School of Built Environment

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The role of status hierarchies and resource allocation on education attainment of Papua New Guinea oil palm smallholders

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Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

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Acknowledgements

Abstract

This thesis examines education investment strategies made by parents in three oil palm growing regions of Papua New Guinea to better understand inter and intra-household factors leading to unequal child school attainment on land settlement scheme blocks. Since their inception in the late 1960s/70s, the land settlement scheme oil palm blocks have undergone significant demographic and socio-economic change. In Hoskins, population density has risen from approximately 6 people per block in the early 1970s to an estimated 18 people per block in 2010. These numbers are high considering the average block size is only 6.07 ha. It is now common for three generations and two or more families to have to share the resources from a single oil palm block. There is concern by industry stakeholders that population pressure is contributing to declining per-capita oil palm incomes and limiting some family's ability to educate their children. Drawing on empirical fieldwork data, this thesis shows at the intra-household level, there are significant education inequalities according to age and gender, with there being an investment bias towards early born and male children. At an inter-household level, children from households with limited, or no access to oil palm income have significantly lower education levels than those who regularly receive oil palm income. These results support the argument that not all families co-resident on the smallholder blocks share equitably the income from oil palm. Furthermore, smallholders on densely populated blocks have lower average education levels and are more likely to pursue more individualised harvesting and production strategies, which are typically less productive than cooperative labour strategies. Current and future education levels of smallholders are significant as educated farmers have a greater ability to adopt new agricultural practices and technologies. In addition, education is an important goal in itself, for example, the education of women is known to be one of the most effective strategies in stopping inter-generational poverty.

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Acronyms and Abbreviations

ADP	Asian Development Bank
CRP	Customary Rights Purchase
DFAT	Department of Foreign Affairs and Trade
LSS	Land Settlement Scheme
MDG	Millennium Development Goal
NSO	National Statistical Office
OPIC	Oil Palm Industry Corporation
OPRA	Oil Palm Research Association
PNG	Papua New Guinea
TFF	Tuition Fee Free
UN	United Nations
VOP	Village Oil Palm
WNBP	West New Britain Province

Currency Conversion Rates

Year	1 USD equivalent in PNGK
2010	2.64
2011	2.33
2012	2.04
2013	2.28
2014	2.58

Source: http://www.ozforex.com.au/forex-tools/historical-rate-tools/yearly-average-rates

CHAPTER 1

Introduction

1.1   Introduction

There is strong general consensus that education plays a key role in development and poverty reduction (ADB 2012; Jha & Dang 2008; UNESCO 2000). Economists and development practitioners alike (e.g. Becker 1964, 1976; De Muro & Burchi 2007; Psacharopoulos 1985, 1994, 2004; Schultz 1961; Thirlwall 2003), recognise the many positive outcomes associated with an educated population, from increased work productivity to better health results and greater participation in political processes. In Papua New Guinea (PNG), early Australian Government and World Bank development policies acknowledged that an educated workforce was a pre-requisite for economic growth and that a shortage of educated Melanesians was a major constraint towards development (Connell 1997). Consequently, the advancement of education has been a central theme through major rural development initiatives in PNG, such as the oil palm land settlement scheme (LSS). Yet despite an awareness that education matters by government and development institutions, education outcomes in PNG are extremely poor. The average adult in PNG has completed just 3.9 years of schooling and the literacy rate is only 62.4% (UNDP 2014d). School statistics show there are low school enrolment rates (74.4% for primary school) and high long term school absenteeism (18%), which point to problems with children attending, and staying in school (Howes et al. 2014; UNDP 2014a). Furthermore, PNG is one of the only nations in the East Asia Pacific region yet to achieve gender parity at the primary school level, and female students fair worse than males across most education indicators. These alarming statistics confirm the need for research into constraints towards children receiving an education, especially on the oil palm blocks, an area which has received little attention.

This thesis investigates the state of education and socio-economic constraints that limit the education of children residing on PNG's most ambitious rural development project: the oil palm LSSs in West New Britain Province (WNBP) and Oro Province. This study helps address a research gap on education barriers for oil palm families educating their children. The agricultural LSS for the production of oil palm has been one of the more successful rural development projects in PNG and therefore might be expected to have high levels of education attainment. However, there is concern amongst industry stakeholders that the educational status of settlers on the oil palm LSSs has not improved over the past 10-15 years. Apart from anecdotal evidence there are very little data on the state of education on the LSS blocks and therefore there is a need for further research into this area.

1.2   Background

PNG's commercial oil palm industry began in the Hoskins-Kimbe area in the mid-1960s, following World Bank recommendations about the potential of African oil palm to be grown in the lowland areas of PNG (oil palm can only be grown in areas up to an altitude of 200 m) (Hulme 1983; IBRD 1965). The Hoskins/Kimbe area of WNBP was deemed environmentally suitable for oil palm, having the right daytime temperature, suitable annual rainfall and fertile volcanic soils. In terms of infrastructure, the area was considered advantageous because of its established roads and shipping facilities, due to the existing logging industry in the area (Jonas 1972). Furthermore, the low population density of the Hoskins-Kimbe area made the location ideal for the resettlement of people from densely populated areas of PNG, which was a key recommendation of the World Bank (Koczberski, Curry & Gibson 2001).

Since being established in the Hoskins region of WNBP, commercial plantings of oil palm have been developed in seven provinces, although this study focuses on the three areas of Hoskins and Bialla in WNBP and Popondetta in Oro Province. Palm oil has been the most valuable of PNG's agricultural exports since 2000 and as of 2012, almost 145,000 ha of oil palm have been planted, with approximately 40% of this area being smallholder plantings (Bourke & Harwood 2009; Orrell 2012). It is

estimated that approximately 166,000 people, or 3% of the national population, reside in households that cultivate oil palm (Bourke & Harwood 2009).

PNG land settlement scheme

A major initiative of the PNG oil palm industry has been the adoption of the land settlement scheme (LSS) for smallholder oil palm production. LSS smallholders grow and harvest oil palm on 6-6.5 ha blocks from which the oil palm is collected fortnightly by company trucks and processed at local mills. LSS blocks are grouped into subdivisions containing between 130 and 320 blocks, and each subdivision has a primary school, community centre, health centre, agricultural extension office and markets and stores (Hulme 1983; Jonas 1972; Koczberski, Curry & Gibson 2001). Proximity to these facilities and services, especially the primary schools, is one of the major benefits for smallholders migrating from other regions to the LSSs. The LSS has been one of the more successful rural development projects in PNG in terms of offering regular income and the provision of basic services for smallholders such as schools. However, the LSS blocks are experiencing significant demographic and socio-economic change which is undermining some smallholders' ability to meet their needs.

Demographic and socio-economic change

Population pressure on the LSS blocks has emerged as a major demographic issue leading to social instability and conflict, reduced oil palm production and declining per-capita incomes (Curry et al. 2007). Since their inception in the late 1960s and early 1970s, the oil palm LSSs in WNBP, have experienced considerable population growth. Population density on the Hoskins LSS has risen from 5.9 persons per block in the early 1970s (Ploeg 1972), to an estimated 18.44 persons per block in 2010 (Curry et al. 2007). These population densities are extremely high given the area of the average LSS oil palm block of just 6.07 ha. At the commencement of the LSSs a 6 ha block was deemed sufficient for the needs of a single nuclear family. Today, the single household has been supplemented by co-resident households as the adult children of settlers marry and raise their own children on the block. Commonly, three generations and two or more families now share the resources of

a single 6 ha block (Koczberski, Curry & Gibson 2001). With the LSS blocks being so densely populated it is suggested that per-capita incomes are decreasing, even in the midst of high oil palm commodity prices. A reduction in incomes impacts the ability of smallholder families to educate their children.

Related to population increase on the LSS blocks is a rise in disputes among households over matters such as land inheritance and control of oil palm income. Conflict often occurs between households once the original leaseholder has died and brothers compete for the position of 'boss' of the block (Koczberski et al. 2013). Fighting over block ownership can lead to great anxiety among smallholders and a reduction in oil palm productivity. With contestation over who will manage the block also comes conflict over the distribution of oil palm income. In Kimbe, (WNBP), evidence (e.g. Bue 2013; Koczberski et al. 2012) suggests that not all families co-resident on smallholder blocks participate equally in oil palm production or share equitably the income from oil palm. It is suggested that status hierarchies among different families living on the same block are preventing some households' access to income and ability to educate their children. When discussing the relative status of households on the LSSs, Bue (2013) makes the distinction between primary households, where the male head is typically the original leaseholder and/or has control over the distribution of the oil palm income, and secondary households, made up of the leaseholder's siblings and families, who have less access to oil palm income (see Section 4.8 for further details).

It is suggested that the combination of demographic and socio-economic pressures discussed above is leading to economic and social stratification on the blocks, as smallholders increasingly pursue individual rather than cooperative income strategies. One way in which this is happening is through change in oil palm harvesting systems from cooperative strategies (called *wok bung*), where most adults on the block contribute to harvesting at the same time, to individual production strategies (called *makim mun* or *skelim hecta*), where harvesting is rotated amongst co-resident households or the blocks are divided into separate

sections (Curry et al. 2007; Koczberski, Curry & Gibson 2001) (see Section 5.4.1 for further details).

1.3   Research objectives

The aim of the research is to identify smallholder education levels as well as understand the socio-economic factors limiting smallholders' education at the intra- and inter-household levels. The research examines education attainment stratified at the intra-household level according to the variables of age and gender. The research also examines inter-household relationships to learn more about relative household status on the blocks and how these interact with the livelihood and educational strategies pursued by different families co-residing on the block.

The main questions that the research addresses are:

What level of educational attainment do LSS smallholders achieve, and how are these determined at the intra-household level by:

- gender, age and birth order;
- education level of parents.

At the inter-household level, how are education levels determined by:

- position of household in relation to control/management of oil palm production and income;
- oil palm production strategies pursued on populated blocks by multiple families on block (e.g. co-operative production or rotation of production amongst households).

1.4   Significance of research

This study provides much needed data regarding the state of education on the LSS blocks. There has not been a comparable socio-economic study investigating LSS smallholder education levels in the three project areas. Whilst studies examining intra-household education investment strategies are prevalent within the development literature, there are few contemporary studies specific to PNG. Even less studied, are constraints towards education at the inter-household level in PNG.

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Little is known about the relationship between relative household status and education outcomes on the LSS blocks. Therefore, the thesis findings go some way to filling a gap on LSS education data at both the intra and inter household levels, as well as providing baseline data for future research into this area. More broadly, this thesis contributes to theoretical debates surrounding socio-economic change in PNG and how people are engaging with the incursion of market capitalism.

1.5   Argument

This thesis argues that emerging status hierarchies on the LSS blocks are constraining the ability of certain smallholders to access the oil palm income required to educate their children. High population growth and declining per-capita incomes on the LSS are forcing smallholders to adopt more individualised livelihood strategies as they compete for limited resources. This is leading to stratification and atomisation of social relations on the blocks as smallholders prioritise the interests of their immediate nuclear families over wider kinship groups. These changes on the blocks are occurring in the context of widespread economic change in PNG, as the cash economy becomes more developed and attitudes towards money favour the possessive individual ethic.

1.6   Overview of the thesis

Chapter 2 provides a review of the major literature pertaining to this thesis. Chapter 3 gives background information on the LSS and the three fieldwork sites as well as providing a rationale for the methods used to collect the data. Chapter 4 discusses the education findings whilst Chapter 5 looks at income strategies. Chapter 6 reiterates the major findings of the thesis and offers recommendations for change.

CHAPTER 2

Literature review

2.1 Introduction

This chapter presents a review of the literature on the role of education in development in general, and constraints on educational opportunities for children on the PNG LSS blocks. As educational barriers in PNG operate on a number of scales both macro-level constraints, such as school fees and government policy, and micro-level constraints, such as inequitable intra-household resource allocation, these are discussed in separate sections.

The chapter is in four sections. The first section investigates the role of formal education within modernisation theory, human capital theory and human development. In addition, the Millennium Development Goals (MDGs) and statistical measures and methods for measuring development and education are also examined. The second section reviews literature on parental investment strategies in child education at the intra-household level. It examines economic household models used to explain intra-household decision-making as well as the major determinants of education investment. The third section provides a brief history of formal education in PNG as well as a discussion of the current state of education and ongoing policy debates. Finally, the fourth section reviews the major conceptual frameworks used to understand socio-economic change associated with the intrusion of capitalism in the developing world. In particular, it examines the concepts of gifts and commodities, moral economy, possessive individualism and social embeddedness, and as they relate to social and economic change in PNG. This is relevant to this thesis as a way of conceptualising change on the LSS blocks.

2.2 Education and Modernisation

The delivery of education through a formal school system has played a key role in the spread of Western development. An educated population is regarded as a

necessary pre-condition for economic growth, and the role of education in poverty reduction and improving human development outcomes are well documented in the development literature (e.g. Becker 1964; Cooper & Packard 2005; Rigg 2007; Willis 2011). However, the diffusion of education throughout the developing world also serves political ends, such as breaking down traditional belief systems whilst encouraging modern ideals. It is therefore worth exploring the relationship between education and development and examining the contestation between modernisation and traditional belief systems.

Development policy in the 1950s and 60s was heavily influenced by modernisation theory and the idea that development was an inherently evolutionary process driven by economic growth (Gardner & Lewis; Power 2003). It was argued that state-led (as opposed to private-led favoured in neo-classical policy) economic growth was the model for the developing world to follow, to progress away from the 'traditional' towards the 'modern', in a linear fashion. However, there were stipulations about the necessary societal conditions or 'preconditions' for economic growth to occur. Economists employed structural functionalist theory to argue that social evolution was a precursor for economic growth and a necessary part of a nation's path to modernisation (Leys 2005; Peet 1991). Education was to play a central role in this process of societal change, creating an educated (largely male) workforce, from which economic 'take-off' could occur. As discussed by Rostow (1971, p.182) in his widely cited book, *Stages of Economic Growth*:

> The tasks of the preconditions period (e.g., in Black Africa) remain as they have long been: the build-up of infrastructure, the education of a generation of modern men, the creation of institutions which can absorb technology and mobilize (*sic*) capital.

The education required for development is one that emphasises modern ideals, such as individualism and science and reason, over indigenous belief systems and knowledge, which in effect, were regarded as obstacles to development (Preston 1996; Schech & Haggis 2000). Local language, as a fundamental part of traditional culture was considered a barrier towards modernity. As noted by Shrestha (1995, p.

105) in relation to the 'modern' attitude towards education in 1950s Nepal, "education could salvage the 'uncivilised' mind, but only if it was 'modern,'… Sanskrit, previously the language of the learned, was a deterrent to the developed." In addition to the promotion of 'Western' over local vernacular languages, the modern school system also played an important part in reorienting identity away from that of the family or clan towards the individual.

The formal schooling system promotes a competitive individualistic ethic over a communal one as the individual is the fundamental "[s]tarting point for all knowledge and action" (Hamilton 1992, p. 22) in a modern society. Whilst traditional knowledge is inseparable from the context of family and village life, learning through formal schooling can be considered an individual investment. As discussed by LiPuma (2000, p. 293) in relation to schooling in PNG, "The education system is not concerned with collectivities, but with individuals… The individual must be the privileged site of the production and reception of knowledge." Smith (2002) too, argues that modern schooling in Kragur village in PNG is understood as an individual pursuit, but with seeming negative consequences, especially as perceived by the older generation. As discussed by one village elder (Smith 2002, p. 158):

> All these educated kids, they think they can do something on their own… They pursue self-reliance, [they] help their [immediate] families. They won't help their brothers and sisters. Maybe this is the European way?

Therefore, with the modern schooling system comes the promotion of individualism and knowledge to compete in a modern competitive environment, but also a perceived weakening of traditional obligations and kinship networks. The privileging of the modern school system over traditional indigenous ways of knowing was, and still is, a key principle within development paradigms. Thus, there is a paradox for those who wish to both preserve indigenous culture, and promote modern health and education benefits at the same time. Whilst modernisation theory is widely criticised for being ethnocentric and ignoring the worth of the 'traditional' (Gardner

& Lewis 1996; Slater 1995), no development practitioner would dismiss the positive effects of a better educated and literate population, such as a reduction in infant mortality, increased employment opportunities, etc. With regards to PNG, tensions between traditional education and modern schooling manifest themselves in a number of ways. For example, there are long-standing disputes regarding the school curriculum, as to whether it should prepare the population for jobs in the modern economy or work in the village, as well as whether education should be taught in the vernacular, *tok pisin* or the English language (Crossley 1990) (see Section 2.7 for further discussion). But whilst many assumptions regarding the role of education in modernisation theory and development in general have been called into question, the rationale of investment in education for economic returns continues almost unopposed through human capital theory.

2.3   Human capital

Human capital[1] is an economic concept that refers to productive human attributes such as knowledge and skills which can be invested in through spending on education and health for a financial return. The concept was established in the early 1960s by the work of economists Schultz (1961) and Becker (1964) who argued that investment in physical capital could only partly explain the economic growth of nations. They reasoned that 'residual' unaccounted-for output was due to input of human abilities and knowledge, or human capital (Becker 1964; Pomfret 2000; Psacharopoulos 1973; Psacharopoulos & Woodhall 1985; Schultz 1961; Tarabini 2010; Thirlwall 2003; Todaro 1994). Thought of in this way, education and health can be invested in for a monetary return, just like any other capital investment. It is almost universally accepted that investment in education leads to economic growth and that the return on education typically exceeds most other types of investment (Huffman 2001; Psacharopoulos 1994; Psacharopoulos & Woodhall 1985; Thirlwall 2003). Governments, international institutions and policy makers invest in human capital, namely through the inputs of education and health, as a key driver of economic growth and poverty reduction.

Education and farm productivity

In economic terms, one of the main reasons for investing in education in nations with large rural populations, such as in PNG, is to increase farm productivity. Using the human capital model, it is argued that higher education levels lead to higher productivity.[2] The often cited work of Lockheed, Jamison and Lau (1980), concludes that an additional 4 years of education leads to an average productivity increase of 7.4%. Welch (1970) and Jamison and Moock (1984) argue that educated farmers have superior problem solving skills and therefore make better use of their resources to work more efficiently.

In terms of agricultural extension, several studies show a positive relationship between farmer education levels and the extent to which they adopt extension messages (e.g. Abebe et al. 2013; Strauss et al. 1991). There is a consensus that educated farmers have a greater capacity to adopt new agricultural technologies and practices that improve farm productivity (Asfaw & Admassie 2004; Cremin & Nakabugo 2012; Huffman 2001; Lockheed, Jamison & Lau 1980; Reimers & Klasen 2013; Thirlwall 2003). For example, it is argued that educated farmers are more capable of assessing risks associated with new high yielding farming technologies and therefore more open to change than uneducated farmers (Asadullah & Rahman 2009). Regarding PNG LSS blocks, experienced extension officers identified poor literacy to be a barrier to the adoption of extension messages (Koczberski et al. 2013).

Level of investment

A major debate regarding human capital investment, particularly in terms of policy implications, concerns the level of education which should be targeted to achieve maximum growth. A considerable amount of literature shows that the rate of return on investment declines with the level of schooling, fitting with the 'law of diminishing returns' for conventional investments (Colclough 1982; Lockheed & Verspoor 1991; Psacharopoulos 1973, 1985, 1994; Psacharopoulos & Patrinos 2004). Psacharopoulos (1973, 1985, 1994), argues that across all major regions, and for both public and private investment, investing in primary level education

produces higher returns than secondary or tertiary education. For example, there is a public percentage level return for the Asia region of 16.2% for primary school completion compared with 11.1% for secondary school completion, and 20% return for primary completion compared to 15.8% for secondary schooling at a private level investment (Psacharopoulos & Patrinos 2004). However, several researchers (e.g. Appleton, Hoddinott & Krishnan 1999; Gibson & Fatai 2006; Kingdon & Unni 2001; Schady 2003) have found that the rate of return on investment does not decline with the level of schooling in several African and Asian nations, leading to debates about whether 'the law of diminishing returns' is applicable for all nations. Some of this debate on the rate of returns on investment centres upon disagreements over sampling data and the methodology used (see Kingdon 2006, p. 154) which are beyond the scope of this research. It is suffice to say that the majority of studies show a declining rate of return with higher levels of schooling, but, there may be variation at a national level.

Quality versus quantity

The use of quantitative over qualitative measures to assess education outcomes is also a subject of much debate. Development policy typically favours quantitative indicators. For example, the MDGs relating to education use quantitative indicators such as net enrolment ratios, education attainment and literacy rates (UN 2013a). However, many researchers (e.g. Castello-Climent & Hidalgo-Cabrillana 2012; Hanushek 2011; Heyneman 2004; Solmon 1985) claim the impact of education investment comes primarily from the quality of education rather than the quantity. Numerous studies show a positive relationship between various school quality variables and higher student earnings. For example, Card and Krueger (1992) and Krueger (1999) demonstrate that smaller student-teacher ratios and better relative teacher salaries can lead to higher returns on investment in education, and Hanushek (2011) predicts a positive effect of teacher training and experience on higher student earnings. But there is no one universally accepted measure of school quality, making standardisation an issue. Several researchers (e.g. Behrman & Birdsall 1983; Rizzuto & Watchtel 1980; Solmon 1985) suggest quality should be measured through money spent per student, however, as Heyneman (2013) points

out, this says nothing about a school's efficiency, and there are many examples of schools from middle income nations outperforming schools in wealthier nations that invest more in education. Therefore, spending per capita does not always produce proportional education outputs. Complicating this matter further is that there is a relationship between quality and quantity, as better school quality often leads to higher school attainment levels, making it difficult to discriminate between the two measures (Castello-Climent & Hidalgo-Cabrillana 2012). For a more comprehensive picture of the effect of education investment it seems sensible to take into consideration a combination of quantitative and qualitative indicators.

2.4   Human development and education

The repeated failure of economic-centric development policies to bring about widespread prosperity in much of the developing world has led to the emergence of a variety of development approaches offering different models and measurements of development. Education still features prominently within these development approaches, although it is typically discussed in regard to its own worth and not just as a vehicle for economic growth.

Human development is one such approach which differs from development orthodoxy by its focus on non-econocentric development measures (Desai 1991; Power 2003; Willis 2011). Pieterse (1997) argues that the strength of the human development approach is that it provided an 'intellectual synthesis' in development thinking as well as a policy orientation that could get backing from the UN and World Bank. According to Ranis, Stewart and Ramirez (2000), Human Development has roots in Sen's capabilities concept and the earlier Basic Needs approach. Drawing on the capabilities approach, education is not just about increasing monetary wealth or agricultural productivity, but agency, and the individual's "ability to pursue and realise goals that he or she values" (De Muro & Burchi 2007, p. 5). A focus on human agency reflects general trends in development theory since the 1960s, from macroeconomic indicators such as GDP per capita, as favoured by modernisation theory, to people centred, non-economic indicators such as life expectancy, education and income security (Power 2003). Yet, as Morse (2004)

reminds us, human development indicators are intended to supplement economic growth indicators rather than replace them (GDP per capita is one of the human development index components).

The key measurement of human development is the Human Development Index (HDI) which combines the three indicators, life longevity, knowledge and income security into a single number between 0 and 1.[3] The advantage of the index is that it simplifies development outcomes down to a single number allowing for easy comparisons between countries. However, the HDI is also criticised for over-simplifying a matter as complex as human development to just one number (Morse 2004; Ravallion 1997; Sagar & Najam 1998). In addition, there are ongoing debates over the HDI including: the quality of data used (e.g. Murray 1991); the method of calculation used; and various aspects of inequality excluded from the HDI such as quality of life, working conditions, physical violence, etc. (UNDP 1990; Veenhoven 1996).

In part, to address shortcomings in measuring inequality, the UNDP uses a number of other indicators in addition to the HDI, such as the Inequality-adjusted HDI (IHDI), the Gender Inequality Index (GII) and the Multidimensional Poverty Index (MPI).[4] These indexes make use of increasingly sophisticated methods to examine more specific aspects of poverty, yet, ongoing issues remain regarding the quality of data used and the lack of 'richness' of numerical data. Significantly, indexes give little information as to why countries are under-performing in the area being measured. In 2013 Papua New Guinea had a HDI of just 0.491, ranking 157 out of 187 nations and placing it in the 'low development' classification (UNDP 2013a). In terms of the GII, PNG had a value of 0.617 in 2012, ranking just 134 out of 148 nations and reflecting a very high level of gender based inequality. These statistics are staggering when considering the decade long mining boom and that PNG's forecast GDP is over 20% for 2015 (UNDP 2014a). Furthermore, this highlights the obvious limitations of standalone economic measures to assess development and poverty in general.

2.5   Millennium development goals

Operating concurrently with the HDI are the MDGs. The MDGs are eight goals covering health, education, gender inequality and environment, aimed at reducing extreme poverty and promoting human rights. The UN instituted the MDGs in 2000 with the broad and ambitious aim of reducing world poverty by 50% by 2015. The MDGs have had a significant influence on development policy, as governments and NGOs work to achieve the associated goals (Willis 2011). The second goal specifically addresses education, whilst goal 3 addresses gender equality within education: to "eliminate gender disparity in primary and secondary education, preferably by 2005, and in all levels of education no later than 2015" (UN 2013a, p. 1 of 2). That education features prominently within the development goals reflects the importance currently placed on education as a means to poverty reduction. However, the MDGs are not without criticism. Commentators point out that for all their good intentions, the MDGs are still an example of a top down development approach imposed on nations that advance the priorities of institutions such as the World Bank (Unterhalter 2014; Willis 2011). Furthermore, there are questions over the indicators used to measure the MDGs. For example, literacy is not used as a measure of education, even though it is known that there is a strong correlation between illiteracy and poverty (Unterhalter 2014). Researchers and practitioners (e.g. Barrett 2011; Brundrett 2014; James 2006) also question the lack of education quality measurements and note that there can be significant variation in learning achievements within indicators such as educational attainment in years (MDG target 2). These criticisms get back to the many complex issues surrounding the most appropriate and accurate methods of measuring development.

2.6   Intra-household investment strategies

Analysis of policy and education investment strategies is useful for understanding major challenges facing developing nations such as PNG in achieving development goals. Examination of issues at this scale, however, overlooks social and economic inequalities at the household level that constrain an individual's ability to achieve an education. At a micro-level, many studies provide evidence of child specialisation within households in which education investment is targeted towards certain

children over others. Parental investment strategies in education are a major determinant of education attainment at the household level and therefore, must be analysed when examining barriers restricting children's education. The following section examines the main economic models used for understanding intra-household decision-making and the role that gender, family size, birth order and parental education levels play in intra-household resource allocation and education levels.

Household models

Within the development literature, economic models feature prominently as a method of framing intra-household decision-making according to returns on investment. Becker's (1976, 1981) often cited work on unitary household models regards households as undifferentiated units or 'small factories' that behave like individual decision-makers in maximising the utility of the household. The central tenet of the unitary model is the 'joint utility function', or the notion that resources are allocated within the household in a way to maximise household welfare rather than individual interests. As discussed by Becker (1981, p. 177):

> An altruist is made better off by actions that raise his family income and worse off by actions that lower it. Since family income is the sum of his own and his beneficiary's income, he would refrain from actions that raise his own income if they lower hers even more; and he would take actions that lower his own if they raise her income even more.

Equity within the household, therefore, depends to a large degree on the household members behaving as 'rational' actors working towards a common goal, as well as altruism shown by the household head regarding the distribution of resources within the household.

