Poverty, Vulnerability and Family Size: Evidence from the Philippines

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ABOUT THE AUTHOR

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ABSTRACT

The population and poverty nexus is not new but remains an important development issue for many countries. Recent research has added the crucial dimension of vulnerability to poverty to the debate on the determinants of the welfare status of a population. But the issue of vulnerability has hardly been dealt with using Philippine data. This paper, therefore, draws together recent results using household survey data regarding the impact of family size on various aspects of family welfare in the Philippines. In particular, it shows results of cross-tabulation and multivariate analyses of the role of family size on such areas as poverty incidence, vulnerability to poverty, as well as the underlying mechanism of savings, labor supply and earnings of parents and human capital investments.

There are several conclusions that can be made from the evidence presented. One, there is a clear negative impact, on average, from additional children on household welfare. Two, and more importantly, these negative impacts are regressive, i.e. the negative impacts on poorer households are larger. Three, the associations between larger family size, poverty incidence and vulnerability to poverty are strong and enduring. These results have important implications for efforts at poverty reduction—the centerpiece program of many Philippine administrations though without much success. Many attribute this lack of success to low and inconsistent growth rates. This paper adds large family size as an obvious, but not well-understood reason, not only for the low and inconsistent economic growth rates but also for direct debilitating effects on many aspects of household welfare.

The results of this paper point to several implications for policy. First, a strong population program must accompany poverty alleviation efforts. In the short run, it may be in the form of providing family planning services for those who need them. In the long run, it may include advocacy for smaller family size. The negative impact of large family size on household savings pointed out in this study has an impact both macro-economically and on households. Larger family size reduces household savings, lowering the already low national savings. This hampers investment, particularly in an environment like the Philippines where foreign direct investment is not high. Having additional children also prevents more school-age children from attending school and leads more to enter child labor. From the perspective of development measured in terms of capabilities, helping families achieve their desired family size directly increases their well being, all other things being constant.

Second, there is a limit to what employment generation programs, even when they can be implemented, can do for large families. Additional children, as the results of this study show, hinder mothers from taking on employment, particularly, paid employment. Third, there is a need to stop the implied intergenerational transmission of poverty indicated by the negative impact of the number of children on school attendance. There is perhaps room for education subsidies directed at large families. Fourth, targeting poor households also means targeting large households and vice-versa. In addition, considering the regressiveness of the impact of additional children, there will be larger impacts from targeting poorer or larger households.

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Aniceto C. Orbeta, Jr. [†]

1.   Introduction

The population and poverty nexus is not new but remains an important development issue for many countries. In the Philippines, for instance, the debate on the role of population growth and family size in development, in general, and on poverty in particular, remains largely unresolved. Recent research has added the important dimension of vulnerability to poverty to the debate on the determinants of the welfare status of a population. Dercon (2005) emphasizes that vulnerability can even cause poverty. The issue of vulnerability has hardly been dealt with using Philippine data. This paper summarizes the empirical evidence, both from secondary sources and from the author's own analyses, on the importance of family size on poverty and vulnerability to poverty.

The role of demographic changes in the development of the Philippines has long been highlighted in many papers. While the Philippines has been credited as one of the earliest adopters of a strong population program in Asia, today it has still not resolved its population problem while its latecomer neighbors in the field have successfully addressed the problem and turned toward other problems. Several recent papers highlight the importance of demographic concerns in Philippine development. Herrin (2002) emphasizes the role of a clear population policy. Mapa and Balisacan (2004) carry out simulations showing the benefits of simply being able to generate the fertility reduction achieved by Thailand with all other things being equal. Alonzo et al. (2004) highlight the role of population in helping to achieve the Medium-Term Development Plan objectives. Orbeta (2002) reviews the implications of population concerns on the Philippine's fight against poverty.

This paper draws together recent results using household survey data regarding the impact of family size on the various aspects of family welfare. In particular, it shows results of cross-tabulation and multivariate analyses of the role of family size on such areas as poverty incidence, vulnerability to poverty, as well as the underlying mechanism of savings, labor supply and earnings of parents and human capital investments. These results are expected to complement those of aggregate-level

analyses mentioned earlier and hopefully help complete the story of the role of demographic changes in Philippine development.

The paper is structured as follows. The next section provides a brief picture of the context of population and development issues in the Philippines. The succeeding section provides an empirical overview of the links between poverty and vulnerability to poverty and family size. The fourth section gives the results of cross-tabulation analyses between family size and household welfare indicators. The results of the multivariate analyses are provided in the fifth section. The final section summarizes and gives implications for policy.

2.   Population and Development in the Philippine Context

At the beginning of the 1960s, the Philippines, Thailand and the Republic of Korea had roughly the same population size. While the two other countries have long achieved replacement fertility (a total fertility rate (TFR) of around 2), the Republic of Korea before the 1990s and Thailand near the middle of the 1990s, the Philippines still has a long way to go, with the latest computed TFR registering 3.5 in 2003. As a result, the population sizes have diverged. By around 2000, Philippines had about 30 million more people than the Republic of Korea and 16 million more than Thailand (Figure 1).[1] In addition, while the two other countries continued to register consistently high economic growth, the Philippines had slow and inconsistent growth rates. Putting the two together, it is not difficult to understand why the Philippines' per capita income has not risen far beyond 1,000 US dollars for more than two decades (Figure 2). It would not be surprising also to realize, as will be discussed in detail in the succeeding sections, that poverty reduction has been slow and tentative (Reyes, 2002).

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
Viet nam	34.7	42.7	53.7	66.2	78.5	81.5

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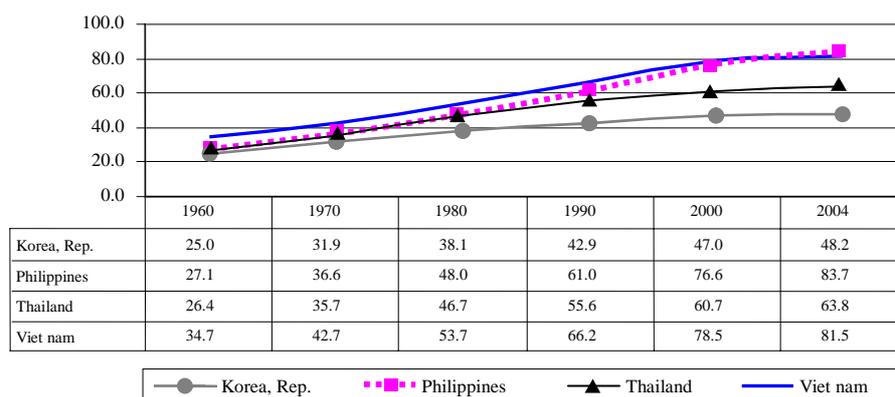
[1] It should be noted had the mortality rates of the two countries been the same as the Philippines rather than lower; the difference in population sizes would have been even bigger.

