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Differential Fertility in Indonesia and the Philippines: A Multivariate Analysis

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Abstract

Drawing upon the data derived from the 1976 Indonesia Fertility Survey and the 1978 Republic of the Philippines Fertility Survey, the present study has attempted to identify the sources of differential fertility both in Indonesia and the Philippines. To disentangle the effect of various socioeconomic factors upon fertility changes in both countries, the author has analyzed these data sets on the basis of multiple classification analysis. It should be stressed that this multivariate analytical tool has been applied to tabulated results rather than individual records.

The statistical results of this study show that the development of Indonesia is still at a very early stage where the pattern of fertility changes is greatly influenced by a variety of nondevelopmental, involuntary factors. In contrast, the Philippines is at a more advanced stage of socioeconomic development and demographic transition where a number of voluntary factors have been considerably operating with regard to the relationship between fertility and development-related variables.

I Introduction

In the recent past, there has been increasing evidence that in many Asian countries population growth has been curbed at a pace much faster than most of the demographers had earlier anticipated.

Within Asia, however, there are pronounced interregional differentials in the pattern of population growth. In East Asia, which contains Japan and China, the average annual population growth rate over the period of 1975-1980 was 1.38 percent, and 2.22 percent for South Asia. At the end of this century, it is estimated to be 1.02 percent and 1.72 percent, respectively.

Furthermore, within South Asia, there are substantial intraregional differentials in the level of population growth. During the period of 1975-1980, Eastern South Asia had a population growth rate of 2.07 percent per annum, Middle South Asia, 2.21 percent, and Western South Asia, 2.84 percent.

In addition to these differentials in the level of population growth, these three subregions have been experiencing a different pace of change in population growth. Over the period of 1970-1975, the average annual population growth rate was 2.54 percent for Eastern South Asia, 2.38 percent in Middle South Asia, and 2.81 percent for Western South Asia. A brief comparison of these figures reveals that the slowdown of

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population growth is extremely fast in Eastern South Asia.

The major source of this impressive decline in the pace of population growth in Eastern South Asia is fertility reduction, partly due to a wider use of contraception and partly due to a rise in age at first marriage. These demographic changes have been confirmed by four countries in Eastern South Asia through their fertility surveys conducted as part of the World Fertility Survey (WFS) program. These four countries are Thailand, Indonesia, Malaysia and the Philippines.

Among these four countries, the author has selected both Indonesia and the Philippines for the present study primarily because of data accessibility. Drawing upon the fertility survey data of Indonesia and the Philippines, this paper attempts to shed some light upon fertility differentials by socioeconomic factors in these countries. Because these countries are currently at different stages of demographic transition, a comparative analysis of differential fertility of these two countries will provide a useful base for further clarification of the interrelationship between population factors and socioeconomic variables, which in turn, may contribute to a better integration of the demographic component into development planning schemes not only in these countries but in other Asian developing countries as well.

Methodologically, the core part of this study is analyzed on the basis of multiple classification analysis which has been widely used in the analysis of survey data. It should be noted, however, that in this paper this multivariate analytical tool is applied not to a set of individual records but to *tabulated* results. Because the application of multiple classification analysis to *tabulations* is a rarity in the literature, the statistical procedure for such application will be also presented in a later section.

II Data Employed

Indonesia carried out in 1976 an inter-censual population survey (called SUPAS) so as to gather information on population change at the middle of the census decade 1971-1981. The data were collected in three phases. SUPAS I was a large-scale household survey with emphasis upon the collection of basic demographic characteristics of the population. SUPAS II, which is a sub-sample of SUPAS I, listed more detailed demographic and socioeconomic characteristics. SUPAS III, or the Indonesia Fertility Survey (IFS), was undertaken by the Central Bureau of Statistics in close cooperation with the National Family Planning Co-ordination Board (BKKBN).

The IFS covered only the islands of Java and Bali, in which two-thirds of the Indonesian population reside. These islands consist of six provinces, five in Java and the province of Bali. In terms of population size, Bali has 2.4 percent; Jakarta, 5.1 percent; Yogyakarta, 3.2 percent; West Java, 28.4 percent; Central Java, 27.6 percent; and East Java, 33.3 percent. Based upon the WFS core questionnaire, the IFS data were gleaned from a total of 9,136 ever-married women aged under 50. The data set used for the present study has been

weighted appropriately to compensate for the regional differences in selection probabilities.

The Republic of the Philippines Fertility Survey (RPFS) was conducted in 1978 by the National Census and Statistics Office in close collaboration with the University of the Philippines Population Institute, the Commission on Population, and the National Economic and Development Authority. The RPFS, based upon a multistage stratified cluster sample of 742 *barangays*, covered a total of 9,268 ever-married women aged 15-49 years. The RPFS was restricted to the de jure population in the following three major geographical areas: Luzon with a 55.2 percent of the total sample; Visayas, 23.9 percent; and Mindanao, 20.9 percent. Similar to IFS, the RPFS data set employed for the present study has been properly weighted to adjust the difference in selection probabilities.

Most of the data used for this study have been collected from the first country report of each WFS-related survey [1 ; 8]. Insofar as Indonesia is concerned, however, additional tabulated data have become available to the author through the generous permission of the Indonesian Government to use the data of the IFS. As for the Philippines, several tabulations have been provided through the courtesy of the University of the Philippines Population Institute. Although additional tabulations for a more in-depth study have been recently requested to the UPPI, they have not yet been completed at the time this paper was written. For this reason, the analysis of the IFS is based upon a greater variety of background variables, as compared with that of the RPFS.

Ⅲ Description of the Explanatory Variables for the IFS

The fertility variables to be considered in this paper are (i) the number of children ever born to all ever-married women, and (ii) the number of children born in the past five years confined to women who had been continuously in the married state for the past five years. The former represents the women's fertility experience up to the time of the survey, while the latter shows their recent and current fertility behavior.

To account for variations in these two dependent variables, several demographic as well as background variables have been selected, subject to limited data availability. In the case of Indonesia, the list of the background variables selected for the analysis of the number of children ever born to all ever-married women includes (i) Region of Residence (Jakarta, West Java, Central Java, East Java, Yogyakarta, Bali), (ii) Level of Education (No Schooling, Primary-Incomplete, Primary-Completed, Junior High, Senior High +), (iii) Husband's Occupation (Professional and Clerical, Sales and Services, Manual, Agricultural, Others and Never Worked), (iv) Childhood Type of Place of Residence (Village, Town, City), and (v) Occupation Before Marriage (Professional and Clerical, Sales and Services, Manual, Agricultural, Others and Never Worked).

Table 1 presents a two-way association between the four main background variables. For each specified category of each background variable, the table exhibits row percent distributions with respect to categories of all other background variables. Based upon this table, the following several observations appear to be worth remarking. First of all, women residing in Jakarta have a higher level of educational attainment than those living elsewhere. Eleven percent of the respondents in Jakarta have completed a level of senior high schools or higher. In contrast, more than half of the women in Central Java, East Java, Yogyakarta and Bali have no schooling at all.

Secondly, women with higher educational attainment tend to be married to husbands whose occupations are professional or clerical. On the other hand, 63 percent of the women with No Schooling are married to husbands who are in the agricultural sector.

Thirdly, as for their occupational statuses, highly educated women are more likely to hold professional or clerical types of work prior to their marriage, as compared with those with lower educational achievement. Women with low education tend to be engaged in agricultural work before they were married.

Fourthly, the women who had been in the agricultural sector before they were married have a high probability (85 percent) of being married to husbands working on farms. A similar pattern can be observed with those women who used to hold professional or clerical jobs; their husbands are also professional or clerical workers. Hence, both husbands and wives have homogenous occupational backgrounds.

Fifthly, women's occupational statuses prior to marriage differ considerably from region to region. The majority of women in Jakarta, West Java and Bali had no work experience before their marriage. Those who reside in other regions have higher labor force participation rates. Particularly, those who are in the Bali region were engaged in agricultural or sales and service sectors in their premarital days, and only 19 percent of them never worked. (These findings are consistent with results of the 1971 Census.)

Sixthly, most of the women who reside in the regions other than Jakarta spent their childhood in villages. In Bali 92 percent of the women lived in villages when they were children. Forty-three percent of those who live in Jakarta, however, spent childhood in towns, as opposed to 31 percent in villages and 26 percent in cities. Furthermore, for women whose childhood place of residence was villages, more than half (65 percent) of them have no educational attainment. The probability of women receiving an educational level of senior high schools or higher is 15 times larger for those who lived in cities in their childhood than for those who resided in villages.

