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Socio-Economic and Proximate Determinants of Fertility in the Philippines

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Abstract: This paper provides an analysis of the socio-economic and proximate determinants of fertility in the Philippines, using the 2008 National Demographic and Health Survey (NDHS) data. Fertility differentials by ethnic group, place of residence, educational attainment, women's work and family wealth are largely due to compositional differences in age and age at marriage. Besides age at marriage, contraceptive use also plays an important role in explaining the fertility differentials. The wealth index emerges as the most important predictor of fertility in the multivariate context. Women from the poorest quintile have almost twice as many children as those from the richest quintile (4.0 versus 2.2). Younger age at first marriage/birth and limited use of modern contraception are the main reasons for the higher fertility among the poor. About one in three poorest women had unmet family planning need. The social and reproductive disadvantages associated with frequent and unplanned pregnancies are of public health concern.

Key words: Philippines · Children · Fertility · Socio-economic · Education · Wealth

INTRODUCTION

The rate of population growth in the Philippines is among the highest in Southeast Asia, due to its relatively high level of fertility. Between 1990 and 2012, the total population of the Philippines increased from 61.9 million to 96.7 million, at a rate of about 2 per cent per annum. Currently, about half of the population lives in the urban areas. The combined gross enrolment ratio in the Philippines is about 106 per cent, 85 per cent and 28 per cent respectively for primary, secondary and tertiary education. The health status of Filipino has seen significant improvement and life expectancy has gone up from about 58 years in 1960 to about 68 years today [1].

The total fertility rate (TFR) in the Philippines declined from more than seven births per woman in the 1960 to 3.1 in 2011 [1]. Between 1970 and 2001, the fertility level declined by 37 per cent among women aged 25-29 and 74 per cent among those aged 45-49. However, childbearing among teenagers had increased since 1985, reversing its declining trend prior to that Demographic surveys in the Philippines found negative correlation between fertility and socio-economic variables such as urbanization, education, modern sector employment and income [2]. Wide variations in fertility can also be observed across ethnic groups. Education leads to postponement of marriage and childbearing [3-8]. The negative correlation between fertility and urbanization is also well established [4, 6, 7, 9]. Many of these socio-economic variables are inter-related and have confounding effects on fertility.

This paper analyses the gross and net effects of socio-economic variables on fertility in the multivariate context, with the aim of identifying factors that contribute to fertility differentials. The effects of contraceptive use on fertility differentials are examined by comparing the fertility level and contraceptive prevalence rate (CPR) for the different sub-groups of the population. This is followed by an examination of the fertility-inhibiting effects of the proximate determinants of fertility. The social and reproductive health implications of fertility differentials will be discussed.

MATERIALS AND METHODS

The data for this paper come from the 2008 Philippines National Demographic and Health Survey (NDHS), conducted by the National Statistical Office (NSO) of the Philippines, under the auspices of the Demographic and Health Surveys (DHS) program.

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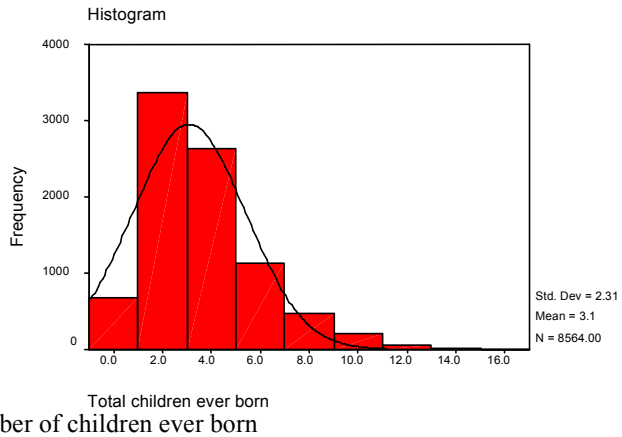

Fig. 1: Histogram of number of children ever born

The 2008 NDHS is a nationally representative survey, covering 8,564 currently married women aged 15 to 49 years, including 1,493 who were cohabitating.