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
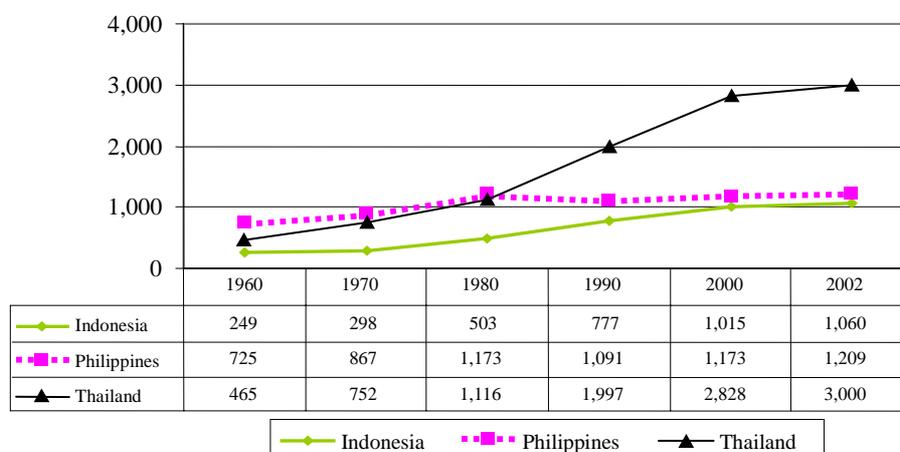
As one looks at other development indicators, the overall long-term development picture given becomes even clearer. The savings rate in the Philippines has been low, often little more than half that of Indonesia, in spite of the higher per capita income (Figure 3). The labor force participation of women is low compared to many other countries in Asia even if the educational attainment of women is higher (see for instance, Manning, 1999). The high school attendance rate,[2] of which the country has long been proud, is quickly eroding.

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

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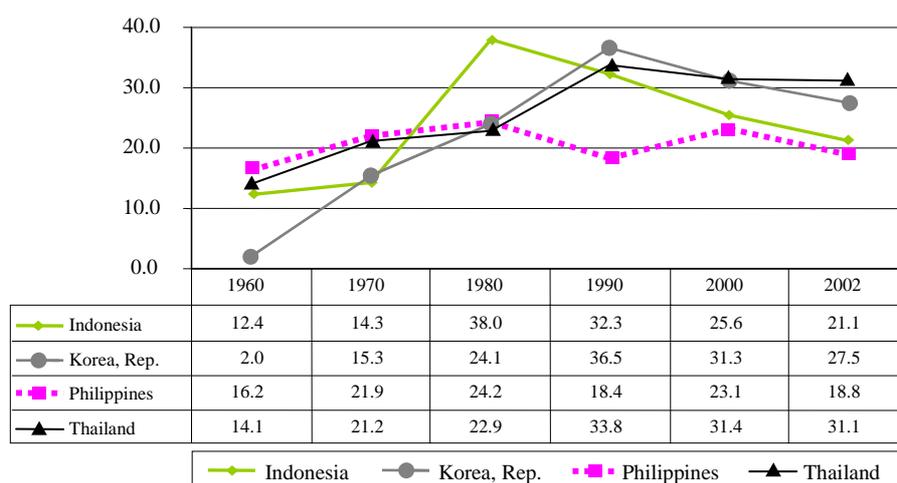
[2] That the Philippines is an outlier in this regard is well documented (see for instance, Berhman and Schneider, 1994; Behrman 1990).

Yet, the role of population growth and family size in development, in general, and poverty and vulnerability, particular, remains largely unrecognized. This is so despite the growing literature worldwide and in the Philippines providing evidence on the importance of population growth and family size in development (see for instance Schelzig, K. (2005), Alonzo et al. (2004), Orbeta (2002), and de Dios and Associates (1993) in the case of the Philippines). Two clear results of this lack of recognition are: (a) the equivocal support given by the government to its population program, and (b) the fact that up to now virtually all contraceptive supplies in public facilities are supplied by donors, as the national government has failed to appropriate money for these commodities.[3] Herrin (2002) describes in detail the noncommittal attitude of the national government on the program and its hazy population policy. He urges it to: (a) address the issue of rapid population growth and fertility reduction, (b) adopt a clear population policy, (c) provide the needed resources for the program, (d) work with the Catholic Church hierarchy, and (e) listen to married couples with unmet needs who have consistently expressed the need for family planning services. The national leadership has avoided the issue in several ways. The current government, for instance, has left it to local government units (LGUs) to decide what to do with family planning services, citing the Local Government Code (LGC) of 1991. The LGC has transferred many direct services, including maternal and child health service and family planning, to LGUs. This lack of national guidance has resulted in fragmentation and in having local programs often work in opposite directions, depending largely on the persuasion of the local executive (Orbeta 2004; Alonzo et al. 2004). One may ask whether there is any real demand for family planning services that the government must respond to. As pointed out earlier, all demographic surveys have documented the consistently high demand for family planning services from women of reproductive age (Herrin, 2002). It has also been pointed out in Orbeta (2004) that the poor have lesser access to family planning services and that their unwanted fertility is much higher than that among the rich. The demand, therefore, for an appropriately funded population program is clear. What is absent is a resolve by the national government to push the program consistently as other countries such Thailand, Indonesia and Viet Nam, have done. The environment has long been ripe, but the national government has refused to respond positively to this consistent and well-expressed demand.

