

ORIGINAL PAPERS

## Effect of Wealth on Marital Fertility in Sri Lanka

Daminda P. Weerasinghe<sup>1</sup> and Nicholas J. Parr<sup>2</sup>

<sup>1</sup>*STI Research Centre, Marian Villa, Westmead Hospital, Westmead NSW 2145, and*

<sup>2</sup>*Division of Economic and Financial Studies, Macquarie University, North Ryde, NSW 2109, Australia*

### ABSTRACT

This study examines the effect of household wealth on marital fertility in Sri Lanka. Data on type of dwelling, availability of vehicles, and electrical equipment in households were combined with estimates of 'typical' rupee values of various elements to generate an index of their wealth. Differentials in value of the wealth indices among sociodemographic subgroups of population are also described. The results of the study showed that, after controlling for other variables, higher levels of household wealth were associated with lower fertility. There were also significant effects of participation of female labour force, ethnicity, age-at-marriage, and parity on current fertility. However, after controlling for wealth and other explanatory variables, the effect of female education was not significant. If the model were to remain constant over time, raising levels of wealth would reduce marital fertility in Sri Lanka.

**Key words:** Wealth; Fertility; Education; Demographic and health surveys; Sri Lanka

### INTRODUCTION

Since the 1960s, a substantial decline in birth rate in Sri Lanka has been evident. By the mid-1980s, the total fertility rate (TFR) in Sri Lanka had declined to 2.8 children per woman—one of the lowest fertility levels in a less-developed country at that time (1). These low levels of fertility are due to late marriage and high rates of contraceptive use compared to other less-developed countries. The decline in fertility in Sri Lanka reflects both a move toward higher ages at marriage and a decline in marital fertility, with rising use of contraception being the major proximate determinant of the latter (1-3).

The importance of wealth and income as determinants of fertility has been much discussed (4-9). A recent review by Robinson asserts, "the economic model has, for the last 15 or 20 years, been the dominant model in fertility and family planning studies" (9). Despite its

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Correspondence and reprint requests should be addressed to: Mr. Daminda P. Weerasinghe  
STI Research Centre  
Marian Villa  
Westmead Hospital  
Westmead NSW 2145  
Australia  
Email: damindaw@icpmr.wsahs.nsw.gov.au

prominence as a theoretical paradigm of fertility behaviour, many studies on fertility in less-developed countries have not incorporated empirical tests of the effects of wealth on fertility. This omission probably reflects the absence of a direct measure of either income or wealth in the sets of questionnaire used by the World Fertility Survey and the Demographic and Health Survey programmes.

This study analyzed the effect of wealth on current marital fertility in Sri Lanka. In the absence of a direct measure of wealth, we constructed a partial index of wealth based on estimates of the value of the dwelling house in which a woman lives, the value of vehicles the household owns or has access to, and the value of electrical equipment in the household. A multivariate analysis was used for assessing the effect of household wealth on current marital fertility, after controlling for a range of confounding factors.

### MATERIALS AND METHODS

Data for this study were drawn from the 1987 Sri Lanka Demographic and Health Survey (SLDHS). This is the only survey conducted in Sri Lanka by the Demographic and Health Survey. From a sample of 8,119 households,

5,865 ever-married women, aged 15-49 years, who slept in the household the previous night were chosen using a multistage, stratified sampling design. The women were interviewed about their nuptiality, fertility, fertility regulation and preferences, infant and child mortality, and health (1). Due to civil disturbances at the time of the survey, the North and East provinces (Zone 8 and Zone 9), consisting of seven districts and 14% of total population at the 1981 Census were excluded from the sample (1). Due to exclusion of predominantly Tamil and Muslim areas (Zone 8 and Zone 9), Tamil and Muslim women were under-represented in the sample, while Sinhalese women were over-represented.

The dependent variable chosen for the analysis was whether a currently-married woman gave birth in 1986. In this dichotomous variable, women who gave birth during 1986 were coded as 1, and women who did not give birth as 0.