The main dependent variable used in this analysis is the number of children ever born (CEB), a cohort measure of the cumulative number of children born to women as at time of the survey. The mean CEB among currently married women is 3.1 children, with a standard deviation of 2.31. The histogram of CEB shows slight deviation from normality (Figure 1). However, the skewness (0.026) and kurtosis (1.735) is within acceptable range. Hence, the data can be assumed to be normally distributed for a sample size of 200 and above [10].

Childbearing is influenced by a host of inter-related socio-economic and demographic variables [3-5, 11, 6, 7, 8]. Bivariate analysis was carried out to examine the socio-economic differentials in mean CEB. Multiple Classification Analysis (MCA) [12], a multivariate technique, is used to examine the combined and independent effects of these variables on CEB. In the MCA models, socio-economic variables were entered in the following sequence: ethnicity, place of residence, respondent's education, women's work status, husband's education and wealth index. Age and age at first marriage were entered last, as covariates.

MCA provides several useful outputs for analysis. These include the mean values for each category of the independent variables, before and after adjusting for other independent variables and covariates in the models. The Eta value shows the correlation between the categorical predictor and the ratio scale dependent variable. The Beta value indicates the relative importance of the independent variables. R^2 is the proportion of variance in the dependent variable that can be explained by the model and it shows the predictive power of the model.

Bongaarts' model is used to estimate the indices of the four main proximate determinants of fertility. Bongaarts [13, 14] postulated that the TFR of a population is a function of the total fecundity rate (TF), index of marriage (C_m), index of contraception (C_c), index of post-partum infecundability (C_i) and index of abortion (C_a), as follows:

$$TFR = C_m \times C_c \times C_i \times C_a \times TF$$

Each of the indices takes the value between 0 and 1. An index with smaller value indicates a greater fertility-inhibiting effect and an index approaches 1 represents smaller effect. The TF value was taken based on the average fecundity rate of 15.3 in the developed and developing countries [13, 14]. Given that the indices of marriage, contraception, post-partum infecundability can be computed from survey data, the index of induced abortion is estimated as a residual, as information on abortion is not readily available.

RESULTS

Bivariate Analysis: The various ethnic groups have different culture and religion which have an effect on childbearing behavior. The minority groups and Waray had the highest mean CEB at 3.6 children, followed by Bicolano (3.4), Cebuano and Ilonggo (3.0). Interestingly, the two largest ethnic groups in the Philippines, the Tagalog and Ilocano have the lowest mean CEB of 2.7 children.

In the 2008 NDHS, urban women had fewer children than their rural counterparts (2.7 versus 3.4). More detailed tabulation of the data shows that the urban-rural differential in mean number of children increases with age. This suggests that urban women were more likely than rural women to stop childbearing at younger age. At age 45-49, rural women had 1.4 children more than urban women.

Education has significant impact on reproductive behavior. The opportunity cost of childbearing is higher among higher educated women as compared to the lesser educated women and the former are also likely to use a contraceptive method as they are more informed. In this survey, tertiary educated women had only 2.3 children as compared to 4.3 children among women with primary education; and the CPR among the former is about 10 percentage points higher than the latter (about 54 per cent as against 44 per cent).

The number of CEB is also related to husband's education. The 2008 NDHS shows that women whose husbands had primary education had almost twice as many children as those whose husbands had tertiary education (4.1 versus 2.3). Non-working women had an average of 2.9 children, as compared to 2.8 among women working in the modern sector and 3.7 children among those working in the traditional sector. A number of studies showed that working women tended to have fewer children than non-working women [15, 4, 11, 7]. The contradictory finding from this analysis can be explained by the "quality-quantity tradeoff" [16, 17], as more children are desired to provide old age financial support in the traditional sector.

Costello and Casterline [17] found that households with higher income tended to have lower demand for children. In the present analysis, the number of CEB ranges from 2.2 among the richest to 4.0 among the poorest. More detailed tabulation of the data indicates that women from the richest families tended to complete childbearing by age 40, as demonstrated by the same number of CEB for those aged 40-44 and 45-49. However, women from the poorest families tended to continue childbearing into the 40s. In 2008, only 26 per cent of the currently married women from the poorest households were using a modern contraceptive method, as compared to 35 per cent among those from the richest households. The former were also much more likely than the latter to have unmet need for family planning (30 per cent versus 21.7 per cent) (Table not shown).