The unitary model has been widely criticised for being based on a number of incorrect assumptions regarding gender relations, positions of power, and, for neglecting non-economic factors relating to decision-making. Much of the criticism has come from feminist theory and evidence that household decisions do not

benefit males and females equally. Feminist scholars (e.g. Folbre 1986a, 1986b; Hart 1992, 1997) argue that understanding a household as an undifferentiated unit neglects significant conflict and inequality within the household along gender lines. Empirical studies (e.g. Glick 2008; Hill & King 1991) show that females typically have lower incomes, lower education levels and do disproportionately more domestic tasks compared with males. It is therefore possible for women to be poor whilst living in a wealthy household, contrary to the assumption of the unitary model. Several authors (e.g. Chowdury 2005; Cuesta 2006; Hart 1997; Thomas 1994) also point out that it matters who controls the household income. There is typically a stronger correlation between child wellbeing and women's income, rather than with men's income (e.g. Thomas 1994), casting doubt upon the altruistic motivations of the male head of the household. With regards to the LSS blocks in PNG, male household heads often spend household income on their own personal interests such as gambling and beer, rather than on the welfare of the household (Koczberski 2007), thus discrediting the notion of the 'benevolent dictator' who acts in an unselfish way.

The importance of kinship networks and wider culture on intra-household decision-making is also overlooked when using unitary models. Households are not isolated units immune to outside influence but rather they are embedded within wider structures that influence household decision-making and resource allocation. As discussed by Delap (2000, p. 731) regarding the influence of cultural norms on child housework in Bangladesh:

> [e]vidence suggests that decisions are guided by a 'rationality' that emphasises conformity to gender and age roles, and thus avoidance of community disapproval, rather than maximisation of the utility of household members. Community approval is essential for the formation of important social support networks.

Kinship networks too, typically spread across several households creating obligations and demands that cannot be taken into account using the joint utility function of the unitary household model. The PNG LSS bocks contain several co-

resident households, bound to each other through various kinship and reciprocal obligations. However, the nature of the relationships is changing, as discussed in the following section.

Other economic household models, such as bargaining models, use game theory to explain decision-making, and differ from unitary models in recognising that intra-household cooperation and conflict do exist. These models are more sophisticated in their capacity for understanding intra-household relationships and bargaining power, but nonetheless are still limited to examining economic determinants and neglecting cultural and social circumstances.

Economic household models have come under heavy criticism due to their perceived shortfalls in explaining the breadth and complexity of factors contributing to intra-household resource allocation. However, much of the literature on household decision-making still explains education strategies according to returns on investment. The following section reviews literature on the interaction between gender, birth order, family size and parental education that impact on parental investment in children's education.

Gender bias

Many studies show that boys typically receive preferential education investment over girls. A major reason given for this bias toward male schooling is the high opportunity costs associated with sending female children to school (Gibson & Sear 2010; Hill & King 1995; Liddell, Henzi & Barrett 2003; Song, Appleton & Knight 2006; Strauss & Thomas 1995; Todaro & Smith 2003). Female children tend to spend more time on household chores and caring for younger siblings than male children, thereby making time sacrificed for female schooling more of a disadvantage to the running of the household than male schooling.

It is also argued that low investment in female education is related to girls marrying out of the family, which is prevalent in many developing nations and sons being more financially accountable for aged parents (Hill & King 1995; Liddell, Henzi &

Barrett 2003). In largely patrilineal societies (such as PNG) female children leave their parents' household to marry, thereby reducing parents' ability to fully recoup returns from their daughter's education. Although, there can be remuneration to the bride's parents through bride price, and in PNG, anecdotal evidence suggests that educated women fetch higher bride prices than non-educated women due to the social status afforded by education.

Another reason for investing in a son's education rather than a daughter's, is due to the influence of gender on earning potential. Males typically receive higher wages (Delap 2000; Gibson & Sear 2010; Song, Appleton & Knight 2006), and are more able to find jobs commensurate with their level of education than females (Connell 1997; Gibson & Sear 2010; Liddell, Henzi & Barrett 2003), thereby providing higher returns on education investment. Related, is the assertion that female schooling is more sensitive to cost than male schooling (Gibson 2000; Glick 2008; Hertz & Sperling 2004). Factors such as high opportunity cost, and low earning potential mean that financial investment in female education is disproportionately affected when money is scarce. But conversely, girls stand to benefit proportionally more than boys from policies that reduce financial stress on households, such as tuition free schooling (see Section 2.7). For example, Hertz and Sperling (2004) report a disproportionate increase in female enrolment in Uganda, Tanzania and Malawi after school fees were eliminated or heavily reduced.

Parental decision-making regarding which children to educate is also influenced by gender norms and community influence. A pro-son bias in resource allocation can be partly attributed to women occupying a subordinate social position in many developing countries (Dammert 2010; Song, Appleton & Knight 2006). As discussed by Moser (1993, p. 24):

> [i]deological and cultural as well as economic reasons underline the symmetries and asymmetries in intra-household resource allocation. It is questionable whether family labour, income and resources, on the grounds of allocative efficiency, enter into a common fund.

The allocation of resources towards male instead of female children may be influenced by a combination of fulfilling cultural obligations (Chowdury 2005) and avoiding community disapproval (Delap 2000). On the LSS blocks in PNG, it is argued that men's reluctance to share income with women is in part due to cultural understandings of cash being associated with male status and masculinity (Koczberski 2007).

Family size

It is widely argued that parental investment in children's education increases as family size decreases and parents invest more in the quality rather than the quantity of their children (Becker 2004; Becker, Murphy & Tamura 1990; Blake 1981; Gibson & Sear 2010; Kaplan et al. 2002). The quality versus quantity argument stems from the resource dilution hypothesis, which posits that given finite resources, per child investment decreases as the total number of children increases. Numerous studies (e.g. Behrman & Taubman 1986; Blake 1981; Dammert 2010; Emerson & Souza 2008) support this hypothesis, finding that family size is inversely related to the average education level of children. Some studies (e.g. Liddell, Henzi & Barrett 2003; Mace & Sear 1997; Salmon 2007) also show that birth spacing matters, as average education levels increase as the birth spacing between each child rises. The argument is that wide birth spacing makes the financial cost of education more manageable as there is less competition over parental resources.

Birth order and sibling composition

Birth order is one of the strongest determinants of education levels within families. Parents typically prioritise early born children with greater investment in their schooling, reflected by first born children having higher education levels than their later born siblings (Gibson & Lawson 2011; Gibson & Sear 2010; Liddell, Henzi & Barrett 2003; Zeng et al. 2012). First born children benefit from exclusive parenting and less competition for resources than later born children (Behrman & Taubman 1986; Salmon 2007). It is also argued that older children are a safer investment than subsequent children as they are more likely to survive into adulthood and have higher reproductive value (Gibson & Sear 2010). With regards to children in South

Africa, Liddell, Henzi and Barrett (2003) hypothesise (accounting for average family size and birth spacing) that it is beneficial for early born children to progress quickly through school as when the final child is born, the first born child will be in a position for employment if educated. Conversely, a common trend identified in the literature (e.g. Dammert 2010; Emerson & Souza 2008; Gibson & Sear 2010; Glewwe & Ilias 1996) is the removal of early born children from school to help provide support (financial or otherwise) for younger sibling's schooling. Older children command higher wages than younger children and may therefore be sent to work if there are financial constraints within the household (Emerson & Souza 2008). Therefore, the relationship between birth order and education levels may be nonlinear, as found by Gibson & Sear (2010) in their study on birth order and education levels in Malawi.

Sibling composition according to sex also has a bearing on education investment strategies. Studies show that having sisters can increase educational attainment for other siblings, whilst having brothers can be a detriment to education achievement (Morduch 2000; Zeng et al. 2012). It is reasoned that several girls can share domestic work and reduce the burden on any one member, and that, girls are more likely than boys to be removed from school to support other children (Dammert 2010; Gibson & Sear 2010; Greenhalgh 1988).

Intergenerational education correlation
Another determinant of child education addressed in the literature is that of parental education. It is widely reported that there is a positive correlation between a parent's education level and that of their children, as argued by several authors (e.g. Fuller & Liang 1999; Gannicott & Avalos 1994; Glewwe & Ilias 1996; Haveman & Wolfe 1995; Lambert, Ravallion & Van de Walle 2014; Marjoribanks 1980). It is reasoned that educated parents are likely to place greater emphasis on their children's education based on their own experience, as well as due to having higher paying employment and consequently more money to spend on their children's schooling.

There is some evidence that the correlation between mother and child education is stronger than that of the father and child.[5] Song, Appleton and Knight (2006) find that maternal education has the strongest effect on children's primary school enrolment rates in rural China, and Haveman and Wolfe (1995) argue that the human capital of the mother has the greatest impact on the education attainment of children in the United States. With regards to PNG, Fox (1999) argues that uneducated parents typically show little interest in educating their children and that daughters rather than sons are typically the most disadvantaged by having uneducated fathers, due to the subordinate position of females within Melanesian culture.

This section has reviewed literature on the main considerations influencing parental investment strategies in children's education at the household level. Assuming that parents are unable to send all of their children to school due to financial constraints, they make investment decisions based on factors such as gender, birth order, sibling composition and family size. Within the literature, these factors are typically framed within neo-classical models, which understand decisions to be based on financial returns, or, gender theory, which looks at the role that women's status plays in investment decisions. This thesis recognises that there are multiple logics operating within households. Thus, economic rationality and socio-cultural arguments both offer valid explanations of investment strategies, but neither are all encompassing. The next section provides a background to the formal education system introduced into PNG as well as its major shortcomings.

2.7   Education in Papua New Guinea

Formal school education was brought to PNG relatively late, not being established until after permanent European settlement in the 1870s (Crossley 1990). Since this time, the education system has gone through three distinct periods: religious education brought by Christian missionaries followed by secular education managed by Australian administrators and finally education since political independence in 1975. Schooling is regarded as a powerful agent of change and each period reflects, in part, the interests of the presiding education authority at

the time as well as the dominant prevailing ideology. The main characteristics of these time periods are discussed below.

Background

Prior to European settlement, there were no formal schools in PNG. Children were educated through observing and participating in community life as well as through various rites of passage. In the absence of writing skills, Papua New Guineans diffused teachings about history, folklore and religion through oratory methods. Great importance was placed in elders who could pass knowledge and rules about social order from one generation to the next (Ikupu & Glover 2002; Thomas 1993).

Formal Western education was brought to PNG by English Christian missionaries in the early 1870s (Crossley 1990; O'Donoghue 1993, 2009). Christian mission education disseminated religious and moral teachings to the PNG population though a school curriculum based upon religious lessons, vernacular literacy and numeracy while largely ignoring existing local knowledge and values (Ikupu & Glover 2002; O'Donoghue 1993). Although missionary schools taught vernacular literacy skills, an estimated 95% of the PNG population was still illiterate in 1939 (O'Donoghue & Austin 1994). Education matters in PNG were for the most part left to Christian missions until the Second World War and by 1950 there were only 4224 students in Australian Administration schools compared with 128,665 in mission schools (Biskup, Jinks & Nelson 1968). The low priority accorded to PNG education by Australian authorities is reflected by the fact that only 8000 pounds per annum was being spent on education as of 1939 (Smith 1975). Churches still have a substantial role in PNG education, with just over 50% per cent of primary schools being run by church groups (Howes et al. 2014).

After the Second World War, the Australian government took a greater interest in PNG education affairs, recognising education as a path towards economic and social development and, in part, as a way of regaining colonial authority in the region (Megarrity 2005; O'Donoghue 2009). Colonial secular education differed from the missionary schools as its goals were more about modernisation and an increased

participation in the cash economy than social cohesion and conversion to Christianity, although, the missionary goals of pacification and civilization equally served the colonial administration as well (Crossley 1990; Smith & Guthrie 1980). Major disagreements emerged at this time about the direction that colonial PNG schooling and curricula should take. On the one hand, education administrators such as W.C. Groves, influenced by post WW2 anthropology,[6] sought a culturally sensitive education system that would maintain a strong indigenous culture (Crossley 1990; Megarrity 2005; O'Donoghue 2009). On the other hand, many Papua New Guinean parents saw village orientated curriculum emphasising practical skills and agriculture as inferior to a more 'metropolitan' style academic education which carried more prestige and would prepare their children for employment in the modern sector (Crossley 1990; O'Donoghue 1993). The contradiction here, as pointed out by Crossley (1990), is that the modern education system is open to criticism as being a form of 'colonial imposition', however, ambitions of creating a more community focused and culturally sensitive school curriculum has been rejected by many Papua New Guineans as backward.

By 1960, only an estimated 25% of school-age children in PNG were participating in primary education and the number of children receiving secondary or tertiary education was negligible (O'Donoghue 2009). Under pressure from the international community the Australian administration increased the number of secondary schools in the 1960s from just 2 to more than 60 (Connell 1997). In addition, the University of Papua New Guinea was established in 1965 to address a lack of Papua New Guinean university graduates (Connell 1997).

By independence in 1975, the proportion of school-age children participating in primary education had increased to 56%, however, the percentage of school-age children attending secondary school was just 12% (Connell 1997). Many constraints to improving education, such as limited school accessibility in rural areas and poor quality teaching persisted post-independence as did the debates on curriculum and school investment.

Post-independence, an emphasis on 'decolonising' the education system from the inherited Australian model led to the creation of an independent system more in line with the needs of rural development (Crossley 1990). This was in part to uphold the principles of the newly formed constitution and partly a reaction against Australian policy, which had ignored traditional skills and knowledge. Primary schools were renamed community schools and a quota system was introduced for secondary schools to ensure a greater representation of rural students. It was argued, especially in the 1986 Matane Report (see UNESCO 2000 for further details), that vocational and technical skills were more relevant than academic curriculum for the majority of children who would be unable to find employment in the formal sector. However, alternatively, it was argued that vocational education merely "reproduced the existing colonial social order" (Crossley 1990, p. 146), and that it would confine children to their existing way of life (Avalos 1993). The tension between adopting a school curriculum that served village and community needs against one that focused on modern economic development and participation in the cash economy remains (Avalos 1993).

School level investment in PNG

From 1945 to 1975, the Australian administration presiding over PNG prioritised primary education investment over secondary and tertiary education (Megarrity 2005). Hasluck, the Australian minister of territories at the time, argued that investment should be focused on primary level education for two main reasons. First, it was thought that this was the most practical approach with so much of the population being illiterate. Second, favouring primary education was thought to be a way of restricting elitism, by limiting the advancement of a small group of Papua New Guineans over the uneducated majority, although, as discussed by Megarrity (2005), a significant minority of the professional and political elite in post-independence PNG completed their secondary education in Australian schools. The majority of students who finished primary school at this time were encouraged to undertake vocational training as there were so few options to continue study at secondary schools.

Since independence, investment policy in PNG has largely adhered to the arguments put forward by Psacharopoulos and the World Bank in general, which favour investment in primary education over secondary and tertiary. Gannicott's (1987) findings on returns to investment in PNG show percent returns for primary education of 29%, 16% for national secondary school and 11% for tertiary, supporting Psacharopoulos's argument that the highest returns occur at the primary school level. However, Gibson and Fatai's (2006) data on private investment in urban schools in PNG finds that returns to investment rise with an additional year for the level of education being considered. Nonetheless, the PNG government has favoured investment in primary over secondary and tertiary education. Between 1976 and 1991, there were no new national high schools established and during the 1980s the number of available places in PNG tertiary institutions actually declined (Weeks 1993). Thus, only a small proportion of the population has secondary or tertiary qualifications. As a consequence, many jobs requiring tertiary qualifications have been filled by overseas workers. Furthermore, it is argued that the small number of secondary and tertiary students has led to poor education standards. For example, Weeks (1993) discusses the 'push up' situation, whereby a lack of competition between students means students are uncritically promoted to the next grade. The recent drive to achieve universal primary education in PNG, in keeping with the MDGs, is further evidence of the prioritisation of the investment in primary education. Although, the policy decision to extend the duration of primary school into grades 7 and 8 has in effect expanded access to secondary school whilst still prioritising investment in primary education.

Current state of education
Examining PNG's main educational indicators suggests a critically underperforming and relatively inefficient school system. The current state of education in PNG is characterised by low levels of educational attainment and literacy, poor school attendance and retention rates, and high levels of gender inequality. The average years of schooling received by people aged 25 years and older is just 3.9 years, which is comparable with the Solomon Islands at 4.5 years, but significantly lower than other regional neighbours like Vanuatu, at 6.7 years, and Fiji, 9.9 years (UNDP

2013a, 2013b; UNDP 2014a, 2014b). PNG also has national literacy rates that are far below the regional averages with just 62.4% of adults being literate compared with 94.4% for the region, and 70.8% of youths compared with the regional average of 98.8% (UNDP 2014d). School enrolment rates are also low with a gross enrolment at primary school level of 74.4% and a secondary rate of just 44.4% (UNDP 2014a). Furthermore, long term school absenteeism (over ten days away from school) has increased from 9% to 18% from 2002 to 2012 (Howes et al. 2014).

PNG has fallen well short of the MDG of all male and female children completing primary education (Grade 8) by the year 2015. PNG is one of the few nations in the East Asia and Pacific region yet to achieve gender equality at primary school level. The gender parity ratio of females to males at a primary level is just 0.93, and 0.90 for secondary level education (DFAT 2012). Although, there has been a substantial increase in female primary school enrolment rates with respect to male enrolment rates (144% compared with 22%) over the decade from 2002 to 2012 (Howes et al. 2014).

At the university level, female enrolment rates have also improved over the last 21 years, although currently female students make up only a minority of the student population in PNG. Gannicott and Avalos (1994) found in 1990 just 23% and 14% of the student population were female at the University of PNG and University of Technology respectively. In 2011, female students accounted for 38% of the total tertiary population (ADB 2012; DFAT 2012), which is still very low by international standards.

Poor female education outcomes across primary, secondary and tertiary education are a major concern due to the fact that female education is a critical demographic outcome. Improving female literacy and education in general is related to many health benefits such as reduced infant mortality and stunting in children. The striking negative correlation between female adult literacy and infant mortality in PNG is shown in Figure 2.1.
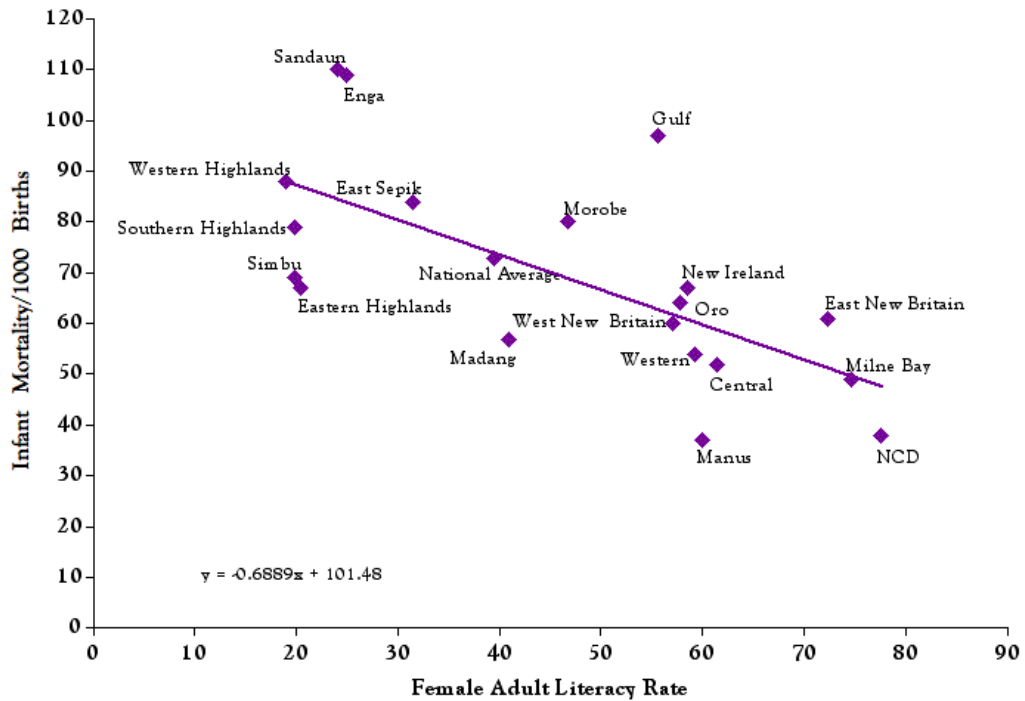
Figure 2.1. Female literacy versus infant mortality, PNG.
Source: NSO (1997).

Figure 2.1 also highlights the significant variation in terms of development between regions in PNG. Uneven development has given an educational advantage to people residing in areas where modern infrastructure is well established such as coastal and urban areas rather than remote regions such as in the highlands, where schools are inaccessible to many (Connell 1997; Gibson 2000; Megarrity 2005; UNDP 2014a). NSO (2013) data shows that over 50% of the highlands population were not progressing past elementary school compared with 20% of the population in urban areas, and Gibson (2001) shows a literacy rate of 85.8% for the National Capital District but just 34.6% for the highlands. Furthermore, it is argued that education inequalities according to gender are more acute in highlands regions (UNDP 2014a).

Barriers to education
There are numerous reasons as to why education programs in PNG have failed. On the supply or 'in school' side, there has been poor/ineffectual management, bureaucracy and a misallocation of funding in the education sector. For example, Blyth (1991) argues that from 1978 to 1988 resources available for education

decreased by as much as 39 per cent. Similarly, per-capita expenditure on education decreased from K31.68 to K26.32 between 1983 and 1991 (National Department of Education 1991). Currently, PNG spends a significant amount (as a percentage of national income) on education compared with other developing nations, and expenditure per student has increased from K159 to K336 over the period from 2001 to 2012 (Gibson & Fatai 2006; Howes et al. 2014). However, the 2013 National Economic and Fiscal Commission report found 16 out of 18 provinces were spending less than the minimum amount required to deliver basic education services (UNDP 2014a). A shortage of competent graduate teachers combined with a high teacher drop-out rate has led to a low teacher to pupil ratio, an indication of poor school quality (which may be exacerbated by the tuition free policy, see below) (UNDP 2014a). Much classroom contact time is also lost through unscheduled school closures, teacher and pupil absences and other disruptions (during fieldwork I encountered a school which had been closed for several days due to a parent threatening teaching staff) (O'Donoghue 1993). Basic school facilities are often poor or lacking, for example, in an estimated 21% of schools there are no permanent classrooms (Howes et al. 2014). Furthermore, other factors such as corruption contribute to poor educational outcomes. Transparency International (2013), report that 47% of PNG survey participants view the education system as either corrupt or highly corrupt, and with good reason. The Anti-Corruption Taskforce asserted that 40 per cent of PNG's development budget was "misused or was unaccounted for" in 2013 (UNDP 2014a, p. 2). Various media reports (e.g. ABC 2013) also suggest that 'leakages' of school funds are relatively common and widespread.

On the demand or 'out of school' side, barriers to educating children include broad issues such as law and order problems, HIV/AIDS, school fee costs, distance from school and seeming irrelevance of education with no commensurate jobs (Connell 1997; UNDP 2014a). The few PNG studies examining intra-household constraints preventing children receiving an education have found parental education levels and the gender of the child to be major determinants of child education levels (Gibson 1999, 2000; Gibson & Rozelle 2004). Gibson (2000) argues that a father's

education is positively correlated with both boys and girls enrolments but interestingly, a mother's education is just correlated with that of the daughters. Regarding the influence of gender, Gibson and Rozelle (2004) find that the addition of male children within a family significantly reduces expenditure on adult goods, whist female children have no impact, indicating gender bias against female children within the household.

Education policy

Over the past two decades there have been several major reforms[7] to the education system to combat poor school attendance and low retention rates, and to achieve the United Nations MDG of universal primary education by 2015. To address high dropout rates at the end of Grades 6 and 10, the PNG education system was restructured in 1995 to delay the finish of primary school from Grade 6 to 8, effectively expanding access to secondary schooling in an attempt to increase retention rates (Avalos 1993; UNESCO 2000). Students now complete three years of elementary education before going to primary school which runs from Grade 3 to 8, while secondary school runs from Grade 9 to 12 (Gibson & Fatai 2006; Guthrie 2012). It is argued that extending primary education to Grade 8 makes economic sense, as community schools are cheaper to run than provincial high schools, and likewise for parents, primary school fees are significantly less than secondary schools fees. In addition, primary schools out number high schools, making them more accessible to more children.

The second major reform to the education system has been the introduction of the Tuition Fee-Free (TFF) education policy, which commenced in 2012, in part honouring a commitment as a party to the Convention on the Rights of a Child (UNDP 2014a). The financial burden for some families sending children to school in PNG is well documented (e.g. ADB 2012; Connell 1997; PNGINA 2012). Thus it has been argued that removing the constraint of school fees for families would boost school attendance rates, especially for girls. The TFF policy provides free tuition[8] from elementary preparation to Grade 10 and a 75% reduction of tuition costs for Grades 11 and 12. Preliminary data from Howes et al. (2014), investigating school

enrolment rates before and after introduction of the TFF policy, found a 17%

increase in total enrolments, but no increase in female enrolment relative to males.

The data also show the proportion of classes with more than 45 students increased

from 13% to 16% from 2011 to 2012, raising concerns over whether the supply of

teachers and school infrastructure will be able to keep pace with increasing

numbers of students (Howes et al. 2014). As this policy was only recently

introduced there is limited data on its impact.

2.8   Individualism and engagement with the market economy

Household studies examining determinants of parental education strategies are

typically limited to investigating decision-making at the intra-household level.

Whilst these studies are useful for conceptualising relationships between household

family members, they neglect the influence of broad processes of social and

economic change. Households do not exist in isolation from the market economy,

and therefore this study takes into account contemporary economic inequalities on

the PNG LSS blocks and the ways in which people engage with capitalism. The

following section provides a brief review of the major literature for understanding

economic and social change related to the influence of the market economy. It

examines the concepts of reciprocity, moral economy, social embeddedness and

possessive individualism as methods for understanding societal change in PNG, by

contrasting and comparing pre-capitalist and market capitalist society. This

discussion is considered relevant to the thesis as it relates to observed changes in

income distribution patterns and education inequalities.

Gift-commodity distinction

One approach to understand social and economic change associated with the

incursion of market capitalism, is through contrasting gift and commodity exchange

practices. Sahlins (1974) influential work on this topic, identifies different types of

exchange, based on the social and moral implications associated with the exchange.

Put simply, generalised or gift exchange practices such as sharing within a family,

are inalienable (or inseparable from the donor) and rely heavily on social relations.

In contrast, market exchange such as financial transactions, operate according to

economic imperatives independent of personal relations. Although a matter of degree rather than kind separates the social implications associated with gift and commodity exchange, scholars have used the theoretical distinctions between them to differentiate the ideology inherent in pre-capitalist and capitalist societies. One of the ways in which this has been done is through discussion of the moral economy.

Moral versus market economies

Scott's influential work, *The Moral Economy of the Peasant*, explains the moral economy as a particular 'ethic' underlying social relations among people earning a subsistence living in non-market societies. Using research from Burma and Vietnam, Scott (1976) argues that the subsistence needs of peasant farmers leads to the formation of particular social relationships, as a type of social insurance or pooling of risk against a precarious existence and unpredictable natural events.

