Thailand

Health and Population Studies Based on the 1987 Thailand Demographic and Health Survey

Institute of Population Studies
Chulalongkorn University

The Population Council

DHS

Demographic and Health Surveys
Institute for Resource Development/Macro Systems, Inc.

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TABLE OF CONTENTS

PREFACE

The Demographic and Health Surveys (DHS) Program was initiated in September 1984 and designed as a follow-on to the World Fertility Survey (WFS) and Contraceptive Prevalence Surveys (CPS). The objectives of the program include the expansion of the international population health data base in Africa, Asia, and Latin America to assist in policy formulation and implementation and the development of skills and resources in survey design and analysis among those working in the program.

With funding provided by the U.S. Agency for International Development, DHS is implemented by the Institute for Resource Development/Macro Systems, Inc. and The Population Council, a major subcontractor. The Population Council, an international nonprofit organization established in 1952, undertakes social and health science programs and research relevant to developing countries and conducts biomedical research to develop and improve contraceptive technology. The Council provides advice and technical assistance to governments, international agencies, and nongovernmental organizations, and it disseminates information on population issues through publications, conferences, seminars, and workshops.

The Population Council was responsible for the establishment, funding, and provision of technical assistance to as many as 25 further analysis studies, in countries where DHS surveys were conducted during the years 1986 and 1987. The studies focus on one or more of the topics covered in the DHS survey, such as fertility, contraception, maternal and child health, breastfeeding, marriage, and fertility preferences; their interrelationships, for example, the effects of the proximate determinants of fertility and the determinants of contraceptive use or child survival; and their correlation with background variables. Although the principal source of data is the DHS survey, comparisons with previous WFS, CPS, or other surveys in order to examine trends over time are included in some of the studies.

Information on the DHS Program can be obtained by writing to: DHS Program, IRD/Macro, 8850 Stanford Boulevard, Suite 4000, Columbia, Maryland 21045, USA (Telephone: 301-290-3800; Telex: 87775; Fax: 301-290-2999). For copies of the studies published in the DHS Further Analysis series, write to the DHS Program, The Population Council, One Dag Hammarskjold Plaza, New York, New York 10017, USA.

HEALTH STUDIES

Child Immunization in Thailand: An Analysis of DHS Data

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A worldwide drive is underway, spurred on by the World Health Organization and UNICEF, to radically improve child survival throughout the developing world (Grant 1988). A very important component of this drive is the WHO sponsored Expanded Program of Immunization (EPI), designed to achieve universal immunization against six important vaccine preventable diseases -- diphtheria, pertussis, tetanus, polio, measles and tuberculosis. Monitoring the achievement of this goal is an important prerequisite for evaluating the success of EPI programs and for providing guidance for improved implementation.

The international program of Demographic and Health Surveys (DHS), sponsored by the United States Agency for International Development, was launched in 1984 by the Institute of Resource Development. One important goal of the DHS is to provide data, including information on immunization, which would be useful for the evaluation of programs designed to promote child health and survival. The present report, based on the survey conducted in Thailand as part of the larger DHS project, is intended to illustrate several ways in which immunization data collected in the DHS can be usefully analyzed. Given the limitations on the nature of the data arising from the DHS core questionnaire structure, determination of coverage levels of specific immunizations is not feasible. Thus emphasis is placed instead on examining the timing of specific immunizations and on the calculation of dropout and completeness rates for particular series of vaccinations.

Immunization Data from the Thailand DHS

In 1987, the Institute of Population Studies of Chulalongkorn University conducted the Thailand Demographic and Health Survey (TDHS). The TDHS is based on a nationally representative sample of 6775 reproductive-aged ever-married women and their children and was designed to provide independent estimates for the four major regions of Thailand and the Bangkok Metropolitan Area, as well as for the urban and rural sectors collectively.[1]

As in other countries conducting the DHS, data on immunization in Thailand were collected for living children under five years of age.[2] The mothers of these children were first asked if they had a health record card or booklet which recorded immunizations for each child. If the mother said yes and could show the interviewer the card or booklet, the types and dates of all immunizations received by the child were recorded. This included information on BCG, DPT, polio and measles vaccinations. Mothers who did not have or could not show an immunization record to the interviewer were asked if the child had ever been vaccinated but no further information on the type or dates of immunization was solicited.

Because information on specific immunizations are only available for the subset of children whose mothers could provide the interviewer with an immunization record, it is not possible to determine unbiased estimates of the overall coverage of specific immunizations from the TDHS.[3] It is possible, however, to determine the extent to which children received at least one dose of any vaccine based on the series of questions asked. In addition, and of particular importance for the present study, the timing of specific immunizations as well as dropout and completeness rates for particular series can be investigated based on information collected for those children for whom an immunization record was available.

Prevalence of Immunization Record Cards or Booklets

There is no single, unified health record card in use in Thailand that is routinely provided to mothers. Within the Ministry of Public Health, several divisions issue different types of cards to record information

relevant to their programs including a card specifically for immunization information issued by the Communicable Disease Control (CDC) department. This card is supposed to be available at all Ministry of Public Health outlets and be given to mothers whose children receive vaccinations. It is by far the most common card with immunization information. Some hospitals also issue their own health record cards or booklets which contain information about immunizations. In the TDHS, only those health record cards or booklets with immunization information were solicited. Given the lack of a unified system, interviewers sometimes encountered difficulties explaining to respondents which card should be shown to them.

Table 1 indicates the percentage of children in various age groups for whom mothers indicated they had a health record card or booklet recording immunizations, whether or not they were able to show it to the interviewer, and the percentage who received at least one immunization as determined through immunization records and mothers' reports combined. Overall, respondents were able to show an immunization record for only 29 percent of the children under 5 years of age. Respondents indicated that they had an immunization record for an additional 15 percent of the children but could not locate the record or were unable to show it for some other reason at the time of the interview. Thus, respondents had immunization records for a total of 44 percent of the children.[4]

The percent of children for whom a mother had an immunization record is lower for children under 6 months of age than for those 6-11 months old. Thereafter the percentage declines with the age of the child. The lower percent for the youngest age group in comparison to the next oldest group probably reflects the fact that some of the youngest children, who eventually will be immunized, had yet to be brought for their first immunization and thus had not received any immunization record. For this reason, the results for this age group undoubtedly understate the percent who will eventually receive a record. In interpreting the decline with age in the proportion of children over 6 months old whose mother indicated they had an immunization record, it should be recognized that the question in the TDHS asked if the respondent currently had such a record and not whether the respondent had <u>ever</u> received one.[5] Hence it is difficult to know if the decline with age of child reflects, at least in part, an increasing extent to which cards or booklets recording immunizations are coming into use or if instead it simply reflects the fact that the older a child is, the greater the likelihood that the parent has lost or discarded the document. Once the basic series of immunizations are completed, mothers may see little purpose in retaining immunization records.

The percentage of children who ever received any immunization is equal to the percentage whose mother could show an immunization record to the interviewer plus the percentage whose mothers were unable to do so but reported that they had brought the child for an immunization. Overall, 83 percent of children under 5 years of age have received at least one dose of some immunization. Moreover, except for children under 6 months of age, there is only a modest difference among the different age groups in the percentage who received an immunization ranging from 90 percent for children aged 12-23 months to 83 percent for those 48-59 months old. The distinctively lower percent among children 0-5 months old undoubtedly understates the percent who will eventually receive an immunization given that some of these children will still be brought to be immunized. Although coverage of the full regime of immunizations included in Thailand's EPI is not addressed by these results, the TDHS suggests that at least some contact with the program has been made for the large majority of children.