3. **Empirical Overview of the Relationships of Family Size, Poverty and Vulnerability to Poverty**

3.1 Poverty Incidence, Gap and Severity and Family Size

The easiest and perhaps most obvious way to demonstrate the relationship of poverty to family size is to show the extent of poverty incidence by family size. Table 1 shows the incidence of poverty by family size over the last 25 years using the Family Income and Expenditure Survey (FIES) and official poverty lines. Clearly, the incidence of poverty

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[3] USAID, the primary donor of contraceptive supplies, has recently indicated to the government that it will phase out its provision of contraceptive supplies.

rises along with family size. For instance, in 1985 the poverty incidence for a four-member household was 36.4 while it was 59.9 for a 9 or more-member household. Hardly surprising, twenty-five years later in 2000, the incidence of poverty for a 4-member household was 23.8, while the corresponding incidence for a 9 or more-member household was 57.3. This relationship has not changed over the last 25 years. If at all, the difference in poverty incidence has widened.

The picture is virtually duplicated when one looks at poverty gap and severity by family size. The average proportionate distance between the poverty line and the average income of the poor (the poverty gap) doubles as one moves from a 4-member household to a 9 or more-member household. This has even worsened over the years. In 1985 the gap was 10% and 23% for a 4-member and 9 or more-member household, respectively, or about twice as large for the latter (Table 1). By 2000 the relative proportions were 6% and 22%, respectively, or more than three times as large. The square of this gap, which is a well-accepted measure of the severity of poverty because it places greater weight on those furthest from the poverty line, tells an identical story.

All of these indicators thus show that no matter what measure one uses, there is a clear indication that poverty worsens as one moves from smaller to bigger family size households.

Table 1. Poverty Incidence, Gap and Severity by Family Size, 1985–2000

Family Size	1985	1988	1991	1994	1997	2000
Incidence						
National	*44.2*	*40.2*	*39.9*	*35.5*	*31.8*	*33.7*
1	19.0	12.8	12.7	14.9	9.8	9.8
2	20.0	18.4	21.8	19.0	14.3	15.7
3	26.6	23.2	22.9	20.7	17.8	18.6
4	36.4	31.6	30.1	25.3	23.7	23.8
5	42.9	38.9	38.3	31.8	30.4	31.1
6	48.8	45.9	46.3	40.8	38.2	40.5
7	55.3	54.0	52.3	47.1	45.3	48.7
8	59.8	57.2	59.2	55.3	50.0	54.9
9 or more	59.9	59.0	60.0	56.6	52.6	57.3
Gap						
National	*14.7*	*12.8*	*13.0*	*11.3*	*10.0*	*10.7*
1	4.6	3.4	3.1	3.5	2.2	2.2
2	4.9	4.4	5.4	4.7	3.7	3.7
3	7.0	5.8	6.3	5.3	4.4	4.6
4	10.3	8.6	8.4	6.7	6.3	6.3
5	13.1	11.6	11.6	9.3	8.8	8.9
6	16.6	14.5	15.4	12.8	12.1	13.0
7	19.8	18.7	18.7	16.3	15.7	16.7
8	22.2	20.4	22.0	20.3	18.5	20.9
9 or more	23.1	22.4	22.9	21.5	20.2	22.1
Severity						
National	*6.6*	*5.5*	*5.8*	*5.0*	*4.3*	*4.6*
1	1.8	1.2	1.2	1.4	0.8	0.7
2	1.8	1.6	2.1	1.7	1.4	1.3
3	2.7	2.1	2.5	2.0	1.6	1.6
4	4.1	3.3	3.4	2.5	2.4	2.4
5	5.6	4.7	4.8	3.8	3.5	3.5
6	7.6	6.2	6.9	5.5	5.2	5.5
7	9.4	8.5	8.7	7.5	7.1	7.6
8	10.7	9.5	10.7	9.8	8.8	10.1
9 or more	11.4	10.8	11.2	10.5	9.9	10.9

Source: Author's calculation using NSO Family Income and Expenditure Surveys

It is also informative to note the very similar results obtained by looking at the vulnerability of households to poverty depending on family size.

3.2 Vulnerability to Poverty and Family Size

Observing the poverty status of households experiencing economic shocks can reveal the relationship of vulnerability to poverty and family size. Reyes (2002) uses a panel data constructed from the 1997 FIES and the 1998 and 1999 Annual Poverty Indicator Surveys (APIS) to study the movement of households in and out of poverty. These surveys were performed immediately after the Asian Financial Crisis in 1997. Table 2 shows the poverty status of households across the three surveys. "P" means "poor," while "N" means "non-poor." Thus, "PPP" means always poor throughout the three years while "NNN" means always non-poor throughout the three years. What one readily observes as one moves from always non-poor to the always-poor categories over the three years is that family size increases. Families that are always poor over the three-year period have an average of size of 6.1 while those that are always non-poor have a size of 4.6. This clearly indicates that the vulnerability to poverty increases with family size.[4]

Table 2. Vulnerability to Poverty and Family Size, 1997–1999

Poverty Group (1997-1999)	Mean Family Size	Prop. Of Families (Unweighted)
PPP	6.1	21.7
PPN	5.1	3.7
PNP	5.4	3.2
NPP	5.4	8.7
PNN	4.8	2.7
NNP	5.1	7.1
NPN	4.6	6.4
NNN	4.6	46.4
Philippines	5.0	100

P-Poor; N-Non-Poor
Sources of Basic Data: Run from the matched
Public Use Files of the 1997 Family Income and
Expenditures Survey, and the 1998 and 1999
Annual Poverty Indicators Surveys.
Source: Reyes (2002)

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[4] There are recent studies that relate specific measures of vulnerability to household characteristics (e.g. Ligon and Schechter, 2003). This study has applied a well-defined vulnerability measure to food consumption using 12-month Bulgarian data. It finds that large family size significantly contributes to the vulnerability of households.

While it is very clear from the foregoing that family size has a positive relationship to poverty incidence as well as vulnerability to poverty, the usefulness of these measures for policy is limited unless one gains a better understanding of the mechanisms behind the connection. It is hypothesized that the main mechanisms operating between family size and poverty and vulnerability to poverty are savings, the labor supply and earnings of parents and investment in the education of children. The first two are known to be the primary engines for the consumption smoothing of households. The last one is the main avenue for securing the future consumption of children and also of parents in their old age.

The rest of the paper examines the role of family size in these mechanisms.

