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Poverty, Fertility Preferences, and Family Planning Practices in the Philippines*

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ABSTRACT

This paper looks at the interaction of poverty, fertility preferences, and family planning practice in the Philippines using the series of nationally representative family planning surveys conducted annually since 1999 augmented by census and other survey data. Its contribution lies in providing recent and nationally representative empirical evidence on the long-running but largely unresolved debate in the country on the relationship between fertility preferences and family planning and socioeconomic status. A detailed characterization of the relationships was done using cross-tabulation analyses. In addition, a recursive qualitative response model was estimated to identify the determinants of fertility preferences and family planning practice across socioeconomic groupings. The paper shows that while the number of children ever born is indeed larger among poorer households, their demand for additional children is actually lower and their contraceptive practice is also poorer. This result

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indicates that, in the case of the Philippines, the larger number of children among the poor is more the result of poorer contractive practice than the higher demand for additional children.

INTRODUCTION

It is well known that poverty incidence is always higher among larger households. This is true in the Philippines as it is in many parts of the world. In the case of the Philippines, for instance, Orbeta (2005) highlights the enduring positive relationship between family size and poverty incidence and severity, using family income and expenditure data for the past 25 years. Results of research summarized in Orbeta (2005) also highlights how large family size creates the conditions leading to greater poverty through its negative impact on household savings, labor force participation, and earnings of parents, as well as on the human capital investment in children. The flipside of this story is that it is also well known that poorer households have poorer access to public services, including family planning services. This is reflected in lower contraceptive prevalence rates and higher unmet need for family planning. The data also indicate that the desired family size is higher among the poor (Orbeta 2004a). Given that it is known that actual fertility is dependent on the use of contraception, the question then is whether higher actual fertility among the poor is a result of higher demand for additional children or of poorer access to family planning services, or both. Clarifying these intertwined issues will provide policymakers a clearer direction on what to do in coming up with the right policies to reduce poverty among larger households.

This paper presents descriptive and multivariate analytical evidence on the relationship between poverty and fertility preferences as well as family planning practices using a recent nationally representative Family Planning Survey (FPS) in the Philippines. Only a few studies provide national survey and analytical evidence on this relationship. To the author's best knowledge, no one, so far, has used Philippine data. Previous analyses (e.g., DeGraff et al. 1997) used subnational surveys and did not deal directly with the role of different socioeconomic factors, a research void this paper tries to fill. Using cross-tabulation analyses utilizing a nationally representative survey data, the paper first characterizes these relationships. It then estimates the joint demand for additional children given the number of children ever born and the use of modern contraception using a recursive discrete choice model that accounts for the correlations of the unobserved characteristics in these relationships. Like earlier studies (e.g., DeGraff et al. 1997; Guilkey and Jayne 1997), it recognizes the proper structuring of the variables, e.g., that the number of children ever born is the product of past decisions and that the demand for additional children is the more relevant current demand for children that consequently affects the current demand for contraception. Since the particular interest

of the paper is quantifying the role of socioeconomic status in these relationships, after controlling for other personal, household, and community characteristics, a variable is provided to represent this particular concern. It uses a wealth index constructed from the presence of household amenities, which the survey provides as a measure of the socioeconomic status of the household. The use of a wealth index was first introduced in Filmer and Pritchett (1998) and thereafter has been used in many other studies. A complete description of the construction of the wealth index is provided in the Annex.

The paper is organized as follows. The next section provides a brief overview of population and development relationships in the Philippines. This overview provides a brief background of the socioeconomic and demographic outcomes in the country. It also provides a cross tabulation of relevant demographic outcomes by socioeconomic class. The cross-tabulation analysis is designed to provide the needed introduction to the multivariate analysis, which follows in the third section of the paper. The last section summarizes the paper and provides practical implications for policy design and advocacy.

POPULATION AND DEVELOPMENT IN THE PHILIPPINE CONTEXT

Overview of population and development[1]

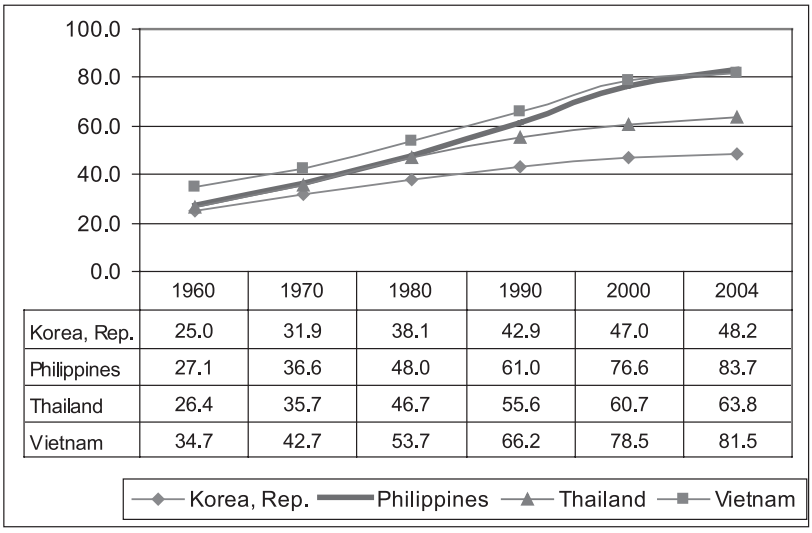
Around the early 1960s, the Philippines, Thailand, and Korea exhibited nearly the same population size. Since then, Thailand and Korea have long achieved replacement fertility— Korea before the 1990s and Thailand in the middle of the 1990s. Replacement fertility is the total fertility rate (TFR) at which women would have only enough children to replace themselves and their partner. Replacement fertility is roughly 2 births per woman. With a TFR of 3.5 as of 2003, the Philippines still has a long way to go.

Due to this mediocre performance, the Philippines' population size has deviated far from the course of the other two countries. By 2000, the Philippines had 30 million more people than Korea and 16 million more than Thailand (Figure 1). Korea and Thailand also continue to register consistent high growth rates in contrast to the Philippines whose growth rates have been slow and inconsistent. It is not too difficult to understand, therefore, why the per capita income of the Philippines has not gone far from 1,000 US dollars for more than two decades now (Figure 2). It is also not surprising if the poverty reduction in the country has been slow and tentative (Reyes 2002).

Additionally, as one looks at other development indicators, the overall long-term development picture given above is really hardly unexpected. For one thing, the saving rates in the Philippines have been low, even often lower than Indonesia's,

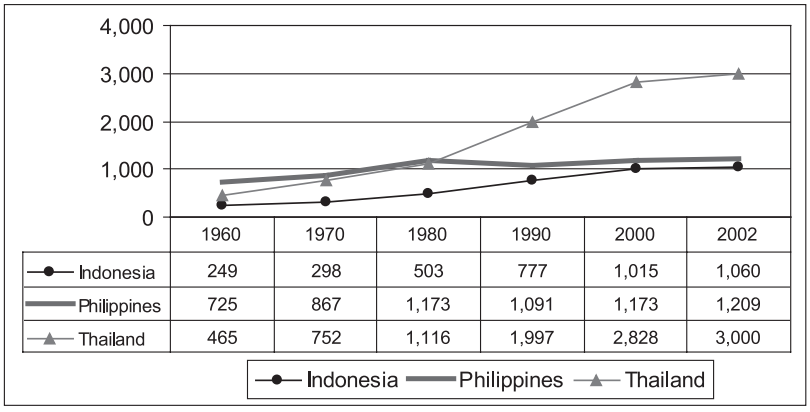
[1] This section draws heavily from Orbeta (2005).

