CHAPTER 6

Women's Employment and Fertility: Cases of Three Asian Developing Countries

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1. THEORETICAL BACKGROUND

The relationship between women's employment and fertility has been the most important subject of the so-called economics of fertility for the last thirty years. The economics of fertility began virtually with Becker's seminal paper in 1960, "An Economic Analysis of Fertility," but the women's employment did not receive sufficient attention in this paper.[1] It implies that he did not discuss about the opportunity costs associated with childbearing and child care. Leibenstein laid at first emphasis on the opportunity costs of having an additional child as a determinant of fertility,[2] and afterwards a great advance was made by Mincer.[3] He took notice of the close relationship between female labor participation and the level of fertility, and made the implications of the opportunity cost clear in this relationship. According to Mincer, the major cost of a child is the mother's time and the foregone income while she must tend to children, that is, the opportunity cost. Mincer shifted the emphasis of the economic approach from income effect to the effects on fertility of variation in the cost of children by showing that the opportunity cost of the wife's time as measured by the wife's wage rate was negatively related to fertility, Willis stated.[4]

Becker emphasized the same point in another novel paper, "A Theory of Time Allocation," and developed more applicable and comprehensive model.[5] Enlightened by Becker's two seminal papers, a large number of economists participated in the field of the study in fertility. They are called the Chicago School or the Chicago-Columbia School, and have established their influence over the United States and other countries.

Traditional economic theory has considered that the production activities are carried out only in the business enterprises and the household only consumes goods and services. On the contrary, however, the new consumer theory led by Becker in the mid-1960s, considers that there is a production activity in the household, too. For example, the housewife not only chooses and buys consumer goods in the market every day, but she also processes and prepares them for consumption of her family. In these senses, everyday housekeeping labor, such as cooking, washing, cleaning, and so on, is clearly a part of household production. Thus, the inputs in the household production function are the market goods and the time of the individual, particularly the housewife, and the outputs are the non-market goods and services, such as the health of the family.[6]

Becker's 1965 paper introduced the concept of time into the process of decision-making with respect to both market and non-market activities, and put stress on the important role of the value of time in the non-market household production. His paper developed the general theory of time allocation and did not directly analyse the fertility behavior, but it was formulated in the form applicable to fertility analysis, and opened the way to new theory of fertility called 'the new home economics approach.' This approach has been most influential in this field since then.

According to the new home economics, the fertility behavior which implies childbearing and child care, is an important part of household production. It is performed with inputs of market goods and time in the same way as other activities, and the consequently expected output is the flow of child services. Bearing a child and caring for the infant are highly labor-intensive activities especially for the mother. When a child is very young, this tendency is clear, and the value of mother's time becomes important in the fertility behavior. The value of time is generally the function of human capital, and then it increases with a rise in the level of income and education, and the cost and price of children also go up.

2. SOME EMPIRICAL RESULTS

The new home economics approach attempts to tie fertility behavior directly with female labor supply and

human capital, and after 1973 in particular, a great advance was made both in theory and in empirical studies.[7] The fertility theory of the Chicago School is characterized by its excellent ability in empirical study, while it has the limit in theory because it is basically applied only to the developed countries. Originally, Becker applied the theory of consumer's behavior to the analysis of fertility, and it implies that the theory treats a child as a consumer's durable. It is clear that the empirical research of Becker and his followers has often been concerned with the differential fertility and long-range decline in fertility in the United States and European countries. This is partly due to the availability of data, but it is fundamentally based upon the abovestated theoretical character of their approach. The Chicago model is, however, not inapplicable to the less developed countries. We can adduce some examples of the application of a typical new home economic model to some less developed countries.[8]

Now, let us refer to some empirical results based on the new home economic model. As stated before, according to this model, the higher is the value of mother's time, the greater is the opportunity cost and the higher are the cost of children and hence the price of children. In such circumstances, the substitution occurs out of the time-intensive goods like children to other market goods and the desired number of children among couples will decrease.

A great number of empirical studies confirm the expected negative relationship between the opportunity cost of mother's time and fertility. It is wife's wage to be mostly used as a proxy of the opportunity cost of time.[9] Another proxy is the female labor force participation rate. The meaning of this variable is that the responsibility of caring a child prevents a woman with a child from participating in labor market and that it yields the opportunity costs. The higher is the female labor force participation rate, the higher is the opportunity cost due to child care in terms of earnings foregone. A number of studies has used this variables.[10] In the comparative studies of World Fertility Survey results, working status, type and timing of work of women are associated with fertility.[11]

The relationship between women's employment and fertility varies with economic development. In the traditional society in which the family involves the productive function, the opportunity cost of bearing and caring children is relatively small, because women can work not too far away from her home, so that the motivation for family limitation is not generated. Nevertheless, as the economy develops and the opportunity of work outside household increases, women's work often compete with childbearing and child care, and then they are driven by necessity of choosing either of the two.[12] If women choose the market labor, they cannot help limitting the family size, and on the contrary, if they bear a child, they are obliged to quit their job for five to ten years. They not only lost their earned wage had they worked, but would also feel a difficulty in returning to labor market again due to the loss of skill. Therefore, it is *a priori* expected that in the less developed countries, most women engage in farming or sedentary work and women's employment will not necessarily prevent them from bearing and caring child. In fact, some results of research in Puerto Rico, Peru and Thailand show that the fertility of working women in agriculture, sales, and services is as high as that of non-working women.[13] These results are not controlled by the factors other than occupation and status of work, but the similar results are obtained in the multiple regression analyses.[14]

3. DATA AND METHOD

The purpose of this paper is to make a comparative study of the relationship between women's work and fertility in the less developed countries which has not yet been a settled issue, by using the data available from the Demographic and Health Surveys (DHS), and to test statistically the presence of *a priori* expected negative relationship between them. Here, the subject of analysis is three Asian developing countries, that is, Indonesia, Sri Lanka and Thailand, and the respondents of this survey are all ever married women aged 15 years and over.

The basic data for my analysis are obtained from DHS datafile and consist of the following items; the number of children ever born and the number of living children as an indicator of fertility, both of which are collected in the form of the distribution of frequency by working status before and after first marriage and currently working status, respectively. These data, in turn, are reclassified by place of residence, educational attainment, age group and husband or partner's occupation. The place of residence is divided into urban and rural, and the educational attainment is classified into four categories; no education, primary, secondary and higher. Age groupings are all five-year groups (15-19 to 45-49). The grouping of husband's occupation varies with the country, so that we cannot compare all of the occupations. Therefore, we used six categories of (1) professional, technical and management, (2) sales, (3) agricultural self-employed, (4) agricultural employed, (5) skilled, and (6) unskilled. Most of these occupations have the number of samples enough to minimize the sampling error.

The focus of the subject is whether there is any significant difference of fertility by working status of

women. Now, consider the frequency distribution of the number of children ever born and living children classified by above-stated characteristics as independent random samples of sizes N_x and N_y, respectively, drawn from two populations which are assumed to be normally distributed. The means of populations are μ_x and μ_y, and the variances are δ_x and δ_y respectively. When the means of sample populations are $\bar{x}$ and $\bar{y}$, and variances are s_x^2 and s_y^2, the unbiased estimate of variance is,

$$\hat{\sigma}^2 = \frac{N_x s_x^2 + N_x s_y^2}{N_x + N_y - 2}$$

And then, the following statistic

$$t = \frac{(\bar{x} - \bar{y}) - (\mu_x - \mu_y)}{\hat{\sigma}\sqrt{\frac{1}{N_x} + \frac{1}{N_y}}}$$

is subject to t distribution with $N_x + N_y - 2$ degrees of freedom.

Based upon this relation, the difference-of-means test can be made. If the statistic t is greater than that derived from t distribution table corresponding to a given level of signifcicance, for example, .01, the difference between the means is judged to be significant at the 1% level. This means that the chance of such a large difference when the samples are from the same population is less than one percent.