The above two-way associations between the selected background variables suggest that the structure of the Indonesian society represented by these sampled women is extremely complex due to different regional cultures and customs. In

Table 1 Association between Background Variables: Within a Specified Category of a Background Variable, the Percentage Distribution According to Categories of Other Background Variables (The Case of the IFS)

	Region of Residence						Level of Education					Husband's Occupation					Childhood Type of Place of Residence			Occupation Before Marriage				
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(1)	(2)	(3)	(4)	(5)
Total	6	28	28	3	33	2	48	35	12	3	2	8	18	16	57	1	77	18	5	2	8	5	31	54
Region of Residence																								
(1)Jakarta							27	33	19	10	11	25	35	35	4	1	31	43	26	10	12	9	2	67
(2)West Java							40	40	16	2	2	8	23	19	48	2	69	25	6	2	5	5	20	68
(3)Central Java							53	35	9	2	1	6	14	4	65	1	83	15	2	2	10	5	36	47
(4)Yogyakarta							55	26	12	4	4	11	10	15	63	1	89	9	2	2	20	18	41	19
(5)East Java							53	34	10	2	1	6	15	12	66	1	84	13	3	2	8	4	40	46
(6)Bali							58	27	10	3	2	8	9	17	65	1	92	6	2	1	17	9	21	52
Level of Education																								
(1)No Schooling	3	24	31	3	36	3						4	17	15	63	1	81	16	3	0	9	5	36	50
(2)Primary-Incomplete	5	32	28	2	32	1						5	19	16	59	1	79	17	4	0	7	6	31	56
(3)Primary-Completed	9	39	20	3	27	2						17	21	21	40	1	65	26	9	4	6	6	16	68
(4)Junior High	23	23	23	4	26	1						37	30	23	8	2	43	35	22	17	6	5	3	69
(5)Senior High +	29	26	17	5	21	2						62	21	12	3	2	35	35	30	49	3	1	1	46
Husband's Occupation																								
(1)Professional, Clerical	17	29	21	4	27	2	27	15	23	15	20						55	28	17	18	8	3	8	63
(2)Sales, Services	10	37	22	2	28	1	57	23	12	5	3						64	27	9	3	13	6	12	66
(3)Manual	12	33	25	3	25	2	58	21	14	5	2						64	28	8	2	10	14	11	63
(4)Agricultural	1	24	32	3	38	2	69	23	8	0	0						88	11	1	0	6	3	46	45
(5)Others, Never Worked	6	35	23	2	23	0	62	18	11	5	4						76	17	7	2	6	4	11	77
Childhood Type of Place of Residence																								
(1)Village	2	26	30	3	36	3	65	23	9	2	1	6	15	13	65	1				1	8	5	35	51
(2)Town	13	38	24	1	23	1	53	21	15	6	5	12	27	25	35	1				5	9	7	19	60
(3)City	29	35	13	2	21	0	34	17	19	15	15	27	34	25	12	2				13	9	8	4	66
Occupation Before Marriage																								
(1)Professional, Clerical	24	27	19	2	27	1	7	1	18	23	51	59	21	14	5	1	37	35	28					
(2)Sales, Services	8	16	34	7	31	4	69	19	8	3	1	7	29	20	43	1	74	20	6					
(3)Manual	9	24	29	10	24	4	60	24	13	3	0	5	23	42	29	1	67	26	7					
(4)Agricultural	1	18	33	4	43	1	72	22	6	0	0	2	7	6	85	0	88	11	1					
(5)Others, Never Worked	7	37	25	10	29	2	57	23	14	4	2	9	23	18	48	2	73	21	6					

Table 2 Relative Distribution of IFS Respondents According to Current Age and Marital Duration within Categories of Each Background Variable

	Age Group							Years Since First Marriage		
	<20	20-24	25-29	30-34	35-39	40-44	45+	<10	10-19	20+
Region of Residence										
Jakarta	0.80	1.13	1.03	1.10	1.08	0.92	0.79	1.19	1.06	0.78
West Java	1.32	1.13	1.03	0.99	0.96	0.77	0.78	1.13	0.97	0.90
Central Java	0.88	0.95	0.96	1.03	0.87	1.25	1.07	0.91	0.99	1.10
Yogyakarta	0.40	0.88	0.97	1.06	1.09	1.25	1.33	0.94	1.00	1.05
East Java	0.94	0.91	0.98	0.94	1.11	1.00	1.16	0.92	1.01	1.07
Bali	0.55	1.07	1.29	1.26	1.19	0.71	0.62	1.32	1.23	0.51
Level of Education										
No Schooling	0.67	0.73	0.79	1.04	1.22	1.30	1.35	0.70	0.95	1.33
Primary-Incomplete	1.58	1.31	1.29	0.93	0.69	0.60	0.50	1.33	1.09	0.62
Primary-Completed	1.87	1.70	1.31	0.89	0.38	0.37	0.33	1.67	1.08	0.30
Junior High	0.90	1.50	1.42	0.85	0.94	0.54	0.48	1.56	1.08	0.40
Senior High +	0.29	1.35	1.76	1.29	1.04	0.46	0.17	1.93	1.04	0.09
Husband's Occupation										
Professional, Clerical	0.68	1.05	1.41	1.04	1.02	0.73	0.89	1.18	1.17	0.69
Sales, Services	1.02	0.97	0.98	1.07	0.98	1.08	0.88	0.97	1.04	1.00
Manual	1.10	1.17	1.03	0.99	1.01	0.81	0.81	1.11	1.04	0.86
Agricultural	0.99	0.94	0.95	0.99	1.00	1.07	1.11	0.94	0.96	1.09
Others, Never Worked	1.81	1.61	0.71	0.40	0.93	0.79	0.93	1.40	0.73	0.84
Childhood Type of Place of Residence										
Village	1.00	0.98	1.01	0.99	1.00	1.01	1.01	0.97	1.01	1.03
Town	0.98	1.08	1.00	1.03	0.99	0.91	0.97	1.07	1.02	0.92
City	1.00	1.05	0.88	0.99	1.01	1.09	0.99	1.27	0.84	0.88
Occupation Before Marriage										
Professional, Clerical	0.17	0.86	1.29	1.16	1.41	1.01	0.74	1.41	1.18	0.47
Sales, Services	0.74	0.82	0.84	0.95	1.10	1.20	1.50	0.89	0.91	1.17
Manual	1.42	1.05	0.89	0.93	0.90	0.94	0.97	1.27	0.81	0.89
Agricultural	0.94	1.04	0.93	0.99	0.99	1.08	1.03	0.99	0.95	1.05
Others, Never Worked	1.07	1.01	0.06	1.01	0.98	0.93	0.92	0.98	1.05	0.98

addition to these cultural factors, the economic development of this society appears to have affected each region differently. More importantly, it is also expected that these women with different background characteristics would differ in their distribution in terms of demographic variables. Let us now examine the two-way association of demographic variables and each of these background variables.

From Table 2 one can note that young women are overrepresented in West Java and seriously underrepresented in both Yogyakarta and Bali. Women at older ages are substantially underrepresented in Jakarta, West Java and Bali. Level

of Education also shows pronounced differences by age. Women with No Schooling are much older than those with some education. In contrast, women with Primary Schooling (both Primary-Incomplete and Primary-Completed) belong to the young age groups. This is very clear particularly for those who completed primary school education. A similar observation can be made for other higher educational categories. However, those with Senior High are underrepresented in their young age group, primarily due to a higher (and rising) age at marriage.

As compared with these background variables, husband's occupational differences are less pronounced. Women with husbands in the professional and clerical category are rather overrepresented in the middle age groups. (This might be again explained by their higher ages at marriage.) Women whose husbands are in the category of Manual are marginally underrepresented among young age groups. Women with husbands engaged in the agricultural sector are somewhat overrepresented among older age groups. Childhood Type of Place of Residence shows no clear distributional difference. Women's Occupation Before Marriage has a relative distribution similar to that for Husband's Occupation.

The right-hand side panel of Table 2 shows the relative distribution of these women by marital duration. Categories in which differences in age-distribution are closely related to differentials and trends in age at marriage are affected. This point is clearly demonstrated by the pattern of

Table 3 Age at Marriage of Ever-married Women by Background Variable in Indonesia

Background Variable	Percentage Distribution	Age at Marriage*
Region of Residence		
Jakarta	5.3	16.8
West Java	26.4	14.7
Central Java	29.2	15.2
Yogyakarta	3.0	17.2
East Java	34.1	15.1
Bali	2.0	18.2
Level of Education		
No Schooling	69.1	14.9
Primary-Incomplete	18.7	15.1
Primary-Completed	7.4	16.3
Junior High	2.5	18.3
Senior High +	2.1	20.7
Husband's Occupation		
Professional, Clerical	7.7	16.9
Sales, Services	18.4	15.3
Manual	15.0	15.5
Agricultural	58.0	14.9
Others, Never Worked	0.9	15.5
Childhood Type of Place of Residence		
Urban	15.7	16.6
Rural	84.3	15.0
Occupation Before Marriage		
Professional, Clerical	2.2	19.8
Sales, Services	8.7	15.9
Manual	4.8	16.2
Agricultural	30.8	15.2
Others, Never Worked	53.5	14.8

* The mean age at marriage of the total sample is 15.2.

N. B. It should be noted that age at marriage presented in this table has been computed on the basis of those women who are currently above age 25 and were married before age 25. This truncation of the data, which is commonly observed in WFS-related country reports, has been done with a view to equalizing exposure to the risk of marriage in all age groups to be compared [1]. Although young age groups are truncated from the data set, one can still recognize the effect of rising age at marriage upon marital duration. The IFS Country Report contains information on age at marriage by background variable only on the basis of the truncated data set.

age at first marriage for these background variables, as indicated in Table 3.

As regards Region of Residence, women with a short marital duration in Jakarta and Bali are overrepresented. A similar effect can be observed with respect to women with a short marital duration in the higher educational categories. Both City and Professional, Clerical categories show the same pattern.

