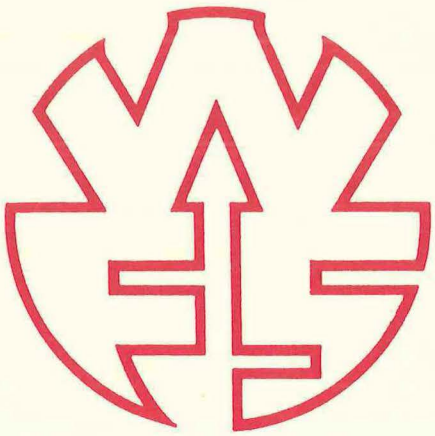

COMPARATIVE STUDIES

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Childspacing in Asia: Similarities and Differences

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The World Fertility Survey (WFS) is an international research programme whose purpose is to assess the current state of human fertility throughout the world. This is being done principally through promoting and supporting nationally representative, internationally comparable, and scientifically designed and conducted sample surveys of fertility behaviour in as many countries as possible.

The WFS is being undertaken, with the collaboration of the United Nations, by the International Statistical Institute in co-operation with the International Union for the Scientific Study of Population. Financial support is provided principally by the United Nations Fund for Population Activities and the United States Agency for International Development. Substantial support is also provided by the UK Overseas Development Administration.

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COMPARATIVE STUDIES

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1 Introduction

At the individual level, fertility rates are most directly expressed in the time elapsed between fertile pregnancies. Although measures of desired family size are useful in the study of fertility, there is a risk that these measures will make the rather fluid concept of desired family size appear fixed. Completed family size may be viewed as the implementation of a reproductive goal, but it is also the cumulative result of a series of pregnancy risks. This complexity of the fertility process is becoming increasingly apparent. Not only may factors affecting the series of pregnancy risks vary from one parity to the next, they may well change over time within a birth interval.

The present analysis represents the fertility process as sequential and time dependent. Rather than seek a singular effect on fertility of a variable such as urban residence, we leave open the question of whether such effects differ across parities, and over successive time periods of exposure within parity. The literature on sequential models of fertility (eg Namboodiri 1972) provides strong theoretical justification for expecting different effects across parities. Although not widely discussed in the literature, there are also good reasons to expect the effects of certain variables, eg breastfeeding, to differ over time within birth intervals. How long ovulation is suppressed by breastfeeding depends on a variety of factors, including the intensity of the suckling by the infant and when supplementary foods are introduced. Nevertheless, even if a woman continues breastfeeding without supplementary feeding, ovulation will eventually resume. Thus, even though this variable may have an important effect on the probability of conception early in a birth interval, the effect declines later in the interval and eventually disappears. As a consequence, variables that may affect fertility through breastfeeding (Akin *et al* 1981) are likely to be more important in the early stages of the birth interval.

Similarly, consider the effects of contraception in a society with extensive breastfeeding (as is the case in most of the developing world). If lactation suppresses ovulation in the early stages of the birth interval for most women, then it is primarily in the later stages of the interval that contraception alters the probability of conception. Thus, the social and demographic variables that affect contraceptive use may also be more important in the later segments of the birth interval. Similar arguments could be made for some of the other intermediate variables, but the important point is that there is reason to expect the effects of social and demographic variables to vary during the birth interval.

1.1 VARIABLES USED AND OVERVIEW OF RESULTS

Variables examined in this paper include respondent's education, urban residence, age at first birth, the sex of the preceding birth, and the time period of observation. To preview the major findings, we find surprisingly little effect for education except in the later stages of birth intervals for women moving to higher parities. On the other hand, urban residence reveals a consistent pattern over birth intervals, being associated with faster transitions in the early segments of the interval and slower transitions in the later segments, patterns we would expect if lower levels of breastfeeding were followed by greater contraceptive use.

To provide a comparative perspective, data are pooled from the WFS surveys of five Asian countries: Thailand, Sri Lanka, Republic of Korea, Malaysia and Philippines. By examining several countries, it is possible to place each within a broader context and see contrasts which would otherwise not be apparent. The importance of cultural heritage in the understanding of fertility emerged from a number of studies during the 1970s (eg Janowitz 1971; Kirk 1971; Taeuber 1972; Coale 1973; Knodel 1974; Livi Bacci 1977; and Lesthaeghe 1977). In particular, there has been speculation about Chinese cultural groups in Asia (Cho and Kobayashi 1977; Tuan 1981). In the present data, Chinese cultural groups and Theravada Buddhist groups are represented in several countries. Thus, we are able to examine the extent to which the behaviour of these groups is similar despite the fact that they live in quite different countries.

While most country differences remain unexplained at this stage, two patterns are particularly noteworthy. The first is that the behaviour of ethnic groups clusters within countries of residence, suggesting the importance of national patterns in spite of marked ethnic and linguistic diversity. A major exception to this is the considerably faster tempo of fertility of the Malaysian Chinese compared to the other Malaysian groups in the earliest segments of exposure, probably reflecting a widespread abandonment of breastfeeding. Another marked pattern is that the tempo of Korean fertility is consistently slower than that of other groups in the early segments of exposure to childbearing but faster in the later segments. Breastfeeding patterns are probably part of the explanation but there must be other factors operating as well.