4.   Evidence from Cross-tabulation Analyses

This section shows that simple cross-tabulations can provide useful information on the relationship between family size and different indicators of family welfare.

Table 3 shows mean per capita income, per capita expenditure and savings of households by size of household. It shows clearly that households are not able to maintain the level of these indicators as household size increases. The mean per capita income declines from 18,429 for a four-member household to 8,935 for a 9 or more-member household. Mean consumption per capita also declines from 15,480 to 7,699 from a four-member to a 9 or more-member household. Finally, the mean savings per capita declines from 2,950 for a four-member household to 1,236 for a 9 or more-member household.

Table 3. Mean Per Capita Income, Expenditure and Savings by Family Size, 2002

Family Size	Mean per capita income	Mean per capita expenditures	Mean per capita savings
1	39,658	33,885	5,773
2	25,712	20,858	4,854
3	21,342	18,307	3,035
4	18,429	15,480	2,950
5	15,227	13,159	2,068
6	12,787	11,416	1,371
7	11,147	9,341	1,806
8	9,259	8,168	1,091
9 or more	8,935	7,699	1,236
Total	14,280	12,252	2,028

Source of basic data: 2002 APIS, NSO

Looking at changes in human capital expenditures, actual school attendance and incidence of child labor as family size increase provides even more revealing information. Not only does expenditure per student decline, but actual school attendance declines and child labor increases as household size increases.

Table 4 shows that as household size increases, the education expenditure per student declines. In addition, the expenditure per sick or injured member, as well as the health expenditure per capita, declines as household size increases. For a four-member household, education expenditure per student is 1,787 while for a nine or more-member household it is 682. Expenditure per sick member also declines from 1,464 for a four-member household to 756 for a nine-member household. Finally, health expenditure per capita declines from 438 for a four-member household to 150 for a nine or more-member household. Since expenditure per member is a good measure of the extent of investment, these figures reveal that families are spreading resources more thinly as family size increases. This has obvious deleterious effects on human capital outcomes.

Table 4. Education and Health Expenditure by Family Size, 2002

Family Size	Mean education expenditure per student	Mean health expenditure per injured/sick member	Mean health expenditure per capita
1	5,558	2,437	1,700
2	3,135	1,969	922
3	2,243	2,124	802
4	1,787	1,464	438
5	1,558	1,454	336
6	1,090	1,311	299
7	858	940	206
8	1,081	744	166
9 or more	682	756	150
Total	1,369	1,400	466

Source of basic data: 2002 APIS, NSO

Going beyond the education expenditure to actual school attendance by household size provides similar revelations, albeit in a more subdued manner. The absence of drastic changes is easily explained by the well-known attitude of Filipino parents to always keep their children in school as long as possible.[5] This is the main explanation for the relatively high attendance rates one finds in the Philippines

[5] De Dios and Associates (1993) succinctly describe this Filipino trait with the following statement: "Makapagpatapos (to let as son/daughter graduate) is still the standard by which successful parenting is measured; the stereotype of good parents, bordering caricature, is still those who scrimp and save to send their children to school and to college."

considering its per capita income. In addition, in looking at the attendance table (Table 5) one must consider the fact that smaller households may also include young starting-out families with no school-age children or older families where the children are no longer living at home. This partly explains the increasing attendance when household size moves from one to about 4 or 5 members.[6] With these considerations in mind, one can see that in a four-member household, 67.9% of the school-age members between the ages of 6 and 24 attend school while in a nine or more-member household the proportion is 65.6% (Table 5). Similar patterns are also obtained if one examines the school attendance in the different age groups corresponding to the elementary, secondary and college levels.

Combining this information with that in the previous table reveals that even though a lesser number of students attend school as family size increases, the expenditure per student is still not maintained as family size grows. This reveals the kind of difficulties large households face in trying to keep their children in school, following a revered Filipino tradition.

Table 5. Proportion Attending School by Age Group, 2002

Family Size	Total (6-24)	Age group 6-12	Age group 13-16	Age group 17-24
1	35.9		73.4	34.6
2	49.5	95.5	84.3	26.4
3	57.5	96.5	84.4	29.0
4	67.9	95.9	88.0	32.9
5	72.6	95.5	88.3	35.9
6	72.6	94.2	88.5	35.4
7	71.1	93.8	84.2	32.9
8	68.2	92.9	81.5	28.2
9 or more	65.6	91.3	80.4	28.5
Total	69.0	94.1	85.3	32.2

Source of basic data: APIS 2002

Finally, the incidence of child labor by size of household also generates revealing information. The proportion of working children under 15 years old rises with family size (Table 6). For a family of four, only 3.3% of children under the age of 15 are working while 4.6% are working in a family of nine-or more. This pattern is, of course, repeated in the 5–9 and 10–14 age groups. This partly explains the decline in school attendance in the previous table as family size increase. Of course, it can be

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[6] This inherent weakness of cross-tabulation analysis will be dealt with in multivariate analysis that allows one to control for these mentioned factors. The results are presented in a subsequent section.

argued that students can still attend school even when working. But this can only be done at the expense of leisure or more frequent absences from classes. Both have negative effects on the welfare of the child.

Table 6. Proportion of Children under 15 Who Are Working by Family Size, 2002

Family Size	Working	Age group		
		5-9	10-12	13-14
2	7.2	0.0	47.0	53.1
3	3.2	2.6	38.4	58.9
4	3.3	4.9	45.2	49.9
5	3.2	5.5	42.3	52.2
6	3.3	6.0	49.2	44.8
7	4.2	6.7	41.4	51.9
8	4.0	4.5	36.6	59.0
9 or more	4.6	10.1	38.1	51.8
Total	3.7	6.4	42.0	51.7

Source of basic data: APIS 2002

Cross-tabulation analyses, of course, suffer from the inability to control for other variables that are known to affect the relationship of family size and the various indicators of family welfare. We therefore turn to multivariate analyses in the next section.