We placed the focus on the significance of differential fertility by working status of women before and after first marriage and current status, using two measures of fertility, children ever born and living children. At first, analysis was made about aggregate sample data, and then using cross-tabulated data with place of residence, educational attainment, age and husband's occupation, when these characteristics are controlled successively, how the differential fertility by working status is varied with such characteristic was analysed. Total number of samples are 11,884 for Indonesia, 5,865 for Sri Lanka, and 6,775 for Thailand. These numbers are large enough to make statistical analysis. In most cases of subdividing into parts by each characteristic, the number of samples is more than 1,000, but only a few cells involve less than 100 samples, and in such cases an entry is made in tables.

4. DIFFERENTIAL FERTILITY BY WORKING STATUS

The three countries treated here belong to low-income or middle-income countries. In Table 1, some socio-economic and demographic indicators showing their current level of development are compared for the three countries. Thailand ranks highest in GNP per capita, but does not stand at an advantage over the other two as regards other indicators. The level of fertility is relatively low in all the countries, and it may be considered that low fertility faithfully represents the result of sustained efforts of population control in east and southeast Asian countries. Among these countries, total fertility rate (TFR) is about the same in Sri Lanka and Thailand (2.4 and 2.5 respectively), while the TFR is 3.1 in Indonesia. Incidentally, average TFR in the less-developed countries was 3.8 as of 1990, and that in the low-income countries was the same. However, the average TFR in the lower-middle-income countries was 4.0 at the same time of reference.

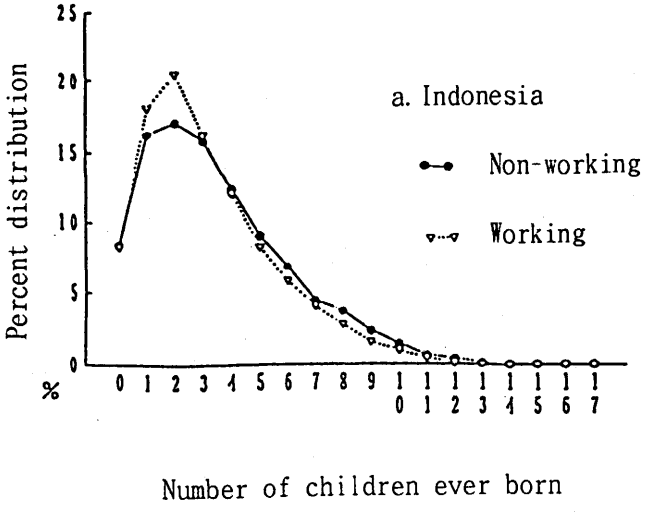
Now, turn to the DHS data. First, the number of children ever born is the measure of cohort fertility, contrasted with TFR as the indicator of period fertility. Figure 1 shows the frequency distribution of the number of children ever born by working status before first marriage. It is clear that the distribution of working women is biased towards the left, while the difference is small in Indonesia. The data of fertility by working status after first marriage and current working status make the difference more indefinite. Moreover, it should be noted that the number of children of non-working women seems to be less than that of working women in some cases. Figure 2-a, 3-a and 3-c are some examples, though we cannot pass a fair judgement on this issue from these figures.

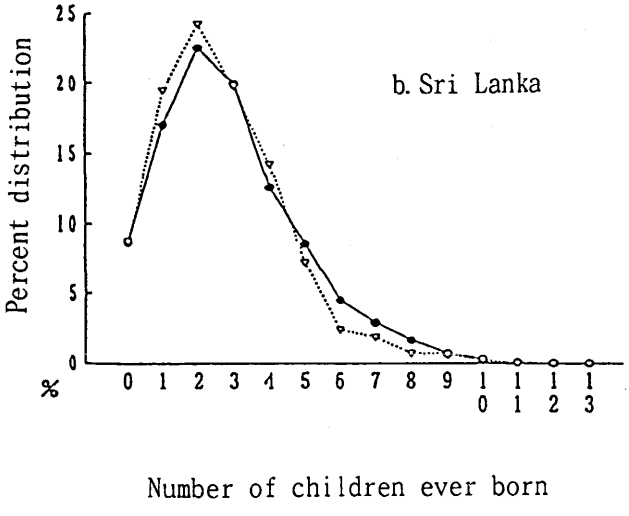
The number of living children is an indicator of cohort fertility as well, but it differs from the number of children ever born which leaves mortality out of consideration. The frequency distributions of it are generally similar to those of children ever born, and yet it is notably marked that in Figure 5-a, the distribution of working women shifts to the right by two. Besides, the phenomena contrary to *a priori* expectation is found in Figure 6-a and 6-c. Nevertheless, because we cannot judge whether there is any significant difference between working and non-working women only from the frequency distribution, let us rather apply more statistically accurate method stated before.

1) The Number of Children Ever Born by Working Status before First Marriage

The number of children ever born by working status before first marriage is the data useful to know how the working experience before marriage influences fertility. The results of analysis are summarized in Tables 2 and 5. In Table 2, the average numbers of children ever born of both women who have never worked and those who have worked are found from the frequency distribution tables, and then t values are calculated to judge the significance of difference of the means. When these t values are larger than those corresponding

Figure 1 Frequency Distribution of the Number of Children Ever Born by Working Status before First Marriage





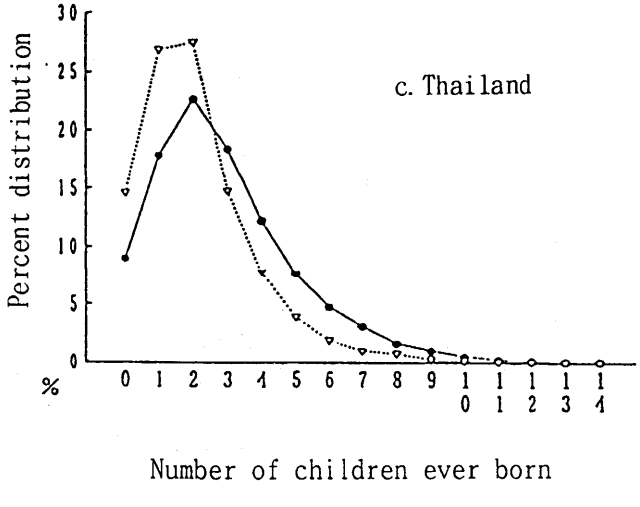
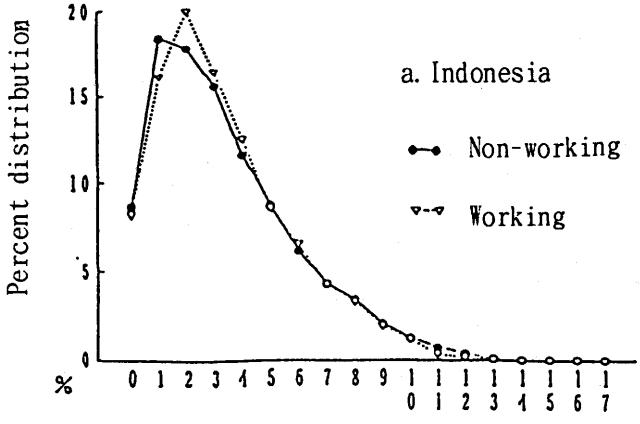
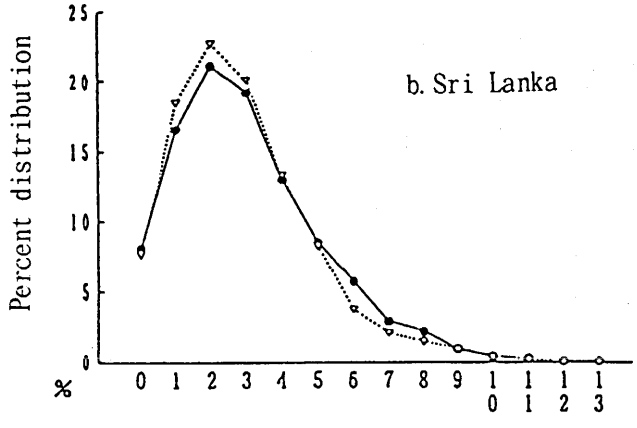


