village populations of northern Thailand. *AIDS, 8*(7), 951-955.

Nelufule, M. D. (2004). *AIDS and democracy: what do we know? - A literature review update*. Durban: Health Economics and HIV/AIDS Research Division, University of Natal.

Nicholls, S., McLean, R., Theodore, K., Henry, R., and Camara, B. (2000). Modelling the macroeconomic impact of HIV/AIDS in the English speaking Caribbean. *South African Journal of Economics, 68*(5), 916-932.

Nilses, C., Lindmark, G., Munjanja, S., and Nystrom, L. (2000). A community based study of HIV in women in rural Gutu District, Zimbabwe 1992 to 1993. *Central African Journal of Medicine, 46*(2), 32-37.

Nopkesorn, T., Mastro, T. D., Sangkharomya, S., Sweat, M. D., Singharaj, P., Limpakarnjanarat, K., Gayle, H.D, and Weniger, B.G. (1993). HIV-1 infection in young men in northern Thailand. *AIDS, 7*, 9.

Nopkesorn, T., Mock, P. A., Mastro, T. D., Sangkharomya, S., Sweat, M. D., Limpakarnjanarat, K., Laosakkitiboran, J., Young, N.L., Morse, S.A., Schmid, D.S., and Weniger, B.G. (1998). HIV-1 subtype E incidence and sexually transmitted diseases in a cohort of military conscripts in northern Thailand. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology, 18*(4), 372-379.

Ntozi, J. P. M. (1997, 3-6 February). *Widowhood, remarriage and migration during the HIV/AIDS epidemic in Uganda.* Paper presented at the Conference on the Socio-Demographic Impact of AIDS in Africa, Durban.

Ntozi, J. P. M., and Nakayiwa, S. (1997). AIDS in Uganda: how has the household coped with the epidemic? In I. O. Orubuloye, J. C. Caldwell and J. P. M. Ntozi (Eds.), *The continuing HIV/AIDS epidemic in Africa: responses and coping strategies* (pp. 155-180). Canberra: Health Transition Centre, National Centre for Epidemioloby and Population Health, Australian National University.

Nunn, A. J., Kengeya-Kayondo, J. F., Malamba, S. S., Seeley, J. A., and Mulder, D. W. (1994). Risk factors for HIV-1 infection in adults in a rural Ugandan community: a population study. *AIDS, 8*(1), 81-86.

Nunn, A. J., Mulder, D. W., Kamali, A., Ruberantwari, A., Kengeya-Kayondo, J. F., and Whitworth, J. A. G. (1997, 3-6 February). *Five-Year HIV-1 Associated Mortality in a Rural Ugandan Population.* Paper presented at the Conference on the Socio-Demographic Impact of AIDS in Africa, Durban.

Nunn, A. J., Wagner, H.-U., Kamali, A., Kengeya-Kayondo, J. F., and Mulder, D. W. (1995). Migration and HIV-1 seroprevalence in a rural Ugandan population. *AIDS, 9*(5), 503-506.

Nyamukapa, C., and Gregson, S. (2005). Extended family's and women's roles in safeguarding orphans' education in AIDS-afflicted rural Zimbabwe. *Social Science & Medicine, 60*(10), 2155-2167.

Ogena, N. B., and DeJong, G. F. (1999). Internal migration and occupational mobility in Thailand. *Asian and Pacific Migration Journal, 8*(4), 419-446.

Oliver, R. (1997). Model living standards measurement study survey questionnaires for the countries of the former Soviet Union, *Living Standards Measurement Survey Working Paper No. 130*. Washington, D.C.: World Bank.

Oni, S. A., Obi, C. L., Okorie, A., Thabede, D., and Jordan, A. (2002). The economic impact of HIV/AIDS on rural households in Limpopo province. *South African Journal of Economics, 70*(7), 1173-1192.

Ou, C.-Y., Takebe, Y., Weniger, B. G., Lou, C.-C., Kalish, M. L., Auwanit, W., Yamazaki, S., Gayle, H.D., Young, N.L., and Schochetman, G. (1993). Independent introduction of two major HIV-1 genotypes into distinct high-risk populations in Thailand. *Lancet, 341*(8854), 1171-1174.

Over, M. (1992). *The macroeconomic impact of AIDS in sub-Saharan Africa*. Washington, D.C.: World Bank.

Over, M. (1998). Coping with the impact of AIDS. *Finance and Development, 35*(1), 22-24.
Over, M. (1999). The public interest in a private disease: an economic perspective on the government role in STD and HIV control. In K. K. Holmes, P. F. Sparling, P.-A. Mardh, S. M. Lemon, W. E. Stamm, P. Piot and J. N. Wasserheit (Eds.), *Sexually transmitted diseases* (3rd ed., pp. 3-11). New York: McGraw-Hill.
Over, M. (2004). Impact of the HIV/AIDS epidemic on the health sectors of developing countries. In M. Haacker (Ed.), *The macroeconomics of HIV/AIDS* (pp. 311-344). Washington, D.C.: International Monetary Fund.
Over, M., Bertozzi, S. M., Chin, J., N'Galy, B., and Nyamuryekung'e, K. M. (1988). The direct and indirect cost of HIV infection in developing countries: the cases of Zaire and Tanzania. In A. F. Fleming, M. Carballo, D. W. FitzSimons, M. R. Bailey and J. M. Mann (Eds.), *The Global Impact of AIDS* (pp. 123-135). New York: Alan R. Liss, Inc.
Over, M., and Piot, P. (1993). HIV infection and sexually transmitted diseases. In D. T. Jamison, W. H. Mosley, A. R. Measham and J. L. Bobadilla (Eds.), *Disease control priorities in developing countries* (pp. 455-527). Washington, D.C.: World Bank.
Pannarunothai, S., and Mills, A. (1997). The poor pay more: health-related inequality in Thailand. *Social Science & Medicine, 44*(12), 1781-1790.
Parish, R. (1992). AIDS and 'market failure'. *The Economic Record, 68*(202), 278-280.
Parker, R. G., and Aggleton, P. (Eds.). (1999). *Culture, society and sexuality - A reader*. London: UCL press.
Paxson, C. (1993). Consumption and income seasonality in Thailand. *Journal of Political Economy, 101*(1), 39-72.
Paz-Bailey, G., Kilmarx, P. H., Supawitkul, S., Chaowanachan, T., Jeeyapant, S., Sternberg, M., Markowitz, L.E., Mastro, T.D., and van Griensven, G.J.P. (2003). Risk factors for sexually transmitted diseases in northern Thai adolescents. *Sexually Transmitted Diseases, 30*(4), 320-326.
Penning, J. M. E., and Garcia, P. (2005). The Poverty Challenge: How Individual Decision-Making Behavior Influences Poverty. *Economics Letters, 88*(1), 115-119.
Peracca, S., Knodel, J. E., and Saengtienchai, C. (1998). Can prostitutes marry? Thai attitudes toward female sex workers. *Social Science & Medicine, 47*(2), 255-267.
Perngmark, P., Celentano, D. D., and Kawichai, S. (2003a). Needle sharing among southern Thai drug injectors. *Addiction, 98*(8), 1153-1161.
Perngmark, P., Celentano, D. D., and Kawichai, S. (2003b). Risk factors for HIV infection among drug injectors in southern Thailand. *Drug and Alcohol Dependence, 71*(3), 229-238.
Phanuphak, P., Locharernkul, C., Panmuong, W., and Wilde, H. (1985). A report of three cases of AIDS in Thailand. *Asian Pacific Journal of Allergy and Immunology, 3*, 195-199.
Philipson, T. J., and Posner, R. A. (1993). *Private choices and public health: the AIDS epidemic in an economic perspective*. Cambridge, Ma.: Harvard University Press.
Philipson, T. J., and Posner, R. A. (1995). The microeconomics of the AIDS epidemic in Africa. *Population and Development Review, 21*(4), 835-848.

Phoolcharoen, W. (1998). HIV/AIDS prevention in Thailand: success and challenges. *Science, 280*(5371), 1873-1874.

Phoolcharoen, W., Ungchusak, K., Sittitrai, W., and Brown, T. F. (1998). Thailand: lessons from a strong national response to HIV/AIDS. *AIDS, 12*(Supplement B), S123-S135.

Pisani, E., Garnett, G. P., Brown, T. F., Stover, J., Grassly, N. C., Hankins, C., Walker, N., and Ghys, P.D. (2003). Back to basics in HIV prevention: focus on exposure. *British Medical Journal, 326*(7403), 1384-1387.

Pitayanon, S., Kongsin, S., and Janjaroen, W. S. (1997). The economic impact of HIV/AIDS mortality on households in Thailand. In D. E. Bloom and P. Godwin (Eds.), *The economics of HIV and AIDS - the case of South and South East Asia* (pp. 53-101). Delhi: Oxford University Press.

Piwoz, E. G., and Preble, E. A. (2000). *HIV/AIDS and nutrition: A review of the literature and recommendations for nutritional care and support in Sub-Saharan Africa*. Washington, D.C.: United States Agency for International Development.

Plamondon, P., Cichon, M., and Amnnycke, P. (2004). Financial effects of HIV/AIDS on national social protection schemes. In M. Haacker (Ed.), *The macroeconomics of HIV/AIDS* (pp. 259-285). Washington, D.C.: International Monetary Fund.

Podhisita, C., Wawer, M. J., Pramualratana, A., Kanungsukkasem, U., and McNamara, R. (1996). Multiple sexual partners and condom use among long-distance truck drivers in Thailand. *AIDS Education and Prevention, 8*(6), 490-498.

Poku, N. K. (2002). Poverty, debt and Africa's HIV/AIDS crisis. *International Affairs, 78*(3), 531-546.

Pollak, R. A. (1985). A transaction cost approach to families and households. *Journal of Economic Literature, 23*(2), 581-608.

Population and Community Development Association. (2000). *Thai Business Initiative in Rural Development: yearbook 2000*. Bangkok: Population and Community Development Association.

Porpora, D., and Lim, M. H. (1987). The political economic factors of migration to Bangkok. *Journal of Contemporary Asia, 17*(1), 76-89.

Postma, M. J., Jager, J. C., Dijkgraaf, M. G. W., Borleffs, J. C. C., Tolley, K., and Leidl, R. M. (1995). AIDS scenarios for the Netherlands: the economic impact on hospitals. *Health Policy, 31*(1), 127-150.

Pothisiri, P., Tangcharoensathien, V., Lertiendumrong, J., Kasemsup, V., and Hanvoravongchai, P. (1999). *Funding priorities for the HIV/AIDS crisis in Thailand*. Geneva: UNAIDS.

Pradhan, B. K., and Sundar, R. (2006). *Gender impact of HIV and AIDS in India*. New Delhi: United Nations Development Programme.

Preble, E. A. (1990). Impact of HIV/AIDS on African children. *Social Science & Medicine, 31*(6), 671-680.

Punpanich, W., Ungchusak, K., and Detels, R. (2004). Thailand's response to the HIV epidemic: yesterday, today, and tomorrow. *AIDS Education and Prevention, 16*(Supplement A), 119-136.

Puthanakit, T., Oberdorfer, A., Akarathum, N., Kanjanavanit, S., Wannarit, P., Sirisanthana, T., and Sirisanthana, V. (2005). Efficacy of highly active antiretroviral therapy in HIV-infected children participating in Thailand's national access to antiretroviral program. *Clinical Infectious Diseases, 41*(1), 100-107.

Puwastien, P., Burlingame, B., Raroengwichit, M., and Sungpuag, P. (2000). *ASEAN food composition tables*. Bangkok: Institute of Nutrition, Mahidol University.

Quattek, K. (2000). The economic impact of AIDS in South Africa: a dark cloud on the horizon. In M. Schonteich, G. Mills, R. Shell and K. Quattek (Eds.), *HIV/AIDS: a threat to the African renaissance?* (pp. 29-56). Johannesburg: Konrad Adenauer Stiftung.

Quigley, M., Munguti, K., Grosskurth, H., Todd, J., Mosha, F. F., Senkoro, K. P., Newell, J.N., Mayaud, P., ka-Gina, G., Klokke, A.H., Mabey, D., Gavyole, A., and Hayes, R.J. (1997). Sexual behaviour patterns and other risk factors for HIV infection in rural Tanzania: A case-control study. *AIDS, 11*(2), 237-248.

Ramanathan, R. (2002). *Introductory econometrics with applications*. Orlando, Fl.: Harcourt College Publishers.

Ramasoota, T. (1991). Four years follow-up of the impact of AIDS and intensive health education on the control of sexually transmitted diseases in Thailand. *Southeast Asian Journal of Tropical Medicine and Public Health, 22*(4), 489-498.

Rangsin, R., Chiu, J., Khamboonruang, C., Sirisopana, N., Eiumtrakul, S., Brown, A. E., Robb, M., Beyrer, C., Ruangyuttikarn, C., Markowitz, L.E., and Nelson, K.E. (2004). The natural history of HIV-1 infection in young Thai men after seroconversion. *Journal of Acquired Immune Deficiency Syndromes, 36*(1), 622-629.

Rao, V., Gupta, I., Lokshin, M., and Jana, S. (2003). Sex workers and the cost of safe sex: the compensating differential for condom use among Calcutta prostitutes. *Journal of Development Economics, 71*(2), 585-603.

Ravallion, M. (1994). Poverty comparisons, *Fundamentals of Pure and Applied Economics Volume 56*. Chur, Switzerland: Harwood Academic Publishers.

Ravallion, M. (1996). Issues in measuring and modelling poverty. *The Economic Journal, 106*(438), 1328-1343.

Razak, M. H., Jittiwutikarn, J., Suriyanon, V., Vongchak, T., Srirak, N., Beyrer, C., Kawichai, S., Tovanabutra, S., Rungruengthanakit, K., Sawanpanyalert, P., and Celentano, D.D. (2003). HIV prevalence and risks among injection and noninjection drug users in northern Thailand: need for comprehensive HIV prevention programs. *Journal of Acquired Immune Deficiency Syndromes, 33*(2), 259-266.

Rehle, T., Brinkmann, U. K., Siraprapasiri, T., Coplan, P., Aiemsukawat, C., and Ungchusak, K. (1992). Risk factors of HIV-1 infection among female prostitutes in Khon Kaen, Northeast Thailand. *Infection, 20*(6), 328-331.

Rhucharoenpornpanich, O., and Chamratrithirong, A. (1999). *Demographic impact of AIDS on the Thai population*. Nakhon Pratom, Thailand: Institute of Population and Social Research, Mahidol University.

Rhucharoenpornpanich, O., and Chamratrithirong, A. (2001). Demographic impact of AIDS on the Thai population. *Asia-Pacific Population Journal, 16*(3), 71-88.

Rice, D. P. (1967). Estimating the cost of illness. *American Journal of Public Health, 57*(3), 424-440.
Richter, K. (2006). Thailand's growth path: from recovery to prosperity, *World Bank Policy Research and External Affairs Working Paper WPS3912*. Washington, D.C.: World Bank.
Richter, K., Guest, P., Boonchalaksi, W., Piriyathamwong, N., and Ogena, N. B. (1997). Migration and the rural family: sources of support and strain in a mobile society, *Institute for Population and Social Research Publication 190*. Nakhom Pathom, Thailand: Institute for Population and Social Research, Mahidol University.
Ritchey, P. N. (1976). Explanations of migration. *Annual Review of Migration, 2*, 363-404.
Rojanapithayakorn, W., and Hanenberg, R. (1996). The 100% condom program in Thailand. *AIDS, 10*(1), 1-7.
Rosen, S. B., MacLeod, W. B., Vincent, J. R., Fox, M. P., Thea, D. M., and Simon, J. L. (2002). Investing in the epidemic: the impact of AIDS on businesses in southern Africa, *International AIDS Conference, Abstract No. ThOrG1505*. Barcelona.
Rosen, S. B., and Simon, J. L. (2002, 6-7 July). *Shifting the burden of HIV/AIDS.* Paper presented at the 2nd IAEN Economics of HIV/AIDS in Developing Countries Symposium, Barcelona.
Rosen, S. B., and Simon, J. L. (2003). Shifting the burden: the private sector's response to the AIDS epidemic in Africa. *Bulletin of the World Health Organisation, 81*(2), 131-137.
Rosen, S. B., Vincent, J. R., MacLeod, W. B., Fox, M. P., Thea, D. M., and Simon, J. L. (2004). The cost of HIV/AIDS to businesses in southern Africa. *AIDS, 18*(2), 317-324.
Rosenzweig, M. R. (1986). Program interventions, intrahousehold distribution and the welfare of individuals: modeling household behavior. *World Development, 14*(2), 233-243.
Rosenzweig, M. R., and Schultz, T. P. (1982). Market opportunities, genetic endowments, and intrafamily resource distribution: child survival in rural India. *American Economic Review, 72*(4), 803-815.
Rothbarth, E. (1943). Note on a method of determining equivalent income for families of different composition. In C. Madge (Ed.), *War-time pattern of saving and spending*. Cambridge: Cambridge University Press.
Rowley, J. T., Anderson, R. M., and Ng, T. W. (1990). Reducing the spread of HIV infection in sub-Saharan Africa: some demographic and economic implications. *AIDS, 4*(1), 47-56.
Ru, X. (2006). Youth and HIV/AIDS in China. In J. Kaufman, A. Keinman and T. Saich (Eds.), *AIDS and social policy in China* (pp. 232-240). Cambridge, Ma.: Harvard University Asia Center.
Rugalema, G. (2000). Coping or struggling? A journey into the impact of HIV/AIDS in southern Africa. *Review of African Political Economy, 27*(86), 537-545.
Ruxrungtham, K., and Phanuphak, P. (2001). Update on HIV/AIDS in Thailand. *Journal of the Medical Association of Thailand, 84*(Supplement 1), S1-S17.

Sackey, J., and Raparla, T. (2000). Lesotho - the development impact of HIV/AIDS - selected issues and options, *Report No. 21103-LSO*. Washington, D.C.: World Bank.
Sackey, J., and Raparla, T. (2001). Swaziland - selected development impact of HIV/AIDS, *Report No. 22044-SW*. Washington, D.C.: World Bank.
Sackey, J., Raparla, T., and Kolavalli, S. (2001). Namibia - selected development impact of HIV/AIDS, *Report No. 22046-NAM*. Washington, D.C.: World Bank.
Saelim, A., Geater, A., Chongsuvivatwong, V., Rodklay, A., and Bechtel, G. A. (1998). Needle sharing and high-risk sexual behaviors among IV drug users in Southern Thailand. *AIDS Patient Care and STDs*, *12*(9), 707-713.
Saengwonloey, O., Jiraphongsa, C., and Foy, H. M. (2003). Thailand report: HIV/AIDS surveillance 1998. *Journal of Acquired Immune Deficiency Syndromes*, *32*(Supplement 1), S63-S67.
Samuelson, P. (1956). Social indifference curves. *Quarterly Journal of Economics*, *90*(1), 1-22.
Sauerborn, R., Adams, A., and Hien, M. (1996). Household strategies to cope with the economic costs of illness. *Social Science & Medicine*, *43*(3), 291-301.
Sawanpanyalert, P., Supawitkul, S., Yanai, H., Saksoong, P., and Piyaworawong, S. (1999). Trend of HIV incidence rates among drug users in an HIV epicenter in northern Thailand (1989-1997). *Journal of Epidemiology, 9*(2), 114-120.
Sawanpanyalert, P., Ungchusak, K., Thanprasertsuk, S., and Akarasewi, P. (1994). HIV-1 seroconversion rates among female commercial sex workers, Chiang Mai, Thailand: a multi cross-sectional study. *AIDS*, *8*(6), 825-829.
Sawanpanyalert, P., Uthaivoravit, W., Yanai, H., Limpakarnjanarat, K., Mastro, T. D., and Nelson, K. E. (1996). Donation deferral criteria for Human Immunodeficiency Virus positivity among blood donors in northern Thailand. *Transfusion, 36*(3), 242-249.
Schechter, M. T., Hogg, R. S., Aylward, B., Craib, K. J. P., Le, T. N., and Montaner, J. S. G. (1994). Higher socioeconomic status is associated with slower progression of HIV infection independent of access to health care. *Journal of Clinical Epidemiology, 47*(1), 59-67.
Scheffe, H. (1953). A method for judging all contrasts in the analysis of variance. *Biometrika*, *40*(1/2), 87-104.
Schoub, B. D. (1999). *AIDS and HIV in perspective - a guide to understanding the virus and its consequences* (2nd ed.). Cambridge, U.K.: Cambridge University Press.
Schultz, T. P. (1990). Testing the neoclassical model of family labor supply and fertility. *Journal of Human Resources, 25*(4), 599-634.
Scitovsky, A. A. (1988). Estimates of the direct and indirect costs of AIDS in the United States. In A. F. Fleming, M. Carballo, D. W. FitzSimons, M. R. Bailey and J. M. Mann (Eds.), *The Global Impact of AIDS* (pp. 137-144). New York: Alan R. Liss, Inc.
Scitovsky, A. A., and Rice, D. P. (1987). Estimates of the direct and indirect costs of acquired immunodeficiency sydrome in the United States, 1985, 1986, and 1991. *Public Health Report, 102*(1), 5-17.
Semba, R. D., and Tang, A. M. (1999). Micronutrients and the pathogenesis of human immunodeficiency virus infection. *British Journal of Nutrition, 81*(3), 181-189.

Sen, A. K. (1976). Poverty: an ordinal approach to measurement. *Econometrica, 44*(2), 219-231.

Sen, A. K. (1981). Ingredients of famine analysis: availability and entitlements. *Quarterly Journal of Economics, 96*(3), 433-464.

Sen, A. K. (1995). Food, economics and entitlements. In J. Dreze, A. K. Sen and A. Hussain (Eds.), *The political economy of hunger: selected essays*. Oxford: Oxford University Press.

Sen, A. K. (1999). *Development as freedom*. Oxford: Oxford University Press.

Senkoro, K. P., Boerma, J. T., Klokke, A. H., Ng'weshemi, J. Z. L., Muro, A. S., Gabone, R., and Borgdorff, M.W. (2000). HIV incidence and HIV-associated mortality in a cohort of factory workers and their spouses in Tanzania, 1991 through 1996. *Journal of Acquired Immune Deficiency Syndromes, 23*(2), 194-202.

Serwadda, D., Wawer, M. J., Musgrave, S. D., Sewankambo, N. K., Kaplan, J. E., and Gray, R. H. (1992). HIV risk factors in three geographic strata of rural Rakai District, Uganda. *AIDS, 6*(9), 983-989.

Shaeffer, S. (1995). The impact on education. In T. F. Brown and W. Sittitrai (Eds.), *The impact of HIV on children in Thailand* (pp. 151-163). Bangkok: Program on AIDS, Thai Red Cross Society.

Shapouri, S., and Rosen, S. (2001). Toll on agriculture from HIV/AIDS in sub-Saharan Africa. *Agriculture Information Bulletin, 765-9*.

Sharp, P. M., Robertson, D. L., Gao, F., and Hahn, B. H. (1994). Origins and diversity of human immunodeficiency viruses. *AIDS, 8*(Supplement 1), S27-S42.

Shell, R. (2000). Halfway to the holocaust: the economic, demographic and social implications of the AIDS pandemic to the year 2010 in the southern African region. In M. Schonteich, G. Mills, R. Shell and K. Quattek (Eds.), *HIV/AIDS: a threat to the African renaissance?* Johannesburg: Konrad Adenauer Stiftung.

Shisana, O., Zungu-Dirwayi, N., Toefy, Y., Simbayi, L. C., Malik, S., and Zuma, K. (2004). Marital status and risk of HIV infection in South Africa. *South African Medical Journal, 94*(7), 537-543.

Siamwalla, A., Setboonsarng, S., and Patamasiriwat, D. (1993). Agriculture. In P. G. Warr (Ed.), *The Thai Economy in Transition* (pp. 81-117). Cambridge: Cambridge University Press.

Sidak, Z. (1967). Rectangular confidence regions for the means of multivariate normal distributions. *Journal of the American Statistical Association, 62*(318), 626-633.

Siraprapasiri, T., Thanprasertsuk, S., Rodklay, A., Srivanichakorn, S., Sawanpanyalert, P., and Temtanarak, J. (1991). Risk factors for HIV among prostitutes in Chiangmai, Thailand. *AIDS, 5*(5), 579-582.

Sirisopana, N., Torugsa, K., Mason, C. J., Markowitz, L. E., Jugsudee, A., Supapongse, T., Chuenchitra, C., Michael, R.A., Burke, D.S., Singharaj, P., Johnson, A.E., McNeil, J.G., McCutchan, F.E., and Carr, J.K. (1996). Correlates of HIV-1 seropositivity among young men in Thailand. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology, 11*(5), 492-498.

Sittitrai, W., and Brown, T. F. (1994). Risk factors for HIV infection in Thailand. *AIDS, 8*(Supplement 2), S143-S153.

Smith, D. G. (1990). Thailand: AIDS crisis looms. *Lancet, 335*(8692), 781-782.

Smith, J. S., Nalugoda, F., Wawer, M. J., Serwadda, D., Sewankambo, N. K., Konde-Lule, J. K., Lutalo, T., Li, C., and Gray, R.H. (1999). Education attainment as a predictor of HIV risk in rural Uganda: Results from a population-based study. *International Journal of STD and AIDS, 10*(7), 452-459.

Solow, R. M. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics, 70*(1), 65-94.

Srinivasan, S., and Sukumar, M. (2006). Liberalization and HIV in Kerala, *Social Policy and Development Programme Paper Number 26*. Geneva: UNRISD.

Stark, O. (2006). Inequality and migration: a behavioral link. *Economics Letters, 91*(1), 146-152.

Stark, O., and Taylor, J. E. (1991a). *Relative Deprivation and Migration: Theory, Evidence and Policy Implications*. Washington, D.C.: World Bank.

Stark, O., and Taylor, J. E. (1991b). Relative deprivation and migration: theory, evidence and policy implications, *World Bank Policy Research and External Affaris Working Paper WPS656*. Washington, D.C.: World Bank.

Stark, O., and Wang, Y. Q. (2000). A theory of migration as a response to relative deprivation. *German Economic Review, 1*(2), 131-143.

Steinfatt, T. M. (2002). *Working at the bar - sex work and health communication in Thailand*. Westport, Ct.: Ablex Publishing.

Stillwaggon, E. (2000). HIV transmission in Latin America: comparison with Africa and policy implications. *South African Journal of Economics, 68*(5), 985-1011.

Stillwaggon, E. (2002). HIV/AIDS in Africa: fertile terrain. *Journal of Development Studies, 38*(6), 1-22.

Stillwaggon, E. (2005, 14-16 April). *The ecology of poverty: nutrition, parasites, and vulnerability to HIV/AIDS.* Paper presented at the HIV/AIDS and Food and Nutrition Security Conference, Durban.

Stover, J. (1998). The future demographic impact of AIDS: what do we know? In M. Ainsworth, L. Fransen and M. Over (Eds.), *Confronting AIDS: evidence from the developing world* (pp. 11-38). Luxembourg: European Commission.

Strickland, R. S. (2004). *To have and to hold - Women's property and inheritance rights in the context of HIV/AIDS in Sub-Saharan Africa*. Washington, D.C.: International Center for Research on Women.

Strickler, H., Hoover, D. R., and Dersimonian, R. (1995). Problems in interpreting HIV sentinel seroprevalence studies. *Annals of Epidemiology, 5*(6), 447-454.

Subbarao, K., Mattimore, A., and Plangemann, K. (2001). *Social protection of Africa's orphans and other vulnerable children*. Washington, D.C.: World Bank.

Surasiengsunk, S., Kiranandana, S., Wongboonsin, K., Garnett, G. P., Anderson, R. M., and van Griensven, G. F. J. P. (1998). Demographic impact of the HIV epidemic in Thailand. *AIDS, 12*(7), 775-784.

Sussangkarn, C. (1993). Labour markets. In P. G. Warr (Ed.), *The Thai economy in transition* (pp. 355-400). Cambridge: Cambridge University Press.

Sussangkarn, C. (1995). Labour market adjustments and migration in Thailand. *ASEAN Economic Bulletin, 12*(2), 237-254.

Suwanakool, S., and Rojanapithayakorn, W. (1989). HIV infections in Thailand. *Journal of the Medical Association of Thailand, 72*(Supplement 2), 49-53.

Taha, T. E., Dallabetta, G. A., Hoover, D. R., Chiphangwi, J. D., Mtimavalye, L. A. R., Liomba, G. N., Kumwenda, N.I., and Miotti, P.G. (1998). Trends of HIV-1 and sexually transmitted diseases among pregnant and postpartum women in urban Malawi. *AIDS, 12*(2), 197-203.

Terceira, N., Gregson, S., Zaba, B., and Mason, P. R. (2003). The contribution of HIV to fertility decline in rural Zimbabwe, 1985–2000. *Population Studies, 57*(2), 149-164.

Thailand Business Coalition on AIDS. (2000). *The Thailand Business Coalition on AIDS (TBCA): the business response to AIDS in Thailand*. Bangkok: Thailand Business Coalition on AIDS.

Thaisri, H., Lerwitworapong, J., Vongsheree, S., Sawanpanyalert, P., Chadbanchachai, C., Rojanawiwat, A., Kongpromsook, W., Paungtubtim, W., Sri-Ngam, P., and Jaisue, R. (2003). HIV infection and risk factors among Bangkok prisoners, Thailand: a prospective cohort study. *BMC Infectious Diseases, 3*, 25.

Thanh-Dam, T. (1983). The dynamics of sex tourism: the case of Southeast Asia. *Development and Change, 14*(1), 533-553.

Thawatwiboonpol Entz, A., Prachuabmoh Ruffolo, V., Chinveschakitvanich, V., Soskolne, V., and van Griensven, G. F. J. P. (2000). HIV-1 prevalence, HIV-1 subtypes and risk factors among fishermen in the Gulf of Thailand and the Andaman Sea. *AIDS, 14*(8), 1027-1034.

Theetranont, C., Suprasert, S., Matanasarawoot, A., Romyen, S., Tulvatana, S., Nelson, K. E., Celentano, D.D., and Wright, N.H. (1994). Seroprevalence of HIV antibodies and risk factors in healthy young males from upper north Thailand. *Journal of the Medical Association of Thailand, 77*(6), 288-292.

Thomas, D. (1990). Intra-household resource allocation - an inferential approach. *Journal of Human Resources, 25*(4), 635-664.

Tibaijuka, A. K. (1997). AIDS and economic welfare in peasant agriculture: case studies from Kagabiro Village, Kagera region, Tanzania. *World Development, 25*(6), 963-975.

Tilly, L. A., and Scott, J. W. (1978). *Women, work, and family*. New York: Holt, Rinehart and Winston.

Topouzis, D., and du Guerny, J. (1999). *Sustainable agricultural/rural development and vulnerability to the AIDS epidemic*. Geneva: UNAIDS.

Torugsa, K., Anderson, S., Thongsen, N., Sirisopana, N., Jugsudee, A., Junlananto, P., Nitayaphan, S., Sangkharomya, S., and Brown, A.E. (2003). HIV epidemic among young Thai men, 1991-2000. *Emerging Infectious Diseases, 9*(7), 881-883.

Traisupa, A., Wongba, C., and Taylor, D. N. (1987). AIDS and prevalence of antibody to human immunodeficiency virus (HIV) in high risk groups in Thailand. *Genitourinary Medicine, 63*(1), 106-108.

Tripodi, P., and Patel, P. (2002). The global impact of HIV/AIDS on peace support operations. *International Peacekeeping, 9*(3), 51-66.

UNAIDS. (1998a). *Connecting lower HIV infection rates with changes in sexual behaviour in Thailand: data collection and comparison*. Geneva: UNAIDS.

UNAIDS. (1998b). *Relationships of HIV and STD declines in Thailand to behavioural change - a synthesis of existing studies*. Geneva: UNAIDS.
UNAIDS. (2001a). *Population mobility and AIDS*. Geneva: UNAIDS.
UNAIDS. (2001b). *HIV prevention needs and successes: a tale of three countries*. Geneva: UNAIDS.
UNAIDS. (2004). *2004 report on the global AIDS epidemic*. Geneva: UNAIDS.
UNAIDS. (2006). *2006 report on the global AIDS epidemic*. Geneva: UNAIDS.
UNAIDS, UNICEF, and World Health Organisation. (2002). *Epidemiological fact sheets on HIV/AIDS and sexually transmitted infections - Thailand*. Geneva: UNAIDS.
UNAIDS, UNICEF, and World Health Organisation. (2004). *Epidemiological fact sheets on HIV/AIDS and sexually transmitted infections - Thailand*. Geneva: UNAIDS.
UNAIDS, and World Health Organisation. (2004). *AIDS epidemic update - December 2004*. Geneva: UNAIDS.
UNDP South East Asia HIV and Development Programme. (2002). *Mobile populations and HIV vulnerability - selected responses in South East Asia*. Bangkok: UNDP South East Asia HIV and Development Programme.
UNESCO Division of Higher Education. (2006). *Expanding the field of inquiry: a cross-country study of higher education institutions' responses to HIV and AIDS*. Paris: United Nations Educational, Scientific and Cultural Organization.
Ungchusak, K., Rehle, T., Thammapornpilap, P., Spiegelman, D., Brinkmann, U., and Siraprapasiri, T. (1996). Determinants of HIV infection among female commercial sex workers in northeastern Thailand: results from a longitudinal survey. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology*, *12*(5), 500-507.
Ungphakorn, J., and Sittitrai, W. (1994). The Thai response to the HIV/AIDS epidemic. *AIDS*, *8*(Supplement 2), S155-S163.
United Nations. (1994). *AIDS and the demography of Africa*. New York: United Nations.
United Nations. (2005). *Population, development and HIV/AIDS with particular emphasis on poverty*. New York: United Nations.
United Nations, and World Health Organisation. (1989). *The AIDS epidemic and its demographic consequences: proceedings of the United Nations/World Health Organization workshop on modelling the demographic impact of the AIDS epidemic in Pattern II countries : progress to date and policies for the future*. New York: United Nations and World Health Organisation.
United Nations Development Program. (1990-2003, annual). *Human Development Report*. Oxford: Oxford University Press.
United Nations Development Program. (1991). *Human Development Report*. Oxford: Oxford University Press.
United Nations Development Program. (2004). *Thailand's Response to HIV/AIDS: Progress and Challenges*. Bangkok: United Nations Development Program.
United Nations Development Programme. (1990-2005, annual). *Human development report*. Oxford: Oxford University Press.
United Nations Development Programme. (2004). *Thailand's response to HIV/AIDS: progress and challenges*. Bangkok: United Nations Development Programme.

United Nations Economic and Social Commission for Asia and the Pacific. (1996). *Women in Thailand - a country profile*. New York: United Nations.
United States Agency for International Development. (2004). *HIV/AIDS and business in Africa*. Washington, D.C.: United States Agency for International Development.
United States Department of Agriculture. (2004). *Composition of foods - raw, processed, prepared*. Beltsville, Md.: United States Department of Agriculture.
Urassa, M., Boerma, J. T., Isingo, R., Ngalula, J., Ng'weshemi, J. Z. L., Mwaluko, G., and Zaba, B. (2001). The impact of HIV/AIDS on mortality and household mobility in rural Tanzania. *AIDS, 15*(15), 2017-2023.
US Census Bureau. (2004a). *CSPro data entry user's guide, version 2.5*. Washington, D.C.: U.S. Census Bureau.
US Census Bureau. (2004b). *CSPro user's guide, version 2.5*. Washington, D.C.: U.S. Census Bureau.
Valdiserri, R. O. (1987). Epidemics in perspective. *Journal of Medical Humanities and Bioethics*, *8*(2), 95-100.
Valdiserri, R. O. (2004). Mapping the roots of HIV/AIDS complacency: implications for program and policy development. *AIDS Education and Prevention*, *16*(5), 426-439.
van der Straten, A., King, R., Grinstead, O., Serufilira, A., and Allen, S. (1995). Couple communication, sexual coercion and HIV risk reduction in Kigali, Rwanda. *AIDS*, *9*, 935-944.
van Griensven, G. F. J. P., Thanprasertsuk, S., Jommaroeng, R., Mansergh, G., Naorat, S., Jenkins, R. A., Ungchusak, K., Phanuphak, P., Tappero, J.W., and Bangkok MSM Study Group. (2005). Evidence of a previously undocumented epidemic of HIV infection among men who have sex with men in Bangkok, Thailand. *AIDS, 19*(5), 521-526.
van Landingham, M. J., Grandjean, N., Suprasert, S., and Sittitrai, W. (1997). Dimensions of AIDS Knowledge and Risky Sexual Practices: A Study of Northern Thai Males. *Archives of Sexual Behaviour, 26*(3), 269-293.
Vanichseni, S., Kitayaporn, D., Mastro, T. D., Mock, P. A., Raktham, S., Des Jarlais, D. C., Sujarita, S., Srisuwanvilai, L., Young, N.L., Wasi, C., Subbarao, S., Heyward, W.L., Esparza, J., and Choopanya, K. (2001). Continued high HIV-1 incidence in a vaccine trial preparatory cohort of injection drug users in Bangkok, Thailand. *AIDS, 15*(3), 397-405.
Viravaidya, M. (1990). *Epidemiological model of HIV in Thailand*. Bangkok: Population and Community Development Association.
Viravaidya, M. (2001). HIV/AIDS: perspective on Thailand. *AIDS Patient Care and STDs*, *15*(8), 437-438.
Viravaidya, M., Obremskey, S. A., and Myers, C. (1993). The economic impact of AIDS on Thailand. In D. E. Bloom and J. V. Lyons (Eds.), *Economic implications of AIDS in Asia* (pp. 7-34). New Delhi: United Nations Development Programme.
Vongchak, T., Kawichai, S., Sherman, S., Celentano, D. D., Sirisanthana, T., Latkin, C., Wiboonnatakul, K., Srirak, N., Jittiwutikarn, J., and Aramrattana, A. (2005). The influence of Thailand's 2003 'war on drugs' policy on self-reported drug use among injection drug users in Chiang Mai, Thailand. *International Journal of Drug Policy*, *16*(2), 115-121.

Wangroongsarb, Y., Weniger, B. G., Wasi, C., Traisupa, A., Kunasol, P., Rojanapithayakorn, W., and Fucharoen, S. (1985). Prevalence of HTLV-III/LAV antibody in selected populations in Thailand. *Southeast Asian Journal of Tropical Medicine and Public Health, 16*(4), 517-520.

Warr, P. G. (1993). The Thai economy. In P. G. Warr (Ed.), *The Thai economy in transition* (pp. 1-80). Cambridge: Cambridge University Press.

Wasi, C., Herring, B., Raktham, S., Vanichseni, S., Mastro, T. D., Young, N. L., Rubsamen-Waigmann, H., von Briesen, H., Kalish, M.L., Luo, C., Pau, C., Baldwin, A., Mullins, J.I., Delwart, E.L., Esparza, J., Heyward, W.L., and Osmanov, S. (1995). Determination of HIV-1 subtypes in injecting drug users in Bangkok, Thailand, using peptide-binding enzyme immunoassay and heteroduplex mobility assay: evidence of increasing infection with HIV-1 subtype E. *AIDS, 9*(8), 843-849.

Wawer, M. J., Podhisita, C., Kanungsukkasem, U., Pramualratana, A., and McNamara, R. (1996). Origins and working conditions of female sex workers in urban Thailand: consequences of social context for HIV transmission. *Social Science & Medicine, 42*(3), 453-462.

Wawer, M. J., Serwadda, D., Gray, R. H., Sewankambo, N. K., Li, C., Nalugoda, F., Lutalo, T., and Konde-Lule, J.K. (1997). Trends in HIV-1 prevalence may not reflect trends in incidence in mature epidemics: data from the Rakai population-based cohort, Uganda. *AIDS, 11*(8), 1023-1030.

Weiss, E., Whelan, D., and Gupta, G. R. (1996). *Vulnerability and opportunity - adolescents and HIV/AIDS in the developing world*. Washington, D.C.: International Center for Research on Women.

Weniger, B. G., Limpakarnjanarat, K., Ungchusak, K., Thanprasertsuk, S., Choopanya, K., Vanichseni, S., Uneklabh, T., Tongcharoen, P., and Wasi, C. (1991). The epidemiology of HIV infection and AIDS in Thailand. *AIDS, 5*(Supplement 2), S71-S85.

Weniger, B. G., Takebe, Y., Ou, C.-Y., and Yamazaki, S. (1994). The molecular epidemiology of HIV in Asia. *AIDS, 8*(Supplement 2), S13-S28.

White, J., and Robinson, E. (2000). HIV/AIDS and rural livelihoods in sub-Saharan Africa, *Policy Series 6*. Chatham, UK: Natural Resources Institute, University of Greenwich.

Whiteside, A. (2001). Demography and economics of HIV/AIDS. In R. A. Weiss, M. W. Adler and S. L. Rowland-Jones (Eds.), *The changing face of HIV and AIDS, British Medical Bulletin 58* (pp. 73-88). Oxford: Oxford University Press.

Whiteside, A. (2002). HIV/AIDS, health, and education. In S. Forsythe (Ed.), *State of the art: AIDS and economics*: International AIDS Economics Network.

Wilde, H., Locharernkul, C., and Phanuphak, P. (1985). Acquired immune deficiency syndrome in Thailand. *Asian Pacific Journal of Allergy and Immunology, 3*, 104-107.

Wilk, R. R. (1989). Decision making and resource flows within the household: beyond the black box. In R. R. Wilk (Ed.), *The household economy - reconsidering the domestic mode of production*. Boulder, Co.: Westview Press.

Wilkins, A., Hayes, R. J., Alonso, P., Baldeh, S., Berry, N., Cham, K., Hughes, A., Jaiteh, K., Oelman, B., Tedder, R., and Whittle, H. (1991). Risk factors for HIV-2 infection in The Gambia. *AIDS, 5*(9), 1127-1132.

Wingood, G. M., and DiClemente, R. J. (2000). Application of the theory of gender and power to examine HIV-related exposures, risk factors, and effective interventions for women. *Health Education & Behaviour, 27*(5), 539-565.

Wolf, D. L. (1990). Daughters, decisions and domination: an empirical and conceptual critique of household strategies. *Development and Change, 21*(1), 43-74.

Wolf, D. L. (1992). *Factory daughters - gender, household dynamics, and rural industrialization in Java*. Berkeley: University of California Press.

Wong, D. (1984). The limits of using the household as a unit of analysis. In J. Smith, I. Wallerstein and H.-D. Evers (Eds.), *Households and the world economy* (pp. 56-63). Beverley Hills, Ca.: Sage Publications.

Wood, C. H. (1982). Equilibrium and historical-structural perspectives on migration. *International Migration Review, 16*(2), 298-319.

Woolcock, M., and Narayan, D. (2000). Social capital: implications for development theory, research, and policy. *World Bank Research Observer, 15*(2), 225-249.

Working, H. (1943). Statistical laws of family expenditure. *Journal of the American Statistical Association, 38*(1), 43-56.

World Bank. (1990). *World development report 1990: poverty*. Oxford: Oxford University Press.

World Bank. (1997). *Confronting AIDS: public priorities in a global epidemic*. Washington, D.C.: World Bank.

World Bank. (2000a). *Thailand's response to AIDS: building on success, confronting the future*. Washington, D.C.: World Bank.

World Bank. (2000b). *World development report 2000/2001: attacking poverty*. Oxford: Oxford University Press.

World Health Organisation. (2001). *HIV/AIDS in Asia and the Pacific region*. Geneva: World Health Organisation.

World Health Organisation. (2002). *Scaling up the response to infectious diseases - a way out of poverty*. Geneva: World Health Organisation.

Wright, N. H., Vanichseni, S., Akarasewi, P., Wasi, C., and Choopanya, K. (1994). Was the 1988 HIV epidemic among Bangkok's injecting drug users a common source outbreak? *AIDS, 8*(4), 529-532.

Xu, F., Kilmarx, P. H., Supawitkul, S., Manopaiboon, C., Yanpaisarn, S., Limpakarnjanarat, K., Chaikummao, S., Mock, P.A, Young, N.L., and Mastro, T.D. (2002). Incidence of HIV-1 infection and effects of clinic-based counseling on HIV preventive behaviors among married women in northern Thailand. *Journal of Acquired Immune Deficiency Syndromes, 29*(3), 284-288.

Yamano, T., and Jayne, T. S. (2002). Measuring the impacts of prime-age adult death on rural households in Kenya, *Tegemeo Working Paper 5*. Nairobi, Kenya: Tegemeo Institute of Agricultural Policy and Development.

Yamano, T., and Jayne, T. S. (2004). Measuring the impacts of working-age adult mortality on small-scale farm households in Kenya. *World Development, 32*(1), 91-119.

Yamano, T., and Jayne, T. S. (2005). Working age adult mortality and primary school attendance in rural Kenya. *Economic Development and Cultural Change, 53*(3), 619-653.

Yanagisako, S. J. (1979). Family and household: the analysis of domestic groups. *Annual Review of Anthropology, 8*, 161-205.
Young, A. (2004). The gift of the dying: the tragedy of AIDS and the welfare of future African generations, *NBER Working Paper 10991*. Cambridga, Ma.: National Bureau of Economic Research.
Young, A. (2005). The gift of the dying: the tragedy of AIDS and the welfare of future African generations. *Quarterly Journal of Economics, 120*(2), 423-466.
Young, L., and Ansell, N. (2003). Fluid households, complex families: The impacts of children's migration as a response to HIV/AIDS in Southern Africa. *The Professional Geographer, 55*(4), 464-476.
Zaba, B., Whiteside, A., and Boerma, J. T. (2004). Demographic and socioeconomic impact of AIDS: taking stock of the empirical evidence. *AIDS, 18*(Supplement 2), S1-S7.
Zhu, J. (1998). Rural out-migration in China: a multilevel model. In R. E. Bilsborrow (Ed.), *Migration, urbanization, and development: new directions and issues* (pp. 157-186). Norwell, Ma.: Kluwer Academic Publishers.
Zimmer, Z., and Dayton, J. M. (2003). *The living arrangements of older adults in sub-Saharan Africa in a time of HIV/AIDS*. New York: Population Council.
Zuma, K., Gouws, E., Williams, B. G., and Lurie, M. N. (2003). Risk factors for HIV infection among women in Carletonville, South Africa: Migration, demography and sexually transmitted diseases. *International Journal of STD and AIDS, 14*(12), 814-817.

Appendix I – Survey Work Plan

The representative household survey consisted of four rounds, and each round lasted four weeks. In each round, weeks three and four repeated weeks one and two respectively. In weeks three and four interviewers proceeded with the household second visit questionnaire rather than the household first visit questionnaire, and with the price questionnaire rather than the community questionnaire. The work plan for interviewer teams in each round of the survey (four weeks) is outlined in Table I.1.