Whilst Scott (1976, p. 6) is careful not to 'romanticise' traditional society and acknowledges that particular behaviour such as the redistribution of wealth is "not so much a product of altruism as of necessity", there is a belief by many that subsistence livelihoods are less exploitative than the market capitalist system for peasant farmers. This Marxist understanding regards market capitalism as a force that undermines and weakens the social contracts and communitarian logic implicit in traditional exchange practices. However, whether people are economically and socially 'worse off' from engaging with a market economy is debatable. Several authors (e.g. Jolly 1987; Kelly 2005; Popkin 1979; Read 1952; Robbins 1994; Strathern 1972, 1982) reject the assumption that pre-capitalist societies are necessarily more egalitarian or less exploitative than market economies, and point to various inequalities that are not unique to modern capitalism. Godelier (1982) noted there were gender inequalities in the Eastern Highlands of PNG, whereby women engaged in subsistence livelihoods were excluded from land ownership and from the manufacturing of salt, the principal means of exchange in the village. Netting (1993) too discusses what he regards as the 'myth' of the egalitarian peasant mode of production. It can therefore be problematic to essentialise either

pre-capitalist or market economies as being inherently more 'moral' than one another. Another way of understanding the underlying social ethic of capitalism is through the concept of possessive individualism.

Possessive individualism

Pre-capitalist and market capitalist societies are contrasted through a distinction between possessive individual and 'dividual' social identity. Macpherson (1962, p. 263) describes the possessive individual as being "[e]ssentially the proprietor of his own person and capacities, for which he owes nothing to society." Thus, the possessive individual is not impeded by social obligations in their pursuit of self-interest, fitting with the demands of the modern capitalist economy. In contrast, is the 'dividual', or a partible person who is defined and constructed according to social relationships. As discussed by Strathern (1988, p. 13), "Melanesian persons are as dividually as they are individually conceived. They contain a generalised sociality within." Many authors (e.g. Mosko 2013; Strathern 1988) argue that the title 'dividual', has more explanatory power to describe indigenous personhood than the concept of the individual, as a person who acts independently of their family and kinship networks. However, there is growing body of research (e.g. LiPuma 2000; Martin 2007; Robbins 2007; Sykes 2007a, 2007b) purporting an increase in possessive individualism in PNG as the cash economy spreads and changes occur with how people view money and money items. In this regard, LiPuma's (2000, p. 151) discussion about 'dividuals' versus individuals is pertinent:

> [t]he Melanesian person, like persons everywhere, has both dividual and individual aspects… It is precisely this individual dimension of Melanesian personhood, traditionally subordinate to the dividual image of the person, for the most part ideologically unarticulated, almost invisible in the context of 'traditional' social practice, that is now beginning to emerge with modernity.

Therefore, context is important. As noted by Curry and Koczberski (2012), the socio-economic environment of the LSS blocks differs from that of the customary context of the village; kinship is weaker, land tenure is individualised and workers are paid for their labour according to market values. In this respect, it can be argued that

possessive individualism has some explanatory power for understanding the identity of LSS smallholders in relation to market capitalism. A different way in which to understand how people engage with capitalism is through Polanyi's concept of social embeddedness.

Social embeddedness

Polanyi uses the concept of social embeddedness to make the point that all exchange practices rely on social relations and that the economy cannot be separate from society. As discussed by Polanyi (1944, p. 48):

> [m]an's economy, as a rule, is submerged in his social relationships. He does not act so as to safeguard his individual interest in the possession of material goods; he acts so as to safeguard his social standing, his social claims, his social assets. He values material goods only in so far as they serve this end.

Thus, all transactions are influenced by the social norms of the culture in which they take place. This perspective on the relationship between the 'social' and capitalism is useful as it provides another way of understanding the intersections of these seeming dichotomies. For example, evidence from PNG shows that contrary to structural (e.g. Neo-Marxist) assumptions about the inevitable outcomes of modernisation, the introduction of capitalism has not completely eroded traditional social relations based upon cooperation and reciprocity. Several authors (e.g. Curry & Koczberski 2012, 2013; LiPuma 2000; Mosko 2013) discuss ways in which indigenous social norms interact with capitalism to produce outcomes that in fact enhance indigenous values. Therefore, it is possible that there are multiple logics operating at the same time.

2.9   Conclusion

This chapter has reviewed the major literature on barriers to education at macro and micro levels in developing nations in general and PNG in particular. It has examined the way in which education is realised within development theory as well as various household models for understanding parental investment strategies in

education. In addition, the chapter has looked at broad debates surrounding the interaction between economy and society as a method for understanding social and economic change. In doing so, the thesis recognises the complexity of factors operating on different scales and according to multiple logics that influence investment strategies in education.

Notes

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[1] Although human capital encompasses the inputs of both health and education the discussion in this thesis focuses solely on education.

[2] In a farming context, productivity is typically measured by a farmer's physical output rather than earnings (Kingdon 2006).

[3] Calculation of the HDI has changed several times since its inception in 1990. For example, the method for measuring education has changed from using literacy initially to a combination of literacy and years of schooling completed, then literacy and enrolment ratios. Currently, the education index takes into account the expected years of schooling for children along with average number of years of schooling for adults (UNDP 2014a; Veenhoven 1996).

[4] For further details on how each index is calculated see UNDP (2014c).

[5] Several authors (e.g. Behrman & Rosenweig 2002; Lambert, Ravallion & Van de Walle 2014) argue there are methodological issues associated with differentiating between a mother and a father's effect on children's education. Lambert, Ravallion and Van de Walle (2014), note that women in studies are typically married, and their welfare is to some degree dependent on that of their husbands, and Behrman and Rosenweig (2002) argue that factors such as 'assortative mating', whereby educated women are likely to marry educated men, may influence education

correlations between women and children. Whether male and female parents have separate incomes or whether the husband controls all the household income also impacts on the correlation between parent's and children's education (for example, a mother's education may count for little in the way of the children's education if it is the father who controls household spending and whose school fees get paid).

[6] Post World War 2, Social Anthropology was heavily influenced by Franz Boas's work on cultural relativism. This thinking recognised that all cultures are equal but different, and rejected previous notions of social evolution (Hendry 1999).
In the context of anti-colonial sentiments and many developing nations seeking independence, anthropologists such as Groves, argued that development policy should preserve indigenous culture rather than allow it to become subsumed by Western culture.

[7] Curriculum reforms, such as Outcome Based Education are not discussed as they are not directly relevant to the thesis.

[8] The TFF policy covers tuition fees only, parents are still required to pay project fees that cover various school costs. Anecdotal evidence suggests project fees are a significant cost in some regions. For example, Kolo (2014) reported as of February 2014, students in the Western Highlands Province were still being charged between K200 and K500 in annual project fees.

CHAPTER 3

Study site and research method

3.1   Introduction

This chapter provides a background to the study sites and presents the research framework used in this thesis. The first part of the chapter gives an overview of the oil palm industry in PNG, before discussing the major characteristics of the LSS blocks in the three fieldwork areas, Hoskins, Bialla and Popondetta, thereby, providing the demographic and socio-economic context for the following chapters. The second part of the chapter describes the research methods used, and justifies how the semi-structured survey approach chosen meets the objectives of the thesis defined in Chapter 1. The chapter is organised as follows: Section 3.2 gives background information on the study sites as well as the LSS. Section 3.3 discusses the research framework in terms of the method chosen, survey design, sampling strategy and the research team. Section 3.4 discusses reflexivity and tensions surrounding conducting scientific research in a social context, while Section 3.5 deliberates on the major ethical issues that had to be addressed when designing the survey and carrying out fieldwork. Section 3.6 gives a summary of my fieldwork experience and Sections 3.7 and 3.8 describe and review the process of data entry and analysis. Finally, Section 3.9 discusses various issues encountered while conducting fieldwork that limited the amount or type of data that could be collected.

3.2   Study site

Primary data were collected on LSS blocks in the oil palm growing regions of Hoskins and Bialla in WNBP and Popondetta in Oro province, PNG (Figure 3.1). These three

Figure 3.1. Papua New Guinea.
Source: ANU (2013).

locations were chosen because they are the major oil palm growing regions in PNG in terms of area of plantings and total production, and the only locations where LSSs were established.[1] In addition, there is an established working relationship between my supervisors and staff at the PNG Oil Palm Research Association (OPRA) and the Oil Palm Industry Corporation (OPIC) that facilitated greater access to the blocks than would have otherwise been possible. This was particularly important when organising the fieldwork.

As discussed in Chapter 1, PNGs oil palm industry was first established in the Hoskins/Kimbe region of WNBP. In establishing the LSS, land was bought from customary land owners and converted to state agricultural leases, which was then leased to smallholders on 99 year leases (Bue 2013; Koczberski, Curry & Gibson 2001). Following the success of the Hoskins scheme, commercial plantings of oil palm were developed in Bialla in 1972, on alienated state land on the sparsely populated North coast of WNBP. Subsequently, the Popondetta oil palm scheme was established in 1976, replacing an existing resettlement scheme based on cocoa (Grieve 1986; Koczberski, Curry & Gibson 2001). As of 2012, there were 2,576 LSS blocks in Hoskins, 1,660 in Bialla and 1,128 in Popondetta (Orrell 2012).

Background

The oil palm scheme in the three project areas is based upon a nucleus estate-smallholder model which consists of an oil palm mill, company estates and LSS smallholder blocks (Koczberski, Curry & Gibson 2001). Oil palm fruit is harvested on a 14 day cycle, with fresh fruit bunches stacked in nets on the roadside to be collected by the company and then processed at local mills (see Plate 3.1 – 3.3). At the time the LSSs were established, the main goals of the smallholder oil palm scheme were to: 1) relocate people from over populated areas, such as East Sepik and Simbu, to areas where they could lease 'unused' land and gain employment; 2) promote individualisation of land tenure; 3) increase agricultural production on otherwise 'unused' land; and 4) increase and diversify cash crops available for export (Hulme 1983). Thus, the LSS bears the hallmarks of a major modernisation project. The goal for farmers was to become modern entrepreneurs whist living in a

modern environment with access to institutions such as schools and health care facilities. Indeed, a major appeal of the LSS for farmers was the notion that they would become *bisnis* men through the management of a block and engagement with the market economy (Ploeg 1972). This move was to be a major departure from traditional village life and social networks (the nuclear family was officially regarded as the primary and social economic unit for each block).

There are three groups of smallholders: 1) LSS smallholders residing on state leasehold land; 2) Village Oil Palm (VOP) smallholders residing on their own customary land; and 3) Customary Rights Purchase (CRP) smallholders which reside on 2 or 4 ha blocks located on customary land that have been 'purchased' from local land owners (typically by immigrants to the area) in order to plant oil palm.

Payment for oil palm fruit production is recorded on a payment card for financial reimbursement on payday. The primary card is called the Papa Card which is typically owned and controlled by the male head of the block (usually the original leaseholder). If the Papa Card is the only payment card on the block, the head of the block may retain a disproportionate share of the income, thereby disadvantaging women and youth. In part, to address this issue, another payment card called the Mama Card was introduced in 1997, which pays women separately for harvesting loose oil palm fruit,[2] giving women some financial autonomy from the 'boss' of the block. More recently, a third payment card has been introduced called the Mobile Card at Bialla and the 'C' card at Hoskins. The cards remunerate smallholders for maintenance and harvesting on the oil palm blocks. Unlike the Papa and Mama Cards, the Mobile Card at Bialla can be used on any block, encouraging labour mobility between blocks.

Plate 3.1. Oil palm fresh fruit bunches on the side of the road for collection, Popondetta.

Plate 3.2. Man sorting oil palm *lus frut* into net, Hoskins.

Plate 3.3. Company truck weighing oil palm harvest before transporting to mill, Hoskins.

3.2.1   LSS income strategies

LSS smallholders pursue a diverse range of income activities in addition to oil palm (Figure 3.2) (Plate 3.4, 3.5), as a strategy to increase household income resilience and decrease vulnerability to various risks and shocks, such as changing access to markets and oil palm price fluctuations. Within the development literature (e.g. Chambers & Conway 1992; Ellis 1998, 2000), it is well documented that people engage in a diverse range of incomes as a risk management strategy, spreading the risk of income failure over several sources. On the LSS blocks, limited opportunities for formal sector employment, increasing difficulties in migrating to other regions for work (Koczberski, Curry & Gibson 2001) and fluctuating oil palm prices, mean smallholders are forced to pursue a range of income strategies to meet household needs.

The vast majority of smallholder households (approximately 80%) are involved in the selling of fresh produce at local markets (Figure 3.2). It is well known that garden food[3] such as root crops and leafy green vegetables are an important commodity item and subsistence food source for LSS smallholders, especially when

oil palm prices are low. In this respect, smallholders are adaptive in the livelihoods they pursue, and may invest more time in one over the other to maximise income. For example, there was a decrease in the proportion of LSS smallholders selling garden foods at the local markets in Kimbe in 2008, partly due to smallholders taking advantage of high oil palm prices at the time (Ryan 2009).

Almost three quarters of surveyed households were also involved in selling betel nut, which is the most lucrative domestic cash crop in PNG (Sharp 2013). Once reserved for just ceremonial use, the consumption of betel nut is now ubiquitous in PNG. Betel nut can be grown in dense plots around houses and therefore does not complete for land with other crops. Some smallholders are buying betel nut in bulk and reselling it at local markets. Another important garden item is tobacco, which is a profitable and easy to transport crop considering its volume to weight ratio. Significantly, almost one-third of smallholder households receive income from re-selling store items, such as batteries and phone cards. Previous research indicates there is an increasing variety of store goods sold at the local markets. A 2008 survey of local markets in the Hoskins/Kimbe area found there were 31 types of store goods which were not sold at the markets in 2000 (Ryan 2009). For those smallholder households with limited access to land for food gardens, reselling store items is an important and relatively easy way (compared to labour intensive growing of root crops) to earn cash. Reselling goods is also a fast way to earn cash, as smallholders don't have to wait for payday, or for their turn at harvesting oil palm if practising *makim mun* production (see below for further details). It might be expected that the proportion of LSS smallholders selling non-garden items such as betel nut and store goods will increase as the population rises and available land for food gardens decreases.

A significant proportion of households on the LSS blocks are also engaged in off-block income sources such as wage employment (approximately 28%) and hired labour (approximately 38%). This is perhaps to be expected, as increasing competition over oil palm income forces smallholders to look for off-block income earning opportunities.
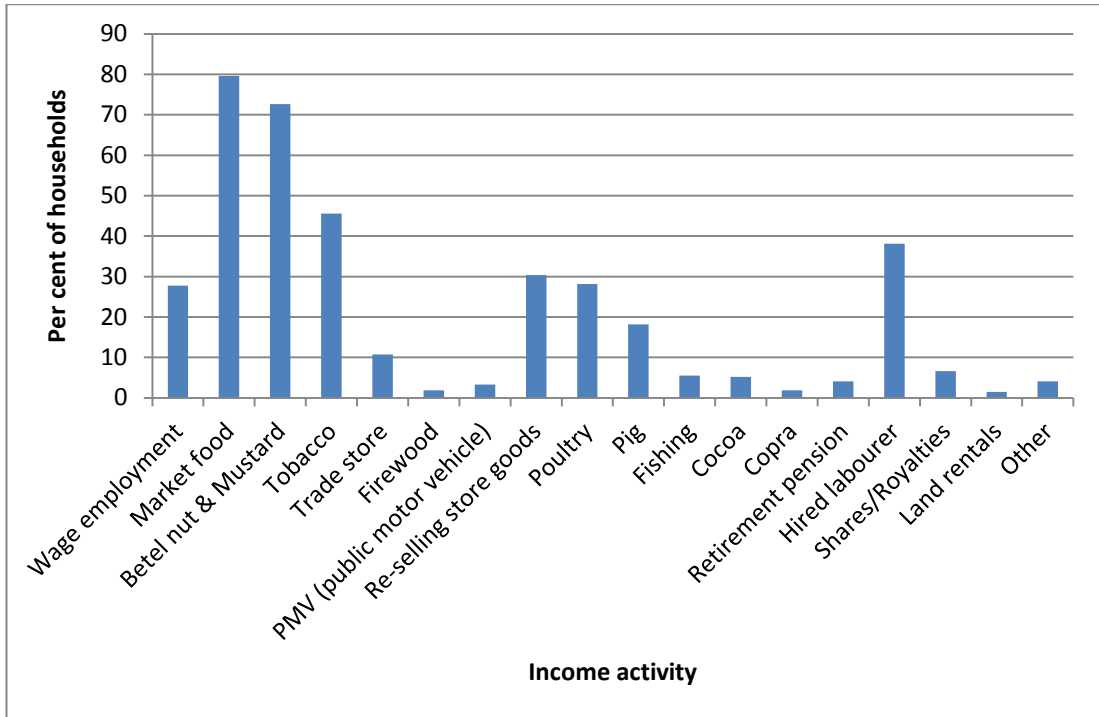
Figure 3.2. Proportion of LSS households engaged in various income activities (n = 270).

Plate 3.4. Small on-block food garden, Hoskins.

Plate 3.5. Chicken coop, Popondetta.

3.3   Research framework

The research strategy employed was determined by the objectives set out in Chapter 1. As the research questions ask about quantitative differences in educational attainment amongst various categories of people, it follows that the method of enquiry was one based on questionnaire surveys, and that the analysis used descriptive and inferential statistics. That is, the type of data and the methods of collection and analysis, were determined by the need to describe various characteristics of a particular group of people.

The research methods used in this thesis was informed by a post-positivist[4] epistemology and its set of assumptions about what counts as knowledge and means to 'knowing.' The relationship between research paradigms and methods is discussed by Usher (1997, p. 4) as being "[w]hat questions can be asked. What can be researched, what is an appropriate methodology, what constitutes data, and what kind of tests enable beliefs to be counted as knowledge." The decision to undertake survey research was based on the research question rather than the philosophical discourse that it belonged to, even though positions on the nature of

social reality and how it can be known precede methodological choices in a theoretical sense. It is beyond the scope of this thesis to review ontological debates, but it is necessary to justify the research method used.

3.3.1 Survey as a research method

This thesis uses De Vaus's (2002, p. 7) definition of surveys being a "[s]tructured approach to data collection and analysis …that … *rely* on a particular logic of analysis." Considering the specific approach to data collection and analysis, surveys were the most appropriate research method for meeting the aims of the research for four main reasons. First, surveys were suitable for collecting variable demographic information such as age and education levels, which made up the bulk of the primary data used. The form of data collected through surveys, namely the same type of variable data across a set of cases, made it possible to describe the characteristics of the sample using statistical analysis. Second, a sample survey allowed inferences to be made about the population from which the sample was drawn. This was important, as it was not feasible to visit every LSS block and yet the research results needed to be relevant for the greater population of oil palm smallholders and not just the sample population (for more on the sampling strategy see Section 3.3.3). Third, surveys allowed for the collection of standardised data that could be compared with other data sets. For example, collecting and analysing personal education data facilitated statistical comparisons between the sample data and national census data. Fourth, there were practical reasons that made surveys an appropriate method. Surveys are considered an 'economical' research method (see Creswell 2009, p. 146) that can make the most of time in the field. As my fieldwork period was limited to approximately two weeks in each of the three field sites, surveys were a relatively efficient method of collecting a significant amount of data in a short amount of time. In addition, I would argue that surveys allowed for greater reliability of data collection when the interviewer had limited understanding of the local language, as was the case with my research.[5] Much of the survey consisted of relatively simple factual questions, which required less cultural knowledge than a participatory method such as ethnography.

As with all research methods, surveys are limited to collecting a certain type of information. Survey and positivist approaches in general, are criticised on such grounds as being unimaginative, impersonal and unable to adequately capture the rich complexity of reality with just 'measures' (Berg & Lune 2012; De Vaus 2002; Hurst 2008). It is true that closed questions are unsuitable for getting to the heart of 'why' questions, but this, I would suggest, is an issue with the method not matching the research objectives rather than a problem with the method in itself. In my surveys, open questions that collected qualitative data were also asked and these were important to find out what a participant thought about certain topics or family issues in their own words.

3.3.2   Survey design

In the most basic sense, survey design is just a matter of translating the research objectives into a series of questions that will answer the research question, however in practice, there are a number of factors to consider. Questionnaire survey questions must be reliable, relevant and elicit a high response rate (Brace 2009). To achieve this, consideration was given to the type of questions asked, the wording, the order of questions and the length of the survey.

Careful attention was given to the level and type of language used so as to have questions appropriate for the age, education and cultural traits of the respondents. Consideration was also given to what sort of information the smallholders were likely to know. For example, asking smallholders how much they earn annually would likely elicit incorrect responses as most people cannot recall accurately that sort of information, especially given that most LSS smallholders have a range of income sources apart from oil palm. Questions chosen were also designed to be clear and unambiguous for both the participants and the researchers.

The order of questions was also important. Relatively simple 'factual' questions were placed at the beginning of the survey before more potentially difficult questions, although as Box 3.1 illustrates this was not always the case. Ordering questions in this way can build a degree of rapport with the respondents prior to raising sensitive topics (Berg & Lune 2012). When constructing the surveys,

questions that were thought to be potentially difficult, such as those regarding reasons why children were not attending school, were asked in the middle of the surveys. Of course, answers were not always given in the same order as the given questions, and sometimes respondents told stories that inadvertently answered multiple questions at the same time. In addition, the surveys were designed so they could be completed in 40 minutes or less, so as to minimise losing the interest of the participants. The survey questionnaire collected data on:

- Household demographics
- Education levels
- Income sources
- Production/harvesting strategies pursued
- Block management
- Extension services

Box   3.1   Interview technique

One of the first survey questions asked was the participant's age. This seemingly straightforward question proved at times to be a real challenge to answer, as well as a great source of laughter. Elderly men in particular gave some wildly inaccurate answers, such as saying they were in their thirties when they must have been at least sixty. Sometimes when this happened a child was sent away to try and locate a birth certificate or official document. At other times, we tried to deduce a person's age by asking questions such as, whether they were born before or after the war, or before or after independence etc. The whole process of deduction was very amusing for everyone involved and often 'broke the ice' putting both the participants and interviewer at ease.

3.3.3   Research team

To make the most of the time spent in the field and to help deal with any cultural and language barriers encountered, at each site, I employed several (between 3 and 5) local research assistants and worked alongside staff members from PNG OPRA and OPIC to assist with data collection (see Plate 3.6). My two supervisors, with many years' experience conducting fieldwork in PNG accompanied the research

team for the first couple of days at each site, and were able to offer valuable advice and guidance for how to carry out fieldwork of this kind.

Plate 3.6. Research team, Popondetta.

PNG OPRA staff members, who were involved with the research from an early stage, were knowledgeable and helpful when it came time to conduct the surveys. Extension officers from OPIC provided 'local knowledge' when in the field and helped by notifying block owners of my visit and by giving directions to the blocks. The research assistants were usually known by the PNG OPRA or OPIC staff and all had a minimum of Grade 10 education and some knowledge of the oil palm industry.

There were a number of issues to consider with respect to the research team. Where the assistants were concerned, it was important to check that they were competent enough to assist with the surveys. As noted by Apentiik and Parpart (2006), a good assistant can make or break one's research and one's relations within the community. As the surveys were carried out by a number of people on

the research team simple questions went some way to increase the reliability of the surveys, that is, questions should get consistent responses during the course of the research.

3.3.4 Sampling strategy

This study required information about the smallholder population living on LSS blocks in three separate oil palm growing regions of Papua New Guinea. The smallholder population in question was a large, diffuse group of people who could only be surveyed using a face-to-face method, therefore, the study necessitated a sample of the population to be surveyed. A correctly designed representative sample allows inferences about a large population to be made from a smaller one with only a minimal loss of accuracy (Balnaves & Caputi 2012; Berg & Lune 2012; De Vaus 2002; Gorard 2004). A complete random sample where each potential survey participant from the target population has a non-zero chance of being selected is in theory the ideal sampling strategy as it eliminates researcher bias and allows for statistical tests such as 'confidence interval' to check the accuracy of the sample (Gorard 2004). However, random sampling applied to a large target population is likely to produce a scattered sample, which would be impractical for this study given the difficulty of reaching many of the blocks and the limited fieldwork time. Furthermore, a simple random sample relies on having access to a complete and up-to-date list of the entire target population, which was not available for this research.

The sampling strategy used for this study is best described as disproportionate stratified random sampling (see Balnaves & Caputi 2012, p. 94 for a summary of sampling types). The initial sampling frame used was a list provided by OPIC[6] containing 100 blocks in each of the three project areas. The provided list had been generated by stratifying the larger population by blocks with 2 or more households residing on them and then randomly selecting blocks from this subset. The sample of 100 blocks per area was further reduced by randomly selecting 30 blocks, so as to meet the target of 90 households per area (assuming approximately 3 households per block and therefore 90 households in total). Using this particular sampling

method was advantageous for two main reasons. Firstly, the stratified sample ensured that blocks containing a number of households would be included in the data collection. Blocks with three or more households were selected so that population pressure and differences between households on multiple household blocks could be examined. Secondly, the sample of blocks had been used for a previous study so it was known the blocks in the sampling frame could be physically reached and that the people residing on them would be more than likely to participate in the research.

In the end, as with most research of this kind, the strategy used was a compromise between the representativeness of the sample and what was practically possible given time and budget limitations. And in practice, the 90 blocks to be sampled were not exactly the same 90 blocks that were surveyed due to various unexpected events (see Section 3.6 for further details). However, differences between the planned and actual sample were not considered large enough to significantly affect the external validity of the sample.

3.3.5 Sample size

Authors De Vaus (2002) and Gorard (2004) suggest that the size of a chosen sample is determined by a number of factors including: accuracy required, variability within the population, number of variables to be analysed and the duration and cost of fieldwork. Provided the sample is drawn from a representative group, the accuracy of a sample increases with the number of cases. In other words, the larger the sample size, the more confident we can be that it is representative of the larger target population (De Vaus 2002). However, an increase in accuracy is more substantial (and easier to affect) when dealing with small sample sizes; the rule is the sampling size has to quadruple to halve the sampling error.[7] For a medium scale study such as this one (less than 300 surveys total) a relatively small increase in sample size can significantly improve the accuracy of the sample, and for this reason as many surveys were conducted as possible.

The sample size should be considered in relation to the population's variability for key variables in the study (Gorard 2004). A population where most answers are the same does not require as large a sample as a population with large variability in order to achieve the same level of accuracy. In practice, the variability of answers can be difficult (if not impossible) to ascertain beforehand and it therefore becomes problematic to try and design the sample size from this. For this reason, variability did not factor into the chosen sample size for this study.

It is also the case that investigating a large number of subgroups within the sample demands a large number of initial cases. For example, if the results were filtered according to only males residing on LSS blocks in a particular area, aged between 6 and 13 and who attended school, then the initial sample would need to be large enough so that the final count number is not insignificantly small (e.g. less than 20 cases). In my experience, this is one of the main reasons to make the sample size as large as possible as the total number of cases determines how 'deep' you can investigate the data.

In addition, there are other reasons why the sample should be as large as possible. Fieldwork is rarely conducted without mistakes and when it comes time for data entry it is likely that some survey answers will not be able to be used due to being incorrectly answered or unintelligible. For this reason it is better to have more cases than less in the event that some answers are unusable.

Thus, the sample size chosen was influenced by a combination of statistical considerations and practical limitations such as the time available. A total of 90 households per study area (270 in total) was proposed as a large enough sample to make statistically significant inferences about the target population. It was predicted that each survey would take approximately 1.5 hours to complete (including travel time, introductions and explanation of the study, informal discussion following the survey, etc.) and that the research team could conduct 3 surveys simultaneously. This would mean up to 15 surveys could be conducted working a 7.5 hour day and therefore 90 surveys could be conducted in 6 days.