5. Evidence from Multivariate Analyses

5.1 Methodology

5.1.1 The Generic Model

The estimation results discussed in the subsequent part of the paper employ a generic model of the form

$$(1) \quad y = \alpha_1 n + X\alpha_2 + \varepsilon$$

The dependent variable of interest y is a function of the number of children n and a host of other individual, household and oftentimes also community variables X. The parameters to be estimated are α and β, and the error term ε is assumed to have the usual convenient properties. The implied subscripts are omitted for clarity. The essential characteristic of this generic model is that n is endogenous and explained by a function, so that

$$(2) \quad n = \beta_1 z + X\beta_3 + \mu$$
$$(3) \quad \mu = \rho\varepsilon + \eta$$

The basic motivations for an endogenous n are the quantity-quality hypothesis (Becker and Lewis 1973), and the fact that children are a form of old-age security (Neher 1971). The quantity-quality hypothesis argues that there is a trade-off between the number and quality (usually expressed in terms of human capital investment) of children, i.e., the number of children is chosen with a given quality in the parent's mind. The variable z is often called the instrument to identify n in the y equation. The error term μ is then correlated with ε as in (3). Given (2), if y is estimated by OLS or some LDV estimation technique, the estimate would be biased if the dependent variable of interest is discrete. One needs to use an instrumental variable (IV) estimation with two-stage LDV estimation techniques to generate consistent estimates. The problem is that it is not easy to find an appropriate instrument z for n that is not included in X. This is the problem we turn to in the next section.

To provide estimates for the responses of the different socioeconomic classes, the number of children variable was interacted with per capita income quintiles.

5.1.2   Balanced Sex-Mix as an Instrument

There are few instruments available for the number children in household models. Most of the likely candidates, such as household income, education of the parents or age of marriage are also related to the dependent variables of interest such as labor force participation of parents, and savings or education of children, rendering them inappropriate. Recent research using US data such as Angrist and Evans (1998) has used the hypothesis that families prefer to have a balanced sex mix of children as an instrument for the number of children. The Philippines is one of the countries in Asia where a balanced sex-mix is found to be prevalent, in contrast to countries in South and Eastern Asia where indications for son preference are often found (Wongboonsin and Ruffolo, 1995). Preliminary work confirming a preference for a balanced sex-mix in the Philippines is found in Stinner and Mader (1975). The other instruments that are available are limited by their applicability to very specific circumstances. The occurrence of twins has also been used as an instrument, again using US data first in Rosenzweig and Wolpin (1980) and in subsequent studies such as Angrist and Evan (1998). A much more recent application was for Romania (Glick, Marini and Sahn, 2005). Son-preference in the Republic of Korea was also used as an instrument for fertility, for instance in Lee (2004). Finally, another instrument would be an exogenous policy change that could affect child bearing. Quian (2004), for instance, use the relaxation of the one-child policy in the People's Republic of China, which allows rural households to have another child if the first is a girl. Viitanen (2003), on the other hand, uses the large-scale distribution of vouchers for privately provided childcare in Finland.

In the case of the balanced sex-mix hypothesis, the fact that families do not have control over the sex of their children makes the same sex for the first two children a virtually 50–50 assignment. As argued in Angrist and Evans (1998) using same sex for the first two children as an instrument allows a causal interpretation. It should be noted, however, that the downside of this instrument is that it renders families with fewer than two children unusable for analysis. While this may be a serious problem in low fertility areas, it may not be so in the case of the Philippines where the average number of children per family exceeds four.

To check the validity of this instrument, Table 7 provides a cross tabulation of the average proportion of families that have additional children and the average number of number of children by sex of the first two children for 24,000 families that have two or more children using the APIS 2002 dataset. The table shows that 67.4% of families that had one male and one female as their first two children had another child, while 71.8% whose first two children were of the same sex had another child. This is a difference of more than 4%. In terms of average number of children, it represents 3.49 as against 3.61 or an average difference of a little over 0.12 children. These average differences are statistically significant under conventional levels. Comparing this with Table 3 and 5 in Angrist and Evans (1998) one can observe several differences. The difference in the proportion of families having a third child between the two groups of families is smaller and the standard error is larger. In the case of the difference in the average number of children, the difference is larger but so is the standard error. This is not unexpected given the larger family size in the Philippines than in the US and the expected larger dispersion of the distribution. Consequently, the implied t statistics in Table 7 are not as large as those in Angrist and Evans (1998) indicating that the discrimination generated from the same-sex instrument may not be as strong as that obtained using US data.

Table 7. Proportion of Families That Had a Third Child and Average Number of Children by Sex of First Two Children

Sex of first two children	Proportion having a third child		Number of children		Proportion to sample
	Mean	SE	Mean	SE	
(1) One male, one female	0.6740	0.0042	3.4850	0.0315	0.491
(2) Both male	0.7179	0.0052	3.6452	0.0420	0.302
(3) Both female	0.7180	0.0063	3.5575	0.0495	0.207
(4) Same sex	0.7179	0.0040	3.6095	0.0320	0.509
Difference (4)-(1)	0.0439	0.0058	0.1245	0.0449	

Source of basic data: National Statistics Office, Annual Poverty Indicators Survey, 2002

5.1.3 Data Sources

The data on most individual and household characteristics and location characteristics were taken from the 2002 Annual Poverty Indicator Survey (APIS). The APIS is a rider survey to the July round of the quarterly Labor Force Survey conducted by the National Statistics Office (NSO). The 2002 APIS is the third of the series conducted by the NSO. The other two were conducted in 1998 and 1999. It provides basic demographic information on all members of households as well as household amenities. Income and expenditure data for the past six months are also gathered.

All monetary values such as income and savings are deflated using provincial consumer price indices compiled by the Price Division of the NSO. This is done to control for inter-provincial price variability.

Barangay and municipal-level data from the 2000 Census of Population and Housing are also used to provide measures of investment opportunities, availability of financial institutions and school facilities. It is therefore assumed that there is not much difference in the structure of distribution of the facilities in 2000 and in 2002 or that whatever changes happened did not upset the distribution of the availability of facilities. These barangay and municipal data set were aggregated at the domain level of the APIS and attached to the APIS data set using domain identification variables.

5.2 Number of Children and their Education

The impact of additional children on education received by children was estimated by using the proportion of school-age children 6 to 24 years old to the number of children in the household. Estimates for the different age groups corresponding to the three education levels—elementary (6–12), secondary (13–16) and tertiary (17–24)—were also made to provide indications of the differential impacts.