Table I.1: Survey work plan

Day	am/pm	Work Plan
Saturday, Week 1	am	Travel to Village 1, Community Questionnaire, Sample Selection
	pm	Household Questionnaire 1 (x4), Return to KK
Sunday, Week 1	am	Return to Village 1, Household Questionnaire 1 (x3)
	pm	Household Questionnaire 1 (x3), Return to KK
Monday, Week 1	am	Travel to Village 2, Community Questionnaire, Sample Selection
	pm	Household Questionnaire 1 (x4), Return to KK
Tuesday, Week 1	am	Return to Village 2, Household Questionnaire 1 (x3)
	pm	Household Questionnaire 1 (x3), Return to KK
Wednesday, Week 1	am	Travel to Village 3, Community Questionnaire, Sample Selection
	pm	Household Questionnaire 1 (x4), Return to KK
Thursday, Week 1	am	Return to Village 3, Household Questionnaire 1 (x3)
	pm	Household Questionnaire 1 (x3), Return to KK
	evening	Debriefing
Friday, Week 1	am/pm	Rest day
Saturday, Week 2	am	Travel to Village 4, Community Questionnaire, Sample Selection
	pm	Household Questionnaire 1 (x4), Return to KK
Sunday, Week 2	am	Return to Village 4, Household Questionnaire 1 (x3)
	pm	Household Questionnaire 1 (x3), Return to KK
Monday, Week 2	am	Travel to Village 5, Community Questionnaire, Sample Selection
	pm	Household Questionnaire 1 (x4), Return to KK
Tuesday, Week 2	am	Return to Village 5, Household Questionnaire 1 (x3)
	pm	Household Questionnaire 1 (x3), Return to KK
Wednesday, Week 2	am	Travel to Village 6, Community Questionnaire, Sample Selection
	pm	Household Questionnaire 1 (x4), Return to KK
Thursday, Week 2	am	Return to Village 6, Household Questionnaire 1 (x3)
	pm	Household Questionnaire 1 (x3), Return to KK
	evening	Debriefing
Friday, Week 2	am/pm	Rest day

Appendix II – Survey Instrument: Representative Household Survey (Community Questionnaire)

2003 BAN PHAI AND PHON DISTRICTS HOUSEHOLD SURVEY

Community Questionnaire

District:	
Sub-district:	
Village Name:	Village Number:
Date of First Visit to Village:	
Total Number of Households: *(copy from Household Listing Form)*	
Interviewer(s):	

INTERVIEWEES

Please list the names of people (and their positions, if any) who were consulted when forming the answers to the questions about the community.

SUPERVISOR CHECK

Sign only after checking that the questionnaire (including the price questionnaire) is complete.

SUPERVISOR:

NOTES TO INTERVIEWERS

- *All Sections should be answered by the interviewer team, in consultation with key informants in the community. The informants' names and positions must be recorded on the front cover of this questionnaire.*
- *The attached Price Questionnaire should be completed by the interview team by observing prices in local stores and in the nearest fresh produce market, using the weighing equipment where necessary.*
- *If the village either has no stores or has no fresh produce market within its boundaries, record prices in the stores and market that are most often used by people living in the village.*
- *The attached Household Listing should be completed by the interview team while mapping the village with a local guide.*
- *For each question, unless otherwise stated, make certain you either tick one box from the choices given, or write the answer in the space provided.*
- *For all questions, when referring to the "nearest" (e.g. hospital, market), "nearest" means the one that can be reached in the shortest time by the method of travel most used by people in this community. This need not be the one that is the closest physical distance.*
- *For all questions, references to "here" mean the centre of the village to which the form relates, i.e. the village whose name is recorded on the front cover.*

SECTION 1: DEMOGRAPHIC INFORMATION

1. How many households are there in this village?

[ ] households

---

2. What are the principal ethnic groups represented in this village?

List in order of importance:
1. [ ]
2. [ ]
3. [ ]
4. [ ]

---

3. What are the major religions practiced by villagers in this village?

List in order of importance:
1. [ ]
2. [ ]
3. [ ]
4. [ ]

---

4. In the last five years, have more new households moved to your village, or have there been more households that moved away?

More arrivals.. [ ] 1
More departures.. [ ] 2
About the same of both.. [ ] 3
Neither arrivals nor departures.. [ ] 4

---

5. For about how many years has this village existed?

[ ] years

---

6. What are the major economic activities of the people of this village?

List in order of importance:
1. [ ]
2. [ ]
3. [ ]
4. [ ]

SECTION 2: LISTING OF COMMUNITY ASSETS

7. *Please record the number of business activities and community assets present in the village, using the list below:*

Business activities and community assets	Number
Trade stores	
Liquor outlets	
Petrol outlets	
Brothels	
Public motor vehicle businesses	
Logging or sawmill operations	
Agricultural processing operations	
Manufacturing operations	
Fresh produce markets	
Temples	
Churches, Mosques	
Village community centres	
Local government offices	

SECTION 3: EDUCATION

	Primary School	Secondary School
8. What is the name of the "nearest" school:		
9. How do school children usually travel from here to this school?		
Walk	1	1
Road transport	2	2
Train	3	3
Water transport	4	4
Air transport	5	5
Other (specify)	6	6
10. How long does it take to travel from here to this school?		
Less than 30 minutes	1	1
At least 30 minutes, but less than 1 hour	2	2
At least 1 hour, but less than 2 hours	3	3
2 hours or more	4	4
If 2 hours or more, please state time in hours here:		
11. Do most school students from here attend this school?		
Yes	1	1
No	2	2
If no, name the other school(s):		
12. Do any students from here sleep at or near the school they attend rather than return home every night?		
Yes	1	1
No	2	2

13. Are there any students from here currently studying with any of the following institutions?

Vocational School	Yes 1	No 2
Technical College	Yes 1	No 2
National High School	Yes 1	No 2
University	Yes 1	No 2
Other Tertiary Institutions	Yes 1	No 2
Any other learning place	Yes 1	No 2

Please describe:

SECTION 3: HEALTH

14a. Is there a village health volunteer (VHV) resident in this village? If no, was the village visited by a VHV in the last year?

No.. ☐ 1 (>>15)
No, but was visited... ☐ 2
Yes... ☐ 3 (>>15)

14b. How often did the VHV visit in the last year?

☐ times per month

---

15. Where is the "nearest" health service provided?	Health Centre	Hospital
	______	______
16. How do people usually travel from here to this health service centre?		
Walk..	☐ 1	☐ 1
Road transport..............................	☐ 2	☐ 2
Train.......................................	☐ 3	☐ 3
Water transport.............................	☐ 4	☐ 4
Air transport...............................	☐ 5	☐ 5
Other (specify).............................	☐ 6	☐ 6
17. How long does it take to travel from here to this centre?		
Less than 30 minutes........................	☐ 1	☐ 1
At least 30 minutes, but less than 1 hour...	☐ 2	☐ 2
At least 1 hour, but less than 2 hours......	☐ 3	☐ 3
2 hours or more.............................	☐ 4	☐ 4
If 2 hours or more, please state time in hours here:	______	______

---

18. Where is the "nearest" family planning clinic?

In this village... ☐ 1 (>>21)
Elsewhere (specify)... ☐ 2

---

19. How do people usually travel from here to the family planning clinic?

- Walk........ 1
- Road transport........ 2
- Train........ 3
- Water transport........ 4
- Air transport........ 5
- Other (specify)........ 6

20. How long does it take to travel from here to the family planning clinic?

- Less than 30 minutes........ 1
- At least 30 minutes, but less than 1 hour........ 2
- At least 1 hour, but less than 2 hours........ 3
- 2 hours or more........ 4

If 2 hours or more, please state time in hours here:

21. What services does the family planning clinic provide?

List all

22. Where is the "nearest" modern pharmacy?

- In this village........ 1 (>>25)
- Elsewhere (specify)........ 2

23. How do people usually travel from here to the modern pharmacy?

- Walk........ 1
- Road transport........ 2
- Train........ 3
- Water transport........ 4
- Air transport........ 5
- Other (specify)........ 6

24. How long does it take to travel from here to the modern pharmacy?

- Less than 30 minutes........ 1
- At least 30 minutes, but less than 1 hour........ 2
- At least 1 hour, but less than 2 hours........ 3
- 2 hours or more........ 4

If 2 hours or more, please state time in hours here:

SECTION 4: PROVINCIAL TOWN

25. Where is the "nearest" provincial town to this village?

☐

26. How do people usually travel from here to this town?

Walk	☐	1
Road transport	☐	2
Train	☐	3
Water transport	☐	4
Air transport	☐	5
Other (specify)	☐	6

27. How long does it take to travel from here to this town?

Less than 30 minutes	☐	1
At least 30 minutes, but less than 1 hour	☐	2
At least 1 hour, but less than 2 hours	☐	3
2 hours or more	☐	4
If 2 hours or more, please state time in hours here:		☐

SECTION 5: TRANSPORT AND COMMUNICATIONS

ROAD TRANSPORT

28. What type of main access road does this village have?

Paved (asphalt or cement)	☐	1
Paved (laterite) – good	☐	2
Paved (laterite) – bad	☐	3
Unpaved or clayed	☐	4
No access road	☐	5

29. Is this main access road impassable during certain times of the year?

No	☐	1
Yes	☐	2
If yes, how much time is the road impassable during the year:		☐

AIR TRANSPORT

30. Where is the "nearest" point of call to this village that is used by government or commercial aircraft?

[ ]

31. How long does it take to travel from here to this point?

Less than 30 minutes	[ ]	1
At least 30 minutes, but less than 1 hour	[ ]	2
At least 1 hour, but less than 2 hours	[ ]	3
2 hours or more	[ ]	4
If 2 hours or more, please state time in hours here:	[ ]	

32. How often do any aircraft call at this point?

At least once a day	[ ]	1
At least once a week	[ ]	2
At least every two weeks	[ ]	3
At least once every month	[ ]	4
Less often than once every month	[ ]	5

WATER TRANSPORT

33. Where is the "nearest" point of call to this village that is used by government or commercial boats and vessels?

[ ]

34. How long does it take to travel from here to this point?

Less than 30 minutes	[ ]	1
At least 30 minutes, but less than 1 hour	[ ]	2
At least 1 hour, but less than 2 hours	[ ]	3
2 hours or more	[ ]	4
If 2 hours or more, please state time in hours here:	[ ]	

35. How often do any boats call at this point?

At least once a day	[ ]	1
At least once a week	[ ]	2
At least every two weeks	[ ]	3
At least once every month	[ ]	4
Less often than once every month	[ ]	5

COMMUNICATION

36. Where is the "nearest" telephone (or radio-telephone) and postal service to this village:	Telephone	Postal Service
	______	______

37. How do people usually travel from here to this point?

	Telephone	Postal Service
Walk	☐ 1	☐ 1
Road transport	☐ 2	☐ 2
Train	☐ 3	☐ 3
Water transport	☐ 4	☐ 4
Air transport	☐ 5	☐ 5
Other (specify)	☐ 6	☐ 6

38. How long does it take to travel from here to this point?

	Telephone	Postal Service
Less than 30 minutes	☐ 1	☐ 1
At least 30 minutes, but less than 1 hour	☐ 2	☐ 2
At least 1 hour, but less than 2 hours	☐ 3	☐ 3
2 hours or more	☐ 4	☐ 4
If 2 hours or more, please state time in hours here:	______	______

39. How often does mail usually arrive at this point?

At least once a day ☐ 1
At least once a week ☐ 2
At least every two weeks ☐ 3
At least once every month ☐ 4
Less often than once every month ☐ 5

40a. Can you receive radio broadcast in this village?

No ☐ 1 (>>41)
Yes, but no radio is working in this village ☐ 2 (>>41)
Yes, and some people listen to the radio ☐ 3

40b. Which radio stations can you receive?

List all

41a. Can you receive television broadcast in this village?

No.. ☐ 1 (>>42)
Yes, but no television is working in this village .... ☐ 2 (>>42)
Yes, and some people listen to the television .... ☐ 3

41b. Which television stations can you receive?

List all

42. Can you access the internet in this village?

No.. ☐ 1
Yes... ☐ 2

SECTION 6: OTHER SERVICES

43. Do any households in this village have electric current?

No.. ☐ 1
Yes, but only a few households.. ☐ 2
Yes, most households.. ☐ 3

44. Do any households in this village have running water?

No.. ☐ 1
Yes, but only a few households.. ☐ 2
Yes, most households.. ☐ 3

45. What is the major source of drinking water for most people in this village?

	Dry Season	Rainy Season
Private tap	☐ 1	☐ 1
Public tap	☐ 2	☐ 2
Private well	☐ 3	☐ 3
Public well without pump	☐ 4	☐ 4
Public well with pump	☐ 5	☐ 5
Spring, river, lake, rainwater	☐ 6	☐ 6
Other (specify)	☐ 7	☐ 7

46. How or where do most households get rid of their waste water (clothes washing, dishwashing)?

- Households have a drainage pipe........ ☐ 1
- On the ground........ ☐ 2
- On the floor........ ☐ 3
- Other (specify)........ ☐ 4

---

47. How or where do most households get rid of their garbage?

- Bury in a hole........ ☐ 1
- Burn........ ☐ 2
- In the river or canal........ ☐ 3
- Sanitary garbage collector........ ☐ 4
- Other (specify)........ ☐ 5

---

48. Where is the "nearest" market that most people use for buying held?

- In this village........ ☐ 1
- Elsewhere (specify)........ ☐ 2

---

49. How often is the market held?

- Daily........ ☐ 1
- Weekly........ ☐ 2
- Less often than once every week........ ☐ 3

---

50. How do people usually travel from here to the market?

- Walk........ ☐ 1
- Road transport........ ☐ 2
- Train........ ☐ 3
- Water transport........ ☐ 4
- Air transport........ ☐ 5
- Other (specify)........ ☐ 6

---

51. How long does it take to travel from here to the market?

- Less than 30 minutes........ ☐ 1
- At least 30 minutes, but less than 1 hour........ ☐ 2
- At least 1 hour, but less than 2 hours........ ☐ 3
- 2 hours or more........ ☐ 4

If 2 hours or more, please state time in hours here: ☐

52. Where is the "nearest" bank that most people use?

In this village.. 1 (>>55)
Elsewhere (specify).. 2

---

53. How do people usually travel from here to the bank?

Walk.. 1
Road transport.. 2
Train.. 3
Water transport.. 4
Air transport.. 5
Other (specify).. 6

---

54. How long does it take to travel from here to the bank?

Less than 30 minutes.. 1
At least 30 minutes, but less than 1 hour.. 2
At least 1 hour, but less than 2 hours.. 3
2 hours or more.. 4
If 2 hours or more, please state time in hours here:

---

55. Is there any other business, organisation or person with whom the people of this village can deposit money?

No.. 1
Yes (specify).. 2

---

56. Is there a credit co-operative in this village?

No.. 1
Yes.. 2

---

57. Is there any other business, organisation or person who lends money to the people of this village?

No.. 1
Yes (specify).. 2

---

58. Is there a women's group in this village?

No.. 1 (>>60)
Yes.. 2

59. What activities does this women's group perform?

List all

60. Where is the "nearest" rural development project (factory/manufacturing centre)?

In this village.. 1
Elsewhere (specify).. 2

61. Is this rural development project sponsored by the PDA?

No.. 1
Yes.. 2
Don't know.. 3

62. How do people usually travel from here to the rural development project?

Walk.. 1
Road transport.. 2
Train.. 3
Water transport.. 4
Air transport.. 5
Other (specify).. 6

63. How long does it take to travel from here to the rural development project?

Less than 30 minutes.. 1
At least 30 minutes, but less than 1 hour.. 2
At least 1 hour, but less than 2 hours.. 3
2 hours or more.. 4
If 2 hours or more, please state time in hours here:

SECTION 7: AGRICULTURE

64. What are the major crops grown by the people of this village?	65. How many times per year is ..[crop].. planted, in general?	66. During which month(s) is it planted? During which month(s) is it harvested? 1=January 2=February 3=March 4=April 5=May 6=June 7=July 8=August 9=September 10=October 11=November 12=December				67. How is harvest of ..[crop].. generally sold? Is it: 1=At the village market? 2=At the market in another place? 3=To private transporters? 4=To a public agency? 5=To a cooperative? 6=Other (specify)
		Plant #1	Harvest #1	Plant #2	Harvest #2	
a.						
b.						
c.						
d.						
e.						
f.						
g.						
h.						
i.						

Rewrite crop listing from Q64. on previous page	68. Who generally plants and harvests the ..[crop]..? 1=Men 2=Women 3=Children 4=Everyone		69. Who generally receives the income when the ..[crop].. is sold? 1=Men 2=Women 3=Children 4=Everyone
	Plants	Harvests	
a.			
b.			
c.			
d.			
e.			
f.			
g.			
h.			
i.			

70. Where is the "nearest" agricultural extension centre?

In this village……………………………………………………………… ☐ 1
Elsewhere (specify)………………………………………………………… ☐ 2

---

71. Does an agricultural extension agent visit the farmers of this village?

No…………………………………………………………………………………… ☐ 1 (>>74)
Yes…………………………………………………………………………………… ☐ 2

---

72. What agency(ies) are they from?

1. ☐
2. ☐
3. ☐

---

73. What services do they provide?

List all

74. Is there an agricultural co-operative in this village?

No.. ☐ 1
Yes... ☐ 2 (>>76)

75. Do any of the farmers in this village participate in an agricultural cooperative?

No.. ☐ 1 (>>77)
Yes... ☐ 2

76. What is its name and what services does it (do they) provide?

List all

77. Is there a tractor in this village?

No.. ☐ 1
Yes... ☐ 2

78. Is there a rice- or coffee-husking machine in this village?

No.. ☐ 1
Yes... ☐ 2

79. Do any farmers in this village use chemical fertiliser?

No.. ☐ 1
Yes... ☐ 2

80. Do any farmers in this village use insecticides?

No.. ☐ 1
Yes.. ☐ 2

---

81. Are there any irrigated fields in this village?

No.. ☐ 1
Yes.. ☐ 2

---

82. During the past 12 months, has there been more or less rain than the previous 12 months?

More.. ☐ 1
Less... ☐ 2
About the same.. ☐ 3

---

83. Do the people in this village buy and sell land?

No.. ☐ 1
Yes.. ☐ 2

---

84. Are there any sharecroppers in this village?

No.. ☐ 1
Yes.. ☐ 2 (>>86)

---

85. Are there many sharecroppers?

Most farmers.. ☐ 1
Half... ☐ 2
Less than half.. ☐ 3
Only a few people.. ☐ 4

---

86. Is there a system of mutual aid among the farmers of this village for field work?

No.. ☐ 1
Yes.. ☐ 2

---

87. How much money does an agricultural labourer earn for a day of work?	Man	Woman	Child

SECTION 8: CHANGES IN ECONOMIC ACTIVITY, INFRASTRUCTURE, AND SERVICES

List any major changes that have taken place in this are within the last 10 years. The changes do not have to have occurred inside the census unit but they must have had a major impact on the people who live in this census unit. Examples: Opening of a factory in a nearby town, construction of an aid post in the village, closure of an air strip, construction of a new access road. Please use the categories specified.

EDUCATION:

HEALTH:

TRANSPORT:

ECONOMIC ACTIVITY:

OTHER:

Appendix III – Survey Instrument: Representative Household Survey (Price Questionnaire)

2003 BAN PHAI AND PHON DISTRICTS HOUSEHOLD SURVEY

PRICE QUESTIONNAIRE

District:	
Sub-district:	
Village Name:	Village Number:
Date of Price Data Collection:	

NOTES TO INTERVIEWERS

- *Record prices of the following items in the two main marketplaces used by people in this village.*
- *Describe the location of the marketplaces in enough detail that they may be readily found again, if necessary.*
- *Record the brand name (if any) and the quantity for each price observation. For fresh produce and meat, record the weight of the product.*

NON-FOOD PRICES

Marketplace for first observation:

Marketplace for second observation:

Code	Product/Item	1st Observation		2nd Observation	
		Brand and Quantity	Price (baht)	Brand and Quantity	Price (baht)
01	Cigarettes				
02	Bath Soap				
03	Laundry Powder				
04	Toilet Paper				
05	Kerosene				
06	Petrol (for motor vehicles)				
07	Matches				
08	Batteries				

FOOD PRICES

Marketplace for first observation:

Marketplace for second observation:

Code	Product/Item	1st Observation		2nd Observation	
		Brand (if any) and Quantity	Price (baht)	Brand (if any) and Quantity	Price (baht)
11	Ordinary rice				
12	Sticky rice				
13	Wheat flour				
14	Wheat or egg noodles				
15	Salt				
16	Sugar				
17	Tofu				
18	Cooking oil				
19	Butter				
20	Fresh milk				
21	Beer				
22	Tea leaf				

FRESH PRODUCE AND MEAT PRICES

Marketplace for first observation:

Marketplace for second observation:

Code	Product/Item	1st Observation		2nd Observation	
		Quantity	Price (baht)	Quantity	Price (baht)
31	Corn				
32	Cassava				
33	Potato				
34	Cabbage				
35	Tomatoes				
36	Bananas				
37	Papayas				
38	Pineapple				
39	Mangoes				
40	Eggs				
41	Chicken (whole)				
42	Fresh fish (catfish)				

Appendix IV – Survey Instrument: Representative Household Survey (Household First Visit Questionnaire)

2003 BAN PHAI AND PHON DISTRICTS HOUSEHOLD SURVEY

Household Questionnaire – First Visit

District:	DESCRIBE (OR SKETCH) THE LOCATION OF THE HOUSEHOLD:
Sub-district:	
Village Name:	
Household Number:	
Name of Household Head:	
Number of People in the Household: (copy from household roster)	
Date of Visit:	
Main respondent: (name, and code from the household roster)	
Interviewers:	

SUPERVISOR CHECK

Sign only after visiting the household described on this sheet and confirming that they were interviewed on the day indicated.

NOTES TO INTERVIEWERS

- *All Sections should be completed by the interviewer, in consultation with respondents from the household. The main respondent's name and code from the household roster must be recorded on the front cover of this questionnaire.*
- *A different respondent or respondents may be engaged for Sections 8 and 9. Their names and codes from the household roster must be recorded in question 50.*
- *The anthropometrist from the interview team must complete Section 10 of this questionnaire.*
- *For each question, unless otherwise stated, make certain you either tick one box from the choices given, or write the answer in the space provided.*
- *For all questions, when referring to the "nearest" (e.g. hospital, market), "nearest" means the one that can be reached in the shortest time by the method of travel most used by people in this community. This need not be the one that is the closest physical distance.*
- *For all questions, references to "here" mean the location of the household.*
- *Any time where a question refers to "in the past year", instead use "in the time between the most recent planting season and the previous planting season".*

Note any problems encountered in the completion of this interview here:

SECTION 1: HOUSEHOLD ROSTER

Person No.	1. What are the names of all the individuals who usually live in this household? *Person 01 is the head of the household. Probe and include children who are studying elsewhere but for whom this household is financially responsible. If a baby has no name yet, enter as "BABY".*	2. Sex	3. How old is [name]? *Only need approximate age if greater than 15*	4. What is [name]'s relationship to the head of the household? 1=Head 2=Spouse 3=Own/adopted child 4=Son/daughter-in-law 5=Grandchild 6=Parent 7=Parent-in-law 8=Brother/sister 9=Other relative 10=Non-relative	5. In which province was [name] born? *Record country of birth if not Thailand*	6. Marital status 1=Never married 2=Married 3=Divorced 4=Separated 5=Widowed	7. Did [name] lodge here yesterday? 1=Yes 2=No	8. For how many months (if any) was [name] absent from the household in the last year? *Only spells of at least one month are relevant* If 0, >>10	9. What was the reason for the latest absence? 1=Working elsewhere 2=On holiday 3=Visiting relatives 4=At school elsewhere 5=In hospital or prison 6=Born during the last year 7=Other (specify)
		M/F	*Years*	*code*	*province*	*code*	*code*	*months*	*code*
01									
02									
03									
04									
05									
06									
07									
08									
09									
10									
11									
12									
13									
14									

SECTION 1: HOUSEHOLD ROSTER

Person No.	10. Is the father of [name] still alive? 1=Yes 2=No (>>13)	11. Is the father of [name] living in this household? 1=Yes 2=No (>>13)	*12. Copy the code number of the father from Question 1*	13. What is the highest educational qualification he completed? 00=No grade completed 1-12=School years 13=Trade certificate 14=Other certificate 15=Diploma 16=Bachelor's degree 17=Postgraduate	14. What type of work did the father of [name] do for most of his life? 1=Agriculture/ fishing 2=Trade 3=Transport 4=Technical/ professional 5=Government 6=Industry 8=Other (specify)	15. Is the mother of [name] still alive? 1=Yes 2=No (>>18)	16. Is the mother of [name] living in this household? 1=Yes 2=No (>>18)	*17. Copy the code number of the mother from Question 1*	18. What is the highest educational qualification she completed? 00=No grade completed 1-12=School years 13=Trade certificate 14=Other certificate 15=Diploma 16=Bachelor's degree 17=Postgraduate	19. What type of work did the mother of [name] do for most of her life? 1=Agriculture/ fishing 2=Trade 3=Transport 4=Technical/ professional 5=Government 6=Industry 7=Housewife 8=Other (specify)
	code	*code*	*code*	*code*	*code*	*code*	*code*	*code*	*code*	*code*
01										
02										
03										
04										
05										
06										
07										
08										
09										
10										
11										
12										
13										
14										

SECTION 2: EDUCATION

Person No.	20. Has [name] ever been to school? 1=Yes 2=No (>>29)	21. What is [name]'s highest educational qualification he/she completed? 00=No grade completed 1-12=School years 13=Trade certificate 14=Other certificate 15=Diploma 16=Bachelor's degree 17=Postgraduate	22. Did [name] go to school last year? 1=Yes 2=No (>>29)	23. How often did [name] go from home to school in the last year? 1=Daily 2=Weekly 3=Monthly 4=Each term 5=Only twice 6=Only once	24. How long did it take [name] to go to school from here? *Time, one-way trip*	25. How much did it cost for each one-way trip [name] made to school?	26. Did [name] complete the last school year? 1=Yes (>>28) 2=No	27. Why did [name] not complete the school year? 1=Fees too high 2=Illness 3=Needed at home 4=Got a job 5=Other (specify)
	code	*code*	*code*	*code*	*time*	*baht*	*code*	*code*
01								
02								
03								
04								
05								
06								
07								
08								
09								
10								
11								
12								
13								
14								

SECTION 2: EDUCATION continued

Person No.	28. How much did this household spend in the last year on [name]'s education for… *If the respondent can only give a total amount, write 'NA' in the relevant columns and the total amount in column e.*					29. Can [name] read a newspaper? 1=Yes 2=No	30. Can [name] write a letter? 1=Yes 2=No	31. Can [name] do written calculations? 1=Yes 2=No	32. Can [name] use a computer? 1=Yes 2=No
	a. School fees	b. Uniforms and sports clothes	c. Books and school supplies	d. Food, board and lodging	e. Other				
	baht	*baht*	*baht*	*baht*	*baht*	*code*	*code*	*code*	*code*
01									
02									
03									
04									
05									
06									
07									
08									
09									
10									
11									
12									
13									
14									

SECTION 4: HEALTH

Person No.	33. Has [name] had any illness or injury during the last 4 weeks? 1=Yes 2=No (>>44)	34. For how many days during the past 4 weeks did [name] suffer from this illness or injury?	35. For how many days during the past 4 weeks was [name] unable to carry on his/her usual activities because of this illness or injury?	36. Has a health practitioner been consulted for this illness or injury? 0=None (>>40) 1=Doctor 2=Nurse 3=Pharmacist 4=Midwife 5=Other (specify)	37. How long did it take [name] to get to this consultation?	38. How many times did [name] consult this person for this illness or injury during the past 4 weeks?	39. How much was or will be paid to this person for all the consultations during the past 4 weeks?	40. How many nights has [name] spent in a hospital or other establishment in the last 4 weeks because of this illness or injury? *(If none >>42)*
	code	*days*	*days*	*code*	*time*	*number*	*baht*	*nights*
01								
02								
03								
04								
05								
06								
07								
08								
09								
10								
11								
12								
13								
14								

SECTION 4: HEALTH continued

Ask questions 47-49 only if [name] is less than five years old

Person No.	41. How much was or will be paid for hospital or other stays for the past 4 weeks?	42. Have medicines also had to be bought for this illness or injury? 1=Yes 2=No (>>44)	43. How much has been or will be spent on medicines for this illness or injury for the past 4 weeks?	44. Apart from for injury or illness, has [name] incurred any medical expenses in the last 4 weeks? 1=Yes 2=No (>>47)	45. What was the expense for? 1=Medical check-up 2=Antenatal care 3=Preventative or other medications 4=Immunisation 5=Other (specify)	46. How much was or will be spent on non-injury, non-illness related medical expenses for the last 4 weeks?	47. Where was [name] born? 1=At home 2=Government hospital 3=Government health centre 4=Temple or church 5=Other private medical (specify) 6=Other (specify) *Record the place name, as a source for verifying age*	48. Who assisted with the delivery of [name]? 1=Doctor 2=Nurse/midwife 3=Village midwife 4=Traditional birth attendant 5=Female relative 6=Other (specify) *Record the person's name, as a source for verifying age*	49. When the mother of [name] was pregnant with him/her, how many times did she go for antenatal care during this pregnancy?
	baht	*code*	*baht*	*code*	*code*	*baht*	*code*	*code*	*number*
01									
02									
03									
04									
05									
06									
07									
08									
09									
10									
11									
12									
13									
14									

SECTION 5: RESPONDENT FOR SECTIONS 8 AND 9

50. Who in this household knows the most about the economic activities of members of the household?

Record the name and Person Number from the household roster. If more than one, then record all numbers.

[ ]

SECTION 6: HOUSING CONDITIONS

51. What is the main religion of members of this household?

Buddhism	1
Islam	2
Christianity	3
Other (specify)	4

52. What language do you normally speak in this household?

Central Thai	1
Northern dialect	2
North-eastern dialect	3
Lao	4
Cambodian	5
Chinese	6
Other (specify)	7

53. Does your household have…

Electricity?	No 1	Yes 2
A radio?	No 1	Yes 2
A stereo?	No 1	Yes 2
A television?	No 1	Yes 2
A refrigerator?	No 1	Yes 2
A computer?	No 1	Yes 2
An clectic fan?	No 1	Yes 2
A VCD player?	No 1	Yes 2

54. Does any member of your household own…

A bicycle?	No 1	Yes 2
A motorcycle?	No 1	Yes 2
A hand tractor modified to carry goods or passengers?	No 1	Yes 2
A car/truck/minibus?	No 1	No 1

55. Does this household have running water?

No.. 1
Yes... 2
If no, what is the households main source of water:

56. Do you have to pay money for your water?

No.. 1 (>>59)
Yes... 2

57. How much was your last payment for water?

[ ] baht

58. How long did this water last?

[ ] days

59. What type of toilet facility does your household usually use?

No toilet facility....................................... 1
Flush toilet with septic tank......................... 2
Household pit... 3
Other (specify)... 4

60. Is this toilet used only by your household, or do other households use it?

This household only.................................... 1
Shared... 2

61. How does your household dispose of its garbage?

Collected by a truck.................................... 1
Burnt or buried.. 2
Dumped in a river/lake................................. 3
No fixed place... 4
Other (specify).. 5

62. How much does your household pay for garbage disposal?

[ ] baht, per

[ ] (time unit)

63. What is the main source of lighting for this dwelling?

Electricity.. 1
Flashlight or battery lamp............................. 2
Gas, oil, kerosene or oil lamps........................ 3
Resin torches).. 4
Other (specify)... 5

64. Does your household have a separate cook house?

No.. 1
Yes... 2

65. What type of fuel is usually used by your household for cooking?

- Wood 1
- Coal or charcoal 2
- Kerosene 3
- Bottled Gas 4
- Electricity 5
- Other (specify) 6

66. What is the main material of the outside walls of the dwelling?

- Fibro-cement, brick, concrete or masonry 1
- Timber (sawn) 2
- Corrugated iron or sheet metal 3
- Traditional materials (bamboo, etc.) 4
- Other (specify) 5

67. What is the main material of the floor of the dwelling?

- Cement or brick 1
- Ceramic tiles or marble 2
- Carpet 3
- Timber (sawn and finished) 4
- Traditional materials (bamboo, etc.) 5
- Earth, mud or sand 6
- Other (specify) 7

68. What is the main material of the roof of the dwelling?

- Corrugated iron or sheet metal 1
- Concrete or cement 2
- Tiles or slate 3
- Wood or bamboo 4
- Traditional materials (thatch, etc.) 5
- Other (specify) 6

69. What are the windows of the dwelling fitted with?

Check only one box.

- Glass windows with shutters 1
- Glass windows only 2
- Sliding windows 3
- No covering (open windows) 4
- No windows 5
- Other (specify) 6

70. Does a member of your household own this dwelling?

- No 1
- Yes .... 2 (>>78)

71. Is this dwelling rented in exchange for goods, services or money?

- No .... 1 (>>74)
- Yes 2

72. From whom is this dwelling rented?

- Relative 1
- Private employer 2
- Public agency or government 3
- Private individual or agency 4
- Other (specify) 5

73. How much money does your household pay in rent for this dwelling?

[ ] baht, per

[ ] (time unit)

If no money payment, enter zero.

74. Does your household also supply goods or services in exchange for this dwelling?

No........ [ ] 1 (>>76)
Yes........ [ ] 2

75. What is the value of all goods and services provided by your household as rent for this dwelling?

[ ] baht, per

[ ] (time unit)

76. Is part or all of the rent for this dwelling paid by someone who is not a member of your household?

No........ [ ] 1 (>>87a)
Yes........ [ ] 2

77. Who pays all or part of the rent?

Relative........ [ ] 1
Private employer........ [ ] 2
Public agency or government........ [ ] 3
Private individual or agency........ [ ] 4
Other (specify)........ [ ] 5

(>>87a)

78. Do you make mortgage payments on this dwelling?

No........ [ ] 1 (>>81)
Yes........ [ ] 2

79. How much was your last payment?

[ ] baht

80. How often do you make these payments?

[ ] (number) times each

[ ] (time unit)

81. How many years ago was your house built?

[ ] years

82. How much did it cost to build or buy this house?

[ ] baht

83. Was any unpaid labour (including from your own family) used to build this house?

No........................ ☐ 1 (>>85)
Yes........................ ☐ 2

84. How many days of unpaid labour were used to build this house?

☐ days

85. If you wanted to sell this dwelling today, how much would you be able to sell it for?

☐ baht

86. If you wanted to rent this dwelling to someone else, how much rent would you be able to get for it?

☐ baht, per

☐ (time unit)

87a. Now I would like to measure the area of your house…

Make a sketch of the main dwelling and any structures that are nearby (e.g. cook houses). Measure the perimeter and indicate all dimensions on the sketch. Exclude toilets, uncovered platforms, terraces, and balconies.

87b. How was the area measured?

From inside........................ ☐ 1
From outside........................ ☐ 2

87c. How many rooms (excluding bathrooms, toilets, and kitchens) are in the measured area?

☐ rooms

87d. Does the dwelling have any of the following…
Tick any that apply

Wall cracked........................ ☐ 1
Floor sunken in........................ ☐ 2
Roof leaking........................ ☐ 3

SECTION 7: MIGRATION

88. Since BE 2541 (1998), how many people who were once members of this household have moved out from this household to live in another district?

[ ] people

If zero (>>99)

List all the people who were identified by question 88.

Person No.	89. What are the names of all the individuals identified in Question 88?	90. Sex	91. How old is [name]? *Only need approximate age*	92. What is [name]'s relationship to the head of the household? 1=Head 2=Spouse 3=Own/adopted child 4=Son/daughter-in-law 5=Grandchild 6=Parent 7=Parent-in-law 8=Brother/sister 9=Other relative 10=Non-relative	93. What is the highest educational qualification he/she completed? 00=No grade completed 1-12=School years 13=Trade certificate 14=Other certificate 15=Diploma 16=Bachelor's degree 17=Postgraduate	94. What type of work does [name] do? 1=Agriculture/fishing 2=Trade 3=Transport 4=Technical/professional 5=Government 6=Industry 7=Prostitution 8=Other (specify)	95. Where did [name] migrate to? 1=Bangkok 2=Khon Kaen 3=Nakhon Ratchasima 4=Elsewhere in Isan (specify) 5=Elsewhere in Thailand (specify) 6=Overseas (specify)	96. Does [name] send any gifts of money or goods to this household, or bring any gifts of money or goods to this household when they come to stay or visit? *1=No (>>99) 2=Yes*	97. How many times in the last year has [name] sent gifts of money or goods to this household?	98. What is the total value of the gifts of money or goods that [name] has sent to this household in the last year?
		M/F	*cms*	*code*	*code*	*code*	*code*	*code*	*time*	*baht*
901										
902										
903										
904										
905										
906										

99. Have any of the people who are now members of this household moved out from this household to live in another district in the past year?

No.. 1 (>>107)
Yes... 2

List all the people who were identified by question 99.

Person No.	100. What are the names of all the individuals identified in Q99? *List also their code number from the household roster*	101. In the time they were away, what type of work did [name] do? 1=Agriculture/ fishing 2=Trade 3=Transport 4=Technical/ professional 5=Government 6=Industry 7=Prostitution 8=Other (specify)	102. How many times has [name] migrated in the past year?	103. Where did [name] migrate to? 1=Bangkok 2=Khon Kaen 3=Nakhon Ratchasima 4=Elsewhere in Isan (specify) 5=Elsewhere in Thailand (specify) 6=Overseas (specify)	104. In the time they were away, did [name] send any gifts of money or goods to this household? *1=No (>>107) 2=Yes*	105. How many times in the last year did [name] send gifts of money or goods to this household?	106. What was the total value of the gifts of money or goods that [name] sent to this household in the last year?
		code	*number*	*code*	*list*	*times*	*baht*
907							
908							
909							
910							
911							
912							

NOTE: This version of the questions was used in Rounds Three and Four

Person No.	99. In the past year, has [name] spent one month or more living outside this district, for work or study or any other reason? *1=No (>>107)* *2=Yes*	100. In the time they were away, what type of work did [name] do? 1=Agriculture/ fishing 2=Trade 3=Transport 4=Technical/ professional 5=Government 6=Industry 7=Prostitution 8=Other (specify)	101. Where did [name] migrate to? 1=Bangkok 2=Khon Kaen 3=Nakhon Ratchasima 4=Elsewhere in Isan (specify) 5=Elsewhere in Thailand (specify) 6=Overseas (specify)	102. How long did [name] spend living outside this district in the last year?	103. Did [name] send any gifts of money or goods to this household, or bring any gifts of money or goods to this household when they returned to this household? *1=No (>>107)* *2=Yes*	104. How many times in the last year did [name] give or bring gifts of money or goods to this household?	106. What was the total value of the gifts of money or goods that [name] gave or brought to this household in the last year?
	code	*code*	*code*	*months*	*code*	*times*	*baht*
01							
02							
03							
04							
05							
06							
07							
08							
09							
10							
11							
12							
13							
14							

SECTION 8: ECONOMIC ACTIVITIES

NOTE: Ask the questions in sections 8 and 9 of the respondent identified in section 5. If more than one respondent answers questions, records the person numbers of all respondents in question 50.

Person No.	107. In the past 12 months, did anyone in this household earn money by growing or selling… *Work across the list of items and circle 'Yes' or 'No'*											
	1801. Rice	1802. Corn	1803. Sugar cane	1804. Cassava	1805. Other vegetables (specify)	1806. Bananas	1807. Papayas	1808. Other food (specify)	1809. Rubber	1810. Chickens	1811. Pigs	1812. Beef Cattle	1813. Buffalo
	1=Yes 2=No	1=Yes 2=No	1=Yes 2=No	1=Yes 2=No	1=Yes 2=No	1=Yes 2=No	1=Yes 2=No	1=Yes 2=No	1=Yes 2=No	1=Yes 2=No	1=Yes 2=No	1=Yes 2=No	1=Yes 2=No
	For each item circled 'Yes', work down the column by asking, for anyone 14 years of age or over: Did [name] earn any money by growing and selling [item] in the last 12 months?												
01													
02													
03													
04													
05													
06													
07													
08													
09													
10													
11													
12													
13													
14													

SECTION 8: ECONOMIC ACTIVITIES continued

Person No.	108. In the past 12 months, did anyone in this household earn money by… *Work across the list of items and circle 'Yes' or 'No'*											109. What was [name]'s most important source of income in the last year?
	1814. Selling products from dairy cattle (e.g. milk)	1815. Catching or selling fish	1816. Gathering or selling firewood	1817. Making or selling artefacts (e.g. carvings)	1818. Making or selling handi-crafts (e.g. baskets)	1819. Running a shop or market stall	1820. Running a public motor vehicle	1821. Running another business	1822. Working for a public sector wage	1823. Working for an agricul-tural wage	1824. Working for a manufac-turing wage	1825. Working for other private sector wage	
	1=Yes 2=No	1=Yes 2=No	1=Yes 2=No	1=Yes 2=No	1=Yes 2=No	1=Yes 2=No	1=Yes 2=No	1=Yes 2=No	1=Yes 2=No	1=Yes 2=No	1=Yes 2=No	1=Yes 2=No	*Use the activity codes 1801-1825, and use 'NA' if no income*
	For each item circled 'Yes', work down the column by asking, for anyone 14 years of age or over: Did [name] earn any money from this activity?												
01													
02													
03													
04													
05													
06													
07													
08													
09													
10													
11													
12													
13													
14													

110. Identify the economic activities performed by the household from questions 107 and 108. Record the activity and its code below, then ask questions 111-113.		*For codes 1801-1821 ask:* 111a. Where is the output from [activity] sold? *For codes 1822-1825 ask:* 111b. Where do you perform the work?	112. How is the price/wage received for [activity] decided upon? 1=Set by seller / worker 2=Bargaining or negotiation 3=Set by government organization 4=set by non-government organization 5=Set by buyer / employer	113. What do you think are the most important factors that prevent your household from receiving a better (higher) price/wage for [activity]? *Record all reasons given (if any)*
code	*activity*	*place*	*code*	*reason*

SECTION 9: AGRICULTURAL ASSETS, INPUTS AND SERVICES

114. Does anyone in this household grow any crops or raise livestock?

No.. ☐ 1 (>>147)
Yes.. ☐ 2

115. In the last year, did agricultural extension officers provide technical advice to anyone in this household?

No.. ☐ 1 (>>117)
Yes.. ☐ 2

116. Which crops or livestock was this advice given for?
List all

Ask question 117 first for all items in the list. Then ask questions 118-125 only for items where question 117 is answered 'Yes'.

117. During the past year, has any member of this household raised [livestock]? *Put a cross in the appropriate box.*				118. How many [animal]s do the members of your household have now?	119. If they wanted to sell all these [animal]s, how much would they receive?	120. During the past year, have the members of your household sold any [animal]s? *1=No (>>123) 2=Yes*	121. How many [animal]s have they sold in the past year?	122. How much did they receive for the [animal]s they sold?	123. During the past year, have the members of your household bought any [animal]s? *1=No (>>126) 2=Yes*	124. How many [animal]s have they bought in the past year?	125. How much did they pay for the [animal]s they bought?
Code	Livestock	Yes	No	*number*	*baht*	*code*	*number*	*baht*	*code*	*number*	*baht*
1901	Dairy cattle										
1902	Beef cattle										
1903	Buffalos										
1904	Chickens										
1905	Pigs										
1906	Sheep or goats										
1907	Other livestock (specify)										

126. List all of the fruit or other tree crops grown by the household. *Use codes from Q107, or specify other. If no tree crops (>>130)*		127. What proportion of your [tree crop] plantings is too young to produce? *Give the proportion as a fraction of the number of plantings (e.g. 1/3, 3/4, etc.)*	128. What proportion of your [tree crop] plantings is in full production? *Give the proportion as a fraction of the number of plantings (e.g. 1/3, 3/4, etc.)*	129. What proportion of your [tree crop] plantings is near the end of its productive life? *Give the proportion as a fraction of the number of plantings (e.g. 1/3, 3/4, etc.)*
code	*tree crop*	*proportion*	*proportion*	*proportion*

130. How many rais of land have members of this household used during the past year, including all parcels of land of all members of the household?

☐ rais

131. How many rais of fallow land are available to members of this household?

☐ rais

132. Do the members of this household have the right to sell all or part of this land if they wish?

No.. ☐ 1
Yes... ☐ 2

133. Do the members of this household have the right to lend all or part of the land they are using, including assigning the right to sharecrop?

No.. ☐ 1
Yes... ☐ 2

Ask question 134 first for all items in the list. Then ask questions 135-141 only for items where question 134 is answered 'Yes'. Ask questions 136-138 only for actions a and b. Ask questions 139-141 only for actions d and e.

134. In the past year has any member of this household… *Put a cross in the appropriate box.*			135. In the past year, how much land did the members of this household [action]?	136. How much money did members of this household pay to [action]?	137. Did your household also supply goods or services to [action]? *1=No (next action) 2=Yes*	138. What is the value of all goods and services that were provided by your household to [action]?	139. How much money was paid to members of this household for [action]?	140. Did your household also receive goods or services for [action]? *1=No (next action) 2=Yes*	141. What is the value of all goods and services that were provided to your household for [action]?
[action]	Yes	No	*rais*	*baht*	*code*	*baht*	*baht*	*code*	*baht*
a. bought any plot of land									
b. rented any plot of land, including for sharecropping									
c. received any plot of land as a gift from someone outside this household									
d. sold any part of their land									
e. lent any part of their land, including to sharecroppers									
f. given any part of their land to a person as a gift									

142. Does anyone in this household own a…

Tractor?	No........☐ 1	Yes.......☐ 2
Walking tiller?	No........☐ 1	Yes.......☐ 2
Corn mill?	No........☐ 1	Yes.......☐ 2
Sprayer?	No........☐ 1	Yes.......☐ 2
Pickup truck?	No........☐ 1	Yes.......☐ 2
Other farm vehicle (specify)?	No........☐ 1	Yes.......☐ 2
Other agricultural machinery (specify)?	No........☐ 1	Yes.......☐ 2

143. Are the fields used by this household irrigated?

No..☐ 1
Yes..☐ 2

144. Are you potentially able to grow crops all year round?

No..☐ 1
Yes..☐ 2
If no, why not (>>146a):

145. Do you grow crops all year round?

No..☐ 1
Yes..☐ 2
If no, why not:

INPUT	146a. In the past year, did anyone in this household spend money on [input]? 1=Yes 2=No (>>next input)	146b. Which crops was the input used on? *Use codes from Q107, or specify other*	146c. Each time [input] was used, what was the cost?	146d. How often is [input] purchased?	146e. Where or who is [input] normally purchased from?	146f. How is the price of [input] decided upon? 1=Set by seller 2=Bargaining or negotiation 3=Set by government organization 4=set by non-government organization 5=Set by buyer
	code	*code*	*baht*	*time*	*source*	*code*
Fertiliser						
Organic manure						
Insecticides and pesticides						
Seeds and seedlings						
Animal feeds						
Farm tools						
Tractor hire						
Hire of other equipment						
Cartage and freight						
Crop storage						
Repairing farm equipment						
Hired labour for agriculture						
Hired labour for supervision						
Agricultural loan repayment						

SECTION 10: ANTHROPOMETRICS

Person No.	147. When was [name] born? *Only record year if born before 1988*	148. Sex	149a. Height	*149b. Was [name] measured lying down or standing up?* *1=Lying down 2=Standing up*	150a. Weight	*150b. What was [name] wearing when he/she was weighed?* *List all items*	*150c. What time of the day was [name] weighed?*
	date	*M/F*	*cms*	*code*	*kgs*	*list*	*time*
01							
02							
03							
04							
05							
06							
07							
08							
09							
10							
11							
12							
13							
14							

SECTION 11: HOUSEHOLD STOCKS

151. Check for major stocks of the listed foods and non-food items. Take care to record the appropriate units.

Code	Food or non-food Product/Item	Quantity (and units)
2101	Ordinary rice	
2102	Glutinous or sticky rice	
2103	Wheat Flour or other flour	
2104	Maize or corn	
2105	Cassava	
2106	Potato or sweet potato	
2107	Wheat or egg noodles	
2108	Processed or dried meat	
2109	Dry or processed fish or shrimp	
2110	Tofu	
2111	Nuts (peanuts, cashews, etc.)	
2112	Salt	
2113	Sugar and sugar cane	
2114	Eggs	
2115	Cooking oil	
2116	Butter or margarine	
2117	Alcohol, beer	
2118	Coffee	
2119	Tea	
2120	Cigarettes or Tobacco	
2121	Kerosene or oil for lighting or cooking	
2122	Firewood, charcoal, etc.	

Appendix V – Survey Instrument: Representative Household Survey (Household Second Visit Questionnaire)

2003 BAN PHAI AND PHON DISTRICTS HOUSEHOLD SURVEY

Household Questionnaire – Second Visit

District:	INTERVIEWER NOTES: *Give details of any unusual spending or other factors that may affect the reported consumption level*
Sub-district:	
Village Name:	
Household Number:	
Name of Household Head:	
Number of People in the Household: (copy from household roster)	
Date of Visit:	
Main respondent: (name, and code from the household roster)	
Interviewers:	

SUPERVISOR CHECK

Sign only after visiting the household described on this sheet and confirming that they were interviewed on the day indicated.