Finally, this comparative approach permits, and indeed requires, explicit tests for whether variables such as education or rural–urban residence operate in the same manner in each country. Surprisingly, we find little evidence of interactions between our predictor variables and the various countries or ethnic groups.

1.2 THE COUNTRIES

The diversity of these countries with respect to indicators of socio-economic development and demographic characteristics is seen in table 1. According to criteria, Korea and Malaysia are economically the most highly developed, with Sri Lanka at the other end of the continuum. Thailand, Malaysia and Sri Lanka are the most rural.

Demographically, all have experienced declines in fertility and mortality. By 1980, all had birth rates in the high 20s or low 30s, with the Philippines highest. Infant mortality rates were higher in the Philippines and Thailand and lower in Korea, Malaysia and Sri Lanka.

There is considerable ethnic diversity among the countries being examined here and within individual countries, making it possible to observe ethnically similar groups in different settings. At the same time, this diversity raises the difficult problem of grouping various ethnicities, ie how to avoid too many small groups with only minimal differences between them and how to avoid combining ethnic groups that should be kept separate. Our decisions were based partly on prior knowledge of each of the countries and partly on preliminary data analysis within each of the countries. Of all the countries, Korea is the most ethnically and culturally homogeneous, with a common Confucian heritage, and it is considered as a single ethnic group in the analysis. Thailand is also a relatively homogeneous society, with Theravada Buddhism the principal religion. Thailand's very small Chinese and Muslim minorities are excluded from the analyses in this paper because they are not large enough for separate analysis and should not be combined with the other Thais.

The other three countries are more ethnically and linguistically diverse. Malaysia has a Malay majority who are Muslim, a large Chinese minority, a smaller Indian minority, and a number of other groups. In this analysis, the Malays and the Chinese are treated separately and the Indians and the other groups have been excluded. It is unfortunate to have to exclude the Malaysian Indians, but their small numbers in the WFS survey made it difficult to include them as a separate group and their distinctiveness within Malaysia which is generally recognized made it inadvisable to put them with either of the other two groups. Sri Lanka has a majority population, Sinhalese, who practise Theravada Buddhism, Sri Lanka and Indian Tamils, both of whom are Hindu, Muslim Moors, and very small numbers in other ethnic groups. In our analysis, the Sinhalese are kept separate, but the Tamils and the Moors are combined, a decision based on a preliminary analysis. We are, of course, aware of important cultural differences between Tamils and Muslims in Sri Lanka, but the childspacing behaviour of the two groups did not appear distinctively different in preliminary analyses. The heterogeneous set of other groups has been excluded.

Finally, the Philippines, though a predominantly Catholic country, has considerable linguistic diversity. We have used the following categories: Visayans, Tagalogs, and all others. The largest language group, the Visayans, live in the central

Table 1 Selected demographic and socio-economic characteristics of five Asian countries, circa 1970 and 1980

	Korea	Thailand	Philippines	Malaysia	Sri Lanka
Population (millions)					
Mid-1971[a]	31.8	37.3	37.9	11.2	12.8
Mid-1979[b]	37.8	45.5	46.7	13.1	14.5
Per cent change	18.9	22.0	23.2	17.0	13.3
Per cent urban					
1970[c]	41.2	13.0	31.8	27.2	21.9
1980[b]	60.0	14.0	36.0	29.0	27.0
Per cent change	45.6	7.7	13.2	6.6	23.3
GNP per capita (US$)					
1971[a]	290	210	240	400	100
1979[b]	1 480	590	600	1 370	230
Per cent change	410.3	181.0	150.0	242.5	130.0
Annual growth rate GDP (per capita)					
1960–70[b]	8.6	8.2	5.1	6.5	4.6
1970–79[b]	10.3	7.7	6.2	7.9	3.8

[a] *World Bank Atlas.* Population, Per Capita Product and Growth Rates 1973.
[b] *World Development Report 1981.* World Bank 1981.
[c] *World Tables.* 2nd edition. World Bank 1980.

part of the Philippines and include the Cebuanos and Ilongos. The Tagalogs are the second largest group, living primarily on the island of Luzon. The final Filipino category is a mixture of dozens of linguistic groups. Preliminary analysis breaking this large group into numerous categories suggested that it was reasonable to group them together. Unfortunately, this results in a large residual group which is less easy to interpret.

Table 2 shows the distribution of these ethnic groups within the total sample. The percentages are approximate because the distribution varies across birth intervals.

Table 2 Ethnic groups included in the analysis and their percentage of all respondents in the analysis

Country	Ethnic group	%
Korea	Korean	18
Thailand	Thai	11
Malaysia	Malay	10
	Chinese	7
Sri Lanka	Sinhalese	12
	Other	8
Philippines	Visayan	15
	Tagalog	7
	Other	12

2 Data and Methodology

This paper is based on data collected as part of the World Fertility Survey programme. Although the design of the WFS core questionnaire creates some problems for the analysis of birth intervals (as discussed later in this paper), the WFS data are by far the best available for the comparative study of childspacing. Except for Malaysia which is restricted to Peninsular Malaysia, the data sets are based on large, national, area probability samples, with the number of respondents ranging from 3820 in Thailand to 9268 in the Philippines. The details for each survey were reported in the First Country Reports for the respective countries (Chander *et al* 1977; Bureau of Statistics and Korean Institute for Family Planning 1977; Department of Census and Statistics 1978; Institute of Population Studies, Chulalongkorn University, and Population Survey Division, National Statistical Office 1977; National Census and Statistics Office *et al* 1979). Each of the surveys collected a complete pregnancy history, paying as much attention as possible to the accuracy of dating the events. Finally, since each country was participating in the broader WFS programme, considerable emphasis was placed on comparable measurement across countries, a major advantage for comparative analysis such as this.