Figure 1. Population size of selected Asian countries, 1960–2004



	1960	1970	1980	1990	2000	2004
Korea, Rep.	25.0	31.9	38.1	42.9	47.0	48.2
Philippines	27.1	36.6	48.0	61.0	76.6	83.7
Thailand	26.4	35.7	46.7	55.6	60.7	63.8
Vietnam	34.7	42.7	53.7	66.2	78.5	81.5

Figure 2. GDP per capita of selected ASEAN countries, constant 1995 US$

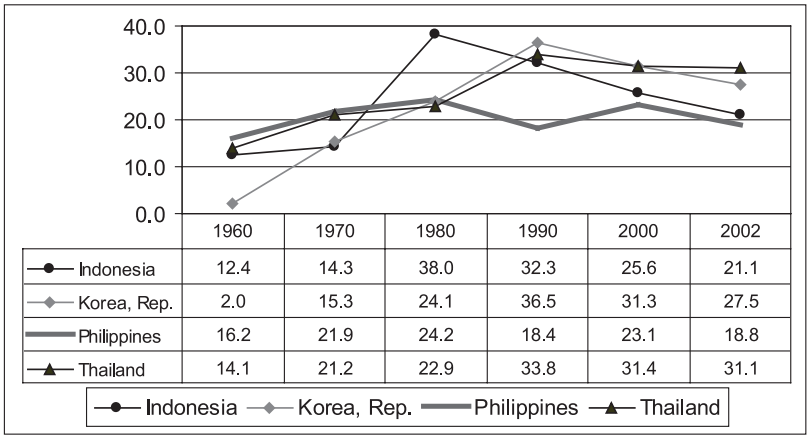


	1960	1970	1980	1990	2000	2002
Indonesia	249	298	503	777	1,015	1,060
Philippines	725	867	1,173	1,091	1,173	1,209
Thailand	465	752	1,116	1,997	2,828	3,000

despite the higher per capita income in the Philippines (Figure 3). Labor force participation of women in the Philippines is lower than in many other countries in Asia even if the educational attainment of women in the Philippines is higher. The high school attendance rate[2], which the country has been proud of for so long, is also eroding fast.

[2] That the Philippines is an outlier in this regard is well documented (see, for instance, Behrman 1990 and Berhman and Schneider 1994)

Figure 3. Gross domestic savings of selected Asian countries (% GDP), 1960–2002



	1960	1970	1980	1990	2000	2002
Indonesia	12.4	14.3	38.0	32.3	25.6	21.1
Korea, Rep.	2.0	15.3	24.1	36.5	31.3	27.5
Philippines	16.2	21.9	24.2	18.4	23.1	18.8
Thailand	14.1	21.2	22.9	33.8	31.4	31.1

Moreover, the issues of the role of population in development, in general, and of poverty and vulnerability, in particular, remain largely unresolved. This reality persists despite the growing literature worldwide and in the Philippines that provides evidence of the impact of population growth and family size on development (see, for instance, de Dios and Associates 1993; Orbeta 2003; Alonzo et al. 2004). The two glaring proofs to this fact are (a) the equivocal support given by the government to the population program, and (b) the fact that, up to now, donors supply virtually all of contraceptives supplies in public facilities because the national government has not appropriated money for these commodities[3]. Herrin (2002) describes in detail the stop-and-go attitude of the various administrations, past and present, in terms of addressing the population issue. The current government, for instance, has left to the local government units (LGUs) the provision of family planning services, using as basis the Local Government Code (LGC) of 1991. The LGC has transferred many direct services, including maternal and child health service and family planning, to the LGUs. The lack of national guidance has resulted into fragmented and local programs often working in opposite directions and largely influenced by the priorities of the local chief executive (Alonzo et al. 2004; Orbeta 2004b). One perhaps may ask whether there is any real demand for family planning services that the government has to respond to. The fact is all the demographic surveys showed the consistent high demand for family planning services from women of reproductive age (Herrin 2002). Orbeta (2004a) also notes

[3] The United States Agency for International Development, the primary donor of contraceptive supplies, has recently indicated to the Philippine government that it will be phasing out its provision of contraceptive supplies.

that the poor have lesser access to family planning services and that their unwanted fertility is higher than those of the rich. The demand, therefore, for an appropriately funded population program is clear. What is absent is the national government's resolve to push the program consistently as other countries, such as Thailand, Indonesia, and Vietnam, have done.

Demographic outcomes by socioeconomic class[4]

To provide a background for the multivariate analysis in the next section, this subsection presents a cross tabulation of fertility and contraceptive practice by asset index quintile. Asset index quintiles were generated using the information on household amenities that are included in the FPS since the 1999 round following Filmer and Pritchett (1998). The full description of the construction of the asset index is described in the Annex.[5]

Demand for children

Children ever born. The main fertility variable that can be generated from the FPS is the mean number of children ever born[6]. The number of children ever born for women aged 40–49, who are considered to have completed or nearly completed fertility, is used as an indicator of fertility. Table 1 shows the number of children ever born for women 40–49 by asset index quintile from 1999 to 2002. The mean number of children ever born remained virtually constant over the years and stood at around 4.6 per married woman. Also noteworthy is the stable difference in the mean number of children ever born across socioeconomic classes. The difference in the mean number of children ever born for women 40–49 years old in the poorest and richest households is a little over 2 births. This difference hardly changed from 1999 to 2002.

Want another child. The problem with the number of children ever born or even the total fertility rate as a demand-for-children variable is that these indicators already incorporate supply and fertility regulation characteristics, particularly access to family planning services. Without access to family planning services, children will be born not because parents want them but because they lack control over their fertility. Thus, another measure of demand for children, perhaps a more

[4] This section draws heavily from Orbeta (2004c).

[5] An earlier estimation and application of the asset index using Philippine data can be found in Orbeta et al. (2003).

[6] The total fertility rate (TFR) can be computed using the recorded births in the last three years determined from the FPS since 1996. The TFR computed value, however, is too low and erratic compared with the ones generated from the National Demographic and Health Survey (NDHS), which probably indicates that the recording of births in the FPS is not as complete and as consistent as the NDHS can be. Perhaps this is because the FPS does not employ elaborate probing techniques, such as validating questions, unlike the NDHS. See Orbeta (2004c) for the estimates.

Table 1. Mean number of children ever born (CEB) for women 40–49 years and percentage of women who want another child, by asset quintile, 1999–2002

Survey Year	Poorest	L. Middle	Middle	U. Middle	Richest	Total	Poor-Rich Diff.
Children ever born (mean no.)							
2002	5.8	5.0	4.5	3.9	3.6	4.6	2.2
2001	5.8	5.0	4.7	3.9	3.3	4.5	2.5
2000	6.0	5.1	4.8	3.9	3.5	4.6	2.5
1999	5.9	5.2	4.9	3.9	3.5	4.6	2.3
Wants another child (%)							
2002	9.9	11.1	12.7	14.0	14.9	12.5	-2.6

Source: Orbeta (2004c), basic data from NSO, Family Planing Surveys 1999–2002.

reliable one, is whether couples want another child or not given the number of children they already have. Table 1 tabulates the proportion of women who want an additional child by asset index quintile. The table reveals that, contrary to expectation, there is a lower proportion of poorer households who want another child given the number of children they already have. The difference between the poorest and the riches households is more than 2 percentage points.

Wanted fertility. The FPS has no direct measure of the demand for children unlike the NDHS that has a measure of wanted fertility. Wanted fertility is discussed here only to provide a comparison. The latest NDHS conducted in 2003 indicates that the difference between actual and wanted fertility among women from the poorest households is about two births. For women from the richest households, the difference is less than half a birth. These figures have hardly changed in the last three NDHS conducted between 1993 and 2003 (Orbeta 2004d).

Use of contraception

Table 2 shows the use of contraception among married women in 2002. Less than half of them use contraception, with a little over 70 percent into modern methods. Amid the very slow rise in total contraception rates, it is encouraging to note that the proportion of women using modern methods is the only one rising at a stable rate (Orbeta 2004a).

As one looks across the socioeconomic classes, the main noticeable difference also lies in the use of modern methods. For the traditional method, there is virtually no difference between the richest and the poorest households. In terms of modern methods, however, the difference between the poorest and the richest households is above 8 percentage points. A lesser proportion of women from poorer households are using modern methods.

Table 2. Contraceptive method by asset index quintile, 2002

Age group	No method	Method		
		Any method	Modern	Traditional
Total	51.2	48.9	35.1	13.8
Poorest	58.5	41.5	28.0	13.5
Lower middle	50.8	49.2	35.9	13.3
Middle	46.2	53.8	39.0	14.8
Upper middle	49.6	50.4	36.8	13.7
Richest	49.9	50.1	36.5	13.6
Poorest/Richest ratio	1.17	0.83	0.77	0.99

Source: Orbeta (2004c), basic data from NSO, Family Planing Survey 2002.