NOTES TO INTERVIEWERS

- *All Sections should be completed by the interviewer, in consultation with respondents from the household. The main respondent's name and code from the household roster must be recorded on the front cover of this questionnaire.*
- *Supervisors will be provided with a table of random numbers that they will use to select the respondents for the individual questionnaire (Sections 12M and 12F).*
- *The anthropometrist from the interview team must be available to complete Section 1 of this questionnaire.*
- *For each question, unless otherwise stated, make certain you either tick one box from the choices given, or write the answer in the space provided.*
- *For all questions, when referring to the "nearest" (e.g. hospital, market), "nearest" means the one that can be reached in the shortest time by the method of travel most used by people in this community. This need not be the one that is the closest physical distance.*
- *Any time where a question refers to "in the past year", instead use "in the time between the most recent planting season and the previous planting season.*

Note any problems encountered in the completion of this interview here:

SECTION 1: HOUSEHOLD ROSTER AND ANTHROPOMETRICS

Person No.	*1. Name* *Copy from household roster on first visit questionnaire*	2. On how many days was [name] absent from the household since my last visit? *If none (>>4a)*	3. Why was [name] absent from the household? 1=Working elsewhere 2=Away at school 3=Funeral/wedding 4=Holiday 5=Other (specify)	4a. Height	*4b. Was [name] measured lying down or standing up?* *1=Lying down* *2=Standing up*	5a. Weight	*5b. What was [name] wearing when he/she was weighed?* *List all items*	*5c. What time of the day was [name] weighed?*
		days	*code*	*cms*	*code*	*kgs*	*list*	*time*
01								
02								
03								
04								
05								
06								
07								
08								
09								
10								
11								
12								
13								
14								

SECTION 2: PURCHASES OF FOOD

Ask question 6 first for all items in the list. Then ask questions 7-13 only for items where question 6 is answered 'Yes'.

6. During the past year, have the members of this household spent money to buy any of the following foods? *Put a cross in the appropriate box.*				7. Since my last visit have members of your household purchased any [item]? *1=No (>>next item) 2=Yes*	8. What was the total value of [item] purchased since my last visit?	9. What was the total quantity of [item] purchased since my last visit?	10. Was any of this [item] given as a gift to people outside the household? *1=No (>>12) 2=Yes*	11. What was the value of [item] that was given away?	12. Was any of this [item] sold or exchanged for other goods? *1=No (>>next item) 2=Yes*	13. What was the value of [item] that was sold or exchanged?
Code	Product/Item	Yes	No	*code*	*baht*	*kgs*	*code*	*baht*	*code*	*baht*
2201	Ordinary rice									
2202	Glutinous or sticky rice									
2203	Bread									
2204	Wheat Flour or other flour									
2205	Biscuits									
2206	Other cereal products (e.g. cakes, breakfast cereal)									
2207	Maize or corn									
2208	Cassava									
2209	Potato or sweet potato									
2210	Wheat or egg noodles									
2211	Other noodles									
2212	Pork									
2213	Beef or buffalo meat									
2214	Chicken									
2215	Processed or dried meat									

SECTION 2: PURCHASES OF FOOD (continued)

Ask question 6 first for all items in the list. Then ask questions 7-13 only for items where question 6 is answered 'Yes'.

6. During the past year, have the members of this household spent money to buy any of the following foods? *Put a cross in the appropriate box.*				7. Since my last visit have members of your household purchased any [item]? *1=No (>>next item) 2=Yes*	8. What was the total value of [item] purchased since my last visit?	9. What was the total quantity of [item] purchased since my last visit?	10. Was any of this [item] given as a gift to people outside the household? *1=No (>>12) 2=Yes*	11. What was the value of [item] that was given away?	12. Was any of this [item] sold or exchanged for other goods? *1=No (>>next item) 2=Yes*	13. What was the value of [item] that was sold or exchanged?
Code	Product/Item	Yes	No	*code*	*baht*	*kgs*	*code*	*baht*	*code*	*baht*
2216	Other meat									
2217	Fresh fish or shrimp									
2218	Dry or processed fish or shrimp									
2219	Tofu									
2220	Cabbage									
2221	Tomatoes									
2222	Other vegetables									
2223	Nuts (peanuts, cashews, etc.)									
2224	Bananas									
2225	Papayas									
2226	Pineapple									
2227	Mangoes									
2228	Other fruits									
2229	Salt									
2230	Sugar and sugar cane									

SECTION 2: PURCHASES OF FOOD (continued)

Ask question 6 first for all items in the list. Then ask questions 7-13 only for items where question 6 is answered 'Yes'.

6. During the past year, have the members of this household spent money to buy any of the following foods? *Put a cross in the appropriate box.*				7. Since my last visit have members of your household purchased any [item]? *1=No (>>next item) 2=Yes*	8. What was the total value of [item] purchased since my last visit?	9. What was the total quantity of [item] purchased since my last visit?	10. Was any of this [item] given as a gift to people outside the household? *1=No (>>12) 2=Yes*	11. What was the value of [item] that was given away?	12. Was any of this [item] sold or exchanged for other goods? *1=No (>>next item) 2=Yes*	13. What was the value of [item] that was sold or exchanged?
Code	Product/Item	Yes	No	*code*	*baht*	*kgs*	*code*	*baht*	*code*	*baht*
2231	Eggs									
2232	Cooking oil									
2233	Butter or margarine									
2234	Fresh or powdered milk									
2235	Other dairy products									
2236	Alcohol, beer									
2237	Coffee									
2238	Tea									
2239	Other beverages									
2240	Other food (specify)									

SECTION 3: OTHER FREQUENT PURCHASES

Ask question 14 first for all items in the list. Then ask questions 15-21 only for items where question 14 is answered 'Yes'.

14. During the past year, have the members of this household spent money to buy any of the following items? *Put a cross in the appropriate box.*				15. Since my last visit have members of your household purchased any [item]? *1=No (>>next item)* *2=Yes*	16. What was the total value of [item] purchased since my last visit?	17. What was the total quantity of [item] purchased since my last visit?	18. Was any of this [item] given as a gift to people outside the household? *1=No (>>20)* *2=Yes*	19. What was the value of [item] that was given away?	20. Was any of this [item] sold or exchanged for other goods? *1=No (>>next item)* *2=Yes*	21. What was the value of [item] that was sold or exchanged?
Code	Product/Item	Yes	No	*code*	*baht*	*kgs*	*code*	*baht*	*code*	*baht*
2301	Meals consumed away from home (e.g. at bars, restaurants)									
2302	Cigarettes or Tobacco									
2303	Bath soap, shampoo, toothpaste									
2304	Other personal car products (cosmetics, etc.)									
2305	Laundry powder or soap									
2306	Toilet paper									
2307	Other home maintenance products									
2308	Kerosene or oil for lighting or cooking									
2309	Petrol for motor vehicles or machinery									
2310	Firewood, charcoal, etc.									
2311	Matches									
2312	Public motor vehicle fares									
2313	Batteries									
2314	Newspapers and magazines									

SECTION 3: OTHER FREQUENT PURCHASES (continued)

Ask question 14 first for all items in the list. Then ask questions 15-21 only for items where question 14 is answered 'Yes'.

14. During the past year, have the members of this household spent money to buy any of the following items? *Put a cross in the appropriate box.*				15. Since my last visit have members of your household purchased any [item]? *1=No (>>next item) 2=Yes*	16. What was the total value of [item] purchased since my last visit?	17. What was the total quantity of [item] purchased since my last visit?	18. Was any of this [item] given as a gift to people outside the household? *1=No (>>20) 2=Yes*	19. What was the value of [item] that was given away?	20. Was any of this [item] sold or exchanged for other goods? *1=No (>>next item) 2=Yes*	21. What was the value of [item] that was sold or exchanged?
Code	Product/Item	Yes	No	*code*	*baht*	*kgs*	*code*	*baht*	*code*	*baht*
2315	Stamps and postage fees									
2316	Lottery tickets									
2317	Other forms of gambling									
2318	Entrance fees for films and videos									
2319	Entrance fees to sports matches									
2320	Other entertainment									

SECTION 4: OWN PRODUCTION OF FOOD

Ask question 22 first for all items in the list. Then ask questions 23-30 only for items where question 22 is answered 'Yes'.

22. During the past year, have the members of this household harvested from their gardens, caught in the river or captured from the bush or their own livestock, any of the following items? *Put a cross in the appropriate box.*				23. Since my last visit have members of your household taken any [item] from their gardens/the river/the animals? *1=No (>>next item)* *2=Yes*	24. What was the total quantity of [item] harvested/ collected since my last visit? 1=Rice bag (25kg) 2=Bunch/heap 3=Kilogram 4=Singles 5=Other (specify)		25. How much would it cost to buy the amount that was harvested/ collected since my last visit?	26. Was any of this [item] given as a gift to people outside the household, or sold or exchanged? *1=No (>>next item)* *2=Yes*	27. What quantity of [item] was given as a gift?	28. What quantity of [item] was sold or exchanged?	29. What is the total value of what they received for the [item]s they sold?	30. What quantity of [item] has been stored for future sale or use?
Code	Product/Item	Yes	No	*code*	*number*	*unit*	*baht*	*code*	*number, unit*	*number, unit*	*baht*	*number, unit*
2401	Rice											
2402	Corn											
2403	Sugar cane											
2404	Cassava											
2405	Other vegetables (specify)											
2406	Bananas											
2407	Papayas											
2408	Other food (specify)											
2410	Chickens											
2411	Pigs											
2412	Beef cattle											
2413	Buffalo											
2414	Dairy products											
2415	Fish											

SECTION 5: GIFTS RECEIVED

31. Since my last visit have members of your household received any of the following items as a gift, given by people from outside of the household? *Put a cross in the appropriate box.* *If the answer is yes, ask questions 32 and 33.* *If the answer is no, go to the next item.*				32. What was the total value of the [item] that was received as a gift?	33. What was the total quantity of the [item] that was received as a gift?	
Cod e	Product/Item	Yes	No	baht	Product/ Item	kgs
2201	Ordinary rice					
2202	Glutinous or sticky rice					
2203	Bread					
2204	Wheat Flour or other flour					
2205	Biscuits					
2206	Other cereal products (e.g. cakes, breakfast cereal)					
2207	Maize or corn					
2208	Cassava					
2209	Potato or sweet potato					
2210	Wheat or egg noodles					
2211	Other noodles					
2212	Pork					
2213	Beef or buffalo meat					
2214	Chicken					
2215	Processed or dried meat					
2216	Other meat					
2217	Fresh fish or shrimp					

31. Since my last visit have members of your household received any of the following items as a gift, given by people from outside of the household? *Put a cross in the appropriate box.* *If the answer is yes, ask questions 32 and 33.* *If the answer is no, go to the next item.*				32. What was the total value of the [item] that was received as a gift?	33. What was the total quantity of the [item] that was received as a gift?	
Cod e	Product/Item	Yes	No	baht	Product/ Item	kgs
2518	Dry or processed fish or shrimp					
2519	Tofu					
2520	Cabbage					
2521	Tomatoes					
2522	Other vegetables					
2523	Nuts (peanuts, cashews, etc.)					
2524	Bananas					
2525	Papayas					
2526	Pineapple					
2527	Mangoes					
2528	Other fruits					
2529	Salt					
2530	Sugar and sugar cane					
2531	Eggs					
2532	Cooking oil					
2533	Butter or margarine					
2534	Fresh or powdered milk					

SECTION 5: GIFTS RECEIVED (continued)

31. Since my last visit have members of your household received any of the following items as a gift, given by people from outside of the household? *Put a cross in the appropriate box. If the answer is yes, ask questions 32 and 33. If the answer is no, go to the next item.*				32. What was the total value of the [item] that was received as a gift?	33. What was the total quantity of the [item] that was received as a gift?	
Cod e	Product/Item	Yes	No	baht	Product/ Item	kgs
2535	Other dairy products					
2536	Alcohol, beer					
2537	Coffee					
2538	Tea					
2539	Other beverages					
2540	Other food (specify)					
2541	Meals consumed away from home (e.g. at bars, restaurants)					
2542	Cigarettes or Tobacco					
2543	Bath soap, shampoo, toothpaste					
2544	Other personal car products (cosmetics, etc.)					
2545	Laundry powder or soap					
2546	Toilet paper					
2547	Other home maintenance products					
2548	Kerosene or oil for lighting or cooking					
2549	Petrol for motor vehicles or machinery					
2550	Firewood, charcoal, etc.					

31. Since my last visit have members of your household received any of the following items as a gift, given by people from outside of the household? *Put a cross in the appropriate box. If the answer is yes, ask questions 32 and 33. If the answer is no, go to the next item.*				32. What was the total value of the [item] that was received as a gift?	33. What was the total quantity of the [item] that was received as a gift?	
Cod e	Product/Item	Yes	No	baht	Product/ Item	kgs
2551	Matches					
2552	Public motor vehicle fares					
2553	Batteries					
2554	Newspapers and magazines					
2555	Stamps and postage fees					
2556	Lottery tickets					
2557	Other forms of gambling					
2558	Entrance fees for films and videos					
2559	Entrance fees to sports matches					
2560	Other entertainment					
2561	Dairy cattle					
2562	Beef cattle					
2563	Buffalos					
2564	Chickens					
2565	Pigs					
2566	Sheep or goats					

SECTION 6: ANNUAL EXPENSES AND GIFTS

Ask question 34 first for all items in the list. Then ask questions 35-41 only for items where question 34 is answered 'Yes'.

34. During the past year, have the members of this household spent money to buy any of the following items, or received the items as a gift? *Put a cross in the appropriate box.*				35. Since my last visit have members of your household purchased any [item]? *1=No (>>37) 2=Yes*	36. What was the total value of [item] purchased since my last visit?	37. How much did your household spend on [item] during the past year?	38. Was any of this [item] bought in the past year given as a gift to people outside the household? *1=No (>>40) 2=Yes*	39. What was the total value of all [item] that was given away?	40. Did you receive any [item] as a gift during the past year? *1=No (>>next item) 2=Yes*	41. What was the total value of all [item] that you received as gifts during the past year?
Code	Product/Item	Yes	No	*code*	*baht*	*baht*	*code*	*baht*	*code*	*baht*
2601	Cloth and clothing material									
2602	Adult's clothing									
2603	Children's clothing (excl. school uniforms)									
2604	Footwear									
2605	Sleeping and other blankets									
2606	Linen									
2607	Kitchen utensils									
2608	Pots, pans, bins, buckets, basins									
2609	Kitchen electrical equipment									
2610	Household and garden tools									
2611	Domestic services (housemaid, babysitter…)									
2612	Telephone and internet charges									
2613	Building materials									
2614	Home repairs, painting, etc.									

SECTION 6: ANNUAL EXPENSES AND GIFTS continued

Ask question 34 first for all items in the list. Then ask questions 35-41 only for items where question 34 is answered 'Yes'.

34. During the past year, have the members of this household spent money to buy any of the following items, or received the items as a gift? *Put a cross in the appropriate box.*				35. Since my last visit have members of your household purchased any [item]? *1=No (>>37) 2=Yes*	36. What was the total value of [item] purchased since my last visit?	37. How much did your household spend on [item] during the past year?	38. Was any of this [item] bought in the past year given as a gift to people outside the household? *1=No (>>40) 2=Yes*	39. What was the total value of all [item] that was given away?	40. Did you receive any [item] as a gift during the past year? *1=No (>>next item) 2=Yes*	41. What was the total value of all [item] that you received as gifts during the past year?
Code	Product/Item	Yes	No	*code*	*baht*	*baht*	*code*	*baht*	*code*	*baht*
2615	Other household equipment and services									
2616	Medicines (modern and traditional)									
2617	Medical fees (doctor, etc.)									
2618	Vehicle repairs and maintenance									
2619	Bicycle or motorcycle repairs and maintenance									
2620	Other transport costs									
2621	Holidays and excursions									
2622	Jewellery, watches, etc.									
2623	Toys									
2624	Entertainment, cultural activities									
2625	Loan payments, bank charges, finance fees									
2626	Insurances									
2627	Wedding expenses									
2628	Burial and death expenses									
2629	Contributions to temples or religious organisations									

SECTION 7: INVENTORY OF DURABLE GOODS

Ask question 42 first for all items in the list. Then ask questions 43-46 for each item identified in question 42.

42. Do the members of this household own any of the following items? *Put a cross in the appropriate box.*			
Code	Item	Yes	No
2701	Chairs and tables		
2702	Primus or portable stoves		
2703	Kerosene lamps		
2704	Refrigerators or freezers		
2705	Sewing machines		
2706	Generators		
2707	Guns		
2708	Boats and outboard motors		
2709	Bicycles		
2710	Motorcycles		
2711	Cars or pickup trucks		
2712	Tractors		
2713	Agricultural equipment		
2714	Cameras		
2715	Radios or stereos		
2716	Television sets or video equipment		
2717	Computers or video games		

	43. Please describe all the [item]s owned by members of the household. *Write the item and description for each of the goods. Copy the code.*			44. In what year did you acquire this [item]?	45. How much did you pay for this [item]? *If it was a gift, what was its value?*	46. If you wanted to sell this [item] today, how much would you receive?
	Item	Description	Code	*year*	*baht*	*baht*
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						

SECTION 8: INWARD TRANSFERS OF MONEY

Ask question 47 first for each type of person in the list. Then ask questions 48-51 for each person identified in question 47.

47. During the past year has any member of your household received cash gifts of 50 baht or more from any of the following people? *Put a cross in the appropriate box.*			
Code	Item	Yes	No
2801	Children living away from this household		
2802	Parents living away from this household		
2803	Other relatives living away from this household		
2804	Guests who are not part of this household		
2805	Other people who are not part of this household		

	48. Please describe all of the [people] who gave cash gifts of at least 50 baht to members of this household during the past year. *Copy the code for each type of person and answer the questions about the gifts they gave.*				49. What was the total value of money given by this person to members of this household in the past year?	50. Were any of the gifts given by this person to be used for special purposes? *1=No (>>next person) 2=Yes*	51. What purposes? 1=Wedding 2=Funeral 3=School fees 4=House building 5=Other (specify)
	Code	Where does he/she live?	What is his/her highest educational qualification?	What is his/her occupation?	*baht*	*code*	*code*
1							
2							
3							
4							
5							
6							
7							
8							

SECTION 9: OUTWARD TRANSFERS OF MONEY

Ask question 52 first for each type of person in the list. Then ask questions 53-56 for each person identified in question 52.

52. During the past year has any member of your household given cash gifts of 50 baht or more to any of the following people? *Put a cross in the appropriate box.*			
Code	Item	Yes	No
2901	Children living away from this household		
2902	Parents living away from this household		
2903	Other relatives living away from this household		
2904	Guests who are not part of this household		
2905	Other people who are not part of this household		

	53. Please describe all of the [people] who received cash gifts of at least 50 baht from members of this household during the past year. *Copy the code for each type of person and answer the questions about the gifts they gave.*				54. What was the total value of money given to this person by members of this household in the past year?	55. Were any of the gifts given to this person to be used for special purposes? *1=No (>>next person) 2=Yes*	56. What purposes? 1=Wedding 2=Funeral 3=School fees 4=House building 5=Other (specify)
	Code	Where does he/she live?	What is his/her highest educational qualification?	What is his/her occupation?	*baht*	*code*	*code*
1							
2							
3							
4							
5							
6							
7							
8							

SECTION 10: SAVINGS AND DEBT

Ask questions 57 and 59 first for each type of institution in the list. Then ask question 58 only for institutions where question 57 is answered 'Yes', and ask question 60 only for institutions where question 59 is answered 'Yes'.

57. Does any member of the household have money saved with… *Put a cross in the appropriate box.*				58. What was the total value of money that members of this household have saved with [institution]?
Code	Institution	Yes	No	*baht*
1001	Banks			
1002	Finance companies			
1003	Local credit cooperatives			
1004	Moneylenders			
1005	Insurance companies			
1006	Other (specify)			

59. Does any member of the household owe any money to… *Put a cross in the appropriate box.*				60. What was the total value of money that members of this household owe to [institution]?
Code	Product/Item	Yes	No	*baht*
1001	Banks			
1002	Finance companies			
1003	Local credit cooperatives			
1004	Moneylenders			
1005	Insurance companies			
1006	Other (specify)			

61. Has any member of this household lent money or goods to individuals, farms, or businesses that will be, but have not yet been repaid? For example, loans to friends, neighbours, relatives or business partners that have not yet been repaid.

No.. ☐ 1 (>>Section 11)
Yes... ☐ 2

62. How much altogether have members of this household loaned to these persons in the past year?

☐ baht

63. Have the people who were loaned money made any repayments in the past year?

No.. ☐ 1 (>>Section 11)
Yes... ☐ 2

64. How much altogether have the people who were loaned money repaid in the past year?

☐ baht

SECTION 11: HOUSEHOLD STOCKS

Check for major stocks of the listed foods and non-food items. Take care to record the appropriate units.

Code	Food or non-food Product/Item	Quantity (and units)
2101	Ordinary rice	
2102	Glutinous or sticky rice	
2103	Wheat Flour or other flour	
2104	Maize or corn	
2105	Cassava	
2106	Potato or sweet potato	
2107	Wheat or egg noodles	
2108	Processed or dried meat	
2109	Dry or processed fish or shrimp	
2110	Tofu	
2111	Nuts (peanuts, cashews, etc.)	
2112	Salt	
2113	Sugar and sugar cane	
2114	Eggs	
2115	Cooking oil	
2116	Butter or margarine	
2117	Alcohol, beer	
2118	Coffee	
2119	Tea	
2120	Cigarettes or Tobacco	
2121	Kerosene or oil for lighting or cooking	
2122	Firewood, charcoal, etc.	

SECTION 12: INDIVIDUAL QUESTIONNAIRE

Select at random one adult male respondent, and one adult female respondent to complete this section. Record their code from the household roster on the first visit questionnaire.

65. Respondents:

Male: [ ]   Female: [ ]

SECTION 12M: MALE INDIVIDUAL QUESTIONNAIRE

Ask questions 66-91 in this section only of the selected adult male respondent.

66. Taking everything into account, do you feel better off, the same, or worse off than you did 2 years ago?

Better off.. [ ] 1
About the same... [ ] 2
Worse off... [ ] 3

67. How would you describe your household's status within this village?

Village headman..................................... [ ] 1
Other high status.................................... [ ] 2
Middle status.. [ ] 3
Low status... [ ] 4

68. Does the household's status in the village place any obligations on your household?

No... [ ] 1
Yes.. [ ] 2
If yes, what are the obligations of this household:

Ask question 69 first for each type of person in the list. Then ask question 70 for each person identified in question 69.

69. If your household fell on hard times, would your household be able to receive support from…

Put a cross in the appropriate box

Cod e	Item	Yes	No
1201	Relatives who live in this district		
1202	Relatives who live elsewhere		
1203	Friends who live in this district		
1204	Friends who live elsewhere		

70. Please describe all of the [people] who would help to support your household.

Copy the code for each type of person and answer the questions about the support they could provide. If many people have the same characteristics, then group them together.

	Cod e	a. Where does he/she live?	b. What is his/her highest educational qualification ?	c. What is his/her occupation?	d. What support could they provide?
1					
2					
3					
4					
5					
6					
7					
8					

71. What do you hope to be doing in five years time?

- Working the same occupation........................ 1
- Working in a different occupation (specify)........ 2
- Retired.. 3
- Studying.. 4
- Other (specify)... 5

72. What do you hope your children (if any) will be doing in five years time?

- Working the same occupation........................ 1
- Working in a different occupation (specify)........ 2
- Retired.. 3
- Studying.. 4
- Other (specify)... 5

Ask question 73 first for all services in the list. Then ask questions 74-76 only for items where question 73 is answered 'Yes'.

73. Since BE 2541 (1998), have members of your household ever denied access to… *Put a cross in the appropriate box.*				74. How long ago was the most recent time they were denied access?	75. Where were they denied this access?	76. What reason was given for them being denied access? 1=No reason given 2=Health concerns 3=Other (specify)
Code	Service	Yes	No	*time*	*place*	*code*
a.	Health care					
b.	Medicines					
c.	Education or schooling					
d.	Public or private transport					
e.	Communication					
f.	Drinking water					
g.	Fresh produce or other markets					
h.	Banking or financial services					
i.	Insurance					
j.	Employment					
k.	Voting or enrolment to vote					

Now I wish to ask you some questions about specific groups of people in the community.

77. What do you think about women who enter the commercial sex industry?

- Strongly support.......... ☐ 1
- Somewhat support.......... ☐ 2
- Indifferent.......... ☐ 3
- Somewhat oppose.......... ☐ 4
- Strongly oppose.......... ☐ 5

78. Why do you think women from your district enter the commercial sex industry?

- Tradition or cultural influences.......... ☐ 1
- Income.......... ☐ 2
- Unemployment.......... ☐ 3
- Forced into industry.......... ☐ 4
- Other (specify).......... ☐ 5

---

79. If one of your children (current or future) entered the commercial sex industry, would you support their decision?

- No.......... ☐ 1
- Yes.......... ☐ 2

80. What do you think about injecting drug users?

- Strongly support.......... ☐ 1
- Somewhat support.......... ☐ 2
- Indifferent.......... ☐ 3
- Somewhat oppose.......... ☐ 4
- Strongly oppose.......... ☐ 5

---

81. Why do you think people from your district become injecting drug users?

- Tradition or cultural influences.......... ☐ 1
- Peer pressure.......... ☐ 2
- Other (specify).......... ☐ 3

82. If one of your children (current or future) became an injecting drug user, would you continue to support them?

- No.......... ☐ 1
- Yes.......... ☐ 2

---

83. What do you think about people who migrate to cities to work?

- Strongly support.......... ☐ 1
- Somewhat support.......... ☐ 2
- Indifferent.......... ☐ 3
- Somewhat oppose.......... ☐ 4
- Strongly oppose.......... ☐ 5

84. Why do you think people from your district migrate to cities to work?

- Tradition or cultural influences.......... ☐ 1
- Income.......... ☐ 2
- Unemployment.......... ☐ 3
- Forced into industry.......... ☐ 4
- Other (specify).......... ☐ 5

---

85. If one of your children (current or future) began migrating to a city to work, would you support their decision?

No... 1
Yes... 2

Now I wish to ask you some questions about HIV/AIDS.

86. Has your village done anything to minimize the risk to villagers of contracting HIV?

No... 1
Yes... 2
If yes, what has the village done:

87. Has your household done anything to minimize the risk to its members of contracting HIV?

No... 1
Yes... 2
If yes, what has the household done:

87X. What do you think have been the most important changes in the way that people live in this village since the beginning of the AIDS epidemic?

---

88. How serious would you describe the AIDS epidemic in your district as being?

Very serious.. 1
Somewhat serious.................................... 2
Not serious.. 3

89. Do you think the government is doing enough to fight the epidemic?

No... 1
Yes... 2
If no, why not:

90. To the best of your knowledge, what are the main ways in which HIV/AIDS is transmitted?

Tick all that are mentioned

Don't know.. ☐ 1
Sexual contact with infected person.................. ☐ 2
Sharing needles with infected person................ ☐ 3
Infected blood transfusion.............................. ☐ 4
Other (specify).. ☐ 5

91. What type of people do you think are at the greatest risk of contracting HIV/AIDS?

Tick all that are mentioned

Don't know.. ☐ 1
Sex workers... ☐ 2
Injecting drug users...................................... ☐ 3
Health workers.. ☐ 4
Migrating workers... ☐ 5
Other (specify).. ☐ 6

SECTION 12F: FEMALE INDIVIDUAL QUESTIONNAIRE

Ask questions 92-117 in this section only of the selected adult female respondent.

92. Taking everything into account, do you feel better off, the same, or worse off than you did 2 years ago?

Better off... ☐ 1
About the same... ☐ 2
Worse off... ☐ 3

93. How would you describe your household's status within this village?

Village headman... ☐ 1
Other high status.. ☐ 2
Middle status... ☐ 3
Low status.. ☐ 4

94. Does the household's status in the village place any obligations on your household?

No.. ☐ 1
Yes.. ☐ 2
If yes, what are the obligations of this household:

Ask question 95 first for each type of person in the list. Then ask question 96 for each person identified in question 95.

95. If your household fell on hard times, would your household be able to receive support from…

Put a cross in the appropriate box

Code	Item	Yes	No
1201	Relatives who live in this district		
1202	Relatives who live elsewhere		
1203	Friends who live in this district		
1204	Friends who live elsewhere		

96. Please describe all of the [people] who would help to support your household.

Copy the code for each type of person and answer the questions about the support they could provide. If many people have the same characteristics, then group them together.

	Code	a. Where does he/she live?	b. What is his/her highest educational qualification?	c. What is his/her occupation?	d. What support could they provide?
1					
2					
3					
4					
5					
6					
7					
8					

97. What do you hope to be doing in five years time?

Working the same occupation	☐	1
Working in a different occupation (specify)	☐	2
Retired	☐	3
Studying	☐	4
Other (specify)	☐	5

98. What do you hope your children (if any) will be doing in five years time?

Working the same occupation	☐	1
Working in a different occupation (specify)	☐	2
Retired	☐	3
Studying	☐	4
Other (specify)	☐	5

Ask question 99 first for all services in the list. Then ask questions 100-102 only for items where question 99 is answered 'Yes'.

99. Since BE 2541 (1998), have members of your household ever denied access to… *Put a cross in the appropriate box.*				100. How long ago was the most recent time they were denied access?	101. Where were they denied his access?	102. What reason was given for them being denied access? 1=No reason given 2=Health concerns 3=Other (specify)
Code	Service	Yes	No	*time*	*place*	*code*
a.	Health care					
b.	Medicines					
c.	Education or schooling					
d.	Public or private transport					
e.	Communication					
f.	Drinking water					
g.	Fresh produce or other markets					
h.	Banking or financial services					
i.	Insurance					
j.	Employment					
k.	Voting or enrolment to vote					

Now I wish to ask you some questions about specific groups of people in the community.

103. What do you think about women who enter the commercial sex industry?

- Strongly support.......... ☐ 1
- Somewhat support.......... ☐ 2
- Indifferent.......... ☐ 3
- Somewhat oppose.......... ☐ 4
- Strongly oppose.......... ☐ 5

104. Why do you think women from your district enter the commercial sex industry?

- Tradition or cultural influences.......... ☐ 1
- Income.......... ☐ 2
- Unemployment.......... ☐ 3
- Forced into industry.......... ☐ 4
- Other (specify).......... ☐ 5

105. If one of your children (current or future) entered the commercial sex industry, would you support their decision?

- No.......... ☐ 1
- Yes.......... ☐ 2

106. What do you think about injecting drug users?

- Strongly support.......... ☐ 1
- Somewhat support.......... ☐ 2
- Indifferent.......... ☐ 3
- Somewhat oppose.......... ☐ 4
- Strongly oppose.......... ☐ 5

107. Why do you think people from your district become injecting drug users?

- Tradition or cultural influences.......... ☐ 1
- Peer pressure.......... ☐ 2
- Other (specify).......... ☐ 4

108. If one of your children (current or future) became an injecting drug user, would you continue to support them?

- No.......... ☐ 1
- Yes.......... ☐ 2

109. What do you think about people who migrate to cities to work?

- Strongly support.......... ☐ 1
- Somewhat support.......... ☐ 2
- Indifferent.......... ☐ 3
- Somewhat oppose.......... ☐ 4
- Strongly oppose.......... ☐ 5

110. Why do you think people from your district migrate to cities to work?

- Tradition or cultural influences.......... ☐ 1
- Income.......... ☐ 2
- Unemployment.......... ☐ 3
- Forced into industry.......... ☐ 4
- Other (specify).......... ☐ 5

111. If one of your children (current or future) began migrating to a city to work, would you support their decision?

No.. ☐ 1
Yes.. ☐ 2

Now I wish to ask you some questions about HIV/AIDS.

112. Has your village done anything to minimize the risk to villagers of contracting HIV?

No.. ☐ 1
Yes.. ☐ 2
If yes, what has the village done:

113. Has your household done anything to minimize the risk to its members of contracting HIV?

No.. ☐ 1
Yes.. ☐ 2
If yes, what has the household done:

113X. What do you think have been the most important changes in the way that people live in this village since the beginning of the AIDS epidemic?

---

114. How serious would you describe the AIDS epidemic in your district as being?

- Very serious .... ☐ 1
- Somewhat serious .... ☐ 2
- Not serious .... ☐ 3

115. Do you think the government is doing enough to fight the epidemic?

- No .... ☐ 1
- Yes .... ☐ 2
- If no, why not:

116. To the best of your knowledge, what are the main ways in which HIV/AIDS is transmitted?

Tick all that are mentioned

- Don't know .... ☐ 1
- Sexual contact with infected person .... ☐ 2
- Sharing needles with infected person .... ☐ 3
- Infected blood transfusion .... ☐ 4
- Other (specify) .... ☐ 5

117. What type of people do you think are at the greatest risk of contracting HIV/AIDS?

Tick all that are mentioned

- Don't know .... ☐ 1
- Sex workers .... ☐ 2
- Injecting drug users .... ☐ 3
- Health workers .... ☐ 4
- Migrating workers .... ☐ 5
- Other (specify) .... ☐ 6

Appendix VI – Survey Instrument: HIV Patient Survey Questionnaire

THE RELATIONSHIP BETWEEN
POVERTY AND HIV/AIDS PREVALENCE
IN RURAL THAILAND

Individual Questionnaire

Town/City:	INTERVIEWER CONFIRMATION *Sign to confirm that the individual who was interviewed in this questionnaire is not an individual who has been interviewed at any other time for this study.*
Hospital:	
Date of Visit:	
Interviewer (Supervisor):	

NOTES TO INTERVIEWERS

- *All Sections should be completed by the interviewer, in consultation with the respondent.*
- *For reasons of privacy the respondent's name is not recorded on this questionnaire. You should determine (by asking the respondent prior to the interview) whether they have already been interviewed for this study (unlikely).*
- *It is especially important that informed consent be given both before and after this interview.*
- *The "most recent household" includes the household (if any) that the respondent is living in at the moment (if they are an outpatient i.e. not institutionalized). Otherwise it refers to the household that the respondent was living in immediately before they were hospitalised.*
- *The "pre-AIDS" household refers to the household that the respondent was living in at the time they were diagnosed with HIV. This may or may not be the same as the "most recent household".*
- *If neither the "most recent household" nor the "pre-AIDS household" are in Khon Kaen province, then the interview should be discontinued.*

SECTION 1: DEMOGRAPHIC INFORMATION

1. Where were you born?

[ ] village/town/city

[ ] district

[ ] province

Record country of birth if not Thailand

2. How old are you?

[ ] years

Only need approximate age if greater than 15

3. What is your gender?

Male	[ ]	1
Female	[ ]	2

4. Are you an in-patient at this hospital or an outpatient (day care patient)?

Inpatient	[ ]	1
Outpatient	[ ]	2
Other (specify)	[ ]	3

5. What is your marital status?

Never married	[ ]	1
Married	[ ]	2
Divorced	[ ]	3
Separated	[ ]	4
Widowed	[ ]	5

6. What type of work do you do?

Agriculture/fishing	[ ]	1
Trade	[ ]	2
Transport	[ ]	3
Technical/professional	[ ]	4
Government	[ ]	5
Industry	[ ]	6
Commercial sex worker	[ ]	7
Housewife	[ ]	8
Unemployed	[ ]	9
Other (specify)	[ ]	0

7. How long ago were you diagnosed with HIV/AIDS?

[ ] months

[ ] years

Only record months if less than 3 years

8. How long ago did you begin to show symptoms of HIV/AIDS?

[ ] months

[ ] years

Only record months if less than 3 years

NOTE: For the rest of this interview, use the earlier of these two times in place of time "A".

9.
Inpatients: Where were you living immediately before you were admitted to this hospital?
Outpatients: Where are you living now?

☐ village/town/city

☐ district

☐ province

Record country if not Thailand

10. Where were you living at time "A"?

☐ village/town/city

☐ district

☐ province

Record country if not Thailand

NOTE: If both the answers to questions 9 and 10 are not in Khon Kaen province, discontinue this interview.

11. What type of work were you doing at time "A"?

Agriculture/fishing	1
Trade	2
Transport	3
Technical/professional	4
Government	5
Industry	6
Commercial sex worker	7
Housewife	8
Unemployed	9
Other (specify)	0

12. How did you contract HIV?

Don't know	1
Sexual contact with infected person	2
Sharing needles with infected person	3
Infected blood transfusion	4
Other (specify)	5

13. After time "A", who was the first person you spoke to about AIDS?

No-one	0
Mother	1
Father	2
Brother or sister	3
Their child	4
Other family member	5
Friend	6
Village health volunteer	7
Other health worker (specify)	8
Other (specify)	9

14. Who was the first person that you told you had HIV/AIDS?

No-one	0
Mother	1
Father	2
Brother or sister	3
Their child	4
Other family member	5
Friend	6
Village health volunteer	7
Other health worker (specify)	8
Other (specify)	9

15. How long ago did you tell them you had HIV/AIDS?

[ ] months

[ ] years

Only record months if less than 3 years

16. Why did you tell that person first rather than any other person?

17.
Inpatients: Was your health status known to many members of your community before you were admitted to this hospital?
Outpatients: Is your health status known to many members of your community?

No.. [ ] 1 (>>19)
Yes... [ ] 2

18. How long has your health status been known to many members of your community?

[ ] months

[ ] years

Only record months if less than 3 years

---

19. Have you ever been to school? 1=Yes 2=No (>>21)	20. What is the highest educational qualification that you have completed? 00=No grade completed 1-12=School years 13=Trade certificate 14=Other certificate 15=Diploma 16=Bachelor's degree 17=Postgraduate	21. Can you read a newspaper? 1=Yes 2=No	22. Can you write a letter? 1=Yes 2=No	23. Can you do written calculations? 1=Yes 2=No	24. Can you use a computer? 1=Yes 2=No
code	*code*	*code*	*code*	*time*	*baht*

Now I wish to ask you some questions about your parents.

Parent	25. Is your [parent] still alive? 1=Yes 2=No (>>27)	26. Where does he/she live? *Record the district and province*	27. What is the highest educational qualification he/she completed? 00=No grade completed 1-12=School years 13=Trade certificate 14=Other certificate 15=Diploma 16=Bachelor's degree 17=Postgraduate	28. What type of work did he/she do for most of their life? 1=Agriculture/ fishing 2=Trade 3=Transport 4=Technical/ professional 5=Government 6=Industry 7=Housewife 8=Other (specify)
	code	*district, province*	*code*	*code*
Father				
Mother				

SECTION 2: MOST RECENT HOUSEHOLD DETAILS

Inpatients: Now I wish to ask you some questions about the household you were living in immediately before you were admitted to this hospital.

Outpatients: Now I wish to ask you some questions about the household you live in.

29. How many people live in this household?

[ ] children under 15 years

[ ] adults (working age)

[ ] adults (retired/elderly)

30. How long have you lived in this household?

[ ] months

[ ] years

Only record months if less than 3 years

31. Have/had any of the other people living in this household been diagnosed with HIV/AIDS, or begun to show symptoms of HIV/AIDS?

No.. [ ] 1 (>>33)
Yes.. [ ] 2
Don't know................................ [ ] 3 (>>33)

32. How many household members have been diagnosed with HIV/AIDS, or begun to show symptoms of HIV/AIDS?

[ ] children under 15 years

[ ] adults (working age)

[ ] adults (retired/elderly)

33. How many rais of land did members of this household use, including all parcels of land of all members of the household?

[ ] rais

34. In the last year that you were living there, did anyone in the household earn money by…
(tick all that apply)

	Yes	No
Growing or selling rice?		
Growing or selling corn?		
Growing or selling sugar cane?		
Growing or selling cassava?		
Growing or selling other vegetables (specify)?		
Growing or selling bananas?		
Growing or selling papayas?		
Growing or selling other food (specify)?		
Growing or selling rubber?		
Growing or selling chickens?		
Growing or selling pigs?		
Growing or selling beef cattle?		
Growing or selling buffalo?		

	Yes	No
Selling products from dairy cattle (e.g. milk)?		
Catching or selling fish?		
Gathering or selling firewood?		
Making or selling artifacts (e.g. carvings)?		
Making or selling handicrafts (e.g. baskets)?		
Running a shop or market stall?		
Running a public motor vehicle?		
Running another business?		
Working for a public sector wage?		
Working for an agricultural wage?		
Working for a manufacturing wage?		
Working for other private sector wage?		

35. What was the main religion of members of the household?

- Buddhism........ 1
- Islam........ 2
- Christianity........ 3
- Other (specify)........ 4

36. What language was normally spoken in the household?

- Central Thai........ 1
- Northern dialect........ 2
- Northeastern dialect........ 3
- Lao........ 4
- Cambodian........ 5
- Chinese........ 6
- Other (specify)........ 7

For questions 37 and 38, put a cross in the appropriate box.

37. Did the household have…							
	Electricity?	A radio?	A television?	A refrigerator?	A computer?	An electric fan?	A VCD player?
Yes							
No							

38. Did any member of the household own…			
	A bicycle?	A motorcycle?	A car/truck/minibus/tuk-tuk?
Yes			
No			

39. Did this household have running water?

No.. 1
Yes.. 2
If no, what was the households main source of water:

40. What type of toilet facility did the household usually use?

No toilet facility............................ 1 (>>42)
Flush toilet with septic tank................ 2
Household pit............................... 3
Other (specify)............................. 4
Ground-level toilet with septic tank...... 5

41. Was this toilet used only by that household, or did other households use it?

That household only.................................. 1
Shared... 2

42. How did the household dispose of its garbage?

Collected by a truck........................ 1
Burnt or buried.............................. 2
Dumped in a river/lake..................... 3
No fixed place............................... 4
Other (specify).............................. 5

43. What was the main source of lighting for the dwelling?

Electricity.. 1
Flashlight or battery lamp............................ 2
Gas, oil, kerosene or oil lamps...................... 3
Resin torches).. 4
Other (specify)... 5

44. Did the household have a separate cook house?

No.. 1
Yes.. 2

45. What type of fuel was usually used by the household for cooking?

Wood.. 1
Coal or charcoal.. 2
Kerosene.. 3
Bottled Gas.. 4
Electricity.. 5
Other (specify)... 6

46. What was the main material of the outside walls of the dwelling?

Fibro-cement, brick, concrete or masonry.......... 1
Timber (sawn).. 2
Corrugated iron or sheet metal........................ 3
Traditional materials (bamboo, etc.)................. 4
Other (specify)... 5

47. What was the main material of the floor of the dwelling?

- Cement or brick 1
- Ceramic tiles or marble 2
- Carpet 3
- Timber (sawn and finished) 4
- Traditional materials (bamboo, etc.) 5
- Earth, mud or sand 6
- Other (specify) 7

48. What was the main material of the roof of the dwelling?

- Corrugated iron or sheet metal 1
- Concrete or cement 2
- Tiles or slate 3
- Wood or bamboo 4
- Traditional materials (thatch, etc.) 5
- Other (specify) 6

49. What were the windows of the dwelling fitted with?

Check only one box.

- Glass windows with shutters 1
- Glass windows only 2
- Sliding windows 3
- No covering (open windows) 4
- No windows 5
- Other (specify) 6

50. How many rooms (excluding bathrooms, toilets, and kitchens) did the dwelling have?

[ ] rooms

SECTION 3: PRE-AIDS HOUSEHOLD DETAILS

Now I wish to ask you some questions about the household you were living in at time "A".

51. How many people lived in this household?

[ ] children under 15 years

[ ] adults (working age)

[ ] adults (retired/elderly)

52. How long did you lived in this household?

[ ] months

[ ] years

Only record months if less than 3 years

53. How many rais of land did members of this household use, including all parcels of land of all members of the household?

[ ] rais

54. In the last year that you were living there, did anyone in the household earn money by…

(tick all that apply)

	Yes	No
Growing or selling rice?		
Growing or selling corn?		
Growing or selling sugar cane?		
Growing or selling cassava?		
Growing or selling other vegetables (specify)?		
Growing or selling bananas?		
Growing or selling papayas?		
Growing or selling other food (specify)?		
Growing or selling rubber?		
Growing or selling chickens?		
Growing or selling pigs?		
Growing or selling beef cattle?		
Growing or selling buffalo?		

	Yes	No
Selling products from dairy cattle (e.g. milk)?		
Catching or selling fish?		
Gathering or selling firewood?		
Making or selling artifacts (e.g. carvings)?		
Making or selling handicrafts (e.g. baskets)?		
Running a shop or market stall?		
Running a public motor vehicle?		
Running another business?		
Working for a public sector wage?		
Working for an agricultural wage?		
Working for a manufacturing wage?		
Working for other private sector wage?		

55. What was the main religion of members of the household?

Buddhism………………………………… [ ] 1
Islam………………………………… [ ] 2
Christianity………………………………… [ ] 3
Other (specify)………………………………… [ ] 4

56. What language was normally spoken in the household?

Central Thai………………………………… [ ] 1
Northern dialect………………………………… [ ] 2
Northeastern dialect………………………………… [ ] 3
Lao………………………………… [ ] 4
Cambodian………………………………… [ ] 5
Chinese………………………………… [ ] 6
Other (specify)………………………………… [ ] 7

For questions 57 and 58, put a cross in the appropriate box.

57. Did the household have…							
	Electricity?	A radio?	A television?	A refrigerator?	A computer?	An electric fan?	A VCD player?
Yes							
No							

58. Did any member of the household own…			
	A bicycle?	A motorcycle?	A car/truck/minibus/tuk-tuk?
Yes			
No			

59. Did this household have running water?

No.. 1
Yes.. 2
If no, what was the households main source of water:

60. What type of toilet facility did the household usually use?

No toilet facility........................ 1 (>>62)
Flush toilet with septic tank........................ 2
Household pit........................ 3
Other (specify)........................ 4

61. Was this toilet used only by that household, or did other households use it?

That household only........................ 1
Shared........................ 2

62. How did the household dispose of its garbage?

Collected by a truck........................ 1
Burnt or buried........................ 2
Dumped in a river/lake........................ 3
No fixed place........................ 4
Other (specify)........................ 5

63. What was the main source of lighting for the dwelling?

Electricity........................ 1
Flashlight or battery lamp........................ 2
Gas, oil, kerosene or oil lamps........................ 3
Resin torches)........................ 4
Other (specify)........................ 5

64. Did the household have a separate cook house?

No........................ 1
Yes........................ 2

65. What type of fuel was usually used by the household for cooking?

Wood........................ 1
Coal or charcoal........................ 2
Kerosene........................ 3
Bottled Gas........................ 4
Electricity........................ 5
Other (specify)........................ 6

66. What was the main material of the outside walls of the dwelling?

Fibro-cement, brick, concrete or masonry........................ 1
Timber (sawn)........................ 2
Corrugated iron or sheet metal........................ 3
Traditional materials (bamboo, etc.)........................ 4
Other (specify)........................ 5

67. What was the main material of the floor of the dwelling?

- Cement or brick 1
- Ceramic tiles or marble 2
- Carpet 3
- Timber (sawn and finished) 4
- Traditional materials (bamboo, etc.) 5
- Earth, mud or sand 6
- Other (specify) 7

68. What was the main material of the roof of the dwelling?

- Corrugated iron or sheet metal 1
- Concrete or cement 2
- Tiles or slate 3
- Wood or bamboo 4
- Traditional materials (thatch, etc.) 5
- Other (specify) 6

69. What were the windows of the dwelling fitted with?

Check only one box.