2.1 COMPARABILITY

The issue of comparability in multi-national research is obviously critical. As outlined in the introduction, the variables we are examining in addition to country/ethnicity are: rural–urban residence, education, age at first birth, and sex of the birth initiating the birth interval.

Sex of the birth initiating the interval is straightforward. (The sex of the last child was used in the case of multiple births.) The urban residence variable is constructed to contrast those who have resided in urban areas for at least part of their lives with those who had lived their entire life in rural areas. Our initial work used a detailed variable based on the cross-classification of current residence by childhood place of residence. The main differences were found between those with only rural residence and all others, and this more parsimonious dichotomy is used here.

It is essential in comparative analysis to bear in mind the approximate nature of comparable coding. For example, in the previous variable, lifetime rural residence is likely to be distinctly more isolated from urban influences in Malaysia than in Korea. Korea defines urban areas as those with a population exceeding 20 000 and not administratively classified as *myuns*; whereas Malaysia uses as urban gazetted areas of 10 000 or more people. A fuller discussion of the differences can be found in Singh (1980).

Comparability is especially hard to achieve with respect to education. How it should be coded depends on what the critical links with fertility are thought to be. A measure of years of education assumes that the process is one in which values and skills cumulate at a constant rate, whereas levels of certification suggest that thresholds are most important in the training and employment of respondents. We have chosen categories that emphasize certified levels of education: no education, elementary education, and more than elementary education. There is considerable variation across countries in the definition of what constitutes elementary schooling. For example, elementary school ends after the fourth grade in Thailand, but at either the sixth or the seventh grade in parts of the Philippines. We were unable to differentiate further within the category of more than elementary education because there were too few cases in several of the countries.

Age in completed years at the woman's first birth is likely to be measured comparably across countries. It marks the respondent's entry into the maternal role, indexing both biological and sociological aspects.

The dependent variable is the length of time after one birth until the next. We have followed the usual custom of indexing the order of the birth interval by the order of the live birth terminating that interval. We do not examine the first birth interval (ie the interval between marriage and the first birth) because variation in the social definition of marriage makes it inappropriate as a common reference point for start of exposure to childbearing. (For further discussion on this point, see Rindfuss, Bumpass, Palmore and Han 1982; Rindfuss, Parnell and Hirschman 1983; Rindfuss and Morgan 1983.)

To avoid more awkward phrasing, the term 'childspacing' will be used to refer to the tempo of fertility subsequent to a reference birth. This usage is not intended to connote either a focus on closed intervals (ie that everyone goes on to have birth i + 1) or that the measured timing is the result of a conscious decision. There is a complex interrelationship between the tempo and quantum of fertility. At the lower parities, which virtually all women attain, the measured differences reflect primarily the tempo of fertility. At the higher parities, however, the proportion having another birth by any given duration reflects both the timing of those completing the transition and the proportion who will eventually do so.

2.2 BIRTH INTERVALS

The analysis of birth intervals raises numerous methodological problems. Some of these problems have commonly accepted solutions, and others warrant more extensive consideration.

Birth intervals in general, and those from cross-sectional data in particular, raise the issue of how to treat open and

closed intervals. It is misleading to focus only on closed intervals or only on open intervals. Instead, both must be used, typically by using a life-table approach. However, the conventional life-table approach is essentially a bivariate procedure whereas multivariate control is necessary for the issues being considered in this paper.

There have been efforts in the last few years to create statistical procedures that incorporate both life-table logic and multivariate control. One approach that has recently attracted the attention of demographers is the proportional hazards model, pioneered by Cox (1972). We preferred a different approach here because we had theoretical reasons to suspect that the assumption of proportionality was not valid, and we had no exact specification of the non-proportionality. Our results do indeed show that the effects are not proportional. Further, the time-dependent covariate models available were not sufficiently flexible for our needs. We also adopted a different approach from the multi-dimensional contingency table approach suggested by Koch and his co-workers (1972), in part to retain age at first birth in its continuous form. Our approach is quite similar, however, to both the above approaches.

Our procedure combines the life-table logic with the multivariate control of logistic regression analysis, which we term conditional transitional analysis. We examine a series of ${}_nq_x$, ie the probability of having a birth in segment x to x+n for those who are exposed to the risk of having a birth in this segment. In other words, we examine the probability of giving birth in a segment among those who have not yet had the birth by month x. The outcome measure in any segment x to x+n is a dichotomous variable: the birth did or did not occur. To avoid the problem inherent in using OLS regression with a dichotomous dependent variable, a logit transform is employed. Maximum likelihood estimates are thus obtained of the effects of the independent variables on the log of the odds that the birth will occur during the segment.