Sources of supply

Seventy percent of the women get their contraceptive supplies from public sources. The rest get their supplies from private sources. All contraceptive supplies, except condoms, are sourced primarily from the public sector (Table 3).

More than 80 percent of the poorest and as much as 50 percent of the women from the richest quintile source their supplies from the public sector. Only condoms and, to some extent, pills and IUDs are sourced primarily from the private sector.

Unmet need for family planning

Table 4 shows that the unmet need for family planning is about 20 percent, which is evenly distributed between spacing (10.1%) and limiting (9.9%) needs.

The limiting need of women from the poorest household is almost twice as that of the women from the richest household while their spacing need is about one and a half times more than that of the women from the richest household. Twenty seven percent of women from the poorest households indicate unmet need for family planning—13.5 percent for spacing and 13.4 percent for limiting. Meanwhile, 16 percent of women from the richest households indicate unmet need—8.8 percent for spacing and 7.2 percent for limiting.

MULTIVARIATE ANALYSES

Model

To shed light on the differential impact of socioeconomic status on demographic behavior, the paper models the joint decision of contraception adoption and demand for additional children with an indicator of socioeconomic class as one of the

Table 3. Source of modern method supply, by method by asset index quintile, 2002

Source	Pill	IUD	Injection	Diaphragm	Condom	Ligation	Vasectomy	Total
Philippines								
Public	65.4	74.9	92.9	100.0	41.0	72.8	81.6	70.1
Private	33.4	22.7	6.0	0.0	57.4	25.6	18.4	28.5
Poorest								
Public	87.8	86.1	96.8	0.0	78.5	84.3	100.0	87.9
Private	11.7	12.1	2.2	0.0	20.2	15.6	0.0	11.4
Lower middle								
Public	75.3	83.8	96.6	100.0	56.0	85.6	100.0	80.8
Private	22.9	12.8	2.4	0.0	44.1	13.2	0.0	17.6
Middle								
Public	66.0	81.1	93.1	0.0	36.6	78.3	53.1	72.9
Private	32.3	17.0	6.9	0.0	61.1	19.4	46.9	25.4
Upper middle								
Public	53.5	61.2	86.0	0.0	36.2	66.9	100.0	60.1
Private	45.3	34.4	11.8	0.0	62.5	30.8	0.0	38.0
Richest								
Public	39.8	53.5	81.5	100.0	19.0	60.0	68.1	50.3
Private	59.2	46.0	16.4	0.0	78.0	38.9	31.9	48.6
Poorest/Richest ratio (%)								
Public	2.2	1.6	1.2	0.0	4.1	1.4	1.5	1.7
Private	0.2	0.3	0.1	-	0.3	0.4	0.0	0.2

Source: Orbeta (2004c), basic data from NSO, Family Planing Survey 2002.

Table 4. Unmet need for family planning, 2002

Asset index quintile	Total	Spacing	Limiting
Philippines	20.0	10.1	9.9
Poorest	27.0	13.5	13.4
Lower middle	21.7	10.3	11.5
Middle	17.1	8.1	9.0
Upper middle	17.7	9.7	7.9
Richest	16.0	8.8	7.2
Poorest/Richest ratio	1.7	1.5	1.9

Source: Orbeta (2004c), basic data from NSO, Family Planing Survey 2002.

explanatory variables after controlling for the usual individual, household, and community characteristics.

The paper estimates a model for the decision to use modern contraception and to have an additional child given the number of children ever born. The model follows closely the one in Degraff et al. (1997). It assumes a sequential decisionmaking process rather than a full dynamic lifetime model that would require data at every stage of the decision process that are not usually available. However, unlike the model in Degraff et al. (1997), the model in the present study did not assume location (community) fixed effects.

It is assumed that the decisions to have an additional child and to use modern contraception are correlated with past decisions embodied in the current number of children but in a recursive way. The current number of children is assumed to be the cumulative outcome of past decisions similar to Degraff et al. (1997) and Guilkey and Jayne (1997). The impact of the outcome of past decisions is assumed to be only through its effect on the current demand for additional children, which, in turn, is expected to affect the decision on whether to use modern contraception or not.

Specifically the model estimated is the following

$$n = f_n(X, Z_n, \varepsilon_n)$$
$$d = f_d(n, X, Z_d, \varepsilon_d)$$
$$c = f_c(d, X, Z_c, \varepsilon_c)$$

The model presumes that the children ever born n is a function of a set of common individual, household, and community characteristics X, and other specific determinants to n, Z_n. The demand for additional children d is a function of the

number of children ever born, common characteristic X, and determinants specific to d, Z_d. Finally, the contraception c is a function of the demand for additional children, common characteristics X, and determinants specific to c, Z_c. The error terms ε are by implication of the structure correlated.

Similar models are in Bollen et al. (1995) and Guilkey and Jayne (1997). Bollen et al. (1997) uses the difference between the stated desired number of children and the number of children ever born as the demand-for-children variable. In Guilkey and Jayne (1997), the demand for children is more finely disaggregated into wanted soon, wanted later, and wanted no more. In this paper, however, the demand for children is indicated by the response to the question on whether the woman wants another child or not.

In terms of contraception, Guilkey and Jayne (1997) used the finer disaggregation of modern, traditional, and none. Degraff et al. (1997) and Bollen et al. (1995), on the other hand, lumped modern and traditional together. In this paper, use of contraception is confined to the use of modern methods. This is influenced by the cross-tabulation result that shows that the difference across socioeconomic classes is only evident in the use of modern methods.

Given the structure of the model, the estimation strategy is as follows. The number-of-children model was estimated using ordinary least squares (OLS). This estimate was used as the first-stage results in the demand-for-children equation. The demand-for-additional-children and the use-of-modern-contraception equations were also estimated using two types of two-stage probit and bivariate probit in addition to using ordinary probit estimation. This is because the number of children ever born is hypothesized to be endogenous in the demand-for-additional-children equation while the demand for additional children is hypothesized to be endogenous in the demand-for-contraception equation. The first two-stage probit estimation method is proposed in Lee (1981), which uses the predicted values of the endogenous variable. The other two-stage probit estimation method is suggested in Rivers and Vuong (1988), which uses the actual values of the endogenous variable plus the estimated error from the first-stage regression as regressors in the second stage. While both produce consistent estimates, it has been argued in Rivers and Vuong 1988 that the latter generates asymptotically efficient estimates. It has been pointed out that the estimated errors using common statistical packages in the second-stage regressions are biased and need to be adjusted. Bollen et al. (1995), however, mentioned Monte Carlo experiments that show that the gains from adjusting the standard errors do not change substantially the resulting test results. Thus, no adjustment was done in the estimates in this paper. The predicted values of the variable for number of children ever born or the estimated error term from this first-stage run are used in the second-stage estimation of the demand-for-additional-children equation. In the case of the equa-

tion for use of modern contraception, the predicted values of the demand for additional children or the estimated error term from this first-stage run was used in the second-stage estimation. Finally, another way of dealing with the correlated error terms similar to the seemingly unrelated regressions in linear models is using a bivariate probit estimation. This also provides a way for directly testing the correlation of the error terms of the two equations. This procedure was used to jointly estimate the demand for additional children and the demand for contraception and to provide corroborating evidence to the other estimation results.

Data used

The individual and household characteristics used in the estimation are taken from the nationally representative FPS round in 2002. The survey is a rider to the April round of the quarterly Labor Force Survey (LFS). The FPS has been conducted annually since 1995 except for the years when the NDHS is conducted. Like many surveys, the questions have evolved through the years. The 2002 FPS was chosen because it has the questions needed to generate information on wanting a child in the future and on the use of contraception, which are not available in the previous FPS. These two questions are the dependent variable used in the literature to study the interaction between demand for children and demand for use of contraception. The question on wanting an additional child is used to construct the current demand for additional children. The information on unwanted fertility was also used as an indicator of the availability of family planning services because there is no other information on family planning program available in the data set. It should be noted that Bruce (1990) considers information on unwanted fertility as the ultimate measure of the quality of family planning services. Finally, the 2002 FPS has information on household amenities that can be used to construct an index for socioeconomic status whose role on the question of demand for additional children and use of contraception is the primary focus of the paper.