The estimate given in Orbeta (2005a) shows that each additional child reduces the proportion of school-age children attending school. The estimated impact of each additional child on the total school-age population from the ages of 6–24 is –19% of current attendance rates (Table 8). The impact for the elementary age group is not significant. However, the estimated impacts for the secondary and tertiary levels are –26% and –57%, respectively. By socioeconomic class, the impact exhibits a regressive effect, having a larger impact on poorer households. For instance, for the 6-24 age group, the impact is –24% for the poorest quintile and –16% for the richest quintile. In the secondary age group, the figure is –29% for the poorest quintile and –17% for the richest quintile. Finally, for the tertiary age group, it is –77% for the poorest age group and –22% for the richest quintile.

Table 8. Impact on Proportion of Enrollment of Children by Per Capita Income Quintile, %

| | Age Groups | | | |
	6–24	6–12	13–16	17–24
Average	–19.3	ns	–25.6	–57.4
Poorest	–23.6	ns	–29.1	–76.7
Lower middle	–15.5	ns	–16.0	–41.9
Middle	–16.0	ns	–16.5	–37.5
Upper middle	–16.0	ns	–16.5	–28.3
Richest	–16.1	ns	–17.1	–22.2
Current Attendance	73.7	94.2	96.7	38.6

ns - not statistically significant
Source: Orbeta (2005a)

The preceding discussion leads to several important conclusions. First, the impact of additional children on school attendance is negative. Second, the impact is regressive, having a bigger negative impact on poorer households than on richer households. Third, the regressiveness intensifies as one goes up the levels of the education ladder.

5.3 Children and the Labor Supply and Wage Income of Parents

The impact of additional children on the labor supply of parents and their wage income has been estimated. A distinction is drawn between all types of work and paid work for the mothers. For fathers, this distinction is not made.

The estimates in Orbeta (2005b) show that the labor force participation of the mother declines by –1.68% per additional child (Table 9). This effect rises to –2.13% when considering only paid work. Another noteworthy result is that the presence of children below the normal school age of 6 years results in a –7.2% decline for all types of work and –5.7% for paid work by mothers. The estimates for fathers show insignificant results.

Table 9. Impact on Labor Force Participation (LFP) of Mothers and Fathers by Per Capita Income Quintile as % of Recorded LFP

| | Mother | | Father |
	All types	Paid	All types
Average	–1.68	–2.13	0.00 *
Poorest	–2.12 *	–5.68	0.00 *
Lower middle	–2.12 *	–2.43	0.33
Middle	–2.12	–1.26	0.60
Upper middle	0.69	2.45	0.43
Richest	6.68	8.52	1.16
Average labor force part. rate, %	54.51	34.89	90.41

* insignificant, assumed same as base case
Source: Orbeta (2005b)

The estimates using the interaction between the number of children and the per capita income quintile show that the impact on mothers in the bottom quintile is higher than the average; –2.12% for all types of work and –5.68% for paid work. The impact on mothers in the higher income groups, interestingly, becomes less negative for the lower middle and middle-income quintiles and becomes positive for the top two classes. This positive effect for higher income groups may mean that mothers are not affected by the presence of children. This may mean that in richer income groups, families are perhaps able to pay for child care and still contribute to household income.

In the case of fathers, while the average effect is not significant, a non-significant effect is only found in the poorest income class. From the lower middle up to

the richest income classes, the impact is positive although not as large as that obtained for mothers. This may be explained by the already high labor force participation rate. It would have been interesting to examine the impact on labor hours, but unfortunately, the data does not contain this information.

Turning to the impact on wage income, each additional child is estimated to reduce mothers' average earnings by 1,010 pesos (deflated with 1994=100) (Table 10). This represents an approximate 5% decline from a six-month[7] average wage income of 20,200. The impact on the wage income of fathers is 233 (deflated with 1994 =100). This is about 1.1% of the six-month average wage income of 21,900.

Table 10. Impact on Wage Income of Mothers and Fathers by Per Capita Income Quintile

	Mothers		Fathers	
	As % of inc.	Abs. value*	As % of inc.	Abs. value*
Average	–5.0	–1,010	1.1	233
Poorest	–12.7	–659	–6.0	–76
Lower middle	–6.8	–598	5.1	93
Middle	2.1	360	12.5	394
Upper middle	15.4	6,200	18.7	1,762
Richest	33.3	25,736	35.4	12,538
Average wage inc. (000)*		20.2		21.9

* Deflated (1994=100)
Source: Orbeta (2005b)

The impact across income class shows that the negative impact on the earnings of mothers is for the bottom two quintiles. It amounts to –13% for the poorest quintile and –7% for the lower middle quintile. The impact on the higher income quintile is positive at 2%, 15% and 33% for the middle, upper middle and the richest quintile, respectively. In the case of fathers, the positive impact is only for the top four quintiles as the impact of the poorest quintile is still negative (–6%). The impact on the higher income classes is 5%, 12%, 19% and 35% for the lower middle, middle, upper middle and richest quintiles, respectively.

From the foregoing discussions, we can draw the following conclusions. First, the impact of additional children on the labor force participation of mothers is negative, on the average, with a higher impact on wage employment compared to all types of work, while for the fathers it is insignificant. Second, the impact on labor force participation of additional children is regressive, with a negative impact on the poorer households and a positive one on the top two quintiles. Third, the impact of additional children on wage incomes substantially echoes the impact on labor force participation,

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[7] The reference period for wage income in APIS 2002 is six-months.

with the additional factor that the impact on fathers, although much more subdued than on mothers, is positive and significant. It should also be pointed out that while the average impact on the wage income of fathers is small and positive, for the poorest quintile it is still negative.

5.4 Children and Household Savings

The impact of children on saving was estimated using two measures of savings, namely: (a) the average savings rates—the ratio of savings to disposable income; and (b) savings levels. There are, in turn, two savings definitions of savings used: (i) income minus expenditures (definition 1) and, (ii) the figure obtained in (i), with expenditures on durable furniture, education and health which have benefits over the longer term added back (definition 2).

The estimates in Orbeta (2005c) shows that each additional child leads to an average reduction in savings rates of about –0.36% for definition 1 and an insignificant change for definition 2 (Table 11). While this number may look small in absolute value, it is substantial when measured relative to the recorded average savings rates. Given the average savings rate in the sample of 0.028 (definition 1) this estimate represents a reduction of about –13%.