In this approach, just as in a conventional life table, only those who are exposed to the risk of a birth are included in the calculation. Thus, those who have had a birth prior to x or who have been censored prior to x are not included in the logit regression for that segment. Further, those who are censored during the segment x to x+n are only exposed to the risk of a birth during part of that segment. Assuming the censoring is evenly spread throughout the segment, one-half (randomly chosen) of those censored during the period are excluded from the logit regression for that segment. Because of these kinds of exclusion, the number exposed to the risk of a birth in a segment decreases as x increases. Thus, as in a conventional life table (and as in actual experience), those who 'survive' a relatively long time are increasingly selected, and this is, in fact, a reason why a conditional approach is needed.

In the present analysis, the following segments are used (each is expressed in terms of months since the birth initiating the interval): 11–16, 17–22, 23–28, 29–34, 35–40. Note that each is six months long, and that none begins or ends on a potential data heaping point. To a certain extent, the width of the segments is arbitrary. The six-month width used here balances two competing concerns. We wanted to keep the length of the segment as short as possible in order to see if the effects of the predictor variables change over the course of the birth interval. At the same time, we wanted to keep the segments as long as possible to keep the number of regression coefficients generated within the bounds of reasonable costs and interpretation, and span points where heaping is most likely to occur.

Another issue that must be faced in analysing birth interval data from cross-sectional surveys is selectivity. The use of all intervals to analyse differentials in birth intervals can severely bias the results (Rindfuss, Palmore and Bumpass 1982). In an attempt to have the maximum number of intervals available for analysis and minimize selectivity biases, we examine all birth intervals begun in the decade which ended in the second year before the year of survey. Intervals begun in the calendar year preceding the survey are eliminated because for these intervals there is very little time available for the interval to have been closed. For example, for a 1974 survey, we are examining intervals initiated in 1963–72.

Birth intervals 2–8 are examined here. The first interval is not being examined for reasons already discussed. Intervals nine and higher are excluded because women at parity nine and above are the oldest, and the restriction to births begun in the decade which ended two years before the survey is not sufficient to correct for the selectivity bias (see Rindfuss, Palmore and Bumpass *et al* 1982). Earlier examination of Philippine and Korean data showed that intervals 4–8 were very similar, but that they differ from intervals 2–3 (see Rindfuss, Bumpass, Palmore and Dae Woo Han 1982; Bumpass *et al* 1982). Further, intervals 2 and 3 differ from one another. Thus we will be examining intervals 2, 3 and 4–8.

Because of trends which may have occurred in the behaviour of respondents, a trend variable is included in the analysis to control for whether the birth interval began in the first five years of the decade or not. Four of the five surveys were carried out in 1974 or 1975, and so cover approximately the same period. The fifth, the survey in the Philippines, was conducted in 1978. In some ways, however, this is fortuitous because the decline in fertility began later in the Philippines than in any of the other countries. Although the birth intervals being examined in the Philippines occurred later, this may produce greater similarity in terms of transition time.

In order to highlight the similarities and differences in childspacing practices across countries, we have opted for a strategy that enables us to test for the significance of country differences and to see whether the other variables operate in the same manner in each of the countries. Specifically, we have combined all five data sets into one large file. Since each survey used different sampling rates, our merged file is not a sample of the combined territory of the five countries. Also, since country is now effectively acting as an additional cluster, the combined sample involves some loss of efficiency, and we must be wary of interpreting levels of statistical significance as precise. The combining of five samples into one produces a large number of cases which also affects significance requirements in that findings of substantive interest will be more likely to be statistically significant.

The number of cases available for anlaysis in each of the three sets of birth intervals, for each of the five segments, is shown in table 3. As noted already, sample size decreases from the early segments to the later segments within an interval. This does not cause any problems in our particular

analysis because it is a direct reflection of the process we are examining. On the other hand, if we consistently found significant effects only in the early segments, such patterning might derive solely from the differing sizes of the samples. As will be seen, this was not the case. The very large number of cases for intervals 4–8 relative to interval 2 or interval 3, however, is a matter for concern. This discrepancy arises because we are pooling across five different birth intervals. In order to reduce the computing expense involved and to minimize the possibility that comparisons in patterns of effects across intervals would be solely the result of differences in sample size, we randomly sampled from the 4–8 intervals in such a manner that the resulting number of cases equalled the average of the number of cases in intervals 2 and 3.

Table 3 Number of cases available for analysis by interval and segment

Birth interval	Segment 11–16	17–22	23–28	29–34	35–40
2	11 370	9 320	6 522	4 039	2 602
3	10 513	9 254	7 274	4 927	3 347
4–8	31 285	28 385	23 706	17 516	12 941

3 Results

Table 4 shows the observed transition rates for the various intervals and segments. These are the zero order relationships that are subsequently analysed by the logit regressions. Ages at first birth are grouped in this table, although this variable is entered into the multivariate analysis in its continuous form. Since logit analysis reveals relatively few interactions, and only modest alterations of observed patterns through multivariate adjustment, the data in table 4 show the scale of levels and differences in these transition probabilities.