- Glass windows with shutters 1
- Glass windows only 2
- Sliding windows 3
- No covering (open windows) 4
- No windows 5
- Other (specify) 6

70. How many rooms (excluding bathrooms, toilets, and kitchens) did the dwelling have?

[ ] rooms

SECTION 4: HEALTHCARE COSTS AND COPING MECHANISMS

71. For how many days during the past 4 weeks have you been unable to carry on your usual activities because of sickness?	72. How many times have you consulted a health practitioner during the past 4 weeks, for advice or treatment?	73. How much was or will be paid to this person for all the consultations during the past 4 weeks?	74. How many nights have you spent in a hospital or other establishment in the last 4 weeks? (If none >>71)	75. How much was or will be paid for hospital or other stays for the past 4 weeks?	76. Have you also had to buy medicines separately, from a pharmacy or other place? 1=Yes 2=No (>>78)	77. How much has been or will be spent on medicines for the past 4 weeks?
days	*number*	*baht*	*nights*	*baht*	*code*	*baht*

78. Have you also sought advice, care or treatment from any other organisation, such as a temple or support group? 1=Yes 2=No (>>82)	79. What organisation did you seek care or treatment from?	80. Did you have to pay money to this organisation for this advice, care or treatment? 1=Yes 2=No (>>82)	81. How much was or will be paid to this organisation for the past 4 weeks?	82. How have your total medical costs been mostly paid for? 1=FMP Programme 2=Health Card Programme 3=Subsidised by employer 4=Private health insurance 5=Paid by self 6=Other (specify)	83. Have any of the costs of your care been paid directly by you or your household? 1=Yes 2=No	84. Have you or your family used past savings to pay for your care? 1=Yes 2=No (>>86)
code	*specify*	*code*	*baht*	*code*	*code*	*code*

85. Where did these past savings come from? 1=Bank account 2=Friends or relatives 3=Other (specify)	86. Have you or your family received money from someone else to pay for your care? 1=Yes 2=No (>>89)	87. Who gave you or your household the money to pay for your care? 1=Relatives living in the same district 2=Relatives living elsewhere 3=Friends living in the same district 4=Friends living elsewhere 5=Bank 6=Moneylender 7=Co-operative 8=Other (specify)	88. Does this money have to be repaid? 1=Yes 2=No	89. Have you or your family sold any household assets in the time you have been sick? 1=Yes (specify) 2=No	90. Have you or your family sold any business or farm assets in the time you have been sick? 1=Yes (specify) 2=No	91. Have you or your family sold any land in the time you have been sick? 1=Yes (specify) 2=No
code	*code*	*code*	*code*	*code*	*code*	*code*

92. Has any member of your household taken days off work to care for you? 1=Yes 2=No (>>95)	93. How many days have they spent caring for you in the time you have been sick?	94. What type of work does he/she normally do? 1=Agriculture/ fishing 2=Trade 3=Transport 4=Technical/ professional 5=Government 6=Industry 7=Housewife 8=Other (specify)	95. Have any elderly members of your household returned to work in the time you have been sick? 1=Yes 2=No (>>97)	96. Where type of work did they do? 1=Family farm 2=Other family business 3=Agriculture 4=Manufacturing 5=Other (specify)	97. Have any children from your household been removed from school since time "A"? 1=Yes 2=No (>>100)	98. Have those children been working in the time since they were removed from school? 1=Yes 2=No (>>100)
code	*code*	*code*	*days*	*code*	*code*	*code*

99. Where type of work did they do? 1=Family farm 2=Other family business 3=Agriculture 4=Manufacturing 5=Other (specify)	100. Have any children from your household been sent to live elsewhere in the time you have been sick? 1=Yes 2=No (>>104)	101. How old are the children?	102. Who were they sent to live with? 1=With grandparents 2=With parents siblings 3=With other relatives (specify) 4=Other (specify)	103. Will they return to your household? 1=Yes 2=No If No, why not?	104. Have any other members of your household changed job in the time you have been sick? 1=Yes 2=No (>>102)	105. Why did they change job? 1=Higher pay 2=To care for the sick 3=Got an extra job 4=Other (specify)
code	*code*	*ages*	*days*	*code, specify*	*code*	*code*

106. Has any member of your household stopped work completely to care for you? 1=Yes 2=No (>>108)	107. What type of work does he/she normally do? 1=Agriculture/ fishing 2=Trade 3=Transport 4=Technical/ professional 5=Government 6=Industry 7=Housewife 8=Other (specify)	108. Was your household sending money or goods to elderly members of your family living elsewhere? 1=Yes 2=No (>>110)	109. Is your household still sending money or goods to elderly members of your family living elsewhere? 1=Yes 2=No
code	*ages*	*code*	*code*

110. Who is the person or organisation who most provides you with:..			
Mental support? 0=No-one 1=Mother 2=Father 3=Brother or sister 4=Their child 5=Other family member 6=Friend 7=Village health volunteer 8=Other health worker (specify) 9=Other (specify)	Advice? 0=No-one 1=Mother 2=Father 3=Brother or sister 4=Their child 5=Other family member 6=Friend 7=Village health volunteer 8=Other health worker (specify) 9=Other (specify)	Treatment and care? 0=No-one 1=Mother 2=Father 3=Brother or sister 4=Their child 5=Other family member 6=Friend 7=Village health volunteer 8=Other health worker (specify) 9=Other (specify)	Financial support? 0=No-one 1=Mother 2=Father 3=Brother or sister 4=Their child 5=Other family member 6=Friend 7=Village health volunteer 8=Other health worker (specify) 9=Other (specify)

111. Since the time "A", what have been the major changes to who lives in your household, what they do, or how members of your family (living in this household or elsewhere) are cared for?

112. Since the time "A", how have members of other households living in your village or elsewhere helped with your care, or helped your household in other ways?

SECTION 5: RISK HISTORY

113. In the five years before time "A", did you spend more than one month living away from your district, for work or study or any other reason?

No.. ☐ 1 (>>120)
Yes.. ☐ 2

For each place, ask:

	114. Where did you live? 1=Bangkok 2=Khon Kaen 3=Nakhon Ratchasima 4=Elsewhere in Isan (specify) 5=Elsewhere in Thailand (specify) 6=Overseas (specify)	115. Why did you spend time living in this place? 0=This is my home province (>>118) 1=Work 2=On holiday 3=Visiting relatives 4=At school or studying 5=In hospital or prison 6=Drafted into army 7=Other (specify)	116. In the time you were living in this place, what type of work did you do? 0=None 1=Agriculture/fishing 2=Trade 3=Transport 4=Technical/ professional 5=Government 6=Industry 7=Prostitution 8=Other (specify)	117. In the time you were living in there, did you send any gifts of money or goods to your home district, or bring any gifts of money or goods with you when you returned there? 1=No 2=Yes	118. When did you move away from this place? If they still live there, leave blank and >>120	119. Why did you move away from this place?
	code	*code*	*code*	*code*	*month, year*	*reason*
01						
02						
03						
04						
05						

120. Since time "A", have you spent more than one month living away from your district, for work or study or any other reason?

No.. ☐ 1 (>>127)
Yes.. ☐ 2

For each place, ask:

	121. Where did you live? 1=Bangkok 2=Khon Kaen 3=Nakhon Ratchasima 4=Elsewhere in Isan (specify) 5=Elsewhere in Thailand (specify) 6=Overseas (specify)	122. Why did you spend time living in this place? 0=This is my home province (>>125) 1=Work 2=On holiday 3=Visiting relatives 4=At school or studying 5=In hospital or prison 6=Drafted into army 7=Other (specify)	123. In the time you were living in this place, what type of work did you do? 0=None 1=Agriculture/fishing 2=Trade 3=Transport 4=Technical/ professional 5=Government 6=Industry 7=Prostitution 8=Other (specify)	124. In the time you were living in there, did you send any gifts of money or goods to your home district, or bring any gifts of money or goods with you when you returned there? 1=No 2=Yes	125. When did you move away from this place? If they still live there, leave blank and >>127	126. Why did you move away from this place?
	code	*code*	*code*	*code*	*month, year*	*reason*
01						
02						
03						
04						
05						

127. In the five years before time "A", did you donate blood at a public or private hospital or at any other place?

No.. ☐ 1 (>>129)
Yes.. ☐ 2

128. How many times did you donate blood in the five years before time "A"?

☐ times

129. Since time "A", have you donated blood at a public or private hospital or at any other place?

No.. ☐ 1 (>>131)
Yes.. ☐ 2

130. How many times have you donated blood in the time since "A"?

☐ times

131. In the five years before time "A", did you receive a blood transfusion at a public or private hospital or at any other place?

No.......... 1 (>>123)
Yes.......... 2

132. How many times did you receive a blood transfusion in the five years before time "A"?

[ ] times

133. How old were you when you first had sexual intercourse?

[ ] years

If never, >> 143

134. What was your relationship with that person?

Spouse.......... 1
Regular partner, boyfriend or girlfriend.......... 2
Casual partner.......... 3
Commercial partner.......... 4
Other (specify).......... 5

Ask question 135 first for each category of partner. Then ask questions 136-138 only for categories of partner where question 135 was answered 'Yes'.

	135. In the five years before "A", did you ever have sexual intercourse with [partner]? 1=No 2=Yes	136. In the five years before "A", how often did you have sexual intercourse with [partner]? 1=Every day 2=At least once a week 3=At least once a month 4=At least once a year 5=Less often than once a year 6=Once only	137. How often did you use a condom with [partner]? 0=Never 1=Occasionally 2=Sometimes 3=Mostly 4=Almost every time 5=Every time (>>next partner)	138. Why did you not use a condom every time?
partner	*code*	*code*	*code*	*reason*
Spouse				
Regular partners, boyfrieds or girlfriends				
Casual partners				
Commercial partners				
Other (specify)				

Ask question 139 first for each category of partner (only ask men about partners of the same sex). Then ask questions 140-142 only for categories of partner where question 139 was answered 'Yes'.

	139. Since "A", have you ever had sexual intercourse with [partner]? 1=No 2=Yes	140. Since "A", how often have you had sexual intercourse with [partner]? 1=Every day 2=At least once a week 3=At least once a month 4=At least once a year 5=Less often than once a year 6=Once only	141. How often did you use a condom with [partner]? 0=Never 1=Occasionally 2=Sometimes 3=Mostly 4=Almost every time 5=Every time (>>next partner)	142. Why did you not use a condom every time?
partner	*code*	*code*	*code*	*reason*
Spouse				
Regular partners, boyfrieds or girlfriends				
Casual partners				
Commercial partners				
Partners of the same sex				
Other (specify)				

Ask question 143 first for each drug. Then ask questions 144-146 only for drugs where question 143 was answered 'Yes'.

	143. In the five years before "A", did you ever use [drug]? 1=No 2=Yes	144. In the five years before "A", how often did you use [drug]? 1=Every day 2=At least once a week 3=At least once a month 4=At least once a year 5=Less often than once a year 6=Once only	145. What was the main method you used to administer [drug]? 1=Inhalation 2=Ingestion 3=Injection 4=Other (specify)	146. Why did you start to use [drug]?
drug	*code*	*code*	*code*	*reason*
Marijuana				
Opium				
Heroin				
Methamphetamine				
Cocaine				
Other drugs (specify)				

Ask question 147 first for each drug. Then ask questions 148-150 only for drugs where question 147 was answered 'Yes'.

	147. Since "A", have you ever used [drug]? 1=No 2=Yes	148. Since "A", how often have you used [drug]? 1=Every day 2=At least once a week 3=At least once a month 4=At least once a year 5=Less often than once a year 6=Once only	149. What was the main method you used to administer [drug]? 1=Inhalation 2=Ingestion 3=Injection 4=Other (specify)	150. Why did you start to use [drug]?
drug	*code*	*code*	*code*	*reason*
Marijuana				
Opium				
Heroin				
Methamphetamine				
Cocaine				
Other drugs (specify)				

If no drugs were administered mainly by injection (questions 145 and 149), ask question 151.

151. Did you ever administer any drugs by injection?

No.. ☐ 1 (>>159)
Yes.. ☐ 2

152. Where did you obtain the injection equipment?

153. What method did you use to clean your injection equipment before use?

Did not clean.............................. ☐ 1
With cold or warm water................ ☐ 2
With boiling water........................ ☐ 3
With alcohol................................ ☐ 4
With bleach.................................. ☐ 5
Other (specify)............................. ☐ 6

154. Did you ever share injection equipment with someone else?

No.. ☐ 1 (>>159)
Yes....................................... ☐ 2

155. How often did you share injection equipment with someone else?

Occasionally.............................. ☐ 1
Sometimes................................. ☐ 2
Mostly.................................... ☐ 3
Almost every time......................... ☐ 4
Every time................................ ☐ 5

156. Who did you share injection equipment with?

Spouse or partner......................... ☐ 1
Friend.................................... ☐ 2
Acquaintance.............................. ☐ 3
Drug dealer............................... ☐ 4
Other (specify)........................... ☐ 5

157. What method did you use to clean the injection equipment that you shared before use?

Did not clean............................. ☐ 1
With cold or warm water................... ☐ 2
With boiling water........................ ☐ 3
With alcohol.............................. ☐ 4
With bleach............................... ☐ 5
Other (specify)........................... ☐ 6

158. What were the main reasons that you shared injection equipment with someone else?

SECTION 6: DISCRIMINATION

Ask question 159 first for all services in the list. Then ask questions 160-162 only for items where question 159 is answered 'Yes'.

159. Since "A" have you ever been denied access to… *Put a cross in the appropriate box.*				160. How long ago was the most recent time you were denied access?	161. Where were you denied this access?	162. What reason was given for you being denied access? 1=No reason given 2=Health concerns 3=Other (specify)
Code	Service	Yes	No	*time*	*place*	*code*
a.	Health care					
b.	Medicines					
c.	Education or schooling					
d.	Public or private transport					
e.	Communication					
f.	Drinking water					
g.	Fresh produce or other markets					
h.	Banking or financial services					
i.	Insurance					
j.	Employment					
k.	Voting or enrolment to vote					

Ask question 163 first for all services in the list. Then ask questions 164-166 only for items where question 163 is answered 'Yes'.

163. Since "A" have members of the household in which you were living ever been denied access to… *Put a cross in the appropriate box.*				164. How long ago was the most recent time they were denied access?	165. Where were they denied this access?	166. What reason was given for them being denied access? 1=No reason given 2=Health concerns 3=Other (specify)
Code	Service	Yes	No	*time*	*place*	*code*
a.	Health care					
b.	Medicines					
c.	Education or schooling					
d.	Public or private transport					
e.	Communication					
f.	Drinking water					
g.	Fresh produce or other markets					
h.	Banking or financial services					
i.	Insurance					
j.	Employment					
k.	Voting or enrolment to vote					

Ask question 167 first for all services in the list. Then ask question 168 only for items where question 167 is answered 'Yes'.

167. During the time between when you were diagnosed with HIV/AIDS and the time you moved here ... *Put a cross in the appropriate box.*				168. What reason was given for this? 1=No reason given 2=Health concerns 3=Other (specify)
Code	Service	Yes	No	*code*
a.	Were you pressured to leave your job?			
b.	Were you pressured to leave your village?			
c.	Were you pressured to remove the children of your household from school?			
d.	Were your children prevented from playing with other children?			
e.	Were other people in your village avoiding dealing with you?			
f.	Were other people in your village avoiding dealing with other members of your household?			

169. Since "A" what have been the major changes in the way other people have treated you or interacted with you?

Appendix VII – Survey Instrument: CBIRD Factory Worker Survey Individual Questionnaire

SECTION 12: INDIVIDUAL QUESTIONNAIRE

Record their code from the household roster on the first visit questionnaire.

65. Respondent:

118. How long have you worked at CBIRD?

119. What job were you doing before you began work at CBIRD?

120. How much on average did you earn each month in that job?

121. Why did you decide to get a job at CBIRD?

122. Since you began your job at CBIRD, have you considered getting another job?

No.. 1 (>>125)
Yes....................................... 2

123. What other jobs have you considered?

124. Why have you considered those jobs?

125. How much income did you receive from your job at CBIRD in the last two weeks?

126. Taking everything into account, do you feel better off, the same, or worse than you did 2 years ago?

Better off	☐ 1
About the same	☐ 2
Worse off	☐ 3

127. What do you hope to be doing in five years time?

Working the same occupation	☐ 1
Working in a different occupation (specify)	☐ 2
Retired	☐ 3
Studying	☐ 4
Other (specify)	☐ 5

128. What have been the most important changes in your household since you began working at CBIRD?

MIGRATION HISTORY

129. In the five years before you began your job at CBIRD, did you spend more than one month living away from your district, for work or study or any other reason?

No.. 1 (>>end)
Yes....................................... 2

For each place, ask:

	130. Where did you live? 1=Bangkok 2=Khon Kaen 3=Nakhon Ratchasima 4=Elsewhere in Isan (specify) 5=Elsewhere in Thailand (specify) 6=Overseas (specify)	131. Why did you spend time living in this place? 0=This is my home province (>>118) 1=Work 2=On holiday 3=Visiting relatives 4=At school or studying 5=In hospital or prison 6=Drafted into army 7=Other (specify)	132. In the time you were living in this place, what type of work did you do? 0=None 1=Agriculture/fishing 2=Trade 3=Transport 4=Technical/ professional 5=Government 6=Industry 7=Prostitution 8=Other (specify)	133. In the time you were living in there, did you send any gifts of money or goods to your home district, or bring any gifts of money or goods with you when you returned there? 1=No 2=Yes	134. When did you move away from this place? If they still live there, leave blank and >>end	135. Why did you move away from this place?
	code	*code*	*code*	*code*	*month, year*	*reason*
01						
02						
03						
04						
05						

Appendix VIII – Data Inventory

Table VIII.1 lists all the important quantitative data variables that were collected during this research from the representative household survey (RHS), HIV/AIDS patient survey (HPS), and CBIRD factory worker survey (FWS). Descriptions in normal type list the sub-categories of the variable about which data was collected, while descriptions in italics list the range of possible responses for the variable. The survey instruments used for data collection are included in Appendices II-IV.

Table VIII.1: Quantitative data variables collected during this research

Variable	Description	RHS	HPS	FWS
DISTRICT LEVEL				
Prices	42 food items			
VILLAGE LEVEL				
Province, district, sub-district		X	X	X
Village location (GPS)		X		
Village size		X		
Village growth rate	*More arrivals; more departures; about the same of both; neither arrivals nor departures*	X		
Village age		X		
Community assets	Trade stores, liquor outlets, petrol outlets, brothels, public motor vehicle businesses, logging or sawmilling operations, agricultural processing operations, manufacturing operations, fresh produce markets, temples, churches/mosques, village community centres, local government offices	X		
Distance to nearest school (time)	Primary, secondary	X		
Study at other institutions	Vocational school, technical college, national high school, university, other tertiary institutions, other learning places	X		
Access to village health volunteer	*Yes; No, but village was visited by a VHV (and how often); No*	X		
Distance to nearest health services (time)	Health centre, hospital, family planning clinic, modern pharmacy	X		
Distance to nearest provincial town (time)		X		
Type of main access road	*Paved (asphalt or cement); paved (laterite) – good; paved (laterite) – bad; unpaved or clayed; no access road*	X		

Variable	Description	RHS	HPS	FWS
Distance to nearest transport services (time)	Airport, water transport	X		
Distance to nearest communication (time)	Telephone, postal service	X		
Number of radio stations received		X		
Number of television channels received		X		
Internet accessibility	*Yes; no*	X		
Main waste water disposal method	*Drainage pip;, on the ground; on the floor; other*	X		
Distance to nearest market (time)		X		
Market frequency	*Daily; weekly; less often than once every week*	X		
Distance to nearest bank (time)		X		
Access to other financial services	Other deposit services, credit co-operative, other lending services	X		
Active women's group	*Yes; no*	X		
Distance to nearest factory (time)		X		
Cropping	Crop types, number of crops per year	X		
How crops are sold	*At the village market; At the market in another place; to private transporters; to a public agency; to a cooperative; other*	X		
Cropping work and income	Who plants the crop, who harvests the crop, who receives the income from the crop: *Men; women; children; everyone*	X		
Access to agricultural services	Agricultural extension centre, agricultural cooperative, tractor, rice mill	X		
Rainfall	*More than last year; less than last year; about the same as last year*	X		
System of mutual aid	*Yes; no*	X		
Agricultural wage	Men, women, children	X		
Prices	24 food items and 8 non-food items	X		
Soil quality		X		
<u>HOUSEHOLD LEVEL</u>				
Household size and composition		X	X	X
HIV status of household members			X	
Religion		X	X	X
Language		X	X	X
Household assets	Electricity, radio, stereo, television, refrigerator, computer, electric fan, VCD player, bicycle, motorcycle, hand tractor, car/truck/minibus	X	X	X
Running water	*Yes; no (main source of water)*	X	X	X
Toilet facility	*No toilet facility, flush toilet with septic tank, household pit, latrine, other*	X	X	X

Variable	Description	RHS	HPS	FWS
Garbage disposal method	*Collected by a truck, burnt or buried, dumped in a river/lake, no fixed place, other*	X	X	X
Lighting source	*Electricity, flashlight or battery lamp, gas or oil lamp, resin torches, other*	X	X	X
Cooking fuel	*Wood, coal or charcoal, kerosene, bottled gas, electricity, other*	X	X	X
Dwelling construction	Materials used for walls, floor, roof, windows	X	X	X
Dwelling age		X		X
Dwelling construction/ purchase cost	incl. unpaid labour in construction	X		X
Dwelling sale/rental value		X		X
Dwelling floor area		X		X
Dwelling number of rooms		X	X	X
Dwelling quality	Walls cracked, floor sunken in, roof leaking: *Yes; no*	X		X
Permanent migrants	Number, gender, age, relationship to household head, education level, occupation, destination	X		X
Permanent migrant remittances	Frequency, value	X		X
Economic activities	Rice, corn, sugar cane, cassava, other vegetables, bananas, papayas, other food, rubber, chickens, pigs, beef cattle, buffalo, dairy products, fishing, firewood, artefacts, handicrafts, shop or market stall, public motor vehicle, other business, public sector wage, agricultural wage, manufacturing wage, other private sector wage	X	X	X
Price/wage setting	*For each activity, and agricultural input: Set by seller/worker; bargaining or negotiation; set by government organisation; set by non-government organisation; set by buyer/employer*	X		X
Agricultural extension visit	*Yes; no*	X		X
Livestock	Current stock, value, sales, purchases	X		X
Land area		X	X	X
Land rights	Right to sell, right to rent out	X		X
Land transfers	Purchases, sales, rent (inward or outward), gifts (inward or outward)	X		X
Agricultural assets	Tractor, walking tiller, corn mill, sprayer, pickup truck, other farm vehicle, other agricultural machinery	X		X
Irrigated fields	*Yes; no*	X		X
Cropping	Potentially able to grow all year round, do grow all year round: *Yes; no (reason)*	X		X
Household stocks	19 food items, and 3 non-food items; stocks measured on both visits	X		X
Household expenditure	Water, garbage disposal, rent/mortgage payments,	X		X

Variable	Description	RHS	HPS	FWS
Agricultural expenditure	14 categories of agricultural inputs	X		X
Food expenditure and gifts	40 categories of food expenditure	X		X
Non-food expenditure and gifts	20 categories of non-food expenditure measured between visits, 29 other categories measured annually by recall	X		X
Own production of food, sales and gifts	Rice, corn, sugar cane, cassava, other vegetables, bananas, papayas, other food, rubber, chickens, pigs, beef, buffalo, dairy products, fish	X		X
Inventory, age, and value of durable goods	17 categories of durable goods	X		X
Inward transfers of cash gifts (inward and outward)	Origin, educational level of sender, occupation of sender, value, purpose of transfer (if any)	X		X
Outward transfers of cash gifts (inward and outward)	Destination, educational level of recipient, occupation of recipient, value, purpose of transfer (if any)	X		X
Total savings and debts	Banks, finance companies, local credit cooperatives, money lenders, insurance companies, other	X		X
Informal loans (outward)	Value, repayments in last year	X		X
<u>INDIVIDUAL LEVEL</u>				
Gender		X	X	X
Age		X	X	X
Relationship to household head		X		X
Province of birth		X	X	X
Patient status	*Inpatient; outpatient*		X	
Marital status		X	X	X
Occupation			X	
Absence from household	Day before first visit, between visits, total number of months absent	X		X
Reason for absence	*Working elsewhere; on holiday; visiting relatives; at school elsewhere; in hospital or prison; born during the last year; other*	X		X
Parents alive	Father, mother: *Yes; no*	X	X	X
Parents' education level	Father, mother	X	X	X
Parents' main occupation	Father, mother	X	X	X
Education level	Years of schooling, can read a newspaper, can write a letter, can do written calculations, can use a computer	X	X	X
Currently going to school	*Yes; no*	X		X
Education costs	Travel cost, school fees, uniforms and sports clothes, books and school supplies, food and lodging, other	X		X
Injury or illness	Number of days sick or injured in last four weeks	X	X	X
Health costs	Health consultations, hospital charges, medicines, other medical expenses	X	X	X
Migration experience	Occupation, destination, time away, remittances	X	X	X

Variable	Description	RHS	HPS	FWS
Remittances	Frequency, value	X		X
Economic activities	See above (household level)	X		X
Most important source of income	*As above*	X		X
Height and weight	Measured on both visits	X		X
Comparison with two years ago	*Feel better off, feel worse off, feel about the same*	X	X	
Self-described household status	*Village headman; other high status; middle status; low status*	X		
Social network	Location, education, occupation, type of support	X		
Hopes for five years time	Themselves, their children: *Working in the same occupation; working in a different occupation; retired; studying; other*	X		
Suffered discrimination, themselves	10 categories, most recent occurrence, location, reason	X	X	
Suffered discrimination, other household members	10 categories, most recent occurrence, location, reason	X		
Suffered stigma	6 categories, reason		X	
Thoughts on women in commercial sex industry	*Strongly support; somewhat support; indifferent; somewhat oppose; strongly oppose*	X		
Perceived reasons for entering commercial sex industry	*Tradition or cultural influences; income; unemployment; forced into industry; other*	X		
Would support their child's decision to enter the commercial sex industry	*Yes; no*	X		
Thoughts on injecting drug users	*Strongly support; somewhat support; indifferent; somewhat oppose; strongly oppose*	X		
Perceived reasons for injecting drug use	*Tradition or cultural influences; peer pressure; other*	X		
Would continue to support their child if they were an injecting drug user	*Yes; no*	X		
Thoughts on rural-urban migrants	*Strongly support; somewhat support; indifferent; somewhat oppose; strongly oppose*	X		
Perceived reasons for rural-urban migration	*Tradition or cultural influences; income; unemployment; forced into migration; other*	X		
Would support their child's decision to migrate	*Yes; no*	X		
Has village done anything to minimise risk of HIV to villagers	*Yes; no*	X		

Variable	Description	RHS	HPS	FWS
Has the household done anything to minimise risk of HIV to villagers	*Yes; no*	X		
Perceived seriousness of the AIDS epidemic	*Very serious; somewhat serious; not serious*	X		
Is the government doing enough to fight the epidemic	*Yes; no*	X		
HIV transmission methods	*Don't know; sexual contact; sharing needles; infected blood transfusion; other*	X		
Who is at greatest risk of contracting HIV	*Don't know; sex workers; injecting drug users; health workers; migrating workers; other*	X		
Time since diagnosis with HIV			X	
Time since symptoms of HIV began			X	
Location at "Time A"			X	
Occupation at "Time A"			X	
Contraction method			X	
First person they spoke to about AIDS			X	
First person they disclosed to, when, and reason			X	
Health status know to community, and for how long			X	
Time in current location			X	
Source of funds for medical costs	*FMP program; health care program; subsidised by employer; private health insurance; paid by self; other*		X	
Savings used for medical expenses, and origin			X	
Received loan or gift to pay for care	Origin, loan or gift		X	
Asset sales	Household assets, business or farm assets, land		X	
Change of work situation	Days off work, elderly returning to work, changes of job and reason, stopped work completely, type of work		X	
Children	Removed from school, sent to work and type of work, sent to live elsewhere		X	
Remittances	Before "time A" and after		X	
Who provides support	Mental support, advice, treatment and care, financial support: *no-one, mother, father, brother or sister, child, other family member, friend, village health volunteer, other health worker, other*		X	
Blood donations	Frequency before and after "time A"		X	
Blood transfusions	Frequency before and after "time A"		X	
First sexual intercourse	Age, and relationship with partner		X	

Variable	Description	RHS	HPS	FWS
Sexual history	Frequency, condom use (and reason if not every time) with: Spouse, regular partners, casual partners, commercial partners, partners of the same sex, other		X	
Drug use history	Frequency, method of use, reason for use of: marijuana, opium, heroin, methamphetamine, cocaine, other drugs		X	
Drug injection	Method of cleaning equipment		X	
Drug injection equipment sharing	Frequency, who, method of cleaning equipment, reasons for sharing equipment		X	
Length of service at CBIRD				X
Previous job	Occupation, average earnings			X
Reason for working at CBIRD				X
Considered other jobs	Types of jobs, reason			X
CBIRD income				X

Appendix IX – Data Consistency Checks and Data Transformations

Table IX.1 lists all the data consistency checks and data transformations that were undertaken, on data from the representative household survey and the CBIRD factory worker household survey, prior to data analysis.

Table IX.1: Data consistency checks and data transformations for the representative household survey

Number of days between household visits	Transformed from date (in Buddhist Era) to a standardised “date number” beginning with 1 for 28/06/2546(2003) to 112 for 17/10/2546(2003). Number of days between visits was then calculated from the difference between the standardised “date numbers” for the two visits
Religion	Omitted from analysis because there was no variation (100% of households self-identified as Buddhist).
Asset ownership	Radio and stereo ownership were combined into one class (“radio or stereo”). The housing record from the household first visit questionnaire was cross-checked with the durable goods record from the household second visit questionnaire to determine whether the household had the following items: radio, stereo, television, refrigerator, computer, VCD player, bicycle, motorcycle, hand tractor, car or pickup truck. For pickup trucks and hand tractors, the housing record from the household first visit questionnaire was cross-checked with the agricultural record from the same questionnaire. Responses recoded as having the item based on the durable goods record: stereo (17), television (2), refrigerator (2), bicycle (10), motorcycle (6), car or pickup truck (2), and hand tractor (1). Responses recoded as not having the item based on its absence from the durable goods record: car or pickup truck (3). Responses recoded as having the item based on the agricultural record: hand tractor (218).
Running water	Only 19 of 708 households identified themselves as not having running water. Based on the responses to the open-ended question about source of water, many of these would have been re-coded.
Payment for Water	The water payment was standardised to the amount paid every 365 days.
Toilet Facility	Only 2 of 708 households identified themselves as not having a latrine as toilet facility. This data was omitted from analysis.
Payment for Garbage	The garbage payment was standardised to the amount paid every 365 days. One household had paid 10 baht and the frequency was recorded as daily – this was revised to 10 baht monthly.
Main lighting source	Only 2 of 708 households identified themselves as not using electricity as the main source of lighting for the home. This data was omitted from analysis.

Data	Transformation/Consistency check
Main cooking fuel	Only 2 of 708 households identified themselves as using kerosene as the main cooking fuel. These responses were combined with ‘bottled gas’.
Main walls material	Responses recorded: “Zinc” (1) recoded as galvanised iron (many of these were recoded during data entry); “Gypsum” (1) recoded as fibrocement, brick or concrete.
Main roof material	Responses recorded: “Zinc” (8) recoded as galvanised iron (many of these were recoded during data entry). Only 1 of 708 households identified themselves as having wood or bamboo as a roofing material. This response was combined with ‘tiles or slate’.
Main window covering	Responses recorded: “Bamboo” (1) recoded as wooden shutters only; “Zinc” (1) recoded as no windows. Only 3 of 708 households identified themselves as having glass windows without shutters. These responses was combined with ‘glass windows with shutters’.
Dwelling ownership and renting	Only 2 of 708 households did not own their house. Of the 2 households that were renting, neither household paid the rent themselves. This data was omitted from analysis.
Payment for Mortgage	The mortgage payment was standardised to the amount (including interest) paid every 365 days. One household identified as having a mortgage made no payments on that mortgage – this was left as zero. The mortgage repayment was verified against the self-reported sale value of the house. In three cases, the mortgage repayment (per year) was more than 50% of the value of the house. ***action***
Cost of dwelling, sale and rental values	Days of unpaid labour were added to the cost of the dwelling at the rate of 100baht/day (the approximate average adult agricultural wage). For the 2 households that were renting, no cost, sale or rental values were recorded (the household members were living for free rent) – the data points were left blank.
Dwelling Floor Area	Dwelling floor area was not adjusted whether the house was measured inside or outside. 483 households were measured from outside, with an average floor area of 88.3 sq.m., and 225 households were measured from inside, with an average floor area of 97.1 sq.m.
Economic Activities – Other Vegetables	No responses to other vegetables (specify) were recoded. Responses included “Chilli” (3), “Lettuce” (1), “Morning Glory” (2), and “Onion” (4). 31 responses did not specify the type of vegetable, but were not re-coded.
Economic Activities – Other Food	Responses recorded: “Lemongrass” (8), “Galingale” (7), “Ginger” (4), “Morning glory” (1), “Bergamot” (1), “Pandan leaf” (1), and “Herbs” (1), were all recoded as other vegetables. Also, this category was expanded during data collection to include all other farming activities. Responses not recoded included “Mango” (17), “Silkworms” (5), “Ducks” (2), “Eucalyptus” (2), “Coconuts” (2), “Solanum” (1), “Yambean” (1), “Watermelon” (1), “Mushrooms” (1), Lemons (1), “Frogs” (1), “Jackfruit” (1), “Custard apple” (1), and “Honey” (1). No responses failed to specify the type of other farming activity.
Economic Activities – Rubber	No households engaged in rubber production as an economic activity. This data was omitted from analysis.
Economic Activities – Dairy Products	No households engaged in dairy product production as an economic activity. This data was omitted from analysis.

Data	Transformation/Consistency check
Economic Activities – Other Private Sector Wage	Responses recorded: “Meechai Centre” (1) was recoded as manufacturing wage. Responses not recoded included “Construction” (12), “Employee (unspecified)” (4), “Transport” or “Driver” (3), “Shop worker” (3), “Security” (3), “Electrician” (2), “Clerk” or “Office worker” (2), “Car Sales” (2), “Chef” (1), “Petrol Station” (1), “Mobile phone salesman” (1), “Restaurant” (1), “Masseuse” (1), “Turner” (1), “Painter” (1), “Maid” (1), “Carpenter” (1), “Cleaner” (1), “Computer technician” (1), and “Odd jobs” (1). Unspecified employees were not recoded.
Durable Goods	The durable goods record from the household second visit questionnaire was cross-checked against the housing record from the household first visit questionnaire to ensure that all durable goods were recorded. Missing information: Radio or stereo (24 – 16 of which were only missing values of a radio, which was likely to be negligible), television (2), refrigerator (2), computer (1), and bicycle (6). Durable goods was then transformed to a single total value of all durable goods owned by the household, and a total for the purchase price of all durable goods purchased within the last year.
Livestock	“Dairy cattle” and “sheep and goats” were removed as no household owned these types of livestock. “Other livestock” included “Ducks” (24), “Birds” (4), and “Horses” (1). All livestock data was reduced to a total value and total purchases within the last year of cattle, buffalo, chickens, pigs, and other livestock. Values were examined for anything extraordinary. The average sale price, average purchase price, and average value were compared for each livestock type. These averages were: cattle (sale price B16655, purchase price B20206, and value B24723), buffalo (sale price B14442, purchase price B18150, and value B13740), chickens (sale price B71, purchase price B47, and value B56), and pigs (sale price B2348, purchase price B861, and value B2283). Extraordinary data was double-checked, but left in the data set as originally recorded.
Tree crops	Tree crops included “Banana” (78), “Mango” (58), “Papaya” (48), “Coconut” (16), “Custard apple” (9), “Tamarind” (8), “Rose apple” (4), “Jackfruit” (4), “Gooseberry” (3), “Eucalyptus” (3), “Guava” (1), “Starfruit” (1), “Greenleaf” (1), “Green plum” (1), and “Lemon” (1). Tree crops data did not provide enough detail for analysis e.g. the values or number of rai planted in different tree crops were not recorded. This data was omitted from analysis.
Land transfers	All land transfer data was reduced to a total area and total value for purchases, sales, inward and outward renting, and inward and outward gifts. Values were examined for anything extraordinary. The per rai average sale price, average purchase price, and average rental price and average gift value were compared. On average these were: purchase price B18349/rai, sale price B19162/rai, rental inwards B900/rai/year, and rental outwards B461/rai/year. Extraordinary data was double-checked, but left in the data set as originally recorded.

Data	**Transformation/Consistency check**
Agricultural asset ownership	"Corn mill" was removed as no household owned one. "Walking tiller" was removed as only two households owned one. "Other farm vehicle" included "Hand tractor" (204), and "Other farm vehicle – unspecified" (38). Unspecified farm vehicles were recoded as "hand tractor". "Other agricultural machinery" did not provide much useful data, so was removed from analysis. "Other agricultural machinery" included "Shovel" (245), "Spade" (242), "Knife" (151), "Hoe" (150), "Sickle" (74), "Harrow" (57), "Hand tractor" (24), "Rake" (10), "Water pump" (5), "Plough" (1), "Milling machine" (1), "Simmer" (1), "Farm trailer" (1), and "Other agricultural machinery – unspecified" (1).
Agricultural expenditure	"Supervision labour" was removed as no household paid any. Agricultural expenditures were standardised to the total amount paid on each item every year. Fertiliser was bought for use on: Rice (583), Sugar cane (87), Cassava (78), Other vegetables (18), Other farming activities (11), Papayas (8), Corn (4), and Bananas (2). Organic manure was bought for use on: Rice (13), Other vegetables (5), Cassava (3), Sugar cane (2), Bananas (1), and Other farming activities (1). Insecticide was bought for use on: Rice (71), Sugar cane (13), Other vegetables (13), Cassava (9), Other farming activities (6), and Papayas (2). Seeds were bought for planting: Rice (35), Other vegetables (17), Cassava (7), Sugar cane (2), Other farming activities (2), Corn (1), Papayas (1), and Bananas (1). Animal feeds were bought for: Chickens (46), Pigs (19), Cattle (13), Other farming activities (2), and Fish (1). Tractor hire was paid for use on: Rice (172), Sugar cane (22), Cassava (21), Other vegetables (2), Corn (1), and Other farming activities (1). Other equipment hire was paid for use on: Rice (7), and Sugar cane (2). Cartage was paid for: Rice (2). Storage was paid for: Rice (1). Agricultural labour was hired for: Rice (444), Sugar cane (73), Cassava (66), Other vegetables (1), and Other farming activities (1).

Data	Transformation/Consistency check
Inward and Outward Transfers	Inward and outward transfers were reduced to a single total each. Transfers received or given for special purposes were retained in the total. Inward transfers received for special purposes included for: “Education costs” (60), “Weddings” (29), “House construction” (8), “Paying off debts” (7), “Vehicle purchase” (5), “Medical costs” (4), “Funerals” (3), “Deposit at bank” (2), “Other asset purchases” (1), “Business expenses” (1), “Ordination” (1), and “Insurance costs” (1). Outward transfers given for special purposes included for: “Education costs” (70), “Weddings” (16), “Funerals” (6), “House construction” (4), “Paying off debts” (3), “Business expenses” (2), and “Medical costs” (2). Details on the origins, destinations, characteristics (education and occupation) of the sender or recipient, purpose of and amounts of transfers were kept for separate analysis.
Savings	Total savings was reduced to a single total for bank savings and other savings. Savings at “insurance companies” was removed from analysis, as many respondents interpreted this as life insurance policies. “Other savings” included total informal lending. “Other savings” were held at: “Credit co-operatives or savings groups” (283), “Village funds or other funds” (5), “Moneylenders or informal lending” (26), “At home” (2), and “With relatives” (1).
Borrowings	Total borrowings was reduced to a single total for bank or finance company borrowing, borrowing from moneylenders, and other borrowing. “Other borrowing” was owed to: “Credit co-operatives or savings groups” (242), “Village funds or other funds (including the million baht fund)” (106), “Employer” (1), “Relatives” (2), “Grocery store” (1), and “Other borrowing – unspecified” (1).
Food Expenditure, Own Production, and Consumption	See section 4.5.2 for details of the data transformation for expenditure and consumption. In “other” categories, where more than one type of good was specified, expenditure was assumed to be evenly distributed between the goods. Purchases of “Other meat” included “Duck” (7), and “Other meat – unspecified” (24). Gifts received of “Other meat” included “Duck” (1). Purchases of “Other vegetables” included “Onion” (136), “Coriander” (49), “Collard/Kale” (46), “Cucumber” (16), “Celery” (13), “White green” (12), “Lettuce” (11), “Morning glory” (10), “Cowpea” (6), “String bean” (3), “Chilli” (3), “Sweet Basil” (3), “Shallots” (2), “Bean sprouts” (2), “Hogweed” (1), “Eggplant” (1), “Mimosa” (1), “Pepper” (1), “Sugar pea” (2), “Carrot” (1), “Parsley” (1), “Mushroom” (1), and “Other vegetables – unspecified” (409). Gifts received of “Other vegetables” included “Morning glory” (33), “White green” (24), “Coriander” (15), “Onion” (10), “Collard/Kale” (10), “Green leaf” (10), “Gourd” (9), “String bean” (8), “Sweet

	Basil” (7), “Mimosa” (5), “Chilli” (4), “Eggplant” (3), “Pumpkin” (3), “Lemongrass” (3), “Bamboo shoot” (1), “Cucumber” (2), “Lettuce” (2), “Garlic” (1), “Watercress” (2), “Ginger” (1), “Galingale” (1), “Celery” (1), “Corkwood fruit” (1), and “Other vegetables – unspecified” (28). Own production of “Other vegetables” included “Morning glory” (82), “Onion” (65), “Coriander” (30), “Green leaf” (27), “White green” (24), “Lemongrass” (22), “Celery” (20), “Bamboo shoot” (19), “Collard/Kale” (18), “Sweet basil” (17), “Watercress” (17), “Lettuce” (15), “Ginger” (11), “Galingale” (11), “Mushroom” (10), “Gourd” (10), “Acacia/Cha-om” (5), “Parsley” (4), “Eggplant” (2), “Chilli” (2), “Pumpkin” (2), “Cucumber” (1), “Potato” (1), “Bergamot” (1), “Pang” (1), “Marum” (1), “Dok Kae” (1), “String bean” (1), “Mimosa” (1), “Mint” (1), “Bean sprouts” (1), “Shallots” (1), “Tomato” (1), “Herbs – unspecified” (3), and “Other vegetables – unspecified” (46). Purchases of “Other fruits” included “Rambutan” (111), “Longan” (56), “Watermelon” (48), “Durian” (38), “Mangosteen” (17), “Orange” (13), “Apple” (3), “Pomelo” (2), “Jujube” (2), “Langsat” (1), and “Other fruits – unspecified” (462). Gifts received of “Other fruits” included “Rambutan” (61), “Longan” (40), “Watermelon” (10), “Custard apple” (10), “Durian” (9), “Orange” (9), “Mangosteen” (4), “Langsat” (4), “Apple” (3), “Pomelo” (1), “Guava” (1), “Sapodilla fruit” (1), “Jujube” (1), and “Other fruits – unspecified” (19). Purchases of “Other dairy products” included “Chocolate powder/Cocoa” (2), and “Other dairy products – unspecified” (184). Gifts received of “Other dairy products” included “Milk” (17), “Powdered milk” (2), “Soy milk” (1), “Condensed milk” (1), and “Other dairy products – unspecified” (1). Purchases of “Other beverages” included “Soft drinks” (30), “Coke” (29), “Orange juice” (8), “Energy drinks” (6), “Sprite” (2), and “Other beverages – unspecified” (248). Gifts received of “Other beverages” included “Coke” (8), “Soft drinks” (7), “Orange Juice” (2), “Energy drinks” (1), “Pepsi” (1), “Ice and sweet milk” (1), and “Other beverages – unspecified” (1). Purchases of “Other food” included various “Canned food” (48), various “Pre-cooked meals” (35), and “Other food – unspecified” (17). Gifts received of “Other food” included various “Pre-cooked meals” (2), and “Other food – unspecified” (4). Own production of “Other food” included “Mango” (1), “Custard apple” (8), “Gooseberry” (2), “Guava” (4), “Tamarind” (2), “Coconut” (2), “Lemon” (2), “Starfruit” (1), and “Frogs” (1).

Data	Transformation/Consistency check
Non-Food Expenditure	See section 4.5.2 for details of the data transformation for expenditure and consumption. For "Other home maintenance", one response of B50,000 for the two week sample period was assumed to have been double-counted (also included in building materials in the annual expenses). Annual expenditure was taken as given, rather than the value given for the previous two weeks in each case. To reduce the effects of significant one-off expenditures, 'Building materials', 'Home repairs', and 'Financial expenses' were discounted to 25% of their value.
Health Expenditure	The health expenditure record from the household first visit questionnaire (previous month's health expenditure by individual) was cross-checked against the annual expenditure record from the household second visit questionnaire for both 'medicines' and 'other medical expenses'. Health expenditure was taken as the annual expenditure figure, except where the annual expenditure figure was lower than the total monthly health expenditure figure. In such cases, the monthly health expenditure was added to the annual expenditure figure. Expenditure on 'medicines' was increased in this way for 27 households (average increase B292), and 'other medical expenses' was increased in this way for 40 households (average increase B1074).
Education Expenditure	In calculating the travel cost of education, data was collected on whether students went to school "daily", "weekly", "monthly", or less often. Where school was attended daily, 200 days per year was assumed. Where school was attended weekly, 40 weeks per year were assumed. Where school was attended monthly, 10 months per year were assumed.
Gender	Gender for each person from the household first visit questionnaire section 1 was cross-checked against the household first visit questionnaire section 10 to ensure data was correct. A total of 13 data points were corrected, by referring to the name of the person from the household first visit questionnaire.
Age	Age for each person from the household first visit questionnaire section 1 was cross-checked against the date of birth (or year of birth) from the household first visit questionnaire section 10 to ensure data was correct. Where there was a discrepancy, the date of birth (or year of birth) was taken as correct – this occurred in 133 cases. In most cases, the error was due to the Asian propensity to express their age as their x^{th} year, rather than the number of complete years since their birth (e.g. someone who is 30 years old would say they are 31, i.e. in their 31^{st} year). Ages for children under the age of 14 were also converted to age in months. For 53 such children, complete data on birthdate was missing – for these children, age in months could not be calculated.

Table IX.2 lists all the data consistency checks and data transformations that were undertaken, on data from the HIV/AIDS patient survey, prior to data analysis.

Table IX.2: Data consistency checks and data transformations for the HIV/AIDS patient survey

Data	**Transformation/Consistency check**
Household composition	The household composition for the AIDS patients' households at the time of interview and at 'impact time' were cross-checked against the age of the AIDS patient to ensure they were included. 1 response was updated to include the AIDS patient.
Economic Activities	Economic activities for the AIDS patients' households at the time of interview and at 'impact time' were cross-checked against the occupation of the AIDS patient at that time. 7 responses were adjusted as a result of this cross-checking.

Appendix X – Unit Price Data

Table X.1 lists the unit prices obtained from the study of prices in Ban Phai and Phon central markets (Mkt), and the median (VMd), highest (VHi), and lowest (VLo) prices obtained from price questionnaires in each district.[133] The prices used to convert quantities into values and vice versa (see Section 4.5) are given in the far right column. The prices used were the median of the two market prices and two village median prices, where possible. Note that in some cases the variability in prices is very high – this may be due to the quantities of the item surveyed – if the interview team could only find small quantities of the item to be purchased, the unit price of the item could be very high. The use of median price rather than the mean price reduced the effect of those outliers.