Given that information on the percent receiving at least one dose of some vaccination is incomplete for very young children, examination of differences according to selected background characteristics, presented in Table 2, is limited to children aged 6-59 months. The results indicate that nationally 85 percent of children in this age range have been immunized with at least one dose of some vaccine. Urban mothers are more likely to have their children immunized than rural mothers. About 95 percent of children aged 6-59 months in the urban areas were immunized at least once, compared to 83 percent of rural children.

With respect to regional differentials, the lowest percentage of children who had been immunized with any antigen are found in the south and the highest percentage in Bangkok. The poorer performance in the south is limited to rural areas; in all regions coverage among urban children is quite high, exceeding 90 percent everywhere except in the remainder of the central region after excluding Bangkok.

The results also reveal a positive relationship between education and immunization that holds in both rural and urban areas. Overall, the percentage of children aged 6 to 59 months who were immunized by at least one dose of one type of vaccine rises from 69 percent among those whose mother had no formal education to 100 percent among those whose mother completed more than secondary education.

In terms of religion, it is evident that children borne by Buddhist mothers, in both rural and urban areas, were more likely to be immunized than children borne by Moslem mothers. The corresponding share of children receiving some immunization for the children of the two religious groups are 88 and 67 percent respectively.

Place of delivery is also associated with the likelihood that at least one immunization was received. Hospital delivery is associated with higher than average coverage while home delivery is associated with a distinctly lower likelihood to have received any immunization. This is true both in rural and urban areas and may arise, as discussed below, from the availability of BCG given shortly after birth at many medical facilities. Women who go to medical facilities for childbirth may also be more prone to adhere to modern medical advice and have their children immunized.

The Timing of Specific Immunizations

Since data on the type and date of vaccination were collected by copying information from the child's health record card or booklet to the DHS questionnaire, information on specific immunizations and their dates is available only for the 29 percent of children for whom a record of immunizations could be shown to the interviewer. While this limitation renders estimation of immunization coverage not feasible, it is far less of an impediment for an analysis of the timing of specific immunizations since by definition any such analysis refers only to children who were immunized. Detailed information on the timing of immunization can be derived in the TDHS by comparing children's birth dates and the exact dates of each vaccination as indicated on their immunization records.[6] Provided the timing of specific immunizations does not differ substantially between children for whom an immunization record could be shown and those for whom such a record could not be shown, the results will not be biased.

Thailand's Expanded Programme of Immunization (EPI), which was started in 1977, currently seeks to immunize children against tuberculosis, diphtheria, pertussis, tetanus, polio, and measles. To achieve this, children are to receive one dose of BCG and measles vaccines and three doses of DPT and polio vaccines. The program operates in all areas of the country and is considered to be one of the priority programs within the Communicable Disease Control Department. As of the time of the TDHS, the schedule of immunizations for children under 1 recommended by the Ministry of Public Health is as follows:

BCG - at birth or 1st month;
DPT1 and Polio1 at ages 2-3 months;
DPT2 and Polio2 at ages 4-5 months;
DPT3 and Polio3 at ages 6-7 months;
and Measles at ages 9-12 months.

It should be noted that the Thai schedule is somewhat later than the schedule currently recommended by WHO and UNICEF. In practice, the actual timing of the immunization can differ considerably from the recommended schedule as it depends on the willingness and ability of the mother to follow the recommendations as well as the availability of supplies at the various health outlets where immunization is provided.

Table 3 summarizes the actual timing of different immunizations as recorded from the health card or booklet for children who received each of the specific immunizations. For each of the eight recommended immunizations, the age by which 10, 25, 50, 75 and 90 percent received the immunization is shown. Results for each of the pairs DPT1 and Polio1, DPT2 and Polio2, and DPT3 and Polio3 are very similar since children will typically receive the respective pairs of vaccines at the same visit. A comparison with the recommended schedule indicates that the median age (i.e., the age by which 50 percent receive the

immunization) falls well within the recommended age span for the vaccination but that for all of the various immunizations the age by which 90 percent receive the immunization lies beyond the recommended age range.

A more concise measure of the extent to which children who receive specific immunizations receive the immunization on time is provided in Table 4. For each of the eight specific immunizations included as part of the Thai EPI for children under 1, the percentage of children who receive them by the oldest recommended age is shown according to selected background characteristics. The minimum age of the children on which the calculations are based varies with the particular immunization to avoid biasing the results due to a data censoring effect. For example, the calculations for DPT2 and Polio2 are based on children who are at least 6 months old since including children under 6 months who received these vaccinations would bias the results in favor of children who received the vaccination on time.

Nationally, a substantial majority of children who receive each of the specific immunizations receive them within the recommended scheduled time. The results range from 64 percent for BCG to 86 percent for both DPT1 and Polio1. A number of differences are apparent, however, with respect to age of the child. The most pronounced differences are found for measles with older children being far less likely to have received the vaccination on time. This reflects, at least in part, the fact that measles vaccination was introduced into the government program only in 1984. There is also a general tendency, with the exception of BCG, for a lower proportion of older children (i.e. aged 36 months and over) to have received the other immunizations on time compared to younger children. Except for measles, lower proportions of rural compared to urban children received immunizations on time. Regionally, except for measles, the northeast and the south show lower proportions receiving immunizations on time, especially for BCG. Children of lesser educated mothers as well as Islamic children are also less likely to receive immunizations on time.

Since BCG is recommended at the time of birth, it is likely to be provided shortly after delivery if the birth takes place in a facility equipped to do so. Thus, as shown in Table 5, the extent to which BCG is received on time varies considerably by place of delivery. Children receiving BCG who were delivered in government or private hospitals are far more likely to have received the immunization within the recommended time period than those delivered elsewhere. Thus, place of delivery appears to be an important intervening factor accounting for the differentials in the timing of BCG vaccinations.

Table 6 reexamines the percentage of children receiving BCG within the recommended time of the first two months of life according to selected background characteristics after controlling for place of delivery. Regardless of background characteristics, the percentage receiving BCG on time is high for children delivered in hospitals and low for those delivered elsewhere. Place of delivery is clearly a key determinant of the timing of BCG vaccination. Given the trend towards higher proportions of births being delivered in hospitals, the proportion receiving BCG on time is likely to increase in the future even without specific efforts being directed towards this end.[7]

Dropout and Completeness Rates

Both DPT and polio vaccination require a series of three doses during the first year of life according to the Thai EPI schedule. Based on the information copied from the immunization records shown to interviewers, it is possible to determine the "dropout rate," defined as the percent who started but did not complete the series. Such information is of importance since an incomplete series compromises the effectiveness of the immunization. In addition, it is possible to determine an overall "completeness rate," defined as the percentage of children who received the complete set of all immunizations. Since measles has only recently been introduced into the Thai EPI and thus differs considerably from other immunizations with respect to coverage, it is useful to also consider a completeness rate excluding measles. Moreover, in assessing the dropout and completeness rates, it is important to limit consideration to children who are past the ages by which the large majority would have already received any particular complete series of immunizations. Otherwise, the rates will be artificially biased downwards. Thus analysis is limited to children at least 12 months old.

Both the dropout and completeness rates are presented in Table 7 according to selected background characteristics. Nationally, dropout rates for both DPT and polio are quite modest. The level of the completeness rate depends heavily on whether or not measles vaccination is included. Completeness for all immunizations excluding measles is high but drops substantially once measles is included. Generally neither the dropout rates nor the completeness rates differ systematically by age of the child although a somewhat more favorable situation characterizes children 24-35 months old than other age groups. With respect to both sets of rates the situation is somewhat more favorable for urban than rural children, for children in Bangkok and the north than in other regions, and for Buddhist than for Islamic children. In addition, the dropout rate decreases and the completeness rate increases with the education of the mother.