Multivariate Analysis: Socio-economic variables are inter-related, with confounding effects on fertility. For instance, urban women generally have higher education than rural women and the number of children is negatively correlated with educational level. Hence, part of the differential in the number of children between urban and rural women could be due to their differences in educational attainment.

Ethnicity and place of residence have rather low predictive power on mean CEB. Ethnicity alone explains only 2.3 per cent of the variation in mean CEB, while including place of residence increases R^2 (the predictive power) slightly to 3.5 per cent. Adding respondent's educational level increases R^2 almost fourfold to 12.4 per cent (Model 3). Women with primary education have significantly more children than those with higher education. Controlling for respondent's education has little effect on ethnic fertility differentials, but it does narrow the urban-rural fertility differentials to only 0.2 children from 0.5 in the previous model.

The inclusion of women's work status in model 4 increases R^2 to 13.5 per cent, but it has little effect on fertility differentials by ethnicity, place of residence and respondent's educational level. Controlling for previous variables in the model, the mean CEB among those involved in the traditional sector and those working in the modern sector would be reduced to 0.3, from 0.9 at the bivariate level. Further addition of husband's education in model 5 increases R^2 to 15.2 per cent and narrows the fertility differentials according to wife's education. The independent effect of husband's education on CEB is rather small, after controlling for wife's education. Cleland [5] argued that the educational level of the mother exerts a more decisive influence on reproduction than that of the father. The inclusion of wealth index in model 6 has little effect on the predictive power. After adjusting for other socio-economic variables, the differential in mean number of CEB between women from the wealthiest and poorest families would be reduced to only 0.5, from 1.8 observed at the bivariate level.

Women's participation in higher education leads to delayed marriage, which in turn affects childbearing directly. Figure 2 shows that higher educated women entered marriage much later than lesser educated women in both urban and rural areas and rural women generally marry earlier and have more children than urban women regardless of educational level. Hence, controlling for age at marriage would have reduced the fertility differentials by education and place of residence.

In model 7, adding age as a covariate to the model increases R^2 significantly to 39.8 per cent. Further controlling for age at first marriage in model 8 increases R^2 to 51.1 per cent. Age and age at first marriage practically explain away the differentials in CEB by education and work status. This suggests that the educational differentials in CEB is almost entirely due to differences in age structure and age at marriage between

Table 1: Total fertility rate and age specific fertility rate, the Philippines, 1970, 1985, 1996 and 2001

	1970	1985	1996	2001	Percentage change 1970-2001
TFR	5.9	4.4	3.8	3.6	-39.0
15-19	56	48	50	55	-1.8
20-24	228	192	177	182	-20.2
25-29	302	229	210	190	-37.1
30-34	273	198	161	146	-46.5
35-39	200	140	106	93	-53.5
40-44	101	62	43	44	-56.4
45-49	23	15	8	6	-73.9
Mean age of childbearing	30.6	30.0	29.2	28.9	-5.6

Source: World Fertility Data 2008 [33]

Table 2: Multiple Classification Analysis on mean number of children ever born by socio-economic variables

			Adjusted Mean for Factors (and Covariates)							
Variables	n	Unadjusted Mean	M 1	M 2	M 3	M4	M5	M6	M7	M8
Ethnicity										
Tagalog	1,949	2.7	2.7	2.8	2.9	2.9	3.0	3.0	3.1	3.1
Cebuano	2,052	3.0	3.0	3.0	3.0	2.9	2.9	2.9	2.9	3.0
Ilocano	839	2.8	2.8	2.7	2.9	2.9	2.9	2.9	2.8	2.8
Ilonggo	801	3.0	3.0	3.0	3.2	3.2	3.2	3.1	3.0	3.0
Bicolano	505	3.4	3.4	3.4	3.3	3.3	3.4	3.4	3.3	3.4
Waray	342	3.6	3.6	3.6	3.5	3.4	3.4	3.4	3.4	3.3
Others	2,076	3.6	3.6	3.5	3.3	3.4	3.3	3.3	3.3	3.3
Place of residence										
Urban	3,838	2.7		2.8	3.0	3.0	3.0	3.1	3.1	3.1
Rural	4,726	3.4		3.3	3.2	3.2	3.1	3.1	3.1	3.1
Women's education										
Primary or no schooling	2,374	4.3			4.2	4.2	3.9	3.9	3.5	3.2
Secondary	3,722	2.9			2.9	2.9	2.9	2.9	3.1	3.0
Higher	2,468	2.3			2.3	2.3	2.6	2.6	2.7	3.0
Women's work status										
Not working	3,376	2.9				2.8	2.8	2.8	3.1	3.2
Modern sector	2,669	2.8				3.1	3.1	3.2	3.0	3.0
Traditional sector	2,519	3.7				3.4	3.4	3.4	3.2	3.1
Husband's education										
Primary or no schooling	2,833	4.1					3.6	3.6	3.3	3.2
Secondary	3,286	2.8					2.9	2.9	3.0	3.0
Higher	2,445	2.3					2.7	2.8	2.9	3.1
Wealth index										
Poorest	1,972	4.0						3.3	3.7	3.7
Poorer	1,856	3.4						3.2	3.4	3.4
Middle	1,728	3.0						3.1	2.9	2.9
Richer	1,609	2.6						3.0	2.8	2.8
Richest	1,399	2.2						2.8	2.4	2.5
R^2			0.023	0.035	0.124	0.135	0.152	0.155	0.398	0511