IV Cumulative and Current Fertility Based Upon the IFS

This section deals with the description of the pattern of the two dependent variables in terms of each explanatory variable for Indonesia. Table 4 presents the number of children ever born (CEB) to ever-married women and the number of children born in the past five years (CB5) to the women who have been married for at least five years, in relation to seven demographic and background variables.

Let us first discuss the pattern of CEB on a classification-by-classification basis. Both Current Age and Marital Duration, which are demographic variables, show *a priori* expected patterns: the older the women's age is and the longer she has been married, the more children she has borne. One should note, however, that for the two oldest age groups, 40-44 and 45-49, the mean number of CEB is rather low in a traditional society where most of women were married very young and were not exposed to the use of any effective contraceptive method throughout their reproductive span. It may be hypoth-

Table 4 Cumulative and Current Fertility Levels for Various Explanatory Variables in Indonesia, 1976

Explanatory Variable	Number of Children Ever Born	Number of Children Born in Past Five Years
Current Age		
<20	0.59	1.36
20-24	1.66	1.55
25-29	2.82	1.41
30-34	4.03	1.15
35-39	4.83	0.81
40-44	5.32	0.49
45-49	5.22	0.22
Marital Duration		
<10	1.35	1.56
10-19	3.76	1.18
20+	5.23	0.53
Region of Residence		
Jakarta	3.74	1.16
West Java	3.49	1.14
Central Java	3.73	0.95
Yogyakarta	3.39	0.80
East Java	3.16	0.80
Bali	3.56	1.14
Level of Education		
No Schooling	3.82	0.84
Primary-Incomplete	2.97	1.17
Primary-Completed	2.72	1.26
Junior High	3.10	1.24
Senior High +	2.57	1.15
Husband's Occupation		
Professional, Clerical	3.50	1.08
Sales, Services	3.63	1.08
Manual	3.48	1.09
Agricultural	3.42	0.88
Others, Never Worked	2.71	0.79
Childhood Type of Place of Residence		
Village	3.43	0.94
Town	3.56	1.02
City	3.65	1.07
Occupation Before Marriage		
Professional, Clerical	3.27	0.96
Sales, Services	3.76	0.91
Manual	3.24	1.01
Agricultural	3.29	0.88
Others, Never Worked	3.55	1.02

esized that this low level of completed fertility is due to high marital instability and subfecundity widely prevalent in rural areas [2]. (In the IFS, two-fifths of the sampled women have experienced marital disruption.)

Because Indonesia is a pluralistic society, caution should be exercised in interpreting regional differences of fertility. Because of pronounced differences in cultural and socioeconomic factors, the nuptiality pattern and family planning acceptance vary with regions. Following some of earlier studies [2 ; 5], one can roughly categorize Central Java and Bali as areas with high marital fertility and low proportions married, and East Java, as an area with the reversed pattern. The remaining regions can be considered as areas where both marital fertility and the proportion married are high. Based upon this categorization, cumulative fertility for West Java in Table 4 appears to be too low. The mean number of CEB for West Java is 3.49, which is the third lowest among all the regions. (The source of this contradictory pattern will be explained in Section VIII.)

The simple two-way association between the mean number of CEB and Level of Education indicates an interesting pattern. Although one can note the inverse association with fertility over the lower educational range, women with an educational level of Junior High have higher fertility than those with either Primary-Incomplete or Primary-Completed. Women with a level of Senior High+, however, have lower fertility than those with Junior High. Note that although these two highest educational categories are combined, the mean number of CEB for this combined category (2.87) is still higher than that of Primary-Completed.

As regards Husband's Occupation, women with husbands in the category of Professional and Clerical have almost the same fertility level as those of Agricultural. The women with husbands engaged in the type of Manual work have slightly lower fertility than those with their husbands having Professional jobs. Women whose husbands are categorized as Sales and Services have the highest fertility among all these occupational groups. Because both Sales and Manual cover a wide range of socioeconomic statuses, the interpretation of these categories is extremely intricate. Women whose husbands belong to the category of Others or Never Worked have the lowest mean number of CEB.

In the analysis of fertility, norms and values, which are formed in one's childhood or pre-marital days, are considered to have a certain effect on reproductive behavior. For this reason, both Childhood Type of Place of Residence and Occupation Before Marriage are included in the present study. The observed pattern of fertility is quite contrary to that prevailing in economically advanced societies. The degree of urbanity is positively related to fertility levels; the mean number of CEB for City is 3.65 and that for Village, 3.45. With regard to Occupation Before Marriage, the pattern is very close to that for Husband's Occupation. This seems to support the hypothesis of the occupational homogeneity in mating, as has been observed in the previous section.

Let us now look at the pattern of CB5 for each classification. The mean number of CB5 shows an inverted U-shape with respect to Current Age, which conforms to *a priori* expectation, and agrees with the pattern observed during the intercensal period of 1961-1970 [2]. In terms of regional differences, the pattern of CB5 is quite comparable to that of CEB, except for West Java.

As distinct from CEB, Level of Education affects CB5 slightly differently; although the nonlinearity between educational attainment and fertility is observed, the highest fertility level is marked by those with an educational level of Primary-Completed rather than Junior High.

Other classifications show patterns quite similar to those for CEB, except that women who had professional and sales-related jobs before their marriages have lower fertility than those who had manual jobs.

In the following two sections, both explanatory and dependent variables to be used for the multivariate analysis of the Philippines will be discussed.

V Description of the Explanatory Variables for the RPFS

From the RPFS the following background variables have been considered for the analysis of cumulative fertility: (i) Region of Residence (Metro Manila, Luzon, Visayas, Mindanao); (ii) Level of Education (No Schooling, Primary, Intermediate, High School, Some College, College with Degree+); and (iii) Type of Place of Residence (Urban, Rural). Note that in the classification of Region of Residence, Metro Manila is considered separately from Luzon, although the former geographically belongs to the latter. With regard to the analysis of recent and current fertility, the two additional background variables are included: Religion (Roman Catholic, Protestant, Iglesia ni Kristo, Aglipayan, Islam, Others), and Husband's Occupation (Never Worked, Professional, Clerical, Sales, Agriculture Self-employed, Agriculture Not Self-employed, Private Household, Other Services, Manual Skilled, Manual Unskilled). Mention should be made pertaining to the classification of Religion. Iglesia ni Kristo represents those who are members of an indigenous Filipino offshoot of Christianity founded in 1914 by Felix Manalo [8]. Aglipayan includes those who support the Philippine Independent Church founded in 1902 by Gregorio Aglipay, a former Roman Catholic priest [8].

Just as has been done for the IFS, let us analyze the two-way association between these selected background variables. Table 5 presents the percentage distribution within each category of a background variable according to categories of other background variables. It is clearly shown in this table that, as compared with Indonesia, the general educational level of the Philippines is substantially higher. The proportion of women with no education is practically nil in urban areas, particularly in Metro Manila. In Mindanao, the proportion of women with No Schooling is 10 percent which is the highest among all the regions.

Table 5 Association between Background Variables: Within a Specified Category of a Background Variable, the Percentage Distribution According to Categories of Other Background Variables (The Case of the RPFS)

	Region of Residence				Level of Education						Type of Place of Residence		Religion						Husband's Occupation							
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Total	12	43	24	21	6	24	37	21	5	7	32	68	85	3	2	4	3	3	6	4	6	30	20	6	23	4
Region of Residence																										
(1)Metro Manila					1	7	27	37	12	16	100	0	90	3	3	1	1	2	15	11	10	1	1	12	42	6
(2)Luzon					5	25	42	18	4	6	23	77	85	4	3	5	0	3	5	4	5	29	24	6	23	4
(3)Visayas					7	32	36	16	3	6	22	78	93	2	1	3	0	1	4	3	6	36	25	5	17	4
(4)Mindanao					10	23	33	21	5	8	21	79	73	4	2	4	12	5	7	4	6	40	18	4	16	4
Level of Education																										
(1)No Schooling	2	34	27	37							10	90	66	6	1	3	20	4	1	0	3	53	29	2	9	3
(2)Primary	4	44	32	20							15	85	86	3	2	4	2	3	1	1	3	43	31	3	16	2
(3)Intermediate	9	49	23	19							26	74	87	3	2	4	1	3	2	2	6	32	23	5	25	5
(4)High School	23	38	18	21							50	50	87	3	3	3	2	2	8	7	8	18	11	11	32	5
(5)Some College	30	31	16	23							63	37	87	4	2	3	3	1	21	16	9	7	4	15	26	2
(6)College with Degree +	27	34	18	21							65	35	86	5	1	2	3	2	38	17	11	6	1	11	13	3
Type of Place of Residence																										
(1)Urban	39	30	17	14	2	12	30	32	9	15			89	2	3	2	2	2	13	10	11	7	6	11	36	6
(2)Rural	0	49	27	24	8	30	40	15	3	4			84	3	2	4	3	4	3	2	4	40	27	4	17	3
Religion																										
(1)Roman Catholic	13	43	26	18	5	24	37	21	5	8	34	66							6	5	6	28	20	7	24	4
(2)Protestant	11	47	14	28	11	27	27	16	6	12	27	73							11	6	4	33	24	5	13	4
(3)Iglesia ni Kristo	17	56	8	19	4	22	39	26	5	4	38	62							4	2	8	23	21	6	30	6
(4)Aglipayan	3	55	22	20	4	27	43	19	3	4	18	82							3	1	3	39	29	5	17	3
(5)Islam	6	0	0	93	44	17	11	13	5	10	24	76							13	3	10	51	8	6	4	5
(6)Others	7	46	11	36	7	25	41	18	3	6	17	83							7	2	5	41	23	3	17	2
Husband's Occupation*																										
(1)Professional	29	33	14	24	1	3	10	26	15	45	67	33	83	5	1	2	5	4								
(2)Clerical	32	25	16	17	0	4	16	33	17	30	71	29	90	5	1	1	2	1								
(3)Sales	22	34	23	21	3	13	36	27	7	14	59	41	86	2	3	2	4	3								
(4)Self-empl. Agr.	1	42	29	28	10	35	39	13	1	2	8	92	81	4	2	5	4	4								
(5)Nons-empl. Agr.	1	50	30	19	8	37	42	11	1	1	9	91	85	4	2	5	1	3								
(6)Services	25	41	19	15	2	10	29	35	11	13	58	42	89	2	2	3	3	1								
(7)Manual Skilled	23	44	18	15	2	17	41	30	6	4	50	50	90	2	3	3	0	2								
(8)Manual Unskilled	19	37	25	19	4	15	47	26	3	5	47	53	86	4	3	3	3	1								