Table 11. Impact of Children on Savings Rate and Levels

	Rate				Levels			
	Def 1		Def 2		Def 1		Def 2	
	coeff.	in %	coeff.	in %	coeff.	in %	coeff.	in %
Average	–0.36	–12.96	ns	ns	–254	–3.28	–309	–2.74
Poorest	–2.76	–13.90	–2.97	–18.22	ns	ns	ns	ns
Lower middle	0.87	41.12	0.97	32.42	–594	–433.35	–592	–61.13
Middle	2.91	48.97	3.21	27.50	–1,538	–63.16	–1,445	–32.63
Upper middle	4.82	36.96	5.55	27.24	–3,458	–43.52	–3,044	–25.28
Richest	6.27	27.07	7.68	23.53	–9,114	–23.86	–7,279	–14.46
Means	0.028		0.091		7,742		10,854	

ns - not significant
Source: Orbeta (2005c)

The impact across income classes shows that there is only a negative impact for the bottom per capita income quintile. In addition, the negative impact is larger on the poorest quintile, at about –3% for both definitions; in terms of proportion to the recorded savings rate it is –14% for definition 1 and –18% for definition 2. For the rest of the income classes the impact is positive, indicating that children increase the household savings rates at an increasing rate as one goes up the income classes. The pattern of the percentage change declines, because the rates of savings rise faster with the income classes.

Turning to the total household savings, each additional child is expected to cause a reduction of –254 (definition 1) or –309 (definition 2) in 1994[8] pesos. This would mean a –3.3% and –2.7% reduction, respectively, with the recorded average savings levels of 7,742 and 10,854 under the two savings definitions.

The impact across income classes shows that it is negative for all except for the poorest quintile, where it is not significant. The impact for the lower middle quintile is –594, and the figure rises to –9,114 for the richest quintile per additional child under definition 1. A similar pattern is seen for the impact using definition two, although at slightly smaller magnitudes. Again, in percentage terms the negative impact declines because of the higher levels of savings as one goes up the income classes.

These results highlight the regressive impacts additional children have on the savings rates and savings levels of households, in a way that can be summarized in two statements. First, the impact on the savings rates of the bottom quintile is negative. Second, the impact on savings levels is negative, and in percentage terms is bigger among lower income households.

6.   Summary and Policy Implications

This paper set out to document the relationship between family size, poverty and vulnerability to poverty. It employed cross-tabulation analyses and buttressed these with results from careful multivariate analyses performed by the author. There are several conclusions that can be made from the evidence presented. One, there is a clear negative impact, on average, from additional children on household welfare. Two, and more importantly, these negative impacts are regressive, i.e. the negative impacts on poorer households are larger. Three, the associations between larger family size, poverty incidence and vulnerability to poverty are strong and enduring.

The multivariate analyses show that additional children, on average, lead to a substantial decline in household savings rates and levels, reduce the work participation and wage income of mothers, have no impact on the labor force participation of fathers, and reduce the proportion of school-age children attending school. These estimates were achieved after carefully controlling for the usual individual, household and community factors that are known to affect these relationships. Estimates on the differential impact of additional children across income classes were also provided. These estimates show the regressive effect of additional children on household welfare. Additional children have large negative impacts on school attendance by all school-age children and the regressiveness rises along with schooling levels. Additional children have a negative impact on the labor force participation of mothers from the bottom three quintiles and have a positive effect only for the top two quintiles. They have no effect on the labor force participation of fathers from the poorest quintiles, but have a small positive effect only for the upper four quintiles. They have negative effects on the earnings of mothers from the bottom two quintiles and have positive effects only for the upper three quintiles. They have a negative impact on the earnings of fathers from the poorest quintile and a positive effect only for the upper four quintiles. They have a negative

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[8] To inflate to survey year (2002) pesos, use the price index value of 1.666.

effect on the savings rates of the poorest quintile and a positive effect only for the upper four quintiles. Finally, they have a negative effect on the savings levels for all households except for the poorest quintile.

Cross-tabulation evidence also shows that families are not able to maintain per capita income, per capita expenditures and per capita savings as family size increases. The tables show that families are also unable to maintain per capita expenditure on human capital as family size increases. Finally, they show that as family size increases, school attendance declines and child labor rises.

This paper also demonstrates the strong and enduring link between family size and poverty incidence and vulnerability to poverty. It shows that larger family size is associated with higher poverty incidence, gap and severity. This association is also shown to be enduring over 25 years for which family income and expenditure data is available. It has also shown that larger family size is associated with higher vulnerability to poverty.

These results have important implications for efforts at poverty reduction—the centerpiece program of many Philippine administrations though without much success (Reyes 2002). Many attribute this lack of success to low and inconsistent growth rates (e.g. Balisacan 2000). This paper adds large family size as an obvious, but not well-understood reason, not only for the low and inconsistent economic growth rates but also for direct debilitating effects on many aspects of household welfare. The results of this paper points to several implications for policy.

First, a strong population program must accompany poverty alleviation efforts. In the short run, it may be in the form of providing family planning services for those who need them. In the long run, it may include advocacy for smaller family size. The negative impact of large family size on household savings pointed out in this study has an impact both macro-economically and on households. Larger family size reduces household savings, lowering the already low national savings. This hampers investment, particularly in an environment like in the Philippines where foreign direct investment is not high. This is particularly important, since for the Philippines, growth is still the main engine for poverty reduction (e.g., Balisacan and Pernia 2003, Reyes 2002, Balisacan 2000). In addition to the macroeconomic effect, lower savings also give larger households more exposure to the adverse effects of income shortfalls compared to smaller households. Unless something can be done quickly to improve the lackluster performance and limited coverage of the Philippine social security system, reductions in family size will be important as an alternative to a formal safety net. It has also been shown that additional children hamper mothers from taking up work, preventing them from contributing to household income. In addition, it has been shown that additional children discourage fathers from taking up work. Having additional children also prevents more school-age children from attending school and leads more to enter child labor. Finally, from the perspective of development measured in terms of capabilities (Sen 1980), helping families achieve their desired family size directly increases their well being, all other things being constant (Herrin 2002). This is particularly important because it has been shown that poorer households, which are also shown here to have larger family size, have a higher unmet need for family planning (Orbeta et al. 2004).