Notes: (i) M7 includes socio-economic variables and age as covariate

(ii) M8 includes socio-economic variables and age and age at first marriage as covariates

women of different educational levels, as the higher educated group tend to be younger and also marry later and hence shorter exposure to the risk of childbearing. It is noteworthy that after adding the demographic controls, non-working women have more children than those who worked in the traditional sector, a reversal of the pattern observed in the bivariate analysis. It is also interesting to note that controlling for age and age at marriage widens the differentials in CEB across the categories of wealth index from 0.5 to 1.2 children.

Table 3: Factor summary on effects of selected socio-economic variables (ethnicity, place of residence, education, work and wealth) on mean number of children ever born

		Beta Adjusted for Factors.							
Variables	Eta	M 1	M 2	M 3	M4	M5	M6	M7	M8
Ethnicity	0.150	0.150	0.130	0.088	0.091	0.081	0.076	0.080	0.069
Place of residence	0.137		0.116	0.044	0.044	0.023	0.006	0.000	0.014
Respondent's educational level	0.338			0.313	0.303	0.223	0.210	0.139	0.033
Women's work status	0.165				0.107	0.095	0.096	0.030	0.033
Husband's educational level	0.317					0.162	0.144	0.070	0.032
Wealth index	0.260						0.068	0.191	0.189
R^2		0.023	0.035	0.124	0.135	0.152	0.155	0.398	0.511

Notes: (i) M7 includes socio-economic variables and age as covariate

(ii) M8 includes socio-economic variables and age and age at first marriage as covariates

Table 4: Indices of proximate determinants, various years

	1993	1998	2003	2008
Cm	0.54	0.52	0.56	0.54
Cc	0.63	0.58	0.56	0.54
Ci	0.91	0.91	0.88	0.87
Ca	0.86	0.88	0.84	0.84

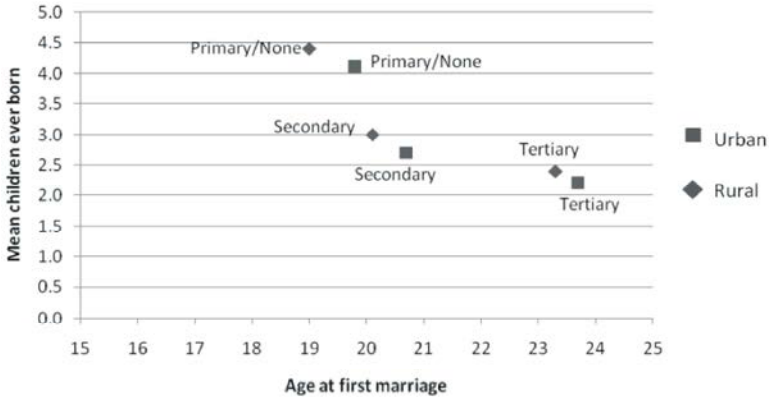

Fig. 2: Mean age at first marriage and mean number of children ever born by respondent's educational level and place of residence