Adding the time needed to mobilise the research team, organise transport, test out the surveys, and check the survey data, etc., it was decided that 2 weeks in the field in each area (6 weeks total excluding travel time to and from PNG) would be sufficient. Of course, the cost of 6 weeks in the field had to be within the budget, which included the cost of flights, a visa, travel insurance, accommodation and payment of the research assistants. In practice, fieldwork did not proceed like clockwork and anywhere between 1 and 25 surveys per day were conducted, depending on weather conditions, availability of the households, availability of transport, etc.

3.3.6 Unit of analysis

Another consideration when planning research is choosing the appropriate unit of analysis. Within development studies, the household is often considered the basic unit of analysis, although there are a number of assumptions made with this approach. Becker's (1976) definition of a household as 'one pot' under 'one roof,' understands the household as a single social unit operating in the same way as a rational actor (fitting with the unitary household model discussed in Chapter 2). The consequences of conducting research at the household level are that individual interests, decision-making and authority, may not be thoroughly investigated. However, alternatively focusing on the individual outside of the household can be misguided, as discussed by Rigg (2003, p. 199) "most people, after all, belong to households and understanding individuals' actions can usually only be achieved by embedding those actions in the wider context of the household." The difficulty therefore can be trying to capture some of the intra-household power dynamics whilst also having a practical research strategy.

For this research, the head of the household (usually but not always male) was interviewed, but if this could not be achieved we would interview the next most senior person. This was also the only practical survey strategy given the limited time available, the need to speak to the household head to be culturally respectful, and to avoid undesirable consequences of surveying more than one household member such as doubling up of data. The head of each household was also chosen because

they typically know the most about the leasehold information, management matters and the allocation of resources on the blocks. Preferably, all surveys were conducted with the wife or the husband present, although this was not always possible. Consequently, the male or female household head present acted as the spokesperson for the entire household, however, as information was collected about individuals (e.g. individual education levels), but within the context of the household, the results data can be presented at the level of the individual, the household or a wider category still.

3.4   Reflexivity

The primary data collected were mainly quantitative data. This might suggest that a discussion on reflexivity is unnecessary, as reflexivity is typically discussed where there is a focus on the research itself and the interpretation of events as opposed to more 'objective' research where the attention is on the methods and outcomes (Usher 1997). However, the notion of a value neutral researcher who studies the social world as an external investigator has been increasingly seen as flawed if not an impossible ideal. As discussed by a number of research scholars (e.g. Cousin 2010; Dillard 2000; Hurst 2008; Mullings 1999; Naples 1996; Rubin & Rubin 1995; Savin-Baden & Major 2010) our knowledge as researchers is mediated and interpreted from a particular 'stance' and language, and therefore there is no such thing as a completely objective social researcher. For this reason it is necessary that I at least acknowledge reflexivity, or how I am 'positioned' within the research and consider how this may affect the quality of data I collect.

My identity as a white male from Australia influenced my particular view of the world and the 'cultural lens' through which I interpreted research participants' stories. Though this was my fourth visit to PNG, my *tok-pisin* speaking skills were still basic and I needed a translator when conducting surveys. When participants answered short answer questions I sometimes wondered about what meanings may have been lost in translation and about whether I was misrepresenting the participants in some way by filtering their responses into something I could understand, and that fit the framing of the study.

Moreover, my status as an 'outsider' influenced the way in which research participants perceived me and the quality of information they gave. Differences between myself and the participants in terms of ethnicity, culture, socio-economic status, gender and other identifiers meant it was not only important to reflect on my own positioning within the research but to also consider how best to navigate any power imbalances between myself and participants that may have affected the kind of responses I received. Much has been written on the advantages/disadvantages of an 'insider' or 'outsider' status when conducting research (e.g. Bhattacharya 2007; Herod 1999; Hurst 2008; Momsen 2006; Mullings 1999; Sidaway 1992). It is argued that being an 'insider' and having a shared cultural knowledge with participants allows for a deeper understanding between the researcher and participants that enables a 'truer' account of a situation. Alternatively, it is also argued an 'outsider' status can be desirable as the distance between the researcher and participants allows for a degree of objectivity and impartiality in observing events.

In the case of my own research, I was of course unable to change my status as an 'outsider' on the blocks I visited. However, perhaps the important question to ask is not whether the researcher must come from the racial or cultural community under study but what actions they are taking to address potential power imbalances between themselves and the participants. As discussed by Milner (2007, p. 388), "[r]esearchers should be actively engaged, thoughtful, and forthright regarding tensions that can surface when conducting research where issues of race and culture are concerned." I sought to minimise the influence of unequal power relations and possible misrepresentation between myself and participants in a number of ways.

Firstly, data were collected using semi-structured surveys. Surveys typically gather simple facts and do not require the same level of cultural knowledge or language proficiency as other methods such as ethnography. Therefore, the use of surveys was commensurate with my experience as a researcher. Secondly, the survey questions were designed in collaboration with local research assistants and

constructed to be culturally sensitive and appropriate to participants' education levels in the type of language and questions asked (see Section 3.3.2 for further details). Thirdly, the research team was a diverse group in terms of age, gender and ethnicity and consisted of both 'insiders' (some of the local researchers lived on or owned oil palm blocks) and 'outsiders.' This allowed for allocating particular researchers with certain participants according to who they were most likely to be comfortable with. For example, female researchers could survey female heads of households while I would survey male smallholders who spoke English. 'Tailoring' the surveying strategy in this way rather than using a one size fits all approach went some way to building trust and facilitating understanding between the researcher and the participants. Finally, at the end of each day I took advantage of my local researcher's knowledge to ask clarifying questions on issues which I felt I may not have understood clearly or misinterpreted.

3.5   Ethics

Conducting social research in PNG has allowed me access to personal information such as peoples' family relations, education levels and livelihoods pursued. It therefore follows that with this access comes an ethical responsibility to the participants in the research to ensure their rights, privacy and welfare are not undermined. Most ethical guidelines (e.g. Berg & Lune 2012; De Vaus 2002; Neuman 2006) emphasise that researchers must at least adhere to the rules of voluntary participation, informed consent, no harm, confidentiality and privacy. In addition to these guidelines, research for this thesis was subject to approval from the Curtin Human Research Ethics Committee and the code of ethics set out in the Australian national statement on ethical conduct in human research.

I addressed ethical issues relating to the research in the following ways. All participation in the research was voluntary, people had the choice of whether or not they wished to partake in the surveys. When meeting people I would explain who I was, the objectives and purpose of the research and the type of questions that would be asked. After this people were asked whether they wished to participate in the study or not. Getting verbal permission to conduct the surveys was the only way to address the issue of consent as many people only had basic

literacy skills and could not understand written information. Furthermore, Papua New Guineans are not used to signing documents unless they are, for example, legal papers, and therefore would be suspicious of signing anything (although information sheets and consent forms were still available, see Appendix 1 and 2). Fortunately for myself, the vast majority of people agreed to participate in the surveys, and in fact several people from blocks that were not part of the sample approached members of my research team and asked if they could be included in the study. As the number of people who declined (or wished to be included) in the study was relatively small it did not significantly change the original sampling strategy.

As discussed in Section 3.3.2, the surveys were designed to be appropriate to participants' education levels and sensitive to their cultural practices in order to minimise any potential stress or embarrassment. This went some way to ensure that the research process caused 'no harm' to participants. However, some authors (e.g. Sidaway 1992) argue that development researchers must go beyond the fundamental ethic of 'doing no harm' and consider what benefit the study will be to the participants and the host country in general. This was a question I contemplated before I left for fieldwork and one I felt important to have clear in my mind. If participants asked how their information and stories were to be used I needed to be able to give them an honest answer as well as be realistic about what I thought the study could achieve. Some farmers asked about what could be done to improve roads or other infrastructure near their blocks. In these instances it was important not to make false promises or to commit to causes over which I had no control. Another consideration was who would be able to access the results of the research. First and foremost, I had an obligation to protect the privacy of the participants and this was addressed by keeping the completed survey forms in a secure location and by coding people's names as ID numbers when creating the database. However, I was also part of a research team conducting the research and I needed to balance the responsibility of the participant's privacy with the commitment to share information with the local researchers. The idea that I would travel to Papua New Guinea to conduct fieldwork then take all the data home to analyse without

including the local researchers calls to mind 'one direction' type studies from colonial times that reinforce unequal power relations between the researcher and the host nation (see Sidaway 1992 for a discussion on this matter). For this reason I kept members of the research team working for PNG OPRA involved with the research and up-to-date with the findings as they were becoming available. The PNG OPRA staff are subject to ethical guidelines regarding the protection of personal identities so there is no conflict with privacy or confidentiality.

3.6   Fieldwork from 30th of April to 13th of June 2012

Fieldwork was conducted in two stages: 1) workshops were held with extension officers; and 2) smallholder survey questionnaires were carried out. The first step of the fieldwork was to conduct workshops with OPIC in the three project areas of Hoskins, Bialla and Popondetta. The aims of the workshops were to:

- Inform OPIC of the study.

- Identify issues related to education and extension.

- Gather information on the major demographic and socio-economic factors observed on the LSS blocks.

- Gather information to inform the design of the smallholder household surveys.

The workshops were facilitated by members of the research team and attended by OPIC extension officers and divisional managers. In the workshops OPIC staff were separated into small groups to answer a number of questions, before a general discussion and presentation was had.[8]

Once a draft survey had been completed, a pilot study of 12 people was conducted to test the survey questions for any problems and to familiarise the research team with the surveys (the data from these 12 surveys were used in the final results). In actuality, revising the survey was an ongoing process during fieldwork as questions that did not elicit much of a response were removed while others were added to gather more information on particular subjects. For example, when it was found that some smallholders could access the internet using their mobile phones the

question "does your mobile phone have internet access?" was added to the survey questionnaire.

Once in the field, it took a while to become used to the routine of gaining access to the blocks and the unfamiliar way of meeting and interviewing people (see Box 3.2). I remember initially feeling uneasy about wandering uninvited onto people's blocks (there were no front doors to knock on) clipboard in hand to announce the purpose of our visit. At times, people would be working in the gardens or woken from a sleep, which could make the research seem intrusive. However, despite my 'outsider' status, or perhaps because of it, I found I was warmly received by the vast majority of people I visited.

Box   3.2   Fieldwork environment

> Early on during fieldwork I remember thinking, whilst sitting on an upturned bucket under a low shelter with a burning log blowing smoke in my eyes while sand flies bit my legs, pigs sniffed my socks, and roosters crowed as I would go to speak, I can't work under these conditions! But as time went on, I came to expect and enjoy the seeming chaos of the blocks, and the thought of an office work environment seemed dreary in comparison.

We tried to visit the blocks as early as possible as many smallholders would go to their gardens or to town by mid-morning (see Section 3.9 for constraints on accessing the blocks). In most instances the research assistants were picked up on the way to the blocks, and I was always amazed at how we could find people (or they would find us) when the designated meeting places, sometimes just described as 'town,' seemed very vague in my mind. When arriving at a block the research assistants of OPIC and PNG OPRA proved invaluable, navigating non-sign posted, potholed paths far from the main roads. The original sampling strategy was adhered to as closely as possible, however, in some instances there were no people to survey on the designated blocks and so we relied on local knowledge to find suitable blocks. On these occasions the sampling approach resembled a snowball strategy whereby smallholders would suggest other densely populated blocks that could be surveyed, who in turn would suggest other blocks, and so on. Obviously

this has the potential to change the external validity of the sample, however as this strategy was practised on only a few blocks it was deemed not to have significantly affected the representativeness of the sample.

Each survey took approximately 30-50 minutes to complete depending on the interviewee. Apart from the information collected from surveys, additional qualitative data was collected during short discussions before, during and after the surveys. These informal discussions on a range of issues gave greater depth and meaning to much of the quantitative data, and strengthened understanding on income and education constraints for smallholders. Typically, older participants gave longer answers than younger people and men said more on the topics regarding block management than women (which is revealing in itself). The 'good' surveys were when I not only filled in all of the answers, but when I had to write in the margins and the back of the sheets to record all the information. As multiple households on each block were surveyed there was a range of perspectives given about the major issues confronting smallholders. In fact, there was usually no shortage of people willing to be surveyed and in some instances curious neighbours began following the research team and volunteered their time to be surveyed next. In total, 279 LSS households were surveyed: 96 households in Bialla, 91 in Hoskins and 92 in Popondetta.

3.7   Data entry

At the end of each day's fieldwork, completed survey forms were checked by the research team to identify any errors and potential problems as soon as possible. For example, determining whether a blank answer means '0' or 'no response' or something else, is easier to sort out at the time with the interviewer rather than once you are home. After the survey forms had been 'cleaned' they were coded and entered into a database. Microsoft Excel was chosen as the database application to be used for several reasons. Firstly, Excel is powerful enough for the type of statistical analysis I intended on using. Secondly, it is also the database that I had the most experience with. Thirdly, the research assistants in Papua New Guinea

used Excel, making ongoing collaboration concerning the database between myself and them possible.

Most numerical data were entered unaltered but nominal data had to be organised into categories before being inputted. The difficulty with sorting the nominal data was to ensure that the range of categories created was both exhaustive enough for every result and also mutually exclusive from one another. Decisions also needed to be made regarding missing data. While every effort was made to fill in survey blanks with the interviewer while in the field, inevitably, some missing or incorrect data were not picked up until a later stage. Sometimes the missing/incorrect data could be easily corrected, such as deducing a person's gender from their name or determining the approximate age of a block owner from cross-referencing with another survey form, but at other times it could not. In these instances, cases with missing data were excluded from the analysis. The risk of this method is that biases may be introduced if the omitted cases come from a particular subgroup within the population or the number of valid cases becomes too small. For example, Hertel (1976) suggests a data set is unacceptable if the deleted cases exceed 15% of the total. Fortunately, the number of cases with missing data in the sample was small enough so as to neither compromise the sample strategy or the total number of cases.

The data entry and 'clean up' process turned out to be a very long and tedious task, taking at least 140 hours (279 surveys x 30 minutes) to complete. I did consider paying someone to do the job but decided against it, in light of possible problems created further down the track if some of the more difficult multi-part answers were not entered correctly.

3.8   Data analysis

Data were analysed using basic descriptive and inferential statistics. Tables and graphs were used to present the descriptive statistics as they provide detailed information about the relationship between variables (De Vaus 2002). The way in

which the analysed data were presented depended on a number of factors including the number of variables being investigated and the variable's level of measurement. Univariate information, such as simple averages, was given as single numbers, while bivariate data, such as education levels according to age, were presented in cross-tabulations or graphs, depending on which was easier to interpret. The level of measurement of most of the primary data was either nominal, such as type of livelihood strategies pursued or interval data, like age of people residing on the oil palm blocks. This also impacted on the way in which the data were presented. For example, when graphing nominal data, bar graphs are suitable but histograms are not. Although I intended to use only Excel, SPSS was used to calculate inferential statistics as I found these particular statistics easier to produce using SPSS. Inferential statistics were used to calculate the likelihood that the descriptive statistics from the sample would be representative of the larger population.

3.9   Limitations

There are a number of limitations associated with conducting survey based research as well as issues that come about from fieldwork in a 'developing' country. Firstly, the nature of the sample population (no postal addresses, landline telephones or known email addresses) dictated that the surveys could only be administered using a face-to-face method. Using this method put limits on the sample size because of the time and cost of conducting the surveys, however, it does have several advantages such as having a high response rate, and being most appropriate if the respondents have low literacy levels (De Vaus 2002), which was the case in this study. Additionally, face-to-face questionnaire surveys allow for the clarification of any misunderstandings and for follow up questions to be asked if necessary. During fieldwork there were a number of issues encountered that either delayed or limited the research. The surveys were conducted during the run-up to the 2012 national elections so by the time the research team could get to some blocks smallholders had left for political gatherings in town. The time around oil palm paydays was also problematic, as smallholders would leave their blocks early in the day to collect their pay. Therefore, every effort was made to arrive at the blocks as

early as possible, although this was not always easy. For example, sometimes we were forced to stay 45 minutes away from the office where we collected the research team each morning. This made getting started at an early time difficult and, indeed, on some days it felt like a major achievement just making it to the blocks.

Security was another issue that had to be taken into account when organising the fieldwork. Immediately before the elections there was the risk of politically motivated instability, especially in Popondetta. This meant not being able to extend the fieldwork period to include harder to reach smallholders, as we did not wish to be travelling to the blocks too close to the impending elections. There were also the usual issues of not wanting to be driving after dusk and being wary of drunkards on the blocks immediately following oil palm paydays. Furthermore, there were a number of unanticipated events such as the designated driver being bedridden with malaria and the fieldwork car being out of action with mechanical problems. For these reasons it is always best to plan to have a few spare days in the event that problems arise.

3.10   Conclusion

This chapter has shown how the particular research strategy of semi-structured surveys was suitable for answering the research question, as well as meeting research design objectives such as validity, reliability and accuracy. As this thesis is primarily interested in the relationship between a number of variable data, surveys were an appropriate method of data collection. Furthermore, the data analysis techniques adopted generated standardised numerical data, allowing for comparisons to be made with secondary data sets. A disproportionate stratified random sampling strategy was employed, which meant that the collected data had external validity and could be used to make inferences about the wider population. Reliability was addressed through carefully designed and administered surveys, asking culturally appropriate and unambiguous questions, and a high degree of accuracy was achieved by making the sample size as large as possible. In addition, various practical issues such as unforeseen circumstances encountered in the field

were dealt with through having a somewhat flexible approach and planning some extra days at each location.

Notes

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[1] Oil palm is grown in seven provinces in PNG but there are no LSS blocks in Milne Bay, New Ireland and the Ramu and Markham valleys.

[2] Oil palm fruitlets or *lus frut* are oil palm fruit which have become separated from the oil palm bunches during harvesting. The loose fruit is heaped onto nets alongside the fruit bunches for collection by the company trucks.

[3] The LSS were initially set up as 6 ha blocks with 4 ha for oil palm plantings and 2 ha dedicated for food gardens, though recently, oil palm farmers have been encouraged to fully plant their blocks to oil palm, thereby limiting the possibilities of diversifying income strategies on the blocks.

[4] The epistemology of post-positivism recognises that the positivist techniques of observation and measurement cannot be completely objective, but it nonetheless still considers these techniques as a valid research method for the social sciences (Crotty 1998; Phillips & Burbules 2000; Trochim 2006). This contrasts with positivism, which assumes that positivist research is value free and objective.

[5] Research for my 2009 Honours thesis was conducted in Bialla and Kimbe/Hoskins, meaning I had some familiarity with the research sites.

[6] OPIC provide extension services for the oil palm smallholders and therefore have detailed records and maps of the LSS subdivisions and bocks.

[7] This formula is based on a sampling error at a 95% confidence level (De Vaus 2002).

[8] Findings from the workshops can be found in the stakeholder consultation workshop report (Koczberski et al. 2012), although these findings pertain more to the consultancy report and its focus on constraints to smallholders adopting extension messages, rather than this thesis.

CHAPTER 4

Education inequalities

4.1   Introduction

Contrary to the assumptions of some economic models which regard households as undifferentiated units or 'black boxes,' my results show significant differences in education levels amongst smallholders at the intra-household level according to age and gender. Furthermore, there is a significant gap in average education levels among households on the LSS blocks according to household status and access to oil palm income. These findings give weight to the argument presented in Chapter 1 that rising block populations are contributing to increasing stratification on the LSS blocks and low average education levels.

This chapter presents findings regarding the state of education on the LSS blocks. In particular it examines the educational outcomes of unequal resource allocation at the intra and co-resident household level, and synthesises these results with the existing literature on parental investment strategies. The chapter is ordered into two sections. The first section examines the general state of education on the LSS blocks as well as education attainment at the intra-household level. It contains the following sections: school attendance, education levels on the LSS blocks, educational attainment according to area, educational attainment according to birth order, correlations between parent and children education levels and educational attainment according to gender. The second section examines the influence of household status on education attainment and is divided into the sections: primary and secondary households, income strategies and education attainment.

4.2   School attendance

The state of human development on the LSS blocks is relatively high compared with many parts of PNG. Broadly speaking, school attendance rates and education attainment levels on the LSS blocks are fair by national standards, being higher than the national averages. Approximately 48% of elementary and 87% of primary school-aged children were attending school at the time of the surveys, which is notably higher than the national net enrolment rates of 36% and 51% for elementary and primary school children respectively (Table 4.1). School attendance is a measure of education coverage and it is likely that higher rates are, in part, due to better access to schooling from the LSS blocks when compared with more remote regions of PNG. But nonetheless, the attendance rates on the LSS blocks are low in comparison to primary net enrolment rates for the East Asia and Pacific region of 95% (UIS 2011). The financial burden for some families sending children to school in PNG is well documented (e.g. ADB 2012; Connell 1997; PNGINA 2012) and from the survey data, over 50% of households with school-age children reported difficulties sending at least some of their children to school, mainly due to the cost of school fees. This is perhaps surprising, considering the high price of oil palm in recent years, however, high prices are being negated by population pressure on the blocks (see Section 5.3 for further discussion).

Table 4.1. Elementary and primary school attendance rates.

	Per cent of LSS children		PNG national net enrolment rate*	
	Elementary** (n=83)	Primary*** (n=165)	Elementary**	Primary***
Male	46.7	85.2	35.5	51.4
Female	50.0	88.1	36.2	50.2
Total	48.2	86.7	35.9	50.9

* Source: NSO (2013).
** Ages 6 to 8 years.
*** Ages 9 to 14 years.

The significant difference between enrolment rates at the elementary and primary levels is likely due to the late starting age at which many children begin school. NSO

(2013) data shows a large discrepancy between PNG net and gross enrolment rates (national gross enrolment rates for elementary and primary school are 83.3% and 74.4% respectively) which is an indication that children are starting school at a late age. A late school starting age is undesirable as older children are more likely to drop out of school (see Section 4.5 for further discussion).

4.3 Education levels on the LSS blocks

The education levels of adults[1] residing on the LSS blocks are significantly higher than the national average (Table 4.2). Adults have completed on average approximately 7 years of schooling compared with the national average of just 3.9 years.

Table 4.2. Average years of schooling for LSS residents aged 25 years and older in 2012.

	N	LSS Average (years)	PNG national average (years)
1st generation male	189	7.0	n.a.
1st generation female	165	5.9	n.a.
2nd and 3rd generation male	158	7.7	n.a.
2nd and 3rd generation female	125	6.7	n.a.
Total	637	6.9	3.9*

*Source: UNDP (2014d).

Education data from the 2000 census[2] (the closest data available for comparison at the time) for the census units of Hoskins rural, Bialla rural and Kokoda rural (Popondetta area) which cover the 3 LSSs, also shows relatively high education attainment levels in these oil palm growing regions (Table 4.4). It is perhaps expected that LSS smallholders would have higher education levels than the national average because of their access to regular and relatively high oil palm income and due to their proximity to primary schools. On average, K13,791 can be earned annually from a 2 ha plot of land, assuming a 2011 price of oil palm of K344.77 per tonne and that 40 tonnes is the average production of a 2 ha plot. Given most smallholders have planted 6 ha of oil palm, average oil palm income per block can reach K41,372 per annum. Furthermore, as discussed in Section 3.2, close

proximity to schools was a major incentive for families settling on the LSSs at the inception of the schemes. However, 7 years of schooling for smallholders is still low considering that the average adult on an LSS block will not have finished primary school (Grade 8). This means, at this present rate, the MDG of all male and female children completing primary education by the year 2015 will not be met.

4.4 Educational attainment according to area

Average education levels of smallholders differ significantly according to the project area (Table 4.3). Hoskins smallholders have the highest average education levels overall having completed approximately 2.5 more years of schooling than the lowest achieving Bialla smallholders. This is perhaps surprising given that Hoskins has higher block population density than the other two areas and might be expected to have lower education levels as a consequence. In contrast, education level data from the 2000 census shows only a small difference between project areas with 0.5 years separating the highest performing residents in Hoskins rural and the lowest in Kokoda rural (Table 4.4). As with the findings from Table 4.2, in general, second and third generation smallholders have higher education levels than first generation smallholders, with the one exception being Popondetta females.

Table 4.3. Average years of schooling for LSS residents in 2012 aged 25 years and older according to area.

	Hoskins		Popondetta		Bialla	
	N	Average (years)	N	Average (years)	N	Average (years)
1st generation male	60	7.9	71	7	58	6.1
1st generation female	55	6.6	59	6.5	51	4.5
2nd and 3rd generation male	38	9.7	81	7.5	38	6.6
2nd and 3rd generation female	36	8.8	59	6.3	30	5
Total	189	8.1	270	6.9	177	5.6

Table 4.4. Average years of schooling for adults aged 25 years and older according to area (2000).

	Hoskins rural		Kokoda rural		Bialla rural	
	N	Average (years)	N	Average (years)	N	Average (years)
Male	2559	6.5	1992	5.9	4607	6.0
Female	2373	6.0	1556	5.4	3109	5.7
Total	4932	6.2	3548	5.7	7716	5.9

Source: NSO (2004).