Figure 2 Frequency Distribution of the Number of Children Ever Born by Working Status after First Marriage





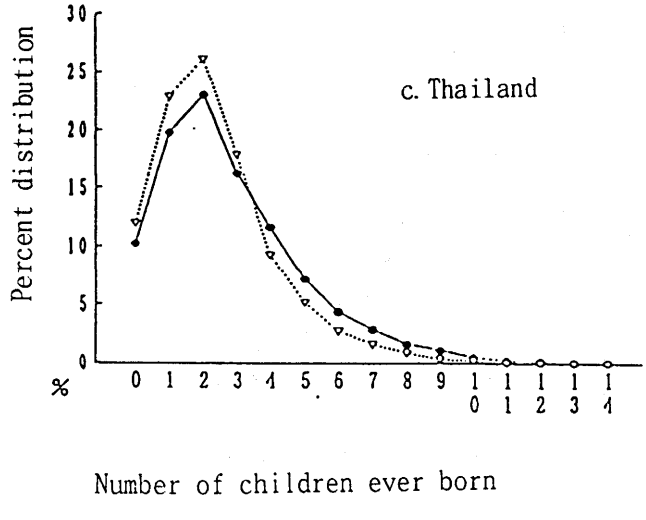
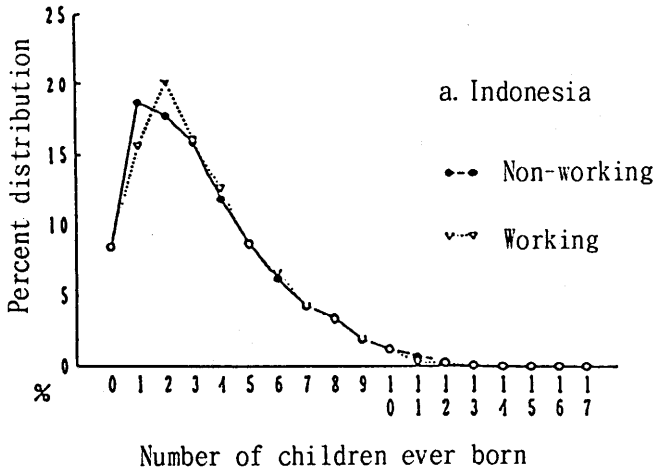
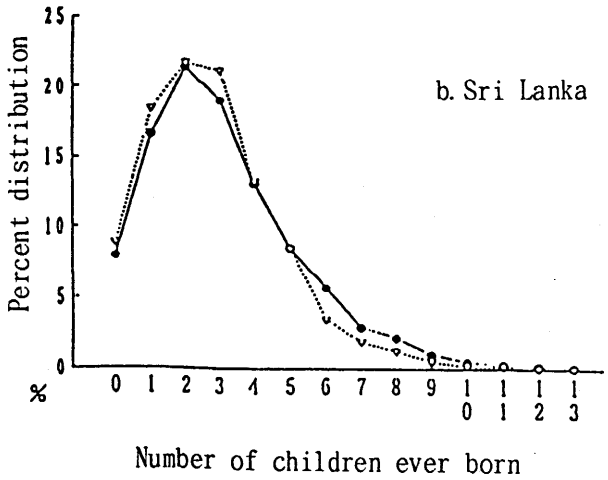


Figure 3 Frequency Distribution of the Number of Children Ever Born By Current Working Status before First Marriage





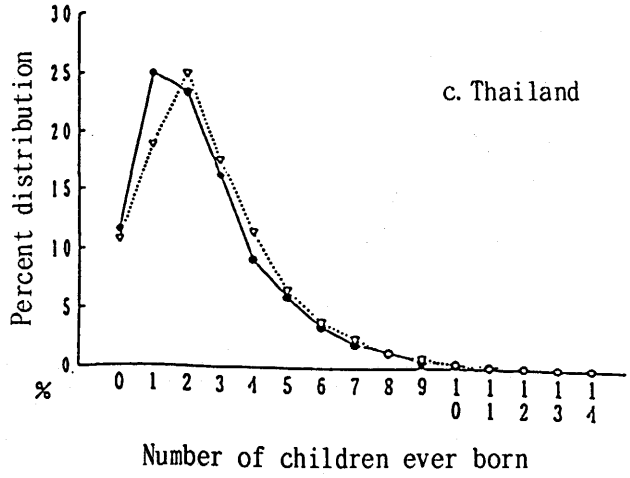
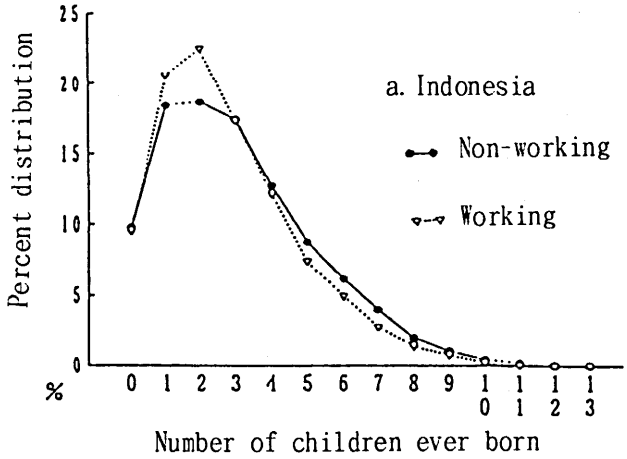
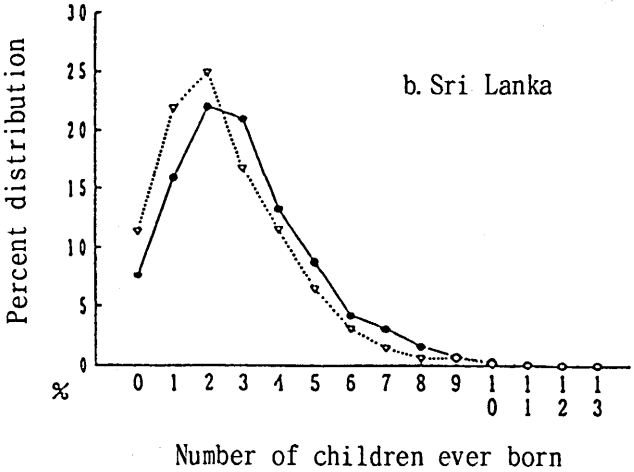


Figure 4 Frequency Distribution of the Number of Living Children by Working Status before First Marriage





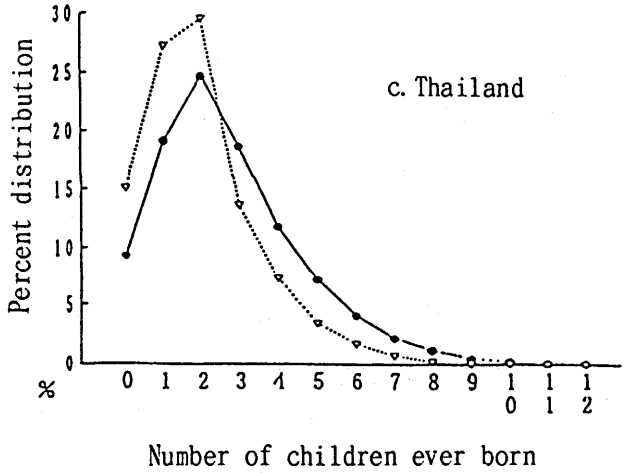


Figure 5 Frequency Distribution of the Number of Living Children by Working Status after First Marriage