The first step in the multivariate analysis was to examine whether variables such as education, age at first birth, rural-urban residence, sex of child, and trend operate in the same way in each country/ethnicity group. In short, does country/ethnicity interact with these variables? Our procedure was to run a baseline model without any interaction terms; and then to run a model including all the interaction terms of country/ethnicity with one of the five other independent variables. (In a few cases the distribution on an individual interaction term was so extremely skewed that the term was not included in the interaction model. Such extremely skewed terms have almost no chance of being significant and their inclusion causes extreme multicollinearity.) A global test was used to see whether the addition of the set of interaction terms significantly improved the fit of the model. If it did, we then included the significant individual interaction terms in the final models presented in this paper. This procedure was repeated for each of the five independent variables, for each segment within each birth interval.

Table 4 Life-table estimates of proportion having a birth within successive segments of intervals 2, 3, and 4–8, by characteristics of respondent and country/ethnicity

Characteristics	Interval														
	2					3					4–8				
	11-16	17-22	23-28	29-34	35-40	11-16	17-22	23-28	29-34	35-40	11-16	17-22	23-28	29-34	35-40
Education															
None	.179	.237	.312	.298	.263	.103	.175	.278	.298	.276	.079	.115	.198	.229	.197
Elementary	.172	.284	.353	.323	.318	.116	.192	.300	.298	.271	.089	.144	.234	.228	.196
More than elementary	.184	.287	.322	.280	.238	.113	.179	.232	.210	.196	.086	.138	.188	.152	.119
Urban residence															
Some urban residence	.192	.290	.345	.306	.257	.126	.187	.252	.245	.218	.096	.140	.186	.175	.141
No urban residence	.162	.271	.333	.305	.305	.102	.185	.298	.292	.272	.080	.134	.237	.239	.209
Age at first birth															
20	.182	.296	.356	.318	.317	.130	.202	.313	.310	.283	.092	.146	.238	.243	.208
20–21	.171	.303	.370	.351	.344	.104	.176	.273	.297	.260	.081	.127	.215	.214	.179
22–24	.175	.277	.360	.324	.299	.108	.190	.271	.274	.264	.078	.132	.198	.178	.160
25+	.177	.240	.265	.239	.193	.102	.164	.225	.179	.169	.088	.127	.174	.167	.124
Sex of preceding birth															
Male	.175	.281	.342	.311	.287	.109	.182	.276	.259	.231	.087	.133	.209	.203	.172
Female	.179	.279	.334	.300	.278	.118	.190	.277	.281	.262	.085	.140	.225	.224	.189
Trend															
First half of decade	.184	.286	.348	.315	.308	.118	.203	.296	.293	.259	.093	.149	.240	.233	.199
Second half of decade	.171	.274	.329	.296	.254	.109	.171	.259	.247	.233	.079	.123	.194	.192	.159
Country/ethnicity															
Korea	.081	.231	.394	.386	.375	.037	.130	.283	.340	.329	.027	.057	.164	.203	.166
Thailand	.139	.235	.252	.231	.271	.091	.151	.241	.254	.260	.086	.134	.226	.203	.209
Malaysia/Malays	.192	.231	.338	.302	.236	.117	.163	.235	.257	.216	.082	.113	.205	.236	.200
Malaysia/Chinese	.333	.377	.334	.312	.279	.235	.249	.258	.233	.169	.133	.181	.190	.171	.125
Philippines/Tagalog	.224	.312	.357	.285	.312	.132	.208	.228	.214	.215	.101	.158	.210	.192	.157
Philippines/Visayas	.220	.342	.371	.326	.272	.132	.220	.336	.294	.234	.101	.176	.273	.260	.198
Philippines/Others	.191	.357	.386	.344	.283	.146	.245	.368	.293	.237	.108	.169	.278	.243	.204
Sri Lanka/Sinhalese	.164	.250	.301	.250	.213	.093	.172	.254	.204	.218	.083	.126	.203	.181	.161
Sri Lanka/Others	.145	.240	.282	.277	.290	.114	.186	.239	.263	.239	.090	.165	.205	.202	.188
Total	.177	.280	.338	.306	.283	.114	.186	.276	.270	.246	.086	.136	.217	.214	.180

In general, there were very few statistically significant interaction terms (only 14 of the 720 tested were significant, several of these undoubtedly by chance). Not only is this fortunate in terms of the exposition of our results, but it is of considerable substantive interest in its own right. This suggests that such variables as education, rural–urban residence, and age at first birth have the same effect on the tempo of fertility in each of these five countries. In work examining the determinants of age at first birth in Asia, similar results were obtained (Rindfuss and Hirschman, forthcoming; Rindfuss, Parnell and Hirschman 1981). Caution needs to be exercised until these results can be confirmed in geographic areas beyond Asia, but such generalizability is encouraging.

More than half of the significant interactions involved sex or trend and Korea. This, of course, fits well with what is known about son preference (see Williamson 1976; Chung *et al* 1972; Chung *et al* 1974) and trends in the tempo of fertility in Korea (see Donaldson and Nichols 1978; Rindfuss, Bumpass, Palmore and Dae Woo Han 1982). Koreans have one of the strongest preferences for sons in the world, and this indeed shows in our analysis. Koreans who begin a second or third birth interval with a daughter are likely to have a short birth interval. Also, again in the second and third intervals, during the period being examined, Korea experienced a quickening of the tempo of fertility, unlike any of the other countries.