School retention

The difficulty of retaining students in secondary school in PNG is shown in Figure 4.1, which shows that just 52% of male and 46% of female children living on the 3 LSSs have completed primary school (at least Grade 8). The largest proportion of males and females on the LSS blocks finish school after completing Grades 6 or 10, which to some extent is an effect of the previous education system when primary school stopped at Grade 6 and junior secondary at Grade 10. Under the previous system, 'two major bottlenecks' were identified at Grades 6 and Grade 10, in part, due to families being unable to afford the increase in school fees after these grades (Connell 1997; PNGINA 2012; UNESCO 2000). As discussed in Section 2.7, in 1995 primary school was extended to Grade 8 to try and increase primary school retention rates, but as many people in the survey sample finished school before the policy change the results are more likely to reflect the school system prior to the new policy. Interestingly, the third largest group of students finish school once completing Grade 8. This perhaps indicates that since primary school was extended, many students are staying an extra two years until they have finished what is now the end of primary school.
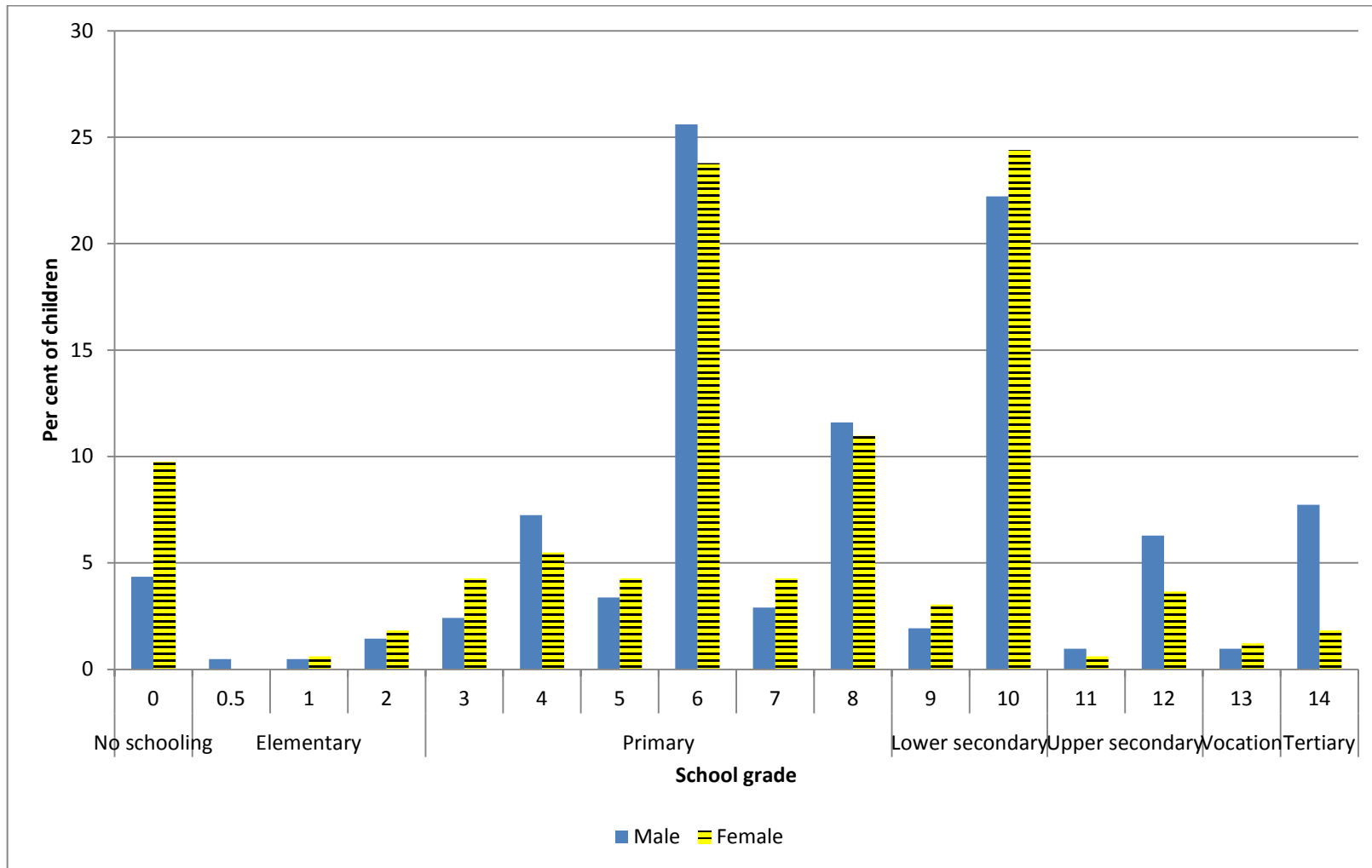
Figure 4.1. Highest school grade completed by LSS children aged 15 – 49 years by gender (n = 371).

With regard to the effect of generational difference on education, a positive trend is that second and third generation smallholders have completed more schooling than first generation smallholders[3] (Table 4.2). This general improvement in education levels is in line with national trends that show higher literacy rates amongst youth (15–24 years) than adults (ADB 2012; UNESCO 2011). That children born on the LSSs are better educated than their parents is perhaps not surprising as many of the first generation smallholders were subsistence farmers prior to settling on the LSSs and had fewer opportunities to gain a formal education than their children.

4.5   Educational attainment according to birth order

Parental decisions as to which children to send to school when money is scarce were found to be related to the children's birth order. Regression analysis found a statistically significant ($p < 0.05$) but weak negative correlation between birth order and education levels, with the first four birth order children gaining higher education levels than later born children (see Appendix 3 for the test output). There is a general decline in education for children born after the third child (Figure 4.2). Preferential treatment for older children was also supported by interview data. As stated by one parent in regard to which children get educated:

> We give preference to those in the higher grades, if they are in Grade 8 or above, and we are short of money then we will pull the younger children out of school. Also, if the children are persistent and wish to go to school then they will go[4] (Bialla Smallholder 177, May, 2012).

The finding that older children tend to receive preferential educational investment is consistent with much of the literature on birth order in general (e.g. Gibson & Lawson 2011; Gibson & Sear 2010; Liddell, Henzi & Barrett 2003; Zeng et al. 2012). Reasons for this are likely to be a combination of resource dilution, exclusive parenting for first born children and early born children being considered 'safe' investments by parents, having already progressed past the vulnerable stage of young childhood. In PNG it is also the case that there is greater status within families associated with higher birth order children, especially male children. For example, with regard to block inheritance, when the original leaseholder has died, typically the first born son takes over as head of the block.

Interestingly, it was found that second, third and fourth birth order children all have slightly higher education levels than the first born child and the overall trend for large families resembles a curvilinear relationship, rather than a linear one. An explanation for this trend is Dammert's (2010) argument that older children may be removed from school early in order to provide for the family while their younger siblings go to school. On the LSSs, it may be that first born male children are leaving school to work on the oil palm blocks at 14 years of age (if starting school at age 8), or, females are being removed if they fall pregnant or to care for younger siblings and do housework. In addition, other variables such as sibling composition and birth spacing are likely to influence parental investment strategies (see Gibson & Sear 2010; Liddell, Henzi & Barrett 2003; Morduch 2000), however they were not investigated due to the limitations of the sample size.

With regards to birth order and birth spacing, interview data suggest some households with several children born at close intervals, stagger their children's school enrolments until they have saved enough money to pay for school fees. One consequence of this is that later birth order children are older when they begin school. The average age of a Grade 1 child on the LSS blocks is approximately 8 years, meaning that by Grade 8, children turn 15 years; an age at which some girls marry or become pregnant and boys start looking for work (interview data). This pattern may also partly explain the large drop in the number of girls moving to Grade 9 (see Figure 4.1) (Ryan et al. 2013).
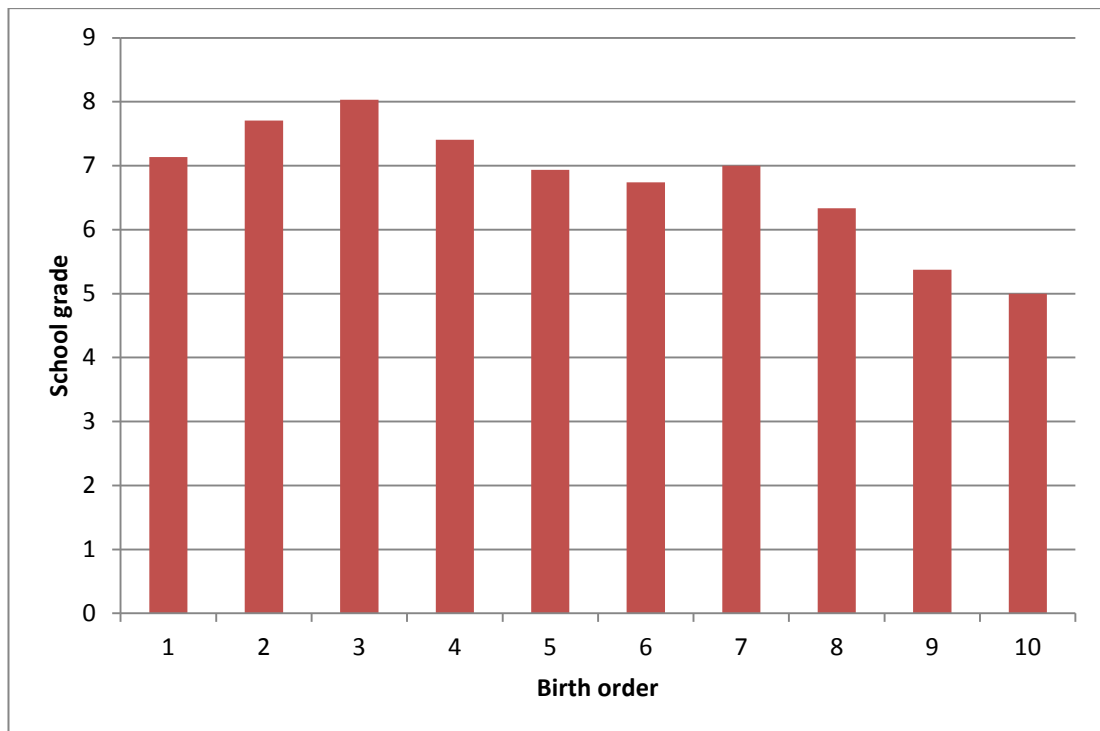
Figure 4.2. Average highest grade achieved by LSS children aged 15 - 49 years according to birth order (n = 366).

In large families, the tenth born child has an education level of just 5 years, which is 3 years less than the highest achieving third born children. This finding supports the resource dilution model, that more siblings 'dilute' the total education income, and also highlights the difficulty for large families to accumulate enough money to send all their children to school.[5] This also shows the significant disadvantage for lower birth order children from large families in terms of educational attainment.

The above analysis of birth order data makes use of economic theory and the joint utility function to understand intra-household decision-making. Whilst this analysis is useful in explaining education investments according to economic rationality, it has little to say about the effect of investment bias on conflict within and among households residing on the LSS blocks. While conducting fieldwork, many stories were told to me and my research assistants that illuminated some of the disputes among family members on the blocks, often regarding parental decisions that some children believe has put them at a disadvantage.

In one example, a smallholder, Simon, said that his schooling was stopped at Grade 10 so that his younger brother could go to university. Simon reasoned that his life

chances had been constrained (unlike his brother who now has a university degree and therefore more chance of gaining non-farm employment) because of his parent's decision to invest in his brother's education over his own. It was for this reason that Simon felt he should be favoured to inherit the block. Thus parental investment bias according to education has on some blocks led to ongoing tensions between brothers.

This story, and many others like it, point to the resentment and jealousies that can result from parental decisions as to which children receive an education, and be the basis of ongoing tensions amongst siblings over a perceived lack of compensation for sons or daughters who were removed from school. Such stories also indicate the complexity of bargaining on the blocks, especially once the father dies and the sons vie for ownership of the block.

4.6 Correlation between parent and children education levels

Within the education literature (e.g. Fuller & Liang 1999; Glewwe & Ilias 1996; Lambert, Ravallion & Van de Walle 2014), it is widely accepted that there is a positive correlation between parent and children education levels, whereby higher parental education is related to higher children's education. The survey data lend support to this hypothesis, showing a moderate positive relationship between education levels of parents and their children (Table 4.5). The results also show that among parents, the relationship between male parents and children is stronger than that between female parents and children of both sexes. This is perhaps to be expected due to two main reasons: (1) men usually control oil palm income and financial decision-making within households; and (2) as discussed by Fox (1999) and Gannicott and Avalos (1994), female education is afforded a lower status than male education in PNG.

Perhaps most significantly, the strongest intergenerational relationship exists between the male heads of blocks and male children, showing a moderate positive relationship (r = 0.681). Put another way, approximately 46% of the variation in the education of sons levels can be accounted for by the education level of the male

head of the block. This is suggestive of the disproportionate influence of male heads relative to other adults on the blocks and is related to male heads control of block income. These findings go some way to showing that educational inequalities are reproduced at an intergenerational level as noted by Gibson (2000), that is, poorly educated parents raise poorly educated children that in turn grow up to have children with low education levels and so on.

Table 4.5. Correlation coefficients between LSS parent and children education levels (aged 25 years and over).

Relationship	N	r value
Male head of block vs male children	86	0.681*
Male head of block vs female children	66	0.588
Male head of block vs male and female children	152	0.646
Fathers vs male children	125	0.607
Fathers vs female children	97	0.589
Fathers vs male and female children	222	0.597
Mothers vs male children	117	0.552
Mothers vs female children	92	0.497
Mothers vs male and female children	209	0.524

* $p < 0.01$ (see Appendix 4 for the full test output).

4.7   Educational attainment according to gender

Gender has a significant influence on parental investment in education on the LSS blocks. The survey results indicate a clear investment bias toward male children, even though the majority of parents surveyed said they did not discriminate between their sons and daughter's education. First, second and third generation male smallholders all have approximately one more year of school education than females, and older women have the lowest education levels overall (Table 4.2). This trend of males having higher education attainment than females is reiterated in secondary data across three regions in the PNG 2000 census (see Table 4.4).

Furthermore, female smallholders do not fare well in comparison to males when examining the proportions completing individual grades, especially in the categories of 'no schooling' and 'tertiary' education. Almost 10% of female children have no formal education at all compared with roughly 4% of male children, whilst nearly 8%

of male children complete tertiary level education compared with just 2% of females (Figure 4.1). The relatively high proportion of women with no or very little education means that a significant minority of women on the blocks are likely to be illiterate. These results support other PNG studies (e.g. ADB 2012; DFAT 2012; Gannicott & Avalos 1994; Gibson & Rozelle 2004; UNDP 2013a) that find women in PNG are more likely to be illiterate, have lower levels of primary and secondary school attainment, and be less represented at the university level than men. Data from the UNDP (2013a) reports that a higher proportion of males than females can read and write (69% compared to 57.3%) and that just 6.8% of adult women have secondary or higher level education compared with 14.1% of men. As discussed in Section 2.7, males make up the vast majority (62%) of students at university level (DFAT 2012).

One explanation for the significant gap between male and female education levels comes from neoclassical models analysing parental investment bias. This reasoning for gender preference typically centres upon: (1) the opportunity cost of sending female children to school being higher than that of male children (see Gibson & Sear 2010; Strauss & Thomas 1995); and (2) that males typically receive higher wages and are more able to find jobs commensurate with their level of education than females (see Connell 1997; Psacharopoulos 1994). In PNG, it is well documented that girls engage in more domestic labour, such as housework and caring for younger family members, than their male siblings, meaning time sacrificed for female schooling is more of a disadvantage to the running of the household than male schooling (PNGINA 2012). It is also the case that in largely patrilineal societies, as in PNG, female children leave their parents' household to marry thereby decreasing investment returns to the parents of female offspring (although there can be remuneration to the brides' parents through bride price). An ADB (2012) report claims that the main cause of female children not attending school in PNG is the inability to pay school fees while for males it is lack of interest. This seems to confirm the disproportionate opportunity cost of female schooling in PNG. Gibson (2000) also concludes that girl's education in PNG is more cost sensitive than males which is evident by the largest gender gaps being in the lowest

income groups. Research also indicates a tendency for PNG parents to invest in sons rather than daughters at a secondary and tertiary level because of security concerns associated with traveling to education institutions far from home (Connell 1997; Hill & King 1991; PNGINA 2012). Proximity to secondary schools could also impact on a child's chances of going to primary school as Gibson (2000) argues if parents do not expect their children to go to secondary school it reduces the demand for them to complete primary school.

Cultural and social norms impact on parental decisions regarding male and female education, and it is likely that investing in sons rather than daughters' education on LSS blocks is also symptomatic of wider discrimination against girls within Melanesian culture. Focusing solely on intra-household decision-making according to economic models, neglects the many wider social and cultural constraints on educating women, as well as some of the benefits of educating women. Fox (1999) argues that women's subordinate position within PNG society is the single most significant factor influencing girls' participation in education. Yeoman (1985) also finds that the main reason behind parents not sending female children to school in PNG is parental attitude and lack of encouragement, which is typically related to low literacy and education attainment levels.

With regards to oil palm work in PNG, there is a division of labour according to gender that defines the type of work, and the level of remuneration that male and female smallholders receive (Koczberski 2007). Not only is the work of harvesting fresh fruit bunches typically reserved for men, but men often have control over oil palm income earned by women.[6] Indeed, these intra-household power imbalances between male and female smallholders go some way to explaining the bias toward male education investment. Furthermore, the failure of men to distribute cash income in an equitable way is related to the power and status associated with cash (discussed further in Section 5.5).

4.8   Household status

So far this chapter has examined parental investment bias in child education operating at the intra-household level. The following section investigates the effect of unequal income distribution on educational attainment at the inter-household level, which has received considerably less attention within development literature. This discussion illuminates status hierarchies existing among households, which affect the ability of some households to educate their children.

Primary and secondary households

Co-resident households on a LSS block can be categorized into primary households and secondary households based on their access to and control over the oil palm income and their role in farm management decisions. As outlined in Chapter 1, when the LSS blocks were initially settled there was one household on the block, headed by the original leaseholder. As sons have married and remained living on the block with their families there are now several co-resident households all residing on the same block. Primary households are defined as those where the male head is typically the original leaseholder and/or has control over the distribution of the oil palm income and makes the major farm investment decisions on the block. Where the original leaseholder is deceased, typically the first born son takes over as head of the primary household on the block, or as locally termed, is the 'boss' of the block. During fieldwork it was not uncommon for several married brothers living on the same block to claim that they were the 'boss,' or the head of the primary household (which is telling in regard to the level of conflict on many of the blocks), making it sometimes difficult to determine the primary household. For this reason, the frequency of household oil palm income access is used to determine household status, with primary households having access to oil palm income every month.

Secondary households are defined as those headed by the married sons (and sometimes daughters) of the original leaseholder and/or relatives living permanently on the block (e.g. in-laws). Members of secondary households have less 'ownership' claims on the oil palm income, and their partly marginalised access

to the oil palm income can be observed in their inferior housing compared with primary households. In contrast to primary households, secondary households have less than monthly access to the oil palm income. The category 'secondary household' consists of households with access to oil palm income anywhere between every 2 months to never, therefore, there is significant variation within this category.

Income strategies

Examining smallholder income strategies shows there is a relationship between access to oil palm income and the type of income strategies pursued (Figure 4.3). Secondary householders, with the least access to oil palm income, are more likely than primary householders to pursue non-farm income strategies such as wage employment and reselling store goods. These results support Bue's (2012) findings that secondary households are more likely to engage in non-oil palm income strategies such as gambling. This makes sense as it is probable that smallholders with limited access to oil palm income and garden space would need to pursue non-farm income strategies. The importance of non-farm income sources as a supplementary, or at times main income source for smallholders is well documented (e.g. Koczberski & Curry 2005; Koczberski, Curry & Gibson 2001), especially on heavily populated blocks where there are smaller per-capita oil palm income earnings. Data from Koczberski and Curry (2005) show there is a positive relationship between block population and number of non-oil palm income sources pursued by smallholders in Bialla and Hoskins.

Primary households, with the greatest access to oil palm income, are more likely to pursue the income sources of market food, betel nut, tobacco, poultry and pigs. Primary households have the most power on the blocks and it is probable that they are controlling the means to non-oil palm income activities requiring land access or substantial capital investment, such as market food, poultry and pigs. Thus, data on income strategies pursued shows that households occupying a marginal status on the blocks, such as secondary households, are disadvantaged by both limited access to oil palm income and restricted land access for diversifying on-farm incomes. Such

households are the most vulnerable to various shocks and are likely to struggle to pay for large expenditures, such as school fees.

Education attainment

Primary households have higher average education levels than secondary households based on their access to oil palm income. Table 4.6 shows there is a positive relationship between both Mama and Papa Card access and smallholder education levels, that is, the more frequent the access to oil palm income the higher the education levels. Smallholders who receive income through the Papa Card every month have 1.7 more years of education than those who never receive Papa Card income. For Mama Card income the difference between those who receive oil palm income monthly and never is 2.4 years, and for access to both Mama and Papa Card income there is a difference of almost 3 years between smallholders who receive oil palm income from both cards on a monthly basis and those who never do. This is a substantial difference given the low number of school years most people complete. There is therefore a large gap between primary households and the lowest ranked secondary households on the LSS blocks in terms of power and educational outcomes. During fieldwork, several smallholders mentioned '*pasendia*'[7] households (long-term visitors), or households made up of relatives (e.g. in-laws on either the husbands or wife's line) with no real bargaining power on the blocks. These secondary households typically have no access to oil palm income and occupy a marginal status on the blocks and therefore are in a difficult position when it comes to paying for school fees.

A further example of the differing education levels among households according to their frequency of oil palm access is given in Figure 4.4. From the graph two main trends are apparent: firstly, smallholders with the least frequent access to oil palm income are more likely to finish their schooling before the end of primary school (Grade 8). Approximately 93% of smallholders with no access to oil palm income have completed their schooling before the end of primary school compared with just 60% of smallholders with monthly oil palm income access. Also, approximately
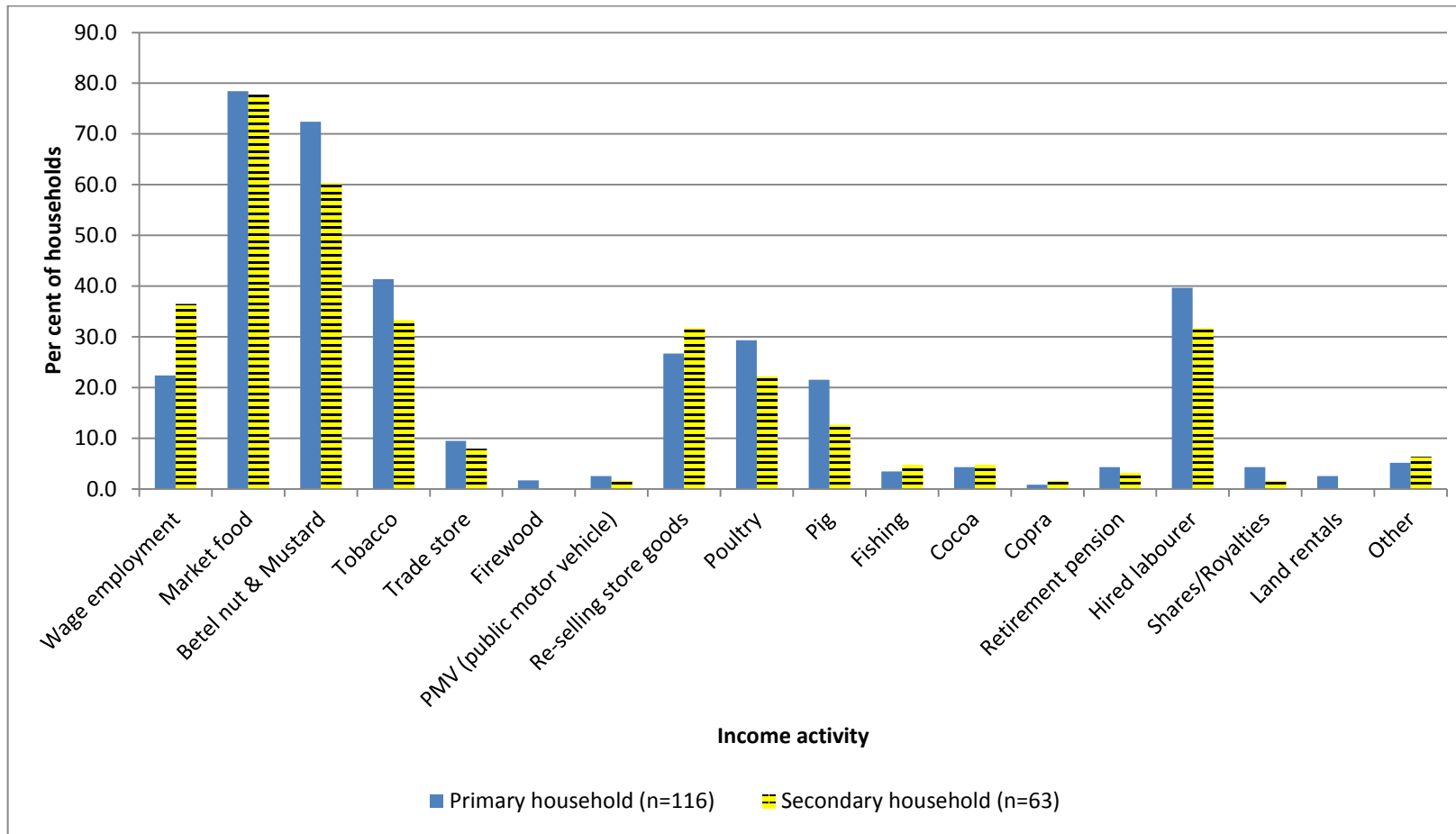
Figure 4.3. Proportions of primary and secondary households engaged in various income activities (2012).

Table 4.6. Average years of schooling for second/third generation smallholders aged 15 to 49 years according to frequency of access to Papa and Mama Card income.

Frequency	Papa card only Years (n)	Mama card only Years (n)	Papa and Mama cards Years (n)
Every month	7.3* (250)**	7.4 (208)	7.5 (172)
Never	5.6* (33)**	5.0 (17)	4.6 (14)

* $p < 0.05$ (see Appendix 5 for the full test output).
** The independent samples T-test was only performed on the relationship between schooling and access to Papa Card income as this was the only relationship where count numbers were above 20 for all categories (see De Vaus 2002, p. 276 for further details on test requirements).

21% of smallholders with no access to oil palm income have no schooling compared to just 7% of smallholders with monthly oil palm income access. Secondly, it follows that smallholders who come from primary households that receive monthly oil palm income are more likely to complete some secondary or tertiary education than those with no oil palm access. Approximately 40% of smallholders with monthly oil palm income completed at least some high school level education compared to just 7% of smallholders with no oil palm income access. The relationship between monetary wealth and educational attainment is well documented in PNG. For example, it has been found that the poorest 40% of the population are only half as likely to complete Grade 6 as the top 20% of 15 – 29 olds (UNICEF 2012 cited in UNDP 2014a).

Furthermore, it is known that people with little or no formal education are more likely to end up living in poverty. In PNG, approximately 55% of the population with no education live below the poverty line, compared with 15% of the population who have a university education (UNDP 2014a). This relationship between income and education inequality highlights the cyclical nature of disadvantage. Smallholders with no access to oil palm income and no education to access off block employment are in a precarious position indeed.
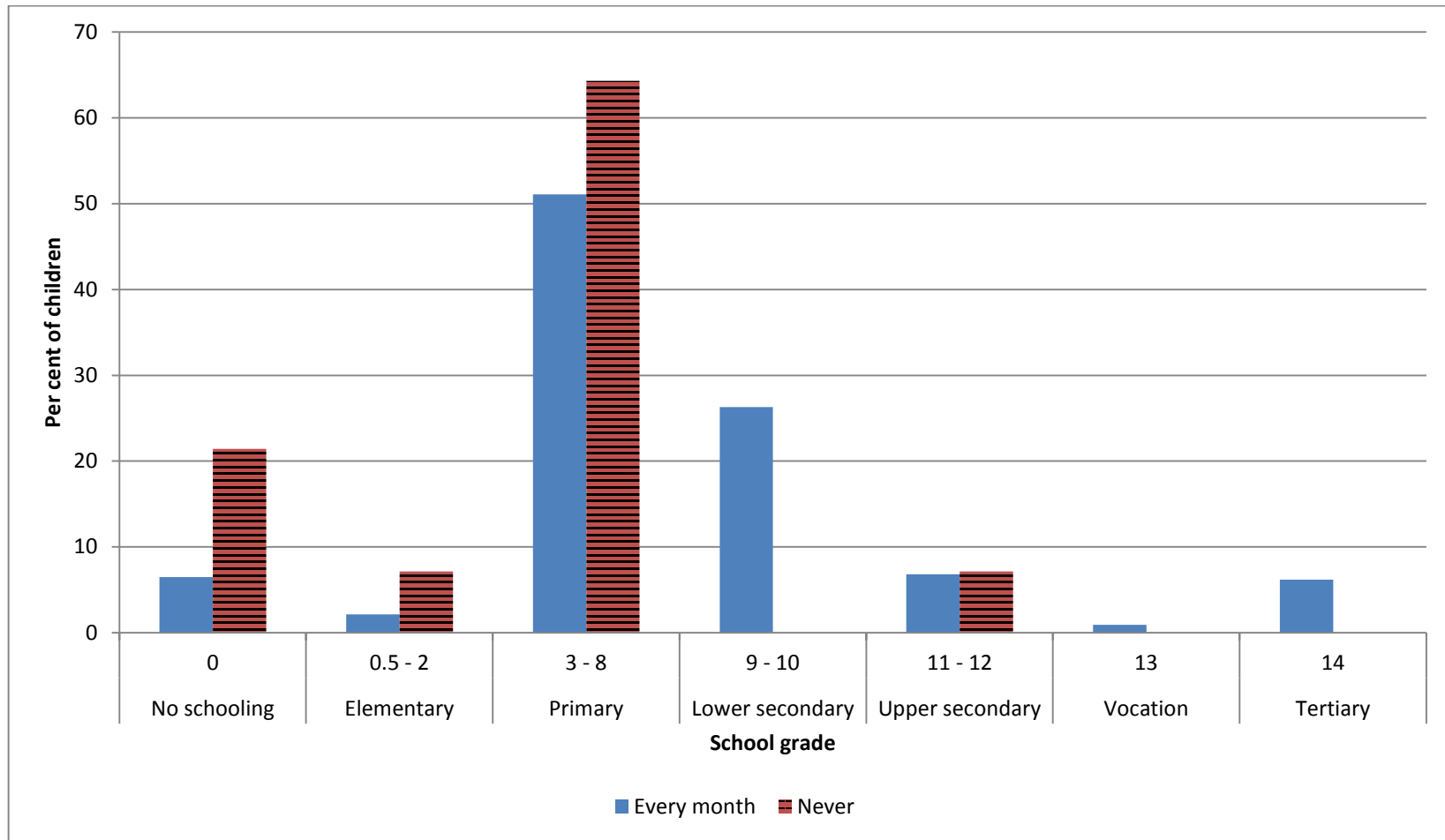
Figure 4.4. Proportion of LSS children aged 15-49 completing various school levels according to frequency of oil palm income access.