Second, there is a limit to what employment generation programs, even when they can be implemented, can do for large families. Additional children, as the results of this study show, hinder mothers from taking on employment, particularly, paid employment. In addition, the study does not show that additional children encourage fathers to take on more work except for those from higher income households.

Third, there is a need to stop the implied intergenerational transmission of poverty indicated by the negative impact of the number of children on school attendance. There is perhaps room for education subsidies directed at large families. Education has long been acknowledged as a potent means for moving out of poverty and more recently has also been found to be important in reducing vulnerability to poverty (e.g. Laigon and Schechter 2003). This study shows that larger family size prevents school-age children from attending school and leads them to go to work instead. While it can be argued that child labor may help finance education (e.g., Suryahadi, Priyambada and, Sumarto 2005), it has not been shown that this does not hamper a student's performance in school or reduce a child's leisure—both causing a reduction in his or her well being. In addition, since school performance is a good determinant of retention, working children may not in the end stay long in school. The design of the subsidies should, of course, consider their potential behavioral effects, i.e. encouraging families to have more children. Considerations, such as giving subsidies to families with completed family sizes or to those who effectively promise to stop bearing any more children, should be included in the design.

Fourth, targeting poor households also means targeting large households and vice-versa. In addition, considering the regressiveness of the impact of additional children, there will be larger impacts from targeting poorer or larger households.

References

Alonzo et al. (2004) "Population and Poverty: The Real Score," UP School of Economics Discussion Paper 0415.

Angrist, J. and W. Evans (1998) "Children and Their Parents' Labor Supply: Evidence from Exogenous Variation in Family Size," *American Economic Review* 88(3), 450-477.

Becker, G. and Lewis (1973) "On the Interaction between the Quantity and Quality of Children," *Journal of Political Economy*, 81(2), S279-S288.

Balisacan, A. and E. Pernia (2003) "Probing Beneath Cross-national Averages: Poverty, Inequality and Growth in the Philippines," ADB ERD Working Paper Series No. 7.

Balisacan, A. (2000) "Growth, Redistribution and Poverty: Is the Philippines an Exception to the Standard Asian Story?" *Journal of Asia Pacific Economy*, 5 (1&2), 125-140.

Behrman, J. (1990) Human Resource Led Development? 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*, Vol. 12, No. 2.

De Dios and Associates (1993). Poverty, Growth and the Fiscal Crisis. Philippine Institute for Development Studies and International Development Research Center.

Dercon, S. (2005) "Vulnerability: A Micro Perspective," Paper presented at the Annual Conference on Development Economics, May 23-24, Amsterdam, The Netherlands.

Glick, P., A. Marini and D. Sahn (2005) "Estimating the Consequences of Changes in Fertility on Child Health and Education in Romania: An Analysis Using Twins Data," Cornell Food and Nutrition Policy Program WP 183.

Herrin, A. (2002) "Population Policy in the Philippines: 1969-2002," PIDS Discussion Paper No. 2002-08.

Imbens, G. (1994) and J. Angrist (1994) "Identification and Estimation of Local Average Treatment Effects," *Econometrica*, 62(2), 467-476.

Ligon, E. and L. Schechter (2003) "Measuring Vulnerability," *Economic Journal* 113 (March) C95-C102.

Lee, J. (2004) "Sibling Size and Investment in Children's Education: An Asian Instrument," IZA Discussion Paper No. 1323. Institute for the Study of Labor (IZA).

Manning, C. "Labor Markets in the ASEAN-4 and the NIEs," *Asian Pacific Economic Literature* 13, May 1999: 50-68

Neher, P (1971) "Peasants, Procreation, and Pension," *American Economic Review*, 61(3), 380-389.

Orbeta, A. (2004) "LGUs Need Strong National Leadership in Population Management," PIDS Policy Note 2004-12.

Orbeta, A., (2004) "Population and Poverty at the Household Level: Revisiting the links using household surveys," Presentation at the ICPD+10 National Conference, Heritage Hotel, Manila. October

Orbeta, A. (2005a) "Number of Children and Their Education in Philippine Households" ADB Institute Discussion Paper No.31, available at www.adbi.org

Orbeta, A. (2005b) "Children and the Labor Force Participation and Earnings of Parents in the Philippines," ADB Institute Discussion Paper No.30, available at www.adbi.org

Orbeta, A. (2005b) "Children and Household Savings in the Philippines," mimeo ADBI

Quian, N. (2004) "Quantity-Quality and the One Child Policy: The Positive Effect of Family Size on School Enrollment in China," http://econ-www.mit.edu/graduate/candidates/download_res.php?id=130

Reyes, C. (2002) "The Poverty Fight: Have We Made and Impact," PIDS DP 2002-20.

Rosenzweig, M and K. Wolpin (1980) "Testing the Quantity-Quality Fertility Model: The Use of Twins as a Natural Experiment," *Econometrica*, 48(1), 227-240.

Schelzig, K. (2005). Poverty in the Philippines: Income, Assets, and Access. Asian Development Bank.

Sen, A. (1980) "The Concept of Development," in H. Chenery and T. N. Srinivasan (eds.) *Handbook of Development Economics*. Vol 1, 9-26.

Stinner, W. and P. Mader (1975) "Sons, Daughters or Both? An Analysis of Family Sex Composition Preferences in the Philippines," *Demography*, 12(1), 67-79.

Suryahadi, A. A. Priyambada and S. Sumarto (2005) "Poverty, School and Work: Children during the Economic Crisis in Indonesia," Paper presented at the Global Conference on Education Research in Developing and Transition Countries, 31 March – 2 April, Prague, Czech Republic

Viitanen, T. (2003) "Children and Their Mothers' Labor Supply: Evidence for a Large-Scale Policy Change in Finland," Paper presented at the Annual Conference of the European Society for Population Economics, New York, June 2003.

Wongboonsin, K. and V. P. Ruffolo (1995) "Sex Preference for Children in Thailand and Some Other South-East Asian Countries" *Asia-Pacific Population Journal*, 10(3), 43-62