The results for our final logit models of the conditional

Table 5 Results of a conditional logit analysis (*betas*) of the determinants of childspacing in Korea, Thailand, Malaysia, Sri Lanka and Philippines: second birth interval

Characteristics	Segment				
	11–16	17–22	23–28	29–34	35–40
Education[a]					
Elementary	−0.4	.14	.12	.08	.25
More than elementary	−0.4	.21*	.04	−.04	.04
Rural–urban[b]	.09	.01	−.04	−.13	−.42**
Age at first birth[c]	.00	−.04**	−.05**	−.05**	−.06**
Sex[d]	−.01	−.11*	−.15*	−.03	−.03
Trend[e]	−.15**	−.17**	−.16**	−.03	−.19*
Country/ethnicity[f]					
Korea	−1.03**	−.62**	.01	.69**	1.00*
Thailand	−.01	−.09	−.35**	−.24	.18
Malays	.37**	−.15	.02	.12	−.06
Malaysian Chinese	3.33**	.69**	.28	.45*	.78**
Tagalog	.52**	.29*	.28*	.25	.76**
Philippines, other	.16	.49**	.35**	.44**	.46**
Visayans	.32*	.43**	.30**	.38**	.43*
Sri Lanka, other	.03	−.13	−.20	.05	.32
Interaction terms					
Visayans * more than elementary	.41**				
Malaysian Chinese * age at first birth	−.10**				
Korea * trend	.61**	.58**	.46**		
Philippines, other * rural–urban	.32*				
Sinhalese * rural–urban	.49**				
Korea * sex		.46**	.49**		

[a]No education is the omitted category.
[b]Always lived in a rural area is the omitted category.
[c]Measured in years.
[d]Male is the omitted category.
[e]First half of the decade is the omitted category.
[f]Sinhalese is the omitted group.
* Significant at .05.
**Significant at .01.

transition analysis are shown in tables 5, 6, and 7 for birth intervals 2, 3, and 4–8 respectively. In all cases, the model was significant, that is, it fit the data better than chance at the 0.01 level. (Note, however, as in all studies of the social determinants of birth intervals, the overall explained variance is low because of the high stochastic element inherent in the biology of the process.) For this reason, we do not show the overall X^2 statistics. In each table, each column represents a separate logit analysis, as described earlier. The coefficients shown are *betas* and are to be interpreted as the change in the log of the odds associated with a unit change in the predictor variables.

Looking first at education, the overall picture which emerges is that education is relatively unimportant. Only 4 of 30 coefficients are significant at the 0.01 level and in the predicted direction, and signs on the education coefficients change from interval to interval and segment to segment. When education has a significant effect, it tends to be in the later segments of the higher order birth intervals, which is where the strongest effects would be expected and substantively may be the most important segments. Also, the effects are strongest for the highest education category.

Given the fairly consistent finding that education has a major impact on total fertility levels, the present findings may seem contradictory. This is not the case, however. First, these results are consistent with results on childspacing from the United States (Rindfuss, Bumpass and St. John 1980). Secondly, very strong effects of education on age at first birth have been found for all of these countries (Rindfuss, Parnell and Hirschmann 1983), and age at first birth affects overall fertility levels. Thirdly, going beyond primary school does depress fertility in the later segments of the higher birth orders. For the early segments, breast-feeding is the most likely intermediate variable to affect

Table 6 Results of a conditional logit analysis (*betas*) of the determinants of childspacing in Korea, Thailand, Malaysia, Sri Lanka and Philippines: third birth interval

Characteristics	Segment				
	11–16	17–22	23–28	29–34	35–40
Education[a]					
Elementary	.13	.08	−.05	.00	−.07
More than elementary	.14	.01	−.28**	−.31*	−.25
Rural–urban[b]	.27**	.02	−.33**	−.24**	−.31**
Age at first birth[c]	−.02*	−.02**	−.05**	−.07**	−.07**
Sex[d]	.06	.04	−.04	.16*	.17*
Trend[e]	−.11	−.28**	−.24**	−.18**	−.12
Country/ethnicity[f]					
Korea	−1.05**	−.67**	−.11	.81**	.75**
Thailand	.02	−.20	−.25*	.09	.09
Malays	.26	−.14	−.67**	.00	−.26
Malaysian Chinese	1.05**	.47**	.12	.32	−.09
Tagalog	.27	.22	.03	.21	.18
Philippines, other	.44**	.42**	.61*	.55**	.25
Visayans	.33**	.29**	.46*	.59**	.24
Sri Lanka, other	.19	.03	−.59**	.15	−.06
Interaction terms					
Korea * trend		.62**	.41**		
Malays * elementary			.48**		
Sri Lanka, other * rural–urban			1.06**		
Korea * sex			.36**		

[a]No education is the omitted category.
[b]Always lived in a rural area is the omitted category.
[c]Measured in years.
[d]Male is the omitted category.
[e]First half of the decade is the omitted category.
[f]Sinhalese is the omitted group.
* Significant at .05.
**Significant at .01.

the probability of having a birth in the segment.