4.9   Conclusion

The results have shown that different education investment strategies pursued by individuals and families are determined by gender, age, and birth order and the position of the household in relation to the control/management of oil palm production and income distribution. The main findings regarding education show that average adult education levels on the LSS blocks are higher than the national average but still low considering that most smallholders do not finish primary school. Male adults have higher education levels than females, and females are more likely to have no education and no tertiary education than males. On average, children have higher levels of education than their parents and there was a moderate positive correlation found between the education levels of male heads of blocks and sons. Lower birth order children (after the 5th born) in large families have less education than higher birth order born children. It was also found that household status affects education attainment. Children from households with monthly access to oil palm income have higher education levels than children from households with no with access to oil palm income. The above findings provide evidence that status hierarchies on the blocks are limiting the ability of some households to educate their children. Furthermore, the reluctance of primary household heads to share oil palm income among other households is indicative of increasing individualisation and the changing ways in which money is perceived in PNG culture. These issues are discussed in the next chapter.

Notes

[1] The age at which adulthood begins varies according to the statistical indicator being measured. The UNESCO Institute for Statistics (UIS 2009) defines adults as members of the population aged 25 years and older when measuring educational attainment. For other education indicators, such as education attainment versus other variables, the UN, World Bank and Asian Development Bank define adults as either 15 years and older or 15 - 49 years old. This thesis specifies the age of adults in the study according to which educational indicator is being used to allow for comparisons with other data sets.

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[2] Unlike the primary data collected, census data were not limited to oil palm blocks in the three areas, and therefore should only be used as a guide when comparing with the primary results.

[3] First generation smallholders are the original leaseholders on the LSSs from when they were established and second generation are the children of the original leaseholders.

[4] The second statement relates to the influence of child motivation on school attainment, and similar comments were made by several parents. It goes without saying that the amount of interest a child shows in their schooling is a factor in the level of education they achieve, yet, with the exception of the ADB (2012) and NSO (2013) reports, this is rarely acknowledged within the literature.

[5] The data analysis did not control for family size or the wealth of the families so some care is needed when interpreting the results. For example, it is not possible to test the results with Kaplan's (1996) demographic transition hypothesis that as wealth increases and fertility declines, parents invest more in the quality rather than quantity of education.

[6] This has partly changed with the introduction *Mama Lus frut* scheme, which pays women directly for their work collecting loose oil palm fruit for pickup.

[7] *Pasendia* (passenger) household is a derogatory term usually meaning a lazy household that uses others to access resources.

CHAPTER 5

Population pressure and socio-economic change

5.1   Introduction

As shown in Chapter 4, emerging status hierarchies on the blocks mean that certain households have greater access to oil palm income than others, resulting in unequal education attainment among households. This chapter continues to examine on-block status hierarchies through investigating the broader demographic and socio-economic context that helps explain why inequalities in education are beginning to emerge on the LSS blocks. The results find that LSS smallholders are increasingly pursuing individual as opposed to cooperative income strategies, as population pressure and changing attitudes towards money intensifies competition between households over oil palm income. This is leading to greater economic and social stratification on the blocks, as households prioritise distribution of money for their own rather than co-resident families. This chapter argues that increasing fragmentation of the blocks must be understood within the context of broader socio-economic change in PNG, as the accumulation of cash has become another way in which to achieve status in PNG. The chapter is ordered into the following sections: income inequalities, constraints on sending children to school, income sources that pay for school fees, population pressure and production strategies. Lastly, these results are discussed with reference to the theoretical debate surrounding possessive individualism in PNG.

5.2   Income inequalities

Chapter 4 showed that smallholders from secondary households with irregular access to oil palm income have lower levels of education attainment than those with regular income access (see Table 4.6). Thus access to regular oil palm income is

a key factor determining education status. This is also supported by the results that show smallholders rely heavily on oil palm income for school fees with 93% of smallholders reporting they use it to pay for school fees (Table 5.1). Apart from oil palm income, almost half of smallholders also report using garden food income to pay for school fees, highlighting the importance of land access to pay for children's education. Interestingly, only 8% of smallholders reported receiving help from family for school fees, but approximately 61% of smallholders when asked separately, said they helped their relatives to pay school fees. It may be that whilst the majority of smallholders do help relatives with school fees, the actual amount given is not considered a significant amount by the receivers.

Table 5.1. Income sources that pay for school fees.

Income source	Per cent of households (n = 150)
Oil palm	93
Marketing garden food	47
Business enterprise	12
Help from family	8

Constraints on sending children to school

Over half of LSS households with school-age children reported having difficulty sending at least some of their children to school. Of the households facing trouble, 82% reported paying school fees as the main constraint (Table 5.2). Given that relatively high incomes can be earned on the LSS blocks (see Section 4.3), it is a concern that a high proportion of smallholders are having trouble paying school fees. Looking at these figures alongside the population data lends weight to the argument that increasing population density is leading to decreasing per-capita incomes. Furthermore, given that school fees are known to be a large cost for households, secondary households with irregular and low access to oil palm income and land for other income strategies struggle to accumulate enough cash for school fees, especially those with several school-aged children. As might be expected, distance from school was not a major constraint for the majority smallholders. As

noted already, one of the advantages of the LSS scheme is the close proximity most people have to schools.

Table 5.2. Constraints on sending children to school.

Constraint	Per cent of blocks (n = 107)
School fees	82
Costs associated with schooling	10
Distance from school/bus fare	4
Other	4
Total	100

Tuition Fee Free policy

As discussed in Chapter 2, the TFF policy was introduced in 2012, with the goals of eliminating school fees from elementary preparation to Grade 10 and reducing school fee costs for Grades 11 and 12 by 75%. At the time of data collection, numerous delays meant that only some schools had received education subsidies from the government and consequently, only a small number of households surveyed were not paying tuition fees. Therefore, it was not possible to assess the impact of the TFF policy for LSS smallholders. However, it is worth considering its possible outcomes.

On the face of it, the TFF policy should enable many financially constrained smallholder families to send their children to school, and some initial findings regarding the policy are promising. For example, there has been a 17% increase in total enrolments in PNG (Howes et al. 2014). Despite this, the policy may not make a difference for some families. Project fees and school-related costs such as books, uniforms, etc., may still be unaffordable for some low income families. Furthermore, as discussed in the previous chapter, there is typically a strong correlation between parent and child education levels, in part due to the importance (or lack of) given to education by parents. It is questionable whether lower school costs will, in the short term, change parental attitudes towards education and break intergenerational education inequalities.

The initial findings from Howes et al. (2014) also indicate that the school enrolment gender gap has not decreased since the introduction of the TFF. This is perhaps surprising, given evidence (e.g. Gibson 2000; Glick 2008; Herz & Sperling 2004) that female schooling is more sensitive to cost than male schooling. In PNG, gender specific constraints such as the opportunity cost of sending girls to school, security concerns over sending girls to far away schools and a general cultural bias against females may be negating the effect of the TFF policy. Although, these are only initial findings and it remains to be seen what long term impacts the TFF policy will have on the education levels of LSS smallholders.

5.3 Income and education inequalities among co-resident households

5.3.1 Population pressure

This section argues that ongoing population growth on the LSS blocks since the schemes were first established is affecting educational outcomes. As outlined in Chapter 1, rising population density on the LSS blocks has been identified as a major economic and social issue affecting oil palm productivity, per-capita incomes and conflict within and between households (Koczberski, Curry and Gibson 2001; Koczberski et al. 2013). At the regional level, both project areas are experiencing high growth rates, with WNBP having an annual rate of 3.3% and Oro Province 3.1% (NSO 2012). PNG's current annual growth rate is 3.1% (NSO 2012) and the median age in PNG as of 2000 was just 19 years (UNDP 2013a). With regards to the LSS blocks, secondary data estimate that population density on the Hoskins LSS has increased from approximately 6 persons per block in the early 1970s (Ploeg 1972), to 18 persons per block in 2010, or 304 persons/km² (Curry et al. 2007) (see Figure 5.1). Likewise, the population on blocks in Bialla and Popondetta has also increased dramatically, although these blocks are less densely populated as they were established later. These population densities on the LSS blocks are extremely high (high population density is considered greater than 50 persons/km², see Bourke & Harwood 2009, p. 48) given the area of the average LSS oil palm block is only 6.07ha. Census data (NSO 2012) show there are on average, approximately 6 people per household across the three project regions (Table 5.3) [1] which is likely to be similar for the LSS blocks.
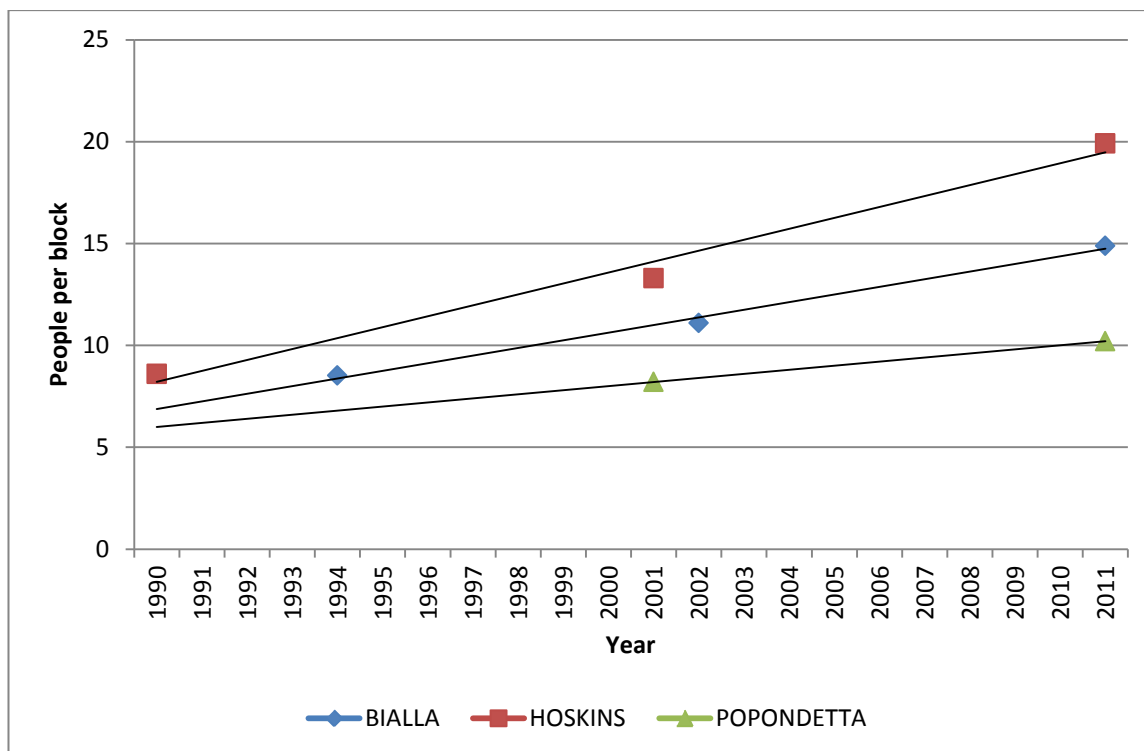
Figure 5.1. LSS block population according to location from 1990 projected to 2011. Source: Curry et al. (2007).

Table 5.3. Average number of people per household (2011 PNG Census).

	Hoskins rural (n)	Bialla rural (n)	Kokoda rural (n)	WNBP (n)	Oro Province (n)
Average No. of people per household	6.2 (27,665)	5.7 (58,373)	5.9 (20,925)	5.2 (264,264)	5.5 (186,309)

Source: NSO (2012).

Investigating the age composition on the LSSs shows that the blocks are made up of a predominately young population, which is further evidence of high population growth. Some 50% of the LSS population are aged 24 years and under and 33% are under 15 years (Figure 5.2), which is comparable with the national age distribution of 38% for the population under 15 years of age (UNESCO 2011). With such a young population residing on the blocks it is critical that more students attend and stay in school, to prevent widespread illiteracy in the future.
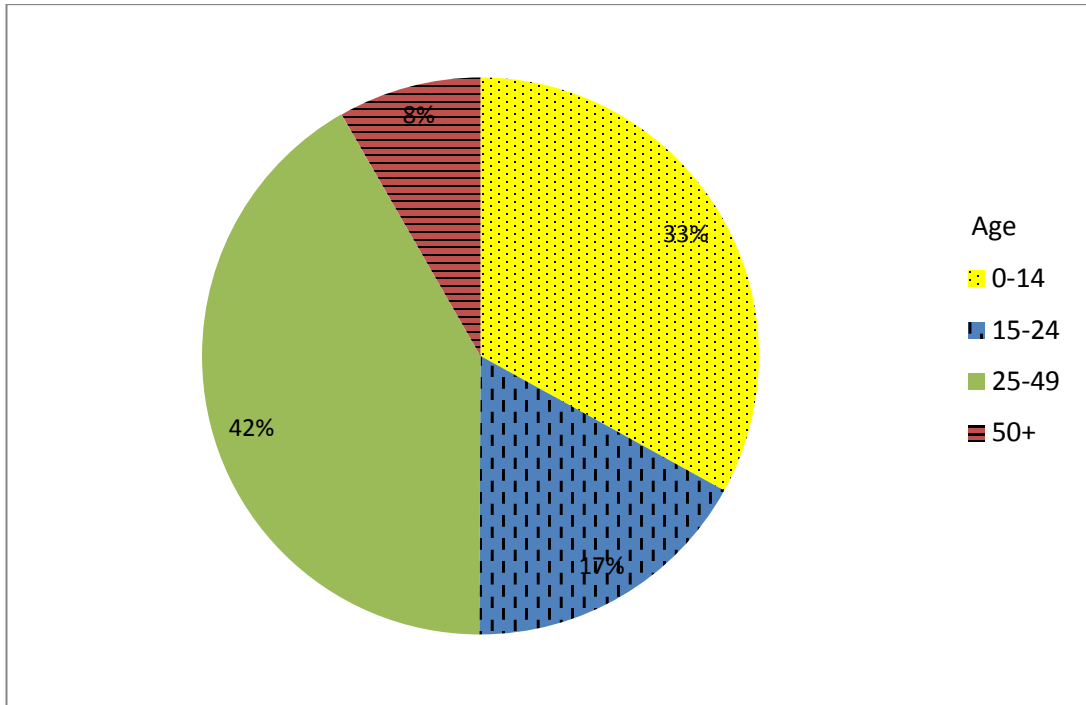
Figure 5.2. Age composition of LSS population (n = 1420).

5.3.2 Education according to population density

Rising population on the LSS blocks is leading to declining per-capita incomes and decreasing average education levels. The results show there is a negative relationship between block population and people's education levels, whereby the higher the block population the lower the average person's education. People residing on blocks the highest population density (31 people and more) have on average 2.8 less years of schooling than people on the least densely populated blocks (1 to 10 people) (Table 5.4).

Table 5.4. Highest school grade achieved according to block population for LSS smallholders (aged 15-49 years).[2]

	Number of people on block			
	1-10 (n=28)	11-20 (n=227)	21-30 (n=67)	31+ (n=44)
Average highest school grade completed	9.4	7.1	7.4	6.6

These findings lend support to predictions that growing block population is leading to declining education levels for some households and smallholders. As school fees are a large expense for many smallholder households, a decline in per-capita incomes affects the ability of parents to send their children to school. Faced with financial difficulty, smallholders make education investment decisions according to economic and socio-cultural logic. At an intra-household level, parents discriminate which children go to school and which go to work on the basis of gender and age, as discussed in Chapters 2 and 4. That is, boys are prioritised over girls, and in general, elder children are given preference over younger children.

Plate 5.1. Smallholder family, Bialla.

At the inter-household level, it is known that primary household heads are investing in their own children rather than in their extended families, as shown by the discrepancy between average primary and secondary household education levels. It is likely that high block populations are encouraging this 'nucleation process' as competition for oil palm income between households forces household heads to invest in their nuclear rather extended families.

5.4 Block fragmentation

Apart from the direct negative relationship between block population and people's education levels, I argue that increasing block population and changing demographics on the blocks are leading to an erosion of cooperative inter-household relations. Increasingly, households are preferring to act like distinct individual household units. As households begin to act more like nucleated units and as per-capita income declines, there is greater likelihood that assisting co-resident household members with school fees may be declining. One significant way to illustrate how population and demographic change is leading to more nuclear household formations is by the shift in oil palm production strategies from cooperative extended family harvesting strategies to more individual household production strategies.

5.4.1 Production strategies

The way in which oil palm labour on the LSS blocks is organised and remunerated is changing as smallholders respond to greater competition and changing demands for oil palm income. Smallholders are increasingly adopting individual household production strategies, as they try to find the most productive labour strategies, in context of high on-block population growth, conflict and changing cultural attitudes regarding money.

The results show that from 2001/2 to 2012 in both Bialla and Popondetta, there has been a decrease in the proportion of households practising the cooperative production strategy of *wok bung* (all co-resident households work together in harvesting and share the income) and a general increase in the more individualised production strategies of *makim mun* (rotate harvesting and the associated income on a monthly basis amongst co-resident families), *skelim hecta* (block is effectively subdivided) and mixed strategies (Table 5.5). In Hoskins the results are less clear-cut: the proportion of households practising *wok bung* has stayed approximately the same whilst *makim mun* has decreased and *skelim hecta* has increased. Mixed strategies have increased then decreased over time. It is difficult to account for differences in production strategies between regions. However, variations may be

related to differences in average block populations.[3] There is also anecdotal evidence suggesting that within regions, smallholders are copying the strategies pursued on other blocks.

Table 5.5. Changes in smallholder production strategies from 2001 to 2012.

LSS	Year	*Wok bung* (%)	*Makim mun* (%)	*Skelim hecta* (%)	Other* (mixed) (%)
Bialla	2002/3**	67	32	0	1
	2009/10***	57	20	5	18
	2012****	18	30	42	9
Hoskins	2001/2**	48	50	0	2
	2009/10***	37	20	23	20
	2012****	42	33	25	0
Popondetta	2001/2**	93	0	0	7
	2009/10***	70	19	1	10
	2012****	51	29	3	18#

* Other or mixed strategies include variations to *skelim hecta* harvesting, such as when two households instead of one maintain each 2 ha phase and oil palm income is rotated between the households. Or, a mix of *makim mun* and *skelim hecta* for the whole block, depending on crop yields and the price of oil palm (See Koczberski et al. 2013, p. 14 for further details).
** Source: Curry et al. (2007).
*** Source: Koczberski et al. (2013).
**** In the 2012 surveys, household selection was targeted at blocks with two or more co-resident households living on the block.
# The 'other' category for Popondetta is mainly 'contract harvesting' arranged by the milling company.

Related to changes in the type of production strategies being pursued on the LSS blocks are the significant number of blocks practising 'skip' harvesting, or deliberately missing every second harvest. A major reason for practicing skip harvesting is to reduce disputes over the distribution of oil palm income. At the time of fieldwork almost 60% of households were skip harvesting. One smallholder told me that they skip harvest on his block because they prefer a 'big pay' every second pay-day, as it is easier to distribute amongst the co-resident households living on the block. However, despite the perception of some smallholders that skip harvesting is the best strategy for populated blocks, preliminary research indicates that skip or under-harvesting produces smaller yields than fortnightly harvesting,

resulting in less oil palm income to be divided among smallholders (Koczberski et al. 2013).

5.4.2 Population pressure and production strategies

Smallholders residing on populated blocks are pursuing more individual strategies such as *makim mun* and *skelim hecta* as they respond to on-block population pressures and the need to divide oil palm income amongst multiple households now occupying the blocks. The results indicate that blocks with low population density have a higher proportion of households practising cooperative harvesting strategies like *wok bung*, whilst more densely populated blocks have a larger proportion practising individualised production, such as *makim mun* and *skelim hecta* (Table 5.6). On low-density blocks (1 - 10 people) almost 50% of households practise *wok bung*, while on densely populated blocks (21 or more people) 72% practise *makim mun* and *skelim hecta*. These results showing a correlation between population and production strategies go some way to explaining why production strategies pursued by smallholders have changed over time.

At the inception of the LSS scheme, a single nuclear family typically occupied a 6 ha bock and decisions regarding labour and the distribution of oil palm income were made by the original leaseholder, or head of the household. Now, multiple households reside on a single 6 ha block (see Plate 5.1), and it has become increasingly difficult to meet the competing demands of households, especially once the original leaseholder has died.

Table 5.6. Per cent of production strategies practiced on LSS blocks according to block population (Papa card only).

Production strategy	Block population			Average block population	Average No. of households
	1 - 10 (n=28)	11 - 20 (n=60)	21 + (n=18)		
Wok Bung	46	38	11	12	2
Makim mun	29	25	50	16	3
Skelim hecta	14	28	22	16	3
Other (mixed)	11	8	17	19	3
Total	100	100	100	15	3

5.4.3 Conflict over oil palm income

Related to rising LSS block populations are increasing conflicts over block ownership and the distribution of oil palm income. Conflict within and between households on the LSS blocks is common. Forty per cent of all blocks in the surveys reported on-going disputes over block titles or landowner harassment, and as mentioned already, several males residing on the same blocks often claimed to be the 'boss' of the block during fieldwork. Conflict often occurs between brothers for control of the block once the father has died or is too old to effectively manage the block (Koczberski et al. 2013). Often it is the first-born son who becomes the boss of the block, controlling oil palm income distribution and making major block management decisions. But these new arrangements frequently lead to disputes between brothers, especially if the legitimacy to be boss is questioned or if people think they are not adequately compensated for their oil palm work.

A major driver of change toward individual over cooperative production strategies is a desire among households to reduce disputes over the distribution of oil palm income. Evidence (e.g. Curry et al. 2007; Curry & Koczberski 2012) suggests there are fewer conflicts among households when practising individualised over cooperative production strategies as individual households take control of the income. Under the cooperative farming system of *wok bung* the boss (or the original leaseholder) of the block has control over the distribution of oil palm income. This arrangement can lead to unfair remuneration of oil palm work, for example, oil palm income may be allocated according to gender or kinship status rather than labour inputs (Curry & Koczberski 2012). The move to more individual production strategies partly addresses this power imbalance by giving households greater financial independence from the boss of the block. The production strategy *makim mun* permits individual households control over oil palm production once a month whilst the strategy of *skelim hecta* allows households autonomy over a 2 ha section of the block. However, there are negative consequences for blocks adopting individual production practices.

It is argued that blocks containing households practising individual production strategies are less productive and block up-keep is poor in comparison with those practising cooperative strategies due to smallholders having reduced incentives to invest in farm inputs and block maintenance (Koczberski et al. 2013). For example, if practising the production strategy *makim mun*, families can go for months at a time without participating in oil palm related work or receiving oil palm income. Under this 'every man for himself' arrangement, smallholders are reluctant to conduct work such as weeding or pruning, that may benefit other households if they think their work may be unreciprocated.

Significantly, a greater proportion of blocks practising individualised production strategies has not resulted in an equitable allocation of oil palm income, as indicated by the large discrepancy in education levels among LSS households. Though individualised production strategies have redistributed power away from the original leaseholder it is clear that new status hierarchies are emerging on multiple household blocks, which are related to a households' access to oil palm income as well as a change in the way money is thought about in PNG.

5.5   Socio-cultural change

So far in my discussion on educational and income inequalities, and the driving forces behind them, the focus has been at the household level and in particular the increasing nucleation and stratification of households on the blocks. In this section the focus is broadened to look at wide societal change occurring in PNG that relate to changing status markers, growing individualisation and consumerism.

Status hierarchies and the atomisation of social relations

The accumulation of money is increasingly viewed as a way in which to achieve status in PNG, especially for young men. Emerging in the literature on social and economic change in PNG (e.g. Martin 2007, 2013; Mosko 2013) is the notion of the 'big shot,' which is a title given to those who have achieved status through monetary wealth. Whilst achieving status this way is commonplace in modern market economies, in PNG, it is a departure from how status has been achieved in

the past. Traditionally in PNG, leadership and 'big man' status were achieved through a person's accumulation and generous distribution of goods and wealth items (such as pigs, root crops and shell valuables) to their kinship group (Bainton 2008; Mosko 2013; Sahlins 1963). Key to the big man's status is the establishment of "relations of loyalty and obligation" (Sahlins 1963, p. 291) among a number of people through social relations. This contrasts with the modern day 'big shot', as described by (Martin 2013, p. 178) as "[a] person who is considered to have placed themselves outside of their moral obligations to others." In much the same way as the theoretical distinction between gifts and commodities, the crucial difference between the traditional and modern way of achieving status is the degree of social obligations associated with exchange and transactions and their meaning within a modern context.

Similarly, young married men on the LSS blocks now can achieve a degree of status through the accumulation of oil palm income without dependence on reciprocal relationships from co-resident family members. A shift away from traditional cooperative norms to strategies allowing for the accumulation of individual wealth is part and parcel of this change in the formation of new status hierarchies on the blocks. At the beginning of the LSS, the *Papa* or original leaseholder relied on the non-market principles of reciprocity and gift exchange to maintain relations between households and give legitimacy to their role as the boss of the block (see Koczberski & Curry 2014). Now achieving status like elsewhere in PNG, is becoming more of an individual pursuit, reached through the accumulation of monetary wealth for the individual or the individual's immediate family, thus sharing similarities with Martin's notion of the 'big shot.' Another way of understanding this change in social relations occurring in PNG is through the concept of possessive individualism.