Discussion and Conclusions

Data collected on immunization through the core DHS questionnaire are of limited value for determining the level of coverage of specific vaccinations in a country such as Thailand where only a minority of mothers have health cards in their possession that contain a detailed immunization record for their children. Nevertheless, some general idea of coverage can be obtained through information available in the questionnaire on whether a child received any immunization based on a combination of information from immunization records and mothers' reports. In addition, information for the subset of children for whom a detailed immunization record is available can be usefully analyzed to study the timing of specific immunizations as well as dropout and completeness rates in relation to the specific series comprising a country's EPI.

The value of the analyses of the timing of immunizations as well as of the dropout and completeness rates is predicated on the assumption that the experience of children who are brought for immunization and whose mother both received and was able to show an interviewer an immunization record is fairly typical of children who received any particular vaccination or who started any particular series. A direct comparison with respect to timing and dropout rates between those for whom a card could be shown and those for whom no card was available is not possible since the necessary information is lacking for the latter group. However, a comparison of selected characteristics of the two groups could provide some insight into potential bias. Such a comparison would indicate whether the analyses based on those for whom a record could be shown were based on children with characteristics that are likely to be associated with a greater (or lesser) than average likelihood of receiving an immunization on time or of successfully completing a series of immunizations.

It is important to recognize that analysis of timing of particular vaccinations is necessarily limited to children who received the vaccination and that an analysis of drop out rates is necessarily limited to children who initiate a particular series. Thus ideally a comparison of characteristics of those for whom cards could be shown and those for whom cards could not be shown should be restricted, in the case of timing, to only those children who received a specific immunization, while in the case of dropout rates, the comparison should be restricted to only those children who initiated a particular series of immunizations. Unfortunately this is not possible to do with DHS data since no information is available on which specific vaccinations were received by children for whom no record could be shown. It is possible, however, based on the mother's report, to differentiate at least between those children who received at least one immunization and those who received none among children for whom no immunization record was shown. Since children who received no vaccinations clearly would not be included in an analyses of timing or drop rates, the more appropriate comparison is between those for whom a record could be shown and those who received at least one immunization but for whom no record could be shown.

Table 8 presents data from the TDHS comparing selected characteristics of children (and their mothers) for whom an immunization record could be shown and those for whom no record could be shown, differentiating those who did and did not receive any vaccination among the latter group. With respect to the characteristics shown, children for whom a record could be shown are generally more likely to have characteristics that are or would seem likely to be associated with more favorable behavior in terms of the timing of immunizations and the completion of a series than those for whom no record was shown; however, among the latter group, those who received at least one immunization are generally distributed more similarly

to children for whom a record was shown than are those who received no immunization. For example, those for whom a record could be shown are more likely to live in urban areas, especially Bangkok, and are more likely to have mothers with secondary education, to have received a tetanus toxoid injection, prenatal care, and to have delivered in a hospital than are children for whom no immunization record could be shown.

Similar differences, however, also characterize children who received at least one immunization but for whom no record could be shown when compared to children who received no immunization. Indeed, with respect to health behavior characteristics of the mother (receiving tetanus toxoid injection, receiving prenatal care, and delivering in a hospital), children for whom no immunization record could be shown but who were immunized at least once are considerably closer to children for whom a record could be shown than to those who received no immunization. In brief, while the results in Table 8 suggest that timing of specific immunizations, as well as dropout and completeness rates based only on children for who an immunization record could be shown might be biased somewhat towards favorable outcomes, the extent of the bias may be modest.

It is also instructive to compare results from the TDHS with estimates of coverage and dropout rates issued at the national level by the Ministry of Public Health. In the MOPH statistics, coverage is estimated by expressing the total reported number of specific vaccinations to children aged under 1 in a given year as a percent of the estimated population under age 1 in that year. Dropout rates are estimated by expressing the number of successive vaccinations in a series to children under 1 as a percent of the number of prior vaccinations in that series to children under one in a given year.[8] Although neither of these measures are directly equivalent to those derived from the TDHS, some rough comparisons are possible.

As indicated by the MOPH estimates presented in Table 9 for the years 1982 through 1987, coverage is consistently higher for BCG than for any of the four other immunizations shown. Moreover, in 1987, a year for which coverage estimates are available for all 8 vaccinations included in the EPI, BCG shows the highest coverage (96 percent compared to 86 percent for DPT1, the next highest). The estimate from the TDHS indicating that 85 percent of children aged 6-59 months old received at least one immunization (see Table 2) seems reasonably consistent with the coverage figures from the MOPH statistics. Over the period 1982 to 1986, the years during which the children aged 6 to 59 months during the time the TDHS was conducted would have been born, the coverage rate for BCG in children under 1 averaged 80 percent. The proportion who received any vaccination should exceed this, since some children who had not received BCG would have received some other vaccine. However, this additional proportion is unlikely to be very much higher as BCG is the most accessible immunization, often provided at time of the mother's confinement. For example, according to the TDHS, among children for whom immunization records were shown and hence had received at least one vaccination, only 9 percent did not have BCG (Chayovan, Kamnuansilpa, and Knodel, 1988).

The dropout rates issued by the MOPH are calculated in a way that would overestimate the actual rate, especially during a period when a new vaccination is being introduced. The reason for this is that the calculation is based only on vaccinations to children under 1 in a given year. Children who are over one at the time they receive the next vaccination in a particular series are treated as having dropped out. This could lead to a serious overestimation of dropout during the years when a vaccination is first being introduced into the program given that some children who are already past the recommended ages when the vaccine first becomes available may start the series late. In any event, the recent dropout rates for DPT and Polio as estimated by the MOPH are quite similar to those derived from the TDHS. For example, for children 12-23 months old at the time of the survey, the TDHS indicates a dropout rate of 16 percent for each of these two series (see Table 7) compared to the MOPH estimated dropout rates of 15 percent for DPT and 16 percent for polio. The fact that the MOPH estimated dropout rates are higher for prior years while there is virtually/no trend with age in the TDHS results may reflect the tendency for the MOPH calculations to overestimate dropout rates as the coverage is spreading or may reflect a greater tendency for mothers of children for which immunization records could be shown to follow through with the series of vaccinations.

Despite some reservations concerning biases toward favorable results, the analysis of data derived from the DHS questionnaire may well be the best data available in many countries for assessing the timing of specific immunization as well as dropout and completeness rates. Provided the biases discussed are not

severe, the fact that the DHS is typically based on a broad nationally representative sample, and contains extensive information about the characteristics of the children and parents, make it a uniquely valuable source of population-based estimates of these important aspects of child immunization.

NOTES

1 Details of the survey and a copy of the questionnaire are presented in the country report. See Chayovan, Kamnuansilpa and Knodel, 1988.

2 In actual implementation, immunization information was collected for all living children born since January 1982. Since the survey took place during March through June 1987, some children aged five were included. The present analysis, however, is limited to children aged 59 months or younger.

3 For example, the proportion of children receiving a specific immunization among those whose mothers could show an immunization record will seriously overestimate the proportion of all children who received the immunization given that only children who received at least one vaccination would have such a record. In contrast, the proportion of children for whom a specific immunization is recorded would seriously understate the prevalence of that immunization since many children for whom no record was available to show the interviewer were immunized.

4 Since only health cards or booklets with immunization information were counted, in all cases where a child is coded as having an immunization record that was shown to the interviewer, the child had received at least one immunization. However, cross tabulation reveals a small number of cases in which the mother reported having a card or booklet that could not be shown to the interviewer but also reported that the child was never immunized. This slight discrepancy probably arises from the existence of multiple types of health record cards and booklets, not all of which contain immunization data, together with a failure of the respondent to understand that the interviewer was only asking about those that contained immunization information.