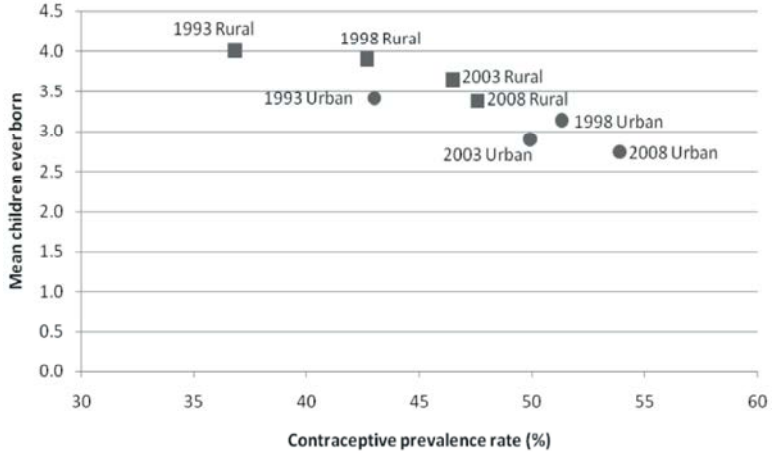

Fig. 3: Contraceptive prevalence rate and mean number of children ever born by place of residence, various years

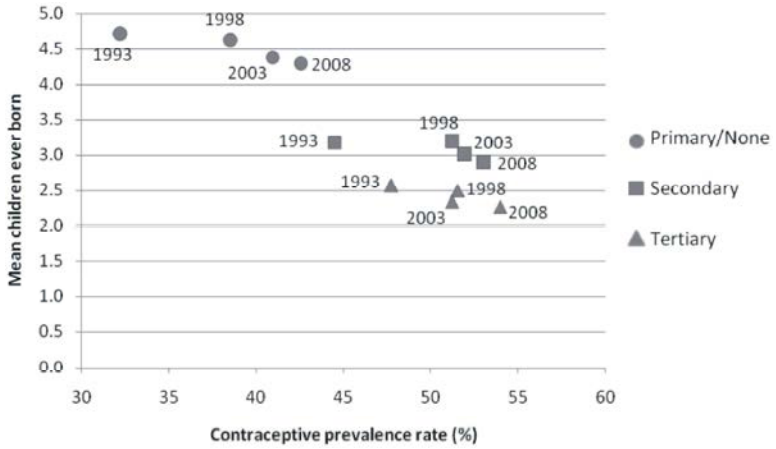

Fig. 4: Contraceptive prevalence rate and mean number of children ever born by respondent's educational level, various years

The Eta values in Table 3 show that respondent's educational level has the strongest correlation with the mean number of CEB (0.338), while place of residence the weakest (0.137). The relative importance of the independent variables, as shown by Beta, changes across the different models. Wealth index emerges as the most important factor in predicting the CEB after controlling for age and age at first marriage. The effects of education and women's work are largely explained away by age and age at marriage.

The Effects of Contraceptive Use on Fertility: Besides delayed marriage, contraceptive use has been found to be an important factor in mediating the effects of socio-economic variables on fertility [18, 18, 20, 21, 22]. Figure 3 shows that the CPR has been increasing in both urban and rural areas and CPR in the urban areas has been consistently higher than that in the rural areas. The scatter plot shows a moderately strong negative association between CPR and CEB. Clearly, the lower fertility among urban women than their rural counterparts can be attributed to their higher CPR.

Figure 4 shows that the CPR has been increasing among women with different educational levels. The DHS for the various years show that CPR was highest among the tertiary educated women and lowest among those with primary education. Higher educated women had significantly fewer children than their less educated counterparts. The educational differentials in CPR and CEB persisted over the years. Scatter plot shows a strong inverse relationship between CPR and CEB. However, there are notable exceptions to these general patterns. While the CPR among the secondary educated women had increased rather substantially between 1993 and 1998, the fertility level had remained unchanged. Another interesting observation is that the higher educated women in 2003 had lower CPR and fewer children as compared to those in 1998.

The Fertility-Inhibiting Effects of Delayed Marriage and Contraceptive Use: Socio-economic factors can influence the fertility level only through the proximate determinants. Most studies on proximate determinants found that marriage and contraceptive use are the two most important direct determinants of fertility [23-28].