Possessive individualism

There is a growing body of literature (e.g. Martin 2007, 2013; Robbins 2007; Sykes 2007a, 2007b) reporting the rise of possessive individualism in PNG, as the cash

economy becomes more developed and people's actions are governed more according to self-interested market logic than customary obligations. It is argued that people are increasingly choosing to turn their back on *kastom* obligations, which demand the sharing and distribution of wealth among kin, to instead hold on to their possessions for individual means. For example, Martin (2007) discusses the reluctance of certain *Tolai* elite to share betel nut with others, and Bainton (2008) writes of the desire (but also the conflict) for men working on the Lihir mine in PNG to pursue individual wants or *bisnis* over *kastom* obligations. These examples point to broad behavioural changes in PNG, as people move towards more individual livelihood strategies fitting with the demands of market capitalism.

On the LSS blocks, the growing reluctance of smallholders to share money outside of their households is indicative of smallholders acting according to a more individual ethic. The results show (see Table 4.6, Figure 4.4) uneven education attainment between primary households who receive oil palm income fortnightly or monthly and other households who never or very irregularly receive oil palm income. The results also show an increase in the proportion of households practising individual production strategies. This means some households (i.e., those which receive regular oil palm income) have control over their own income and a degree of autonomy from their block co-residents.

Whilst some authors (e.g. Mosko 2013) argue it is misguided to understand engagement with the cash economy in rural PNG as possessive individualism, these studies are typically in relation to a village context. This thesis does not dispute that all transactions and exchanges are embedded within social relations, rather, it recognises that the socio-cultural context of the LSS blocks differs significantly from that of villages. In this respect Polanyi's notion of social embeddedness is enlightening. As discussed by Block and Somers (2014, p. 30):

> [W]estern societies are as much shaped by culture as are tribal societies; it is just that the content of our own cultural beliefs now reflect the core ideas of Western Liberalism – belief in the sovereignty of the self-interested, materially motivated individual, and the sacred status we attribute to a rapidly developing economy.

In much the same way, the LSS blocks are a highly commoditised environment that encourages behaviour fitting with the demands of a competitive market economy. Therefore, smallholder blocks differ from villages in a number of ways. Firstly, smallholders are typically migrants removed from their original kinship networks. Indeed, many have never visited their parent's villages. In this respect, smallholders on the LSSs do not have the same clan based obligations as their relatives living back in the village and can pursue more individualised livelihood strategies. Secondly, unlike villagers occupying inalienable customary land, LSS smallholders reside upon state land on 99 year leases. Therefore, leaseholders have exclusive claims to property rights. Thirdly, as pointed out by Curry and Koczberski (2012), the institutional context of the LSS blocks is one geared toward business. One of the goals of the LSS was to encourage smallholders to become more *bisnis* minded through engagement with the market economy, and in this way, smallholders tend to be more entrepreneurial than villagers.

5.5.1   Consumerism and individualisation

Finally, further evidence of increasing individualisation and change in attitudes towards money items is shown by a growing demand for consumer goods by smallholders. Changing consumption patterns are a key characteristic of the modernisation process, and the relationship between rising personal incomes and increased consumption of western goods is well documented (e.g. Rigg 2003, 2007).

On the LSS blocks, change in consumption patterns is evident through an increase in electronic and store items being bought and sold at local markets, as well as changing food preferences. The results show that over half of LSS households surveyed had access to DVD players and almost 90% had mobile phones (Table 5.7). The use of mobile phones is now widespread and common in PNG, especially amongst the youth. With higher than average incomes on the blocks, it is perhaps predictable that smallholder mobile phone ownership is high. It was also found that almost one-third of households in Popondetta had internet access via their mobile phones. It is probable that the number of smallholders with smart phones will increase, as smart phones are the main, if not only, way to access the internet from

the blocks. It is also likely that there is a degree of status associated with mobile phone ownership with more expensive models indicating greater status and wealth. However, over time, with rapid transformation taking place, the mobile phone is likely to change from a status to a necessity item.

Table 5.7. Technology ownership/access on LSS blocks.

	N	Ownership/access (%)
DVD	259	57
Mobile phone	259	88
Mobile phone internet access	60*	32
Computer	260	4
Generator	124*	57
Radio	86*	52

* Count number varies as questions were added during fieldwork.

The type of food consumed in PNG is also changing as people adopt more modern consumption habits and develop a taste for 'western' style food. Evidence suggests (e.g. Bourke 2005; Connell 1997) that people in PNG are consuming less traditional foods such as root crops, and more store bought foods, such as rice and tinned meat. In WNBP, Dewhurst (2007) found that the younger generation in particular had a strong preference for imported store foods over garden foods. As with the push for technology change, the change in food consumption patterns is predominantly driven by the youth. The younger generation value money and items bought with money in the context of a market economy. That is, where the individual pursuit of money items affords the consumer a degree of status.

5.6   Conclusion

This chapter has shown that the LSS blocks are becoming more socially and economically fragmented as households pursue individualised income strategies where wealth is distributed between immediate families rather than wider kinship groups. Furthermore, new status hierarchies are emerging between households as the accumulation of money becomes synonymous with status in an increasingly

commoditised environment. These findings support the argument that people are increasingly acting according to the ethic of possessive individualism in PNG.

The results show that primary households have a relatively privileged position on the blocks with regular access to oil palm income and land to pursue other income strategies, whilst, secondary (especially *pasendia*) households are in a vulnerable position with limited or no oil palm access and a narrow range of off-block incomes to pursue. It is known that oil palm income is the most important income source to pay for school fees, therefore secondary households typically struggle to pay school fees as a result.

This chapter has argued that increasing individualisation and inequalities are symptomatic of broader socio-economic change in PNG, as the cash economy becomes more developed and people act according to market logic rather than indigenous social norms. Furthermore, changes in production strategies are indicative of smallholders trying to find the most productive labour strategies while reducing disputes within the context of high population growth and declining per-capita incomes.

Notes

[1] The primary research survey sample included, but was not limited to, the three areas of Hoskins rural, Bialla rural and Kokoda rural. Therefore, the 2011 census data presented in Table 5.3 should only be used as an approximation for comparison with the survey results.

[2] As discussed in Section 3.9, some smallholders were absent from their blocks at the time of data collection due to the impending elections. This means that the population data, especially for Hoskins, are under-represented. However, the relationship shown in Table 5.4 is valid, and I would argue, would be even stronger than what is shown had more populated blocks been surveyed.

[3] As noted already, not all densely populated blocks could be surveyed due to smallholders being absent from their blocks during the lead up to the national elections. Therefore, it is probable that the results would show a higher proportion of blocks practising *makim mun*, *skelim hecta* and mixed strategies had more densely populated blocks been surveyed, especially for the Hoskins region.

CHAPTER 6

Conclusion

6.1   Introduction

This thesis has examined smallholder education levels to better understand both the state of education on the LSSs, and resource allocation between and among households on the LSS blocks. There is little published data on education levels on rural smallholders in PNG, and, therefore, this study provides valuable quantitative data on what is a fundamental measure of development. Furthermore, data on oil palm income distribution adds to and strengthens previous research (e.g. Curry & Koczberski 2012) on the subject of emerging status hierarchies on the blocks. The findings on education reveal there is a low level of education attainment and school attendance on the LSS blocks relative to the blocks' general prosperity. The LSS is considered one of the more successful development projects in PNG that gives people a regular income and access to services such as schools and health facilities. Therefore, low levels of education attainment on the LSS block are a concern, and raise questions about why the state of education on the blocks has not improved to the extent that might be expected.

At the intra-household level, the results show there are significant education inequalities according to age and gender, with there being an investment bias towards early born and male children. In understanding investment decisions, this thesis recognises that there are a multitude of factors, including economic reasoning and socio-cultural norms that influence parental education investment strategies. There is a wealth of literature that frames investment decisions according to economic rationality, but equally, many studies show the pervasiveness of cultural norms in influencing household decision-making.

Consequently, the thesis acknowledges that there are multiple logics operating on the blocks which influence investment strategies and decision-making.

At an inter-household level, this thesis has shown that unequal distribution of oil palm income and changing production strategies are leading to increasing economic and social stratification on the blocks. Emerging status hierarchies on the blocks are most evident when examining the education gap between primary and secondary households. Smallholders belonging to primary households have the highest education levels as a consequence of regular access to oil palm income, whilst smallholders from secondary households have the lowest average education levels as an outcome of infrequent or no access to oil palm income. As secondary households are largely excluded from oil palm wealth, they are forced to pursue a greater proportion of non-oil palm incomes, such as re-selling store goods.

That some households occupy such a marginal status on the blocks is a major concern for several reasons. Firstly, it is known that there is a correlation between parental and child education levels. Therefore, it is likely that there is a cycle of shared down poverty with poorly educated parents having poorly educated children. In this regard the TFF policy may have little effect on improving education levels, if parents do not value education or if the opportunity cost of sending children to school is too high. Secondly, poorly educated smallholders are not likely to be able to find well paid off-block employment. This means they will be confined to living on the blocks and contributing to population pressure. Thirdly, as production strategies become more individualised, some secondary households have very little involvement with block management decisions. As a result, they have little incentive to harvest and help maintain the oil palm blocks. A growing population of oil palm smallholders who are disinterested in block maintenance and general oil palm activities is a significant problem, likely to contribute to lower overall productivity, conflict amongst households and increasing economic differentiation between those households benefiting from oil palm income and those which do not.

The findings on education and production strategies must be understood within the context of high population growth on the blocks. This thesis identifies high population density as being related to a number of factors including declining per-capita oil palm incomes and education levels, increased conflict and the pursuit of more individualised production strategies. The findings show there is a negative correlation between block population and average education levels, with the most densely populated blocks having the lowest average education levels. Densely populated blocks are also correlated with households conducting more individualised production strategies. With an increase in population on the blocks there is a need to divide oil palm income among multiple households. The more individual strategies such as *makim mun* and *skelim heta* are a way of distributing income in a manner that minimises disputes over pay. However, under these arrangements some households have greater access to oil palm income than others.

At a broader level, the new status hierarchies on the blocks are related to socio-economic change occurring in PNG as the cash economy becomes more developed and the social implications of money change. LSS smallholders now achieve a degree of social status through the accumulation of money, in a similar way to the 'big shot,' described by Martin (2013). This way of achieving status is different from the past in its neglect of traditional social obligations in favour of an individual capitalist ethic. This study has emphasised that it is change in the broader economic environment which values economic autonomy and independence, which has enabled people to achieve status through the accumulation of money while neglecting traditional moral obligations.

Furthermore, the LSS is a modernisation project that encourages smallholders to act according to a market logic favouring an individual ethic. In saying this, the thesis does not argue that social relations on the LSS blocks are guided solely according to individual market principles (or that this happens in any market capitalist society). Rather, it acknowledges that economic decision-making on the blocks is socially embedded, but, it argues that the socio-cultural context of the LSS and PNG in general, is increasingly one that favours an individualistic and profit making ethos.

6.2 Significance of research

It is known that analysing education data is an effective method of investigating household and block inequalities. Therefore, the education findings give an important insight into emerging economic and social inequality on the LSS blocks. Examining education levels according to variables such as gender and age reveals investment biases within households and gives an insight into processes of wealth distribution. Differences in average education levels between co-resident households expose status hierarchies related to access to oil palm income on the blocks and build upon work by Curry and Koczberski (2012) examining change in the valuing of labour on the LSS blocks according to market principles. In addition, findings showing uneven development on the blocks go some way to illustrate the complexity of economic and social relations within households and on the blocks. Therefore, not only is it incorrect to regard households as 'black boxes,' it is also misguided to consider LSS blocks as simple homogenous units when seeking to understand economic decision-making.

The primary data collected on production strategies adds to previous research and allows for a longitudinal study of change in the way labour is organised and remunerated on the blocks. The trends show that smallholders are adopting increasingly individual production strategies as they compete with one another in an increasingly competitive environment, thus giving an insight into ways in which smallholders are adapting to on-block pressures. Furthermore, these trends allow for inferences to be made concerning future change on the blocks. It is hard to imagine that control of oil palm income will ever revert back to a cooperative system with centralised control and distribution. Rather, it seems likely that production strategies will become increasingly complex as smallholders try and find new ways of adapting to growing population pressure and increasing commodification of social relationships on the blocks.

6.3　Areas for further research

Impact of tuition fee free policy

The TFF policy is the most important education reform in PNG in recent times, and therefore, research into the outcomes of the TFF for LSS smallholders is warranted. Apart from the Howe et al. (2014) study, there have been little data published on its results. As discussed in Section 5.4, the TFF policy has the potential to enable low-income families to send their children to school. It may also improve gender equality within schools if international trends are applicable to PNG, but its long-term impact remains to be seen.

Parental attitudes towards education

Within the education literature it is argued that parental attitudes towards education have a major effect on the investment in children's education. As this thesis used survey questionnaires as its research method, data on attitudes towards education are lacking. Surveys are effective in answering 'what' questions, but less so when finding answers to 'why' questions. Given more time, a focus group could have been employed to gain a greater understanding into where school education fits within the diverse suite of concerns of smallholder parents. If indeed, poor parental attitudes towards education on the LSS were identified it would impact on how to address low education levels.

Data from schools

Primary data were collected only from LSS blocks. A more detailed picture of the state of education in the three project areas could be achieved with the addition of enrolment and attendance data from local schools. Furthermore, interviews with teachers and headmasters would give further insights into the constraints preventing children attending and staying in school.

6.4　Recommendations

Changes are needed to improve the state of education on the LSS blocks. The average smallholder has not completed primary school and there are high levels of inequality amongst smallholders according to gender and status/access to oil palm

income. Given these findings, the recommendations below are offered to improve education levels and strengthen smallholder livelihoods.

- Smallholders should be encouraged to diversify livelihood strategies into non-oil palm incomes

This point has been made in a previous report (Koczberski, Curry & Gibson 2001) but given the findings it is worth reiterating. A reliance on oil palm income is a risky strategy given the fluctuating commodity price of palm oil and declining per-capita incomes related to increasing population. Furthermore, status hierarchies on the blocks mean that some secondary households have no access to oil palm income at all. Therefore, alternative income strategies such as other cash crops and off-block labour should be promoted as ways of improving food security on the blocks.

- Teach LSS bock management in schools to target extension messages to youth and encourage parents to send their children to school

There is a perception among some parents that school education is irrelevant to their children's needs. Teaching block management skills at school could create links between schooling and the blocks and emphasise the relevance of school education for parents. It could also encourage school children to engage with various farming issues on the blocks rather than to become disinterested.

- Education on family planning

Many of the socio-economic problems facing LSS smallholders stem from high population density and large families. The results show that large families (more than five children) have low average education levels, mainly due to the costs associated with raising several children. It is also known that when girls fall pregnant they drop out of school, often never to return. Therefore, birth control should be taught at school.

- Target education strategies towards girls

Within development literature the importance of female education is consistently stressed and yet females have the lowest education outcomes on the LSS blocks. Parents need to recognise the value of female education and girls should be encouraged to attend and stay in school. Extension officers could emphasis the message that female education matters at field days.

6.5   Conclusion

To conclude, the oil palm LSSs in PNG have been one of the more successful economic developments in rural PNG, creating jobs and contributing significantly to national agricultural exports. However, the LSS blocks in the three project regions have undergone a demographic and socio-economic transformation since their inception in the 1960s and 1970s, and population pressure has emerged as a major constraint affecting smallholders' ability to make a living. Using empirical fieldwork data this thesis has shown that increasing population density is contributing to economic and social stratification on the blocks. Smallholders are increasingly pursuing individualised income strategies as they compete over limited resources, which is evident through unequal educational attainment according to household status on the blocks. It is likely that LSS smallholders will continue to pursue individual livelihood strategies as they adapt to growing population pressure into the future and the increasingly commodified environment of the LSS blocks.

References

ABC 2013. Preying on Paradise. *4 Corners.* ABC.

ABEBE, G. K., BIJMAN, J., PASCUCCI, S. & OMTA, O. 2013. Adoption of Improved
Potato Varieties in Ethiopia: The role of agricultural knowledge and
innovation system and smallholder farmers' quality assessment. *Agricultural
Systems,* 122**,** 22-32.

ADB 2012. Papua New Guinea: Critical development constraints. Mandaluyong City:
http://www.nicta.gov.pg/publicinquirynew/Comments%20%20RSD%202nd
%20Discussion%20Paper/Digicel%20Response%20ADB%20PNG%20-
%20critical%20development%20constraints.pdf.

ADSPNG 2001. Study of the Smallholder Oil Palm Sector: Achievements and
potential for future development. Port Moresby Papua New Guinea.

ANU. 2013. *Papua New Guinea base* [Online]. ANU. Available:
http://asiapacific.anu.edu.au/mapsonline/base-maps/papua-new-guinea-
base.

APENTIIK, C. R. A. & PARPART, J. L. 2006. Working in Different Cultures: Issues of
race, ethnicity and identity. *In:* DESAI, V. & POTTER, R. B. (eds.) *Doing
Development Research. Doing Development Research.* London: SAGE
Publications, Ltd.

APPLETON, S., HODDINOTT, J. & KRISHNAN, P. 1999. The Gender Wage Gap in Three
African Countries. *Economic Development and Cultural Change,* 47**,** 289-312.

ASADULLAH, M. N. & RAHMAN, S. 2009. Farm Productivity and Efficiency in Rural
Bangladesh: The role of education revisited. *Applied Economics,* 41**,** 17-33.

ASFAW, A. & ADMASSIE, A. 2004. The Role of Education on the Adoption of
Chemical Fertiliser under Different Socioeconomic Environments in Ethiopia.
Agricultural Economics, 30**,** 215-228.

AVALOS, B. 1993. Ideology, Policy and Educational Change in Papua New Guinea.
Comparative Education, 29**,** 275-292.

BAINTON, N. A. 2008. Men of Kastom and the Customs of Men: Status, legitimacy
and persistent values in Lihir, Papua New Guinea. *Australian Journal of
Anthropology,* 19**,** 194-212.

BALNAVES, M. & CAPUTI, P. 2012. *Introduction to Quatitative Research Methods,*
London, SAGE.

BARRETT, C. B. 2011. A Millennium Learning Goal for education post-2015: A question of outcomes or processes. *Comparative Education, 47***,** 119-133.

BECKER, G. S. 1964. *Human Capital: A Theoretical and Empirrical Analysis, with Special Reference to Education,* New York, Columbia University Press.

BECKER, G. S. 1976. *The Economic Approach to Human Behaviour,* Chicago, University of Chicago Press.

BECKER, G. S. 1981. *A Treatise on the Family,* Cambridge, Harvard University Press.

BECKER, G. S. 2004. Economic Approaches to Understanding Families. *Annals New York Acdemy of Sciences,* 1038**,** 201-205.

BECKER, G. S., MURPHY, K. M. & TAMURA, R. 1990. Human Capital, Fertility and Economic Growth. *Journal of Political Economy,* 98**,** 12-37.

BEHRMAN, J. & BIRDSALL, N. 1983. The Quality of Schooling: Quantity alone is misleading. *American Journal Review,* 73.

BEHRMAN, J. R. & ROSENZWEIG, M. R. 2002. Does Increasing Women's Schooling Raise the Schooling of the Next Generation? *The American Economic Review,* 92**,** 323-334.

BEHRMAN, J. & TAUBMAN, P. 1986. Birth Order, Schooling and Earnings. *Journal of Labor Economics,* 4**,** 121-145.

BERG, B. & LUNE, H. 2012. *Qualitative Research Methods for the Social Sciences,* New York, Pearson.

BHATTACHARYA, K. 2007. Consenting to the Consent Form: What are the fixed and fluid understandings between the researcher and researched? *Qualitative Inquiry,* 13**,** 1095-1115.

BISKUP, P., JINKS, B. & NELSON, H. 1968. *A Short History of New Guinea,* Sydney, Angus and Robertson.

BLAKE, J. 1981. Family Size and the Quality of Children. *Demography,* 18**,** 421-442.

BLYTH, C. 1991. Government Expenditure in Papua New Guinea: Human Capital Formation. Port Moresby: Institute of National Affairs.

BOURKE, M. & HARWOOD, T. (eds.) 2009. *Food and Agriculture in Papua New Guinea,* Canberra: ANU Press.

BOURKE, R. M. 2005. Marketed fresh food: A successful part of the Papua New Guinea economy. *Development Bulletin,* 67**,** 22-24.

BRACE, I. 2009. *Questionnaire Design,* London, Kogan Page.

BRUNDRETT, M. 2014. Education for all: The challenges of achieving universal early childhood care and primary education. *Education 3-13: International Journal of Primary, Elementary and Early Years Education,* 42**,** 233-236.

BUE, V. 2013. *The Role of Smallholder Farmers in Sustaining Household Food Security at Bialla and Hoskins Oil Palm Land Settlement Schemes, Papua New Guinea.* Doctor of Philosophy, Curtin.

CARD, D. & KRUEGER, A. B. 1992. Does School Quality Matter? Returns to education and the characteristics of public schools in the United States. *Journal of Political Economy,* 100**,** 1-39.

CASTELLO-CLIMENT, A. & HIDALGO-CABRILLANA, A. 2012. The Role of Educational Quality and Quantity in the Process of Economic Development. *Economics of Education Review,* 31**,** 391-409.

CHAMBERS, R. & CONWAY, G. R. 1992. Sustainable Rural Livelihoods: Practical concepts for the 21st Century. *IDS Discussion Paper 296.* Brighton: IDS.

CHOWDHURY, J. 2005. Contested History of Neo-Classical Economic Models of Households in Development. *BRAC University Journal,* 2**,** 23-33.

COLCLOUGH, C. 1982. The Impact of Primary Schooling on Economic Development: A review of the evidence. *World Development,* 10**,** 167-185.

CONNELL, J. 1997. *Papua New Guinea: The Struggle for Development,* London, Routledge.

COOPER, F. & PACKARD, R. 2005. The History and Politics of Development Knowledge. *In:* EDELMAN, M. & HAUGERUD, A. (eds.) *The Anthropology of Development and Globalisation.* Oxford: Blackwell.

COUSIN, G. 2010. Positioning positionality: The reflexive turn. *In:* SAVIN-BADEN, M. & MAJOR, C. H. (eds.) *New Approaches to Qualitative Research: Wisdom and Uncertainty.* Hoboken: Taylor and Francis.

CREMIN, P. & NAKABUGO, M. G. 2012. Education, Development and Poverty Reduction: A literature critique. *International Journal of Educational Development,* 32**,** 499-506.

CRESWELL, J. W. 2009. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches,* Los Angeles, Sage.

CROSSLEY, M. 1990. Curriculum Policy and Practice in Papua New Guinea. *Compare,* 20**,** 141-154.

CROTTY, M. 1998. Positivism: The march of science. *In:* CROTTY, M. (ed.) *The Foundations of Social Research: Meaning and perspectives in the research process.* Sydney: Allen & Unwin.

CUESTA, J. 2006. The Distributive Consequences of Machismo: A simulation analysis of intra-household discrimination. *Journal of International Development,* 18**,** 1065-1080.

CURRY, G. N. 2005. Reluctant Subjects or Passive Resistance? A commentary on J. K. Gibson-Graham's "Surplus possibilities: Postdevelopment and community economies". *Singapore Journal of Tropical Geography,* 26**,** 127-131.

CURRY, G. N. & KOCZBERSKI, G. 2012. Relational Economies, Social Embeddedness and Valuing Labour in Agrarian Change: An example from the Developing World. *Geographical Research,* 50**,** 377-392.

CURRY, G. N., KOCZBERSKI, G., OMURU, E., DUIGU, J., YALA, C. & IMBUN, B. 2007. Social Assessment Report for the Smallholder Agriculture Development Project (SADP) Papua New Guinea. World Bank.

DAMMERT, A. C. 2010. Siblings, child labor, and schooling in Nicaragua and Guatemala. *Journal of Popular Economics,* 23**,** 199-224.

DE MURO, P. & BURCHI, F. 2007. Education for Rural People and Food Security: A Cross Country Analysis. Rome: Food and Agriculture Organisation of the United Nations

DE VAUS, D. E. 2002. *Surveys in Social Research,* Crows Nest NSW, Allen & Unwin.

DELAP, E. 2000. Child Housework in Urban Bangladesh: An exploration of intra-household labour deployment. *Journal of International Development,* 12**,** 723-734.

DESAI, M. 1991. Human Development: Concepts and measurement. *European Economic Review,* 35**,** 350-357.

DFAT 2012. Papua New Guinea Annual Program Performance Report 2011. Canberra: Department of Foreign Affairs and Trade.

DILLARD, C. B. 2000. The substance of things hoped for, the evidence of things not seen: Examining an endarkened feminist epistemology in educational research and leadership. *International Journal of Qualitative Studies in Education,* 13**,** 661-681.

ELLIS, F. 1998. Household Strategies and Rural Livelihood Diversification. *Journal of Development Studies,* 35**,** 1-38.

ELLIS, F. 2000. *Rural Livelihoods and Diversity in Developing Countries,* New York, Oxford University Press.

EMERSON, P. M. & SOUZA, A. P. 2008. Birth Order, Child Labor, and School Attendance in Brazil. *World Development,* 36**,** 1647-1664.

FOLBRE, N. 1986a. Cleaning House: New perspectives on households and economic development. *Journal of Development Economics,* 22**,** 5-40.

FOLBRE, N. 1986b. Hearts and Spades: Paradigms of Household Economics. *World Development,* 14**,** 245-255.

FOX, C. 1999. Girls and Women in Education and Training in Papua New Guinea. *In:* HEWARD, C. & BUNWAREE, S. (eds.) *Gender, Education and Development: Beyond access to empowerment.* London: Zed Books.

FULLER, B. & LIANG, X. 1999. Which Girls Stay in School? The influence of family economy social demands and ethnicity in South Africa. *In:* BLEDSOE, C. H., CASTERLINE, J. B., JOHNSON-KUHN, J. A. & HAAGA, J. G. (eds.) *Critical Perspectives on Schooling and Fertility in the Developing World.* Washington: National Academy Press.

GANNICOTT, K. G. & AVALOS, B. 1994. *Pacific 2010: Women's education and economic development in Melanesia*, National Library of Australia.

GARDNER, K. & LEWIS, D. 1996. *Anthropology, Development and the Post Modern Challenge,* London, Pluto Press.

GIBSON, J. 1999. How can Women's Education Aid Economic Development? The effect on child stunting in Papua New Guinea. *Pacific Economic Bulletin,* 14**,** 71-80.

GIBSON, J. 2000. Who's Not in School? Economic barriers to universal primary education in Papua New Guinea. *Pacific Economic Bulletin,* 15**,** 46-58.

GIBSON, J. & FATAI, O. K. 2006. Susidies, selectivity and the returns to education in urban Papua New Guinea. *Economics of Education Review,* 25**,** 133-146.

GIBSON, J. & ROZELLE, S. 2004. Is it Better to be a Boy? A disaggregated outlay equivalent analysis of gender bias in Papua New Guinea. *The Journal of Development Studies,* 40**,** 115-136.

GIBSON, M. A. & LAWSON, D. W. 2011. "Modernization" Increases Parental Investment and Sibling Resource Competition: Evidence from a rural development initiative in Ethiopia. *Evolution and Human Behavior,* 32**,** 97.

GIBSON, M. A. & SEAR, R. 2010. Does Wealth Increase Parental Investment Biases in Child Education? *Current Anthropology,* 51**,** 693-701.

GLEWWE, P. & ILIAS, N. 1996. The Determinants of School Attainment in Sub-Saharan Africa: A case study of Ghana. *Journal of International Development,* 8**,** 395-413.

GLICK, P. 2008. What Policies will Reduce Gender Schooling Gaps in Developing Countries: Evidence and interpretation. *World Development,* 36**,** 1623-1646.