Table X.1: Unit prices obtained from price survey

Item (units)	Prices (baht)								
	Ban Phai				Phon				Used
	Mkt	VMd	VHi	VLo	Mkt	VMd	VHi	VLo	
Fresh Produce and Meat Prices									
Corn (kg)	9.3	13.7	27.5	9.5	17.6	12.9	26.5	10	**13.3**
Cassava (kg)	-	9	10	8	-	8	8	8	**8.5**
Potato (kg)	48.2	51.7	60	30	50	32	55	9	**49.1**
Cabbage (kg)	19.6	10	16.7	5.5	15.2	10	17.1	5	**12.6**
Tomato (kg)	33.9	22.3	63.8	5	28.3	25	100	8.3	**26.7**
Collard (kg)	27.3	-	-	-	22.7	-	-	-	**25.0**
Morning Glory (kg)	24.1	-	-	-	14.0	-	-	-	**19.1**
Nuts (kg)	51.3	-	-	-	59.0	-	-	-	**55.2**
Banana (kg)	20.2	6.5	15	5	10.2	7.4	18	5	**8.8**
Papaya (kg)	28.5	6	14	3	4.0	6	12	3	**6.0**
Pineapple (kg)	12.5	15	20	6.5	29.8	10	20	5.8	**13.8**
Mango (kg)	30.0	30	38	16.7	27.5	15	25	12.1	**28.8**
Rambutan (kg)	-	-	-	-	23.8	-	-	-	**23.8**
Watermelon (kg)	9.3	-	-	-	6.7	-	-	-	**8.0**
Eggs (1)	1.9	2.5	3	2	2.1	2.5	3	2	**2.3**
Chicken (kg)	93.4	50	65	40	84.4	53.8	65	45	**69.1**
Fish (kg)	59.9	38.3	51	30	64.6	37.5	51	30	**49.1**
Pork (kg)	69.4	-	-	-	98.8	-	-	-	**84.1**
Beef (kg)	143.5	-	-	-	136.9	-	-	-	**140.2**

[133] The price obtained from each price question was the average of the two prices, where two prices were able to be recorded for the item.

Item (units)	Prices (baht)								
	Ban Phai				Phon				Used
	Mkt	VMd	VHi	VLo	Mkt	VMd	VHi	VLo	
Other Food prices									
Ordinary Rice (kg)	14	17.5	26	15	14.5	15	23.5	7	**14.8**
Sticky Rice (kg)	16	20	25	14.5	17.3	17	25	6	**17.2**
Bread (kg)	88.5	-	-	-	36.4	-	-	-	**62.5**
Flour (kg)	24	18	27.7	9.1	24	17.5	22.8	11	**21.0**
Biscuits (kg)	64.2	-	-	-	72.1	-	-	-	**68.2**
Cake (1kg)	76.9	-	-	-	167.8	-	-	-	**122.4**
Noodles (kg)	143.2	90.9	233.3	22	81.8	90.9	125	30	**90.9**
Dried Meat (kg)	222.3	-	-	-	366.7	-	-	-	**294.5**
Dried Fish (kg)	103.2	-	-	-	166.7	-	-	-	**135.0**
Salt (kg)	10	5.3	50	4.5	5	6	100	4.5	**5.7**
Sugar (kg)	14.5	16	18	13.5	14.5	15.5	17	13	**15.0**
Tofu (100g piece)	4.88	6	7	6	5.0	6.5	7	6	**5.5**
Cooking Oil (litre)	34.5	42.8	100	12.0	34	44	110	34	**38.7**
Butter (100g packet)	12.0	12	12	8	14.8	12	12	12	**12.0**
Milk (litre)	40	50	120	20.8	31.5	40	80	30	**40.0**
Beer (640ml bottle)	32.5	35	40	30	32.5	35	40	30	**33.8**
Coffee (kg)	11	-	-	-	12.5	-	-	-	**11.8**
Tea (100g packet)	16.5	10	15	10	20.7	10	10	10	**13.3**
Coca Cola (litre)	18.8	-	-	-	16	-	-	-	**17.4**
Orange Juice (litre)	5	-	-	-	5	-	-	-	**5.0**
Non-food prices									
Cigarettes (90g packet)	-	35	38	35	-	35	38	35	**35.0**
Soap (90g bar)	-	8.0	14.6	6	-	8.7	15	6	**8.4**
Laundry Powder (100g)	-	5.6	20	2	-	5.6	12.8	2.5	**5.6**
Toilet Tissue (1 roll)	-	6	8.5	5	-	6	8.5	3.5	**6.0**
Kerosene (litre)	-	22.5	125	10	-	25	57.5	10	**23.8**
Petrol (litre)	-	17	18	15	-	16	18	15	**16.5**
Matches (1 box)	-	1	3	1	-	1	3	1	**1.0**
Batteries (1 AA)	-	8	10	5.5	-	6	10	5	**7.0**

For some items, no price data was obtained from the survey. The prices of these goods were estimated by using a weighted average of all purchases and gifts received, as detailed in Table X.2. Where the sample size of purchases and gifts received of the goods was less than five, the weighted average also included estimated value of own production.

Table X.2: Unit prices estimated from purchases and gifts received

Item (units)	Estimation Method	Estimated Price
Meals consumed away from home (unit)	The weighted average price based on prices and quantities purchased or gifted was B77.8 (highest B1000, lowest B10, n=72).	**77.8**
Firewood (kg)	The weighted average price based on prices and quantities purchased or gifted was B3.1 (highest B25, lowest B0.4, n=78).	**3.1**
Duck (kg)	The weighted average price based on prices and quantities purchased or gifted was B72.8 (highest B103.3, lowest B36.7, n=8). This is similar to the price of chicken (69.1).	**72.8**
Celery (kg)	The weighted average price based on prices and quantities purchased or gifted was B17.1 (highest B30, lowest B10, n=14).	**17.1**
Chilli (kg)	The weighted average price based on prices and quantities purchased or gifted was B19.3 (highest B33.3, lowest B15, n=7).	**19.3**
Coriander (kg)	The weighted average price based on prices and quantities purchased or gifted was B14.5 (highest B100, lowest B10, n=36).	**21.9**
Cowpea (kg)	The weighted average price based on prices and quantities purchased or gifted was B13.2 (highest B20, lowest B10, n=6).	**13.2**
Cucumber (kg)	The weighted average price based on prices and quantities purchased or gifted was B14.6 (highest B33.3, lowest B10, n=18).	**14.6**
Gourd (kg)	The weighted average price based on prices and quantities purchased or gifted was B9.5 (highest B20, lowest B5, n=9).	**9.5**
Green Leaf (kg)	The weighted average price based on prices and quantities purchased or gifted was B16.5 (highest B33.3, lowest B10, n=10).	**16.5**
Lettuce (kg)	The weighted average price based on prices and quantities purchased or gifted was B16.8 (highest B30, lowest B10, n=13).	**16.8**
Mimosa (kg)	The weighted average price based on prices and quantities purchased or gifted was B27.6 (highest B100, lowest B10, n=6).	**27.6**
Onion (kg)	The weighted average price based on prices and quantities purchased or gifted was B17.6 (highest B50, lowest B10, n=146).	**17.4**
Sweet Basil (kg)	The weighted average price based on prices and quantities purchased or gifted was B16.4 (highest B100, lowest B10, n=9).	**16.4**
String Bean (kg)	The weighted average price based on prices and quantities purchased or gifted was B11.5 (highest B20, lowest B5, n=11).	**11.5**

Item (units)	Estimation Method	Estimated Price
White Green (kg)	The weighted average price based on prices and quantities purchased or gifted was B12.4 (highest B30, lowest B5, n=36).	**12.4**
Apple (kg)	The weighted average price based on prices and quantities purchased or gifted was B31.1 (highest B50, lowest B15, n=6).	**31.1**
Custard Apple (kg)	The weighted average price based on prices and quantities purchased or gifted was B14.3 (highest B20, lowest B10, n=9).	**14.3**
Durian (kg)	The weighted average price based on prices and quantities purchased or gifted was B24.4 (highest B75, lowest B10, n=47).	**24.4**
Langsat (kg)	The weighted average price based on prices and quantities purchased or gifted was B45.0 (highest B60, lowest B30, n=9).	**45.0**
Longan (kg)	The weighted average price based on prices and quantities purchased or gifted was B22.7 (highest B60, lowest B10, n=96).	**22.7**
Mangosteen (kg)	The weighted average price based on prices and quantities purchased or gifted was B18.0 (highest B50, lowest B10, n=21).	**18.0**
Orange (kg)	The weighted average price based on prices and quantities purchased or gifted was B24.0 (highest B35, lowest B10.0, n=22).	**24.0**
Energy drinks (litre)	The weighted average price based on prices and quantities purchased or gifted was B43.2 (highest B66.7, lowest B22.4, n=6).	**43.2**
Acacia/Cha-om (kg)	The weighted average price based on prices and quantities purchased or gifted or estimates of own production was B16.9 (highest B40, lowest B6.7, n=5).	**16.9**
Bamboo Shoot (kg)	The weighted average price based on prices and quantities purchased or gifted or estimates of own production was B13.3 (highest B40, lowest B5, n=23).	**13.3**
Eggplant (kg)	The weighted average price based on prices and quantities purchased or gifted or estimates of own production was B16.1 (highest B50, lowest B5, n=6).	**16.1**
Galingale (kg)	The weighted average price based on prices and quantities purchased or gifted or estimates of own production was B11.9 (highest B50, lowest B6.7, n=12).	**11.9**
Ginger (kg)	The weighted average price based on prices and quantities purchased or gifted or estimates of own production was B10.8 (highest B20, lowest B5, n=12).	**10.8**
Lemongrass (kg)	The weighted average price based on prices and quantities purchased or gifted or estimates of own production was B11.6 (highest B20, lowest B4, n=25).	**11.6**
Mushroom (kg)	The weighted average price based on prices and quantities purchased or gifted or estimates of own production was B58.6 (highest B100, lowest B15, n=10).	**58.6**
Parsley (kg)	The weighted average price based on prices and quantities purchased or gifted or estimates of own production was B27.3 (highest B30, lowest B6.7, n=5).	**27.3**
Pumpkin (kg)	The weighted average price based on prices and quantities purchased or gifted or estimates of own production was B9.1 (highest B10, lowest B5, n=5).	**9.1**

Item (units)	Estimation Method	Estimated Price
Watercress (kg)	The weighted average price based on prices and quantities purchased or gifted or estimates of own production was B14.4 (highest B25, lowest B2, n=19).	**14.4**
Guava (kg)	The weighted average price based on prices and quantities purchased or gifted or estimates of own production was B10.0 (highest B15, lowest B5, n=5).	**10.0**

The following items were identified in "other" categories, but had insufficient data to estimate prices: frog (other meat), bean sprouts, bergamot, carrot, corkwood fruit, dok kae, garlic, hogweed, marum, mint, pang, pepper, shallots, and sugar pea (other vegetables), and coconut, jujube, gooseberry, lemon, pomelo, rose apple, sapodilla fruit, starfruit, and tamarind (other fruit). These items were included in the aggregate goods specified above (see also Appendix XI). All dairy products were included in a single category (dairy products). All soft drinks (including coke, sprite, pepsi, and generic soft drinks) were included in a single category (soft drinks).

Appendix XI – Aggregate Goods

Where purchases or gifts were recorded in categories marked "other" (other vegetables, other fruit, and other beverages), often the actual products were not specified. To cover these cases an aggregate good was created which was a weighted average of the purchases and gifts of households in the sample where the purchases or gifts were specified, e.g. to compute the price of the aggregate good A:

$$p_A = \sum_{i=1}^{n} w_i p_i \quad where \quad w_i = \frac{C_i}{\sum_{i=1}^{n} C_i}$$

In addition to prices, the calorie and protein content of the three aggregate goods categories could be calculated using the same method. The weightings used in the creation of the aggregate goods is summarised in Table XI.1.

Table XI.1: Weightings used in creation of aggregate goods

	Category	Weighting	Category	Weighting
Other vegetables	Acacia Leaf	0.011264	Lemongrass	0.015993
	Bamboo Shoot	0.042414	Lettuce	0.032119
	Celery	0.043304	Mimosa	0.005192
	Chilli	0.011720	Morning Glory	0.067649
	Collard/Kale	0.088315	Mushroom	0.067649
	Coriander	0.078939	Onion	0.236634
	Cowpea	0.004302	Parsley	0.004718
	Cucumber	0.014539	Pumpkin	0.004451
	Eggplant	0.035293	String Bean	0.014910
	Galingale	0.008961	Sweet Basil	0.016826
	Ginger	0.007566	Watercress	0.016200
	Gourd	0.021126	White Green	0.068130
	Green Leaf	0.034848		
Other fruit	Apple	0.014296	Longan	0.236687
	Custard Apple	0.025904	Mangosteen	0.040348
	Durian	0.146510	Orange	0.052792
	Guava	0.004787	Rambutan	0.365841
	Langsat	0.020658	Watermelon	0.092177
Other beverages	Energy drinks	0.075032	Soft Drinks	0.822825
	Orange Juice	0.102144		

Using the formula given above, the prices of the three aggregate goods were B20.3 for other vegetables, B22.2 for other fruit, and B18.1 for other beverages.

The calculated calorie and protein content of the three aggregate goods are given in Appendix XII.

Appendix XII – Food Composition Table

Table XII.1 summarises the calorie and protein content of foods used in the calculation of consumption amounts. All data are taken from the ASEAN food composition tables (Puwastien *et al.*, 2000), and each item is identified by the ID number from the tables. Where more than one ID number is listed, the median of the calorie and protein contents from the ID numbers is shown.

Five food items were not listed in the ASEAN food composition tables. Two of these items (tofu and energy drinks) were found on the USDA Nutritional Database (United States Department of Agriculture, 2004). The remaining three items (green leaf, morning glory and white green) were estimated to have the same calorie and protein content as the mean content of all other vegetables (40kcal and 2.5g protein per 100g edible portion).

Table XII.1: Food composition table

Food Item	ASEAN FCT ID Number/s or USDA NDB ID Number	Calorie content (kcal) per 100g edible portion	Protein content (g) per 100g edible portion
Ordinary rice	AAA65	355	6.8
Sticky rice	AAA60	355	7.3
Bread	AAA17	290	11.1
Flour	AAA74	354	11.6
Biscuits	AAA2-AAA10	447	7.05
Corn	AAA33, AAA37	150	3.6
Cake	AAA115	435	7.1
Cassava	AAB6	150	0.8
Potato	AAB10	79	2.2
Wheat noodles	AAA54	456	10.5
Other noodles	AAA78	376	6.1
Pork	AAF157	278	17.3
Beef	AAF20-AAF22	149	30.2
Chicken	AAF104, AAF105	212.5	17.65
Dried Meat	AAF32	479	38.3
Duck	AAF111	233	15.6
Fresh Fish/Shrimp	AAG22, AAG60, AAG105	92	17.5
Dried Fish	AAG80, AAG92, AAG138, AAG237	256	45.5
Tofu	NDB16427	76	8.1
Cabbage	AAD26	29	1.5
Tomato	AAD128	25	1.0
Acacia/Cha-om	AAD36	67	10.5
Bamboo Shoot	AAD8	34	2.0
Celery	AAD35	30	1.3
Chilli	AAN4, AAN93	53.5	2.55

Food Item	ASEAN FCT ID Number/s or USDA NDB ID Number	Calorie content (kcal) per 100g edible portion	Protein content (g) per 100g edible portion
Collard/Kale	AAD72	38	2.7
Coriander	AAD41	33	2.5
Cowpea	AAD44	53	4.1
Cucumber	AAD45, AAD46	20	0.7
Eggplant	AAD50, AAD52, AAD54	32	1.3
Galingale	AAN34	49	0.9
Ginger	AAN36	44	1.2
Gourd	AAD59-AAD65	23	0.9
Green Leaf	-	40	2.5
Lemongrass	AAN42	78	0.8
Lettuce	AAD75	19	1.3
Mimosa	AAD132	48	4.2
Morning Glory	-	40	2.5
Mushroom	AAD83	33	4.7
Onion	AAD96	44	2.2
Parsley	AAD99	43	3.0
Pumpkin	AAD105	49	1.3
String bean	AAC55	46	4.3
Sweet Basil	AAN71	40	2.9
Watercress	AAC133	23	1.9
White Green	-	40	2.5
Nuts	AAC16, AAC63	443.5	18.25
Banana	AAE10, AAE12	105	1.3
Papaya	AAE83	42	0.9
Pineapple	AAE91	50	0.5
Mango	AAE67-AAE71	83.5	0.75
Apple	AAE2	55	0.4
Custard Apple	AAE28	131	1.4
Durian	AAE31	159	2.4
Guava	AAE41	63	0.9
Langsat	AAE50	67	0.9
Longan	AAE55	73	1.0
Mangosteen	AAE75	71	0.6
Orange	AAE80	48	0.9
Rambutan	AAE100	69	0.9
Watermelon	AAE126	25	0.6
Salt	-	0	0
Sugar	AAM24	398	0
Egg[134]	AAH14	159	13.2
Cooking oil	AAK16	817	0
Butter	AAK1, AAK23	759	0.55
Dairy products	AAJ20, AAJ28	64	3.05
Alcohol/Beer	AAP1, AAP6	8.5	0.2
Coffee	AAQ9	63	1.7

[134] Chicken eggs were estimated to weigh 60 grams.

Food Item	ASEAN FCT ID Number/s or USDA NDB ID Number	Calorie content (kcal) per 100g edible portion	Protein content (g) per 100g edible portion
Tea	AAQ55	68	0.1
Energy Drinks	NDB14154	43	0.4
Orange Juice	AAQ43	56	0.6
Soft Drinks	AAQ49	41	0
Other vegetables	-	38.6	2.5
Other fruit	-	79.4	1.1
Other beverages	-	42.7	0.09

Appendix XIII – Complete Regression and Statistical Test Results

Complete Tables of Results for Section 4.5.2

Table XIII.4.1: Regression results for Engel method of estimating equivalence scales

	Coefficient	Std. Error	t	P > |t|
Linear model				
Total per capita expenditure	-0.1689	0.0100	-16.81	<0.001
Number of Adults	-0.0325	0.0040	-8.06	<0.001
Number of Children	-0.0273	0.0052	-5.28	<0.001
Constant	2.3214	0.1038	22.37	<0.001
		Adjusted $R^2 = 0.3101$		
Quadratic model				
Total per capita expenditure	-0.0193	0.2010	-0.10	0.924
Total per capita expenditure squared	-0.0075	0.0101	-0.75	0.456
Number of Adults	-0.0325	0.0040	-8.07	<0.001
Number of Children	-0.0272	0.0052	-5.25	<0.001
Constant	1.5800	1.0002	1.58	0.115
		Adjusted $R^2 = 0.3097$		

Table XIII.4.2: Regressions for candidate adult goods – Simple method

	Coefficient	Std. Error	t	P > |t|
Cigarettes and tobacco				
Total expenditure	0.0116	0.0026	4.45	<0.001
Number of Adults	106.2319	85.9801	1.24	0.217
Number of Children	-156.3977	100.6049	-1.55	0.121
Constant	131.1368	274.1419	0.48	0.633
		Adjusted $R^2 = 0.3558$		
Lottery tickets				
Total expenditure	0.0404	0.0035	11.69	<0.001
Number of Adults	-482.9237	114.1787	-4.23	<0.001
Number of Children	-207.3179	133.5999	-1.55	0.121
Constant	-628.8675	364.0513	-1.73	0.085
		Adjusted $R^2 = 0.1694$		
Other gambling				
Total expenditure	0.0620	0.0063	9.90	<0.001
Number of Adults	-823.4279	207.0576	-3.98	<0.001
Number of Children	-475.5247	242.2771	-1.96	0.050
Constant	-943.8413	660.1897	-1.43	0.153
		Adjusted $R^2 = 0.1288$		

	Coefficient	Std. Error	t	P > |t|
Adult clothing				
Total expenditure	0.0090	0.0009	9.93	<0.001
Number of Adults	76.3544	30.1359	2.53	0.012
Number of Children	-30.3811	35.2619	-0.86	0.389
Constant	136.3727	96.0864	1.42	0.156
		Adjusted $R^2 = 0.1682$		
Jewellery				
Total expenditure	0.0231	0.0030	7.62	<0.001
Number of Adults	-157.1965	100.2891	-1.57	0.117
Number of Children	-118.7699	117.3477	-1.01	0.312
Constant	-668.9518	319.7651	-2.09	0.037
		Adjusted $R^2 = 0.0785$		
Alcohol and beer				
Total expenditure	0.0192	0.0023	8.41	<0.001
Number of Adults	-81.6730	75.5494	-1.08	0.280
Number of Children	7.1929	88.4000	0.08	0.935
Constant	-33.3399	240.8843	-0.14	0.890
		Adjusted $R^2 = 0.0982$		
Meals consumed away from home				
Total expenditure	0.0263	0.0033	8.09	<0.001
Number of Adults	-333.6077	107.544	-3.10	0.002
Number of Children	18.5224	125.8367	0.15	0.883
Constant	-122.0167	342.8971	-0.36	0.722
		Adjusted $R^2 = 0.0875$		

Table XIII.4.3: Regressions for estimation of outlay equivalent ratios for candidate adult goods

	Coefficient	Std. Error	t	P > |t|
Cigarettes and tobacco (as a share of total expenditure)				
Log per capita expenditure	0.0031	0.0027	1.13	0.258
Log household size	0.0075	0.0033	2.28	0.023
Proportion of children in household	-0.0181	0.0073	-2.50	0.013
Constant	-0.0205	0.0283	-0.72	0.470
		Adjusted R^2 = 0.0087		
Lottery tickets (as a share of total expenditure)				
Log per capita expenditure	0.0114	0.0017	6.70	<0.001
Log household size	0.0046	0.0021	2.24	0.025
Proportion of children in household	-0.0007	0.0045	-0.15	0.885
Constant	-0.1113	0.0177	-6.27	<0.001
		Adjusted R^2 = 0.0607		
Other gambling (as a share of total expenditure)				
Log per capita expenditure	0.0128	0.0022	5.84	<0.001
Log household size	0.0031	0.0027	1.17	0.243
Proportion of children in household	-0.0010	0.0059	-0.18	0.861
Constant	-0.1241	0.0229	-5.43	<0.001
		Adjusted R^2 = 0.0480		
Adult clothing (as a share of total expenditure)				
Log per capita expenditure	-0.0034	0.0010	-3.26	0.001
Log household size	-0.0008	0.0013	-0.61	0.545
Proportion of children in household	-0.0064	0.0028	-2.30	0.022
Constant	0.0500	0.0109	4.61	<0.001
		Adjusted R^2 = 0.0179		
Jewellery (as a share of total expenditure)				
Log per capita expenditure	0.0077	0.0018	4.34	0.000
Log household size	0.0032	0.0022	1.47	0.143
Proportion of children in household	0.0016	0.0047	0.35	0.729
Constant	-0.0763	0.0185	-4.12	<0.001
		Adjusted R^2 = 0.0235		
Alcohol and beer (as a share of total expenditure)				
Log per capita expenditure	0.0028	0.0025	1.11	0.268
Log household size	0.0034	0.0030	1.12	0.262
Proportion of children in household	0.0009	0.0066	0.14	0.887
Constant	-0.0169	0.0259	-0.65	0.513
		Adjusted R^2 = -0.0013		
Meals consumed away from home (as a share of total expenditure)				
Log per capita expenditure	0.0108	0.0023	4.68	0.000
Log household size	0.0015	0.0028	0.53	0.596
Proportion of children in household	0.0110	0.0062	1.78	0.075
Constant	-0.1011	0.0241	-4.20	<0.001
		Adjusted R^2 = 0.0308		

Table XIII.4.4: Estimated outlay equivalent ratios for candidate adult goods

	Outlay equivalent ratio
Cigarettes and tobacco	-0.4466
Lottery tickets	-0.6802
Other gambling	-1.3783
Adult clothing	-0.1539
Jewellery	-0.4355
Alcohol and beer	0.0816
Meals consumed away from home	-0.0883
Mean outlay equivalent ratio	-0.4430

Table XIII.4.5: Regression results for Rothbarth method of estimating equivalence scales

	Coefficient	Std. Error	t	P > |t|
Model with 'simple method' selected adult goods				
Log per capita expenditure	0.0222	0.0034	6.35	<0.001
Log household size	0.0153	0.0042	3.62	<0.001
Proportion of children in household	-0.0171	0.0093	-1.84	0.066
Constant	-0.2081	0.0364	-5.72	<0.001
		Adjusted R^2 = 0.0618		
Model with 'OER method' selected adult goods				
Log per capita expenditure	-0.0003	0.0028	-0.11	0.910
Log household size	0.0068	0.0034	1.98	0.048
Proportion of children in household	-0.0245	0.0075	-3.26	0.001
Constant	0.0296	0.0293	1.01	0.314
		Adjusted R^2 = 0.0120		

Table XIII.4.6: Regression results for Engel method of estimating size elasticity

	Coefficient	Std. Error	t	P > |t|
Model with 'simple method' selected adult goods				
Log total expenditure	-0.1729	0.0096	-17.94	<0.001
Log household size	0.0530	0.0110	4.81	<0.001
Constant	2.3906	0.1005	23.78	<0.001
		Adjusted R^2 = 0.3401		

Complete Tables of Results for Section 4.5.4

Table XIII.4.7: Estimated Models 4.10

	Coefficient	Std. Error	t	P > |t|
Per capita expenditure				
$\ln(x_i / z^F)$	-0.1662	0.0102	-16.30	<0.001
Number of adults	-0.0341	0.0041	-8.39	<0.001
Number of children	-0.0253	0.0052	-4.85	<0.001
Number of elderly household members	-0.0248	0.0082	-3.03	0.003
Constant	0.8037	0.0181	44.45	<0.001
	Adjusted R^2 = 0.3114; F(4,655) = 75.50 (p<0.0001)			
Per adult equivalent expenditure				
$\ln(x_i / z^F)$	-0.1674	0.0101	-16.51	<0.001
Number of adults	-0.0365	0.0041	-8.95	<0.001
Number of children	-0.0148	0.0050	-2.96	0.003
Number of elderly household members	-0.0281	0.0082	-3.41	0.001
Constant	0.8140	0.0184	44.29	<0.001
	Adjusted R^2 = 0.3167; F(4,655) = 77.36 (p<0.0001)			

Table XIII.4.8: Estimated poverty model PL1

	Coefficient	Std. Error	t	P > |t|
Separate cookhouse (1 = yes)	0.0601	0.0376	1.60	0.110
Main cooking fuel*:				
Wood	-0.1480	0.1337	-1.11	0.269
Kerosene or bottled gas	0.0125	0.1400	0.09	0.929
Electricity	0.2064	0.3026	0.68	0.495
Main walls material**:				
Brick or concrete	-0.0727	0.1076	-0.68	0.500
Timber	0.0275	0.0792	0.35	0.729
Traditional materials	-0.3416	0.2006	-1.70	0.089
Main floor material†:				
Brick or concrete	-0.0273	0.1888	-0.14	0.885
Ceramic tiles or marble	0.2327	0.2372	0.98	0.327
Carpet	-0.0755	0.2489	-0.30	0.762
Timber	-0.0884	0.1832	-0.48	0.629
Main roof material‡:				
Corrugated iron	-0.0179	0.0663	-0.27	0.787
Main window covering§:				
Glass windows	-0.0059	0.0752	-0.08	0.937
Open windows (no shutters)	-0.1943	0.3445	-0.56	0.573
Wooden shutters only	-0.0839	0.0659	-1.27	0.203
Number of rooms	0.0083	0.0158	0.52	0.601
Number of children	-0.1770	0.0181	-9.76	<0.001
Number of productive adults	-0.1381	0.0170	-8.14	<0.001
Number of elderly	-0.1881	0.0325	-5.78	<0.001
Radio or stereo ownership (1 = yes)	0.0084	0.0409	0.20	0.838
Television ownership	0.3063	0.1159	2.64	0.008

Refrigerator ownership	0.0476	0.0469	1.01	0.311
	Coefficient	**Std. Error**	**t**	**P > |t|**
Computer ownership	0.3307	0.1421	2.33	0.020
Electric fan ownership	0.1654	0.1161	1.42	0.155
VCD player ownership	0.1168	0.0392	2.98	0.003
Bicycle ownership	-0.0348	0.0393	-0.89	0.376
Motorcycle ownership	0.0520	0.0426	1.22	0.222
Car or truck ownership	0.2258	0.0556	4.06	0.000
Income from rice (1 = yes)	0.0963	0.0580	1.66	0.097
Income from corn	0.3240	0.1981	1.64	0.102
Income from sugar cane	0.0125	0.0512	0.24	0.808
Income from cassava	0.0767	0.0479	1.60	0.110
Income from vegetables	0.1179	0.0620	1.90	0.058
Income from bananas	-0.1545	0.1325	-1.17	0.244
Income from papayas	-0.2409	0.1203	-2.00	0.046
Income from other food	0.0815	0.0952	0.86	0.393
Income from chickens	0.1213	0.0492	2.46	0.014
Income from pigs	0.0504	0.0706	0.71	0.476
Income from cattle	0.0515	0.0397	1.30	0.195
Income from buffalo	-0.1022	0.0691	-1.48	0.140
Income from fishing	0.0474	0.1471	0.32	0.748
Income from firewood	0.2935	0.1128	2.60	0.010
Income from artefacts	0.2815	0.2960	0.95	0.342
Income from handicrafts	-0.0267	0.0735	-0.36	0.716
Income from shop or stall	0.0754	0.0632	1.19	0.233
Income from public motor vehicle	0.3199	0.1409	2.27	0.024
Income from other business	0.1044	0.0817	1.28	0.201
Public sector wage (1 = yes)	0.1360	0.0839	1.62	0.106
Agricultural wage	-0.0385	0.0370	-1.04	0.299
Manufacturing wage	-0.0193	0.0538	-0.36	0.719
Other private sector wage	0.0378	0.0583	0.65	0.516
Constant	0.5311	0.2827	1.88	0.061

n = 660; Adjusted R^2 = 0.5165

* reference category is coal or charcoal

** reference category is corrugated iron or sheet metal

† reference category is earth, mud or sand

‡ reference category is other roofing materials

§ reference category is no windows

Table XIII.4.9: Estimated poverty model PL2

	Coefficient	Std. Error	t	P > |t|
Separate cookhouse (1 = yes)	0.0601	0.0376	1.60	0.110
Main cooking fuel*:				
Wood	-0.1480	0.1337	-1.11	0.269
Kerosene or bottled gas	0.0125	0.1400	0.09	0.929
Electricity	0.2064	0.3026	0.68	0.495
Main walls material**:				
Brick or concrete	-0.0727	0.1076	-0.68	0.500
Timber	0.0275	0.0792	0.35	0.729
Traditional materials	-0.3416	0.2006	-1.70	0.089
Main floor material†:				
Brick or concrete	-0.0273	0.1888	-0.14	0.885
Ceramic tiles or marble	0.2327	0.2372	0.98	0.327
Carpet	-0.0755	0.2489	-0.30	0.762
Timber	-0.0884	0.1832	-0.48	0.629
Main roof material‡:				
Corrugated iron	-0.0179	0.0663	-0.27	0.787
Main window covering§:				
Glass windows	-0.0059	0.0752	-0.08	0.937
Open windows (no shutters)	-0.1943	0.3445	-0.56	0.573
Wooden shutters only	-0.0839	0.0659	-1.27	0.203
Number of rooms	0.0083	0.0158	0.52	0.601
Number of children	-0.1770	0.0181	-9.76	<0.001
Number of productive adults	-0.1381	0.0170	-8.14	<0.001
Number of elderly	-0.1881	0.0325	-5.78	<0.001
Radio or stereo ownership (1 = yes)	0.0084	0.0409	0.20	0.838
Television ownership	0.3063	0.1159	2.64	0.008
Refrigerator ownership	0.0476	0.0469	1.01	0.311
Computer ownership	0.3307	0.1421	2.33	0.020
Electric fan ownership	0.1654	0.1161	1.42	0.155
VCD player ownership	0.1168	0.0392	2.98	0.003
Bicycle ownership	-0.0348	0.0393	-0.89	0.376
Motorcycle ownership	0.0520	0.0426	1.22	0.222
Car or truck ownership	0.2258	0.0556	4.06	0.000
Income from rice (1 = yes)	0.0963	0.0580	1.66	0.097
Income from corn	0.3240	0.1981	1.64	0.102
Income from sugar cane	0.0125	0.0512	0.24	0.808
Income from cassava	0.0767	0.0479	1.60	0.110
Income from vegetables	0.1179	0.0620	1.90	0.058
Income from bananas	-0.1545	0.1325	-1.17	0.244
Income from papayas	-0.2409	0.1203	-2.00	0.046
Income from other food	0.0815	0.0952	0.86	0.393
Income from chickens	0.1213	0.0492	2.46	0.014
Income from pigs	0.0504	0.0706	0.71	0.476
Income from cattle	0.0515	0.0397	1.30	0.195
Income from buffalo	-0.1022	0.0691	-1.48	0.140
Income from fishing	0.0474	0.1471	0.32	0.748
Income from firewood	0.2935	0.1128	2.60	0.010
Income from artefacts	0.2815	0.2960	0.95	0.342
Income from handicrafts	-0.0267	0.0735	-0.36	0.716
Income from shop or stall	0.0754	0.0632	1.19	0.233
Income from public motor vehicle	0.3199	0.1409	2.27	0.024
Income from other business	0.1044	0.0817	1.28	0.201

	Coefficient	Std. Error	t	P > |t|
Public sector wage (1 = yes)	0.1360	0.0839	1.62	0.106
Agricultural wage	-0.0385	0.0370	-1.04	0.299
Manufacturing wage	-0.0193	0.0538	-0.36	0.719
Other private sector wage	0.0378	0.0583	0.65	0.516
Constant	0.4895	0.2827	1.73	0.084

n = 660; Adjusted R^2 = 0.5165

* reference category is coal or charcoal

** reference category is corrugated iron or sheet metal

† reference category is earth, mud or sand

‡ reference category is other roofing materials

§ reference category is no windows

Table XIII.4.10: Estimated poverty model PL3

	Coefficient	Std. Error	t	P > |t|
Separate cookhouse (1 = yes)	0.0597	0.0376	1.59	0.113
Main cooking fuel*:				
Wood	-0.1505	0.1338	-1.12	0.261
Kerosene or bottled gas	0.0153	0.1397	0.11	0.913
Electricity	0.2048	0.3175	0.65	0.519
Main walls material**:				
Brick or concrete	-0.0680	0.1081	-0.63	0.529
Timber	0.0352	0.0801	0.44	0.660
Traditional materials	-0.3493	0.2061	-1.69	0.091
Main floor material†:				
Brick or concrete	-0.0237	0.1939	-0.12	0.903
Ceramic tiles or marble	0.2264	0.2406	0.94	0.347
Carpet	-0.0791	0.2606	-0.30	0.761
Timber	-0.0872	0.1887	-0.46	0.644
Main roof material‡:				
Corrugated iron	-0.0173	0.0660	-0.26	0.794
Main window covering§:				
Glass windows	-0.0094	0.0760	-0.12	0.902
Open windows (no shutters)	-0.2353	0.3327	-0.71	0.480
Wooden shutters only	-0.0894	0.0668	-1.34	0.181
Number of rooms	0.0054	0.0159	0.34	0.736
Number of children	-0.1134	0.0181	-6.25	<0.001
Number of productive adults	-0.1514	0.016+9	-8.96	<0.001
Number of elderly	-0.2049	0.0326	-6.29	<0.001
Radio or stereo ownership (1 = yes)	0.0064	0.0411	0.16	0.876
Television ownership	0.3137	0.1175	2.67	0.008
Refrigerator ownership	0.0515	0.0471	1.09	0.275
Computer ownership	0.3348	0.1410	2.37	0.018
Electric fan ownership	0.1662	0.1170	1.42	0.156
VCD player ownership	0.1180	0.0392	3.01	0.003
Bicycle ownership	-0.0332	0.0393	-0.84	0.399
Motorcycle ownership	0.0503	0.0430	1.17	0.242
Car or truck ownership	0.2268	0.0553	4.10	<0.001

	Coefficient	Std. Error	t	P > |t|
Income from rice (1 = yes)	0.0920	0.0579	1.59	0.113
Income from corn	0.3496	0.2016	1.73	0.083
Income from sugar cane	0.0077	0.0511	0.15	0.881
Income from cassava	0.0747	0.0479	1.56	0.119
Income from vegetables	0.1172	0.0628	1.87	0.062
Income from bananas	-0.1607	0.1323	-1.21	0.225
Income from papayas	-0.2413	0.1228	-1.97	0.050
Income from other food	0.0802	0.0958	0.84	0.403
Income from chickens	0.1202	0.0492	2.44	0.015
Income from pigs	0.0512	0.0701	0.73	0.466
Income from cattle	0.0550	0.0398	1.38	0.167
Income from buffalo	-0.0905	0.0697	-1.30	0.195
Income from fishing	0.0444	0.1498	0.30	0.767
Income from firewood	0.2776	0.1136	2.44	0.015
Income from artefacts	0.2874	0.2996	0.96	0.338
Income from handicrafts	-0.0306	0.0747	-0.41	0.683
Income from shop or stall	0.0752	0.0627	1.20	0.231
Income from public motor vehicle	0.3093	0.1413	2.19	0.029
Income from other business	0.0991	0.0803	1.23	0.217
Public sector wage (1 = yes)	0.1328	0.0840	1.58	0.114
Agricultural wage	-0.0378	0.0373	-1.01	0.311
Manufacturing wage	-0.0192	0.0536	-0.36	0.721
Other private sector wage	0.0365	0.0581	0.63	0.531
Constant	0.5164	0.2880	1.79	0.073

n = 660; Adjusted R^2 = 0.4880

[*] reference category is coal or charcoal

[**] reference category is corrugated iron or sheet metal

[†] reference category is earth, mud or sand

[‡] reference category is other roofing materials

[§] reference category is no windows

Table XIII.4.11: Estimated poverty model PL4

	Coefficient	Std. Error	t	P > |t|
Separate cookhouse (1 = yes)	0.0597	0.0376	1.59	0.113
Main cooking fuel*:				
Wood	-0.1505	0.1338	-1.12	0.261
Kerosene or bottled gas	0.0153	0.1397	0.11	0.913
Electricity	0.2048	0.3175	0.65	0.519
Main walls material**:				
Brick or concrete	-0.0680	0.1081	-0.63	0.529
Timber	0.0352	0.0801	0.44	0.660
Traditional materials	-0.3493	0.2061	-1.69	0.091
Main floor material†:				
Brick or concrete	-0.0237	0.1939	-0.12	0.903
Ceramic tiles or marble	0.2264	0.2406	0.94	0.347
Carpet	-0.0791	0.2606	-0.30	0.761
Timber	-0.0872	0.1887	-0.46	0.644
Main roof material‡:				
Corrugated iron	-0.0173	0.0660	-0.26	0.794
Main window covering§:				
Glass windows	-0.0094	0.0760	-0.12	0.902
Open windows (no shutters)	-0.2353	0.3327	-0.71	0.480
Wooden shutters only	-0.0894	0.0668	-1.34	0.181
Number of rooms	0.0054	0.0159	0.34	0.736
Number of children	-0.1134	0.0181	-6.25	<0.001
Number of productive adults	-0.1514	0.016+9	-8.96	<0.001
Number of elderly	-0.2049	0.0326	-6.29	<0.001
Radio or stereo ownership (1 = yes)	0.0064	0.0411	0.16	0.876
Television ownership	0.3137	0.1175	2.67	0.008
Refrigerator ownership	0.0515	0.0471	1.09	0.275
Computer ownership	0.3348	0.1410	2.37	0.018
Electric fan ownership	0.1662	0.1170	1.42	0.156
VCD player ownership	0.1180	0.0392	3.01	0.003
Bicycle ownership	-0.0332	0.0393	-0.84	0.399
Motorcycle ownership	0.0503	0.0430	1.17	0.242
Car or truck ownership	0.2268	0.0553	4.10	<0.001
Income from rice (1 = yes)	0.0920	0.0579	1.59	0.113
Income from corn	0.3496	0.2016	1.73	0.083
Income from sugar cane	0.0077	0.0511	0.15	0.881
Income from cassava	0.0747	0.0479	1.56	0.119
Income from vegetables	0.1172	0.0628	1.87	0.062
Income from bananas	-0.1607	0.1323	-1.21	0.225
Income from papayas	-0.2413	0.1228	-1.97	0.050
Income from other food	0.0802	0.0958	0.84	0.403
Income from chickens	0.1202	0.0492	2.44	0.015
Income from pigs	0.0512	0.0701	0.73	0.466
Income from cattle	0.0550	0.0398	1.38	0.167
Income from buffalo	-0.0905	0.0697	-1.30	0.195
Income from fishing	0.0444	0.1498	0.30	0.767
Income from firewood	0.2776	0.1136	2.44	0.015
Income from artefacts	0.2874	0.2996	0.96	0.338
Income from handicrafts	-0.0306	0.0747	-0.41	0.683
Income from shop or stall	0.0752	0.0627	1.20	0.231
Income from public motor vehicle	0.3093	0.1413	2.19	0.029
Income from other business	0.0991	0.0803	1.23	0.217

	Coefficient	Std. Error	t	P > |t|
Public sector wage (1 = yes)	0.1328	0.0840	1.58	0.114
Agricultural wage	-0.0378	0.0373	-1.01	0.311
Manufacturing wage	-0.0192	0.0536	-0.36	0.721
Other private sector wage	0.0365	0.0581	0.63	0.531
Constant	0.5504	0.2880	1.91	0.056

n = 660; Adjusted R^2 = 0.4880

[*] reference category is coal or charcoal

[**] reference category is corrugated iron or sheet metal

[†] reference category is earth, mud or sand

[‡] reference category is other roofing materials

[§] reference category is no windows

Complete Tables of Results for Section 5.1.4

Table XIII.5.1: Table 5.7 Complete: Changes in household characteristics of the household HIV/AIDS patients live in

Variable / Household Characteristic	Mean after 'impact time'	Mean before 'impact time'	p-value*
Household characteristics			
Household size	4.254	4.169	0.3919
Number of productive adults	2.718	2.873	0.1964
Proportion of non-productive household members	0.322	0.273	0.0492
Land			
Land (rai)	7.808	7.732	0.4733
Land per capita	1.783	1.707	0.4130
Land per adult equivalent	1.924	1.871	0.4437
Wealth and poverty			
Total assets	347 232	335 343	0.3080
Total assets per capita	90 527	89 121	0.4353
Total assets per adult equivalent	96 703	95 078	0.4264
Total household assets	43 352	43 352	0.5000
Total household assets per capita	10 542	11 026	0.3745
Total household assets per adult equivalent	11 300	11 771	0.3833
Wealth index	-0.1001	0.2403	0.0866
Poverty estimate PL1	0.2312	0.2185	0.3455
Poverty estimate PL2	0.258	0.243	0.3327
Poverty estimate PL3	0.220	0.208	0.3429
Poverty estimate PL4	0.200	0.189	0.3512
Sending remittances	0.113	0.295	0.0386
Asset Ownership			
Radio or stereo	0.620	0.549	0.1973
Television	0.859	0.845	0.4066
Refrigerator	0.592	0.521	0.1992
Computer	…	…	…
Electric fan	0.958	0.958	0.5000
VCD player	0.323	0.197	0.0427
Bicycle	0.535	0.408	0.0651
Motorcycle	0.690	0.662	0.3599
Car or truck	0.056	0.127	0.0728
Economic Activities			
Rice	0.563	0.549	0.4329
Corn	0.014	0.028	0.2798
Sugarcane	0.056	0.028	0.2021
Cassava	0.028	0.042	0.3244
Vegetables	0.056	0.028	0.2021
Bananas	…	…	…
Papayas	…	…	…
Other food	0.014	0.014	0.5000
Chickens	0.070	0.070	0.5000
Pigs	0.014	0.014	0.5000
Cattle	0.113	0.099	0.3924

Variable / Household Characteristic	Mean after 'impact time'	Mean before 'impact time'	p-value*
Buffalo	0.042	0.014	0.1552
Fishing	0.028	0.028	0.5000
Firewood	0.028	0.014	0.2798
Artefacts	…	…	…
Handicrafts	0.085	0.085	0.5000
Shop or stall	0.099	0.028	0.0425
Public motor vehicle	0.014	0.099	0.0145
Other business	0.085	0.141	0.1442
Public sector wage	0.042	0.028	0.3244
Agricultural wage	0.386	0.451	0.2171
Factory wage	0.157	0.211	0.2037
Other private wage	0.214	0.366	0.0235
AIDS Patient Occupation			
Agriculture	0.507	0.493	0.4334
Trade	0.042	0.056	0.3491
Transport	0.000	0.028	0.0772
Technical or professional	0.014	0.085	0.0263
Public sector wage	…	…	…
Factory wage	0.056	0.099	0.1732
Commercial sex work	0.000	0.014	0.1578
Other work	0.084	0.155	0.0981
Unemployed	0.296	0.070	0.0003

* p-values are for a one-sided test of the equality of proportions, or a one-sided paired *t*-test

Table XIII.5.2: Table 5.8 Complete: Changes in household characteristics of the household HIV/AIDS patients live in, for non-movers

Variable / Household Characteristic	Mean after 'impact time'	Mean before 'impact time'	p-value*
Household characteristics			
Household size	4.18	4.72	0.0206
Number of productive adults	2.68	3.22	0.0020
Proportion of non-productive household members	0.339	0.313	0.0492
Land			
Land (rai)	8.13	9.29	0.1946
Land per capita	1.96	2.04	0.4339
Land per adult equivalent	2.13	2.23	0.4206
Wealth and poverty			
Total assets	368 918	376 600	0.3897
Total assets per capita	98 364	85 560	0.0952
Total assets per adult equivalent	105 472	92 465	0.0979
Total household assets	47 481	52 002	0.2758
Total household assets per capita	11 561	11 288	0.4352
Total household assets per adult equivalent	12 393	12 203	0.4578
Wealth index	0.0382	-0.2698	0.0855
Poverty estimate PL1	0.211	0.253	0.0532
Poverty estimate PL2	0.238	0.282	0.0585
Poverty estimate PL3	0.196	0.242	0.0393
Poverty estimate PL4	0.221	0.176	0.0374

Variable / Household Characteristic	Mean after 'impact time'	Mean before 'impact time'	p-value*
Sending remittances	0.120	0.320	0.0079
Asset Ownership			
Radio or stereo	0.600	0.480	0.1143
Television	0.840	0.860	0.3897
Refrigerator	0.600	0.560	0.3427
Computer	…	…	…
Electric fan	0.940	0.940	0.5000
VCD player	0.380	0.220	0.0404
Bicycle	0.520	0.440	0.2117
Motorcycle	0.720	0.680	0.3313
Car or truck	0.080	0.140	0.1688
Economic Activities			
Rice	0.560	0.660	0.1527
Corn	0.020	0.040	0.2789
Sugarcane	0.060	0.040	0.3232
Cassava	0.040	0.060	0.3232
Vegetables	0.040	0.040	0.5000
Bananas	…	…	…
Papayas	…	…	…
Other food	0.020	0.020	0.5000
Chickens	0.060	0.080	0.3476
Pigs	0.020	0.020	0.5000
Cattle	0.100	0.120	0.3746
Buffalo	0.040	0.020	0.2789
Fishing	0.020	0.040	0.2789
Firewood	0.040	0.020	0.2789
Artefacts	…	…	…
Handicrafts	0.080	0.100	0.3634
Shop or stall	0.100	0.040	0.1198
Public motor vehicle	0.020	0.020	0.5000
Other business	0.080	0.120	0.2525
Public sector wage	0.020	0.020	0.5000
Agricultural wage	0.360	0.480	0.1121
Factory wage	0.140	0.220	0.1489
Other private wage	0.180	0.320	0.0530
AIDS Patient Occupation			
Agriculture	0.560	0.580	0.4200
Trade	0.060	0.080	0.3476
Transport	…	…	…
Technical or professional	0.020	0.100	0.0461
Public sector wage	…	…	…
Factory wage	0.020	0.060	0.1537
Commercial sex work	…	…	…
Other work	0.060	0.080	0.3476
Unemployed	0.280	0.100	0.0109