5 In this connection it is interesting to note that of those children for whom the mother claimed she had an immunization record, the proportion who could show the record to the interviewer declines with age of child. For example, for 81 percent (37.7 percent out of 46.5 percent) of children under age 6 months whose mothers said they had an immunization record, the mother was able to show the record to the interviewer compared to only 47 percent in the case of children aged 48-59 months. This probably reflects the lessening importance of the record to the mother after the child passes the ages at which immunization occurs and hence the greater difficulty in locating the record. It also suggests that the mothers of the children who said they had a record but could not show it to the interviewer had in fact lost the record by the time of the survey. Hence the results in Table 1 probably do not refer strictly to the percent of children for whom an immunization record is currently in the possession of the mother but rather of those currently with a record combined with some unknown proportion of those who had received a record but subsequently lost it.

6 The calculation of the age at immunization is based on comparing the exact date of immunization in terms of day, month and year with the birth date of the child provided only in terms of month and year. For the purpose of the calculation of age, children were assumed to be born on the 15th of each month unless this would yield a negative age. In such cases the child was assumed to be age 0 at the time of immunization.

7 According to the TDHS, 51 percent of births during the preceding five years were delivered in hospitals. This is in sharp contrast to findings from a national sample survey in 1969 and 1970 which indicated 87 percent of births were usually delivered at home or in another house.

8 For example the number of reported DPT1 and DPT3 vaccinations to children under 1 in 1987 is 779,809 and 679,316 respectively. The estimated population under 1 in 1987 is 904,704. Thus the coverage rates for DPT1 is 86.19% = (779,809/904,704 x 100) while the dropout rate between DPT1 to DPT3 is 12.89% (1-(679,316/779,809) x 100). It should be noted that some immunizations provided by private clinics of hospitals may not be included in the figures reported to the MOPH.

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Table 1 Among children under 5 years of age, percentage with an immunization record card or booklet and percent receiving any immunization, by age of child

	% having an immunization card/booklet			% received at least one immunization as determined from:		
Age of child in months	Shown to interviewer	Not shown	Total	Immunization record	mother's report	Total
0-5	37.7	8.8	46.5	37.7	26.6	64.3
6-11	49.5	12.5	62.0	49.5	36.4	85.8
12-23	36.1	16.4	52.5	36.1	53.5	89.6
24-35	31.0	12.7	43.7	31.0	52.0	83.0
36-47	22.3	16.3	38.6	22.3	61.8	84.1
48-59	14.5	16.2	30.7	14.5	68.8	83.3
Total	29.4	14.6	44.0	29.4	54.0	83.4

Table 2 Among Children aged 6-59 months, the percent receiving any immunization by selected background characteristics

	Total	Rural	Urban
National	85.2	83.0	95.6
Region			
Bangkok	96.2	-	96.2
Other central	85.2	84.6	89.2
North	84.2	83.0	99.1
Northeast	86.9	86.5	95.4
South	75.5	73.6	97.8
Mother's education			
Less than 4 years	69.4	68.5	79.9
4-6 years*	85.8	84.3	95.6
Secondary	97.3	97.1	97.5
Beyond secondary	100.0	100.0	100.0
Religion			
Buddhist	87.5	85.6	96.2
Islam	67.1	63.5	86.2
Place of delivery			
Government hospital**	93.9	93.0	96.0
Private hospital	97.6	(94.2)	99.5
Clinic	90.0	90.7	(86.6)
Health Center	88.0	87.5	-
Home	72.4	72.3	(79.2)
Other	(79.4)	(79.4)	-

Note: Results in parentheses are based on 20-49 unweighted cases; results based on less than 20 cases are omitted.

* Includes 7 years of education during the period when upper primary education included a 7th grade.

** Includes Bangkok health centers

Table 3 Among children receiving specific immunization, the age in months by which 10, 25, 50, 75 and 90 percent have received the immunization

Percent having received immunization	Among children aged 3 to 59 months			Among children aged 6 to 59 months		Among children aged 12 to 59 months		
	BCG	DPT1	Polio1	DPT2	Polio2	DPT3	Polio3	Measles
10	0.1	1.7	1.7	3.6	3.7	5.7	5.7	8.7
25	0.2	2.0	2.0	4.0	4.0	6.1	6.0	9.1
50	0.6	2.4	2.4	4.6	4.6	6.8	6.8	10.5
75	2.5	3.1	3.1	5.7	5.7	8.2	8.2	13.6
90	4.2	4.6	4.7	8.5	8.3	12.9	12.8	17.9
MOPH recommended age	0-1	2-3	2-3	4-5	4-5	6-7	6-7	9-12

Table 4 Among children receiving specific immunization, the percentage receiving the immunization by the recommended time (according to the Ministry of Public Health guidelines), by selected background characteristics

Background characteristic	Among children aged 3 to 59 months			Among children aged 6 to 59 months		Among children aged 12 to 59 months		
	BCG	DPT1	Polio1	DPT2	Polio2	DPT3	Polio3	Measles
National	64	86	86	79	79	73	73	72
Age of children (months)								
Under 12	63	93	93	84	84	-	-	-
12-23	64	85	85	80	80	75	74	90
24-35	66	90	91	84	85	76	76	77
36-47	61	82	81	69	69	69	70	48
48-59	65	72	72	68	71	65	65	29
Rural-urban residence								
Rural	55	84	84	75	76	70	70	74
Urban	88	92	93	88	88	79	78	68
Region								
Bangkok	91	93	93	86	86	78	78	72
Other central	73	90	90	85	84	83	82	69
North	61	89	89	87	88	82	81	75
Northeast	47	80	80	60	61	52	53	72
South	53	82	82	77	78	67	66	71
Mother's education								
Less than 4 years	56	76	76	79	79	78	76	65
4-6 years*	60	85	86	75	76	69	69	75
Secondary	81	94	93	92	92	88	86	69
Beyond secondary	76	96	95	87	90	80	79	66
Region								
Buddhist	64	87	87	79	79	73	73	71
Islam	59	73	73	66	67	56	56	83

Note: The recommended time according to the Ministry of Public Health for BCG is by 1 month; DPT1 and Polio 1 by 3 months; DPT2 and Polio2 by 5 months; DPT3 and Polio3 by 7 months; and Measles by 12 months

* Includes 7 years of education during the period when upper primary education included a 7th grade

Table 5 Among children aged 3-59 months with an immunization record card, the percentage receiving BCG before age 2 months, by place of delivery

Place of delivery	Percent
Government hospital*	77
Private hospital	89
Health center	39
Clinic	(33)
Home	25
Total**	64

Note: Results in parentheses are based on less than 50 unweighted cases

* Includes Bangkok health centers

** Includes a small number of children delivered in places other than those indicated

Table 6 Among children aged 3-59 months with an immunization record card, the percentage receiving BCG before age 2 months, by place of delivery and selected background characteristics

Background characteristic	Place of delivery		
	Hospital	Other	Total
National	78	30	64
Age of children (months)			
3-11	78	33	63
12-23	80	27	64
24-35	78	34	66
36-47	76	27	61
48-59	75	26	65
Rural-urban residence			
Rural	72	29	55
Urban	89	-	88
Region			
Bangkok	93	-	91
Other central	78	(48)	73
North	75	23	61
Northeast	66	(26)	47
South	74	34	53
Mother's education			
Less than 4 years	78	-	56
4-6 years*	76	31	60
Secondary	88	(43)	81
Beyond secondary	78	-	76
Religion			
Buddhist	78	31	69
Islam	(91)	(30)	59

Note: Results in parentheses are based on 20-49 unweighted cases; results based on less than 20 cases are omitted.