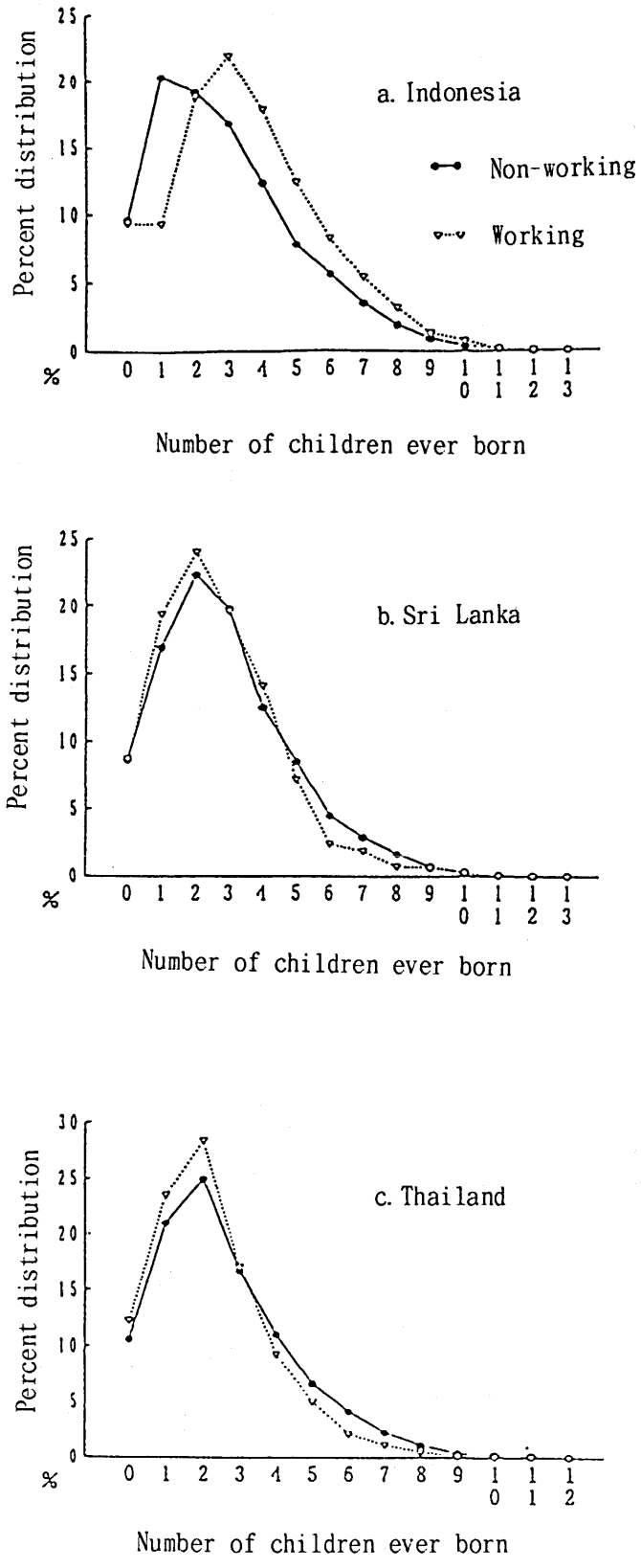


Figure 6 Frequency Distribution of the Number of Living Children by Current Working Status

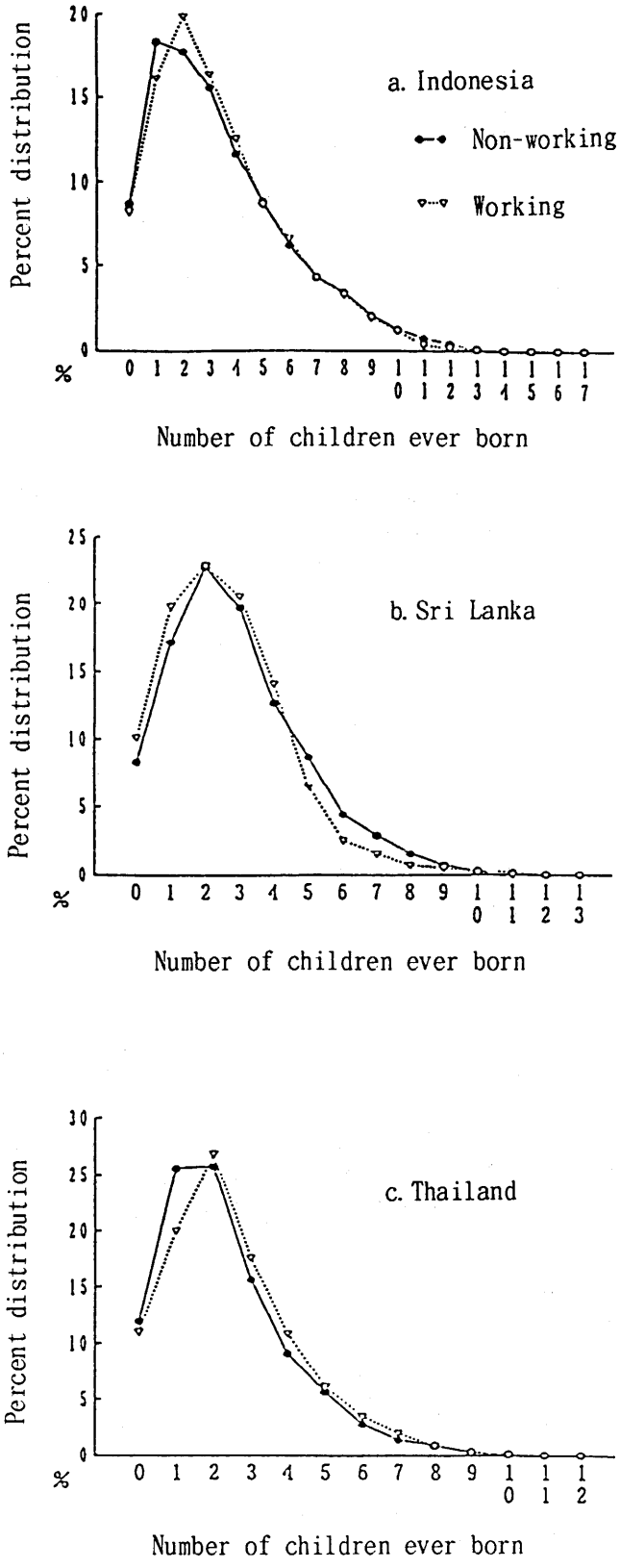


Table 1 Socio-economic and Demographic Indicators of Development for Indonesia, Sri Lanka, and Thailand in 1990

Country	GNP per capita (US$)	Life Expectancy (Years)	Illiteracy(1) (%)	Total Fertility Rate	Contraception (%)(2)	Infant Mortality Rate(3)	Maternal Mortality (4)	Urbanization (%)(5)	Secondary Education(6)
Indonesia	570	62	32	3.1	45	61	2,750	31	47
Sri Lanka	470	71	17	2.4	62	19	2,277	21	74
Thailand	1,420	66	10	2.5	66	27	2,316	23	28

(Notes) 1.Female only.
2.Percentage of married women of childbearing age using contraception. Data for 1988.
3.Per 1,000 live births.
4.Per 100,000 live births. Data for 1980.
5.Urban population as a percentage of total population.
6.Percentage of age group enrolled in secondary education. Data for 1989.

(Source) World bank, *World Development Report 1992,* Oxford University Press, 1992

Table 2 Average Number of Children Ever Born by Working Status before First Marriage and Place of Residence, and the Difference-of-means Test between Working and Non-working Women

Place of Residence	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
Total	3.512	3.178	5.421	3.164	2.649	7.830	2.941	2.077	14.331
Urban	3.583	3.019	9.426	2.983	2.080	13.503	2.489	1.898	9.769
Rural	3.456	3.262	3.152	3.202	2.754	6.773	3.072	2.337	12.079

(Note) The degree of freedom is 34 for all of countries. The levels of significance are t-values of 2.732 or more at 1 per cent level, 2.034 or more at 5 per cent level and 1.692 or more at 10 per cent level, respectively.