* p-values are for a one-sided test of the equality of proportions, or a one-sided paired *t*-test

Table XIII.5.3: Table 5.9 Complete: Changes in household characteristics of the household HIV/AIDS patients live in, for movers

Variable / Household Characteristic	Mean after 'impact time'	Mean before 'impact time'	p-value*
Household characteristics			
Household size	4.43	2.86	0.0252
Number of productive adults	2.81	2.05	0.0267
Proportion of non-productive household members	0.322	0.273	0.0492
Land			
Land (rai)	7.04	4.02	0.0707
Land per capita	1.36	0.91	0.1200
Land per adult equivalent	1.43	1.01	0.1501
Wealth and poverty			
Total assets	295 596	237 111	0.1081
Total assets per capita	71 869	97 602	0.0701
Total assets per adult equivalent	75 823	101 299	0.0701
Total household assets	33 522	22 756	0.0862
Total household assets per capita	8 117	10 401	0.2447
Total household assets per adult equivalent	8 696	10 740	0.2701
Wealth index	-0.4294	1.4548	0.0008
Poverty estimate PL1	0.2821	0.1362	0.0593
Poverty estimate PL2	0.3065	0.1515	0.0559
Poverty estimate PL3	0.2792	0.1249	0.0368
Poverty estimate PL4	0.2593	0.1129	0.0386
Sending remittances	0.0952	0.2381	0.1071
Asset Ownership			
Radio or stereo	0.667	0.714	0.3693
Television	0.905	0.810	0.1889
Refrigerator	0.571	0.429	0.1773
Computer	…	…	…
Electric fan	1.000	1.000	…
VCD player	0.190	0.143	0.3394
Bicycle	0.571	0.333	0.0606
Motorcycle	0.619	0.619	0.5000
Car or truck	0.000	0.095	0.0736
Economic Activities			
Rice	0.571	0.286	0.0307
Corn	…	…	…
Sugarcane	0.048	0.000	0.1557
Cassava	…	…	…
Vegetables	0.095	0.000	0.0736
Bananas	…	…	…
Papayas	…	…	…
Other food	…	…	…
Chickens	0.095	0.048	0.2745
Pigs	…	…	…
Cattle	0.143	0.048	0.1466
Buffalo	0.048	0.000	0.1557
Fishing	0.048	0.000	0.1557
Firewood	…	…	…
Artefacts	…	…	…
Handicrafts	0.095	0.048	0.2745

Variable / Household Characteristic	Mean after 'impact time'	Mean before 'impact time'	p-value*
Shop or stall	0.095	0.000	0.0736
Public motor vehicle	0.000	0.286	0.0041
Other business	0.095	0.190	0.1889
Public sector wage	0.095	0.048	0.2745
Agricultural wage	0.450	0.381	0.3269
Factory wage	0.200	0.190	0.4693
Other private wage	0.300	0.476	0.1238
AIDS Patient Occupation			
Agriculture	0.381	0.286	0.2563
Trade	…	…	…
Transport	0.000	0.095	0.0736
Technical or professional	0.000	0.048	0.1557
Public sector wage	…	…	…
Factory wage	0.143	0.190	0.3394
Commercial sex work	0.000	0.048	0.1557
Other work	0.143	0.333	0.0736
Unemployed	0.333	0.000	0.0019

* p-values are for a one-sided test of the equality of proportions, or a one-sided paired *t*-test

Table XIII.5.4: Table 5.12 Complete: Estimated models explaining the change in key household variables before and after 'impact time'

	Coefficient	Std. Error	t	P > |t|
Δ[Household size] model 1				
Age	-0.0602	0.0428	-1.41	0.165
Time since symptoms began	-0.0071	0.0113	-0.63	0.533
Moved household	1.9430	0.7426	2.62	0.011
Wealth index at 'impact time'	0.2464	0.1486	1.66	0.102
Constant	1.6330	1.4336	1.14	0.259
		Adjusted R^2 = 0.1550		
Δ[Household size] model 2				
Age	-0.0506	0.0431	-1.17	0.245
Time since symptoms began	-0.0100	0.0117	-0.85	0.397
Moved household	2.3386	0.7055	3.31	0.001
Log of total household assets at 'impact time'	-0.1739	0.2173	-0.80	0.426
Constant	3.0475	2.6579	1.15	0.256
		Adjusted R^2 = 0.1283		
Δ[Household size] model 3				
Age	-0.0489	0.0430	-1.14	0.259
Time since symptoms began	-0.0096	0.0115	-0.83	0.410
Moved household	2.2756	0.7082	3.21	0.002
Log of total assets at 'impact time'	-0.4085	0.3837	-1.06	0.291
Constant	6.3642	5.0053	1.27	0.208
		Adjusted R^2 = 0.1347		

	Coefficient	Std. Error	t	P > |t|
Δ[Household size] model 4				
Age	-0.0510	0.0430	-1.19	0.240
Time since symptoms began	-0.0066	0.0117	-0.57	0.574
Moved household	2.3393	0.7039	3.32	0.001
Log of total household assets per capita at 'impact time'	0.2103	0.2351	0.89	0.374
Constant	-0.5517	2.4817	-0.22	0.825
		Adjusted R^2 = 0.1304		
Δ[Household size] model 5				
Age	-0.0511	0.0431	-1.18	0.240
Time since symptoms began	-0.0068	0.0117	-0.58	0.563
Moved household	2.3521	0.7044	3.34	0.001
Log of total household assets per adult equivalent at 'impact time'	0.1813	0.2353	0.77	0.444
Constant	-0.3132	2.4957	-0.13	0.901
		Adjusted R^2 = 0.1277		
Δ[Household size] model 6				
Age	-0.0573	0.0422	-1.36	0.179
Time since symptoms began	-0.0068	0.0112	-0.60	0.548
Moved household	2.1677	0.6941	3.12	0.003
Log of total assets per capita at 'impact time'	0.8133	0.4047	2.01	0.049
Constant	-7.5428	4.5986	-1.64	0.106
		Adjusted R^2 = 0.1706		
Δ[Household size] model 7				
Age	-0.0572	0.0425	-1.35	0.183
Time since symptoms began	-0.0068	0.0113	-0.60	0.550
Moved household	2.2118	0.6964	3.18	0.002
Log of total assets per adult equivalent at 'impact time'	0.7345	0.4100	1.79	0.078
Constant	-6.7322	4.6789	-1.44	0.155
		Adjusted R^2 = 0.1606		
Δ[Proportion of household members who are non-productive] model 1				
Age	0.0015	0.0045	0.34	0.737
Time since symptoms began	-0.0007	0.0012	-0.60	0.551
Moved household	0.0597	0.0776	0.77	0.445
Wealth index at 'impact time'	0.0224	0.0155	1.44	0.154
Constant	-0.0064	0.1498	-0.04	0.966
		Adjusted R^2 = 0.0036		
Δ[Proportion of household members who are non-productive] model 2				
Age	0.0024	0.0045	0.53	0.597
Time since symptoms began	-0.0010	0.0012	-0.86	0.392
Moved household	0.0932	0.0731	1.27	0.207
Log of total household assets at 'impact time'	-0.0236	0.0225	-1.05	0.298
Constant	0.2027	0.2754	0.74	0.464
		Adjusted R^2 = -0.0108		

	Coefficient	Std. Error	t	P > |t|
Δ[Proportion of household members who are non-productive] model 3				
Age	0.0026	0.0044	0.59	0.557
Time since symptoms began	-0.0010	0.0012	-0.84	0.402
Moved household	0.0833	0.0730	1.14	0.258
Log of total assets at 'impact time'	-0.0599	0.0396	-1.51	0.135
Constant	0.7082	0.5160	1.37	0.175
		Adjusted R^2 = 0.0068		
Δ[Proportion of household members who are non-productive] model 4				
Age	0.0024	0.0045	0.53	0.597
Time since symptoms began	-0.0008	0.0012	-0.63	0.531
Moved household	0.0988	0.0736	1.34	0.184
Log of total household assets per capita at 'impact time'	0.0064	0.0246	0.26	0.796
Constant	-0.0954	0.2595	-0.37	0.714
		Adjusted R^2 = -0.0267		
Δ[Proportion of household members who are non-productive] model 5				
Age	0.0024	0.0045	0.53	0.595
Time since symptoms began	-0.0008	0.0012	-0.66	0.510
Moved household	0.1001	0.0736	1.36	0.178
Log of total household assets per capita at 'impact time'	0.0016	0.0246	0.06	0.949
Constant	-0.0542	0.2606	-0.21	0.836
		Adjusted R^2 = -0.0276		
Δ[Proportion of household members who are non-productive] model 6				
Age	0.0021	0.0045	0.47	0.642
Time since symptoms began	-0.0008	0.0012	-0.63	0.533
Moved household	0.0904	0.0739	1.22	0.226
Log of total assets per capita at 'impact time'	0.0365	0.0431	0.85	0.401
Constant	-0.4351	0.4899	-0.89	0.378
		Adjusted R^2 = -0.0167		
Δ[Proportion of household members who are non-productive] model 7				
Age	0.0022	0.0045	0.49	0.626
Time since symptoms began	-0.0008	0.0012	-0.64	0.521
Moved household	0.0951	0.0740	1.28	0.203
Log of total household assets per capita at 'impact time'	0.0219	0.0436	0.50	0.617
Constant	-0.2784	0.4972	-0.56	0.577
		Adjusted R^2 = -0.0238		
Δ[Land (rai)] model 1				
Age	-0.0528	0.1656	-0.32	0.751
Time since symptoms began	-0.0784	0.0439	-1.79	0.079
Moved household	5.2438	2.8701	1.83	0.072
Wealth index at 'impact time'	0.6810	0.5744	1.19	0.240
Constant	2.0556	5.5404	0.37	0.712
		Adjusted R^2 = 0.0574		

	Coefficient	Std. Error	t	P > |t|
Δ[Land (rai)] model 2				
Age	-0.0254	0.1657	-0.15	0.879
Time since symptoms began	-0.0819	0.0449	-1.82	0.073
Moved household	6.4791	2.7127	2.39	0.020
Log of total household assets at ‘impact time’	-0.0214	0.8355	-0.03	0.980
Constant	1.2414	10.2201	0.12	0.904
		Adjusted R^2 = 0.0373		
Δ[Land (rai)] model 3				
Age	-0.0118	0.1563	-0.08	0.940
Time since symptoms began	-0.0938	0.0419	-2.24	0.029
Moved household	5.3371	2.5767	2.07	0.042
Log of total assets at ‘impact time’	-4.0139	1.3960	-2.88	0.005
Constant	51.1917	18.2107	2.81	0.006
		Adjusted R^2 = 0.1445		
Δ[Land (rai)] model 4				
Age	-0.0269	0.1654	-0.16	0.871
Time since symptoms began	-0.0782	0.0448	-1.75	0.086
Moved household	6.3780	2.7055	2.36	0.021
Log of total household assets per capita at ‘impact time’	0.4261	0.9035	0.47	0.639
Constant	-2.6479	9.5380	-0.28	0.782
		Adjusted R^2 = 0.0405		
Δ[Land (rai)] model 5				
Age	-0.0269	0.1655	-0.16	0.871
Time since symptoms began	-0.0787	0.0448	-1.75	0.084
Moved household	6.4059	2.7046	2.37	0.021
Log of total household assets per adult equivalent at ‘impact time’	0.3590	0.9034	0.40	0.692
Constant	-2.0904	9.5819	-0.22	0.828
		Adjusted R^2 = 0.0396		
Δ[Land (rai)] model 6				
Age	0.0029	0.1609	0.02	0.986
Time since symptoms began	-0.0879	0.0429	-2.05	0.045
Moved household	7.3856	2.6483	2.79	0.007
Log of total assets per capita at ‘impact time’	-3.2565	1.5442	-2.11	0.039
Constant	36.2609	17.5465	2.07	0.043
		Adjusted R^2 = 0.0981		
Δ[Land (rai)] model 7				
Age	0.0076	0.1602	0.05	0.962
Time since symptoms began	-0.0890	0.0427	-2.08	0.041
Moved household	7.3497	2.6284	2.80	0.007
Log of total assets per adult equivalent at ‘impact time’	-3.5139	1.5475	-2.27	0.026
Constant	39.2501	17.6581	2.22	0.030
		Adjusted R^2 = 0.1071		

	Coefficient	Std. Error	t	P > |t|
Δ[Land per capita] model 1				
Age	0.0212	0.0528	0.40	0.689
Time since symptoms began	-0.0201	0.0140	-1.44	0.155
Moved household	0.8179	0.9145	0.89	0.374
Wealth index at 'impact time'	0.1421	0.1830	0.78	0.440
Constant	-0.4094	1.7654	-0.23	0.817
		Adjusted R^2 = -0.0095		
Δ[Land per capita] model 2				
Age	0.0269	0.0525	0.51	0.609
Time since symptoms began	-0.0207	0.0142	-1.45	0.151
Moved household	1.0815	0.8592	1.26	0.213
Log of total household assets at 'impact time'	0.1458	0.2646	0.06	0.956
Constant	-0.7751	3.2370	-0.24	0.811
		Adjusted R^2 = -0.0187		
Δ[Land per capita] model 3				
Age	0.0299	0.0511	0.58	0.561
Time since symptoms began	-0.0234	0.0137	-1.71	0.092
Moved household	0.8281	0.8429	0.98	0.329
Log of total assets at 'impact time'	-0.8697	0.4566	-1.90	0.061
Constant	10.2454	5.9570	1.72	0.090
		Adjusted R^2 = 0.0344		
Δ[Land per capita] model 4				
Age	0.0267	0.0525	0.51	0.612
Time since symptoms began	-0.0204	0.0142	-1.44	0.155
Moved household	1.0653	0.8582	1.24	0.219
Log of total household assets per capita at 'impact time'	0.0460	0.2866	0.16	0.873
Constant	-1.0212	3.0255	-0.34	0.737
		Adjusted R^2 = -0.0183		
Δ[Land per capita] model 5				
Age	0.0268	0.0525	0.51	0.612
Time since symptoms began	-0.0205	0.0142	-1.44	0.153
Moved household	1.0700	0.8576	1.25	0.217
Log of total household assets per adult equivalent at 'impact time'	0.0314	0.2865	0.11	0.913
Constant	-0.8972	3.0383	-0.30	0.769
		Adjusted R^2 = -0.0185		
Δ[Land per capita] model 6				
Age	0.0349	0.0513	0.68	0.499
Time since symptoms began	-0.0225	0.0137	-1.65	0.104
Moved household	1.3311	0.8446	1.58	0.120
Log of total assets per capita at 'impact time'	-0.9197	0.4925	-1.87	0.066
Constant	9.3268	5.5958	1.67	0.100
		Adjusted R^2 = 0.0324		

	Coefficient	Std. Error	t	P > |t|
Δ[Land per capita] model 7				
Age	0.0361	0.0512	0.71	0.483
Time since symptoms began	-0.0228	0.0136	-1.67	0.099
Moved household	1.3176	0.8398	1.57	0.121
Log of total assets per adult equivalent at 'impact time'	-0.9789	0.4945	-1.98	0.052
Constant	10.0244	5.6421	1.78	0.080
		Adjusted R^2 = 0.0384		
Δ[Land per adult equivalent] model 1				
Age	0.0234	0.0569	0.41	0.682
Time since symptoms began	-0.0218	0.0151	-1.45	0.152
Moved household	0.8462	0.9870	0.86	0.394
Wealth index at 'impact time'	0.1528	0.1976	0.77	0.442
Constant	-0.4751	1.9053	-0.25	0.804
		Adjusted R^2 = -0.0100		
Δ[Land per adult equivalent] model 2				
Age	0.0296	0.0566	0.52	0.603
Time since symptoms began	-0.0224	0.0154	-1.46	0.150
Moved household	1.1322	0.9273	1.22	0.226
Log of total household assets at 'impact time'	0.0236	0.2856	0.08	0.934
Constant	-0.9505	3.4934	-0.27	0.786
		Adjusted R^2 = -0.0191		
Δ[Land per adult equivalent] model 3				
Age	0.0330	0.0550	0.60	0.551
Time since symptoms began	-0.0256	0.0147	-1.74	0.087
Moved household	0.8393	0.9064	0.93	0.358
Log of total assets at 'impact time'	-0.9979	0.4910	-2.03	0.046
Constant	11.7665	6.4061	1.84	0.071
		Adjusted R^2 = 0.0408		
Δ[Land per adult equivalent] model 4				
Age	0.0294	0.0566	0.52	0.606
Time since symptoms began	-0.0221	0.0153	-1.44	0.155
Moved household	1.1089	0.9261	1.20	0.235
Log of total household assets per capita at 'impact time'	0.0633	0.3093	0.20	0.839
Constant	-1.2519	3.2649	-0.38	0.703
		Adjusted R^2 = -0.0186		
Δ[Land per adult equivalent] model 5				
Age	0.0294	0.0566	0.52	0.606
Time since symptoms began	-0.0222	0.0153	-1.45	0.153
Moved household	1.1145	0.9255	1.20	0.233
Log of total household assets per adult equivalent at 'impact time'	0.0466	0.3091	0.15	0.881
Constant	-1.1114	3.2789	-0.34	0.736
		Adjusted R^2 = -0.0188		

	Coefficient	Std. Error	t	P > |t|
Δ[Land per adult equivalent] model 6				
Age	0.0387	0.0552	0.70	0.486
Time since symptoms began	-0.0246	0.0147	-1.67	0.100
Moved household	1.4145	0.9088	1.56	0.124
Log of total assets per capita at 'impact time'	-1.0480	0.5299	-1.98	0.052
Constant	10.6331	6.0210	1.77	0.082
		Adjusted R^2 = 0.0378		
Δ[Land per adult equivalent] model 7				
Age	0.0401	0.0551	0.73	0.470
Time since symptoms began	-0.0249	0.0147	-1.70	0.094
Moved household	1.3991	0.9033	1.55	0.126
Log of total assets per adult equivalent at 'impact time'	-1.1153	0.5318	-2.10	0.040
Constant	11.4265	6.0686	1.88	0.064
		Adjusted R^2 = 0.0445		
Δ[Total assets] model 1				
Age	-439.31	3573.37	-0.12	0.903
Time since symptoms began	-1433.23	946.54	-1.51	0.135
Moved household	94573.8	61939.1	1.53	0.132
Wealth index at 'impact time'	6993.12	12397.2	0.56	0.575
Constant	30282.2	119 567	0.27	0.788
		Adjusted R^2 = 0.0074		
Δ[Total assets] model 2				
Age	-197.319	3501.14	-0.06	0.955
Time since symptoms began	-1686.90	949.265	-1.78	0.080
Moved household	100 116	57318.9	1.75	0.085
Log of total household assets at 'impact time'	-23282.7	17654.2	-1.32	0.192
Constant	261 179	215 949	1.21	0.231
		Adjusted R^2 = 0.0282		
Δ[Total assets] model 3				
Age	146.297	3325.34	0.04	0.965
Time since symptoms began	-1738.67	891.809	-1.95	0.055
Moved household	81608.5	54832.7	1.49	0.141
Log of total assets at 'impact time'	-89876.5	29705.8	-3.03	0.004
Constant	1 145 060	387 517	2.95	0.004
		Adjusted R^2 = 0.1241		
Δ[Total assets] model 4				
Age	-109.836	3534.70	-0.03	0.975
Time since symptoms began	-1578.55	956.899	-1.65	0.104
Moved household	110 706	57801.9	1.92	0.060
Log of total household assets per capita at 'impact time'	-13367.8	19302.8	-0.69	0.491
Constant	136 747	203 778	0.67	0.505
		Adjusted R^2 = 0.0098		

	Coefficient	Std. Error	t	P > |t|
Δ[Total assets] model 5				
Age	-93.5587	3531.87	-0.03	0.979
Time since symptoms began	-1593.93	956.619	-1.67	0.100
Moved household	110 640	57703.9	1.92	0.060
Log of total household assets per adult equivalent at 'impact time'	-14900.3	19275.0	-0.77	0.442
Constant	150 805	204 435	0.74	0.463
		Adjusted R^2 = 0.0116		
Δ[Total assets] model 6				
Age	370.597	3472.15	0.11	0.915
Time since symptoms began	-1583.13	925.839	-1.71	0.092
Moved household	124 176	57137.9	2.17	0.033
Log of total assets per capita at 'impact time'	-60974.0	33316.6	-1.83	0.072
Constant	681 477	378 568	1.80	0.076
		Adjusted R^2 = 0.0508		
Δ[Total assets] model 7				
Age	468.833	3458.46	0.14	0.893
Time since symptoms began	-1605.99	922.041	-1.74	0.086
Moved household	123 736	56729.6	2.18	0.033
Log of total assets per adult equivalent at 'impact time'	-66734.0	33401.1	-2.00	0.050
Constant	747 679	381 124	1.96	0.054
		Adjusted R^2 = 0.0595		
Δ[Total assets per capita] model 1				
Age	2451.09	1265.77	1.94	0.057
Time since symptoms began	-71.0300	335.284	-0.21	0.833
Moved household	-32227.0	21940.2	-1.47	0.147
Wealth index at 'impact time'	-3872.11	4391.35	-0.88	0.381
Constant	-68056.9	42353.2	-1.61	0.113
		Adjusted R^2 = 0.0622		
Δ[Total assets per capita] model 2				
Age	2288.96	1257.63	1.82	0.073
Time since symptoms began	-86.1883	340.982	-0.25	0.801
Moved household	-40414.8	20589.3	-1.96	0.054
Log of total household assets at 'impact time'	-3636.92	6341.48	-0.57	0.568
Constant	-24759.0	77570.1	-0.32	0.751
		Adjusted R^2 = 0.0558		
Δ[Total assets per capita] model 3				
Age	2346.64	1243.73	1.89	0.064
Time since symptoms began	-97.8394	333.550	-0.29	0.770
Moved household	-43644.0	20508.3	-2.13	0.037
Log of total assets at 'impact time'	-15221.2	11110.4	-1.37	0.175
Constant	128 082	144 937	0.88	0.380
		Adjusted R^2 = 0.0774		

	Coefficient	Std. Error	t	P > |t|
Δ[Total assets per capita] model 4				
Age	2331.50	1240.01	1.88	0.064
Time since symptoms began	-136.155	335.690	-0.41	0.686
Moved household	-36721.6	20277.5	-1.81	0.075
Log of total household assets per capita at 'impact time'	-10154.1	6771.60	-1.50	0.139
Constant	25246.8	71487.2	0.35	0.725
		Adjusted R^2 = 0.0824		
Δ[Total assets per capita] model 5				
Age	2337.80	1241.10	1.88	0.064
Time since symptoms began	-135.885	336.158	-0.40	0.687
Moved household	-37085.6	20277.3	-1.83	0.072
Log of total household assets per adult equivalent at 'impact time'	-9907.41	6773.28	-1.46	0.148
Constant	23698.1	71839.0	0.33	0.743
		Adjusted R^2 = 0.0809		
Δ[Total assets per capita] model 6				
Age	2606.74	1177.98	2.21	0.030
Time since symptoms began	-120.032	341.104	-0.38	0.704
Moved household	-29350.7	19384.8	-1.51	0.135
Log of total assets per capita at 'impact time'	-35962.7	11303.1	-3.18	0.002
Constant	326 990	128 434	2.55	0.013
		Adjusted R^2 = 0.1773		
Δ[Total assets per capita] model 7				
Age	2630.67	1181.15	2.23	0.029
Time since symptoms began	-126.008	314.899	-0.40	0.690
Moved household	-30501.3	19374.5	-1.57	0.120
Log of total assets per adult equivalent at 'impact time'	-35737.0	11407.3	-3.13	0.003
Constant	326 621	130 163	2.51	0.015
		Adjusted R^2 = 0.1740		
Δ[Total assets per adult equivalent] model 1				
Age	2587.57	1283.39	2.02	0.048
Time since symptoms began	-131.738	339.951	-0.39	0.700
Moved household	-30795.5	22245.6	-1.38	0.171
Wealth index at 'impact time'	-3764.13	4452.47	-0.85	0.401
Constant	-71335.5	42942.7	-1.66	0.101
		Adjusted R^2 = 0.0632		
Δ[Total assets per adult equivalent] model 2				
Age	2429.29	1274.10	1.91	0.061
Time since symptoms began	-150.198	345.447	-0.43	0.665
Moved household	-38877.4	20858.9	-1.86	0.067
Log of total household assets at 'impact time'	-3931.10	6424.52	-0.61	0.543
Constant	-25175.3	78585.9	-0.32	0.750
		Adjusted R^2 = 0.0584		

	Coefficient	Std. Error	t	P > |t|
Δ[Total assets per adult equivalent] model 3				
Age	2495.59	1254.96	1.99	0.051
Time since symptoms began	-166.324	336.563	-0.49	0.623
Moved household	-42703.1	20693.5	-2.06	0.043
Log of total assets at ‘impact time’	-17624.2	11210.8	-1.57	0.121
Constant	154 675	146 247	1.06	0.294
		Adjusted R^2 = 0.0872		
Δ[Total assets per adult equivalent] model 4				
Age	2471.82	1257.82	1.97	0.054
Time since symptoms began	-196.213	340.512	-0.58	0.566
Moved household	-35129.2	20568.8	-1.71	0.092
Log of total household assets per capita at ‘impact time’	-10011.5	6868.88	-1.46	0.150
Constant	20576.7	72514.1	0.28	0.777
		Adjusted R^2 = 0.0825		
Δ[Total assets per adult equivalent] model 5				
Age	2478.38	1258.55	1.97	0.053
Time since symptoms began	-196.640	340.884	-0.58	0.566
Moved household	-35469.9	20562.4	-1.72	0.089
Log of total household assets per adult equivalent at ‘impact time’	-9850.17	6868.51	-1.43	0.156
Constant	19759.2	72849.0	0.27	0.787
		Adjusted R^2 = 0.0816		
Δ[Total assets per adult equivalent] model 6				
Age	2758.60	1189.79	2.32	0.024
Time since symptoms began	-183.683	317.254	-0.58	0.565
Moved household	-27370.3	19579.3	-1.40	0.167
Log of total assets per capita at ‘impact time’	-37236.2	11416.5	-3.26	0.002
Constant	337 328	129 723	2.60	0.011
		Adjusted R^2 = 0.1845		
Δ[Total assets per adult equivalent] model 7				
Age	2786.15	1191.63	2.34	0.022
Time since symptoms began	-190.482	317.693	-0.60	0.551
Moved household	-28489.1	19546.4	-1.46	0.150
Log of total assets per adult equivalent at ‘impact time’	-37297.6	11508.5	-3.24	0.002
Constant	340 156	131 318	2.59	0.012
		Adjusted R^2 = 0.1830		
Δ[Total household assets] model 1				
Age	-256.234	894.727	-0.29	0.775
Time since symptoms began	16.6462	237.000	0.07	0.944
Moved household	18156.5	15508.8	1.17	0.246
Wealth index at ‘impact time’	-1791.12	3104.09	-0.58	0.566
Constant	3187.93	29938.0	0.11	0.916
		Adjusted R^2 = -0.0313		

	Coefficient	Std. Error	t	P > |t|
Δ[Total household assets] model 2				
Age	-351.223	825.498	-0.43	0.672
Time since symptoms began	-100.967	223.818	-0.45	0.653
Moved household	10730.9	13514.7	0.79	0.430
Log of total household assets at 'impact time'	-13430.0	4162.50	-3.23	0.002
Constant	144 070	50916.4	2.83	0.006
		Adjusted R^2 = 0.1047		
Δ[Total household assets] model 3				
Age	-289.209	874.154	-0.33	0.742
Time since symptoms began	-9.4304	234.436	-0.04	0.968
Moved household	11577.5	14414.2	0.80	0.425
Log of total assets at 'impact time'	-11576.6	7808.95	-1.48	0.143
Constant	150 610	101 869	1.48	0.144
		Adjusted R^2 = -0.0031		
Δ[Total household assets] model 4				
Age	-282.171	839.387	-0.34	0.738
Time since symptoms began	-81.5403	227.235	-0.36	0.721
Moved household	18152.1	13726.3	1.32	0.191
Log of total household assets per capita at 'impact time'	-12904.0	4583.8	-2.82	0.006
Constant	117 006	48391.1	2.42	0.018
		Adjusted R^2 = 0.0746		
Δ[Total household assets] model 5				
Age	-272.234	838.322	-0.32	0.746
Time since symptoms began	-85.0158	227.063	-0.37	0.709
Moved household	17789.7	13696.6	1.30	0.199
Log of total household assets per adult equivalent at 'impact time'	-13041.4	4575.11	-2.85	0.006
Constant	118 945	48524.7	2.45	0.017
		Adjusted R^2 = 0.0771		
Δ[Total household assets] model 6				
Age	-288.752	889.336	-0.32	0.746
Time since symptoms began	16.8174	237.139	0.07	0.944
Moved household	16153.5	14635.0	1.10	0.274
Log of total assets per capita at 'impact time'	-4572.00	8533.52	-0.54	0.594
Constant	55384.3	96964.1	0.57	0.570
		Adjusted R^2 = -0.0320		
Δ[Total household assets] model 7				
Age	-280.334	889.470	-0.32	0.754
Time since symptoms began	14.8709	237.137	0.06	0.950
Moved household	16148.0	14590.1	1.11	0.272
Log of total assets per adult equivalent at 'impact time'	-5115.95	8590.31	-0.60	0.554
Constant	61567.4	98020.1	0.63	0.532
		Adjusted R^2 = -0.0310		

	Coefficient	Std. Error	t	P > |t|
Δ[Total household assets per capita] model 1				
Age	56.2312	228.580	0.25	0.806
Time since symptoms began	56.0309	60.5477	0.93	0.358
Moved household	-2037.38	3962.10	-0.51	0.609
Wealth index at ‘impact time’	-1240.02	793.018	-1.56	0.123
Constant	-2841.12	7648.41	-0.37	0.711
		Adjusted R^2 = 0.0024		
Δ[Total household assets per capita] model 2				
Age	0.7782	216.500	0.00	0.997
Time since symptoms began	31.6310	58.6998	0.54	0.592
Moved household	-5302.4	3544.43	-1.50	0.139
Log of total household assets at ‘impact time’	-3240.75	1091.68	-2.97	0.004
Constant	32382.2	13353.6	2.42	0.018
		Adjusted R^2 = 0.0873		
Δ[Total household assets per capita] model 3				
Age	0.7782	216.500	0.00	0.997
Time since symptoms began	31.6310	58.6998	0.54	0.592
Moved household	-5302.4	3544.43	-1.50	0.139
Log of total assets at ‘impact time’	-3240.75	1091.68	-2.97	0.004
Constant	32382.2	13353.6	2.42	0.018
		Adjusted R^2 = 0.0873		
Δ[Total household assets per capita] model 4				
Age	11.4385	229.644	0.05	0.960
Time since symptoms began	57.5564	61.5872	0.93	0.353
Moved household	-4733.97	3786.68	-1.25	0.216
Log of total household assets per capita at ‘impact time’	-1520.95	2051.44	-0.74	0.461
Constant	18053.8	26761.4	0.67	0.502
		Adjusted R^2 = -0.0261		
Δ[Total household assets per capita] model 5				
Age	24.6318	209.575	0.12	0.907
Time since symptoms began	26.0453	56.7641	0.46	0.648
Moved household	-3351.46	3424.05	-0.98	0.331
Log of total household assets per adult equivalent at ‘impact time’	-4260.62	1143.75	-3.73	< 0.001
Constant	35971.6	12130.8	2.97	0.004
		Adjusted R^2 = 0.1451		
Δ[Total household assets per capita] model 6				
Age	35.9227	227.095	0.16	0.875
Time since symptoms began	55.6679	60.5543	0.92	0.361
Moved household	-3353.77	3737.09	-0.90	0.373
Log of total assets per capita at ‘impact time’	-3419.68	2179.06	-1.57	0.121
Constant	36048.2	24760.1	1.46	0.150
		Adjusted R^2 = 0.0026		

	Coefficient	Std. Error	t	P > |t|
Δ[Total household assets per capita] model 7				
Age	36.8123	227.708	0.16	0.872
Time since symptoms began	55.4055	60.7079	0.91	0.365
Moved household	-3499.47	3735.12	-0.94	0.352
Log of total assets per adult equivalent at ‘impact time’	-3250.64	2199.15	-1.48	0.144
Constant	34407.6	25093.5	1.37	0.175
		Adjusted R^2 = -0.0015		
Δ[Total household assets per adult equivalent] model 1				
Age	79.4545	240.219	0.33	0.742
Time since symptoms began	49.1181	63.6307	0.77	0.443
Moved household	-1345.03	4163.85	-0.32	0.748
Wealth index at ‘impact time’	-1355.55	833.397	-1.63	0.109
Constant	-3608.35	8037.86	-0.45	0.655
		Adjusted R^2 = -0.0011		
Δ[Total household assets per adult equivalent] model 2				
Age	18.8242	226.595	0.08	0.934
Time since symptoms began	22.3852	61.4369	0.36	0.717
Moved household	-4916.21	3709.71	-1.33	0.190
Log of total household assets at ‘impact time’	-3549.02	1142.59	-3.11	0.003
Constant	34961.8	13976.3	2.50	0.015
		Adjusted R^2 = 0.0915		
Δ[Total household assets per adult equivalent] model 3				
Age	30.6763	241.537	0.13	0.899
Time since symptoms began	50.6183	64.7768	0.78	0.437
Moved household	-4308.74	3982.79	-1.08	0.283
Log of total assets at ‘impact time’	-1718.17	2157.69	-0.80	0.429
Constant	19927.3	28147.4	0.71	0.481
		Adjusted R^2 = -0.0314		
Δ[Total household assets per adult equivalent] model 4				
Age	41.4698	218.947	0.19	0.850
Time since symptoms began	17.3312	59.2724	0.29	0.771
Moved household	-2644.52	3580.38	-0.74	0.463
Log of total household assets per capita at ‘impact time’	-4638.52	1195.66	-3.88	< 0.001
Constant	38386.2	12622.4	3.04	0.003
		Adjusted R^2 = 0.1521		
Δ[Total household assets per adult equivalent] model 5				
Age	44.5590	219.609	0.20	0.840
Time since symptoms began	17.0318	59.4819	0.29	0.776
Moved household	-2799.72	3587.99	-0.78	0.438
Log of total household assets per adult equivalent at ‘impact time’	-4575.76	1198.51	-3.82	< 0.001
Constant	38111.36	12711.65	3.00	0.004
		Adjusted R^2 = 0.1471		

	Coefficient	Std. Error	t	P > |t|
Δ[Total household assets per adult equivalent] model 6				
Age	54.9233	239.324	0.23	0.819
Time since symptoms began	49.2305	63.8150	0.77	0.443
Moved household	-2858.40	3938.33	-0.73	0.471
Log of total assets per capita at 'impact time'	-3469.29	2296.40	-1.51	0.136
Constant	35993.4	26093.4	1.38	0.172
		Adjusted R^2 = -0.0065		
Δ[Total household assets per adult equivalent] model 7				
Age	56.1962	239.845	0.23	0.815
Time since symptoms began	48.8825	63.9437	0.76	0.447
Moved household	-2996.51	3934.21	-0.76	0.449
Log of total assets per adult equivalent at 'impact time'	-3337.25	2316.37	-1.44	0.154
Constant	34758.2	26431.0	1.32	0.193
		Adjusted R^2 = -0.0095		
Δ[Wealth index] model 1				
Age	0.0121	0.0303	0.40	0.692
Time since symptoms began	0.0112	0.0080	1.39	0.169
Moved household	-1.8446	0.5260	-3.51	0.001
Wealth index at 'impact time'	-0.3893	0.1053	-3.70	< 0.001
Constant	-0.3797	1.0153	-0.37	0.710
		Adjusted R^2 = 0.3488		
Δ[Wealth index] model 2				
Age	-0.0036	0.0330	-0.11	0.913
Time since symptoms began	0.0130	0.0090	1.45	0.151
Moved household	-2.5569	0.5405	-4.73	< 0.001
Log of total household assets at 'impact time'	-0.0077	0.1665	-0.05	0.963
Constant	0.2912	2.0362	0.14	0.887
		Adjusted R^2 = 0.2139		
Δ[Wealth index] model 3				
Age	-0.0049	0.0326	-0.15	0.881
Time since symptoms began	0.0142	0.0087	1.63	0.108
Moved household	-2.4460	0.5377	-4.55	< 0.001
Log of total assets at 'impact time'	0.3792	0.2913	1.30	0.198
Constant	-4.5281	3.8003	-1.19	0.238
		Adjusted R^2 = 0.2336		
Δ[Wealth index] model 4				
Age	-0.0030	0.0328	-0.09	0.928
Time since symptoms began	0.0117	0.0089	1.31	0.193
Moved household	-2.5113	0.5362	-4.68	< 0.001
Log of total household assets per capita at 'impact time'	-0.1709	0.1791	-0.95	0.343
Constant	1.6835	1.8905	0.89	0.376
		Adjusted R^2 = 0.2246		

	Coefficient	Std. Error	t	P > |t|
Δ[Wealth index] model 5				
Age	-0.0029	0.0328	-0.09	0.930
Time since symptoms began	0.0117	0.0089	1.31	0.193
Moved household	-2.5175	0.5360	-4.70	< 0.001
Log of total household assets per adult equivalent at 'impact time'	-0.1664	0.1790	-0.93	0.356
Constant	1.6536	1.8990	0.87	0.387
		Adjusted R^2 = 0.2240		
Δ[Wealth index] model 6				
Age	-0.0031	0.0331	-0.09	0.927
Time since symptoms began	0.0130	0.0088	1.47	0.147
Moved household	-2.5371	0.5450	-4.66	< 0.001
Log of total assets per capita at 'impact time'	-0.0629	0.3178	-0.20	0.844
Constant	0.8927	3.6107	0.25	0.805
		Adjusted R^2 = 0.2144		
Δ[Wealth index] model 7				
Age	-0.0031	0.0331	-0.09	0.925
Time since symptoms began	0.0130	0.0088	1.47	0.146
Moved household	-2.5422	0.5436	-4.68	< 0.001
Log of total assets per adult equivalent at 'impact time'	-0.0500	0.3201	-0.16	0.876
Constant	0.7552	3.6523	0.21	0.837
		Adjusted R^2 = 0.2142		
Δ[Poverty estimate PL1] model 1				
Age	-0.0013	0.0048	-0.26	0.793
Time since symptoms began	-0.0012	0.0013	-0.97	0.333
Moved household	0.1835	0.0839	2.19	0.032
Wealth index at 'impact time'	0.0237	0.0168	1.41	0.162
Constant	0.0267	0.1620	0.16	0.870
		Adjusted R^2 = 0.0850		
Δ[Poverty estimate PL1] model 2				
Age	-0.0003	0.0049	-0.07	0.948
Time since symptoms began	-0.0014	0.0013	-1.03	0.307
Moved household	0.2270	0.0797	2.85	0.006
Log of total household assets at 'impact time'	0.0008	0.0245	0.03	0.974
Constant	-0.0177	0.3001	-0.06	0.953
		Adjusted R^2 = 0.0573		
Δ[Poverty estimate PL1] model 3				
Age	-0.0001	0.0048	-0.07	0.985
Time since symptoms began	-0.0016	0.0013	-1.23	0.223
Moved household	0.2071	0.0787	2.63	0.011
Log of total assets at 'impact time'	-0.0688	0.0426	-1.61	0.112
Constant	0.8501	0.5564	1.53	0.131
		Adjusted R^2 = 0.0930		

	Coefficient	Std. Error	t	P > |t|
Δ[Poverty estimate PL1] model 4				
Age	-0.0005	0.0048	-0.10	0.922
Time since symptoms began	-0.0010	0.0013	-0.79	0.434
Moved household	0.2162	0.0781	2.77	0.007
Log of total household assets per capita at ‘impact time’	0.0420	0.0261	1.61	0.112
Constant	-0.3712	0.2752	-1.35	0.182
		Adjusted R^2 = 0.0930		
Δ[Poverty estimate PL1] model 5				
Age	-0.0005	0.0048	-0.10	0.919
Time since symptoms began	-0.0010	0.0013	-0.80	0.428
Moved household	0.2181	0.0782	2.79	0.007
Log of total household assets per adult equivalent at ‘impact time’	0.0392	0.0261	1.50	0.138
Constant	-0.3490	0.2770	-1.26	0.212
		Adjusted R^2 = 0.0884		
Δ[Poverty estimate PL1] model 6				
Age	-0.0007	0.0048	-0.15	0.880
Time since symptoms began	-0.0013	0.0013	-0.99	0.327
Moved household	0.2136	0.0797	2.68	0.009
Log of total assets per capita at ‘impact time’	0.0479	0.0465	1.03	0.307
Constant	-0.5272	0.5281	-1.00	0.322
		Adjusted R^2 = 0.0722		
Δ[Poverty estimate PL1] model 7				
Age	-0.0005	0.0049	-0.14	0.887
Time since symptoms began	-0.0013	0.0013	-0.99	0.325
Moved household	0.2170	0.0797	2.72	0.008
Log of total assets per adult equivalent at ‘impact time’	0.0397	0.0469	0.85	0.400
Constant	-0.4417	0.5355	-0.82	0.412
		Adjusted R^2 = 0.0674		
Δ[Poverty estimate PL2] model 1				
Age	-0.0016	0.0051	-0.32	0.749
Time since symptoms began	-0.0012	0.0013	-0.92	0.360
Moved household	0.1912	0.0879	2.17	0.033
Wealth index at ‘impact time’	0.0243	0.0176	1.44	0.156
Constant	0.0373	0.1698	0.22	0.827
		Adjusted R^2 = 0.0860		
Δ[Poverty estimate PL2] model 2				
Age	-0.0006	0.0051	-0.12	0.906
Time since symptoms began	-0.0014	0.0014	-0.98	0.330
Moved household	0.2375	0.0835	2.84	0.006
Log of total household assets at ‘impact time’	0.0006	0.0257	0.03	0.980
Constant	-0.0077	0.3147	-0.02	0.981
		Adjusted R^2 = 0.0574		

	Coefficient	Std. Error	t	P > |t|
Δ[Poverty estimate PL2] model 3				
Age	-0.0004	0.0050	-0.07	0.941
Time since symptoms began	-0.0016	0.0013	-1.17	0.245
Moved household	0.2172	0.0826	2.63	0.011
Log of total assets at ‘impact time’	-0.0705	0.0448	-1.58	0.120
Constant	0.8802	0.5839	1.51	0.136
		Adjusted R^2 = 0.0916		
Δ[Poverty estimate PL2] model 4				
Age	-0.0007	0.0050	-0.15	0.878
Time since symptoms began	-0.0010	0.0014	-0.73	0.465
Moved household	0.2261	0.0818	2.76	0.007
Log of total household assets per capita at ‘impact time’	0.0444	0.0273	1.62	0.109
Constant	-0.3831	0.2885	-1.33	0.189
		Adjusted R^2 = 0.0937		
Δ[Poverty estimate PL2] model 5				
Age	-0.0008	0.0050	-0.16	0.876
Time since symptoms began	-0.0010	0.0014	-0.75	0.459
Moved household	0.2281	0.0820	2.78	0.007
Log of total household assets per adult equivalent at ‘impact time’	0.0414	0.0274	1.51	0.136
Constant	-0.3596	0.2904	-1.24	0.220
		Adjusted R^2 = 0.0889		
Δ[Poverty estimate PL2] model 6				
Age	-0.0011	0.0051	-0.21	0.833
Time since symptoms began	-0.0013	0.0014	-0.93	0.354
Moved household	0.2225	0.0835	2.67	0.010
Log of total assets per capita at ‘impact time’	0.0537	0.0487	1.10	0.274
Constant	-0.5824	0.5531	-1.05	0.296
		Adjusted R^2 = 0.0745		
Δ[Poverty estimate PL2] model 7				
Age	-0.0010	0.0051	-0.20	0.840
Time since symptoms began	-0.0013	0.0014	-0.94	0.353
Moved household	0.2262	0.0835	2.71	0.009
Log of total assets per adult equivalent at ‘impact time’	0.0451	0.0492	0.92	0.362
Constant	-0.4922	0.5610	-0.88	0.383
		Adjusted R^2 = 0.0693		
Δ[Poverty estimate PL3] model 1				
Age	-0.0011	0.0046	-0.24	0.814
Time since symptoms began	-0.0010	0.0012	-0.78	0.437
Moved household	0.1928	0.0796	2.42	0.018
Wealth index at ‘impact time’	0.0207	0.0159	1.30	0.199
Constant	0.0107	0.1537	0.07	0.945
		Adjusted R^2 = 0.0988		

	Coefficient	Std. Error	t	P > |t|
Δ[Poverty estimate PL3] model 2				
Age	-0.0003	0.0046	-0.06	0.956
Time since symptoms began	-0.0011	0.0012	-0.85	0.401
Moved household	0.2304	0.0754	3.05	0.003
Log of total household assets at 'impact time'	-0.0002	0.0232	-0.01	0.995
Constant	-0.0191	0.2841	-0.07	0.947
		Adjusted R^2 = 0.0759		
Δ[Poverty estimate PL3] model 3				
Age	< |-0.0001|	0.0045	< |-0.01|	0.998
Time since symptoms began	-0.0013	0.0012	-1.05	0.296
Moved household	0.2098	0.0742	2.83	0.006
Log of total assets at 'impact time'	-0.0722	0.0402	-1.80	0.077
Constant	0.8815	0.5244	1.68	0.097
		Adjusted R^2 = 0.1189		
Δ[Poverty estimate PL3] model 4				
Age	-0.0004	0.0045	-0.09	0.931
Time since symptoms began	-0.0007	0.0012	-0.60	0.552
Moved household	0.2206	0.0740	2.98	0.004
Log of total household assets per capita at 'impact time'	0.0388	0.0247	1.57	0.121
Constant	-0.3545	0.2608	-1.36	0.179
		Adjusted R^2 = 0.1091		
Δ[Poverty estimate PL3] model 5				
Age	-0.0004	0.0045	-0.09	0.928
Time since symptoms began	-0.0007	0.0012	-0.61	0.546
Moved household	0.2224	0.0741	3.00	0.004
Log of total household assets per adult equivalent at 'impact time'	0.0364	0.0247	1.47	0.146
Constant	-0.3362	0.2624	-1.28	0.205
		Adjusted R^2 = 0.1052		
Δ[Poverty estimate PL3] model 6				
Age	-0.0006	0.0046	-0.13	0.901
Time since symptoms began	-0.0010	0.0012	-0.80	0.425
Moved household	0.2202	0.0757	2.91	0.005
Log of total assets per capita at 'impact time'	0.0373	0.0441	0.84	0.401
Constant	-0.4239	0.5013	-0.85	0.401
		Adjusted R^2 = 0.0858		
Δ[Poverty estimate PL3] model 7				
Age	-0.0005	0.0046	-0.12	0.907
Time since symptoms began	-0.0010	0.0012	-0.81	0.423
Moved household	0.2230	0.0756	2.95	0.004
Log of total assets per adult equivalent at 'impact time'	0.0305	0.0445	0.68	0.496
Constant	-0.3522	0.5079	-0.69	0.490
		Adjusted R^2 = 0.0824		