* Because of its small sample size, the "Never Worked" category has been omitted. The category of "Private Household" has been combined with that of "Services."

Besides such regional differences, educational levels rise with the degree of urbanity. In urban areas, 24 percent of the women covered by the RPFS have college-level education (Some College and College with Degree+). On the other hand, only four percent of the women in rural areas have the same level of education.

Highly educated women tend to hold professional or clerical types of work. In contrast, women in the agricultural sector are equipped with low levels of education. As regards Religion, 85 percent of the respondents are Roman Catholic. For this reason, one can hardly recognize educational differences by religion, except that Islamic women, the majority of whom reside in Mindanao, have relatively low education.

Apart from educational characteristics, the RPFS shows that the Philippines is basically an agricultural country with approximately 80 percent of its population in rural areas. As compared with Indonesia's 57 percent, 50 percent of the respondents' husbands are in the agricultural sector. One may say that the level of economic development is somewhat higher in the Philippines than in Indonesia. In addition, the social development of the Philippines is also considerably more advanced than that of Indonesia, as has been discussed with regard to education.

Table 6 presents the relative distribution of the RPFS women according to their current ages and marital duration within categories of each background variable. Let us first examine the distribution of the RPFS respondents in terms of age-cohorts. As regards regional differences, married women in Metro Manila are underrepresented in their young age group (15-19 years old), while those in Mindanao are overrepresented in their young age groups, 15-19, 20-24 and 25-29. Educational differences are even more pronounced. Although women with No Schooling are grossly underrepresented in young age groups, they are enormously overrepresented in older groups. (This pattern simply reflects the vast educational improvements over time.) Although young women are also underrepresented for the category of Primary, the degree of its underrepresentation is much less than that for those with No Schooling. More importantly, in higher educational categories young age groups are overrepresented. It may be worth noting that women in Some College are underrepresented in the age group of 15-19. This can be accounted for by their higher ages at marriage. Furthermore, the women of this category are extremely overrepresented in the next age groups, 20-24, and 25-29. This pattern of educational differences is quite comparable to that of Indonesia.

Urban women are considerably underrepresented in the group of 15-19 while rural women of this age group are slightly overrepresented. In terms of Religion, although Roman Catholic women are properly represented for all age groups, women who have faith in Iglesia ni Kristo, Islam and Others are overrepresented in younger groups, but underrepresented in older age groups.

Husband's occupational categories show

Table 6 Relative Distribution of RPFS Respondents According to Current Age and Marital Duration within Categories of Each Background Variable

	Age Group							Years Since First Marriage		
	<20	20-24	25-29	30-34	35-39	40-44	45+	<10	10-19	20+
Region of Residence										
Metro Manila	0.60	0.97	1.17	1.09	0.90	0.97	0.92	1.19	0.94	0.83
Luzon	0.93	1.00	0.90	1.03	0.99	1.03	1.08	0.94	1.03	1.07
Visayas	0.93	0.82	1.00	0.99	1.04	1.08	1.04	0.94	1.06	1.02
Mindanao	1.40	1.21	1.12	0.88	1.00	0.88	0.82	1.11	0.94	0.93
Level of Education										
No Schooling	0.57	0.77	0.48	0.65	0.99	1.23	2.33	0.55	0.82	2.37
Primary	0.83	0.68	0.77	0.89	1.10	1.24	1.42	0.69	1.04	1.51
Intermediate	1.30	1.08	1.01	1.10	1.07	0.91	0.68	1.01	1.11	0.87
High School	1.27	1.42	1.18	0.88	0.78	0.99	0.72	1.26	0.90	0.81
Some College	0.40	1.54	1.67	1.09	0.53	0.50	0.69	1.68	0.78	0.39
College with Degree +	—	0.26	1.21	1.36	1.20	0.81	1.08	1.33	1.04	0.60
Type of Place of Residence										
Urban	0.70	0.94	1.05	1.08	0.97	1.01	0.98	1.10	0.99	0.87
Rural	1.13	1.03	0.98	0.96	1.01	1.00	1.01	0.95	1.01	1.06
Religion										
Roman Catholic	0.93	0.97	1.00	1.01	1.00	1.03	0.98	0.99	1.02	1.20
Protestant	1.00	0.92	1.03	1.02	1.09	0.75	1.16	0.91	1.12	1.04
Iglesia ni Kristo	1.38	1.38	0.92	0.99	0.83	0.89	1.02	1.10	1.03	1.05
Aglipayan	0.93	0.75	0.97	0.75	1.23	1.08	1.24	0.86	0.98	1.26
Islam	2.45	1.66	1.20	0.99	0.53	0.76	0.65	1.45	0.72	0.85
Others	2.07	1.41	0.80	0.88	0.96	0.74	1.17	1.14	0.83	1.18
Husband's Occupation										
Professional	0.41	0.50	1.01	1.28	1.10	0.93	1.15	1.11	1.13	0.72
Clerical	0.69	0.95	1.20	1.04	0.79	1.01	1.02	1.29	0.88	0.83
Sales	0.83	0.76	1.02	1.18	1.04	0.97	0.98	1.01	1.03	0.99
Self-empl. Agr.	1.28	0.88	0.90	0.98	1.00	1.04	1.18	0.86	1.00	1.22
Nons-empl. Agr.	1.34	1.18	0.95	0.88	1.02	0.99	0.98	0.96	1.02	1.04
Services	0.86	1.07	1.04	0.89	0.88	1.23	0.99	1.10	0.96	1.00
Manual Skilled	0.72	1.14	1.12	1.02	1.02	0.90	0.81	1.11	1.01	0.83
Manual Unskilled	0.86	1.24	0.94	1.05	0.96	1.08	0.73	1.11	1.00	0.99

Source : [8]

a considerable skewness for various age groups. Women with their husbands holding professional, clerical and sales-related jobs are underrepresented in their young age groups. In contrast, women who are married to husbands working in the agricultural sector are overrepresented in young age groups. Women with their husbands belonging to the categories of Manual Skilled and Manual Unskilled are underrepresented in the age group of 15-19, but overrepresented in the next age

Table 7 Age at Marriage of Ever-married Women by Background Variable in the Philippines

Background Variable	Percentage Distribution	Age of Marriage*
Region of Residence		
Metro Manila	11.8	19.7
Luzon	43.6	18.7
Visayas	24.2	18.9
Mindanao	20.5	18.7
Level of Education		
No Schooling	6.6	17.4
Primary	27.2	18.1
Intermediate	37.4	18.8
High School	19.2	19.6
Some College	3.9	20.4
College with Degree +	5.6	21.5
Type of Place of Residence		
Urban	30.5	19.5
Rural	69.5	18.6
Religion		
Roman Catholic	85.7	18.9
Protestant	3.4	18.6
Iglesia ni Kristo	2.0	19.2
Aglipayan	3.8	18.8
Islam	2.2	17.9
Others	2.8	18.7
Husband's Occupation		
Professional	5.7	20.3
Clerical	3.8	20.1
Sales	6.1	19.3
Self-empl. Agr.	31.7	18.3
Nons-empl. Agr.	20.8	18.5
Services	5.5	19.3
Manual Skilled	22.5	19.2
Manual Unskilled	3.8	19.1

* The mean age at marriage for the whole sample is 18.9.

groups, 20-24 and 25-29.

Let us now consider the relative distribution on the basis of marriage-cohorts, which is shown in the right-hand panel of Table 6. Just as the case with Indonesia, one can easily note that those women with short marital duration (<10) show a markedly different pattern in comparison to that for young age groups. This difference can be attributed to the fact that age at marriage varies greatly with women's background characteristics [3]. Table 7 substantiates this demographic phenomenon.