In Easterlin's studies, the demand for children was considered a function of potential household income (7,8). In the 1987 SLDHS, data on income of households were not collected. However, information on type of house and possession of various types of electrical equipment and different types of vehicles by households was collected. An index of wealth was generated using this information. The type of house was determined taking into consideration the following factors: type of floor, toilet, roof, wall-material, and availability of electricity and water facilities. The electrical equipment component was assessed by considering the availability of radio, television, and refrigerator. The vehicle component was determined by considering the availability of bicycle, motorbike, and car. For each category of each of these items, a 'typical rupee value' was estimated, based on 1986 Colombo wholesale prices computed by the Department of Census and Statistics (11) (Table 1). The rupee values of the items were summed to create a total value of items possessed. An index of wealth scaled between 0 and 100 was then created by dividing the total value of items possessed by a particular household by the maximum possible total of the typical values of these items for a household.

The level of household wealth is likely to correlate with many other variables that could affect fertility. For example, household wealth and education are likely to be positively correlated, because wealthier families are more likely to educate their children at higher levels and have their children marry highly-educated partners. Better-educated women are more likely to earn higher

**Table 1.** Estimated rupee values of components of the wealth index

Item	Estimated rupee value	Respondents (n=5,332)	
		No.	%
<b>Type of floor</b>			
Terrazzo/floor tile	50,000	30	0.6
Cement	25,000	3,066	57.5
Wood	4,000	22	0.4
Dung/mud	500	2,190	41.1
Sand	100	15	0.3
Other	50	9	0.2
<b>Type of wall</b>			
Brick/cement/stone	40,000	3,129	58.7
Wood	9,000	144	2.7
Mud	8,000	1,912	35.9
Cadjan/palmyra	2,500	120	2.3
Other	500	27	0.5
<b>Type of roof</b>			
Tile	40,000	2,316	43.4
Asbestos	30,000	506	9.5
Tin	15,000	1,041	19.5
Cadjan/palmyra/straw	2,000	1,340	25.1
Other	750	129	2.4
<b>Main source of drinking-water</b>			
Piped to residence	10,000	385	7.2
Piped to premises	7,500	130	2.4
Protected well	4,000	2,268	42.5
Tubewell/abesin pump	3,000	99	1.8
Unprotected well	2,500	1,387	26.0
Public tap	25	686	12.9
River/canal/tank/other	25	377	7.1
<b>Type of toilet</b>			
Flush	20,000	180	3.4
Water seal	8,500	2,198	41.2
Pit	3,500	1,837	34.5
Bucket	2,000	20	0.4
Other	500	101	1.9
No facilities	0	996	18.7
<b>Availability of electricity</b>			
Yes	10,000	1,263	23.7
No	0	4,069	76.3
<b>Electrical equipment</b>			
Radio	500	4,043	75.8
Television	10,000	1,039	19.5
Fridge	15,000	357	6.7
<b>Vehicles</b>			
Bicycle	2,800	2,012	37.7
Motorbike	15,000	285	5.3
Car	125,000	160	3.0
Sources: Sri Lanka demographic and health survey-1987 (1)			
Sri Lanka. Department of Census and Statistics. Statistical abstract of the Democratic Socialist Republic of Sri Lanka (10)			

incomes. Participation of women in the labour force and wealth also are likely to be correlated because earnings of a woman raise household income. Thus, multivariate analytic methods, which determine whether one variable has an effect on the dependent variable after controlling for other independent variables, are needed. For multivariate analysis, a logistic regression model was used (11-13) because of the dichotomous form of the dependent variable. Like the index of wealth, the independent variables used in analysis included: sector, ethnicity, educational attainment, participation of labour force, parity, age-at-first marriage, and current age. The first five variables were considered categorical, and the latter two were considered continuous variables.