* Includes 7 years of education during the period when upper primary education included a 7th grade.

Table 7 Among children aged 12-59 months with an immunization record card, dropout rate for DPT and Polio and completness rate for all immunizations including and excluding measles, by selected background characteristics

Background characteristic	Dropout rate (%)		Completeness rate (%)	
	DPT	Polio	All immunizations**	All but measles
National	14	14	44	77
Age of children (months)				
12-23	16	16	48	77
24-35	10	10	52	81
36-47	15	14	31	72
48-59	15	15	37	75
Rural-urban residence				
Rural	16	15	41	74
Urban	9	9	53	84
Region				
Bangkok	7	7	55	87
Other central	16	16	37	69
North	8	8	51	83
Northeast	20	19	33	72
South	20	19	48	75
Mother's education				
Less than 4 years	23	22	42	70
4-6 years*	14	14	41	76
Secondary	12	13	58	79
Beyond secondary	5	6	58	90
Religion				
Buddhist	14	13	44	77
Islam	24	22	31	73

Note: The dropout rate refers to the percent who received the third immunization in the series (DPT3 or Polio3 respectively) among those who received the first immunization (DPT1 or Polio1 respectively).

* Includes 7 years of education during the period when upper primary education included a 7th grade.

** Refers to children who are fully immunized (i.e. those receiving BCG, three doses of DPT and polio and a measles vaccination).

Table 8 Percentage distribution of children according to selected background characteristics, by whether the mother could or could not show an immunization record to the TDHS interviewer

Background characteristic	Could show record	Could not show record		
		Total	Received at least one immunization	Received no immunization
Total	100	100	100	100
Age of child (in months)				
0-5	11	8	4	18
6-11	17	7	7	8
12-23	27	10	21	14
24-35	21	19	19	20
36-47	15	22	23	19
48-59	10	25	26	21
Rural-urban residence				
Rural	74	87	84	94
Urban	266	13	16	6
Region				
Bangkok	17	8	9	3
Other central	19	19	19	19
North	25	17	16	20
Northeast	25	39	42	31
South	14	17	14	27
Mother's education				
0-3 years	8	16	13	28
4-6 years	71	74	75	70
Secondary	13	7	8	2
Beyond secondary	8	3	4	1
Whether mother received tetanus toxoid injection				
Yes	76	62	73	28
No	24	38	27	72
Whether mother received professional prenatal care				
Yes	90	72	83	40
No	10	28	17	60
Place of delivery				
Hospital	69	43	50	21
Health center (or clinic)	10	12	12	10
Home (and other)	21	46	38	70

Table 9 Coverage rates and dropout rates for specific immunizations for children under 1 year of age as estimated by the Communicable Disease Control Department of the Ministry of Public Health, 1982-1987

	1982	1983	1984	1985	1986	1987
Coverage rate						
BCG	73	76	76	80	95	96
DPT 2	52	65	67	67	76	79
DPT 3	21	49	53	62	71	75
Polio 3	34	46	52	62	70	74
Measles	-	-	6	26	45	52
Dropout rate						
DPT 1-3	69	34	27	18	15	13
Polio 1-3	42	33	26	19	16	13

Note: The coverage rate refers to the number of vaccinations of a specific kind given to children under one year of age in a given year as a percent of the estimated total number of children under age one in that year. The dropout rate refers to the number of children under age one receiving the third dose of a series in a given year as a percent of the number of children under age one who received the first dose in that year

Source: Thailand, Communicable Disease Control Department, Ministry of Public Health, Analysis of Results of the Expanded Program of Immunization, 1987.

Infant Feeding Practices in Thailand: An Update from the 1987 Demographic and Health Survey

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Abstract

Data from the Thai Demographic and Health Survey, conducted in 1987, provide new information on trends in breastfeeding, child-based estimates of breastfeeding differentials, and various aspects of infant feeding practices in Thailand. The findings confirm evidence from earlier surveys that the decline in the duration of breastfeeding evident during the 1970s has come largely to a standstill in the 1980s. In addition, the proportion initiating breastfeeding while high throughout the period, has increased to the point where, at the national level, it is now close to universal. These changes in breastfeeding trends coincide with a variety of efforts, primarily undertaken or coordinated by the Ministry of Public Health, to promote breastfeeding and discourage the use of breast milk substitutes. While substantial socioeconomic differentials still exist with respect to the duration of breastfeeding, initiation is common even among the groups that breastfeed for the shortest period of time.

Breastfed children are commonly given supplemental foods or liquids at very early ages. It is common to breastfeed children relatively frequently during the day and evening. Bottles with nipples are used to provide supplementary food to breastfed children by a substantial proportion of mothers. Most use of bottles with breastfed children is not for the provision of infant formula but for other types of supplemental food.

The impact of infant feeding practices on the health of children and the importance of encouraging breastfeeding has gained increased recognition during recent years. Breast milk is more nutritious, more hygienic, and cheaper than bottle-feeding and, in addition, confers immunities to infants against common infections. Moreover breastfeeding promotes healthy birth spacing. While breastfeeding is advantageous the world over, it is particularly important in the Third World where families are generally poorer, health services less adequate, and the general health environment more hazardous. Thus UNICEF has made the promotion of breastfeeding one of the major components of its strategy to improve child survival (Grant, 1988).

In contrast to the situation in most developing countries, data on infant feeding practices at the national level in Thailand have been relatively abundant as a result of a series of surveys conducted during the last two decades. The Thai Demographic and Health Survey, conducted in 1987, now provides additional information permitting an updated assessment of recent trends and provides new information on several aspects of infant feeding that has not been available from previous surveys.

Data and Methods

The Thai Demographic and Health Survey (TDHS) was carried out between March and June 1987 as part of the international Demographic and Health Surveys project. Details of the survey methodology and sample as well as the principal findings have been published in a country report (Chayovan, Kamnuansilpa and Knodel, 1988). A probability sample of 6,775 ever-married women aged 15-49 was interviewed.[1] The

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sample was designed so that approximately equal numbers of women would be interviewed in Bangkok, provincial urban areas, and the rural areas of each of the four major regions. Through appropriate weighting,nationally representative results can be obtained.[2]

For all live births occurring since January 1982, questions were asked to determine whether the child was ever breastfed and, if so, for how long. This represents the first time any national survey in Thailand collected information on breastfeeding for all births during a specified period. The duration of breastfeeding in previous national surveys in Thailand was asked only for the most recent child with one exception in which information was collected for the two most recent births. For several technical reasons, estimates of breastfeeding based on all births within a given period immediately prior to the survey is preferable to ones based only on the most recent birth or even the two most recent births.[3] In the TDHS, women who were currently breastfeeding a child were also asked about the number of feedings during the previous night and the previous day, what kinds of supplementary food were provided, and if any liquid foods were given in a bottle with a nipple. Information on the frequency of feeding and the use of bottles is not available from previous national surveys thus adding interest to the TDHS results on these topics.

Various approaches exist for the analysis of breastfeeding patterns (e.g., Lesthaeghe and Page, 1980 and Page, Lesthaeghe and Shah, 1982). Country reports issued by the Demographic and Health Survey project employ two simple methods to estimate the duration of breastfeeding. One method, sometimes referred to as the current status approach, estimates the median duration based on the proportion currently breastfeeding among all women at successive durations since childbirth. The other method, sometimes referred to as the prevalence-incidence approach, estimates the mean duration of breastfeeding by simply dividing the number of currently breastfeeding mothers by the average number of births per month during the previous few years.