We estimated the indices of proximate determinants using Bongaarts' model and the results are shown in Table 4. Based on theses indices, delayed and non-marriage has the strongest fertility-inhibiting effect in all the years under study, but contraceptive use has become just as important since 2003. In comparison, the fertility-inhibiting effects of breastfeeding and induced abortion are relatively small.

DISCUSSION

The relatively high fertility level in the Philippines can be explained by the leveling of CPR at about 50 per cent for all methods and 33 per cent for modern methods. Following the reversal of the Government's commitment to promote wider contraceptive use, due to opposition from the Catholic Church in 1986, the importance of family planning has been relegated [29]. In 2009, the family planning effort score for the Philippines stood at a low level of 29.8, as compared to 60.7 for Asia as a whole [30]. Besides the low CPR, the mean age at marriage among

Filipino women has remained at around 23 years for the past three decades. The trends in these two proximate determinants are the main reasons for the wide differentials in fertility and its slow decline.

Analysis of the 2008 NDHS data shows that CEB is inversely related to education, modern sector work and family wealth. Multivariate analysis shows that much of the effects of the socio-economic variables were attributed to age and age at marriage, except for wealth index. Jones [8] argued that women's education exerts a positive impact on female labor force participation, which in turn leads to marriage postponement. In the Philippines, age at first marriage is positively correlated with education, urbanization and modern sector employment. The most pronounced differential in age at marriage was observed between the poorest and richest quintiles, with a mean difference of more than four years.

The wealth index emerges as the most significant determinant of fertility, after controlling for other factors and age and age at marriage. Women from the poorest families tended to have the most number of children, as they gave birth at a young age and continued childbearing beyond age 40. Moreover, they were also less likely to use a contraceptive method and more likely to have unmet family planning need. The "disadvantaged" women tended to cherish large family size, with one in four reporting an ideal family size of five or more. The high fertility among the poorest segment of the population has significant implications on social welfare of the individual families and socio-economic development at the macro level. In an eight-year longitudinal study, Adair, Guilkey, Bisgrove and Gultiano [15] found that two or more additional children born significantly reduced women's earnings, while having an additional child less than two years of age reduced hours worked. The burden of supporting a large family will perpetuate the vicious cycle of poverty, as children from the poorer families are generally disadvantaged in education and upward mobility.

One of the targets of the Millennium Development Goals (MDGs) to improve maternal health is to ensure universal access to reproductive health, including family planning. Reasons given by the respondents for non-use of contraception suggest that accessibility of family planning services is not a barrier to contraceptive use even among the poorest and it is imperative that other factors must have resulted in the relatively low CPR. The underlying causes for the low usage and high unmet need would have to be further investigated for the formulation of program intervention strategies. The 2008 NDHS shows that more than one third of the women mentioned health concern or fear of side effects as reasons for not using a method. Hence, reproductive health information and education are needed to dispel some of the misconceptions in order to increase family planning practice and reduce unmet need for contraception and to enable couples to plan their families according to their financial capability.

Frequent childbearing has been found to be the cause of reproductive health risk. Hence, strategies to improve reproductive health services should include family planning to reduce maternal mortality. However, studies have shown inconsistent associations between number of births and maternal mortality [31, 32]. There is a need for more research on the linkages between frequent pregnancy and maternal deaths and poor reproductive outcome.

CONCLUSION

Socio-economic differentials in fertility are likely to persist in the Philippines and it is implausible for the country to achieve replacement level in the near future. Castello and Casterline [17] opined that replacement fertility is unlikely to be achieved in the Philippines in the next 20 years, unless a firmly-held two-child norm emerges and effective contraceptive practice becomes more widespread.

Socio-economic differentials in fertility can be explained by the differential rate of contraceptive use. More efforts are needed to redirect the family planning program to target the disadvantaged groups so that they are able to plan their families according to their financial status. In keeping with the MDGs, the goal should be to increase the CPR and reduce the unmet need for contraception.

Filipinos entered marriage and give birth at relatively young age and this may hamper their education and career advancement, as well as having adverse effects on their reproductive health. Hence, family life and reproductive health education should be introduced in schools so as to better prepare the future generation for a planned parenthood.

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