(Source) DHS Files.

Table 3 Average Number of Children Ever Born by Working Status before First Marriage and Educational Attainment, and the Difference-of-means Test between Working and Non-working Women

Level of Education	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
No Education	4.027	3.962	0.922	4.350	3.286	14.630	4.187	3.358	11.210
Primary	3.557	3.057	8.144	3.838	3.175	8.773	2.927	2.238	11.064
Secondary	2.982	2.606	5.956	2.856	2.320	7.963	1.726	1.639	1.539
Higher	2.081	2.014	1.109	2.201	1.858	5.243	1.143	1.433	-5.307

(Note and Source) The same as Table 2.
"Italics" indicates the rates based on fewer than 100 samples.

to the given degrees of freedom at a specified level of significance, the difference is proved to be statistically significant.

The first line represents the average number of children ever born of both women with and without working experience and t value for each of three countries. In Indonesia, for example, the number of children ever born of women without working experience before marriage is 3.51 on an average, while that of women with working experience is 3.18. The t value of 5.421 is significant at the 1% level, because t value with 34 degrees of freedom and at the 1% level of significance is 2.732. From this fact, we may conclude that the fertility of Indonesian women with no working experience before marriage is higher than that of women with working experience. Similarly in Sri Lanka and Thailand, the means of women without working experience is clearly larger than that of women with working experience, so that the difference between the two are statistically significant.

Table 2 also presents the mean number of children ever born for working and non-working women by their rural-urban residence for each of three countries. In all cases of both urban and rural areas, the average number of children of women with no working experience is larger than that of women with working experience, and the estimated t values of the mean differences are all significant at the 1% level. In fact, the women who have worked before marriage in these countries, wherever they reside, have apparently lower fertility than those with no working experience.

In this table, we can also find the urban-rural differential in fertility. Though in Indonesia the fertility in urban area is higher than that in rural, the other two countries represent the contrary. It is, however, very important to argue the meanings of differential fertility by a sort of characteristics as well as place of residence, but the focus of this paper is the issues of differential fertility by working status of women, and hence the subject of differential fertility by a characteristic other than working status of women will not be taken up well here.

Tables 3, 4 and 5 show the values in the cases of grouping by a characteristic other than place of residence. Now, Table 3 analyzes the differential fertility by working status and educational attainment of women. Here, we can find the statistically insignificant results and those contrary to *a priori* expectation in some cases. As regards no and higher education in Indonesia and secondary education in Thailand, although the fertility of working women is slightly lower than that of women without labor experience, t value are very small and the differentials are not significant. The reason is partly due to sample errors, but it cannot be explained only by this reason. It is an unique case that t value for the higher education in Thailand has a significant and negative sign. As the high educated women who have not worked before marriage form a small minority, the sampling errors are not avoidable and the data to explain the meaning of significant difference of means are not available. From this table, we can also find clearly the differential fertility by educational attainment. As was expected, the higher is the educational attainment, the lower is the fertility, and moreover the differentials are very great. Indeed, the differential by educational attainment is greater than that by working status, and therefore it is possible to find the importance of education in antinatalist policy.

In Table 4, the differential fertility by working status and age groups is analyzed. The differential is obscure in the younger ages, but with advancing years, the fertility of women who have ever worked is clearly lower than that of women without working experience. The differentials are more predominant in Thailand compared to Indonesia and Sri Lanka. It implies that the differential fertility by working status was clearer, as time goes back to the past.

A point which deserves our attention is that fertility rises with increment in age in all of countries. This is usually a normal phenomenon and it is true that the number of children ever born for ages 45-49 represents a completed fertility at the present time, whereas it should be noted that the number of children ever born for the younger ages is not equivalent to the midway to completed fertility. It is because in these countries, the fertility is rapidly declining in recent years, and hence it is not probable that the fertility behavior of actual age group 15-19, for example, will continue from now on to be equal to that for actual ages 45-49. Moreover, it may well be expected that the differential by working status will be reduced as compared with the present and the level of fertility will be still lower with it, because the differential is much smaller in the younger ages.

Table 5 shows the results of analysis concerning the number of children ever born by working status of married women and their husband or partner's occupation. Because the data about the occupation of women themselves are not available, it has also the meaning as a proxy to it. According to this table, in all of occupations the fertility of women with working experience is lower than those who have never worked, and the difference is significant at the 5% level at the least. Except in case of the agricultural self-employed in Indonesia and Sri Lanka, t values are very great, showing that the differential by working status is decidedly big.

Table 4 Average Number of Children Ever Born by Working Status before First Marriage and Age Group, and the Difference-of-means Test between Working and Non-working Women

Age Group	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
15-19	0.591	0.638	-1.326	*0.676*	0.467	6.620	0.531	0.447	2.835
20-24	1.494	1.420	1.280	1.351	1.245	1.920	1.220	0.957	5.394
25-29	2.550	2.234	4.116	2.179	1.826	4.890	1.916	1.527	5.928
30-34	3.582	3.213	4.141	2.972	2.325	7.995	2.653	2.064	7.250
35-39	4.480	4.039	4.833	3.521	2.908	7.158	3.458	2.643	9.321
40-44	5.321	4.870	4.443	4.511	3.753	8.281	4.307	3.343	10.735
45-49	5.912	5.279	6.260	5.327	4.572	7.749	5.344	3.850	15.926

(Note and Source) The same as Table 3.

Table 5 Average Number of Children Ever Born by Working Status before First Marriage and Husband or Partner's Occupation, and the Difference-of-means Test between Working and Non-working Women

Husband or Partner's Occupation	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
Prof., Tech., & Management	3.709	3.025	10.396	2.543	1.864	9.893	2.121	1.729	6.305
Sales	3.524	3.147	6.121	-	-	-	2.814	2.297	7.489
Agriculture: Self-empl.	3.522	3.399	2.426	3.639	*3.488*	2.058	3.173	2.451	11.776
Agriculture: Employed	-	-	-	3.541	3.020	7.271	3.190	2.508	11.245
Skilled Manual	3.323	2.886	7.226	3.053	2.506	8.085	2.582	2.121	7.537
Unskilled Man.	-	-	-	3.064	2.732	5.137	3.067	2.361	11.490

(Note and Source) The same as Table 3.
- denotes data not available.

Table 6 Average Number of Children Ever Born by Working Status after First Marriage and Place of Residence, and the Difference-of-means Test between Working and Non-working Women

Place of Residence	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
Total	3.364	3.326	0.612	3.069	2.863	3.048	2.835	2.360	7.889
Urban	3.472	3.144	5.296	2.821	2.469	5.188	2.139	2.132	0.112
Rural	3.271	3.405	-2.208	3.125	2.925	2.954	2.987	2.679	4.896

(Note and Source) The same as Table 5.

Table 7 Average Number of Children Ever Born by Working Status after First Marriage and Educational Attainment, and the Difference-of-means Test between Working and Non-working Women

Level of Education	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
No Education	4.096	3.946	2.142	4.338	3.374	13.098	4.090	3.785	3.929
Primary	3.378	3.253	2.055	3.802	3.238	7.303	2.789	2.588	3.173
Secondary	2.907	2.696	3.324	2.751	2.763	-0.171	1.509	1.742	-4.214
Higher	1.983	2.085	-1.669	2.149	1.929	3.290	*0.844*	1.445	-11.658

(Note and Source) The same as Table 5.

Table 8 Average Number of Children Ever Born by Working Status after First Marriage and Age Group, and the Difference-of-means Test between Working and Non-working Women

Age Group	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
15-19	0.671	0.524	4.357	0.627	*0.650*	-0.705	0.524	*0.447*	2.532
20-24	1.506	1.412	1.627	1.307	1.378	-1.247	1.199	0.959	5.003
25-29	2.577	2.221	4.650	2.082	2.061	0.282	1.928	1.545	5.787
30-34	3.649	3.211	4.864	2.890	2.533	4.398	2.623	2.212	5.006
35-39	4.614	4.035	6.297	3.483	2.971	5.876	3.501	2.785	8.124
40-44	5.448	4.888	5.450	4.451	3.869	6.440	4.530	3.436	11.641
45-49	6.097	5.249	8.356	5.234	4.731	5.094	5.462	4.172	13.295

(Note and Source) The same as Table 5.