This basic data set is augmented by community information taken from other sources. Community information such as the proportion of barangays with electricity and those with access to national highways are taken from the 2000 Census of Population and Housing. It is, therefore, assumed that not much has changed between the census and in 2002 particularly in the relative distribution of these types of infrastructure.

The child-wage variable, which is an indicator of the economic services provided by children, was generated from the 2002 Annual Poverty Indicators Survey (APIS). This represents the wage income of children for the past six months, which is the reference period for the survey, particularly of working children aged 5 to 14 years old. To control for the endogeneity of wages, a community average

computed at the domain level was used. Finally, to control for interprovincial price variations, the 2002 provincial price index from the NSO price division was used as a deflator.[7]

Descriptive statistics

Table 5 shows the descriptive statistics of the variables used in the analysis. Only married[8] women are considered in the analysis. The mean number of children ever born to married women respondents is less than four children although the number could be as high as 17. The proportion of married women who wanted another child is 12 percent. Thirty four percent of the married women are using modern methods. The average age is about 36 years. In terms of education, 29 percent had some elementary education, 40 percent had some secondary education, 30 percent had college education, and about 2 percent had no education. These proportions reveal the high educational attainment of Filipino women in general. The proportion of married women living in urban areas is 61 percent. The proportion of barangays with electricity is about 81 percent and about the same proportion of barangays has access to national highways. The six-month labor earnings of children 5–14 years old range from zero to 207[9] or an average of 20 pesos. Finally, the proportion of total (sum of limiting and spacing) unmet need for family planning services is about 20 percent.

Estimation results

The estimation only includes married women of reproductive age and always employs robust standard error estimates.

Children ever born

Table 6 shows the OLS estimates of the number of children ever born. The estimates confirm expectations that, controlling for other variables, the number of children ever born for poorer households (wealth index quintiles 1 to 4) is significantly bigger than for women from the richest quintile, the omitted category. The poorest quintile, for instance, has an average of 1.1 children more than the richest. This is followed by the lower middle quintile with 0.6 more births and so on. The coefficients for the age of the mother show that, as expected, the number of children rises with age but at a declining trend. The coefficients for the education

[7] It can be argued that many of the children are utilized as unpaid family workers. While this may be true, there is still a need to value their inputs. Using a community average wage rate of working children who are actually paid, as is done in this paper, would be a better way of doing this.

[8] Those who are living together with their husband.

[9] This has been deflated using the consumer price index (1994=100). The recorded average six-month wage earnings of adults (15 years and above) is about 9,900.

Table 5. Descriptive statistics

Variable	Obs.	Mean	Std. dev.	Min	Max
Children ever born	16625	3.472	2.325	0	17
Wants another child	16625	0.124	0.330	0	1
Use modern method	16625	0.344	0.475	0	1
Age of mother	16625	35.529	8.024	15	49
Mother with no education	16625	0.020	0.140	0	1
Mother with elementary education	16625	0.286	0.452	0	1
Mother with secondary education	16625	0.396	0.489	0	1
Mother with college education	16625	0.297	0.457	0	1
Urban	16485	0.606	0.489	0	1
Proportion of barangay with electricity	16485	0.808	0.176	0.251	1
Proportion of barangay with access to national highways	16485	0.809	0.127	0.384	1
Mean income of child workers (5–14), domain level	16485	20.090	28.301	0	207
Total unmet need for family planning, province level	16625	0.203	0.058	0.060	0.397

Source of basic data: Family Planning Survey 2002, NSO.

Table 6. OLS Estimates of determinants of children ever born to married women, 2002

Explanatory variables	Coef.	Std. err.*	t
Age of mother	0.370	0.016	23.26
Age of mother, squared	-0.003	0.000	-14.12
Mother with elementary education	0.325	0.172	1.89
Mother with secondary education	-0.212	0.172	-1.23
Mother with college education	-0.852	0.173	-4.91
Urban	-0.082	0.038	-2.17
Poorest quintile	1.085	0.067	16.29
Lower middle quintile	0.614	0.057	10.69
Middle quintile	0.348	0.051	6.88
Upper middle quintile	0.126	0.046	2.74
Proportion of barangay with electricity	0.060	0.148	0.40
Proportion of barangay with access to national highways	-1.216	0.193	-6.31
Mean income of child workers (5–14), domain level	0.001	0.001	1.45
Constant	-4.372	0.325	-13.45
R-square	0.339		
Obs.	16,485		

* Robust standard errors.

dummy variables show that only the women with college education have significantly lower number of children ever born compared with the women with no education. Those with elementary and secondary education are not significantly

different from those with no education. The impact of community variables confirms common expectations. Women living in urban areas have significantly lower number of children ever born. The presence of electricity is not a significant determinant in contrast to earlier results such as Herrin (1979). Perhaps, given the wider reach of electricity these days, the availability of electricity no longer has a pervasive effect unlike in the earlier times. Access to national highways significantly lowers the number of children ever born confirming earlier results. The positive coefficient for the mean income of children workers lends some support to the hypothesis that children are desired because of their economic contribution to household income. However, this is not statistically significant implying perhaps that the influence in general is weak. It is worth noting that the recorded average contribution of children to household income is minuscule relative to the contribution of adult workers.

Demand for additional children

Table 7 provides the results of the different estimation procedures employed for the demand for additional children. As mentioned earlier, the different estimation procedures are employed to consider the possible endogeneity of the variable for the number of children ever born in this equation. The impact of the number of children ever born on the demand for additional children has a mixed result. The ordinary probit estimate generated the expected negative sign and statistical significance but when the two two-stage probit estimations were applied to allow for the endogeneity of this variable, the coefficient became positive yet insignificant. As argued in Rivers and Vuong (1988), the significance of the estimated error term in the two two-stage probit estimations confirm the endogeneity hypothesis making the ordinary probit estimate inconsistent. It also means that the depressing effect of the number of the children ever born on the demand for additional children exhibited by the ordinary probit results cannot be relied upon particularly since the two-stage probit estimates yielded opposite signs and not significant. Hence, the two-stage probit results are used in subsequent discussions.

The estimation results show that the demand for additional children rises with age but at a declining rate. The education of the mother does not significantly affect the demand for additional children.[10] There is no significant difference in the demand for additional children between those living in the urban and in the rural areas.

[10] It can be argued that the characteristics of the husband may provide some explanation that is independent of that of the wife's characteristics. Unfortunately, while this is possible, the data set does not provide information on the characteristics of the husband. In addition, the children's' characteristics may also play an important part, following the quantity and quality trade-off literature (Becker 1960; Becker and Tomes 1976) but, again, the data set does not include such information.

Table 7. Determinants of demand for additional children, 2002

Explanatory variables	Ordinary probit			Two-stage probit 1			Two-stage probit 2			
	Coef.	Std. err.*	z	Coef.	Std. err.*	z	Coef.	Std. err.*	z	Mar. eff.
Children ever born (CEB)	-0.1686	0.0120	-14.10				0.1189	0.1247	0.95	0.0151
Estimated error, CEB							-0.2891	0.1240	-2.33	-0.0367
Predicted CEB				0.1558	0.1199	1.30				
Age of mother	0.1124	0.0197	5.70	-0.0094	0.0482	-0.20	0.0060	0.0501	0.12	0.0008
Age of mother, squared	-0.0026	0.0003	-8.42	-0.0014	0.0005	-2.70	-0.0016	0.0005	-3.08	-0.0002
Mother with elementary education	-0.1500	0.1384	-1.08	-0.1723	0.1385	-1.24	-0.2276	0.1430	-1.59	-0.0271
Mother with secondary education	-0.1255	0.1388	-0.90	0.0104	0.1383	0.08	-0.0452	0.1426	-0.32	-0.0057
Mother with college education	0.0103	0.1415	0.07	0.3254	0.1743	1.87	0.2725	0.1796	1.52	0.0381
Urban	-0.0370	0.0346	-1.07	-0.0041	0.0386	-0.11	0.0043	0.0394	0.11	0.0006
Poorest quintile	-0.0660	0.0603	-1.09	-0.3830	0.1506	-2.54	-0.3955	0.1561	-2.53	-0.0426
Lower middle quintile	-0.0974	0.0543	-1.79	-0.2755	0.0937	-2.94	-0.2830	0.0964	-2.94	-0.0317
Middle quintile	-0.0314	0.0502	-0.63	-0.1304	0.0653	-2.00	-0.1333	0.0663	-2.01	-0.0160
Upper middle quintile	-0.0330	0.0482	-0.68	-0.0666	0.0504	-1.32	-0.0688	0.0509	-1.35	-0.0085
Constant	-1.3008	0.3322	-3.92	0.3152	0.7039	0.45	0.2012	0.7301	0.28	
Pseudo R2	0.1869			0.1642			0.1874			
Obs.	16,485			16,485			16,485			

* Robust standard errors.