Within the categories of Region of Residence, there is a difference of one year between Metro Manila (19.7 years) and Luzon or Mindanao (18.7 years). Level of Education presents a difference of 4.1 years between the lowest and the highest educational category. Urban women show a higher mean age at marriage than rural women by 0.9 years. Regarding Religion, there is a difference of 1.3 years between Iglesia ni Kristo and Islam. Within the categories of Husband's Occupation, women whose husbands are professional are matriculated two years later than those whose husbands are self-employed agricultural workers. These differentials in the mean age at marriage by background characteristics appear to suggest that education has been playing a principal role in the changing nuptiality pattern in the Philippines.

VI Cumulative and Current Fertility Based Upon the RPFS

As with the IFS, this section examines on the basis of the RPFS the pattern of both cumulative and recent fertility for each classification variable, as shown in Table 8.

The pattern of the mean number of CEB with regard to Current Age and

Table 8 Cumulative and Current Fertility Levels for Various Explanatory Variables in the Philippines, 1978

Explanatory Variable	Number of Children Ever Born	Number of Children Born in Past Five Years
Current Age		
<20	0.85	1.51
20-24	1.89	2.17
25-29	2.96	1.83
30-34	4.27	1.44
35-39	5.66	1.18
40-44	6.74	0.75
45-49	7.00	0.28
Marital Duration		
<10	2.18	—
10-19	5.08	—
20+	7.55	—
Region of Residence		
Metro Manila	3.58	0.89
Luzon	4.79	1.20
Visayas	4.71	1.24
Mindanao	4.61	1.35
Level of Education		
No Schooling	5.81	1.00
Primary	5.71	1.26
Intermediate	4.62	1.32
High School	3.83	1.10
Some College	2.76	1.05
College with Degree+	3.10	0.99
Type of Place of Residence		
Urban	3.99	0.99
Rural	4.86	1.30
Religion		
Roman Catholic	4.60	1.20
Protestant	4.78	1.18
Iglesia ni Kristo	4.48	1.17
Aglipayan	4.74	1.13
Islam	4.92	1.36
Others	4.38	1.18
Husband's Occupation		
Professional	3.65	0.84
Clerical	3.39	0.87
Sales	4.13	1.02
Self-empl. Agr.	5.09	1.26
Nons-empl. Agr.	4.97	1.37
Services	4.14	0.91
Manual Skilled	4.39	1.21
Manual Unskilled	4.61	1.35

— not available
Source : [8]

Marital Duration is similar to that of Indonesia, except that the value of each category is considerably higher in the case of the Philippines. This may reflect the difference in the level of marital instability, subfecundity, nutrition and the duration of breastfeeding, etc. (In the RPFS, for instance, only eight percent of the sampled women have experienced marital dissolution, as compared with 40 percent for the IFS.)

Metro Manila, which is the most urbanized in the Philippines, has the lowest fertility level (3.58 children) among all the regions. Luzon excluding Metro Manila has the largest number of CEB (4.79), which is followed by 4.71 children for Visayas and 4.61 children for Mindanao.

With regard to educational differences, one can note an inverse association between educational attainment and fertility, except for the highest educational category. However, once the two highest educational categories are combined, the mean number of CEB is 2.96, thus presenting the perfectly inverse relationship between educational achievement and cumulative fertility.

Unlike the Indonesian case, the level of urbanity is negatively related to cumulative fertility. Urban women have given birth to 3.99 children while rural women, 4.86 children.

As regards Religion, Protestant women have the largest number of CEB (4.78), although they constitute one of the minority groups. The other minority group, Islam, has the lowest cumulative fertility level. The difference between these two

categories, however, is only 0.86 which is even slightly smaller than the urban-rural difference. Roman Catholic women, who are approximately 85 percent of the total sample, show cumulative fertility of 4.60 which falls in between these two categories.

Husband's occupational differences in the Philippines show a totally different picture, as compared with those for Indonesia. Women with higher socioeconomic statuses such as Professional and Clerical have a smaller number of CEB than those with lower statuses including farmers and manual workers. The difference between Clerical and Self-employed Agricultural amounts to 1.7 children, which is quite substantial.

In the above, the pattern of cumulative fertility in the Philippines has been discussed. Let us now consider the mean number of children born in the past five years. Just as the case with CEB, the pattern of CB5 is quite similar to that of Indonesia except that the former is substantially lower than the latter. In terms of Region of Residence, Metro Manila shows the lowest level (0.89), Mindanao has the largest mean number of CB5, which is followed by Visayas (1.24) and then Luzon (1.20). The order of the latter three regions is the opposite of that for CEB.

Level of Education has an inverted U-shaped pattern, which coincides with the Indonesian case. Women with an educational level of Intermediate have the largest number of CB5 (1.32), while those with College with Degree+ show the smallest number of CB5 (0.89).

Just as with CEB, urban women have a smaller number of children born in the past five years than their rural counterparts. The difference between these two categories is 0.31, which is not as large as that for Level of Education.

As for Religion, women who believe in Islam have the largest mean number of children born in the past five years. The second highest fertility group is Roman Catholic. The difference in the mean number of CB5 between Roman Catholic and Aglipayan (lowest fertility group) is only a 0.05 child.

The pattern of CB5 for Husband's Occupation is similar to that of CEB. The only exception is that both Manual Skilled and Manual Unskilled have a relatively large mean number of CB5.

In the foregoing four sections, we have discussed the socioeconomic structure of each society and its simple association with demographic factors. However, it remains to be examined how and to what extent each of these explanatory variables has actually affected both cumulative and current fertility levels. Because these socioeconomic factors are closely interrelated with each other and the pattern of CEB and CB5 is directly affected by the age composition of each classification, some of the multivariate analytical tools are required to disentangle the complex effects of these explanatory variables upon the levels of CEB and CB5. For this reason, we will apply multiple classification analysis to tabulated results, most of which are contained in the country report of the respective country. Before proceeding to

multivariate analyses, the statistical procedure for the multiple classification analysis based upon tabulations is in order.

Ⅶ Analytical Method

Because the basic statistical features of multiple classification analysis have been both intensively and extensively described elsewhere [9], some of the key procedures for applying multiple classification analysis to a set of tabulated results should be discussed in this section.

An additive model for multiple classification analysis (MCA) is based upon the following three mathematical expressions:

(1) $Y_i=\bar{Y}+\sum_{j=1}^{r}\alpha_j X_{ji}+\sum_{k=1}^{s}\beta_k Z_{ki}+\varepsilon_i$,

(2) $\sum_{j=1}^{r}X_{ji}=\sum_{k=1}^{s}Z_{ki}=1$, for all is, and

(3) $\sum_{j=1}^{r}\alpha_j\bar{X}_j=\sum_{k=1}^{s}\beta_k\bar{Z}_k=0$

The second term of the right-hand side of the first equation implies that the effect of the ith individual being in the jth category of the classification described by X_j is expressed as a deviation from the grand mean ($\bar{Y}$), adjusted for this individual being in the kth category of the classification of Z. A similar explanation is applicable to the third term of the right-hand side. The last term of the equation (1) represents the error of estimation, which is equal to zero in a least square solution. Equation (2) states that the classification of X_js is exclusive and exhaustive to that of Z_ks. In other words, each individual can and must be only in one category of each classification. Equation (3), which is an assumption, is required to enable one to identify these effect coefficients.

Given these three assumptions, one can generate the normal equations for MCA by multiplying equation (1) by each successive dummy variable for each individual and summing across all individuals. Note that because $\sum_{i=1}^{N}X_{ji}^2=\sum_{i=1}^{N}X_{ji}$ for dummy variables coded 1 and 0, and $\sum_{i=1}^{N}X_{ji}X_{li}=0$, $j\neq l$, for dummy variables within a set, one can express the system of normal equations as shown below:

$$\text{Set } X_j\begin{cases}\sum X_{1i}Y_i=\bar{Y}\sum X_{1i}+\alpha_1\sum X_{1i}+\sum_{k=1}^{s}\beta_k(\sum X_{1i}Z_{ki})\\ \vdots\qquad\vdots\qquad\vdots\qquad\vdots\\ \sum X_{ri}Y_i=\bar{Y}\sum X_{ri}+\alpha_r\sum X_{ri}+\sum_{k=1}^{s}\beta_k(\sum X_{ri}Z_{ki})\end{cases}$$

$$\text{Set } Z_k\begin{cases}\sum Z_{1i}Y_i=\bar{Y}\sum Z_{1i}+\sum_{j=1}^{r}\alpha_j(\sum Z_{1k}X_{ji})+\beta_1\sum Z_{1i}\\ \vdots\qquad\vdots\qquad\vdots\qquad\vdots\\ \sum Z_{si}Y_i=\bar{Y}\sum Z_{si}+\sum_{j=1}^{r}\alpha_j(\sum Z_{si}X_{ji})+\beta_s\sum Z_{si}\end{cases}$$

Furthermore, because a dummy variable can be regarded as a counter variable, the following three equations hold:

(6) $\sum_{i=1}^{N}X_{ji}=n_{j\cdot}$,

(7) $\sum_{i=1}^{N}X_{ji}Z_{ki}=n_{jk}$, and

(8) $\sum_{i=1}^{N}X_{ji}Y_i=n_j\bar{Y}_j$

Equation (6) states that the sum of a dummy variable for the jth category of X across all the individuals is equal to the number of persons falling into this category. Equation (7) implies that the product of a pair of dummy variables is just the number of individuals who are included in both groups. Equation (8) says that the sum of the product of a dummy variable and a continuous variable is just the sum of the continuous variable within the group

identified by the dummy variable.