GODELIER, M. 1982. Social Hierarchies among the Baruya. *In:* STRATHERN, A. (ed.) *Inequality in New Guinea Highlands Societies.* Cambridge: Cambridge University Press.

GORARD, S. 2004. *Quantitative Methods in Social Science,* London, Continuum.

GRIEVE, R. 1986. The Oil Palm Industry of Papua New Guinea. *Australian Geographer,* 17**,** 72-76.

GUTHRIE, G. 2012. The Failure of Progressive Classroom Reform: Lessons from the Curriculum Reform Implementation Project in Papua New Guinea. *Australian Journal of Education,* 56**,** 241-256.

HAMILTON, P. 1992. The Enlightenment and the Birth of Social Science. *In:* HALL, S. & GIEBEN, B. (eds.) *Formations of Modernity.* Cambridge: Polity Press

HANUSHEK, E. A. 2011. The economic value of higher teacher quality. *Economics of Education Review,* 30**,** 466-479.

HANUSHEK, E. A. 2013. Economic Growth in Developing Countries: The role of human capital. *Economics of Education Review,* 37**,** 204-212.

HART, G. 1992. Imagined Unities: Constructions of the Household in Economic Theory. *In:* ORTIZ, S. & LEES, S. (eds.) *Understanding Economic Process.* London: University Press of America.

HART, G. 1997. From 'Rotten Wives' to 'Good Mothers': Household models and the limits of economism. *IDS Bulletin,* 28**,** 14-25.

HAVEMAN, R. & WOLFE, B. 1995. The Determinants of Children's Attainments: A review of methods and findings. *Journal of Economic Literature,* 33**,** 1829-1878.

HENDRY, J. 1999. *An Introduction to Social Anthropology: Other People's Worlds,* Hampshire, Palgrave.

HEROD, A. 1999. Reflections on Interviewing Foreign Elites: Praxis, positionality, validity, and the cult of the insider. *Geoforum,* 30**,** 313-327.

HERTEL, B. 1976. Minimising Error Variance Introduced by Missing Data Routines in Survey Analysis. *Sociological Methods and Research,* 4**,** 459-474.

HERZ, B. & SPERLING, G. 2004. What Works in Girls' Education: Evidence and policies from the developing world. New York: Council on Foreign Relations.

HEYNEMAN, S. P. 2013. The International Efficiency of American Education: The bad and the not-so-bad news. *In:* HEINZ-DIETER, M. & BENAVOT, A. (eds.) *Pisa, Power and Policy: The emergence of global educational governance.* Oxford: Oxford Studies in Comparative Education Symposium

HIES 2011. Household Income and Expenditure Survey 2009/10. Port Moresby: National Statistical Office.

HILL, M. A. & KING, E. M. 1991. Women's education in developing countries: an overview. *In:* KING, E. M. & HILL, M. A. (eds.) *Women's Education in Developing Countries: barriers, benefits and policy.* Washington, DC: World Bank.

HILL, M. A. & KING, E. M. 1995. Women's Education and Economic Wellbeing. *Feminist Economics,* 1**,** 21-46.

HOWES, S., MAKO, A. A., SWAN, A., WALTON, G., WEBSTER, T. & WILTSHIRE, C. 2014. A Lost Decade? Service delivery and reforms in Papua New Guinea 2002 - 2012. Canberra: The National Research Institute and the Development Policy Centre.

HUFFMAN, W. 2001. Human Capital: Education and Agriculture. *In:* GARDNER, B. & RAUSSER, G. (eds.) *Handbook of Agricultural Economics.* 1 ed. Amsterdam: Elsevier Science.

HULME, D. 1983. An Economic Appraisal of the Hoskins Oil Palm Scheme. *Australian Geographer,* 15**,** 330-334.

HURST, A. L. 2008. A Healing Echo: Methodological reflections of a working-class researcher on class. *The Qualitative Report,* 13**,** 334-352.

IBRD 1965. The Economic Development of the Territory of Papua and New Guinea. Baltimore: International Bank for Reconstruction and Development.

IKUPU, A. & GLOVER, A. 2002. Papua New Guinea Elementary Teacher Education: Mixed mode teacher training for 16 000 village teachers. *Australasian Journal of Early Childhood,* 28**,** 39-45.

JAMES, J. 2006. Misguided Investments in Meeting Millennium Development Goals: A reconsideration using ends-based targets. *Third World Quarterly,* 27**,** 443-458.

JAMISON, D. T. & MOOCK, P. R. 1984. Farmer Education and Farm Efficiency in Nepal: The role of schooling, extension services, and cognitive skills. *World Development,* 12**,** 67-86.

JOLLY, M. 1987. The Chimera of Equality in Melanesia. *Mankind,* 17**,** 168-183.

JONAS, W. J. A. 1972. The Hoskins Oil Palm Scheme. *Australian Geographer,* 12**,** 57-58.

KAPLAN, H. 1996. A Theory of Fertility and Parental Investment in Traditional and Modern Human Societies. *American Journal of Physical Anthropology,* 101**,** 91-135.

KELLY, P. 2005. Scale, Power and the Limits to Possibilities. *Singapore Journal of Tropical Geography,* 26**,** 39-43.

KINGDON, G. 2006. Returns to Education. *In:* CLARK, D. A. (ed.) *The Elgar Companion to Development Studies.* Cheltenham: Edward Elgar.

KINGDON, G. & UNNI, J. 2001. Education and Women's Labour Market Outcomes in India. *Education Economics,* 9**,** 173-195.

KOCZBERSKI, G. 2007. Loose Fruit Mamas: Creating Incentives for Smallholder Women in Oil Palm Production in Papua New Guinea. *World Development,* 35**,** 1172-1185.

KOCZBERSKI, G., CURRY, G. N. & GIBSON, K. 2001. Improving Productivity of the Smallholder Oil Palm Sector in Papua New Guinea: A socio-economic study of the Hoskins and Popondetta schemes. Canberra: Department of Human Geography, Research School of Pacific and Asian Studies, The Australian National University.

KOCZBERSKI, G., RYAN, S., ROGER, D., GERMIS, E., KOIA, M. & CURRY, G. N. 2013. Smallholder Engagement Strategy for OPIC. *Developing a Smallholder Engagement Strategy for OPIC.* Perth: PNG Oil Palm Research Association. Curtin University.

KOLO, P. 2014. Schools Still Charging Fees. *Papua New Guinea Post Courier*, February 4th.

KRUEGER, A. B. 1999. Experimental Estimates of Education Production Functions. *Quarterly Journal of Economics,* 114**,** 497-532.

LAMBERT, S., RAVALLION, M. & VAN DE WALLE, D. 2014. Intergenerational Mobility and Interpersonal Inequality in an African Economy. *Journal of Development Economics,* 110**,** 327-344.

LEYS, C. 2005. The Rise and Fall of Development Theory. *In:* EDLEMAN, M. & HAUGERUD, A. (eds.) *The Anthropology of Development and Globalisation.* Oxford: Blackwell.

LIDDELL, C., HENZI, P. & BARRETT, L. 2003. Parental Investment in Schooling: Evidence from a subsistence farming community in South Africa. *International Journal of Psychology,* 38**,** 54-63.

LIPUMA, E. 2000. *Encompassing Others: The magic of modernity in Melanesia,* Ann Arbor, University of Michigan Press.

LOCKHEED, M. E., JAMISON, T. & LAU, L. J. 1980. Education and Farmer Efficiency: A Survey. *Economic Development and Cultural Change,* 29**,** 37-76.

LOCKHEED, M. E. & VERSPOOR, A. 1991. *Improving primary education in developing countries,* Washington, Oxford University Press.

MACE, R. & SEAR, R. 1997. Birth Interval and the Sex of Children in a Traditional African Population: An evolutionary analysis. *Journal of Biosocial Science,* 29**,** 499-507.

MACPHERSON, C. B. 1962. *The Political Theory of Possessive Individualism,* Oxford, Oxford University Press.

MARJORIBANKS, K. 1980. *Ethnic families and children's achievements* Sydney, George Allen & Unwin.

MARTIN, K. 2007. Your Own Buai You Must Buy: The ideology of possessive individualism in Papua New Guinea. *Anthropological Forum,* 17**,** 285-298.

MARTIN, K. 2013. *The Death of the Big Men and the Rise of the Big Shots: Custom and conflict in East New Britain,* New York, Berghahn Books.

MEGARRITY, L. 2005. Indigenous Education in Colonial Papua New Guinea: Australian Government Policy 1945 - 1975. *History of Education Review,* 34**,** 41-58.

MILNER, H. R. 2007. Race, Culture and Researcher Positionality: Working through dangers seen, unseen and unforeseen. *Educational Researcher,* 36**,** 388-400.

MOMSEN, J. H. 2006. Women, Men and Fieldwork: Gender relations and power structures. *In:* DESAI, V. & POTTER, R. B. (eds.) *Doing Development Research.* London: Sage.

MORDUCH, J. 2000. Sibling Rivalry in Africa. *The American Economic Review,* 90**,** 405-409.

MORSE, S. 2004. *Indices and Indicators in Development,* London, Earthscan.

MOSER, C. 1993. *Gender Planning and Development: Theory, practice, and training,* London, Routledge.

MOSKO, M. S. 2013. Dividuals, Individuals, or Possessive Individuals?: Recent transformations of North Mekeo commoditization, personhood, and sociality. *In:* MCCORMACK, F. & BARCALY, K. (eds.) *Development Implications of the Engagement with Capitalism: Improving the social returns of development.* Bingley: Emerald.

MULLINGS, B. 1999. Insider or outsider, both or neither: Some dilemmas of interviewing in a cross-cultural setting. *Geoforum,* 30**,** 337-350.

MURRAY, C. J. L. 1991. Development Data Constraints and the Human Development Index. *In:* UNRISD (ed.). Geneva.

NAPLES, N. A. 1996. A Feminist Revisiting of the Insider/Outsider Debate: The 'outsider phenomenon' in rural Iowa. *Qualitative Sociology,* 19**,** 83-106.

NATIONAL DEPARTMENT OF EDUCATION 1991. Education Sector Review: Volume 2, Deliberations and Findings. Waigani: National Department of Education.

NSO 1997. PNG Demographic and Health Survey 1996 National Report. Port Moresby.

NSO 2004. *National Statistical Office of Papua New Guinea - 2000 Census* [Online]. Available: https://www.spc.int/prism/country/pg/stats/2000_Census/census.htm.

NSO 2012. Preliminary Figures: Papua New Guinea Census 2011. Port Moresby: National Statistical Office.

NETTING, R. M. 1993. *Smallholders, Householders : Farm families and the ecology of intensive, sustainable agriculture,* Stanford, Stanford University Press.

NEUMAN, W. L. 2006. *Social Research Methods: Qualitative and quantitative approaches,* Boston, Pearson.

O' DONOGHUE, T. 2009. Colonialism, Education and Social Change in the British Empire: The cases of Australia, Papua New Guinea and Ireland. *Paedagogica Historica,* 45**,** 787-800.

O' DONOGHUE, T. & AUSTIN, D. 1994. The Evolution of a National System of Teacher Education in the Developing World. *History of Education,* 23**,** 313.

O' DONOGHUE, T. A. 1993. Community Development and the Primary School Teacher in the Developing World: An analysis of recent trends in Papua New Guinea. *Teacher and Teacher Education,* 9**,** 183-191.

ORRELL, I. 2012. Palm Oil Industry Statistics - 2012. Kimbe, West New Britain Province, PNG: Papua New Guinea Palm Oil Council.

PEET, R. 1991. *Global Capitalism: Theories of Societal Development,* London, Routledge.

PHILLIPS, D. C. & BURBULES, C. 2000. *Post-Positivism and Education Research,* Boston, Rowman & Littlefield.

PIETERSE, J. N. 1997. Globalisation and Emancipation. *New Political Economy,* 2**,** 79-92.

PNG DEPARTMENT OF EDUCATION. 2009. *Province Profile - West New Britain Province* [Online]. Available: http://www.education.gov.pg/Province_Profile/province-profiles/province-profile-west-new-britain.pdf.

PNGINA 2012. Gender and Economic Choice: Papua New Guinea country work. *Rapid Qualitative Assessment to inform the World Development Report on Gender.* Port Moresby: http://www.inapng.com/pdf_files/PNG%20Gender%20Report%20brief.pdf.

POLANYI, K. 1944. *The Great Transformation: The political and economic origins of our time,* Boston, Beacon.

POMFRET, R. 2000. *Development Economics,* Adelaide, University of Adelaide.

POPKIN, S. L. 1979. *The Rational Peasant: The political economy of rural society in Vietnam,* Berkeley, University of California Press.

POWER, M. 2003. *Rethinking Development Geographies,* London, Routledge.

PRESTON, P. W. 1996. *Development Theory: An Introduction,* Oxford, Blackwell Publishers.

PSACHAROPOULOS, G. 1973. *Returns to Education,* Amsterdam, Elsevier.

PSACHAROPOULOS, G. 1985. Returns to Education: A further international update and implication. *The Journal of Human Resources,* 20**,** 583-597.

PSACHAROPOULOS, G. 1994. Returns to Investment in Education: A Global Update. *World Development,* 22**,** 1325-1343.

PSACHAROPOULOS, G. & PATRINOS, H. A. 2004. Returns to Investment in Education: A further update. *Education Economics,* 12**,** 111-134.

RANIS, G., STEWART, F. & RAMIREZ, A. 2000. Economic Growth and Human Development. *World Development,* 28**,** 197-219.

RAVALLION, M. 1997. Good and Bad Growth: The human development reports. *World Development,* 25**,** 631-638.

READ, K. 1952. The Nama Cult of the New Guinea Highlands. *Oceania,* 23**,** 1-25.

REIMERS, M. & KLASEN, S. 2013. Revisiting the Role of Education for Agricultural Productivity. *American Journal of Agricultural Economics,* 95**,** 131-152.

RIGG, J. 2003. *Southeast Asia: The human landscape of modernization and development,* London, Routledge.

RIGG, J. 2007. *An Everyday Geography of the Global South,* Oxon, Routledge.

RIZZUTO, R. & WATCHTEL, P. 1980. Further Evidence on the Returns to School Quality. *Journal of Human Resources,* XV**,** 240-254.

ROBBINS, J. 1994. Equality as a Value: Ideology in Dumont, Melanesia and the West. *Social Analysis***,** 21-70.

ROBBINS, J. 2007. Afterword: Possessive individualism and cultural change in the Western Pacific. *Anthropological Forum,* 17**,** 299-308.

ROSTOW, W. W. 1971. *The Stages of Economic Growth: A non-communist manifesto,* Cambridge, Cambridge University Press.

RUBIN, H. J. & RUBIN, I. S. 1995. *Qualitative Interviewing: The art of hearing data,* Thousand Oaks, SAGE.

RYAN, S. 2009. *Maximising Income: Livelihood change and risk management for oil palm settlers in Papua New Guinea.* Honours thesis, Curtin University.

RYAN, S., KOCZBERSKI, G., GERMIS, E. & CURRY, G. N. 2013. Smallholder Education Strategies Report. *Developing a Smallholder Engagement Strategy for OPIC.* Perth: PNG Oil Palm Research Association.
Curtin University.

SAGAR, A. D. & NAJAM, A. 1998. The Human Development Index: A critical review. *Ecological Economics,* 25**,** 249-264.

SAHLINS, M. 1963. Poor Man, Rich Man, Big Man, Chief: Political types in Melanesia and Polynesia. *Comparative Studies in Society and History,* 5**,** 285-303.

SAHLINS, M. 1974. *Stone Age Economics,* London, Routledge.

SALMON, C. 2007. Big Brothers and Little Sisters? Sex selection and birth order. *Ethics, Bioscience and Life,* 2**,** 12-17.

SAVIN-BADEN, M. & MAJOR, C. H. 2010. New Approaches to Qualitative Research: Wisdom and uncertainty. 1 ed. Hoboken: Taylor and Francis.

SCHADY, N. 2003. Convexity and Sheepskin Effects in the Human Capital Earnings Function: Recent Evidence for Filipino Men. *Oxford Bulletin of Economics and Statistics,* 65**,** 171-196.

SCHECH, S. & HAGGIS, J. 2000. *Culture and Development: A Critical Introduction,* London, Blackwell Publishers.

SCHULTZ, T. W. 1961. Investment in Human Capital. *The American Economic Review,* 51**,** 1-17.

SCOTT, J. C. 1976. *The Moral Economy of the Peasant: Rebellion and subsistence in Southeast Asia,* London, Yale University Press.

SHARP, T. L. M. 2013. Baias, Bisnis, and Betel Nut: The place of Traders in the Making of a Melanesian Market. *In:* MCCORMACK, F., BARCLAY, K. & WOOD, D. C. (eds.) *Engaging with Capitalism: Cases from Oceania research in economic anthropology.* Bradford: Emerald Group.

SHRESTHA, N. 1995. Becoming a Development Category. *In:* CRUSH, J. S. (ed.) *Power of Development.* London: Routledge.

SIDAWAY, J. D. 1992. In Other Worlds: On the politics of research by 'First World' Geographers in the 'Third World'. *Area,* 24**,** 403-408.

SLATER, D. 1995. Trajectories of Development Theory: Capitalism, Socialism, and Beyond. *In:* JOHNSTON, R. J., TAYLOR, P. J. & WATTS, M. J. (eds.) *Geographies of Global Change: Remapping the World in the Late Twentieth Century.* Oxford: Blackwell.

SMITH, G. 1975. *Education in Papua New Guinea,* Melbourne, Melbourne University Press.

SMITH, M. F. 2002. *Village on the Edge: Changing times in Papua New Guinea,* Honolulu, University of Hawai'i Press.

SOLMON, L. C. 1985. Quality of Education and Economic Growth. *Economics of Education Review,* 4**,** 273-290.

SONG, L., APPLETON, S. & KNIGHT, J. 2006. Why do Girls in Rural China Have Lower School Enrolment? *World Development,* 34**,** 1639-1653.

STRATHERN, A. 1972. *One Father, One Blood,* London, Tavistock.

STRATHERN, A. 1982. *Inequality in New Guinea highlands societies / edited by Andrew Strathern,* Cambridge, Cambridge University Press.

STRATHERN, M. 1988. *The Gender of the Gift: Problems with women and problems with society in Melanesia,* Berkeley, University of California Press.

STRAUSS, J., BARBOSA, M., TEIXEIRA, S., THOMAS, D. & GOMES, R. 1991. Role of Education and Extension in the Adoption of Technology: A study of upland rice and soybean farmers in Central-West Brazil. *Agricultural Economics,* 5**,** 341-359.

STRAUSS, J. & THOMAS, D. 1995. Human Resources: Empirical Modeling of Household and Family Decisions. *In:* BEHRMAN, J. & SRINIVASAN, T. N. (eds.) *Handbook of Development Economics.* Amsterdam: Elsevier Science B.V.

TARABINI, A. 2010. Education and Poverty in the global development agenda: Emergence, evolution and consolidation. *International Journal of Educational Development,* 30**,** 204-212.

THIRLWALL, A. P. 2003. *Growth and Development,* Hampshire, Palgrave MacMillan.

THOMAS, D. 1994. Like Father, Like Son - Like Mother, Like Daughter - Parental resources and child height *Journal of Human Resources,* 29**,** 950-988.

THOMAS, R. M. 1993. Education in the South Pacific: The context for development. *Comparative Education,* 29**,** 233-248.

TODARO, M. P. & SMITH, S. C. 2003. *Economic Development,* Boston, Addison Wesley.

TRANSPARENCY INTERNATIONAL. 2013. *Global Corruption Barometer: Papua New Guinea* [Online]. Available: http://www.transparency.org/gcb2013/country////?country=papua_new_g uinea [Accessed 10 October 2014.

TROCHIM, W. 2006. *Positivism & Post-Positivism* [Online]. Research Methods Knowledge Database. Available: http://www.socialresearchmethods.net/kb/positvsm.php.

UIS. 2009. *Education Indicators Technical Guidelines* [Online]. UNESCO. Available:
http://www.uis.unesco.org/Library/Documents/eiguide09-en.pdf.

UN. 2013a. *United Nations Millennium Development Goals* [Online]. New York:
United Nations. Available:
http://www.un.org/millenniumgoals/education.shtml.

UNDP. 1990. Human Development Report 1990. Oxford: United Nations
Development Programme.

UNDP. 2013a. Human Development Report 2013: Papua New Guinea. Available:
http://hdr.undp.org/sites/default/files/Country-Profiles/PNG.pdf.

UNDP. 2013b. Human Development Report 2013: Vanuatu. Available:
http://hdr.undp.org/sites/default/files/Country-Profiles/VUT.pdf.

UNDP. 2014a. National Human Development Report: Papua New Guinea. Available:
http://www.pg.undp.org/content/dam/papua_new_guinea/docs/Publicatio
ns/FINAL%20PNG%20NHDR_low%20res.compressed.pdf.

UNDP. 2014b. Human Development Report 2014: Fiji. Available:
http://hdr.undp.org/sites/all/themes/hdr_theme/country-notes/FJI.pdf.

UNESCO. 2000. The Education for All 2000 Assessment: Country Reports. Papua
New Guinea.
http://www.unesco.org/education/wef/CountryReports/papua_new_guinea
/rapport_2.html.

UNESCO. 2014. Education Profile - Papua New Guinea. Available:
http://stats.uis.unesco.org/unesco/TableViewer/document.aspx?ReportId=1
21&IF_Language=eng&BR_Country=5980&BR_Region=40515.

UNTERHALTER, E. 2014. Measuring Education for the Millenium Development
Goals: Reflections on targets, indicators, and post-2015 framework *Journal
of Human Development and Capabilities,* 15**,** 176-187.

USHER, R. 1997. Introduction. *In:* MCKENZIE, G., POWELL, J. & USHER, R. (eds.)
Understanding Social Research: Perspectives on methodology and practice.
London: Falmer Press.

VEENHOVEN, R. 1996. Happy Life Expectancy: A comprehensive measure of quality
of life in nations *Social Indicators Research,* 39**,** 1-58.

WEEKS, S. G. 1993. Education in Papua New Guinea 1973 - 1993: The late-
development effect? *Comparative Education,* 29**,** 261-273.

WELCH, F. 1970. Education in Production. *The Journal of Political Economy,* 78**,** 35-59.

WILLIS, K. 2011. *Theories and Practices of Development,* Oxon, Routledge.

ZENG, W., UNDURRAGA, E. A., EISENBERG, D. T. A., RUBIO-JOVEL, K., REYES, G., VICTORIA & GODOY, R. 2012. Sibling Composition and Child Educational Attainment: Evidence from Native Amazonians in Bolivia. *Economics of Education Review***,** 1017-1027.

Curtin University of Technology

Department of Geography and Planning

Participant Information Sheet

My name is Sean Ryan. I am a student at Curtin University and am here in PNG to undertake fieldwork research. The title of my research project is: "The role of status hierarchies and resource allocation on education attainment of Papua New Guinea oil palm smallholders".

The purpose of my research is to find out the current education levels and strategies of oil palm smallholders and the constraints towards sending children to school. This information may have implications for improving the effectiveness and appropriateness of current OPIC extension strategies.

I am interested in finding out:

1. The current education levels of people living on the block
2. Any constraints to sending children to school
3. What factors in the family affect the particular role of children in education
4. The production strategies pursued by multiple families on the block (e.g. co-operative, rotation, sub-letting or caretaker)
5. Income sources of different families on the block

The survey will take approximately 50 minutes to complete.

Please Note

- Your involvement in the research is completely voluntary. You have the right to withdraw from the study at any stage and to ask for all data concerning you to be destroyed immediately without it affecting your rights or my responsibilities.
- Your privacy is respected and any information that could identify you will be removed when the data is transcribed and analysed.

- The Interviewer has signed a confidentiality form and cannot share information about you with any person except his supervisor.
- All information will be stored under lock and key and under code at Curtin University of Technology for 5 years. After this time the information will be destroyed.
- This research could be of benefit by informing policy makers of important issues of social development, education, migration and economic development policy
- Your identity and your family's identity as well as your block number will be left confidential and will not be revealed to anyone outside the research team.

If you have any concerns about the researcher or his research during or after the interview, please do not hesitate to contact the following:

Sean Ryan on +61 8 93413367, e-mail: sean.ryan@student.curtin.edu.au or send a letter addressed to him at:

Faculty of Humanities
Curtin University of Technology
GPO Box U 1987
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Professor George Curry on +61 8 9266 3310, e-mail: g.curry@curtin.edu.au or send a letter addressed to him at:

Faculty of Humanities
Curtin University of Technology
GPO Box U 1987
Perth Western Australia 6845

Thank you very much for your time. Please hold onto this letter for your information.

Research Participants' Verbal Consent Form

- I have been provided with the participant information sheet.

- I understand the purpose of the study

- I understand that the research outcomes may make no difference to me.

- I understand that my involvement is voluntary and I can withdraw from the study at any time without prejudice.

- I understand that no personal identifying information such as my name or the name of the community I live in will be used and that all information will be securely stored for up to seven years before being destroyed.

- I have been given the opportunity to ask questions.

- I agree to participate in the study outlined to me.

Witness Signature   _____   Date   _____

Appendix 3. Correlation between highest education achieved and birth order of second generation LSS smallholders (aged 15 - 49 years).

Correlations

		Highest grade achieved	Birth order
Pearson Correlation	Highest grade achieved	1.000	-.110
	Birth order	-.110	1.000
Sig. (1-tailed)	Highest grade achieved	.	.017
	Birth order	.017	.
N	Highest grade achieved	366	366
	Birth order	366	366

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.110[a]	.012	.009	3.153	.012	4.496	1	364	.035

a. Predictors: (Constant), Birth order

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	44.706	1	44.706	4.496	.035[b]
	Residual	3619.307	364	9.943		
	Total	3664.014	365			

a. Dependent Variable: Highest grade achieved

b. Predictors: (Constant), Birth order

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.858	.318		24.713	.000
	Birth order	-.161	.076	-.110	-2.120	.035

a. Dependent Variable: Highest grade achieved

Appendix 4. Correlation between LSS male head of block and male children (aged 25 years and older).

Correlations

		Male head of block education	Male children education level
Male head of block education	Pearson Correlation	1	.681**
	Sig. (2-tailed)		.000
	N	86	86
Male children education level	Pearson Correlation	.681**	1
	Sig. (2-tailed)	.000	
	N	86	86

**. Correlation is significant at the 0.01 level (2-tailed).

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.681ᵃ	.464	.458	2.634	.464	72.808	1	84	.000

a. Predictors: (Constant), Male head of block education

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	505.222	1	505.222	72.808	.000[b]
	Residual	582.885	84	6.939		
	Total	1088.108	85			

a. Dependent Variable: Male children education level

b. Predictors: (Constant), Male head of block education

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.976	.450		11.048	.000
	Male head of block education	.590	.069	.681	8.533	.000

a. Dependent Variable: Male children education level

Appendix 5. Independent samples T-test of education level according to frequency of papa card income.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means
		F	Sig.	t
Education level (years)	Equal variances assumed	.062	.804	-2.863
	Equal variances not assumed			-2.622

Independent Samples Test

		t-test for Equality of Means		
		df	Sig. (2-tailed)	Mean Difference
Education level (years)	Equal variances assumed	281	.005	-1.7379
	Equal variances not assumed	39.016	.012	-1.7379

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
Education level (years)	Equal variances assumed	.6070	-2.9328	-.5431
	Equal variances not assumed	.6628	-3.0786	-.3972