The impact of the wealth variable yielded interesting results. It shows that, except for the upper middle quintile, there is a significant negative difference in the demand for children between women from the lowest three wealth quintiles and women from the richest quintile, the omitted category. This implies that given the number of children ever born, contrary to common expectation, women from poorer households demand less children than those from the richer households. The estimation result also shows increasing marginal effects as one goes down the wealth ladder. This indicates that the results of the bivariate analysis shown in Table 1 holds true even after controlling for other relevant variables in a multivariate setting.

Use of modern contraception

The estimation results on the use of modern contraception are given in Table 8. The demand for additional children has a mixed impact on the demand for modern contraception. The coefficient is positive and significant in the ordinary probit equation but is negative and significant in the two-stage probit equations. Even more important is the significant coefficient for the estimated error term in the first stage,which confirms the endogeneity of the demand-for-additional-children variable in the contraceptive use equation and indicating the inappropriateness of the ordinary probit results. Again, following the suggestion in Rivers and Vuong (1988), the two-stage probit estimate is used in subsequent discussions. The result of the two-stage probit implies that the demand for additional children depresses the demand for modern method, which agrees with expectations.

The effect of the age of the mother shows a rise in the demand for contraception with age at a declining rate. The impact of the education variable clearly indicates a higher demand for those with higher education with marginal effects rising from 21 percent with elementary education to 27 percent for those with college education over those with no education. Again, living in urban areas has no significant impact on modern contraception adoption.

The variable used to indicate the availability of family planning services, average proportion of women with unmet need averaged at the provincial level, has the expected negative sign and is highly statistically significant. Lowering the proportion of women with unmet need by 1 percent increases the proportion of using modern contraception by a little more than 1 percent as well.

Finally, the use of modern contraception among women from poorer households is significantly lower relative to the richest quintile in the two-stage probit estimates. The marginal effects in the last column of the table show that the use of modern contraception among women from the poorest quintile is 13 percent lower, on the average, compared with that among women in the richest quintile. For women in the lower middle quintile, it is lower by 6 percent, in the middle

Table 8. Determinants of using modern contraception, 2002

Explanatory variables	Ordinary probit Coef.	Std. err.*	z	Two-stage probit 1 Coef.	Std. err.*	z	Two-stage probit 2 Coef.	Std. err.*	z	Mar. eff.
Wants another child (WAC)	0.0800	0.0367	2.18				-4.4269	0.2287	-19.35	-0.5449
Estimated error, WAC							4.6410	0.2315	20.05	1.6885
Predicted WAC				-4.3644	0.2288	-19.08				
Age of mother	0.2086	0.0125	16.76	0.0698	0.0138	5.05	0.0693	0.0139	5.00	0.0252
Age of mother, squared	-0.0030	0.0002	-17.02	-0.0019	0.0002	-10.14	-0.0019	0.0002	-10.12	-0.0007
Mother with elementary education	0.6419	0.1143	5.62	0.5665	0.1173	4.83	0.5627	0.1181	4.76	0.2107
Mother with secondary education	0.7275	0.1150	6.32	0.6906	0.1179	5.86	0.6875	0.1187	5.79	0.2524
Mother with college education	0.5597	0.1169	4.79	0.7151	0.1199	5.96	0.7137	0.1207	5.91	0.2694
Urban	-0.0061	0.0253	-0.24	-0.0319	0.0255	-1.25	-0.0323	0.0255	-1.27	-0.0118
Total unmet need, province	-2.8943	0.2223	-13.02	-3.0882	0.2251	-13.72	-3.1013	0.2255	-13.75	-1.1283
Poorest quintile	-0.2283	0.0437	-5.22	-0.3906	0.0450	-8.67	-0.3919	0.0451	-8.69	-0.1345
Lower middle quintile	-0.0322	0.0400	-0.80	-0.1601	0.0409	-3.92	-0.1610	0.0409	-3.94	-0.0573
Middle quintile	-0.0235	0.0379	-0.62	-0.0789	0.0382	-2.07	-0.0797	0.0382	-2.08	-0.0287
Upper middle quintile	-0.0370	0.0368	-1.01	-0.0719	0.0368	-1.95	-0.0719	0.0368	-1.95	-0.0259
Constant	-3.8027	0.2481	-15.33	0.2235	0.3150	0.71	0.2539	0.3154	0.81	
Pseudo R2	0.0375			0.0566			0.0585			
Obs.	16,485			16,485			16,485			

* Robust standard errors.

lower by 2.9 percent, and in the upper middle by 2.6 percent. This result highlights the main source of the difference in unmet need for family planning: women from poorer households demand less modern methods compared with women from the richer households.

Bivariate probit results

Finally, to further confirm the estimated interrelationships of the relevant variables in these equations, bivariate probit estimates were obtained to directly test the correlation between the demand-for-children equation and the demand-for-modern-contraception equation. The bivariate probit estimation results are given in Table 9. The computed chi-square value for the test of the correlation of the errors between the two equations is 193.19, which is highly significant, confirming earlier results from the two-stage probit. It also confirms the coefficient estimates of the two-stage probit and provides other meaningful results. For instance, the number of children ever born is a strong significant negative determinant of the demand for additional children. The age of the mother has the usual effect, which is, rising at a declining rate. The impact of education is not significant on the demand for additional children but positive and significant on the demand for contraception. Residing in urban areas has no effect on both the demand for additional children and the demand for contraception. The impact of socioeconomic status on the demand for additional children and for modern contraception has effects that are similar in direction as those obtained from the two-stage probit results but the significance of the coefficients is much lower.

SUMMARY AND IMPLICATIONS

The cross-tabulation analyses show that there are significant differences in fertility and family planning practices across socioeconomic classes. The average number of children ever born to families in the poorest quintile is more than two children higher than the average number of children ever born to families in the richest quintile. The use of modern contraception is also lower among the poor. These results are in agreement with the higher unmet need for family planning among women in poorer households compared with those in richer households. These facts are observed in other countries as well. However, cross-tabulation analysis is limited by its inability to control for other individual, household, and community factors that are known to play in these relationships. A recursive discrete choice model was therefore estimated to shed light on the role of socioeconomic class, which is measured by a wealth index, on these relationships after controlling for individual, household, and community characteristics. The estimation results show that the number of

Table 9. Bivariate probit estimates of demand for additional children and contraception, 2002

Explanatory variables	Additional children			Contraception		
	Coef.	Std. err.*	z	Coef.	Std. err.*	z
Children ever born (CEB)	-0.2245	0.0132	-16.97			
Wants another child (WAC)				-1.1913	0.0553	-21.54
Age of mother	0.1123	0.0175	6.40	0.1411	0.0128	11.05
Age of mother, squared	-0.0024	0.0003	-8.95	-0.0024	0.0002	-13.17
Mother with elementary education	-0.1458	0.1357	-1.08	0.5550	0.1039	5.34
Mother with secondary education	-0.1269	0.1358	-0.93	0.6446	0.1046	6.16
Mother with college education	-0.0292	0.1384	-0.21	0.5595	0.1062	5.27
Urban	-0.0502	0.0323	-1.55	-0.0133	0.0243	-0.55
Total unmet need, province				-2.6327	0.1987	-13.25
Poorest quintile	-0.0835	0.0568	-1.47	-0.2667	0.0420	-6.35
Lower middle quintile	-0.0926	0.0512	-1.81	-0.0746	0.0386	-1.93
Middle quintile	-0.0629	0.0474	-1.33	-0.0416	0.0366	-1.14
Upper middle quintile	-0.0350	0.0452	-0.77	-0.0456	0.0352	-1.29
Constant	-1.2896	0.3064	-4.21	-2.0959	0.2547	-8.23
Wald test of rho=0: Chi2 (P-value)	193.19 (0.0000)					
Obs.	16,485					

* Robust standard errors.

children ever born is really higher among poorer households even after controlling for the other characteristics. The number of children ever born has a mixed impact as a determinant of the demand for additional children. But what is more interesting to note from the results is that contrary to common expectation that the poor have a higher demand for children hence they tend to have larger families, socioeconomic status is not a consistent significant determinant of the demand for additional children given the number of children already born. In fact, women from poorer households have a lower demand for children than those from richer households.