Sector (urban, rural, or estate) was included because the differences in the level of development by sector may affect fertility. Women in rural areas may consider children an asset. Ethnicity, categorized into Sinhalese and Other, was included in analysis because different cultural and religious attitudes, for example restrictions on family-planning activities, may affect fertility. The highest level of education was included because more-educated women are more knowledgeable about family planning and are likely to prefer smaller families (14,15). Participation of a woman in the labour force will correlate with level of her wealth but may also affect her fertility. For example, women engaged in agricultural activities may consider children an asset. Moreover, non-agricultural employment requires women to be away from the household and reduces the time available to look after children. In the 1987 SLDHS, parity ranged from 0 to 13 child(ren). The effect of parity will indicate whether women with more children are more likely to restrict fertility. To prevent overlap with the response variable, the value of parity at the start of 1986 was used in analysis. Controls for age were included because fecundability and attitude to childbearing vary with age. Finally, age-at-marriage was included as an independent variable because sexual activity and tempo of childbearing may be affected by the time since marriage.

Although, in Sri Lanka, not all childbearing takes place within marriage (in the 1987 SLDHS, for 0.6% of births the date of birth was before the date of marriage and 11.3% of the births to the 1940-1947 cohort were the result of premarital conception) (16,17), nonetheless marriage remains an important determinant of childbearing. In the SLDHS, no woman was recorded to 'live together'; 3.8% were widowed, 0.3% were

divorced, and 2.9% were separated. These women were excluded from analysis, as were women who reported a date of marriage after the end of 1986. Of the 5,865 women surveyed, 5,332 who were married before 1987 and had been living with their husbands were included in analysis.

A few minor adjustments were made to the reported ages at marriage in the light of a few probable errors in the data. For 0.3% of women, the reported date of first marriage was before the date of her birth. This error was mostly detected among women aged over 40 years, and the date of first marriage was adjusted by considering the duration of marriage and the date of birth of the first child.

## RESULTS

### Differentials in wealth index

The mean value of the wealth index was 24.9, with a standard deviation of 17.1. The distribution of the wealth index was bimodal, with ranges in which values most frequently fall under 5 or from 30 to 40. The distribution had a long upper tail. Wide differentials were observed in the wealth index by sector of residence, education of a woman, and her participation in labour force. There were fairly wide differences in the value of the wealth index by age, age-at-first marriage, and parity, but the differences by ethnicity and whether a woman is using contraception were fairly small.

The highest mean index of wealth was recorded for women in the urban sector, and the lowest for the estate women. Standard deviations showed that the wealth inequality was the highest among rural women. With an increase in a woman's level of education, there was an increase in the index of wealth, i.e. women with higher education had nearly twice the average level of wealth. Women in non-agricultural occupations had much higher-than-average values for the wealth index, women in agricultural occupations being relatively poor. Wealth tends to increase with the age of the woman, the increase being pronounced below the age of 25 years and then becoming fairly slight. With the increase in age-at-first marriage, there was an increase in the wealth index, i.e. women who married at a relatively young age were considerably less wealthy than those who married at 25 years or older. The fairly rapid increase in wealth with age observed earlier, in part, would be due to the selectivity of marriage, those from wealthier families tending to marry later than those from poorer families.

Women with parity 1 to 2 recorded the highest index of wealth, while those with a parity of five or more had a noticeably lower mean value for the index of wealth (Table 2).

**Table 2.** Mean index of wealth by sector, ethnicity, education, occupation, age-at-first marriage, age, parity, and use of contraception

Variable	Mean index of wealth	Married women (n=5,332)	
		No.	%
All women	24.9	5,332	100.0
Sector			
Urban	36.5	923	17.3
Rural	23.8	3,814	71.5
Estate	19.3	595	11.1
Ethnicity			
Non-Sinhalese	24.1	866	16.2
Sinhalese	25.1	4,466	83.8
Highest level of education			
No education	15.2	635	11.9
Primary	17.9	1,589	29.8
Secondary	28.6	2,811	52.7
Higher	48.3	297	5.6
Participation in labour force			
Not working	25.3	4,244	79.6
Agricultural work	17.9	839	15.7
Non-agricultural work	42.5	249	4.7
Age-at-first marriage (years)			
<20	20.7	2,375	44.5
20-<25	26.2	1,920	36.0
25-<30	31.8	792	14.8
30-<35	34.2	209	3.9
35-<40	30.5	30	0.6
40-<45	28.5	6	0.1
Age (years)			
15-<20	19.8	222	4.2
20-<25	21.5	788	14.8
25-<30	24.4	1,066	20.0
30-<35	24.6	1,094	20.5
35-<40	26.9	1,007	18.9
40-<45	27.2	741	13.9
45+	27.3	414	7.8
Parity			
0	26.2	676	12.7
1 to 2	27.4	1,986	37.2
3 to 4	24.2	1,621	30.4
5 or more	20.6	1,049	19.7
Use of contraception			
Using	25.2	3,307	62.0
Not using	24.6	2,025	38.0