Neither of the two approaches utilized for the country reports takes full advantage of the available data. In contrast, life table methodology permits full utilization of the information on whether the child was ever breastfed, whether the child was currently being breastfed, and at what age weaning occurred if breastfeeding had ceased. As a result, the life table approach is able to provide more detailed information on the duration of breastfeeding than the other two approaches. In addition, unlike current status tabulations, the way in which a life table is calculated ensures that the estimated proportion currently breastfeeding declines monotonically with months since last birth. However, since the life table approach incorporates information on reported age at weaning, it is influenced by inaccuracies in these data such as those caused by the concentration (heaping) of responses at certain durations. A typical feature of retrospectively reported durations of breastfeeding is that they are heaped at durations corresponding to half-years since some mothers round their answers.[4]

A conceptual distinction can be made in the analysis of breastfeeding with respect to whether interest in breastfeeding focuses on the woman's or the child's viewpoint. When the average duration is calculated per woman, each woman has equal weight but when durations are calculated per child, women with short birth intervals contribute more children within a given time span than women with long intervals. Since the duration of breastfeeding is usually positively correlated with length of the birth interval, average breastfeeding durations measured per woman are usually longer than if measured per child.[5] In some settings these differences can be substantial. In the case of present-day Thailand, however, they are negligible. For example, life table calculations based on TDHS data for births in the last five years yield a median duration of breastfeeding of 14.98 months when woman-based and 14.93 when child-based.[6] The lack of a more pronounced difference probably reflects the fact that when contraceptive use is high, as it is in Thailand, the duration of breastfeeding is no longer a primary determinant of the timing of a subsequent birth.

Recent Trends in Breastfeeding

Similar to many other Third World countries during recent decades, the duration of breastfeeding declined in Thailand during the 1970s as indicated by findings from four national surveys conducted between 1969 and 1979 (Knodel and Debavalya, 1980). While the decline appears to have been moderate, it was also pervasive, affecting both rural and urban mothers as well as mothers of different educational levels. Findings

from Thailand's second and third national contraceptive prevalence surveys (CPS2 and CPS3) conducted in 1981 and 1984, however, suggested that this earlier trend towards reduced breastfeeding may have halted (Knodel, Kamnuansilpa, Chamratrithirong, 1985). The TDHS results are thus of particular interest with respect to the evidence they provide as to whether or not the apparent halt in this decline has continued.

Before proceeding to a more detailed examination of recent trends in breastfeeding indicators as derived through life table methodology, it is useful to examine evidence provided by the current status data. Table 1 shows the percent of women currently breastfeeding their last-born child according to the number of months since giving birth for the three national surveys taken during the 1980s as well for the Survey of Fertility in Thailand (SOFT) conducted in 1975 as part of the World Fertility Survey.[7] The results are based on tabulations of the percent currently breastfeeding according to single month durations since the most recent birth. As a way of summarization, they have been grouped into six-month categories after applying equal weight standardization to the single month results. This procedure eliminates the influence of differences in the single month distribution of births within the broader six-month categories.

For each survey, the proportion currently being breastfed declines with duration since the most recent birth, reflecting increases in the cumulative proportions of mothers who have weaned their child with increasing age of the child.[8] The decline in breastfeeding that occurred during the 1970s is apparent from a comparison of SOFT with the other three surveys. Except for women who gave birth within the first six months prior to interview, the highest proportion of women are recorded as currently breastfeeding at each duration in SOFT. The longer the duration since childbirth, the more pronounced the difference in the percentage currently breastfeeding. Thus well over half (57 percent) of women who gave birth between 18 and 23 months prior to interview were currently breastfeeding their most recent child in 1975 compared to approximately a third according to the other three surveys conducted during the 1980s. No consistent trend is evident, however, in the proportion currently breastfeeding according to different duration categories when the three surveys taken during the 1980s are compared with each other. Thus, based on current status information, it appears that the decline in breastfeeding has halted during the 1980s.

Table 2 compares a series of breastfeeding indicators, derived through the life table approach, based on CPS2, CPS3 and TDHS.[9] Results are presented at the national level as well as for the rural and urban sector separately. In CPS2 only women who had a surviving birth in the previous two years were asked about breastfeeding. In addition, in both CPS2 and CPS3 information about breastfeeding was only collected for the last birth. To facilitate comparison between the three surveys, results from all three surveys presented in Table 2 are subject to the same restrictions, i.e., estimates are based on the most recent birth to women with a surviving birth in the 24 months preceding the survey.

As with current status data, breastfeeding indicators derived through the life table approach as applied to the data described above suggest that the decline in breastfeeding has stopped during the 1980s in Thailand. The median duration of breastfeeding nationally hovers around 17 months with no consistent trend evident between the 1981 and 1987 surveys. This compares with a median duration of breastfeeding of 22.9 months derived from SOFT for 1975 (not shown) based on women who gave birth in the two years prior to the survey.[10] At the national level, the initiation of breastfeeding increased during the 1980s to a point where breastfeeding appears to be close to universal, with only 3 percent of women with a birth in the last 2 years indicating in the TDHS that they never breastfed. Estimates of the national proportions breastfeeding at least 3, 6, and 12 months rise slightly across the three successive surveys. The proportion breastfeeding at least 18 months based on TDHS, however, while higher than the CPS2 estimate, is slightly lower than indicated by CPS3.[11]

All three surveys reveal substantial rural-urban differentials in the extent of breastfeeding. Rural mothers breastfeed far longer than urban mothers and fewer rural mothers never breastfeed. In addition, some rural-urban differences in trends are apparent. The median duration of breastfeeding among urban mothers during the 1980s increased from an average of 4 to almost 6 months while the median duration of breastfeeding for rural mothers changed only slightly, remaining at approximately a year and a half in all three surveys.[12] For both rural and urban mothers, the proportion initiating breastfeeding increased as indicated by declines in the proportion never breastfeeding their children. The percentage of urban mothers not breastfeeding at all declined from 17 to 9 percent and for rural mothers declined from 8 to 2 percent.

In sum, results based on both the current status approach and life table methodology present fairly strong evidence that the earlier decline in breastfeeding in Thailand, apparent during the 1970s, has halted. The median duration has remained relatively stable for rural women during the 1980s and actually increased for urban women. Moreover, initiation of breastfeeding at the national level, while common even at the start of the 1980s, is now close to universal.

Differential Breastfeeding Patterns

Child-based breastfeeding indicators based on the life table approach are presented in Table 3 according to various selected background characteristics. The full set of information on all children born during the 60 months preceding the survey, including those who died, is utilized. The results represent the first life table set of national child-based indicators for Thailand. The overall median duration of breastfeeding is 14.9 months, noticeably shorter than the 16.8 months presented in the previous table. The reason for the difference lies in the different selection of cases on which each set of calculations are based. Restricting consideration to only the most recent surviving birth, as was done in the previous table, to ensure comparability across different surveys, tends to yield higher average durations of breastfeeding than do child-based estimates including children who died (Page, Lesthaeghe and Shah, 1982). Moreover, the two tables refer to different reference periods.

Overall, the life table estimates based on children born within the 5 years preceding the survey indicate that only 6 percent of children were never breastfed, that over three quarters (77 percent) of infants were breastfed at least 6 months, and that over half (56 percent) of infants were breastfed at least for one year. Thus from the child's perspective, as from the mother's perspective, breastfeeding is close to universal in Thailand and pursued for relatively long durations. It should be noted, however, that supplemental food is introduced quite early in the diet and thus the long durations of breastfeeding reported by Thai women typically include substantial periods of mixed feeding (Knodel, Kamnuansilpa and Chamratrithirong, 1985).

Additional evidence from TDHS confirming that breastfeeding is not declining during recent years is provided by a comparison of breastfeeding indicators based on children born in the first three years prior to the survey with those born in the fourth and fifth prior year. The results indicate a slight increase in the duration of breastfeeding during this 5 year period and a slight decrease in the proportion never breastfed.