In contrast to education, urban residence consistently affects the pace of fertility. The same pattern emerges at each interval: women with some urban residence are more likely to have a birth in the early segments but markedly less likely to do so in the later segements. For segment 17–22 urban residence does not affect the probability of giving birth. Why does the effect of urban residence change over the course of the birth interval? Urban women are more likely to adopt forms of behaviour that have opposite effects on the timing of births, ie they are more likely not to breast-feed (increasing the probability of having a very short birth interval) and at the same time they are also more likely to use contraception (reducing fertility in the later segments of exposure). This is consistent with the point we made earlier that effects might vary with duration of exposure.

Older age at first birth consistently depresses the tempo of fertility. Within each birth interval, the strength of this effect increases as we move from the earlier to the later segments. Those with a later age at first birth are more likely to use contraception and to have more experience of its use. It is also likely, however, that this variable indexes differential fecundity with age. It is possible that women with an older age at first birth are somewhat selected towards lower levels of fecundity.

The effect of the sex of the birth initiating the interval is more complicated partly because there are frequent interaction terms and partly because the main effect changes over intervals and segments. Looking first at the interactions, in the middle segments, of the second and third intervals, there are significant Korea by sex interactions such that Koreans who began the interval with a daughter are more likely to have a birth in these segments than Koreans who had a son or than women from other countries. This is consistent with the widely acknowledged strong son preference which exists in Korea (see Chung *et al* 1974). We would not expect, and do not find, similar interactions at interval 4–8 because the overwhelming majority of Korean women would have had at least one son by then. The fact that the interaction terms are significant only in the middle segments suggests that breastfeeding is terminated at an earlier point if the initiating birth is a girl. With respect to the main effect of sex of birth initiating the interval on the length of that particular interval, most of the coefficients in the various intervals and segments

Table 7 Results of a conditional logit analysis (*betas*) of the determinants of childspacing in Korea, Thailand, Malaysia, Sri Lanka and Philippines: birth intervals four through eight

Characteristics	Segment				
	11–16	17–22	23–28	29–34	35–40
Education[a]					
Elementary	.09	.05	.17*	.05	−.15
More than elementary	−.08	.06	.02	−.38**	−.46*
Rural–urban[b]	.30**	.04	−.26**	−.43**	−.43**
Age at first birth[c]	.00	.00	−.04*	−.04**	−.04*
Sex[d]	−.09	.06	.13*	.11	.11
Trend[e]	−.14*	−.13*	−.28**	−.20**	−.21*
Country/ethnicity[f]					
Korea	−1.49**	−.78**	−.01	.29*	.10
Thailand	.04	.32*	.19	−.05	.46*
Malays	.01	.02	.04	.20	−.28
Malaysian Chinese	.47**	.65**	.13	.29	−.05
Tagalog	.17	.39*	.31	.31	−.01
Philippines, other	.01	.35**	.65**	.57**	.59**
Visayans	.12	.60**	.60**	.78**	.64**
Sri Lanka, other	.02	.60**	.14	.25	.28

[a] No education is the omitted category.
[b] Always lived in a rural area is the omitted category.
[c] Measured in years.
[d] Male is the omitted category.
[e] First half of the decade is the omitted category.
[f] Sinhalese is the omitted group.
* Significant at .05.
** Significant at .01.

are insignificant. This is always the case in the first two segments, suggesting that sons and daughters are not differentially breastfed. (See Ferry and Smith 1983, who show no differential in length of breastfeeding by sex.) In three of the four instances where the effect is significant, women with a daughter initiating the interval are more likely to close the interval during that segment, which is what one would expect in a country with a predominant son preference. Trend is included simply as a control variable, and we do not examine it in great detail (see Rindfuss *et al* 1982). Nevertheless, the negative effects for the second half of the decade sample is what we expect, given the higher levels of contraceptive use. We were concerned that the effect of trend might depend on the level of education. We tested for this interaction and the results were not significant.

We now turn to the differences among the countries or ethnic groups themselves. The results in tables 5–7 clearly indicate that little of the country/ethnicity differences found in table 4 are explained by socio-economic characteristics. After controlling for the effects of education, place of residence, age at first birth, sex of child initiating the interval and trend, significant and substantively important differences remain among the various country and ethnic groups. We particularly questioned whether groups with similar religious or cultural heritages would also be similar in their childspacing patterns after compositional differences were controlled. The answer is no. This can be seen most clearly for the two groups with a Confucian heritage: the Chinese in Malaysia and the Koreans. In the early segments of each interval, the Koreans are the least likely to experience the transition and the Chinese in Malaysia are the most likely. This suggests radically different breastfeeding for these two groups. The Koreans practise almost universal and lengthy breastfeeding, while among the Chinese in Malaysia a substantial proportion of mothers are not breastfeeding their children (DeVanzo and Haaga 1981). It can also be seen that the two Theravada Buddhist groups, the Thais and the Sinhalese, often differ from one another.