By applying these definitions and identities, and shifting the first term on the right-hand side of each normal equation to the left, one may reformulate the system of normal equations for MCA as follows:

$$\text{Set } X_j \begin{cases} n_{1\cdot}(\bar{Y}_{1\cdot}-\bar{Y}) = n_{1\cdot}\alpha_1 + \sum_{k=1}^{s} n_{1k}\beta_k \\ \vdots \\ n_{r\cdot}(\bar{Y}_{r\cdot}-\bar{Y}) = n_{r\cdot}\alpha_r + \sum_{k=1}^{s} n_{rk}\beta_k \end{cases}$$

$$\text{Set } Z_r \begin{cases} n_{\cdot 1}(\bar{Y}_{\cdot 1}-\bar{Y}) = \sum_{j=1}^{r} \alpha_j n_{j1} + n_{\cdot 1}\beta_1 \\ \vdots \\ n_{\cdot s}(\bar{Y}_{\cdot s}-\bar{Y}) = \sum_{j=1}^{r} \alpha_j n_{js} + n_{\cdot s}\beta_s \end{cases}$$

The above system of normal equations, however, can not be solved in that they are linearly dependent. To make this system of normal equations solvable, one needs to eliminate the redundant equation in Set X_j and that in Set Z_k by replacing any one of the equations in each set by equation (3). Suppose that the last equation of each set is replaced by equation (3), then MCA coefficients can be obtained directly by solving the following system of equations:

$$\text{Set } X_j \begin{cases} n_{1\cdot}(\bar{Y}_{1\cdot}-\bar{Y}) = n_{1\cdot}\alpha_1 + \sum_{k=1}^{s} n_{1k}\beta_k \\ \vdots \\ n_{r-1\cdot}(\bar{Y}_{r-1\cdot}-\bar{Y}) = n_{r-1\cdot}\alpha_{r-1} + \sum_{k=1}^{s} n_{(r-1)k}\beta_k \\ 0 = \sum_{j=1}^{r} n_{j\cdot}\alpha_j \end{cases}$$

$$\text{Set } Z_r \begin{cases} n_{\cdot 1}(\bar{Y}_{\cdot 1}-\bar{Y}) = \sum_{j=1}^{r} \alpha_j n_{ji} + n_{\cdot 1}\beta_1 \\ \vdots \\ n_{r-1\cdot}(\bar{Y}_{\cdot s-1}-\bar{Y}) = \sum_{j=1}^{n} \alpha_j n_{j(s-1)} + n_{\cdot s-1}\beta_{s-1} \\ 0 = \sum_{k=1}^{s} n_{\cdot k}\beta_k \end{cases}$$

These equations can be expressed in the matrix form as follows:

$$\begin{pmatrix} n_{1j} & 0 & \cdots & 0 & n_{1k} & \cdots & n_{1s} \\ 0 & & & \vdots & \vdots & & \vdots \\ \vdots & & & & & & \\ 0 & 0 & \cdots & n_{(r-1)j} & n_{(r-1)k} & \cdots & n_{(r-1)s} \\ n_{1j} & \cdots & n_{rj} & & 0 & \cdots & 0 \\ n_{1j} & \cdots & n_{1r} & & n_{1k} & 0 \cdots & 0 \\ \vdots & & \vdots & & \vdots & & \vdots \\ n_{(s-1)j} & \cdots & n_{(s-1)r} & & 0 & \cdots & n_{(s-1)k} \quad 0 \\ 0 & \cdots & 0 & & n_{1k} & \cdots & n_{sk} \end{pmatrix}$$

Matrix **A**

$$\begin{pmatrix} \alpha_1 \\ \vdots \\ \alpha_{r-1} \\ \alpha_r \\ \beta_1 \\ \vdots \\ \beta_{s-1} \\ \beta_s \end{pmatrix} = \begin{pmatrix} n_{1\cdot}\ (\bar{Y}_{1\cdot}-\bar{Y}) \\ \vdots \\ n_{r-1\cdot}\ (\bar{Y}_{r-1\cdot}-\bar{Y}) \\ 0 \\ n_{\cdot 1}\ (\bar{Y}_{\cdot 1}-\bar{Y}) \\ \vdots \\ n_{\cdot s-1}\ (\bar{Y}_{\cdot s-1}-\bar{Y}) \\ 0 \end{pmatrix}$$

Vector **B** Vector **C**

For the sake of simplicity, let us call each component of the above matrix form, Matrix **A**, Vector **B**, and Vector **C**. One can transform the above expression as shown below:

(9) $\mathbf{B}=\mathbf{A}^{-1}\cdot\mathbf{C}$

In the present study the number of observations for each category of each classification contained in Matrix **A** has been obtained from tabulations. All of the values required for Vector **C** have been also gathered from tabulated results. Based upon these collected data, Vector **B**

has been solved via matrix inversion by computers.

Ⅷ Statistical Results: Indonesia

This section discusses statistical results of the mean number of CEB and CB5 for Indonesia. Table 9 presents both unadjusted and adjusted mean number of CEB for six explanatory variables. Because the unadjusted mean number of CEB has already been analyzed in Section IV, the adjusted mean number of CEB will be examined in this section.

As regards Marital Duration, the adjusted mean number of CEB is 1.31 for those women who have been married for less than 10 years, and 5.28 for those having been married for more than 20 years. After statistical adjustment, the difference between the lowest and the highest categories has increased marginally from 3.88 to 3.97.

Insofar as Region of Residence is concerned, the adjusted mean number of CEB for each category is considerably different, as compared with the unadjusted one. For instance, once statistically adjusted, the mean number of CEB for West Java has increased from 3.49 to 3.63. Bali shows a large increase from 3.56 to 4.14, which is the highest level, exceeding Jakarta. The mean number of CEB for Jakarta has risen from 3.74 to 3.79, while that for East Java has decreased from 3.16 to 3.09. The principal source of these changes is attributable to regional differences in the pattern of nuptiality and marital fertility, as has already been explained in Section

Table 9 Relation between Number of Children Ever Born to All Ever-married Women and Selected Variables: Indonesia

Variable	Number of Cases	Mean Number of Children Ever Born	
		Unadjusted	Adjusted
Marital Duration ($\eta^2=0.340$; $\beta^2=0.356$)			
<10	3146	1.35	1.31
10-19	2692	3.76	3.74
20+	3317	5.23	5.28
Region of Residence ($\eta^2=0.007$; $\beta^2=0.010$)			
Jakarta	508	3.74	3.79
West Java	2609	3.49	3.63
Central Java	2575	3.73	3.63
Yogyakarta	251	3.39	3.34
East Java	3026	3.16	3.09
Bali	185	3.56	4.14
Level of Education ($\eta^2=0.028$; $\beta^2<0.001$)			
No Schooling	5636	3.82	3.43
Primary-Incomplete	2013	2.97	3.47
Primary-Completed	984	2.72	3.57
Junior High	296	3.10	3.65
Senior High +	225	2.57	3.45
Husband's Occupation ($\eta^2=0.002$; $\beta^2=0.001$)			
Professional, Clerical	716	3.50	3.66
Sales, Services	1680	3.63	3.52
Manual	1457	3.48	3.56
Agricultural	5189	3.42	3.40
Others, Never Worked	112	2.71	3.12
Childhood Type of Place of Residence ($\eta^2=0.001$; $\beta^2=0.001$)			
Village	7005	3.43	3.43
Town	1661	3.56	3.54
City	451	3.65	3.67
Occupation Before Marriage ($\eta^2=0.003$; $\beta^2<0.001$)			
Professional, Clerical	217	3.27	3.59
Sales, Services	745	3.76	3.54
Manual	482	3.24	3.43
Agricultural	2815	3.29	3.39
Others, Never Worked	4894	3.55	3.49

$R^2=0.356$, Grand Mean=3.46

IV. This is true particularly for Bali where the pattern of high marital fertility prevails. These adjusted means are fairly comparable to fertility rates computed for these regions on the basis of the 1971 Census, except that Bali appears to be overestimated and West Java underestimated. The reliability of these computed results should be further tested as more data such as the 1981 Census become available.

Level of Education shows the nonlinear relationship with respect to cumulative fertility. One may say, however, that by and large it presents a mildly positive relationship. After statistical adjustment, the fertility differential by education becomes extremely small; the difference between the highest and the lowest category is only 0.22. Judging from the value of β^2, this background variable seems to have an almost negligible effect on the mean number of CEB. This result may be explained by the hypothesis that the effect of education upon fertility is mediated through age at marriage and marital fertility, both of which are represented by Marital Duration. The other hypothesis to account for this result would be that due to Indonesia's pluralistic social and cultural nature, the effect of education upon fertility varies considerably among regions. This effect is captured by Region of Residence. It should be also noted that women with no education have the lowest level of cumulative fertility. The sources of this pattern may be subfecundability, misreporting, and higher incidence of marital disruption [7].

Husband's Occupation shows a slight difference between unadjusted and adjusted means. For the category of Professional and Clerical the mean number of CEB increases from 3.50 to 3.66 by making statistical adjustments, thus becoming the highest fertility level within this classification. For the category of Others and Never Worked, which is the lowest fertility group, it increases from 2.71 to 3.12. The differential between these two categories is 0.54, which is more than twice as large as that for Level of Education. Statistically speaking, however, this background variable has practically no explanatory power, as indicated by the value of β^2.