Source: Sri Lanka demographic and health survey-1987 (1)

### Differentials in fertility

In 1986, seven hundred and fifty-four babies were born to 747 women (14%). The percentage of women who gave birth was noticeably lower for women in the wealthiest section (25%), but differed little among women in the other three quartiles of the distribution of wealth index (Table 3). Interpretation of the differentials in current fertility by the value of the wealth index is complicated by the differences in the value of the index of wealth by other variables that are likely to affect fertility of a woman. Therefore, a multivariate analysis, including controls for the effects of confounding variables, was performed. In the logistic model, 16 variables were used, including dummy variables. Parameter estimates in the logistic regression model are given in Table 4.

The main finding, the index of wealth, had a significant (at 5% level) negative effect on marital fertility. The coefficient showed that a unit increase in the index of wealth reduced the log of the odds of a woman who gave birth in 1986 by 0.0047. The implication of the magnitude of this coefficient is that probability of giving birth (0.128) for a 'poor woman' (INDEX=10) who is currently aged 30 years, with age-at-first marriage 25 years, and baseline values for the other variables, was almost one and a half times that of a very 'rich woman' (INDEX=100) with the same values for the other explanatory variables. Following the suggestion of a reviewer, we have tested for non-linearity in the effects of the wealth index, specifically by including a dummy variable for the highest quartile and by including the wealth index squared. Neither the wealth index squared nor the indicator for the highest quartile of the wealth index was significant. As a result of colinearity between education and the wealth index, if education were to be excluded from the model, the magnitude of coefficient of the wealth index would increase by about 50%.

The ethnicity variable (a woman being Sinhalese) recorded a significant negative effect (at 1% level). Most Sinhalese are Buddhists (93%). The lower fertility of Sinhalese women would reflect that there are no religious restrictions on family-planning activities for Buddhists, except for abortions. This coefficient may be understated due to exclusion of women from the predominantly Tamil regions in northern Sri Lanka, where fertility is relatively high. Addition of an interaction term between ethnicity and the wealth index proved not significant.

Working {agricultural [odds ratio (OR)=0.575] and non-agricultural [OR=0.835]} women were less likely

**Table 3.** Percentage of women who gave birth in 1986 by index of wealth by sector, ethnicity, education, occupation, age-at-first marriage, age, and parity

Variable	% of women who gave birth (n=5,332)
All women	14.1
Index of wealth (inter-quartile range)	
1.5-8.8	15.8
8.8-24.7	14.1
24.7-35.6	15.8
35.6-100	11.5
Sector	
Urban	12.9
Rural	14.3
Estate	14.9
Ethnicity	
Non-Sinhalese	16.4
Sinhalese	13.7
Highest level of education	
No education	12.6
Primary	14
Secondary	14.5
Higher	14.1
Participation in labour force	
Not working	14.6
Agricultural work	12.1
Non-agricultural work	12
Age-at-first marriage (inter-quartile range) (years)	
<18	11.7
18-<20	14.3
20-<24	15.8
24+	14.8
Age (years)	
15-<20	32
20-<25	29.4
25-<30	21.1
30-<35	12.1
35-<40	7.5
40-<45	2.2
45-<50	1.7
Parity	
0	32.1
1 to 2	19.5
3 to 4	7
5 to 13	3.3

Source: Sri Lanka demographic and health survey-1987 (1)

to give birth than non-working women. This could be because women withdraw from work as a result of pregnancy and childbirth or because of the greater opportunity-costs of childbearing for working women.