Table 9 Average Number of Children Ever Born by Working Status after First Marriage and Husband or Partner's Occupation, and the Difference-of-means Test between Working and Non-working Women

Husband or Partner's Occupation	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
Prof., Tech., & Management	3.713	2.991	10.943	2.428	2.000	6.186	*2.025*	1.798	3.765
Sales	3.312	3.414	-1.648	-	-	-	2.545	2.578	-0.493
Agriculture: Self-empl.	3.380	3.506	-2.030	3.594	*4.100*	-6.130	3.095	2.913	2.785
Agriculture: Employed	-	-	-	3.515	3.070	6.222	3.065	3.007	0.913
Skilled Manual	3.166	3.045	2.009	2.918	2.917	0.006	2.353	2.337	0.255
Unskilled Man.	-	-	-	2.987	3.003	-0.236	2.865	2.633	3.895

(Note and Source) The same as Table 5.

2) The Number of Children Ever Born by Working Status after First Marriage and by Currently Working Status

Next, we will turn to data clarifying the influence of working experience after marriage on fertility, though it is unknown whether this experience had continued before marriage. The results of analysis are collected in Table 6 to Table 9. As it is worthwhile to compare the effect of working experience after marriage with that before marriage, the comparison among tables is made succesively. At first, compared with Table 2, the average number of children ever born of women with no working experience is smaller in Table 6 for all of three countries and that with working experience is greater. As a result, t value becomes insignificant in Indonesia and smaller in other two countries. Observed by the place of residence, the same change is found, and the reversal of sign occurs in rural Indonesia. In the data by working status and educational attainment in Table 7, almost the same tendency is found and the statistical significance falls greatly. Especially in the case of secondary and higher education in Thailand, negative and significant t value is observed.

Comparing Table 8 with Table 4 divided by age group, the difference becomes smaller in Sri Lanka and Thailand, while it widens out and t value rises a little in Indonesia. As regards the data by husband or partner's occupation, t value in most of cases except professional, technical and managerial occupation in Indonesia, also decrease, and over a half of cases have negative and/or insignificant signs.

Contrasted the working status before with after marriage, why did the difference of means lower or reverse, and why did the level of significance of the difference decline, in almost all characteristics. It is probable that women who worked after marriage, suffered from economic difficulty because of high fertility and participated in labor market for the purpose of assisting their household. Therefore, they would have employed after having a series of children, not just after their marriage. Of course, this is a hypothesis and we should not form a hasty conclusion only from the above analysis.

The following tables, however, showing the differential fertility by currently working status, would be a substantial evidence supporting that hypothesis. Observed from the point of time of the survey, the working status before marriage is the most remote and the currently status is the nearest. And then, we can safely judge that if the differential fertility by currently working status is smaller than that after marriage, not to mention before marriage, or if the reversal of differential contrary to *a priori* expectation is found, women were employed after having a child.

In Table 10, t value in Indonesia as a whole declines and this hypothesis seems to be supported. It is due to the rural area, and the negative and significant value is found there. But, the fertility of working women in the urban area is lower than that of non-working women and the reversal does not occur there. In Sri Lanka, the positive and significant value is obtained, though in Thailand the difference of means is statistically insignificant in the urban area and the negative and significant t values are found in the whole nation and rural area. It is a more conspicuous reversal phenomenon than in Indonesia, and in effect the above hypothesis proves to be supported in both Thailand and Indonesia.

In the data by educational attainment in Table 11, any notable change is not found in Indonesia and Sri Lanka as compared with Table 7. But in Thailand, the signs of t value are all negative and moreover significant. Although the fact that the fertility of women with higher educational attainment is lower, remains to be true, that the working women have higher fertility is compatible with the above hypothesis.

When we compare Table 12 with Table 8, in Indonesia and Sri Lanka, no obvious difference is found with a few exceptions in the same way as the preceding paragraph. It is natural that the differentials are not significant in the younger ages, because the duration of marriage is short and the younger wives have little experience in bearing a child. Nevertheless, in Thailand, t values lose statistical significance in most of older ages as well as in the younger ages, while the signs remain to be positive. Here, it is a proper way to resort to the above hypothesis.

Making a comparison between Table 13 and Table 9 showing the differential fertility by husband's occupation, only a slight change is found in Indonesia, and there is no perceptible difference with an exception of change into positive and significant sign in Sri Lanka. In Thailand, the results are subject to variation, and the negative and significant relationship emerges in agriculture and skilled labor. Though, we cannot make clear the reason why such changes sometimes occur in Thailand from this analysis.

3) The Number of Living Children by Working Status before First Marriage

The difference between the number of children ever born and the number of living children depends on whether mortality has been taken into account, and if mortality is triflingly low, it is meaningless to take it up. In the less developed countries, however, where infant and child mortality is still high, it is of considerable significance to analyze it in relation to the number of children ever born. Besides, though the number of children ever born often involves the errors due to a slip

Table 10 Average Number of Children Ever Born by Current Working Status and Place of Residence, and the Difference-of-means Test between Working and Non-working Women

Place of Residence	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
Total	3.348	3.336	0.210	3.078	2.775	4.459	2.497	2.702	-3.467
Urban	3.449	3.114	5.415	2.818	2.196	9.355	2.139	2.129	0.167
Rural	3.261	3.420	-2.599	3.137	2.834	4.428	2.717	3.001	-4.649

(Note and Source) The same as Table 5.

Table 11 Average Number of Children Ever Born by Current Working Status and Educational Attainment, and the Difference-of-means Test between Working and Non-working Women

Level of Education	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
No Education	4.041	3.958	1.183	4.425	3.141	17.269	3.764	4.116	-4.750
Primary	3.364	3.253	1.818	3.812	3.089	9.334	2.559	2.813	-4.077
Secondary	2.900	2.663	3.740	2.753	2.747	0.086	1.593	1.730	-2.418
Higher	2.017	2.067	-0.822	2.137	1.897	3.576	*1.049*	0.436	-7.167

(Note and Source) The same as Table 5.

Table 12 Average Number of Children Ever Born by Current Working Status and Age Group, and the Difference-of-means Test between Working and Non-working Women

Age Group	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
15-19	0.669	0.470	6.041	0.639	*0.579*	1.870	0.586	0.398	6.188
20-24	1.486	1.410	1.325	1.304	1.407	-1.784	1.145	1.085	1.241
25-29	2.552	2.196	4.663	2.079	2.070	0.118	1.816	1.707	1.650
30-34	3.610	3.191	4.678	2.880	2.488	4.854	2.459	2.399	0.742
35-39	4.520	4.031	5.357	3.428	3.017	4.699	3.225	3.134	1.029
40-44	5.409	4.858	5.411	4.451	3.689	8.292	4.212	3.947	2.874
45-49	5.917	5.306	6.113	5.250	4.510	7.419	5.038	4.899	1.429

(Note and Source) The same as Table 5.

Table 13 Average Number of Children Ever Born by Current Working Status and Husband or Partner's Occupation, and the Difference-of-means Test between Working and Non-working Women

Husband or Partner's Occupation	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
Prof., Tech., & Management	3.720	2.847	13.141	2.423	1.889	7.646	*2.071*	1.763	4.996
Sales	3.299	3.442	-2.308	-	-	-	2.540	2.582	-0.624
Agriculture: Self-empl.	3.361	3.524	-2.617	3.609	*4.064*	-4.455	2.860	3.170	-4.976
Agriculture: Employed	-	-	-	3.582	2.983	8.334	2.830	3.176	-5.657
Skilled Manual	3.133	3.076	0.938	2.920	*2.926*	-0.090	2.237	2.436	-3.297
Unskilled Man.	-	-	-	3.013	2.850	2.353	2.776	2.699	1.290

(Note and Source) The same as Table 5.