The other thing is that the demand for modern contraception is significantly lower among women from poorer households compared with women from richer households, other things being equal. This lends support to the common notion that women from poorer households have a lower adoption rate for modern methods. Of course, this may be viewed as a result of the lower access of the poor to free supplies from the public sector or their lower ability to pay for supplies from the private sector. Considering the still high dependence on public supplies of women even from the richest households as shown in the cross-

tabulation results, this may be an indication of the crowding out of women from poorer households, which contributes further to their low demand for modern methods. Since there is no indication that these relationships have drastically changed over the years, this lower demand for modern contraception for whatever reason has contributed to the higher number of children ever born among the poor.

To summarize, this study therefore shows that it is not always true that the larger family size among the poor is the result of their higher demand for children. Given the number of children already born, the demand for additional children, as well as the demand for modern methods, is actually lower among women from poorer households than among women from richer households. Using the econometric as well as the cross-tabulation results, this particular outcome can be the result of at least three factors: (a) the crowding out of women from poor households by a significant percentage of women from richer households that are getting their supplies of modern contraception also from public sources, (b) the lower education of women from poorer households, and (c) the lower capacity of women from poorer households to pay for private supplies.

These results imply that the Philippines must deal with the population reduction issue once and for all. The study puts in a better light the glaring problem of larger family size among poor households and the high unmet need for family planning among them. Since it is not the demand for more children that is the reason for their large family size but their use of ineffective fertility control measures, then there is really a need to focus the attention on increasing the adoption of modern contraception among the poor. Measures to address this issue may include (a) providing subsidy to the poor for modern methods, (b) lowering the dependence of richer households on public supplies, and (c) intensifying advocacy for modern methods among the poor.

ANNEX

Asset index construction using FPS household assets

Introduction

Generating wealth index has been resorted to by researchers when there is a need for an indicator of socioeconomic status but the data set under consideration does not contain income or consumption and only has information on household assets. There are many ways of generating a socioeconomic indicator out of household assets (see Bollen et al. 2001 for a recent review of the methods). Two will be discussed here. First is the statistical method called principal components analysis. Second is the Philippine National Statistical Office method, which for lack of a better term may be called “relative deprivation” index.

Principal components analysis[11]

Principal components analysis (PCA) is a technique of summarizing a set of variables into a smaller set of mutually orthogonal components that best capture the common information present in the variables. The first principal component captures the largest and the most common variation among the variables.

The generic problem with PCA is that while it is easy to interpret the first principal component, the interpretation of the higher order components is more problematic. Filmer and Pritchett (1998) used the first principal component to define an asset index. The crucial assumption is that the most common variation in the assets is caused by the household long-run wealth. They have shown that the index fared well in comparison with other measures of economic status such as the family-size-adjusted per capita consumption.

Recently, the use of discrete variables in PCA has been criticized because it was originally designed for continuous variables (Kolenikov and Angeles 2004). The authors themselves admit, however, that given the complexity of the proposed appropriate methodology for a PCA-like analysis for discrete variables,[12] the simulation results show that the practical relevance of the proposal is only in the use of natural ordering of classifications rather than in the discrete rendering of the natural ordering as originally proposed in Filmer and Pritchett (1998). The reason is that information is lost when using the correlation of the discrete rendering of the natural ordering than when the natural ordering of the variables is used. These qualifications, however, do not apply to the data set that is used in this study because the data only provide information on the presence or absence of the household amenity that is used as an indicator of household wealth.

The variables are usually standardized before weights are computed. Raw values can be used but the weights will be larger for variables that vary more.

The asset index for household j (Aj) is given as

$$A_j = f_1 * \frac{(a_{j1} - a_1)}{s_1} + \ldots + f_N * \frac{(a_{jN} - a_N)}{s_N} \quad (A1)$$

where f_1 is the weight of asset 1; a_{j1} is the value of the household j's first asset; and a_1 and s_1 are the mean and standard deviation of the first asset for all households.

Thus, in the case of a dichotomous variable such as 1 representing the presence of an asset in the household and 0 representing the absence of it, A_j will change with two values. For asset 1, for instance, it is $f_1*(1-a_1)/(s_1)$ if present, and $f_1(-a1)/(s_1)$ if absent.

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[11] A close cousin of PCA, factor analysis has also been used and even argued to be better conceptually than PCA although the results of the two are very similar (Sahn and Stiefel 2001).

[12] Kolenikov and Angeles (2004) called the procedure polychoric and polyserial correlations.

NSO socioeconomic index

The documentation of the socioeconomic index is not included in the survey reports but informally published in NSO (n.d). It uses "relative deprivation" when assigning weights to the asset variables. As such, assets more commonly owned by households will have smaller weights and, conversely, assets owned by fewer households will have larger weights. In particular, it uses as weights 1 minus the proportion of household in the survey owning the asset, hence the name "relative deprivation" index. Note that this method works only when asset measures are dichotomous such as the asset information in the FPS. It cannot handle continuous variables like the PCA.

Formally, the asset index in the NSO socioeconomic index is

$$A_j = (1-\tilde{a_1}) * a_{j1} + ... + (1-\tilde{a_N}) * a_{jN} \quad (A2)$$

where $\tilde{a_k}$ is the proportion of households in the survey owning asset k.

Socioeconomic classification

Those who use PCA typically use quintiles or deciles of the index value to classify households. In contrast, the NSO method uses poor/nonpoor classification of households. It considers the lowest one-third of the women[13] in terms of index value as poor.

Principal component results

The FPS started to ask questions on household assets in the 1999 survey. The responses are used to generate asset index using PCA. The results of the exercise are summarized in Annex Table 1. The first two columns provide the mean and the standard deviation of the household asset variables. Since the assets are coded as "1" if the household has the asset and "0" if otherwise, the means are the proportion of the households that has the particular asset. For instance, in the 2002 survey, 81 percent of the households have electricity. The rightmost column is the PCA weights (the fs in equation A1). The generated index values (A_j) are used as the basis for classifying households into socioeconomic quintiles. The five columns in the middle of the table are the means by asset index quintile. Again, these represent the estimated proportion of households owning a particular asset by quintile. Thus, for instance, in 2002, the asset index predicted that there are only 16 percent of the poorest households that have electricity while virtually all of the households in the richest quintile are predicted to have electricity. Less than 1

[13] NSO(n.d.) specifically mentions that it is the women, not the households, that are classified as poor or nonpoor according to index values. This is surprising given that the assets are household assets, not individual assets.

Annex Table 1. Factor score coefficients, descriptive statistics, total and by asset index quintile, 1999–2002

Asset variable	Total		Asset quintile index (means)					Score
	Mean	Std. dev.	Poorest	Lower middle	Middle	Upper middle	Richest	coeff.
2002								
Electricity	0.8148	0.3885	0.1660	0.9121	0.9975	0.9995	0.9990	0.3960
Radio	0.8186	0.3853	0.3714	0.7979	0.9476	0.9801	0.9962	0.3318
TV	0.6792	0.4668	0.0048	0.4245	0.9730	0.9945	0.9992	0.4533
Telephone	0.3192	0.4662	0.0008	0.0199	0.1162	0.5392	0.9199	0.4085
Refrigerator	0.4454	0.4970	0.0003	0.0358	0.2785	0.9247	0.9879	0.4508
Bicycle	0.2246	0.4173	0.0491	0.1524	0.2051	0.2008	0.5154	0.1771
Motorcycle	0.1438	0.3509	0.0053	0.0431	0.0748	0.1429	0.4529	0.2334
Car/Jeep/Van	0.1010	0.3014	0.0035	0.0086	0.0098	0.0088	0.4745	0.2677
2001								
Electricity	0.8106	0.3919	0.1420	0.9132	0.9980	0.9998	1.0000	0.4046
Radio	0.8420	0.3648	0.4389	0.8289	0.9577	0.9877	0.9968	0.3189
TV	0.6516	0.4765	0.0027	0.2876	0.9717	0.9966	0.9995	0.4655
Telephone	0.2252	0.4177	0.0005	0.0052	0.0088	0.2367	0.8746	0.3915
Refrigerator	0.4278	0.4948	0.0000	0.0460	0.1878	0.9108	0.9946	0.4629
Bicycle	0.2008	0.4006	0.0288	0.1799	0.1996	0.2114	0.3845	0.1663
Motorcycle	0.1143	0.3181	0.0032	0.0369	0.0760	0.1500	0.3053	0.2144
Car/Jeep/Van	0.0882	0.2837	0.0010	0.0074	0.0042	0.0143	0.4145	0.2769
2000								
Electricity	0.7883	0.4085	0.0570	0.8879	0.9971	0.9998	1.0000	0.4095
Radio	0.8277	0.3776	0.4579	0.7360	0.9549	0.9923	0.9976	0.3275
TV	0.6373	0.4808	0.0048	0.2190	0.9714	0.9925	0.9991	0.4628