The contrast between women working in the agricultural sector and non-working women was significant ( $p=0.027$ ), while that between women working in the non-agricultural sector was not significant ( $p=0.43$ ).

The main effect of age-at-first marriage was positive, while the coefficient of age-at-first marriage squared was negative. The effect of age-at-first marriage on fertility was positive for all ages at first marriage found in the sample and reached a maximum at age 26 years. According to the model, a later age-at-first marriage is likely to increase current fertility. In some cases, women may postpone their marriage due to socioeconomic problems. Soon after they get married, they are likely to have a baby.

The effect of age of a woman on fertility was significant and non-linear. The main effect of age was positive, and the coefficient for age squared was negative. The effect of age reached a maximum at age 20 years and gradually declined thereafter. The net effect of the coefficients was that the effect of age on fertility was positive up to 39.4 years and negative thereafter.

Women with parity less than 2 had significantly higher probabilities of producing children than women with higher parities. Women with zero parity were more than three times as likely ( $OR=3.145$ ) to give birth than women with parity 3 to 4. Most women of zero parity would have been recently married because the sample included only married women, and so many gave birth. Women with parity 1 to 2 were twice as likely ( $OR=2.174$ ) to have another child compared to women with parity 3 to 4. The negative coefficient of parity 5+ indicated that high-parity women were less likely to have an extra child. The lower current fertility of women with higher parities would reflect stopping behaviour by women who have achieved their desired family size.

Both women living in the rural sector and women living in the estate sector had higher fertility than women living in the urban sector. The odds ratios showed that women living in rural areas were 1.14 times more likely ( $OR=1.139$ ) to give birth than urban women, while women in the estate areas were 1.1 times more likely ( $OR=1.087$ ) to give birth than urban women. However, after controlling for other variables, the rural and estate-sector effects were not significant [ $p=0.294$  (rural) and  $p=0.716$  (estate)].

With an increase in level of education, there was a reduction in marital fertility, i.e. women with primary or no education had higher fertility than women with

<b>Table 4.</b> Parameter estimates of logistic model of whether a woman gave birth in 1986			
Independent variable	Parameter estimate	Standard error	Odds ratio
Intercept	-4.8904	1.0985	1.0000
Index of wealth	-0.0047	0.0016	0.995**
Sector			
Urban	0.0000		1.000
Rural	0.13	0.1239	1.139
Estate	0.0838	0.2307	1.087
Ethnicity			
Non-Sinhalese	0.0000		1.0000
Sinhalese	-0.4655	0.1498	0.628***
Highest level of education			
No education	0.2029	0.2571	1.225
Primary	0.2969	0.2238	1.346
Secondary	-0.0214	0.2014	0.979
Higher	0.0000		1.0000
Participation in labour force			
Not working	0.0000		1.0000
Agricultural work	-0.5536	0.1844	0.575**
Non-agricultural work	-0.18	0.2295	0.835
Age-at-first marriage	0.1624	0.0662	1.208*
Age-at-first marriage <sup>2</sup>	-0.00312	0.00165	0.997
Age	0.1345	0.0597	1.144*
Age <sup>2</sup>	-0.00341	0.00095	0.996***
Parity			
0	1.1458	0.1702	3.145***
1 to 2	0.7765	0.1264	2.174***
3 to 4	0.0000		1.0000
5 to 13	-0.1177	0.2103	0.889
N=5,332			
* Significant at 0.05			
** Significant at 0.01			
*** Significant at 0.001			

secondary or higher education. Fertility of women with a higher education was slightly higher than fertility of women with secondary education. However, the strength of education effects was not significant at 10% level.