Another aspect of the country/ethnicity differences is that the differences between countries are more important than the differences within a country. The various ethnic groups in Sri Lanka are indistinguishable in most cases. There are only two exceptions in the 15 segment by interval combinations. The three Philippines groups are not identical in most of the order by segment combinations. This can be seen visually by examining the coefficients in tables 5–7, and was confirmed statistically by constraining the three coefficients to be the same. When we did so, there was a significant loss in explanatory power of the model. Nevertheless, the three Filipino groups resemble one another more than they resemble the other countries or ethnic groups. When the difference between coefficients is compared within groups and between groups, Filipino groups differ from one another less than from other ethnic groups in 80 per cent of the 270 comparisons over segments and intervals. (This has to be treated as a rough approximation because we are ignoring the interaction terms. However, it is only in the first segment of the second birth interval that any of the Philippine groups are involved in a significant interaction term.) Thus, it appears that there is something about country itself, rather than religious or cultural heritage, that is producing the differences. This clustering is not found for Malaysia: the Malays and Chinese in Malaysia differ from one another in most interval by segment combinations.

4 Summary and Conclusions

To summarize, there are significant and important differences in the patterns of childspacing for the five Asian countries examined here. Age at first birth significantly reduces the tempo of fertility in almost all of the segments examined. Urban residence has a consistent pattern of effects: the effect changes across segments within intervals, accelerating the tempo in the early segments and delaying it in the later segments. Education seems to be relatively unimportant except at the later segments of the higher birth orders, where number rather than timing considerations are paramount. Finally, with the exception of Korea, sex of the birth initiating the interval is rarely important. Perhaps one of the most important findings was a negative one: given the large number tested, there were very few significant interaction terms involving country/ethnicity.

This set of variables does not explain the observed country/ethnicity differences. In general, the Koreans have the slowest tempo and the Chinese in Malaysia the fastest, but this pattern only exists in the early segments of each of the birth intervals. With the exception of Malaysia, ethnic groups within a country are similar. The principal differences are across countries.

These results for childspacing differ in a number of ways from the results of a comparative study of the determinants of age at first birth in Asia (Rindfuss and Hirschman, forthcoming; Rindfuss, Parnell and Hirschman 1983), suggesting that these are two different processes. Education is relatively important for the timing of the first birth but relatively unimportant to the timing of subsequent births. Urban residence is a major determinant of birth interval dynamics but had no effect on the timing of the first birth. In predicting the first birth, we find ethnic groups clustered around religious or cultural heritage (eg all Muslim groups are similar across countries); whereas, in predicting birth spacing, ethnic groups are clustered within countries (eg the Sri Lanka groups behave similarly).

These contrasting patterns show that different intermediate variables are important in determining the timing of the first birth and birth spacing thereafter. Breastfeeding is the most obvious in that it clearly cannot have an effect on the timing of the first birth. There is almost no contraceptive use before the first birth in any of these countries (Lightbourne 1980), and thus it is unimportant for determining the timing of the first birth. Conversely, a number of variables which are important for the timing of the first birth are unimportant for the tempo of subsequent fertility. The start of intercourse is the best example. This is, of course, a major determinant of age at first birth but would have no direct effect on the subsequent tempo of fertility. Age at the start of exposure would be heavily influenced by cultural or religious norms regarding appropriate times to marry and virginity at marriage; and, thus, one would expect clustering according to culture or religion.

The different education effects for these two processes are remarkably similar to what we find in the US (Rindfuss, Bumpass and St. John 1980). Education may lead to a postponement of the first birth by providing opportunities that compete with motherhood, a delay reinforced by the more restricted nature of the marriage market at later ages. These considerations become relatively unimportant, however, after the first birth occurs.

The results presented here also have implications for sequential theories of fertility. Not only do the importance of factors change from parity to parity, they also change from one segment to another within a parity. This adds to the cumulating evidence that our theories of fertility need to be more complex than before. In particular, attention must be paid to clarifying the role of intermediate variables in producing trends and differentials in fertility.

The results of this analysis indicate large differences in the rate of fertility specific to parity and duration segment. It is likely that many of the differences are the consequence of differing patterns of breastfeeding and contraceptive use. We plan to return to the same data sets to test such speculations,[1] but preliminary work suggests that many differences will remain unexplained. While such a finding should sharpen our concern with measurement issues, it should also underscore the importance of other intermediate variables, particularly those affecting periodic separations and coital frequency. The size of the differences in fertility rates found at the lower parities among these Asian populations indicates how critical it is to search for an explanation. The potential for change in natural fertility is sufficiently large for these changes to obscure our understanding of the effects of fertility control attempted by policy-makers unless we can monitor the role of other intermediate variables as well.

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[1] Even though information on these two intermediate variables was collected in the WFS surveys, the way in which it was collected and coded makes it impossible to test directly the extent to which these two intermediate variables are responsible for the observed differences. First of all, with the exception of Korea, information on breastfeeding and contraception was only collected for the open interval and the last closed interval. Thus, the appropriate information was not collected for most of the intervals being examined here. Secondly, the standard recode scheme employed routinely assigned a 'not applicable' code if the respondent was currently pregnant at the time of the interview. Since a substantial number of respondents were currently pregnant at that time and since they came disproportionately from those with short intervals, such women cannot be excluded from the analysis. In future work, we hope to go back to the raw data tapes to remedy this second problem. We are also working on an analysis strategy that would circumvent the fact that this information was only collected for the last and next-to-last intervals.

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