Similar observations are applicable to both Childhood Type of Place of Residence and Occupation Before Marriage. Although neither of these background variables has any substantial explanatory power, the category of Professional and Clerical has increased its mean number of CEB after statistical adjustment, thus becoming the highest fertility group within this classification. Although the late age at marriage for this category may explain this result, it may be also possible to advance the hypothesis that a large part of the women with lower socioeconomic statuses have a high level of marital instability and are subfecund due to their poor living conditions. If this hypothesis is correct, the socioeconomic development of Indonesia is still premature, and this country is at an early stage of demographic transition. In fact, this hypothesis seems to be quite valid in view of the above statistical results that the demographic factor explains most of the variance of cumulative

fertility, and that none of socioeconomic variables account for the pattern of the mean number of CEB to any significant extent. (Also note that these women with low socioeconomic statuses are likely to have underreporting problems.) To judge whether or not this hypothesis is correct, let us analyze the pattern of current fertility which would be more directly subject to the recent socioeconomic development of Indonesia.

Table 10 shows the statistical results of the pattern of the mean number of CB5. In terms of explanatory variables, there are two pronounced differences, as compared with the analysis of CEB. First of all, Current Age is used instead of Marital Duration. This is because the data set used for this analysis is limited to those women who have been married for at least five years, which implies that the data set has already been controlled for marital duration to a certain extent. Moreover, preliminary statistical results show that either of these demographic variables presents a quite similar picture. Secondly, Occupation Before Marriage has been deleted from analysis because of its serious multicollinearity with Husband's Occupation with regard to this dependent variable.

As for Current Age, the pattern of the mean number of CB5 has hardly changed even after being statistically adjusted. This demographic variable accounts for the majority of the variance of this dependent variable.

In comparison to the unadjusted pattern, no marked regional difference can be observed in the pattern of the adjusted

Table 10 Relation between Number of Children Born in Past Five Years and Selected Variables : Indonesia

Variable	Number of Cases	Mean Number of Children Born in Past Five Years	
		Unadjusted	Adjusted
Current Age ($\eta^2=0.218$; $\beta^2=0.209$)			
<20	70	1.36	1.31
20-24	733	1.55	1.53
25-29	1158	1.41	1.40
30-34	1169	1.15	1.15
35-39	1197	0.81	0.81
40-44	986	0.49	0.51
45+	707	0.22	0.23
Region of Residence ($\eta^2=0.022$; $\beta^2=0.012$)			
Jakarta	331	1.16	1.11
West Java	1635	1.14	1.08
Central Java	1773	0.95	0.99
Yogyakarta	176	0.80	0.91
East Java	1980	0.80	0.83
Bali	126	1.14	0.85
Level of Education ($\eta^2=0.034$; $\beta^2=0.001$)			
No Schooling	3921	0.84	0.95
Primary-Incomplete	1215	1.17	1.03
Primary-Completed	572	1.26	0.98
Junior High	188	1.24	1.02
Senior High +	123	1.15	0.73
Husband's Occupation ($\eta^2=0.011$; $\beta^2=0.007$)			
Professional, Clerical	481	1.08	1.02
Sales, Services	1072	1.08	1.02
Manual	904	1.09	1.03
Agricultural	3503	0.88	0.93
Others, Never Worked	60	0.79	0.32
Childhood Type of Place of Residence ($\eta^2=0.002$; $\beta^2<0.001$)			
Village	4627	0.94	0.97
Town	1110	1.02	0.95
City	288	1.07	0.99

$R^2=0.241$, Grand Mean=0.97

mean number of CB5, except for Bali and Yogyakarta. These two regions show considerable differences between the adjusted and unadjusted means primarily because the age composition of these two regions is substantially different from that of others, as indicated in Table 2. Even after statistical adjustment, both Jakarta and West Java remain as the two highest fertility groups. This background variable seems to have an appreciable explanatory power, as indicated by the value of β^2.

Level of Education shows somewhat an intriguing result, though it fails to explain the pattern of the mean number of CB5 to any substantial degree. As distinct from the pattern of the unadjusted means, the Junior High group has the highest fertility level after being statistically controlled. The overall relationship between educational attainment and fertility looks M-shaped. This result may suggest that, as was the case with CEB, the effect of education upon fertility is extremely heterogeneous. In other words, different factors have been operating at the higher and lower levels of the education range. At the lowest level, fertility is held down by subfecundity, marital instability, long breastfeeding and abstinence. At higher levels of education, traditional effects of education on fertility come into play [4].

As far as Husband's Occupation is concerned, no pronounced difference can be noted between adjusted and unadjusted means. The Professional and Clerical category shows a higher level of fertility than the category of Agricultural. Although the Others and Never Worked category has decreased its mean number of CB5 from 0.79 to 0.32, the interpretation of this change requires a certain degree of caution because of its relatively small sample size.

Childhood Type of Place of Residence presents a rather puzzling picture. After statistical adjustment, City shows the largest mean number of CB5, which is followed by Village and then by Town. This pattern, which differs from that of most of the modernized societies, may be partly explained by the development of Indonesia's family planning program, which has emphasized the rural areas. Also poverty-related factors may contribute to lower fertility for those who have spent their childhood in rural areas rather than towns or cities.

To sum up, these computational results for CB5 are fairly in agreement with those for CEB; the demographic factor is the main explanatory variable with respect to the variance of CB5, and hardly any socio-economic variables play a significant role in accounting for the differentials in current fertility in Indonesia. These results, therefore, may lead to the conclusion that Indonesia is still premature in socio-economic development and demographic transition.

IX Statistical Results: The Philippines

The relation between the mean number of CEB and four predictors is shown in Table 11. Although seven demographic and background variables were considered with the analysis of CEB in Section V,

Table 11 Relation between Number of Children Ever Born to All Ever-married Women and Selected Variables : The Philippines

Variable	Number of Cases	Mean Number of Children Ever Born	
		Unadjusted	Adjusted
Marital Duration ($\eta^2=0.518$; $\beta^2=0.452$)			
<10	3663	2.18	2.34
10-19	3176	5.08	5.06
20+	2428	7.55	7.34
Region of Residence ($\eta^2=0.017$; $\beta^2=0.002$)			
Metro Manila	1166	3.58	4.26
Luzon	3953	4.79	4.61
Visayas	2211	4.71	4.55
Mindanao	1938	4.61	4.75
Level of Education ($\eta^2=0.093$; $\beta^2=0.014$)			
No Schooling	537	5.81	4.63
Primary	2254	5.71	4.99
Intermediate	3396	4.62	4.70
High School	1927	3.83	4.31
Some College	446	2.76	3.94
College with Degree +	707	3.10	3.79
Type of Place of Residence ($\eta^2=0.018$; $\beta^2=0.001$)			
Urban	2976	3.99	4.45
Rural	6292	4.86	4.64

$R^2=0.330$, Grand Mean=4.58

the multivariate analysis of CEB has been confined to four explanatory variables due to the lack of required data.

Unlike the case of IFS, Marital Duration has a narrower difference in the mean number of CEB between the highest and the lowest category, after being statistically adjusted. As regards Region of Residence, statistical adjustments have produced a different pattern of regional differences in cumulative fertility, particularly for Mindanao. This is primarily the demographic compositional effect, as noted in Table 6. The pattern of adjusted cumulative fertility seems to conform to *a priori* expectation; Metro Manila, which is very urbanized, has the lowest cumulative fertility level while Mindanao, which has a large population of Muslim and is economically undeveloped, shows the highest fertility level. Statistically, however, this variable does not have much explanatory power.

After being statistically controlled, women with no education have a lower level of cumulative fertility than those with primary school education. This result might be partly explained by their subfecundability. By excluding this category, however, Level of Education shows an inverse relationship between educational attainment and cumulative fertility. Because this inverse pattern is widely observed in a relatively modernized society, one may suggest that the socioeconomic development of the Philippines is more advanced than that of Indonesia, and that demographic transition has already been definitely under way in the Philippines.

Similar observations can be applied to the urban-rural differential. Type of Place of Residence, however, seems to have less explanatory capability than Level of Education.