Table 14 Average Number of Living Children by Working Status before First Marriage and Place of Residence, and the Difference-of-means Test between Working and Non-working Women

Place of Residence	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
Total	3.024	2.753	4.206	2.984	2.475	7.644	2.703	1.968	11.868
Urban	3.170	2.701	7.145	2.820	2.004	12.054	2.357	1.823	8.699
Rural	2.922	2.782	2.198	3.021	2.563	6.822	2.801	2.175	9.933

(Note and Source) The same as Table 5.

Table 15 Survival Ratio by Working Status before First Marriage and Place of Residence

Place of Residence	Indonesia		Sri Lanka		Thailand	
	Non-Working	Working	Non-Working	Working	Non-Working	Working
Total	0.861	0.866	0.943	0.934	0.919	0.948
Urban	0.885	0.895	0.945	0.963	0.947	0.960
Rural	0.845	0.853	0.943	0.931	0.912	0.931

(Note) Survival ratio is here defined as the quotient of the number of living children divided by the number of children ever born.
(Source) Table 2 and Table 14.

Table 16 Average Number of Living Children by Working Status before First Marriage and Educational Attainment, and the Difference-of-means Test between Working and Non-working Women

Level of Education	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
No Education	3.272	3.266	0.078	3.977	2.953	14.152	3.669	3.172	6.446
Primary	3.056	2.658	6.247	3.598	2.932	8.745	2.703	2.092	9.573
Secondary	2.784	2.447	5.227	2.712	2.240	6.980	1.670	1.605	1.135
Higher	*1.980*	1.908	1.183	2.136	1.803	5.103	*1.130*	1.407	-5.034

(Note and Source) The same as Table 5.

Table 17 Average Number of Living Children by Working Status before First Marriage and Age Group, and the Difference-of-means Test between Working and Non-working Women

Age Group	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
15-19	0.541	0.585	-1.293	0.630	*0.467*	5.272	0.521	*0.415*	3.734
20-24	1.376	1.283	1.642	1.317	1.206	2.032	1.161	0.924	4.848
25-29	2.299	2.007	3.860	2.100	1.722	5.336	1.837	1.460	5.680
30-34	3.151	2.890	2.922	2.841	2.185	8.009	2.503	1.989	6.282
35-39	3.841	3.505	3.657	3.321	2.783	6.301	3.212	2.512	7.966
40-44	4.533	4.083	4.425	4.197	3.422	8.627	3.887	3.104	8.661
45-49	4.778	4.356	4.356	4.924	4.183	7.585	4.688	3.531	12.151

(Note and Source) The same as Table 5.

Table 18 Average Number of Living Children by Working Status before First Marriage and Husband or Partner's Occupation, and the Difference-of-means Test between Working and Non-working Women

Husband or Partner's Occupation	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
Prof., Tech., & Management	3.328	2.792	7.811	2.437	1.817	9.095	2.001	1.660	5.303
Sales	3.077	2.746	5.145	-	-	-	2.670	2.173	7.126
Agriculture: Self-empl.	2.959	2.860	1.517	3.411	*3.288*	1.682	2.893	2.296	9.349
Agriculture: Employed	-	-	-	3.273	2.761	7.078	2.840	2.323	8.293
Skilled Manual	2.886	2.539	5.551	2.887	2.365	7.634	2.435	1.999	6.950
Unskilled Man.	-	-	-	2.908	2.558	5.260	2.830	2.159	10.523

(Note and Source) The same as Table 5.

Table 19 Average Number of Living Children by Working Status after First Marriage and Place of Residence, and the Difference-of-means Test between Working and Non-working Women

Place of Residence	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
Total	2.928	2.855	1.155	2.905	2.653	3.669	2.600	2.221	6.105
Urban	3.086	2.789	4.561	2.672	2.362	4.509	2.026	2.040	-0.242
Rural	2.794	2.883	-1.406	2.958	2.697	3.790	2.725	2.475	3.839

(Note and Source) The same as Table 5.

Table 20 Average Number of Living Children by Working Status after First Marriage and Educational Attainment, and the Difference-of-means Test between Working and Non-working Women

Level of Education	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
No Education	3.347	3.228	1.700	3.969	3.037	12.628	3.612	3.423	2.356
Primary	2.931	2.799	2.091	3.574	2.959	7.895	2.568	2.423	2.227
Secondary	2.711	2.531	2.797	2.619	2.639	-0.281	1.487	1.691	-3.687
Higher	1.830	2.007	-2.902	2.086	1.871	3.222	*0.844*	1.417	-11.092

(Note and Source) The same as Table 5.

Table 21 Average Number of Living Children by Working Status after First Marriage and Age Group, and the Difference-of-means Test between Working and Non-working Women

Age Group	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
15-19	0.607	0.472	4.082	0.585	*0.650*	-2.048	0.511	*0.421*	3.100
20-24	1.372	1.276	1.705	1.278	1.315	-0.669	1.140	0.930	4.355
25-29	2.312	1.997	4.157	2.011	1.931	1.079	1.838	1.487	5.257
30-34	3.251	2.841	4.540	2.769	2.364	4.911	2.471	2.123	4.225
35-39	3.987	3.468	5.571	3.295	2.819	5.481	3.269	2.658	6.857
40-44	4.623	4.107	4.993	4.162	3.466	7.732	4.072	3.176	9.382
45-49	4.998	4.275	7.422	4.840	4.329	5.071	4.793	3.763	10.566

(Note and Source) The same as Table 5.

Table 22 Average Number of Living Children by Working Status after First Marriage and Husband or Partner's Occupation, and the Difference-of-means Test between Working and Non-working Women

Husband or Partner's Occupation	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
Prof., Tech., & Management	3.326	2.774	8.061	2.330	1.949	5.551	*1.949*	1.711	3.933
Sales	2.885	2.989	-1.619	-	-	-	2.393	2.449	-0.827
Agriculture: Self-empl.	2.857	2.929	-1.116	3.373	3.850	-5.596	2.831	2.672	2.349
Agriculture: Employed	-	-	-	3.269	2.793	6.528	2.742	2.715	0.412
Skilled Manual	2.786	2.634	2.443	2.768	2.703	0.917	2.199	2.218	-0.312
Unskilled Man.	-	-	-	2.842	2.790	0.750	2.634	2.422	3.284

(Note and Source) The same as Table 5.

Table 23 Average Number of Living Children by Current Working Status and Place of Residence, and the Difference-of-means Test between Working and Non-working Women

Place of Residence	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
Total	2.913	2.859	0.843	2.906	2.573	4.852	2.312	2.506	-3.191
Urban	3.066	2.764	4.657	2.672	2.112	8.332	2.032	2.037	-0.080
Rural	2.782	2.898	-1.824	2.960	2.622	4.894	2.482	2.752	-4.256

(Note and Source) The same as Table 5.

Table 24 Average Number of Living Children by Current Working Status and Educational Attainment, and the Difference-of-means Test between Working and Non-working Women

Level of Education	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
No Education	3.298	3.241	0.826	4.034	2.838	16.014	3.323	3.671	-4.579
Primary	2.913	2.804	1.718	3.572	2.844	9.368	2.371	2.606	-3.659
Secondary	2.713	2.492	3.419	2.622	2.614	0.112	1.554	1.684	-2.308
Higher	1.889	1.985	-1.581	2.075	1.840	3.519	*1.000*	1.417	-7.539

(Note and Source) The same as Table 5.