Annex Table 1 continued

Asset variable	Total		Asset quintile index (means)					Score
	Mean	Std. dev.	Poorest	Lower middle	Middle	Upper middle	Richest	coeff.
Telephone	0.1901	0.3924	0.0003	0.0054	0.0061	0.1181	0.8205	0.3703
Refrigerator	0.4222	0.4939	0.0005	0.0495	0.1419	0.9279	0.9912	0.4573
Bicycle	0.2285	0.4199	0.0376	0.2135	0.2249	0.2591	0.4075	0.1757
Motorcycle	0.1266	0.3326	0.0053	0.0475	0.0825	0.1660	0.3319	0.2225
Car/Jeep/Van	0.0954	0.2937	0.0009	0.0046	0.0043	0.0189	0.4483	0.2903
1999								
Electricity	0.7747	0.4178	0.0000	0.8827	0.9920	0.9990	1.0000	0.4117
Radio	0.8489	0.3581	0.5777	0.7138	0.9636	0.9925	0.9969	0.3011
TV	0.6072	0.4884	0.0000	0.1356	0.9093	0.9917	0.9995	0.4708
Telephone	0.1572	0.3640	0.0000	0.0023	0.0065	0.0351	0.7420	0.3651
Refrigerator	0.3996	0.4898	0.0000	0.0070	0.0842	0.9176	0.9894	0.4672
Bicycle	0.2152	0.4110	0.0341	0.2146	0.2226	0.2634	0.3412	0.1774
Motorcycle	0.1095	0.3123	0.0023	0.0181	0.0777	0.1015	0.3479	0.2192
Car/Jeep/Van	0.0845	0.2781	0.0000	0.0052	0.0039	0.0145	0.3988	0.2951

Source of basic data: Family Planning Survey 1999–2002, NSO.

percent of the poorest households own cars/jeeps/vans while 47 percent of the richest households own cars. The rest of the assets have similar ownership pattern that follows common expectation.

The public use files (PUF) of the FPS only have individual weights referring to the subject of the survey, that is, women of reproductive ages. They do not contain household weights that are needed in the construction of the household asset index.[14] Given this, it was assumed that the households are self-weighting.

NSO socioeconomic index results

Annex Table2 provides the summary of the results generated using the NSO index. The rightmost column is $(1-\tilde{a}_k)$ in equation A2. The ownership pattern is very similar to the one generated using PCA. In 2002, for instance, 22 percent of the poorest households are predicted to have electricity while virtually all of the households in the richest quintile are predicted to have electricity. Nobody owns a car/jeep/van among the poorest households while 47 percent among the richest households own one.

Comparing the PCA and NSO Index Results

At the outset, it must be stated that the correlation between the index values (the As) is very high—0.93 in the 2002 round.

To appreciate the differences between the PCA classification results and the NSO index classification results, two comparisons are done. One is generating the poor/nonpoor classification used by the FPS. The other is comparing the quintile classification results.

While the asset variables are included since the 1999 round, the poor/nonpoor classification is included only in the 2002 PUF. The NSO index values are not provided. In order to do a replication, women were classified using the actual proportion of poor/nonpoor women in the 2002 PUF. NSO (n.d.) says about one-third of the women are considered poor. Tabulation using the 2002 PUF's "ecostat" variable indicates that 25.76 percent of the women are poor. Rather than one-third, this proportion is used. The resulting classifications are then tabulated against the NSO classification included in the PUF. The results of the comparison are given in Annex Table 3. The diagonal cells indicating correct classification denote that 99 percent of the poor and nonpoor are correctly classified.

The quintile generated using the NSO index values and the PCA results were compared. The results are given in Annex Table 4. The households classified as poorest and richest in the NSO index values and in the PCA results are more than

[14] Together with the survey parameters, the household weights are also requested by the author from the NSO. Unfortunately, these have not been released yet when this report is being written.

Annex Table 2. Descriptive statistics by asset by NSO asset index, 2002

Variable	Total		NSO asset index quintile (means)					Implied
	Mean	Std. dev.	Poorest	Lower middle	Middle	Upper middle	Richest	score coeff.
2002								
Electricity	0.8148	0.3885	0.2242	0.9778	0.8836	0.9904	0.9980	0.1852
Radio	0.8186	0.3853	0.4142	0.8801	0.8485	0.9635	0.9869	0.1814
TV	0.6792	0.4668	0.0048	0.6805	0.7555	0.9632	0.9919	0.3208
Telephone	0.3192	0.4662	0.0000	0.0008	0.1190	0.5712	0.9050	0.6808
Refrigerator	0.4454	0.4970	0.0000	0.0003	0.4761	0.8166	0.9342	0.5546
Bicycle	0.2246	0.4173	0.0000	0.0000	0.2956	0.2706	0.5567	0.7754
Motorcycle	0.1438	0.3509	0.0000	0.0000	0.0431	0.1736	0.5023	0.8562
Car/jeep/van	0.1010	0.3014	0.0000	0.0000	0.0083	0.0285	0.4685	0.8990
2001								
Electricity	0.8106	0.3919	0.1782	0.9850	0.9027	0.9889	0.9983	0.1894
Radio	0.8420	0.3648	0.4598	0.9071	0.9095	0.9440	0.9897	0.1580
TV	0.6516	0.4765	0.0000	0.5556	0.7394	0.9678	0.9953	0.3484
Telephone	0.2252	0.4177	0.0000	0.0000	0.0047	0.4821	0.6391	0.7748
Refrigerator	0.4278	0.4948	0.0000	0.0000	0.5155	0.6735	0.9501	0.5722
Bicycle	0.2008	0.4006	0.0000	0.0000	0.1753	0.3139	0.5150	0.7992
Motorcycle	0.1143	0.3181	0.0000	0.0000	0.0317	0.0809	0.4587	0.8857
Car/jeep/van	0.0882	0.2837	0.0000	0.0000	0.0074	0.0147	0.4191	0.9118
2000								
Electricity	0.7883	0.4085	0.1063	0.9774	0.8688	0.9920	0.9973	0.2117
Radio	0.8277	0.3776	0.4579	0.8491	0.8947	0.9454	0.9917	0.1723
TV	0.6373	0.4808	0.0000	0.5401	0.6912	0.9631	0.9923	0.3627

Annex Table 2 continued

Variable	Total		NSO asset index quintile (means)					Implied
	Mean	Std. dev.	Poorest	Lower middle	Middle	Upper middle	Richest	score coeff.
Telephone	0.1901	0.3924	0.0000	0.0000	0.0046	0.2940	0.6519	0.8099
Refrigerator	0.4222	0.4939	0.0000	0.0005	0.4937	0.6715	0.9452	0.5778
Bicycle	0.2285	0.4199	0.0000	0.0000	0.2220	0.4670	0.4536	0.7715
Motorcycle	0.1266	0.3326	0.0000	0.0000	0.0398	0.0910	0.5024	0.8734
Car/jeep/van	0.0954	0.2937	0.0000	0.0000	0.0065	0.0140	0.4564	0.9046
1999								
Electricity	0.7748	0.4178	0.0359	0.9796	0.8693	0.9915	0.9974	0.2252
Radio	0.8489	0.3581	0.5783	0.8006	0.9163	0.9566	0.9928	0.1511
TV	0.6072	0.4884	0.0000	0.3830	0.6958	0.9633	0.9941	0.3928
Telephone	0.1572	0.3640	0.0000	0.0000	0.0054	0.1242	0.6563	0.8428
Refrigerator	0.3996	0.4898	0.0000	0.0000	0.3649	0.6818	0.9514	0.6004
Bicycle	0.2152	0.4110	0.0000	0.0000	0.2216	0.4703	0.3840	0.7848
Motorcycle	0.1095	0.3123	0.0000	0.0000	0.0372	0.0795	0.4308	0.8905
Car/jeep/van	0.0844	0.2781	0.0000	0.0000	0.0070	0.0108	0.4044	0.9156

Source of basic data: Family Planning Survey 1999–2002, NSO.