The substantial rural-urban differences in infant feeding practices, evident from the woman-based indicators of breastfeeding, are likewise apparent from the child-based indicators. For rural children born in the five years preceding the survey, the median duration of breastfeeding was 16 months compared to slightly less than 5 months for urban children. Within the urban category, children born in provincial urban areas are breastfed slightly longer than children born in Bangkok. Despite the sharp rural-urban differences in the duration of breastfeeding, the vast majority of urban children are breastfed for at least a short period of time with only 12 percent not being breastfed at all. Almost three fourths of rural children compared to only one third of urban children are breastfed at least a year.

Regional differentials in breastfeeding patterns are also evident and conform closely to patterns revealed by estimates from previous surveys. Children are breastfed for the shortest durations in Bangkok, consistent with the urban pattern discussed above. Indeed, Bangkok children are breastfed for one month less than provincial urban children, although the proportion who never breastfeed at all is slightly lower in Bangkok than in provincial urban areas. The median duration that a child is breastfed is longest in the northeast, averaging over one and a half years, and shortest in the central region (excluding Bangkok) and the north, where children are breastfed for a median duration of just over one year. Children in the southern region occupy an intermediate position.

Some differences are evident between the majority Buddhists and Moslems, who constitute a small minority of the population and tend to be concentrated disproportionately in the south.[13] Although Moslem children tend to be breastfed for a longer duration than Buddhist children, there is almost no difference in the proportion of Buddhist and Moslem children that are breastfed through at least the first 6 months.

Consistent with previous survey findings, breastfeeding patterns are also associated with the educational attainment of the mother. A large majority of women in the reproductive ages in Thailand have a primary education and the vast majority of children represented in Table 3 have mothers in that category. By and large there is little difference between the breastfeeding patterns of children born to mothers with no schooling and those with primary education. However, children born to mothers with higher education are breastfed for considerably shorter durations and, in the case of children of mothers with secondary education, are less likely to be breastfed at all than children of mothers in the other educational categories.

Given that educational attainment is closely associated with rural and urban residence, differentials in breastfeeding patterns according to mother's education are shown separately for rural and urban children. For both groups, reduced breastfeeding duration is associated with educational levels beyond primary schooling. This is quite consistent with findings from previous surveys pointing to the strong association of higher education with lesser breastfeeding. Nevertheless, it is interesting to note that the vast majority of children, regardless of the educational attainment of the mother, or any of the other background characteristics shown in Table 3, are breastfed at least initially. The highest proportion of children for whom breastfeeding was not initiated are found among those whose mothers have a secondary education. Even in these cases, only 15 percent were never breastfed. Moreover, although a higher proportion of children whose mothers studied beyond the secondary level were breastfed initially, the median duration of breastfeeding is shorter for these children than for those born to mothers with only a secondary education. Already by 3 months, a noticeably higher proportion of children whose mothers have a secondary education were currently being breastfed than children whose mothers studied beyond the secondary level.

Supplemental Food to Breastfed Children

While the TDHS did not collect information on how long after birth a child was first given supplemental foods, mothers of children born during the last five years prior to the survey and who were currently breastfeeding their child were asked if they had given various types of liquids or solid foods to the child during the past day or night. The results, summarized in Table 4, indicate that despite the rather long duration of breastfeeding in Thailand, most children are given supplementary food at an early age. This is consistent with findings from earlier surveys.

It is almost universal in Thailand to provide plain water to breastfed children regardless of how young the child is. Thus even among children aged 3 months or less, over 90 percent were given plain water during the 24 hours prior to interview. For older children, the proportion given plain water is even higher. Although the provision of plain water is of interest as a potential source of contaminants, it has no nutritional value and is thus not appropriately thought of as supplemental food. The other liquids or foods asked about all have some nutritional value and thus are likely to have a greater effect on the duration and intensity with which the child breastfeeds and thereby affect the extent to which breastfeeding delays the return of ovulatory cycles for the mother.

Orange juice is the second most common liquid given to breastfed children although for no age category were more than a third of children provided orange juice during the previous day or night. Powdered milk formula was even less commonly given to children and was primarily given to those in the youngest age groups. Animal milk, mainly from cows, is seldom given to breastfed children in Thailand as a supplement. Other unspecified liquids are occasionally given as well. The low percentages of breastfed children that are given formula or animal milk may reflect a pattern whereby the introduction of breast milk substitutes is associated with an intention to wean and thus is followed by a relatively rapid cessation of breastfeeding. The existence of such a pattern has been suggested by a study of Bangkok infants and mothers conducted in 1982 (Winikoff et al., no date).

Solid food is introduced fairly early in Thailand. Slightly over half of the children 3 months of age or younger are given solid food along with breast milk and the vast majority of breastfed children 4 months or older receive solid food. This frequently includes premasticated rice or mashed bananas, although the TDHS questionnaire did not inquire about the specific types of food provided. The Ministry of Public Health,

through its breastfeeding promotion programs, recommends exclusive breastfeeding for the first three months and the successive introduction of a variety of supplemental foods in addition to breastfeeding starting during the fourth month of life. Thus the frequency with which liquids and solid foods are given to breastfed children is both a matter of custom and in part, for the older children, promoted by public health policy.

The bottom line of Table 4 indicates the extent to which some sort of supplemental food (other than water) is provided to infants. Over two thirds of even the youngest age group are provided with at least some food or liquid and approximately 9 out of 10 breastfed infants aged 4 months or older are provided with some supplemental food. Exclusive breastfeeding in Thailand thus is rare even after a very short period following birth.

Frequency of Breastfeeding

The TDHS is the first national level survey in Thailand to collect information on the frequency of breastfeeding. Women who were currently breastfeeding a child were asked two questions in this regard: the first referred to how many times the child was breastfed during the previous night between sundown and sunrise; the second inquired about how many times the child was fed during the daylight hours. The results are summarized in Table 5 according to the age of the child and are limited to children under two years of age since the number of children past that age who are currently being breastfed becomes quite small. The percentage of children in each group who were currently being breastfed is also shown and, as would be expected, declines with the age of child. A substantial proportion of mothers did not respond to the question about frequency of breastfeeding with a numerical answer. Instead they indicated that they breastfed the child during the daytime as often as the child wanted or that during the nighttime the child slept at the breast and thus could suckle at will. Presumably children in these categories are breastfed relatively often and therefore are included at the high end of the 'number of feeds' scale.

The findings indicate that Thai children in general are breastfed frequently. Almost three quarters of breastfed children under age two were either breastfed at will or at least four or more times during the previous day while three quarters were breastfed at least three times during the previous night or slept at the breast. There is an apparent association between the frequency of breastfeeding and the age of the child. In general, infrequent feeding during the daytime is more common among children aged 12 through 23 months than for those under age one. A similar although less pronounced pattern is evident with respect to nighttime feeds. The stronger association between age and daytime feeds may be due to a tendency for supplementary feeds to increasingly replace breast feeds during the daytime as children grow older. Since supplementary feeds are less commonly given at nighttime, a decline in breast feeds during the nighttime with age would be less apparent (Baum et al., 1987).

It should be recalled that the comparison of children at different age groups does not necessarily reflect changes in breastfeeding frequency with age that would be typical for a particular child. Such a determination would require longitudinal observations of children as they age over time. Since the proportion of children that are currently being breastfed declines relatively sharply with age after one year, cross-sectional results, such as those derived through the TDHS, represent an increasingly selective group of infants at older ages, namely only those yet to be weaned; this may obscure a substantially sharper decline in the frequency of breastfeeding by age that would be characteristic for any particular infant as he or she ages.