Table 25 Average Number of Living Children by Current Working Status and Age Group, and the Difference-of-means Test between Working and Non-working Women

Age Group	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
15-19	0.619	0.417	6.250	0.597	*0.579*	0.568	0.563	0.391	5.842
20-24	1.368	1.266	1.816	1.272	1.350	-1.382	1.103	1.032	1.453
25-29	2.294	1.980	4.169	2.009	1.926	1.124	1.727	1.641	1.279
30-34	3.219	2.827	4.362	2.752	2.328	5.186	2.335	2.281	0.662
35-39	3.914	3.462	4.890	3.248	2.841	4.693	2.994	2.942	0.595
40-44	4.598	4.070	5.140	4.130	3.368	8.528	3.792	3.601	2.025
45-49	4.853	4.315	5.587	4.858	4.078	7.776	4.477	4.331	1.493

(Note and Source) The same as Table 5.

Table 26 Average Number of Living Children by Current Working Status and Husband or Partner's Occupation, and the Difference-of-means Test between Working and Non-working Women

Husband or Partner's Occupation	Indonesia			Sri Lanka			Thailand		
	Non-Working	Working	T-value	Non-Working	Working	T-value	Non-Working	Working	T-value
Prof., Tech., & Management	3.333	2.659	9.797	2.327	1.845	6.947	*2.000*	1.673	5.289
Sales	2.879	3.009	-2.007	-	-	-	2.388	2.454	-0.971
Agriculture: Self-empl.	2.841	2.941	-1.544	3.385	*3.876*	-5.171	2.603	2.907	-4.717
Agriculture: Employed	-	-	-	3.323	2.719	8.257	2.578	2.823	-3.861
Skilled Manual	2.743	2.675	1.098	2.763	*2.721*	0.586	2.102	2.303	-3.249
Unskilled Man.	-	-	-	2.858	2.673	2.649	2.544	2.489	0.863

(Note and Source) The same as Table 5.

of memory of women who were interviewed in the survey, the number of living children is much more accurate and therefore of greater analytical significance.

At first, Table 14 shows the average number of living children by working status before first marriage and by the place of residence for each of three countries. Seeing the national totals for Indonesia, the number of living children of women with no working experience is 3.02 and that of women with working experience is 2.75, and the difference between the two is fairly significant. These numbers for Sri Lanka are 2.98 and 2.48, and 2.70 and 1.97 for Thailand, respectively, all of which have great and positive t values. Almost all of the difference of means by the place of residence also prove to be positive and significant.

When we compare the values of Table 14 with those of Table 2, the former in which death is deducted is clearly smaller. Let us briefly refer to the issue of mortality, because it is not a central question. Now, we will make an international comparison, assuming that the number of living children divided by the number of children ever born equals to the survival ratio. This value only represents crude rate taking no account of age structure, but it may fairly be useful as a rough indicator of mortality. In Table 15, the survival ratios by country and the place of residence are compared only respecting the averages by working status before marriage. According to this table, the survival ratio for Sri Lanka is high as a whole and that for Thailand remains to be above the 90% level, while in Indonesia it is about 86%. This order and level are similar to the situation of life expectency at birth, infant mortality and maternal mortality shown in Table 1, telling the reliability of both data. We can read from this table that the survival ratio in the urban district is higher than that in the rural, and that the existence of working experience is related with survival ratio only in Thailand, while the difference between these factors is unlikely to make a significant distinction in other two countries.

In the cases divided by educational attainment (Table 16), by age groups (Table 17) and by husband's occupation (Table 18), the results of analysis as regards the differential fertility by working status are nearly the same as the cases of the number of children ever born, and then there is no matter being worth special mention. The levels of fertility are all lower according to each survival ratio.

4) The Number of Living Children by Working Status after First Marriage and by Currently Working Status

As regards the differentials of the number of living children by working status and currently working status, the results are nearly the same as the number of children ever born. As is confirmed from the comparison between the results of Tables 19 to 26 and those of Tables 6 to 14 and 16 to 18, only a difference is the reduced level of fertility owing to death, t value with reference to the difference of means are very close to each other in the corresponding cases. Therefore, there is nothing worthy of special mention about the issues of differential fertility by working status.

For the survival ratio, very similar values are given in all of items as to data by working status after marriage and currently working status, and it suggests that both statuses are close together in point of time.

5. CONCLUSION

The purpose of this paper is to test statistically the negative relationship expected in theory between women's employment and fertility in the less developed countries, by using the data obtained from the DHS. So far as Indonesia, Sri Lanka and Thailand are concerned, we may safely say that the existence of negative relationship is nearly confirmed on the whole. It is when the data are divided by the working experience before first marriage that the difference emerges the most clearly, and the level of significance declines in the differentials by working status after marriage and by currently working status and sometimes the reversal of signs is revealed.

In effect, when a comparison was made between the working status before and after marriage, the shrinkage or reversal of difference occurred and the significance of difference declined for almost all of characteristics. We proposed a hypothesis on this point; for the women who worked after marriage, they felt economic difficulties because of so many childbearing and participated in the labor market for helping family finances. If their market labor was not experienced just after marriage, but after some childbirths, it is possible to explain the meaning of negative signs, and we reached the conclusion that it is a fairly probable hypothesis, judging from the situation of differential fertility by working status after marriage and by currently working status.

Our analysis was attempted for both the number of children ever born and the number of living children, and the results were quite similar. Different were their levels, and as the difference represents the survival ratio, a little consideration was given to it.

The scope of our study is limited to the significance test of differential fertility by working status of women, and we did not measure quantitatively the influence of women's employment on fertility by using multivariate analysis. In this method of analysis, however, it is possible to make a comparison of differential fertility,

for example, by educational attainment through the significance test by t value, and these subjects to be solved were left over.

NOTES

1 See Becker, 1960.
2 Leibenstein, 1957.
3 Mincer, 1963.
4 See Willis, 1973, p.S14n.
5 Becker, 1965.
6 T. W. Schultz, 1973, p.S6.
7 T. P. Schultz, 1969, 1976, 1981; Nerlove, 1974; Willis, 1973; De Tray, 1973; Butz and Ward, 1979; Michael, 1973; Becker and Barro, 1988; Barro and Becker, 1989; Cigno and Ermisch, 1989; Heckman and Walker, 1991; Cigno, 1991; Murphy, 1992; Becker, 1992.
8 Nerlove and T. P. Schultz, 1970; Harman, 1970; Da Vanzo, 1972; Ben Porath, 1972, 1973, 1978; T. P. Schultz, 1969, 1973; Rosenzweig and Evenson, 1977; Blan, 1984; Gulati, 1988.
9 Mincer, 1963; Gregory et al., 1972; Gardner, 1973; T. P. Schultz, 1973; De Tray, 1973; Cain and Weininger, 1973; Butz and Ward, 1979; Ermisch, 1979; Ogawa and Mason, 1986.
10 Heer and Turner, 1965; T. P. Schultz, 1969, 1972, 1973; Gendell et al., 1970; Sweet, 1970; Wat and Hodge, 1972; Gregory et al., 1972; Repetto, 1972; Kleinmann, 1973; Hashimoto, 1974; Cain and Dooley, 1976; Ohbuchi, 1982; Carliner et al., 1984; Donaldson, 1991.
11 United Nations, 1985; Singh and Casterline, 1985.
12 Myrdal and Klein, 1956. As regards the trade-off relation between childbearing and market labor, there are some different opinions. According to Leibenstein, for example, most women do not work for cultural reasons. If so, the mother's time is not a significant factor in these areas. More important is the case that the net opportunity cost of a mother's time is not measured by her own earned revenue had she been able to work, but by the substitute babytendering costs of servants, grandparents or older siblings (Leibenstein, 1974, p.467). Easterlin also critisized that, when private or public facilities, or elderly relatives and older children are available for childcare, use of the wife's wage rate to evaluate all childcare time is likely to exaggerate the cost of children if the wife is above the lowest wage level (Easterlin, 1978, pp.65-6).
13 Jaffe and Azumi, 1960; Carleton, 1965; Stycos, 1965; Goldstein, 1972; Simmons, 1985, pp.81-2.
14 T. P. Schultz, 1969; Gendell et al., 1970; Costello and Costello, 1986; cf. Standing, 1983.

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