	Coefficient	Std. Error	t	P > |t|
Δ[Poverty estimate PL4] model 1				
Age	-0.0008	0.0044	-0.19	0.852
Time since symptoms began	-0.0010	0.0012	-0.83	0.412
Moved household	0.1854	0.0763	2.43	0.018
Wealth index at ‘impact time’	0.0195	0.0153	1.27	0.207
Constant	0.0034	0.1473	0.02	0.982
		Adjusted R^2 = 0.0975		
Δ[Poverty estimate PL4] model 2				
Age	< |-0.0001|	0.0044	-0.01	0.993
Time since symptoms began	-0.0011	0.0012	-0.88	0.380
Moved household	0.2210	0.0723	3.06	0.003
Log of total household assets at ‘impact time’	0.0002	0.0223	0.01	0.994
Constant	-0.0278	0.2722	-0.10	0.919
		Adjusted R^2 = 0.0754		
Δ[Poverty estimate PL4] model 3				
Age	0.0002	0.0043	0.05	0.963
Time since symptoms began	-0.0013	0.0012	-1.10	0.275
Moved household	0.2008	0.0710	2.83	0.006
Log of total assets at ‘impact time’	-0.0702	0.0385	-1.82	0.073
Constant	0.8515	0.5021	1.70	0.095
		Adjusted R^2 = 0.1198		
Δ[Poverty estimate PL4] model 4				
Age	-0.0002	0.0043	-0.04	0.969
Time since symptoms began	-0.0008	0.0012	-0.64	0.524
Moved household	0.2115	0.0709	2.98	0.004
Log of total household assets per capita at ‘impact time’	0.0371	0.0237	1.57	0.122
Constant	-0.3451	0.2499	-1.38	0.172
		Adjusted R^2 = 0.1085		
Δ[Poverty estimate PL4] model 5				
Age	-0.0002	0.0043	-0.04	0.965
Time since symptoms began	-0.0008	0.0012	-0.65	0.518
Moved household	0.2132	0.0710	3.00	0.004
Log of total household assets per adult equivalent at ‘impact time’	0.0348	0.0237	1.47	0.147
Constant	-0.3280	0.2515	-1.30	0.197
		Adjusted R^2 = 0.1046		
Δ[Poverty estimate PL4] model 6				
Age	-0.0003	0.0044	-0.07	0.941
Time since symptoms began	-0.0010	0.0012	-0.85	0.399
Moved household	0.2118	0.0725	2.92	0.005
Log of total assets per capita at ‘impact time’	0.0330	0.0423	0.78	0.437
Constant	-0.3838	0.4807	-0.80	0.428
		Adjusted R^2 = 0.0838		

	Coefficient	Std. Error	t	P > |t|
Δ[Poverty estimate PL4] model 7				
Age	-0.0003	0.0044	-0.07	0.948
Time since symptoms began	-0.0010	0.0012	-0.85	0.397
Moved household	0.2144	0.0725	2.96	0.004
Log of total assets per adult equivalent at 'impact time'	0.0266	0.0427	0.62	0.535
Constant	-0.3158	0.4870	-0.65	0.519
		Adjusted R^2 = 0.0808		

Table XIII.5.5: Table 5.15 Complete: Estimated models explaining other key changes in AIDS patients' households

	Coefficient	Std. Error	t	P > |t|
Used savings to pay for medical expenses model 1				
Age	-0.0007	0.0085	-0.08	0.936
Time since symptoms began	-0.0034	0.0022	-0.15	0.880
Moved household	-0.1071	0.1469	-0.73	0.468
Wealth index at 'impact time'	0.0205	0.0294	0.70	0.488
Constant	0.3536	0.2836	1.25	0.217
		Adjusted R^2 = -0.0451		
Used savings to pay for medical expenses model 2				
Age	0.0003	0.0082	0.03	0.973
Time since symptoms began	0.0003	0.0022	0.12	0.901
Moved household	-0.0460	0.1345	-0.34	0.733
Log of total household assets at 'impact time'	0.0764	0.0414	1.84	0.070
Constant	-0.4636	0.5066	-0.92	0.363
		Adjusted R^2 = -0.0012		
Used savings to pay for medical expenses model 3				
Age	-0.0004	0.0081	-0.05	0.957
Time since symptoms began	0.0001	0.0022	0.04	0.970
Moved household	-0.0200	0.1332	-0.15	0.881
Log of total assets at 'impact time'	0.1735	0.0722	2.40	0.019
Constant	-1.8464	0.9416	-1.96	0.054
		Adjusted R^2 = 0.0319		
Used savings to pay for medical expenses model 4				
Age	-0.0001	0.0082	-0.02	0.987
Time since symptoms began	0.0002	0.0022	0.09	0.928
Moved household	-0.0894	0.1347	-0.66	0.510
Log of total household assets per capita at 'impact time'	0.0778	0.0450	1.73	0.089
Constant	-0.3472	0.4750	-0.73	0.467
		Adjusted R^2 = -0.0073		
Used savings to pay for medical expenses model 5				
Age	-0.0002	0.0082	-0.02	0.981
Time since symptoms began	0.0002	0.0022	0.10	0.917
Moved household	-0.0874	0.1345	-0.65	0.518
Log of total household assets per adult equivalent at 'impact time'	0.0796	0.0449	1.77	0.081
Constant	-0.3674	0.4765	-0.77	0.443
		Adjusted R^2 = -0.0051		

	Coefficient	Std. Error	t	P > |t|
Used savings to pay for medical expenses model 6				
Age	-0.0013	0.0082	-0.16	0.876
Time since symptoms began	-0.0001	0.0022	-0.06	0.952
Moved household	-0.1152	0.1347	-0.86	0.396
Log of total assets per capita at 'impact time'	0.1645	0.0785	2.09	0.040
Constant	-1.4577	0.8923	-1.63	0.107
		Adjusted R^2 = 0.0128		
Used savings to pay for medical expenses model 7				
Age	-0.0015	0.0082	-0.18	0.857
Time since symptoms began	-0.0001	0.0022	-0.04	0.969
Moved household	-0.1122	0.1339	-0.84	0.405
Log of total assets per adult equivalent at 'impact time'	0.1729	0.0789	2.19	0.032
Constant	-1.5584	0.8998	-1.73	0.088
		Adjusted R^2 = 0.0186		
Received money from others for medical expenses model 1				
Age	-0.0120	0.0092	-1.31	0.195
Time since symptoms began	0.0022	0.0024	0.92	0.362
Moved household	0.0228	0.1587	0.14	0.886
Wealth index at 'impact time'	0.0060	0.0318	0.19	0.852
Constant	0.8009	0.3063	2.61	0.011
		Adjusted R^2 = -0.0213		
Received money from others for medical expenses model 2				
Age	-0.0117	0.0091	-1.30	0.200
Time since symptoms began	0.0022	0.0025	0.88	0.380
Moved household	0.0330	0.1485	0.22	0.825
Log of total household assets at 'impact time'	-0.0025	0.0457	-0.05	0.957
Constant	0.8171	0.5593	1.46	0.149
		Adjusted R^2 = -0.0218		
Received money from others for medical expenses model 3				
Age	-0.0118	0.0091	-1.30	0.199
Time since symptoms began	0.0022	0.0024	0.91	0.366
Moved household	0.0357	0.1496	0.24	0.812
Log of total assets at 'impact time'	0.0068	0.0810	0.08	0.933
Constant	0.7069	1.0571	0.67	0.506
		Adjusted R^2 = -0.0217		
Received money from others for medical expenses model 4				
Age	-0.0117	0.0091	-1.29	0.201
Time since symptoms began	0.0021	0.0025	0.86	0.390
Moved household	0.0360	0.1483	0.24	0.809
Log of total household assets per capita at 'impact time'	-0.0089	0.0495	-0.18	0.857
Constant	0.8688	0.5227	1.66	0.101
		Adjusted R^2 = -0.0213		

	Coefficient	Std. Error	t	P > |t|
Received money from others for medical expenses model 5				
Age	-0.0117	0.0091	-1.29	0.202
Time since symptoms began	0.0021	0.0025	0.86	0.394
Moved household	0.0360	0.1481	0.24	0.809
Log of total household assets per adult equivalent at ‘impact time’	-0.0105	0.0495	-0.21	0.833
Constant	0.8828	0.5248	1.68	0.097
		Adjusted R^2 = -0.0211		
Received money from others for medical expenses model 6				
Age	-0.0116	0.0091	-1.28	0.205
Time since symptoms began	0.0022	0.0024	0.90	0.373
Moved household	0.0367	0.1497	0.25	0.807
Log of total assets per capita at ‘impact time’	-0.0109	0.0873	-0.13	0.901
Constant	0.9103	0.9920	0.92	0.362
		Adjusted R^2 = -0.0216		
Received money from others for medical expenses model 7				
Age	-0.0116	0.0091	-1.27	0.207
Time since symptoms began	0.0022	0.0024	0.89	0.376
Moved household	0.0377	0.1493	0.25	0.802
Log of total assets per adult equivalent at ‘impact time’	-0.0160	0.0879	-0.18	0.856
Constant	0.9662	1.0032	0.96	0.339
		Adjusted R^2 = -0.0213		
Sold household assets model 1				
Age	0.0152	0.0060	2.52	0.014
Time since symptoms began	0.0019	0.0016	1.17	0.248
Moved household	-0.1745	0.1043	-1.67	0.099
Wealth index at ‘impact time’	0.0527	0.0209	2.53	0.014
Constant	-0.3572	0.2013	-1.77	0.081
		Adjusted R^2 = 0.1620		
Sold household assets model 2				
Age	0.0174	0.0061	2.87	0.006
Time since symptoms began	0.0022	0.0016	1.31	0.194
Moved household	-0.0599	0.0993	-0.60	0.549
Log of total household assets at ‘impact time’	0.0597	0.0306	1.95	0.055
Constant	-1.0514	0.3742	-2.81	0.007
		Adjusted R^2 = 0.1311		
Sold household assets model 3				
Age	0.0170	0.0061	2.77	0.007
Time since symptoms began	0.0018	0.0016	1.11	0.271
Moved household	-0.0561	0.1014	-0.55	0.582
Log of total assets at ‘impact time’	0.0779	0.0549	1.42	0.161
Constant	-1.4110	0.7166	-1.97	0.053
		Adjusted R^2 = 0.1081		

	Coefficient	Std. Error	t	P > |t|
Sold household assets model 4				
Age	0.0170	0.0060	2.83	0.006
Time since symptoms began	0.0022	0.0016	1.34	0.184
Moved household	-0.0965	0.0986	-0.98	0.331
Log of total household assets per capita at ‘impact time’	0.0718	0.0329	2.18	0.033
Constant	-1.0556	0.3474	-3.04	0.003
		Adjusted R^2 = 0.1428		
Sold household assets model 5				
Age	0.0170	0.0060	2.81	0.006
Time since symptoms began	0.0022	0.0016	1.34	0.186
Moved household	-0.0938	0.0987	-0.95	0.345
Log of total household assets per adult equivalent at ‘impact time’	0.0696	0.0330	2.11	0.039
Constant	-1.0406	0.3496	-2.98	0.004
		Adjusted R^2 = 0.1391		
Sold household assets model 6				
Age	0.0165	0.0061	2.68	0.009
Time since symptoms began	0.0018	0.0016	1.09	0.281
Moved household	-0.1049	0.1010	-1.04	0.303
Log of total assets per capita at ‘impact time’	0.0960	0.0589	1.63	0.108
Constant	-1.4757	0.6693	-2.20	0.031
		Adjusted R^2 = 0.1165		
Sold household assets model 7				
Age	0.0164	0.0062	2.67	0.010
Time since symptoms began	0.0018	0.0016	1.09	0.281
Moved household	-0.1006	0.1010	-1.00	0.323
Log of total assets per adult equivalent at ‘impact time’	0.0906	0.0595	1.52	0.132
Constant	-1.4229	0.6786	-2.10	0.040
		Adjusted R^2 = 0.1122		
Sold farm or business assets model 1				
Age	-0.0051	0.0036	-1.41	0.163
Time since symptoms began	0.0010	0.0010	1.06	0.295
Moved household	-0.0708	0.0631	-1.12	0.266
Wealth index at ‘impact time’	-0.0074	0.0126	-0.58	0.562
Constant	0.2110	0.1218	1.73	0.088
		Adjusted R^2 = 0.0080		
Sold farm or business assets model 2				
Age	-0.0054	0.0036	-1.51	0.137
Time since symptoms began	0.0010	0.0010	1.06	0.295
Moved household	-0.0849	0.0591	-1.44	0.156
Log of total assets at ‘impact time’	-0.0022	0.0182	-0.12	0.906
Constant	0.2444	0.2228	1.10	0.277
		Adjusted R^2 = 0.0031		

	Coefficient	Std. Error	t	P > |t|
Sold farm or business assets model 3				
Age	-0.0055	0.0036	-1.52	0.132
Time since symptoms began	0.0011	0.0010	1.15	0.255
Moved household	-0.0789	0.0594	-1.33	0.189
Log of total household assets at ‘impact time’	0.0188	0.0322	0.58	0.562
Constant	-0.0123	0.4201	-0.03	0.977
		Adjusted R^2 = 0.0080		
Sold farm or business assets model 4				
Age	-0.0054	0.0036	-1.50	0.138
Time since symptoms began	0.0010	0.0010	1.06	0.292
Moved household	-0.0838	0.0591	-1.42	0.161
Log of total household assets per capita at ‘impact time’	-0.0019	0.0197	-0.10	0.923
Constant	0.2387	0.2083	1.15	0.256
		Adjusted R^2 = 0.0030		
Sold farm or business assets model 5				
Age	-0.0054	0.0036	-1.50	0.138
Time since symptoms began	0.0011	0.0010	1.08	0.286
Moved household	-0.0842	0.0590	-1.43	0.158
Log of total household assets per adult equivalent at ‘impact time’	-0.0001	0.0197	-0.01	0.994
Constant	0.2235	0.2092	1.07	0.289
		Adjusted R^2 = 0.0029		
Sold farm or business assets model 6				
Age	-0.0056	0.0036	-1.56	0.123
Time since symptoms began	0.0011	0.0010	1.14	0.258
Moved household	-0.0908	0.0595	-1.53	0.131
Log of total assets per capita at ‘impact time’	0.0237	0.0347	0.68	0.496
Constant	-0.0345	0.3939	-0.09	0.931
		Adjusted R^2 = 0.0099		
Sold farm or business assets model 7				
Age	-0.0057	0.0036	-1.58	0.118
Time since symptoms began	0.0011	0.0010	1.16	0.250
Moved household	-0.0915	0.0592	-1.55	0.127
Log of total assets per adult equivalent at ‘impact time’	0.0296	0.0348	0.85	0.398
Constant	-0.1001	0.3976	-0.25	0.802
		Adjusted R^2 = 0.0137		
Sold land model 1				
Age	0.0069	0.0047	1.46	0.149
Time since symptoms began	-0.0003	0.0012	-0.23	0.816
Moved household	0.0488	0.0815	0.60	0.551
Wealth index at ‘impact time’	-0.0070	0.0163	-0.43	0.670
Constant	-0.1636	0.1572	-1.04	0.302
		Adjusted R^2 = -0.0225		

	Coefficient	Std. Error	t	P > |t|
Sold land model 2				
Age	0.0066	0.0047	1.41	0.163
Time since symptoms began	-0.0002	0.0013	-0.20	0.845
Moved household	0.0364	0.0763	0.48	0.635
Log of total household assets at 'impact time'	0.0009	0.0235	0.04	0.970
Constant	-0.1622	0.2874	-0.56	0.575
		Adjusted R^2 = -0.0254		
Sold land model 3				
Age	0.0062	0.0045	1.40	0.166
Time since symptoms began	< 0.0001	0.0012	0.04	0.970
Moved household	0.0647	0.0734	0.88	0.381
Log of total assets at 'impact time'	0.1001	0.0398	2.52	0.014
Constant	-1.4041	0.5190	-2.71	0.009
		Adjusted R^2 = 0.0644		
Sold land model 4				
Age	0.0066	0.0047	1.41	0.163
Time since symptoms began	-0.0002	0.0013	-0.20	0.845
Moved household	0.0358	0.0762	0.47	0.640
Log of total household assets per capita at 'impact time'	0.0011	0.0255	0.04	0.966
Constant	-0.1622	0.2687	-0.60	0.548
		Adjusted R^2 = -0.0254		
Sold land model 5				
Age	0.0066	0.0047	1.41	0.164
Time since symptoms began	-0.0002	0.0013	-0.19	0.852
Moved household	0.0356	0.0761	0.47	0.642
Log of total household assets per adult equivalent at 'impact time'	0.0023	0.0254	0.09	0.927
Constant	-0.1731	0.2698	-0.64	0.523
		Adjusted R^2 = -0.0253		
Sold land model 6				
Age	0.0056	0.0044	1.26	0.214
Time since symptoms began	< |-0.0001|	0.0012	-0.03	0.976
Moved household	0.0040	0.0729	0.05	0.957
Log of total assets per capita at 'impact time'	0.1163	0.0425	2.73	0.008
Constant	-1.4112	0.4832	-2.92	0.005
		Adjusted R^2 = 0.0789		
Sold land model 7				
Age	0.0054	0.0044	1.23	0.223
Time since symptoms began	< |-0.0001|	0.0012	< |-0.01|	0.997
Moved household	0.0061	0.0724	0.08	0.933
Log of total assets per adult equivalent at 'impact time'	0.1219	0.0426	2.86	0.006
Constant	-1.4790	0.4864	-3.04	0.003
		Adjusted R^2 = 0.0876		

	Coefficient	Std. Error	t	P > |t|
Other household member/s took days off work to care for AIDS patient model 1				
Age	0.0012	0.0022	0.54	0.592
Time since symptoms began	-0.0002	0.0006	-0.37	0.714
Moved household	-0.0099	0.0380	-0.26	0.795
Wealth index at 'impact time'	-0.0030	0.0076	-0.40	0.690
Constant	-0.0163	0.0733	-0.22	0.825
		Adjusted R^2 = -0.0470		
Other household member/s took days off work to care for AIDS patient model 2				
Age	0.0011	0.0022	0.49	0.628
Time since symptoms began	-0.0002	0.0006	-0.33	0.742
Moved household	-0.0153	0.0355	-0.43	0.668
Log of total household assets at 'impact time'	0.0004	0.0109	0.04	0.968
Constant	-0.0162	0.1339	-0.12	0.904
		Adjusted R^2 = -0.0495		
Other household member/s took days off work to care for AIDS patient model 3				
Age	0.0010	0.0021	0.45	0.652
Time since symptoms began	-0.0001	0.0006	-0.21	0.833
Moved household	-0.0082	0.0353	-0.23	0.818
Log of total assets at 'impact time'	0.0255	0.0192	1.33	0.188
Constant	-0.3301	0.2498	-1.32	0.191
		Adjusted R^2 = -0.0221		
Other household member/s took days off work to care for AIDS patient model 4				
Age	0.0011	0.0022	0.49	0.625
Time since symptoms began	-0.0002	0.0006	-0.37	0.711
Moved household	-0.0148	0.0355	-0.42	0.677
Log of total household assets per capita at 'impact time'	-0.0025	0.0119	-0.21	0.835
Constant	0.0096	0.1252	0.08	0.939
		Adjusted R^2 = -0.0488		
Other household member/s took days off work to care for AIDS patient model 5				
Age	0.0011	0.0022	0.49	0.624
Time since symptoms began	-0.0002	0.0006	-0.38	0.707
Moved household	-0.0149	0.0355	-0.42	0.677
Log of total household assets per adult equivalent at 'impact time'	-0.0028	0.0118	-0.23	0.816
Constant	0.0123	0.1257	0.10	0.922
		Adjusted R^2 = -0.0486		
Other household member/s took days off work to care for AIDS patient model 6				
Age	0.0009	0.0022	0.41	0.685
Time since symptoms began	-0.0002	0.0006	-0.28	0.782
Moved household	-0.0211	0.0356	-0.59	0.556
Log of total assets per capita at 'impact time'	0.0203	0.0208	0.98	0.333
Constant	-0.2308	0.2359	-0.98	0.331
		Adjusted R^2 = -0.0346		

	Coefficient	Std. Error	t	P > |t|
Other household member/s took days off work to care for AIDS patient model 7				
Age	0.0009	0.0022	0.40	0.688
Time since symptoms began	-0.0002	0.0006	-0.27	0.785
Moved household	-0.0203	0.0355	-0.57	0.570
Log of total assets per adult equivalent at ‘impact time’	0.0196	0.0209	0.94	0.352
Constant	-0.2250	0.2387	-0.94	0.349
		Adjusted R^2 = -0.0357		
Other household member/s changed job because of AIDS patient (for care or some other reason) model 1				
Age	0.0032	0.0021	1.49	0.140
Time since symptoms began	-0.0005	0.0006	-0.91	0.365
Moved household	-0.0206	0.0370	-0.56	0.580
Wealth index at ‘impact time’	0.0069	0.0074	0.93	0.354
Constant	-0.0750	0.0714	-1.05	0.297
		Adjusted R^2 = 0.0057		
Other household member/s changed job because of AIDS patient (for care or some other reason) model 2				
Age	0.0035	0.0021	1.65	0.104
Time since symptoms began	-0.0004	0.0006	-0.78	0.436
Moved household	-0.0047	0.0346	-0.13	0.893
Log of total household assets at ‘impact time’	0.0107	0.0106	1.01	0.318
Constant	-0.1957	0.1302	-1.50	0.138
		Adjusted R^2 = 0.0078		
Other household member/s changed job because of AIDS patient (for care or some other reason) model 3				
Age	0.0034	0.0021	1.61	0.112
Time since symptoms began	-0.0005	0.0006	-0.89	0.378
Moved household	-0.0037	0.0349	-0.11	0.917
Log of total assets at ‘impact time’	0.0151	0.0189	0.80	0.429
Constant	-0.2737	0.2468	-1.11	0.272
		Adjusted R^2 = 0.0022		
Other household member/s changed job because of AIDS patient (for care or some other reason) model 4				
Age	0.0034	0.0021	1.63	0.107
Time since symptoms began	-0.0004	0.0006	-0.68	0.496
Moved household	-0.0130	0.0340	-0.38	0.704
Log of total household assets per capita at ‘impact time’	0.0198	0.0114	1.74	0.086
Constant	-0.2558	0.1199	-2.13	0.037
		Adjusted R^2 = 0.0368		
Other household member/s changed job because of AIDS patient (for care or some other reason) model 5				
Age	0.0034	0.0021	1.62	0.109
Time since symptoms began	-0.0004	0.0006	-0.69	0.493
Moved household	-0.0122	0.0341	-0.36	0.722
Log of total household assets per adult equivalent at ‘impact time’	0.0189	0.0114	1.66	0.101
Constant	-0.2494	0.1207	-2.07	0.043
		Adjusted R^2 = 0.0331		

	Coefficient	Std. Error	t	P > |t|
Other household member/s changed job because of AIDS patient (for care or some other reason) model 6				
Age	0.0031	0.0021	1.51	0.137
Time since symptoms began	-0.0005	0.0006	-0.86	0.394
Moved household	-0.0190	0.0341	-0.56	0.579
Log of total assets per capita at ‘impact time’	0.0399	0.0199	2.01	0.049
Constant	-0.5171	0.2260	-2.29	0.025
		Adjusted R^2 = 0.0505		
Other household member/s changed job because of AIDS patient (for care or some other reason) model 7				
Age	0.0031	0.0021	1.50	0.140
Time since symptoms began	-0.0005	0.0006	-0.85	0.399
Moved household	-0.0173	0.0341	-0.51	0.615
Log of total assets per adult equivalent at ‘impact time’	0.0378	0.0201	1.88	0.065
Constant	-0.4966	0.2293	-2.17	0.034
		Adjusted R^2 = 0.0438		
Other household member/s stopped work to care for AIDS patient model 1				
Age	-0.0062	0.0030	-2.07	0.042
Time since symptoms began	0.0002	0.0008	0.29	0.774
Moved household	0.0048	0.0515	0.09	0.926
Wealth index at ‘impact time’	0.0130	0.0103	1.26	0.213
Constant	0.2231	0.0994	2.25	0.028
		Adjusted R^2 = 0.0238		
Other household member/s stopped work to care for AIDS patient model 2				
Age	-0.0057	0.0029	-1.95	0.056
Time since symptoms began	-0.0001	0.0008	-0.09	0.927
Moved household	0.0207	0.0477	0.43	0.665
Log of total household assets at ‘impact time’	-0.0250	0.0147	-1.70	0.094
Constant	0.4604	0.1796	2.56	0.013
		Adjusted R^2 = 0.0424		
Other household member/s stopped work to care for AIDS patient model 3				
Age	-0.0056	0.0030	-1.88	0.064
Time since symptoms began	0.0001	0.0008	0.16	0.871
Moved household	0.0253	0.0490	0.52	0.607
Log of total assets at ‘impact time’	-0.0110	0.0266	-0.42	0.679
Constant	0.3414	0.3464	0.99	0.328
		Adjusted R^2 = 0.0030		
Other household member/s stopped work to care for AIDS patient model 4				
Age	-0.0056	0.0029	-1.89	0.063
Time since symptoms began	< |-0.0001|	0.0008	-0.03	0.974
Moved household	0.0342	0.0479	0.71	0.478
Log of total household assets per capita at ‘impact time’	-0.0228	0.0160	-1.43	0.159
Constant	0.3999	0.1690	2.37	0.021
		Adjusted R^2 = 0.0302		

	Coefficient	Std. Error	t	P > |t|
Other household member/s stopped work to care for AIDS patient model 5				
Age	-0.0055	0.0029	-1.89	0.063
Time since symptoms began	< |-0.0001|	0.0008	-0.04	0.969
Moved household	0.0336	0.0479	0.70	0.486
Log of total household assets per adult equivalent at ‘impact time’	-0.0228	0.0160	-1.43	0.158
Constant	0.4015	0.1697	2.37	0.021
		Adjusted R^2 = 0.0304		
Other household member/s stopped work to care for AIDS patient model 6				
Age	-0.0057	0.0030	-1.91	0.061
Time since symptoms began	0.0002	0.0008	0.22	0.825
Moved household	0.0264	0.0491	0.54	0.592
Log of total assets per capita at ‘impact time’	0.0074	0.0286	0.26	0.798
Constant	0.1237	0.3254	0.38	0.705
		Adjusted R^2 = 0.0014		
Other household member/s stopped work to care for AIDS patient model 7				
Age	-0.0057	0.0030	-1.91	0.061
Time since symptoms began	0.0002	0.0008	0.22	0.824
Moved household	0.0267	0.0490	0.54	0.588
Log of total assets per adult equivalent at ‘impact time’	0.0073	0.0288	0.25	0.801
Constant	0.1241	0.3291	0.38	0.707
		Adjusted R^2 = 0.0014		
Children removed from school model 1				
Age	0.0006	0.0035	0.19	0.852
Time since symptoms began	0.0015	0.0010	1.48	0.145
Moved household	0.0748	0.0575	1.30	0.200
Wealth index at ‘impact time’	-0.0033	0.0124	-0.27	0.790
Constant	-0.0460	0.1137	-0.40	0.688
		N = 48; Adjusted R^2 = 0.0615		
Children removed from school model 2				
Age	0.0002	0.0035	0.07	0.945
Time since symptoms began	0.0015	0.0010	1.49	0.143
Moved household	0.0725	0.0570	1.27	0.210
Log of total household assets at ‘impact time’	-0.0128	0.0182	-0.71	0.483
Constant	0.0997	0.2348	0.42	0.673
		N = 48; Adjusted R^2 = 0.0708		
Children removed from school model 3				
Age	0.0009	0.0035	0.25	0.803
Time since symptoms began	0.0014	0.0010	1.40	0.170
Moved household	0.0768	0.0573	1.34	0.187
Log of total assets at ‘impact time’	0.0180	0.0297	0.60	0.549
Constant	-0.2787	0.4021	-0.69	0.492
		N = 48; Adjusted R^2 = 0.0679		

	Coefficient	Std. Error	t	P > |t|
Children removed from school model 4				
Age	0.0002	0.0035	0.06	0.954
Time since symptoms began	0.0015	0.0010	1.50	0.141
Moved household	0.0742	0.0568	1.31	0.198
Log of total household assets per capita at 'impact time'	-0.0167	0.0187	-0.89	0.378
Constant	0.1142	0.2120	0.54	0.593
		N = 48; Adjusted R^2 = 0.0770		
Children removed from school model 5				
Age	0.0002	0.0035	0.05	0.957
Time since symptoms began	0.0015	0.0010	1.50	0.142
Moved household	0.0744	0.0567	1.31	0.197
Log of total household assets per adult equivalent at 'impact time'	-0.0176	0.0188	-0.93	0.356
Constant	0.1240	0.2138	0.58	0.565
		N = 48; Adjusted R^2 = 0.0786		
Children removed from school model 6				
Age	0.0007	0.0035	0.21	0.832
Time since symptoms began	0.0014	0.0010	1.42	0.162
Moved household	0.0742	0.0572	1.30	0.202
Log of total assets per capita at 'impact time'	0.0109	0.0302	0.36	0.720
Constant	-0.1681	0.3578	-0.47	0.641
		N = 48; Adjusted R^2 = 0.0628		
Children removed from school model 7				
Age	0.0007	0.0035	0.21	0.836
Time since symptoms began	0.0014	0.0010	1.43	0.160
Moved household	0.0741	0.0573	1.29	0.203
Log of total assets per adult equivalent at 'impact time'	0.0092	0.0304	0.30	0.763
Constant	-0.1503	0.3625	-0.41	0.681
		N = 48; Adjusted R^2 = 0.0620		
Children sent to live elsewhere model 1				
Age	-0.0078	0.0061	-1.28	0.207
Time since symptoms began	-0.0018	0.0017	-1.05	0.299
Moved household	-0.0086	0.1003	-0.09	0.932
Wealth index at 'impact time'	0.0036	0.0216	0.17	0.867
Constant	0.3617	0.1985	1.82	0.075
		N = 48; Adjusted R^2 = 0.0037		
Children sent to live elsewhere model 2				
Age	-0.0086	0.0061	-1.41	0.165
Time since symptoms began	-0.0017	0.0017	-1.02	0.313
Moved household	-0.0091	0.0993	-0.09	0.928
Log of total household assets at 'impact time'	-0.0249	0.0317	-0.78	0.437
Constant	0.6430	0.4093	1.57	0.124
		N = 48; Adjusted R^2 = 0.0171		

	Coefficient	Std. Error	t	P > |t|
Children sent to live elsewhere model 3				
Age	-0.0085	0.0060	-1.42	0.163
Time since symptoms began	-0.0016	0.0017	-0.92	0.361
Moved household	-0.0190	0.0987	-0.19	0.848
Log of total assets at 'impact time'	-0.0640	0.0512	-1.25	0.218
Constant	1.1912	0.6924	1.72	0.093
		N = 48; Adjusted R^2 = 0.0379		
Children sent to live elsewhere model 4				
Age	-0.0089	0.0060	-1.48	0.147
Time since symptoms began	-0.0017	0.0017	-1.03	0.311
Moved household	-0.0054	0.0984	-0.06	0.956
Log of total household assets per capita at 'impact time'	-0.0390	0.0325	-1.20	0.237
Constant	0.7347	0.3673	2.00	0.052
		N = 48; Adjusted R^2 = 0.0353		
Children sent to live elsewhere model 5				
Age	-0.0089	0.0060	-1.48	0.146
Time since symptoms began	-0.0017	0.0017	-1.03	0.309
Moved household	-0.0052	0.0983	-0.05	0.958
Log of total household assets per adult equivalent at 'impact time'	-0.0404	0.0326	-1.24	0.222
Constant	0.7517	0.3705	2.03	0.049
		N = 48; Adjusted R^2 = 0.0374		
Children sent to live elsewhere model 6				
Age	-0.0083	0.0058	-1.43	0.160
Time since symptoms began	-0.0015	0.0017	-0.90	0.374
Moved household	-0.0135	0.0960	-0.14	0.889
Log of total assets per capita at 'impact time'	-0.0974	0.0507	-1.92	0.061
Constant	1.4546	0.6003	2.42	0.020
		N = 48; Adjusted R^2 = 0.0818		
Children sent to live elsewhere model 7				
Age	-0.0083	0.0058	-1.43	0.161
Time since symptoms began	-0.0015	0.0017	-0.90	0.371
Moved household	-0.0134	0.0957	-0.14	0.889
Log of total assets per adult equivalent at 'impact time'	-0.1014	0.0509	-1.99	0.053
Constant	1.5077	0.6061	2.49	0.017
		N = 48; Adjusted R^2 = 0.0872		

Complete Tables of Results for Section 5.2.2

Table XIII.5.6: Aggregation of response categories for "Type IV impact" probit models

Response category	Experiences or observations (from Table 5.19)
Education campaign	The village conducted an HIV/AIDS or related education campaign
Fear	People are afraid of getting HIV/AIDS
Direct stigma	People avoid contact/interaction with HIV-infected people; HIV-infected people are not allowed to participate in village activities, etc.
Poverty	HIV/AIDS has caused poverty / family problems / emotional problems in this village
Stigma of association	If someone dies it is assumed they died of AIDS / If someone returns from working elsewhere they are assumed to have HIV
Sexual behavioural change	Changes in sexual behaviour; Increased use of condoms; Trust their spouse / Not be promiscuous; People avoid sex entirely
Drug use change	Changes in drug use behaviour
Social capital impacts	People avoid suspected prostitutes / People visit prostitutes less often; People take care of/look after themselves (rather than helping others); People no longer go to night life, karaoke bars, etc.; People won't touch or use others clothing or other items; People won't share meals / drink from the same glass as others; It is harder to keep or make new friends
Health checks	People have health checks more frequently
More careful	People are more careful about how they live
Migration to escape	Villagers have moved away to escape HIV/AIDS

Table XIII.5.7: Table 5.20 Complete: Probit models explaining the likelihood of a given response to the three open-ended questions of impacts of HIV/AIDS

	Marginal Probability	Coefficient	Std. Error†	z	P > |z|
Education campaign model 1					
Gender (male = 1)	0.1101	0.3008	0.0751	4.00	< 0.001
Age	-0.0033	-0.0090	0.0031	-2.89	0.004
Education	-0.0082	-0.0223	0.0132	-1.69	0.091
Wealth index	0.0170	0.0460	0.0186	2.48	0.013
Constant	–	0.7600	0.1866	4.07	< 0.001
		Pseudo R^2 = 0.0181			
Education campaign model 2					
Gender (male = 1)	0.1070	0.2921	0.0749	3.90	< 0.001
Age	-0.0030	-0.0082	0.0031	-2.64	0.008
Education	-0.0057	-0.0154	0.0129	-1.20	0.231
Log of total household assets	0.0079	0.0215	0.0290	0.74	0.459
Constant	–	0.4519	0.3684	1.23	0.220
		Pseudo R^2 = 0.0143			
Education campaign model 3					
Gender (male = 1)	0.1095	0.2959	0.0751	3.98	< 0.001
Age	-0.0031	-0.0085	0.0031	-2.75	0.006
Education	-0.0070	-0.0189	0.0129	-1.46	0.143
Log of total assets	0.0355	0.0963	0.0452	2.13	0.033
Constant	–	-0.5492	0.6098	-0.90	0.368
		Pseudo R^2 = 0.0170			
Education campaign model 4					
Gender (male = 1)	0.1075	0.2936	0.0750	3.92	< 0.001
Age	-0.0032	-0.0086	0.0031	-2.75	0.006
Education	-0.0058	-0.0158	0.0129	-1.22	0.221
Log of total household assets per capita	0.0085	0.0230	0.0292	0.79	0.430
Constant	–	0.4827	0.3189	1.51	0.130
		Pseudo R^2 = 0.0143			
Education campaign model 5					
Gender (male = 1)	0.1075	0.2937	0.0750	3.92	< 0.001
Age	-0.0031	-0.0085	0.0031	-2.75	0.006
Education	-0.0059	-0.0159	0.0129	-1.23	0.219
Log of total household assets per adult equivalent	0.0091	0.0246	0.0294	0.84	0.403
Constant	–	0.4654	0.3237	1.44	0.151
		Pseudo R^2 = 0.0144			
Education campaign model 6					
Gender (male = 1)	0.1114	0.3044	0.0752	4.05	< 0.001
Age	-0.0036	-0.0099	0.0032	-3.11	0.002
Education	-0.0072	-0.0196	0.0130	-1.51	0.132
Log of total assets per capita	0.0330	0.0894	0.0429	2.08	0.037
Constant	–	-0.2761	0.4988	-0.55	0.580
		Pseudo R^2 = 0.0169			

	Marginal Probability	Coefficient	Std. Error[†]	z	P > |z|
Education campaign model 7					
Gender (male = 1)	0.1117	0.3052	0.0752	4.06	< 0.001
Age	-0.0036	-0.0099	0.0032	-3.12	0.002
Education	-0.0073	-0.0197	0.0130	-1.52	0.129
Log of total assets per adult equivalent	0.0345	0.0947	0.0436	2.17	0.030
Constant	–	-0.3455	0.5107	-0.68	0.499
		Pseudo R^2 = 0.0172			
Fear model 1					
Gender (male = 1)	0.0107	0.0567	0.0954	0.59	0.552
Age	-0.0010	-0.0055	0.0041	-1.36	0.175
Education	-0.0053	-0.0281	0.0179	-1.57	0.117
Wealth index	0.0017	0.0009	0.0239	0.04	0.971
Constant	–	-0.8490	0.2431	-3.49	< 0.001
		Pseudo R^2 = 0.0038			
Fear model 2					
Gender (male = 1)	0.0100	0.0530	0.0955	0.56	0.579
Age	-0.0010	-0.0052	0.0041	-1.28	0.200
Education	-0.0060	-0.0315	0.0177	-1.78	0.075
Log of total household assets	0.0086	0.0458	0.0394	1.16	0.245
Constant	–	-1.3487	0.4920	-2.74	0.006
		Pseudo R^2 = 0.0054			
Fear model 3					
Gender (male = 1)	0.0115	0.0612	0.0957	0.64	0.522
Age	-0.0011	-0.0057	0.0041	-1.39	0.165
Education	-0.0067	-0.0358	0.0178	-2.01	0.044
Log of total assets	0.0290	0.1549	0.0645	2.40	0.016
Constant	–	-2.8509	0.8699	-3.28	0.001
		Pseudo R^2 = 0.0109			
Fear model 4					
Gender (male = 1)	0.0103	0.0545	0.0955	0.57	0.568
Age	-0.0012	-0.0061	0.0041	-1.49	0.137
Education	-0.0063	-0.0335	0.0178	-1.89	0.059
Log of total household assets per capita	0.0120	0.0639	0.0395	1.62	0.106
Constant	–	-1.4154	0.4254	-3.33	0.001
		Pseudo R^2 = 0.0069			
Fear model 5					
Gender (male = 1)	0.0103	0.0547	0.0955	0.57	0.567
Age	-0.0011	-0.0061	0.0041	-1.48	0.139
Education	-0.0063	-0.0335	0.0177	-1.89	0.059
Log of total household assets per adult equivalent	0.0123	0.0654	0.0400	1.64	0.102
Constant	–	-1.4367	0.4328	-3.32	0.001
		Pseudo R^2 = 0.0070			

	Marginal Probability	Coefficient	Std. Error†	z	P > |z|
Fear model 6					
Gender (male = 1)	0.0130	0.0695	0.0960	0.72	0.469
Age	-0.0016	-0.0085	0.0042	-2.01	0.045
Education	-0.0072	-0.0387	0.0178	-2.17	0.030
Log of total assets per capita	0.0337	0.1811	0.0615	2.94	0.003
Constant	–	-2.8196	0.7141	-3.95	< 0.001
		Pseudo R^2 = 0.0145			
Fear model 7					
Gender (male = 1)	0.0132	0.0707	0.0960	0.74	0.462
Age	-0.0016	-0.0085	0.0042	-2.00	0.046
Education	-0.0072	-0.0386	0.0178	-2.17	0.030
Log of total assets per adult equivalent	0.0351	0.1890	0.0630	3.00	0.003
Constant	–	-2.9293	0.7371	-3.97	< 0.001
		Pseudo R^2 = 0.0148			
Direct stigma model 1					
Gender (male = 1)	< 0.0001	0.0002	0.0879	< 0.01	0.999
Age	0.0007	0.0030	0.0036	0.82	0.410
Education	-0.0005	-0.0019	0.0157	-0.12	0.903
Wealth index	-0.0010	-0.0042	0.0216	-0.19	0.847
Constant	–	-1.1376	0.2199	-5.17	< 0.001
		Pseudo R^2 = 0.0011			
Direct stigma model 2					
Gender (male = 1)	0.0001	0.0005	0.0879	0.01	0.996
Age	0.0007	0.0029	0.0037	0.80	0.425
Education	-0.0004	-0.0018	0.0154	-0.12	0.906
Log of total household assets	-0.0030	-0.0126	0.0339	-0.37	0.710
Constant	–	-0.9939	0.4317	-2.30	0.021
		Pseudo R^2 = 0.0012			
Direct stigma model 3					
Gender (male = 1)	0.0001	0.0028	0.0881	0.03	0.975
Age	0.0007	0.0030	0.0037	0.83	0.409
Education	-0.0019	-0.0082	0.0155	-0.53	0.597
Log of total assets	0.0253	0.1080	0.0566	1.91	0.056
Constant	–	-2.5315	0.7665	-3.30	0.001
		Pseudo R^2 = 0.0046			
Direct stigma model 4					
Gender (male = 1)	-0.0001	-0.0003	0.0879	< 0.01	0.997
Age	0.0007	0.0031	0.0036	0.85	0.395
Education	-0.0004	-0.0018	0.0155	-0.11	0.909
Log of total household assets per capita	-0.0026	-0.0113	0.0339	-0.33	0.738
Constant	–	-1.0317	0.3726	-2.77	0.006
		Pseudo R^2 = 0.0012			

	Marginal Probability	Coefficient	Std. Error[†]	z	P > |z|
Direct stigma model 5					
Gender (male = 1)	-0.0001	-0.0003	0.0879	< 0.01	0.997
Age	0.0007	0.0031	0.0036	0.85	0.398
Education	-0.0004	-0.0019	0.0155	-0.12	0.903
Log of total household assets per adult equivalent	-0.0024	-0.0103	0.0342	-0.30	0.763
Constant	–	-1.0394	0.3783	-2.75	0.006
		Pseudo R^2 = 0.0012			
Direct stigma model 6					
Gender (male = 1)	0.0021	0.0089	0.0882	0.10	0.920
Age	0.0003	0.0015	0.0038	0.39	0.697
Education	-0.0021	-0.0089	0.0156	-0.57	0.569
Log of total assets per capita	0.0232	0.0990	0.0532	1.86	0.063
Constant	–	-2.2093	0.6198	-3.56	< 0.001
		Pseudo R^2 = 0.0044			
Direct stigma model 7					
Gender (male = 1)	0.0023	0.0097	0.0882	0.11	0.912
Age	0.0003	0.0015	0.0037	0.39	0.698
Education	-0.0021	-0.0091	0.0156	-0.58	0.562
Log of total assets per adult equivalent	0.0248	0.1057	0.0543	1.95	0.052
Constant	–	-2.2945	0.6373	-3.60	< 0.001
		Pseudo R^2 = 0.0048			
Poverty model 1					
Gender (male = 1)	0.0295	0.3276	0.1304	2.51	0.012
Age	0.0004	0.0045	0.0052	0.87	0.385
Education	0.0018	0.0201	0.0227	0.88	0.376
Wealth index	-0.0045	-0.0508	0.0333	-1.52	0.128
Constant	–	-2.1997	0.3244	-6.78	< 0.001
		Pseudo R^2 = 0.0225			
Poverty model 2					
Gender (male = 1)	0.0307	0.3398	0.1308	2.60	0.009
Age	0.0003	0.0034	0.0052	0.66	0.509
Education	0.0015	0.0170	0.0221	0.88	0.376
Log of total household assets	-0.0068	-0.0508	0.0333	-1.62	0.105
Constant	–	-1.2771	0.6094	-2.10	0.036
		Pseudo R^2 = 0.0228			
Poverty model 3					
Gender (male = 1)	0.0301	0.3293	0.1300	2.53	0.011
Age	0.0004	0.0041	0.0052	0.80	0.426
Education	0.0011	0.0118	0.0220	0.54	0.592
Log of total assets	-0.0004	-0.0047	0.0769	-0.06	0.952
Constant	–	-2.0656	1.0477	-1.97	0.049
		Pseudo R^2 = 0.0171			

	Marginal Probability	Coefficient	Std. Error†	z	P > |z|
Poverty model 4					
Gender (male = 1)	0.0303	0.3335	0.1304	2.56	0.011
Age	0.0004	0.0045	0.0052	0.86	0.387
Education	0.0014	0.0158	0.0221	0.72	0.474
Log of total household assets per capita	-0.0048	-0.0540	0.0492	-1.10	0.272
Constant	–	-1.6449	0.5389	-3.05	0.002
		Pseudo R^2 = 0.0197			
Poverty model 5					
Gender (male = 1)	0.0303	0.3336	0.1305	2.56	0.011
Age	0.0004	0.0044	0.0051	0.86	0.391
Education	0.0014	0.0159	0.0221	0.72	0.473
Log of total household assets per adult equivalent	-0.0049	-0.0559	0.0496	-1.13	0.260
Constant	–	-1.6257	0.5468	-2.97	0.003
		Pseudo R^2 = 0.0199			
Poverty model 6					
Gender (male = 1)	0.0302	0.3303	0.1300	2.54	0.011
Age	0.0003	0.0034	0.0053	0.65	0.517
Education	0.0007	0.0084	0.0222	0.38	0.705
Log of total assets per capita	0.0049	0.0549	0.0765	0.72	0.473
Constant	–	-2.7281	0.9003	-3.03	0.002
		Pseudo R^2 = 0.0183			
Poverty model 7					
Gender (male = 1)	0.0302	0.3305	0.1300	2.54	0.011
Age	0.0003	0.0035	0.0053	0.66	0.510
Education	0.0008	0.0086	0.0222	0.39	0.700
Log of total assets per adult equivalent	0.0049	0.0548	0.0778	0.70	0.482
Constant	–	-2.7335	0.9227	-2.96	0.003
		Pseudo R^2 = 0.0182			
Stigma of association model 1					
Gender (male = 1)	0.0011	0.1133	0.3044	0.37	0.710
Age	-0.0002	-0.0241	0.0157	-1.54	0.124
Education	-0.0008	-0.0890	0.0766	-1.16	0.245
Wealth index	0.0006	0.0674	0.0674	1.00	0.317
Constant	–	-1.2489	0.8954	-1.39	0.163
		Pseudo R^2 = 0.0525			
Stigma of association model 2					
Gender (male = 1)	0.0009	0.0903	0.3020	0.30	0.765
Age	-0.0002	-0.0218	0.0148	-1.47	0.142
Education	-0.0007	-0.0661	0.0753	-0.88	0.380
Log of total household assets	-0.0009	-0.0951	0.1073	-0.89	0.375
Constant	–	-0.3977	1.3687	-0.29	0.771
		Pseudo R^2 = 0.0490			

	Marginal Probability	Coefficient	Std. Error†	z	P > |z|
Stigma of association model 3					
Gender (male = 1)	0.0008	0.0787	0.3002	0.26	0.793
Age	-0.0002	-0.0222	0.0151	-1.47	0.141
Education	-0.0008	-0.0734	0.0761	-0.96	0.335
Log of total assets	-0.0006	-0.0566	0.1799	-0.31	0.753
Constant	–	-0.6291	2.4158	-0.26	0.795
		Pseudo R^2 = 0.0403			
Stigma of association model 4					
Gender (male = 1)	0.0009	0.0848	0.3005	0.28	0.778
Age	-0.0002	-0.0211	0.0151	-1.39	0.163
Education	-0.0007	-0.0696	0.0763	-0.91	0.362
Log of total household assets per capita	-0.0006	-0.0617	0.1136	-0.54	0.587
Constant	–	-0.8512	1.2484	-0.68	0.495
		Pseudo R^2 = 0.0429			
Stigma of association model 5					
Gender (male = 1)	0.0009	0.0846	0.3004	0.28	0.778
Age	-0.0002	-0.0211	0.0151	-1.40	0.162
Education	-0.0007	-0.0699	0.0762	-0.92	0.360
Log of total household assets per adult equivalent	-0.0006	-0.0609	0.1148	-0.53	0.596
Constant	–	-0.8511	1.2640	-0.67	0.501
		Pseudo R^2 = 0.0427			
Stigma of association model 6					
Gender (male = 1)	0.0009	0.0861	0.3000	0.29	0.774
Age	-0.0002	-0.0231	0.0156	-1.48	0.139
Education	-0.0008	-0.0809	0.0778	-1.04	0.298
Log of total assets per capita	0.0004	0.0358	0.1834	0.20	0.845
Constant	–	-1.7215	2.1495	-0.80	0.423
		Pseudo R^2 = 0.0395			
Stigma of association model 7					
Gender (male = 1)	0.0009	0.0870	0.3001	0.29	0.772
Age	-0.0002	-0.0232	0.0156	-1.49	0.137
Education	-0.0008	-0.0814	0.0779	-1.05	0.296
Log of total assets per adult equivalent	0.0004	0.0428	0.1884	0.23	0.820
Constant	–	-1.8009	2.2194	-0.81	0.417
		Pseudo R^2 = 0.0397			
Sexual behavioural change model 1					
Gender (male = 1)	0.1001	0.2665	0.0743	3.59	< 0.001
Age	-0.0060	-0.0159	0.0032	-4.99	< 0.001
Education	-0.0087	-0.0232	0.0131	-1.77	0.076
Wealth index	0.0129	0.0344	0.0181	1.90	0.058
Constant	–	0.3213	0.1874	1.71	0.086
		Pseudo R^2 = 0.0256			