90 percent in agreement. However, there are considerable deviations in the middle quintile classifications. There is only 50 percent agreement in the middle quintile, around 66 percent agreement in the lower middle quintile, and 75 percent agreement in the upper middle quintile.

Annex Table 3. Comparison of PUF classification and publication classification

PUF classification	Publication classification: Nonpoor	Poor	Total
Nonpoor	22,017	77	22,094
	99.7	0.4	100.0
	99.7	1.0	74.2
Poor	77	7,589	7,666
	1.0	99.0	100.0
	0.4	99.0	25.8
Total	22,094	7,666	29,760
	74.2	25.8	100.0
	100.0	100.0	100.0

(Number)
(Row Percentage)
(Column Percentage)

Source of basic data: Family Planning Survey 2002, NSO.

Annex Table 4. Comparison of PCA and NSO index quintile classification, 2002

NSO index classification	PCA classification: Poorest	Lower middle	Middle	Upper middle	Richest	Total
Poorest	4,789	315	0	0	0	5,104
	93.8	6.2	0.0	0.0	0.0	100.0
	94.2	5.8	0.0	0.0	0.0	17.2
Lower middle	6	3,653	1,906	0	0	5,565
	0.1	65.6	34.3	0.0	0.0	100.0
	0.1	66.7	32.4	0.0	0.0	18.7
Middle	287	1,454	2,893	1,157	0	5,791
	5.0	25.1	50.0	20.0	0.0	100.0
	5.6	26.5	49.2	18.5	0.0	19.5

Annex Table 4 continued

NSO index classification	PCA classification Poorest	Lower middle	Middle	Upper middle	Richest	Total
Upper middle	4	57	1,079	4,708	448	6,296
	0.1	0.9	17.1	74.8	7.1	100.0
	0.1	1.0	18.3	75.2	6.4	21.2
Richest	0	1	7	394	6,602	7,004
	0.0	0.0	0.1	5.6	94.3	100.0
	0.0	0.0	0.1	6.3	93.7	23.5
Total	5,086	5,480	5,885	6,259	7,050	29,760
	17.1	18.4	19.8	21.0	23.7	100.0
	100.0	100.0	100.0	100.0	100.0	100.0

(Number)
(Row Percentage)
(Column Percentage)

Source of basic data: Family Planning Survey 2002, NSO.

REFERENCES

Alonzo, R., A. Balisacan, D. Canlas, J. Capuno, R. Clarete, R. Danao, E. de Dios, B. Diokno, E. Esguerra, R. Fabella, Ma. S. Bautista, A. Kraft, F. Medalla, Ma. N. Mendoza, S. Monsod, C. Paderanga, Jr., E. Pernia, S. Quimbo, G. Sicat, O. Solon, E. Tan and G. Tecson. 2004. Population and poverty: the real score. Discussion Paper No. 415. Quezon City: UP School of Economics.

Becker, G. 1960. An economic analysis of fertility. In *Demographic and economic change in developed countries*. Princeton, NJ: Princeton University Press.

Becker, G. and N. Tomes. 1976. Child endowments and the quantity and quality of children. *Journal of Political Economy* 84:S143–S189.

Behrman, J. 1990. Human resource led development? New Delhi: ILO-ARTEP.

Behrman, J. and R. Schneider. 1994. An international perspective on schooling investments in the last quarter century in some fast-growing East and Southeast Asian countries. *Asian Development Review* 12(2):1–50.

Bollen, K., D. Guilkey and T. Mroz. 1995. Binary outcomes and endogenous explanatory variables: tests and solutions with an application to the demand for contraceptive use in Tunisia. *Demography* 32(1):111–131.

Bollen, K., J. Glanville and G. Stecklov. 2001. Economic status proxies in studies of fertility in developing countries: does the measure matter? Measure Evalu-

ation Project Working Paper Series no. 01-38. Chapel Hill, North Carolina: Carolina Population Center.

Bruce, J. 1990. Fundamental elements of the quality of care: A simple framework. *Studies in Family Planning* 21(2):61–91.

de Dios, E.S. and Associates. 1993. Poverty, growth and the fiscal crisis. Makati City: Philippine Institute for Development Studies; Ontario: International Development Research Centre.

Degraff, D., R. Bilsborrow and D. Guilkey. 1997. Community-level determinants of contraceptive use in the Philippines: A structural analysis. *Demography* 34(3):385–398.

Filmer, D. and L. Pritchett. 1998. Estimating wealth effects without expenditure data–or tears: an application to educational enrollments in states of India. WPS1994. Washington, DC: World Bank.

————. 2001. Estimating wealth effects without expenditure data-or tears: An application to education enrollments in states of India. *Demography* 38(1):115–132.

Guilkey, D. and S. Jayne. 1997. Fertility transition in Zimbabwe: Determinants of contraceptive use and method choice. *Population Studies* 51(2):173–189.

Herrin, A. 1979. Rural electrification and fertility change in Southern Philippines. *Population and Development Review* 5(1):61–86.

————. 2002. Population policy in the Philippines, 1969-2002. PIDS Discussion Paper Series No. 2002-08. Makati City: Philippine Institute for Development Studies.

Kolenikov, S. and G. Angeles. 2004. The use of discrete data in PCA: theory, simulations and applications to socioeconomic indices. Measure Evaluation Working Paper Series No. 04-85. Chapel Hill, North Carolina: Carolina Population Center.

Lee, L. 1981. Simultaneous equation models with discrete and censored dependent variables. In *Structural analysis of discrete data with economic applications*, edited by C. Manski and D. McFadden. Cambridge, MA: MIT Press.

National Statistics Office (NSO). n.d. Socioeconomic indicator to identify the poorest households for family planning survey and maternal and child health survey. Manila.

Orbeta, A. 2003. Population and poverty: a review of the links, evidence and implications for the Philippines. *Philippine Journal of Development* 30(2):195–227.

————. 2004a. Population and poverty at the household level: revisiting the links using household surveys. Paper presented at the ICPD+10 National Conference, Heritage Hotel, Manila, October.

————. 2004b. LGUs need strong national leadership in population management. PIDS Policy Notes No. 2004-12. Makati City: Philippine Institute for Development Studies.

————. 2004c. Major findings from the family planning surveys, 1995-2002. Consultant's report prepared for the Local Enhancement and Development (LEAD) for Health Project (funded by the United States Agency for International Development). Manila.

————. 2004d. Major findings from the National Demographic and Health Surveys: 1998, 1993. Consultant's report prepared for the Local Enhancement and Development (LEAD) for Health Project. (funded by the United States Agency for International Development). Manila.

————. 2005. Poverty, vulnerability and family size: evidence from the Philippines. ADBI Discussion Paper No. 29. Tokyo: Asian Development Bank Institute.

Orbeta, A., I. Acejo, J. Cuenca, and F. del Prado. 2003. Family planning and maternal and child health outcomes, utilization and access to services by asset quintile. PIDS Discussion Paper No. 2003-14. Makati City: Philippine Institute for Development Studies.

Reyes, C. 2002. The poverty fight: have we made and impact. PIDS Discussion Paper No. 2002-20. Makati City: Philippine Institute for Development Studies.

Rivers, D. and Q. Vuong. 1988. Limited information estimators and exogeniety tests for simultaneous probit models. *Journal of Econometrics* 39:347–366.

Sahn, D. and D. Stifel 2001. Exploring alternative measures of welfare in the absence of expenditure data. Cornell Food and Nutrition Policy Program Working Paper No. 97. Ithaca, NY: Cornell University.