### DISCUSSION

The main finding of our analysis was the significant negative effect in the logistic regression model of the index of wealth on fertility, indicating that, in Sri Lanka, as accumulated household wealth increases, marital fertility decreases. The fertility-reducing effect of higher wealth may be explained in terms of a greater preference of wealthier people for a higher quality as opposed to a higher quantity of children, the rising opportunity costs of parental time, and the reduced reliance on children for support in the old age of the more wealthy parents. Contraceptive use is a proximate determinant of the negative effect of wealth on marital fertility. However,

its contribution to the explanation of differences in fertility by wealth is small, the percentage of women in the highest quartile currently using contraception (62.3%) being only marginally greater than that in the lowest quartile (61.8%). The association between greater wealth and a higher likelihood of contraceptive use by married women may be explained by the effects of wealth on child preferences and the affordability of contraception, and by some assets of the more wealthy families, such as radio and television, increasing their exposure to family-planning messages.

The measurement of wealth used in our analysis has many limitations. First, data on many components of the real level of wealth, such as land ownership, savings, jewelry, and furniture, are not available. Second, data do not enable us to determine whether the households have only one radio, television, refrigerator, bicycle, motorbike, or car, or whether they have more than one

of each item. Third, the values of components of the index of wealth will vary considerably from household to household, i.e. the values of new houses and new cars will be very different. Fourth, no account was taken of the effects of depreciation on the values of assets. Fifth, the ownership of assets is unclear as are the functions they serve. For example, a car operated as a taxi by a household member but not owned would be included in the wealth index, while a shop owned by another household would not, although both are means of generating income. From the SLDHS data, we could not distinguish whether the car was used for business or for private purpose. In the construction of the wealth index, a taxi and a private car used for pleasure only were given the same weight. It might also be that the strength of effect of the true level of wealth on marital fertility was stronger than that indicated by our analysis. Moreover, additional information on economic background of women and their spouses, such as extent to which household wealth may be attributed to the occupation of women and her education, would facilitate the 'unpacking' of the wealth effect found. The effects on explanatory power of the wealth index of inclusion of different ranges of assets, different functional forms, and different weighting systems, for example, principal components factor loading approach used by Filmer and Pritchett, are other issues that could be considered (18).

One of the consequences of the introduction of wealth index into the model is that the effect of education of a woman on marital fertility ceases to be significant. Cleland and Wilson have claimed, "the strength of the relationship between education and fertility tends to be stronger than for purely economic characteristics of couples" (19). Our results for Sri Lanka are contrary to their claim. There is a need to establish whether the strength of effects of the measure of wealth presented here (and lack of effect of education after controlling for it) apply in other contexts, and hence, whether the pattern for Sri Lanka in 1986 is an isolated exception or whether the conclusion of Cleland and Wilson, cited above, is the product of inadequate attempts to control for economic factors.

The implication of our findings is that, if the coefficients of the model were to remain constant over time, an increase in the level of wealth would reduce marital fertility. According to the World Bank estimates, Sri Lanka has experienced high rates of GDP growth in recent years (4.0% per annum between 1980 and 1990 and 5.3% between 1990 and 1999) (20). Presuming such

a growth of increased household wealth, the estimated decline in total fertility to 2.1 births per woman since 1987 may, in part, be explained by increased household wealth. Analyses of data from other time periods are needed to test the constancy of the model over time. The comparison of models for different time points may be used for apportioning the fertility decline into components linked to changes in population composition and components due to changes in fertility behaviour within segments of populations, assuming that rates of childbearing within segments are independent of population composition. An assessment of the effect of wealth on the overall level of fertility in Sri Lanka would also require tests of the effects of wealth on marital status and fertility outside marriage. However, because we believe that increased wealth will neither reduce age-at-marriage nor increase childbearing outside marriage, further efforts toward raising household wealth by increasing the availability of electricity, water and toilet facilities, and income will reduce fertility in Sri Lanka.

Another implication of the inverse relationship between marital fertility and wealth, found in our analysis, is that most Sri Lankan children will be born in relatively poor households. In view of this, attention to the welfare of children of today's poor will be an important determinant of prosperity and well-being of future generations of adults in Sri Lanka.

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