	Marginal Probability	Coefficient	Std. Error†	z	P > |z|
Sexual behavioural change model 2					
Gender (male = 1)	0.0987	0.2626	0.0743	3.54	< 0.001
Age	-0.0058	-0.0155	0.0032	-4.87	< 0.001
Education	-0.0062	-0.0166	0.0129	-1.28	0.199
Log of total household assets	-0.0026	-0.0070	0.0294	-0.24	0.813
Constant	–	0.3452	0.3709	0.93	0.352
		Pseudo R^2 = 0.0232			
Sexual behavioural change model 3					
Gender (male = 1)	0.0987	0.2626	0.0743	3.54	< 0.001
Age	-0.0058	-0.0155	0.0032	-4.88	< 0.001
Education	-0.0063	-0.0167	0.0129	-1.29	0.196
Log of total assets	-0.0021	-0.0056	0.0458	-0.12	0.902
Constant	–	0.3423	0.6174	0.55	0.579
		Pseudo R^2 = 0.0234			
Sexual behavioural change model 4					
Gender (male = 1)	0.0986	0.2623	0.0743	3.53	< 0.001
Age	-0.0058	-0.0153	0.0032	-4.81	< 0.001
Education	-0.0060	-0.0159	0.0130	-1.23	0.219
Log of total household assets per capita	-0.0049	-0.0131	0.0295	-0.45	0.656
Constant	–	0.3847	0.3193	1.20	0.228
		Pseudo R^2 = 0.0233			
Sexual behavioural change model 5					
Gender (male = 1)	0.0986	0.2623	0.0743	3.53	< 0.001
Age	-0.0058	-0.0153	0.0032	-4.82	< 0.001
Education	-0.0060	-0.0160	0.0129	-1.24	0.217
Log of total household assets per adult equivalent	-0.0048	-0.0127	0.0298	-0.43	0.669
Constant	–	0.3829	0.3242	1.18	0.238
		Pseudo R^2 = 0.0233			
Sexual behavioural change model 6					
Gender (male = 1)	0.0982	0.2613	0.0743	3.52	< 0.001
Age	-0.0057	-0.0152	0.0033	-4.67	< 0.001
Education	-0.0059	-0.0158	0.0130	-1.21	0.225
Log of total assets per capita	-0.0070	-0.0185	0.0435	-0.43	0.670
Constant	–	0.4693	0.5039	0.93	0.352
		Pseudo R^2 = 0.0235			
Sexual behavioural change model 7					
Gender (male = 1)	0.0982	0.2613	0.0743	3.52	< 0.001
Age	-0.0057	-0.0152	0.0032	-4.69	< 0.001
Education	-0.0060	-0.0159	0.0130	-1.22	0.222
Log of total assets per adult equivalent	-0.0067	-0.0178	0.0442	-0.40	0.687
Constant	–	0.4637	0.5158	0.90	0.369
		Pseudo R^2 = 0.0235			

	Marginal Probability	Coefficient	Std. Error†	z	P > |z|
Drug use change model 1					
Gender (male = 1)	-0.0034	-0.0356	0.1241	-0.29	0.774
Age	-0.0002	-0.0022	0.0053	-0.42	0.678
Education	0.0046	0.0477	0.0200	2.38	0.017
Wealth index	-0.0033	-0.0344	0.0318	-1.08	0.280
Constant	–	-1.8736	0.3111	-6.02	< 0.001
		Pseudo R^2 = 0.0191			
Drug use change model 2					
Gender (male = 1)	-0.0034	-0.0352	0.1245	-0.28	0.777
Age	-0.0003	-0.0031	0.0053	-0.58	0.559
Education	0.0045	0.0475	0.0192	2.47	0.013
Log of total household assets	-0.0078	-0.0819	0.0462	-1.77	0.077
Constant	–	-0.9311	0.5744	-1.62	0.105
		Pseudo R^2 = 0.0229			
Drug use change model 3					
Gender (male = 1)	-0.0050	-0.0536	0.1257	-0.43	0.670
Age	-0.0003	-0.0031	0.0053	-0.59	0.555
Education	0.0049	0.0530	0.0193	2.75	0.006
Log of total assets	-0.0201	-0.2167	0.0700	-3.10	0.002
Constant	–	0.9765	0.9406	1.04	0.299
		Pseudo R^2 = 0.0361			
Drug use change model 4					
Gender (male = 1)	-0.0039	-0.0414	0.1250	-0.33	0.740
Age	-0.0001	-0.0014	0.0053	-0.26	0.796
Education	0.0050	0.0526	0.0195	2.71	0.007
Log of total household assets per capita	-0.0107	-0.1135	0.0462	-2.46	0.014
Constant	–	-0.8448	0.4893	-1.73	0.084
		Pseudo R^2 = 0.0288			
Drug use change model 5					
Gender (male = 1)	-0.0040	-0.0421	0.1251	-0.34	0.736
Age	-0.0001	-0.0014	0.0053	-0.27	0.788
Education	0.0050	0.0528	0.0195	2.71	0.007
Log of total household assets per adult equivalent	-0.0111	-0.1177	0.0465	-2.53	0.011
Constant	–	-0.7955	0.4955	-1.61	0.108
		Pseudo R^2 = 0.0296			
Drug use change model 6					
Gender (male = 1)	-0.0063	-0.0708	0.1270	-0.56	0.577
Age	0.0001	-0.0011	0.0054	0.20	0.840
Education	0.0055	0.0617	0.0197	3.13	0.002
Log of total assets per capita	-0.0239	-0.2664	0.0676	-3.94	< 0.001
Constant	–	1.0244	0.7704	1.33	0.184
		Pseudo R^2 = 0.0486			

	Marginal Probability	Coefficient	Std. Error†	z	P > |z|
Drug use change model 7					
Gender (male = 1)	-0.0065	-0.0733	0.1271	-0.58	0.564
Age	0.0001	-0.0010	0.0054	0.19	0.851
Education	0.0055	0.0617	0.0197	3.14	0.002
Log of total assets per adult equivalent	-0.0247	-0.2765	0.0682	-4.06	< 0.001
Constant	–	1.1642	0.7827	1.49	0.137
		Pseudo R^2 = 0.0505			
Social capital impacts model 1					
Gender (male = 1)	0.0948	0.3741	0.0861	4.34	< 0.001
Age	-0.0026	-0.0103	0.0037	-2.78	0.005
Education	-0.0011	-0.0042	0.0148	-0.29	0.776
Wealth index	0.0088	0.0355	0.0209	1.70	0.089
Constant	–	-0.6939	0.2140	-3.24	0.001
		Pseudo R^2 = 0.0281			
Social capital impacts model 2					
Gender (male = 1)	0.0939	0.3696	0.0860	4.30	< 0.001
Age	-0.0024	-0.0097	0.0037	-2.64	0.008
Education	0.0005	0.0022	0.0145	0.15	0.882
Log of total household assets	0.0004	0.0016	0.0348	0.05	0.963
Constant	–	-0.7685	0.4295	-1.79	0.074
		Pseudo R^2 = 0.0254			
Social capital impacts model 3					
Gender (male = 1)	0.0945	0.3729	0.0861	4.33	< 0.001
Age	-0.0025	-0.0099	0.0037	-2.69	0.007
Education	-0.0006	-0.0022	0.0146	-0.15	0.877
Log of total assets	0.0215	0.0859	0.0557	1.54	0.123
Constant	–	-1.8543	0.7461	-2.49	0.013
		Pseudo R^2 = 0.0277			
Social capital impacts model 4					
Gender (male = 1)	0.0940	0.3697	0.0860	4.30	< 0.001
Age	-0.0024	-0.0097	0.0037	-2.63	0.009
Education	0.0006	0.0023	0.0146	0.15	0.877
Log of total household assets per capita	0.0001	0.0004	0.0347	0.01	0.992
Constant	–	-0.7543	0.3675	-2.05	0.040
		Pseudo R^2 = 0.0254			
Social capital impacts model 5					
Gender (male = 1)	0.0940	0.3697	0.0860	4.30	< 0.001
Age	-0.0024	-0.0097	0.0037	-2.63	0.008
Education	0.0006	0.0022	0.0146	0.15	0.878
Log of total household assets per adult equivalent	0.0001	0.0005	0.0350	0.01	0.988
Constant	–	-0.7558	0.3732	-2.03	0.043
		Pseudo R^2 = 0.0254			

	Marginal Probability	Coefficient	Std. Error†	z	P > |z|
Social capital impacts model 6					
Gender (male = 1)	0.0953	0.3759	0.0862	4.36	< 0.001
Age	-0.0028	-0.0110	0.0038	-2.90	0.004
Education	-0.0006	-0.0025	0.0146	-0.17	0.865
Log of total assets per capita	0.0184	0.0736	0.0523	1.41	0.159
Constant	–	-1.5428	0.6016	-2.56	0.010
		Pseudo R^2 = 0.0273			
Social capital impacts model 7					
Gender (male = 1)	0.0955	0.3765	0.0862	4.37	< 0.001
Age	-0.0028	-0.0110	0.0038	-2.90	0.004
Education	-0.0006	-0.0024	0.0146	-0.17	0.868
Log of total assets per adult equivalent	0.0191	0.0763	0.0532	1.44	0.151
Constant	–	-1.5817	0.6168	-2.56	0.010
		Pseudo R^2 = 0.0274			
Health checks model 1					
Gender (male = 1)	0.0215	0.2231	0.1248	1.79	0.074
Age	0.0007	0.0084	0.0050	1.67	0.094
Education	0.0008	0.0084	0.0230	0.36	0.716
Wealth index	-0.0061	-0.0646	0.0332	-1.95	0.052
Constant	–	-2.1902	0.3192	-6.86	< 0.001
		Pseudo R^2 = 0.0229			
Health checks model 2					
Gender (male = 1)	0.0222	0.2247	0.1242	1.81	0.071
Age	0.0008	0.0079	0.0051	1.57	0.116
Education	-0.0004	-0.0040	0.0221	-0.18	0.857
Log of total household assets	0.0007	0.0075	0.0494	0.15	0.880
Constant	–	-2.1670	0.6355	-3.41	0.001
		Pseudo R^2 = 0.0146			
Health checks model 3					
Gender (male = 1)	0.0223	0.2252	0.1242	1.81	0.070
Age	0.0008	0.0078	0.0050	1.56	0.119
Education	-0.0003	-0.0027	0.0222	-0.12	0.901
Log of total assets	-0.0016	-0.0165	0.0755	-0.22	0.827
Constant	–	-1.8693	1.0249	-1.82	0.068
		Pseudo R^2 = 0.0146			
Health checks model 4					
Gender (male = 1)	0.0222	0.2250	0.1242	1.81	0.070
Age	0.0008	0.0078	0.0050	1.54	0.123
Education	-0.0005	-0.0049	0.0221	-0.22	0.826
Log of total household assets per capita	0.0021	0.0218	0.0498	0.44	0.662
Constant	–	-2.2852	0.5576	-4.10	< 0.001
		Pseudo R^2 = 0.0150			

	Marginal Probability	Coefficient	Std. Error†	z	P > |z|
Health checks model 5					
Gender (male = 1)	0.0222	0.2249	0.1242	1.81	0.070
Age	0.0008	0.0078	0.0050	1.54	0.124
Education	-0.0005	-0.0051	0.0221	-0.23	0.817
Log of total household assets per adult equivalent	0.0026	0.0272	0.0505	0.54	0.590
Constant	–	-2.3383	0.5679	-4.12	< 0.001
		Pseudo R^2 = 0.0152			
Health checks model 6					
Gender (male = 1)	0.0225	0.2277	0.1244	1.83	0.067
Age	0.0007	0.0076	0.0051	1.48	0.138
Education	-0.0004	-0.0042	0.0222	-0.19	0.848
Log of total assets per capita	0.0014	0.0153	0.0725	0.21	0.832
Constant	–	-2.2522	0.8575	-2.63	0.009
		Pseudo R^2 = 0.0146			
Health checks model 7					
Gender (male = 1)	0.0226	0.2290	0.1244	1.84	0.066
Age	0.0007	0.0075	0.0051	1.46	0.144
Education	-0.0005	-0.0048	0.0222	-0.21	0.830
Log of total assets per adult equivalent	0.0026	0.0265	0.0741	0.36	0.720
Constant	–	-2.3787	0.8830	-2.69	0.007
		Pseudo R^2 = 0.0148			
More careful model 1					
Gender (male = 1)	-0.0066	-0.1904	0.1507	-0.73	0.468
Age	-0.0001	-0.0012	0.0064	-0.18	0.857
Education	0.0005	0.0084	0.0276	0.30	0.761
Wealth index	-0.0045	-0.0744	0.0412	-1.80	0.072
Constant	–	-1.8906	0.3908	-4.84	< 0.001
		Pseudo R^2 = 0.0132			
More careful model 2					
Gender (male = 1)	-0.0063	-0.0997	0.1498	-0.67	0.506
Age	-0.0001	-0.0022	0.0064	-0.34	0.732
Education	-0.0002	-0.0039	0.0265	-0.15	0.883
Log of total household assets	-0.0017	-0.0264	0.0574	-0.46	0.645
Constant	–	-1.4653	0.7326	-2.00	0.045
		Pseudo R^2 = 0.0026			
More careful model 3					
Gender (male = 1)	-0.0063	-0.1000	0.1497	-0.67	0.504
Age	-0.0001	-0.0020	0.0064	-0.31	0.756
Education	-0.0004	-0.0063	0.0265	-0.24	0.813
Log of total assets	0.0004	0.0067	0.0939	0.07	0.943
Constant	–	-1.8408	1.2731	-1.45	0.148
		Pseudo R^2 = 0.0019			

	Marginal Probability	Coefficient	Std. Error[†]	z	P > |z|
More careful model 4					
Gender (male = 1)	-0.0063	-0.1009	0.1497	-0.67	0.501
Age	-0.0001	-0.0018	0.0064	-0.28	0.779
Education	-0.0003	-0.0041	0.0267	-0.15	0.878
Log of total household assets per capita	-0.0013	-0.0210	0.0578	-0.36	0.716
Constant	–	-1.5684	0.6351	-2.47	0.014
		Pseudo R^2 = 0.0023			
More careful model 5					
Gender (male = 1)	-0.0063	-0.1009	0.1497	-0.67	0.501
Age	-0.0001	-0.0018	0.0064	-0.28	0.776
Education	-0.0003	-0.0042	0.0266	-0.16	0.875
Log of total household assets per adult equivalent	-0.0013	-0.0204	0.0584	-0.35	0.726
Constant	–	-1.5713	0.6452	-2.44	0.015
		Pseudo R^2 = 0.0023			
More careful model 6					
Gender (male = 1)	-0.0062	-0.0990	0.1497	-0.66	0.508
Age	-0.0001	-0.0023	0.0066	-0.35	0.726
Education	-0.0004	-0.0071	0.0267	-0.27	0.791
Log of total assets per capita	0.0012	0.0190	0.0899	0.21	0.833
Constant	–	-1.9589	1.0452	-1.87	0.061
		Pseudo R^2 = 0.0021			
More careful model 7					
Gender (male = 1)	-0.0062	-0.0989	0.1497	-0.66	0.509
Age	-0.0001	-0.0023	0.0066	-0.36	0.722
Education	-0.0005	-0.0072	0.0266	-0.27	0.787
Log of total assets per adult equivalent	0.0014	0.0222	0.0917	0.24	0.809
Constant	–	-1.9966	1.0746	-1.86	0.063
		Pseudo R^2 = 0.0021			
Migration to escape model 1					
Gender (male = 1)	0.0058	0.2393	0.2180	1.10	0.272
Age	-0.0003	-0.0133	0.0103	-1.30	0.195
Education	< 0.0001	0.0014	0.0345	0.04	0.967
Wealth index	0.0015	0.0643	0.0484	1.33	0.184
Constant	–	-1.9592	0.5438	-3.60	< 0.001
		Pseudo R^2 = 0.0416			
Migration to escape model 2					
Gender (male = 1)	0.0058	0.2293	0.2159	1.06	0.288
Age	-0.0003	-0.0116	0.0099	-1.17	0.242
Education	0.0004	0.0157	0.0337	0.47	0.641
Log of total household assets	0.0001	0.0029	0.0882	0.03	0.974
Constant	–	-2.1197	1.0669	-1.99	0.047
		Pseudo R^2 = 0.0297			

	Marginal Probability	Coefficient	Std. Error†	z	P > |z|
Migration to escape model 3					
Gender (male = 1)	0.0056	0.2208	0.2166	1.02	0.308
Age	-0.0003	-0.0113	0.0099	-1.15	0.250
Education	0.0005	0.0208	0.0335	0.62	0.533
Log of total assets	-0.0021	-0.0845	0.1259	-0.67	0.502
Constant	–	-1.0160	1.6789	-0.61	0.545
			Pseudo R^2 = 0.0328		
Migration to escape model 4					
Gender (male = 1)	0.0058	0.2294	0.2160	1.06	0.288
Age	-0.0003	-0.0122	0.0101	-1.20	0.229
Education	0.0003	0.0124	0.0341	0.36	0.717
Log of total household assets per capita	0.0009	0.0352	0.0925	0.38	0.703
Constant	–	-2.3903	0.9546	-2.50	0.012
			Pseudo R^2 = 0.0307		
Migration to escape model 5					
Gender (male = 1)	0.0058	0.2296	0.2160	1.06	0.288
Age	-0.0003	-0.0121	0.0101	-1.20	0.231
Education	0.0003	0.0127	0.0341	0.37	0.710
Log of total household assets per adult equivalent	0.0008	0.0331	0.0930	0.36	0.722
Constant	–	-2.3756	0.9657	-2.46	0.014
			Pseudo R^2 = 0.0306		
Migration to escape model 6					
Gender (male = 1)	0.0058	0.2274	0.2163	1.05	0.293
Age	-0.0003	-0.0113	0.0101	-1.11	0.265
Education	0.0004	0.0173	0.0338	0.51	0.608
Log of total assets per capita	-0.0005	-0.0201	0.1302	-0.15	0.877
Constant	–	-1.8733	1.4964	-1.25	0.211
			Pseudo R^2 = 0.0300		
Migration to escape model 7					
Gender (male = 1)	0.0058	0.2267	0.2164	1.05	0.295
Age	-0.0003	-0.0112	0.0101	-1.11	0.268
Education	0.0004	0.0176	0.0338	0.52	0.601
Log of total assets per adult equivalent	-0.0006	-0.0260	0.1316	-0.20	0.844
Constant	–	-1.8077	1.5219	-1.19	0.235
			Pseudo R^2 = 0.0301		

† reported standard errors are for the coefficient, not the marginal probability

Complete Tables of Results for Section 6.2.3

Table XIII.6.1: Table 6.5 Complete: Tobit models of HIV/AIDS knowledge score

	Coefficient	Std. Error	z	P > |z|
Model 1				
Gender (male = 1)	0.1668	0.0389	4.29	< 0.001
Age	-0.0081	0.0016	-5.02	< 0.001
Education	0.0225	0.0069	3.27	0.001
Wealth index	-0.0111	0.0096	-1.16	0.245
Constant	2.2242	0.0975	22.82	< 0.001
		Pseudo R^2 = 0.0326		
Model 2				
Gender (male = 1)	0.1654	0.0388	4.26	< 0.001
Age	-0.0080	0.0016	-4.93	< 0.001
Education	0.0174	0.0067	2.59	0.010
Log of total household assets	0.0406	0.0153	2.65	0.008
Constant	1.7962	0.1933	9.29	< 0.001
		Pseudo R^2 = 0.0347		
Model 3				
Gender (male = 1)	0.1690	0.0389	4.35	< 0.001
Age	-0.0085	0.0016	-5.23	< 0.001
Education	0.0183	0.0068	2.69	0.007
Log of total assets	0.0397	0.0238	1.67	0.095
Constant	1.7291	0.3213	5.38	< 0.001
		Pseudo R^2 = 0.0331		
Model 4				
Gender (male = 1)	0.1678	0.0389	4.32	< 0.001
Age	-0.0085	0.0016	-5.23	< 0.001
Education	0.0182	0.0068	2.69	0.007
Log of total household assets per capita	0.0260	0.0154	1.69	0.091
Constant	2.0096	0.1673	12.01	< 0.001
		Pseudo R^2 = 0.0332		
Model 5				
Gender (male = 1)	0.1679	0.0389	4.32	< 0.001
Age	-0.0085	0.0016	-5.23	< 0.001
Education	0.0181	0.0068	2.68	0.007
Log of total household assets per adult equivalent	0.0280	0.0155	1.80	0.072
Constant	1.9887	0.1698	11.71	< 0.001
		Pseudo R^2 = 0.0333		
Model 6				
Gender (male = 1)	0.1681	0.0389	4.32	< 0.001
Age	-0.0084	0.0017	-5.02	< 0.001
Education	0.0202	0.0068	2.97	0.003
Log of total assets per capita	0.0037	0.0226	0.17	0.869
Constant	2.2001	0.2632	8.36	< 0.001
		Pseudo R^2 = 0.0321		

	Coefficient	Std. Error	z	P > |z|
Model 7				
Gender (male = 1)	0.1684	0.0389	4.32	< 0.001
Age	-0.0084	0.0017	-5.06	< 0.001
Education	0.0200	0.0068	2.94	0.003
Log of total assets per adult equivalent	0.0072	0.0230	0.31	0.756
Constant	2.1617	0.2695	8.02	< 0.001
		Pseudo R^2 = 0.0321		

Table XIII.6.2: Table 6.7 Complete: Probit models of "I don't know" answers to HIV transmission modes question

	Coefficient	Std. Error	z	P > |z|
Model 1				
Gender (male = 1)	-0.7475	0.2907	-2.57	0.010
Age	0.0261	0.0083	3.13	0.002
Education	-0.0227	0.0482	-0.47	0.637
Wealth index	-0.0069	0.0535	-0.13	0.897
Constant	-3.1203	0.5593	-5.58	< 0.001
		Pseudo R^2 = 0.1502		
Model 2				
Gender (male = 1)	-0.7033	0.3005	-2.34	0.019
Age	0.0202	0.0084	2.41	0.016
Education	-0.0029	0.0483	-0.06	0.952
Log of total household assets	-0.2319	0.0640	-3.62	< 0.001
Constant	0.5110	0.8821	-0.58	0.562
		Pseudo R^2 = 0.2287		
Model 3				
Gender (male = 1)	-0.7592	0.3006	-2.53	0.012
Age	0.0247	0.0083	2.97	0.003
Education	0.0073	0.0467	0.16	0.877
Log of total assets	-0.3372	0.1017	-3.32	0.001
Constant	1.1362	1.3609	0.83	0.404
		Pseudo R^2 = 0.2132		
Model 4				
Gender (male = 1)	-0.7282	0.2997	-2.43	0.015
Age	0.0236	0.0082	2.87	0.004
Education	-0.0050	0.0494	-0.10	0.920
Log of total household assets per capita	-0.2331	0.0689	-3.38	0.001
Constant	-0.9341	0.8214	-1.14	0.255
		Pseudo R^2 = 0.2189		
Model 5				
Gender (male = 1)	-0.7281	0.3001	-2.43	0.015
Age	0.0233	0.0082	2.84	0.005
Education	-0.0047	0.0493	-0.09	0.925
Log of total household assets per adult equivalent	-0.2361	0.0689	-3.43	0.001
Constant	-0.8823	0.8266	-1.07	0.286
		Pseudo R^2 = 0.2207		

	Coefficient	Std. Error	z	P > |z|
Model 6				
Gender (male = 1)	-0.7792	0.2982	-2.61	0.009
Age	0.0288	0.0084	3.44	0.001
Education	-0.0018	0.0481	-0.04	0.971
Log of total assets per capita	-0.2697	0.1043	-2.59	0.010
Constant	-0.2067	1.2206	-0.17	0.866
		Pseudo R^2 = 0.1886		
Model 7				
Gender (male = 1)	-0.7813	0.2988	-2.62	0.009
Age	0.0287	0.0084	3.43	0.001
Education	-0.0008	0.0480	-0.02	0.987
Log of total assets per capita	-0.2796	0.1046	-2.67	0.008
Constant	-0.0745	1.2311	-0.06	0.952
		Pseudo R^2 = 0.1911		

Table XIII.6.3: Table 6.8 Complete: Probit models of misconceptions about HIV transmission modes

	Coefficient	Std. Error	z	P > |z|
Model 1				
Gender (male = 1)	0.0329	0.2215	0.15	0.882
Age	-0.0086	0.0100	-0.86	0.389
Education	0.0043	0.0337	0.13	0.898
Wealth index	0.1188	0.0483	2.46	0.014
Constant	-2.1234	0.5487	-3.87	< 0.001
		Pseudo R^2 = 0.0646		
Model 2				
Gender (male = 1)	0.0256	0.2161	0.12	0.906
Age	-0.0080	0.0098	-0.81	0.416
Education	0.0189	0.0335	0.57	0.572
Log of total household assets	0.0863	0.0929	0.93	0.353
Constant	-3.1355	1.1748	-2.67	0.008
		Pseudo R^2 = 0.0280		
Model 3				
Gender (male = 1)	0.0313	0.2153	0.15	0.885
Age	-0.0087	0.0097	-0.90	0.367
Education	0.0234	0.0331	0.71	0.479
Log of total assets	0.0483	0.1465	0.33	0.741
Constant	-2.8037	1.9829	-1.41	0.157
		Pseudo R^2 = 0.0223		
Model 4				
Gender (male = 1)	0.0290	0.2155	0.13	0.893
Age	-0.0090	0.0097	-0.93	0.355
Education	0.2085	0.0336	0.62	0.535
Log of total household assets per capita	0.0508	0.0896	0.57	0.571
Constant	-2.6330	0.9752	-2.70	0.007
		Pseudo R^2 = 0.0238		

	Coefficient	Std. Error	z	P > |z|
Model 5				
Gender (male = 1)	0.0291	0.2156	0.13	0.893
Age	-0.0091	0.0098	-0.93	0.354
Education	0.0201	0.0336	0.60	0.550
Log of total household assets per adult equivalent	0.0616	0.0913	0.67	0.500
Constant	-2.7378	0.9990	-2.74	0.006
		Pseudo R^2 = 0.0248		
Model 6				
Gender (male = 1)	0.0294	0.2153	0.14	0.892
Age	-0.0083	0.0098	-0.85	0.394
Education	0.0275	0.0335	0.82	0.411
Log of total assets per capita	-0.0319	0.1303	-0.24	0.807
Constant	-1.8280	1.5127	-1.21	0.227
		Pseudo R^2 = 0.0220		
Model 7				
Gender (male = 1)	0.0301	0.2153	0.14	0.889
Age	-0.0086	0.0098	-0.88	0.380
Education	0.0263	0.0334	0.79	0.432
Log of total assets per capita	-0.0123	0.1343	-0.09	0.927
Constant	-2.0400	1.5704	-1.30	0.194
		Pseudo R^2 = 0.0216		

Complete Tables of Results for Section 6.3.4

Table XIII.6.4: Table 6.11 Complete: Probit models of HIV infection

	Marginal Probability	Coefficient	Std. Error†	z	P > |z|
Model 1					
Gender (1 = male)	-0.0203	-0.2324	0.0960	-2.42	0.015
Age	-0.0054	-0.0603	0.0053	-11.35	< 0.001
Education	-0.0069	-0.0778	0.0178	-4.37	< 0.001
Migrant household	0.0839	0.7950	0.0956	8.31	< 0.001
Wealth index	0.0026	0.0294	0.0215	1.37	0.171
Constant	–	1.1929	0.2629	4.54	< 0.001
		Pseudo R^2 = 0.2191			
Model 2					
Gender (1 = male)	-0.0194	-0.2703	0.1015	-2.66	0.008
Age	-0.0044	-0.0604	0.0054	-11.24	< 0.001
Education	-0.0038	-0.0522	0.0185	-2.82	0.005
Migrant household	0.0759	0.8448	0.0997	8.47	< 0.001
Log of total household assets	-0.0205	-0.2789	0.0317	-8.80	< 0.001
Constant	–	3.9471	0.4292	9.20	< 0.001
		Pseudo R^2 = 0.2819			
Model 3					
Gender (1 = male)	-0.0238	-0.3346	0.1023	-3.27	0.001
Age	-0.0041	-0.0565	0.0053	-10.76	< 0.001
Education	-0.0027	-0.0364	0.0185	-1.97	0.049
Migrant household	0.0756	0.8453	0.0997	8.48	< 0.001
Log of total assets	-0.0362	-0.4950	0.0554	-8.93	< 0.001
Constant	–	7.1588	0.7381	9.70	< 0.001
		Pseudo R^2 = 0.2845			
Model 4					
Gender (1 = male)	-0.0187	-0.2610	0.1014	-2.57	0.010
Age	-0.0041	-0.0565	0.0053	-10.65	< 0.001
Education	-0.0037	-0.0504	0.0186	-2.71	0.007
Migrant household	0.0800	0.8815	0.1005	8.77	< 0.001
Log of total household assets per capita	-0.0223	-0.3034	0.0341	-8.89	< 0.001
Constant	–	3.6294	0.3979	9.12	< 0.001
		Pseudo R^2 = 0.2852			
Model 5					
Gender (1 = male)	-0.0190	-0.2657	0.1016	-2.62	0.009
Age	-0.0041	-0.0566	0.0053	-10.68	< 0.001
Education	-0.0037	-0.0503	0.0186	-2.70	0.004
Migrant household	0.0799	0.8811	0.1006	8.76	< 0.001
Log of total household assets per adult equivalent	-0.0225	-0.3073	0.0341	-9.00	< 0.001
Constant	–	3.6926	0.4007	9.21	< 0.001
		Pseudo R^2 = 0.2866			

	Marginal Probability	Coefficient	Std. Error†	z	P > |z|
Model 6					
Gender (1 = male)	-0.0221	-0.3000	0.1008	-2.98	0.003
Age	-0.0038	-0.0509	0.0052	-9.71	< 0.001
Education	-0.0030	-0.0398	0.0186	-2.14	0.03
Migrant household	0.0836	0.8950	0.1003	8.93	< 0.001
Log of total assets per capita	-0.0363	-0.4810	0.0569	-8.45	< 0.001
Constant	–	6.1258	0.6585	9.30	< 0.001
		Pseudo R^2 = 0.2795			
Model 7					
Gender (1 = male)	-0.0228	-0.3104	0.1012	-3.07	0.002
Age	-0.0038	-0.0507	0.0052	-9.71	< 0.001
Education	-0.0029	-0.0388	0.0186	-2.09	0.037
Migrant household	0.0835	0.8959	0.1004	8.92	< 0.001
Log of total assets per adult equivalent	-0.0374	-0.4975	0.0574	-8.67	< 0.001
Constant	–	6.3435	0.668	9.50	< 0.001
		Pseudo R^2 = 0.2824			

† reported standard errors are for the coefficient, not the marginal probability

Table XIII.6.5: Table 6.13 Complete: Logit models of HIV infection

	Odds Ratio	Coefficient	Std. Error†	z	P > |z|
Model 1					
Gender (1 = male)	0.6736	-0.3952	0.1790	-2.21	0.027
Age	0.8897	-0.1168	0.0105	-11.10	< 0.001
Education	0.8347	-0.1807	0.0373	-4.84	< 0.001
Migrant household	4.4361	1.4898	0.1812	8.22	< 0.001
Wealth index	1.0683	0.0661	0.0399	1.66	0.098
Constant	–	2.6992	0.5264	5.13	< 0.001
		Pseudo R^2 = 0.2162			
Model 2					
Gender (1 = male)	0.6270	-0.4668	0.1885	-2.48	0.013
Age	0.8922	-0.1140	0.0104	-10.92	< 0.001
Education	0.8872	-0.1197	0.0370	-3.23	0.001
Migrant household	4.7006	1.5477	0.1874	8.26	< 0.001
Log of total household assets	0.6086	-0.4967	0.0570	-8.72	< 0.001
Constant	–	7.4201	0.7954	9.33	< 0.001
		Pseudo R^2 = 0.2757			
Model 3					
Gender (1 = male)	0.5649	-0.5711	0.1897	-3.01	0.003
Age	0.8978	-0.1078	0.0103	-10.48	< 0.001
Education	0.9071	-0.0975	0.0376	-2.59	0.010
Migrant household	4.9913	1.6077	0.1904	8.44	< 0.001
Log of total assets	0.4066	-0.9000	0.1011	-8.91	< 0.001
Constant	–	13.3868	1.3545	9.88	< 0.001
		Pseudo R^2 = 0.2811			

	Odds Ratio	Coefficient	Std. Error†	z	P > |z|
Model 4					
Gender (1 = male)	0.6308	-0.4607	0.1881	-2.45	0.014
Age	0.8991	-0.1064	0.0103	-10.35	< 0.001
Education	0.8957	-0.1102	0.0370	-2.97	0.003
Migrant household	5.0746	1.6242	0.1892	8.59	< 0.001
Log of total household assets per capita	0.5768	-0.5503	0.0627	-8.77	< 0.001
Constant	–	6.8751	0.7423	9.26	< 0.001
		Pseudo R^2 = 0.2791			
Model 5					
Gender (1 = male)	0.6248	-0.4704	0.1885	-2.50	0.013
Age	0.8989	-0.1066	0.0103	-10.38	< 0.001
Education	0.8953	-0.1106	0.0371	-2.99	0.003
Migrant household	5.0928	1.6278	0.1896	8.59	< 0.001
Log of total household assets per adult equivalent	0.5726	-0.5576	0.0627	-8.90	< 0.001
Constant	–	6.9954	0.7475	9.36	< 0.001
		Pseudo R^2 = 0.2808			
Model 6					
Gender (1 = male)	0.5882	-0.5307	0.1875	-2.83	0.005
Age	0.9075	-0.0970	0.0102	-9.49	< 0.001
Education	0.9063	-0.0984	0.0376	-2.61	0.009
Migrant household	5.5295	1.7101	0.1921	8.90	< 0.001
Log of total assets per capita	0.4095	-0.8927	0.1066	-8.38	< 0.001
Constant	–	11.6645	1.2355	9.44	< 0.001
		Pseudo R^2 = 0.2761			
Model 7					
Gender (1 = male)	0.5753	-0.5529	0.1884	-2.94	0.003
Age	0.9078	-0.0968	0.0102	-9.50	< 0.001
Education	0.9072	-0.0974	0.0377	-2.58	0.010
Migrant household	5.5972	1.7223	0.1930	8.92	< 0.001
Log of total assets per adult equivalent	0.3953	-0.9281	0.1080	-8.60	< 0.001
Constant	–	12.1243	1.2592	9.63	< 0.001
		Pseudo R^2 = 0.2797			

† reported standard errors are for the coefficient, not the marginal probability

Table XIII.6.6: Sensitivity analysis – Probit models of HIV infection using log of discounted total household assets

	Marginal probability	Coefficient	Std. Error†	z	P > |z|
Total household assets discounted by 10%					
Gender (1 = male)	-0.0200	-0.2672	0.1006	-2.66	0.008
Age	-0.0046	-0.0600	0.0053	-11.26	< 0.001
Education	-0.0042	-0.0542	0.0184	-2.95	0.003
Migrant household	0.0780	0.8376	0.0989	8.47	< 0.001
Log of discounted total household assets	-0.0195	-0.2553	0.0317	-8.05	< 0.001
Constant	–	3.6895	0.4252	8.68	< 0.001
		Pseudo R^2 = 0.2707			
Total household assets discounted by 25%					
Gender (1 = male)	-0.0208	-0.2617	0.0991	-2.64	0.008
Age	-0.0049	-0.0596	0.0053	-11.29	< 0.001
Education	-0.0047	-0.0578	0.0182	-3.18	0.001
Migrant household	0.0811	0.8261	0.0976	8.46	< 0.001
Log of discounted total household assets	-0.0173	-0.2128	0.0320	-6.65	< 0.001
Constant	–	3.2359	0.4199	7.71	< 0.001
		Pseudo R^2 = 0.2534			
Total household assets discounted by 50%					
Gender (1 = male)	-0.0217	-0.2486	0.0968	-2.57	0.010
Age	-0.0053	-0.0591	0.0052	-11.31	< 0.001
Education	-0.0059	-0.0662	0.0179	-3.69	< 0.001
Migrant household	0.0854	0.8062	0.0958	8.41	< 0.001
Log of discounted total household assets	-0.0096	-0.1083	0.0333	-3.25	0.001
Constant	–	2.1773	0.4148	5.25	< 0.001
		Pseudo R^2 = 0.2261			
Total household assets discounted by 58%					
Gender (1 = male)	-0.0214	-0.2423	0.0962	-2.52	0.012
Age	-0.0054	-0.0592	0.0052	-11.31	< 0.001
Education	-0.0063	-0.0700	0.0179	-3.91	< 0.001
Migrant household	0.0859	0.8007	0.0955	8.38	< 0.001
Log of discounted total household assets	-0.0053	-0.0584	0.0342	-1.71	0.088
Constant	–	1.6958	0.4152	4.08	< 0.001
		Pseudo R^2 = 0.2199			
Total household assets discounted by 59%					
Gender (1 = male)	-0.0214	-0.2414	0.0962	-2.51	0.012
Age	-0.0054	-0.0593	0.0052	-11.31	< 0.001
Education	-0.0064	-0.0705	0.0179	-3.95	< 0.001
Migrant household	0.0859	0.8001	0.0955	8.38	< 0.001
Log of discounted total household assets	0.0046	-0.0512	0.0344	-1.49	0.136
Constant	–	1.6280	0.4153	3.92	< 0.001
		Pseudo R^2 = 0.2193			

Table XIII.6.7: Sensitivity analysis – Logit models of HIV infection using log of discounted total household assets

	Odds Ratio	Coefficient	Std. Error†	z	P > |z|
Total household assets discounted by 10%					
Gender (1 = male)	0.6306	-0.4611	0.1868	-2.47	0.014
Age	0.8927	-0.1135	0.0104	-10.93	< 0.001
Education	0.8831	-0.1243	0.0369	-3.37	0.001
Migrant household	4.6478	1.5364	0.1860	8.26	< 0.001
Log of discounted total household assets	0.6343	-0.4552	0.0572	-7.95	< 0.001
Constant	–	6.9766	0.7884	8.85	< 0.001
		Pseudo R^2 = 0.2647			
Total household assets discounted by 25%					
Gender (1 = male)	0.6374	-0.4503	0.1843	-2.44	0.015
Age	0.8932	-0.1129	0.0103	-10.95	< 0.001
Education	0.8760	-0.1324	0.0368	-3.60	< 0.001
Migrant household	4.5692	1.5193	0.1839	8.26	< 0.001
Log of discounted total household assets	0.6842	-0.3794	0.0582	-6.52	< 0.001
Constant	–	6.1885	0.7801	7.93	< 0.001
		Pseudo R^2 = 0.2478			
Total household assets discounted by 50%					
Gender (1 = male)	0.6552	-0.4228	0.1804	-2.34	0.019
Age	0.8930	-0.1131	0.0103	-10.98	< 0.001
Education	0.8590	-0.1520	0.0368	-4.13	0.001
Migrant household	4.4563	1.4943	0.1812	8.25	< 0.001
Log of discounted total household assets	0.8291	-0.1874	0.0617	-3.03	0.002
Constant	–	4.3040	0.7767	5.54	< 0.001
		Pseudo R^2 = 0.2213			
Total household assets discounted by 58%					
Gender (1 = male)	0.6634	-0.4103	0.1794	-2.29	0.022
Age	0.8924	-0.1138	0.0103	-11.01	< 0.001
Education	0.8512	-0.1611	0.0370	-4.35	< 0.001
Migrant household	4.4304	1.4884	0.1808	8.23	< 0.001
Log of discounted total household assets	0.9106	-0.0937	0.0636	-1.47	0.141
Constant	–	3.4286	0.7810	4.39	< 0.001
		Pseudo R^2 = 0.2156			
Total household assets discounted by 59%					
Gender (1 = male)	0.6646	-0.4086	0.1793	-2.28	0.023
Age	0.8923	-0.1139	0.0103	-11.01	< 0.001
Education	0.8502	-0.1623	0.0370	-4.39	< 0.001
Migrant household	4.4276	1.4879	0.1807	8.23	< 0.001
Log of discounted total household assets	0.9229	-0.0802	0.0639	-1.26	0.209
Constant	–	3.3046	0.7818	4.23	< 0.001
		Pseudo R^2 = 0.2151			

Complete Tables of Results for Section 7.2.5

Table XIII.7.1: Paired t-test results comparing factory workers' current income from CBIRD with the income from their previous job

	Current CBIRD Income (Discounted)	Previous Job Income	t	P > |t|
Undiscounted CBIRD income	5378.7	3981.8	3.8090	0.0002
Discounted by 10%	4840.9	3981.8	2.4051	0.0103
Discounted by 15%	4571.9	3981.8	1.6732	0.0508
Discounted by 17%	4464.3	3981.8	1.3750	0.0881
Discounted by 18%	4410.6	3981.8	1.2247	0.1137

Appendix XIV – Abstracts of papers from this thesis

Lim, S., and Cameron, M. P. (2003). The contribution of multinationals to the fight against HIV/AIDS. In R. Sullivan (Ed.), *Business and human rights: dilemmas and solutions*. Sheffield, U.K.: Greenleaf Publishing.

Abstract

This chapter approaches the globalisation debate in a novel way, by linking multinational enterprises to working conditions and community health outcomes. The novelty arises from the mechanism by which multinationals might indirectly contribute to reductions in HIV infection rates, despite following a strictly profit-maximisation approach. The flavour of the argument is as follows. Poverty leads to adverse social and health outcomes, including HIV contraction. The sick become even further excluded from market opportunities, exacerbating the social disruption in which HIV infection flourishes. The key is to break the poverty-HIV cycle with decisive interventions, particularly with the creation of jobs to alleviate poverty. The chapter seeks to contribute to the debate by examining NGO-sponsored projects in Thailand that bring together the self-interest of multinationals and villagers, a process that can create jobs, maintain adequate labour standards and protect workers' rights to health.

Lim, S., Cameron, M. P., Apinundecha, C., and Laohasiriwong, W. (2004). Economic interventions in the fight against HIV/AIDS: a case study of northeast Thailand. *Journal of GMS Development Studies*, *1*(1), 67-88.

Abstract

This study investigates the links between human immunodeficiency virus (HIV) acquired immunodeficiency syndrome (AIDS), migration, and rural enterprises. We establish a strong positive statistical relationship between migration and HIV/AIDS. Given this relationship, we explore economic interventions to reduce the level of out-migration from rural villages. Using a case study of Northeast Thailand, our study focuses on the impact of emerging rural industry in raising household incomes and thereby reducing incentives for at-risk people to migrate. We note that this impact of rural industrialization may only be evidence in the medium to longer term.

Lim, S., Cameron, M. P., Taweekul, K., and Askwith, J. (2007). Harnessing the private sector for rural development, poverty alleviation, and HIV prevention. *Submitted to International Development Planning Review*.

Abstract

In resource-constrained developing countries, mobilising resources from outside sources may assist in overcoming many development challenges. This paper examines the Thai Business Initiative in Rural Development (TBIRD), an NGO-sponsored program that brings together the comparative advantages and self-interest of rural villages, private sector firms and a facilitating NGO, to improve social and community health outcomes in rural areas. We analyse key issues in the program with data from Northeast Thailand. We find that the TBIRD program appears to improve the income earning and other prospects of the TBIRD factory workers. Further, TBIRD factory employment exhibits a pro-poor bias. A key impact is to provide jobs for people who might otherwise be at increased risk of HIV infection through poverty-induced decisions to migrate to urban centres and participate in the commercial sex industry. This program adds another important tool for development planners in the fight against HIV/AIDS.

Lim, S., and Cameron, M. P. (2007). The business of social responsibility: Evidence from the garment industry in Northeast Thailand. ***Submitted to Business Ethics: A European Review*****.**

Abstract

Many SME managers demonstrate a reluctance to engage fully with CSR. They often perceive CSR as a cost and their CSR activities tend to be piecemeal and defensive. Such suboptimal outcomes can stem from a failure to appreciate a firm's social assets. We suggest that firms have the potential to engage much more fully with CSR, in a manner that is consistent with a profit-maximising approach to businesss. But managers need help in both gaining an awareness of the social contributions that they can make and in navigating their way through CSR issues. To this end, we outline a programme of four-Ds, namely dialogue, data, design and delivery, to assist SME managers integrate CSR issues into their overall business strategies. Our case study of the garment industry in Thailand illustrates how CSR issues can be leveraged to increase worker productivity and deliver positive social and community health outcomes, despite operating in an area that is often subject to criticism.

Cameron, M. P. (2007). HIV/AIDS in rural Northeast Thailand: Narratives of the impacts of HIV/AIDS on individuals and households. *Submitted to New Zealand Journal of Asian Studies*.

Abstract

HIV/AIDS is one of the greatest public health and development challenges currently faced by the global community. However, amongst reported statistics such as the 39.5 million people infected with HIV at the end of 2006, the human face of HIV/AIDS is often lost. This paper presents several narratives of the impacts of HIV/AIDS on individuals and households, drawn from a 2003 survey of 71 HIV/AIDS patients in Khon Kaen Province, Northeast Thailand. These narratives illustrate the broad range of impacts of HIV/AIDS, as well as the diverse coping strategies that are employed to deal with those impacts. The narratives also demonstrate how the HIV/AIDS epidemic impacts not just those who are HIV-infected and other members of their household, but also the wider community.

Cameron, M. P., Lim, S., Apinundecha, C., and Laohasiriwong, W. (2007). Exploring the socio-economic impacts of HIV/AIDS: Evidence from Northeast Thailand. ***Submitted to International Congress on AIDS in the Asia Pacific*****.**

Abstract

Introduction: There have been several attempts to estimate the socio-economic impacts of the epidemic in Thailand (e.g. see Pitayanon *et al.*, 1997). However, these estimates often fail to take into account broader impacts on society, including impacts on households that do not directly care for HIV-infected individuals.

Methods: We collected data from 71 randomly selected households of PLWHA and 660 representative households in Khon Kaen Province in 2003. Socio-economic impacts were assessed by comparing the current household of the PLWHA with their household at 'impact time' and with households from the representative sample.

Results: Our statistical analysis reveals that impacts differ by mobility of the PLWHA. 'Movers' now belonged to a larger household, were more likely to engage in agriculture, and were more likely to be in poverty. 'Non-movers' had insignificant impacts on wealth, decreases in poverty, and their household size had decreased. Most impacts increased with the elapsed time since 'impact time'. Both directly- and indirectly-affected households employed a wide range of coping strategies to mitigate the adverse impacts of HIV/AIDS.

Conclusions: Previous estimates underestimate the total welfare impacts of the epidemic. The benefits of policies or programs that reduce HIV/AIDS may have substantially greater benefits than previously thought.