Table 12 presents the statistical results of the mean number of CB5. Owing to the better availability of data, the analysis of the mean number of CB5 has a greater number of predictors, as compared with that of CEB. Because both Current Age and Region of Residence show no pronounced

Table 12 Relation between Number of Children Born in Past Five Years and Selected Variables: The Philippines

Variable	Number of Cases	Mean Number of Children Born in Past Five Years	
		Unadjusted	Adjusted
Current Age ($\eta^2=0.275$; $\beta^2=0.268$)			
<20	16	1.51	1.39
20-24	443	2.17	2.13
25-29	1295	1.83	1.83
30-34	1541	1.44	1.45
35-39	1556	1.18	1.18
40-44	1304	0.75	0.75
45+	1083	0.28	0.29
Region of Residence ($\eta^2=0.014$; $\beta^2=0.003$)			
Metro Manila	865	0.89	1.08
Luzon	3142	1.20	1.19
Visayas	1740	1.24	1.23
Mindanao	1492	1.35	1.26
Level of Education ($\eta^2=0.016$; $\beta^2=0.004$)			
No Schooling	455	1.00	1.18
Primary	1953	1.26	1.28
Intermediate	2655	1.32	1.22
High School	1390	1.11	1.11
Some College	274	1.05	1.08
College with Degree+	512	0.89	1.15
Type of Place of Residence ($\eta^2=0.019$; $\beta^2=0.003$)			
Urban	2248	0.99	1.11
Rural	4990	1.30	1.24
Religion ($\eta^2=0.001$; $\beta^2=0.001$)			
Roman Catholic	6192	1.20	1.21
Protestant	248	1.18	1.16
Iglesia ni Kristo	154	1.17	1.16
Aglipayan	276	1.13	1.12
Islam	161	1.36	1.23
Others, None	207	1.18	1.14
Husband's Occupation ($\eta^2=0.025$; $\beta^2=0.005$)			
Never Worked	19	1.64	1.57
Professional	459	0.84	1.04
Clerical	284	0.87	1.06
Sales	442	1.02	1.11
Self-empl. Agr.	2235	1.26	1.22
Nons-empl. Agr.	1513	1.37	1.27
Private Household	23	1.10	1.05
Other Services	385	0.91	1.08
Manual Skilled	1593	1.21	1.21
Manual Unskilled	285	1.35	1.35

$R^2=0.301$, Grand Mean=1.20

difference between adjusted and unadjusted means, let us analyze the effect of Level of Education upon CB5. Unlike the case of CEB, the pattern of the adjusted mean number of CB5 with respect to education looks N-shaped. After statistical compositional adjustment, women of College with Degree+ have a higher fertility level than those of Some College and High School. This statistical result might be partly explained by the so-called catch-up effect [10]; because this group has an extremely high age at marriage, as shown in Table 7, highly educated women tend to achieve their targeted fertility level by shortening birth intervals. Obviously, further research is needed with regard to this phenomenon.

Urban-rural differentials present an expected pattern. In the case of Religion, no major difference can be noted between before and after statistical adjustment. Both Roman Catholic and Islam show the highest level of current fertility. In terms of Husband's Occupation, statistical controlling does not yield any pronounced change. Modern occupational categories such as Professional and Clerical have a lower level of fertility than the categories of traditional occupation such as farming and manual work.

To summarize, the pattern of both cumulative and current fertility of the Philippines is more closely related to socioeconomic factors than that of Indonesia. In other words, the effect of socioeconomic development has permeated throughout the Philippine society more than it has in the Indonesian society.

X Concluding Remarks: Limitation of Multivariate Analysis

In both Indonesia and the Philippines, demographic factors account for most of the variance of both cumulative and current fertility. In the case of the Philippines, however, socioeconomic factors explain the variation of the fertility level to a greater extent, as compared with Indonesia. Among these socioeconomic variables, Level of Education shows pronounced differences between these two countries. In Indonesia, a mildly positive relationship between educational attainment and cumulative fertility can be observed, as opposed to an inverse relationship in the Philippines. In terms of current fertility, however, Indonesia has an M-shaped relationship, and the Philippines, an N-shaped pattern. In both countries, subfecundity and underreporting seem to contribute to these results, though the degree of the effect of each of these factors differs between the two societies. Furthermore, the catch-up effect appears to play a certain role in explaining the relatively high current fertility among the highest educational category in the Philippines.

The pattern of urban-rural differentials is also markedly different between these two countries: Indonesia having a positive relationship between urbanity and fertility, and the Philippines having an inverse relationship. In the case of Indonesia, her family planning strategy may be partly related to such a positive pattern.

In terms of Husband's Occupation, higher socioeconomic status groups show a higher level of fertility in Indonesia while the opposite pattern is observed in the Philippines. Again, just as was the case with Level of Education, both subfecundity and misreporting may substantially account for the pattern observed in Indonesia.

Based upon these statistical results, one may conclude that Indonesia's development is still at an infant stage where both her extreme poverty and cultural plurality have been contributing to the complex relationship between fertility and development. In a traditional society like Indonesia, therefore, the pattern of fertility changes is heavily influenced by a variety of involuntary factors. In contrast, the Philippines is at a more advanced stage of economic development and demographic transition in which various voluntary factors have been considerably operating with regard to the relationship between fertility and development variables.

The validity of these statistical results, however, needs to be carefully evaluated. First of all, the quality of data should be assessed. One of the earlier studies [6] has pointed out a certain degree of unreliability of the IFS data. The assessment of both IFS and RPFS data, however, falls outside the scope of the present paper.

Secondly, the applicability of multiple classification analysis based upon an additive model to these fertility survey data should be examined. Figures 1 and 2 depict the relationship between cumulative fertility and education for each region in both countries. As shown in Figure 1, the case of Indonesia appears to have a

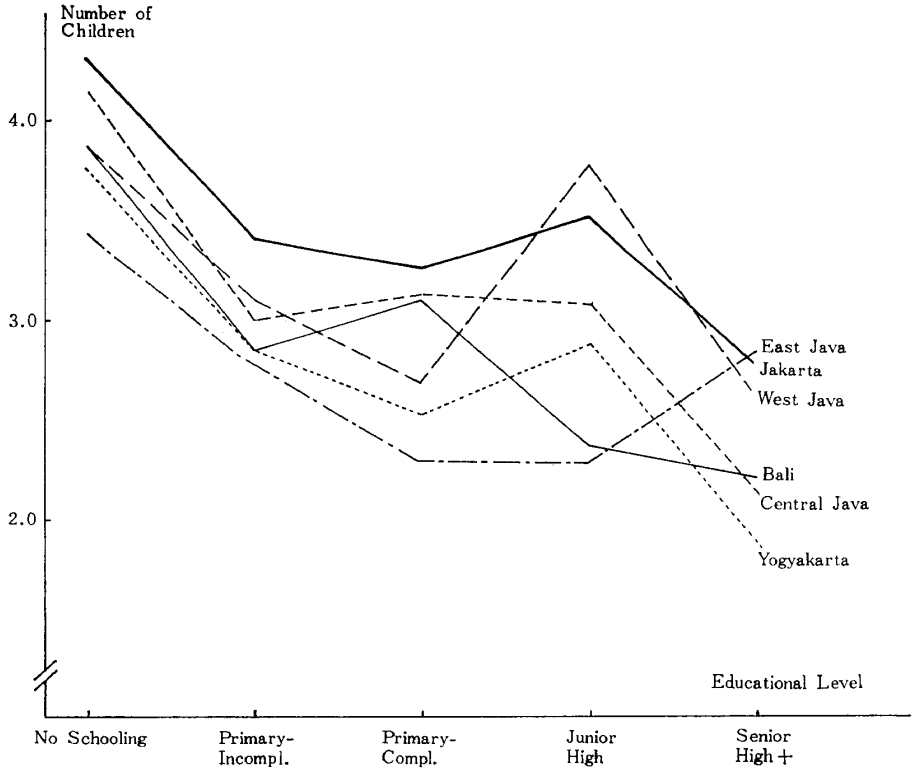

Fig. 1 Mean Number of Children Ever Born to Ever-married Women, Java and Bali, 1976

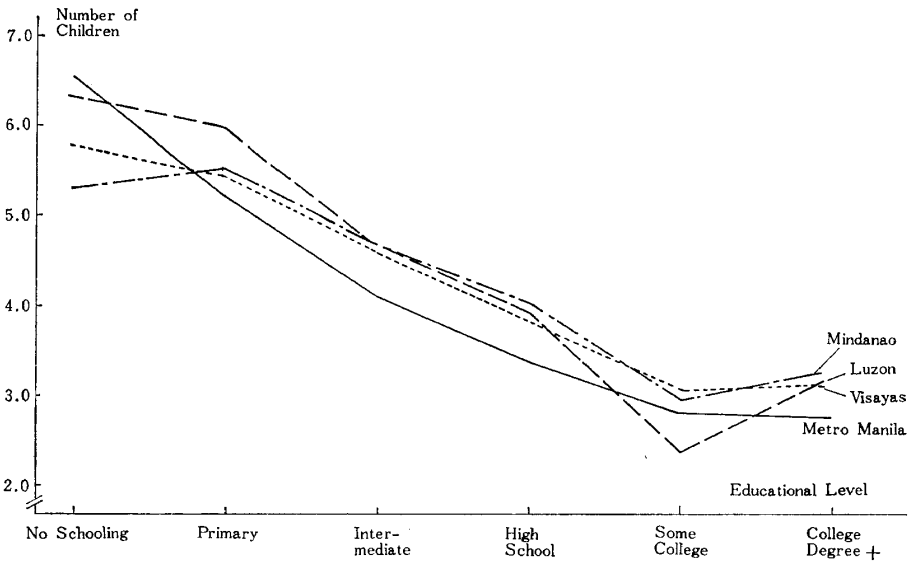

Fig. 2 Mean Number of Children Ever Born to Ever-married Women, the Philippines, 1978

considerable level of interaction among fertility, education and region. As opposed to Indonesia, the Philippines shows no pronounced interaction among these variables, as indicated in Figure 2. It is technically possible to incorporate some interaction terms in analysis. However, a more detailed set of tabulations will be required to make this statistical modification.

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