Use of Bottles for Supplemental Feeding

Mothers in the TDHS sample who indicated that they were currently breastfeeding their children and also indicated that during the previous day or night they had given their child some liquid or food other than breast milk, were asked whether or not the food or liquid was given in a bottle with a nipple. Such information is of interest because if bottles are not always properly cleaned they can become an important source of pathogens for the infant. In addition, providing bottles with nipples to children may reduce the suckling stimulus for breastfeeding and therefore affect the impact of breastfeeding on the suppression of ovulation. With the information collected in the TDHS, it is also possible to examine the extent to which

the use of a bottle is associated with providing a breastfed child with infant formula.[14] One reason the use of infant formula is discouraged in many Third World countries is because the potential for introducing infections due to unsterilized bottles used for feeding the child is substantial. However, the same dangers will be associated with supplemental liquids other than formula if such foods are also provided through bottle feeding.

Table 6 presents the results for infants in the first two years of life according to their age and residence in rural or urban areas. That only a small minority of Thai children who are currently being breastfed are provided with infant formula has already been indicated. Of the minority who do provide their children with infant formula, the vast majority utilize bottles to do so. However, a significant proportion of breastfed children who are not given formula but are given other types of liquid or food also receive bottles. As a result, almost half of children currently being breastfed under age one were also being bottle-fed during the past day or evening. Providing bottles to older breastfed children is less common and only 16 percent of those aged 12 to 23 months were provided with a bottle during the previous day or night. Overall only a minority of breastfed children provided with bottles were being given formula.

The use of bottles in Thailand is clearly not limited to formula feeding. Among breastfed children, bottles are associated with supplemental feeding (including water) in general, but in only a minority of cases is the bottle used to provide infant formula. Use of bottles among breastfed children is more common in urban areas than in rural areas. In addition, the association between bottles and formula for breastfed children is also higher in urban areas although even among urban breastfed children who use the bottle, fewer than half are given formula.

Discussion

The Thailand Demographic and Health Survey has provided new information on trends in breastfeeding, child-based estimates of breastfeeding differentials, and various aspects of infant feeding practices in Thailand. Perhaps the finding of greatest interest is that the decline in the duration of breastfeeding that characterized the 1970s has come largely to a standstill in the 1980s. Moreover, an actual increase in the proportion initiating breastfeeding appears to have occurred to the point where at the national level, breastfeeding for at least a short period is almost universal and is very common even among groups that breastfeed the least. It is noteworthy that this shift in the trend in breastfeeding practices coincides with extensive efforts undertaken in Thailand by the Ministry of Public Health, as well as by several non-governmental organizations, to promote breastfeeding and to discourage the use of breast milk substitutes, especially at early ages (Chatranon, 1988).

Systematic efforts to promote breastfeeding by the Ministry of Public Health began in 1979 when several seminars were held with health professionals and administrators on the topic. As an outcome, guidelines were developed for implementing a program to promote breastfeeding which continue to serve as the basis of such efforts in this regard until the present.[15] An explicit mandate was incorporated into the Fifth National Economic and Social Development Plan (for 1982-1986) as well as in Sixth Plan (for 1987-1991) to promote breastfeeding as a means to improve child health. In accordance with this mandate, the Division of Nutrition at the Ministry of Public Health launched annual month-long promotion campaigns starting in 1982. These campaigns involve activities at the provincial, the district and the village level and enlist the full range of mass media (radio, newspapers, magazines, television, and public address systems) to provide information about breastfeeding to the public. All provincial radio stations participate. Posters and leaflets are also circulated throughout the government's widespread health care system. In addition, meetings are held to inform officials and workers at all levels of the health system about the campaign and their particular responsibilities. A major emphasis of the campaign is to encourage breastfeeding during the first year of infancy.

Also of significance are the steps taken to control the marketing of breast milk substitutes and related products following the guidelines adopted by the World Health Assembly in Geneva in 1981. The Thai government adopted a version of the code the same year. The infant formula industry in Bangkok apparently began to implement some provisions, such as those prohibiting mass media promotion, in anticipation of the

code's adoption. Other promotional techniques, however, were substituted by the industry (Winikoff et al., no date). In 1984, the Ministry of Public Health, in collaboration with a number of other agencies and organizations including WHO and UNICEF, negotiated with the infant formula companies to establish the current revised Thailand Code of Marketing of Breast milk Substitutes. This new code substantially restricts the use of free breast milk substitutes in hospitals and includes a ban on advertising infant formula and related products (including baby bottles and nipples) through the mass media or through exhibitions. Direct or indirect free distribution to pregnant women or mothers is also prohibited (Thailand, Ministry of Public Health, 1984; Luanguthai and Khathong, 1984). Although few violations were observed during the first few years after the revised code was announced, there is new concern about its effectiveness and steps are being taken to seek ways to legislate the code (Chatranon, 1988).

Also of likely relevance are the many seminars, workshops, and training sessions that have been held in Thailand over the last decade for health service providers and administrators in relation to the promotion of breastfeeding. In many cases these were the result of cooperative efforts between the Ministry of Public Health and non-governmental organizations. This aspect of the program included a series of seminars to promote breastfeeding in maternity wards which began in 1986. A large number of health personnel have been involved and policies and practices followed in maternity wards are thought to have changed as a result, including increased rooming-in following childbirth to permit the mother to breastfeed her newborn infant.

Systematic evaluations of most of these measures have not been carried out to determine if there is any direct link to actual changes in infant feeding practices. Nevertheless, their combined impact could quite plausibly explain the cessation of the breastfeeding decline and the increase in the initiation of breastfeeding observed in the trend data for the 1980s. Indirect evidence from the TDHS, presented in Table 7 and indicating trends in breastfeeding according to place of delivery, lends some support to this possibility.

Given that many of the measures to promote breastfeeding have focused on health personnel and on practices in health facilities, particularly hospitals, it is interesting to compare breastfeeding trends for births that were delivered in a hospital or other health facility with those that occurred at home. Data from the TDHS permit such a comparison since a special question was added to the standard questionnaire to obtain information on the place of delivery of each birth in the last five years. Overall, 51 percent of births during this period were delivered in hospitals, 11 percent in health stations, and virtually all the remainder at home.

As has been found in previous studies in Thailand and elsewhere, results in Table 7 indicate that children delivered in hospitals and other health facilities are breastfed less than those delivered at home (Knodel and Debavalya, 1980; Winikoff, Castle and Laukaran, 1988). While factors associated with the place of delivery itself may play some role, the fact that women who deliver in health facilities are more likely than those delivering at home to have characteristics that are negatively associated with breastfeeding (such as being urban and better educated) undoubtedly is an important reason responsible for the observed association. Of particular interest for the present study, however, is the fact that the proportion initiating breastfeeding increased during the period under observation for children delivered in hospitals while remaining virtually unchanged for home deliveries. Moreover, while the median duration of breastfeeding increases for both groups, increases in the proportion of children breastfeeding at least 3 months and at least 6 months are more evident for hospital and health facility deliveries than for home deliveries.

It will be interesting to observe whether the levelling off of the median duration of breastfeeding at a relatively high level and the nearly universal level of initiation that is presently evident will be maintained in the future. There are a number of social and economic forces operating in Thailand that have encouraged a reduction in breastfeeding and undoubted underlay the earlier decline. These include the rising educational level of women in reproductive ages, urbanization, and increasing labor force activity among women outside of agriculture (Nag, 1983). Thus compositional changes in the population can be expected to exert pressure on reducing breastfeeding even if infant feeding practices remain unchanged within each segment of the population.[16] The steps implemented to promote breastfeeding during the 1980s appear to have succeeded in counteracting the impact of forces that would otherwise have led to a continuation of the trends observed during the 1970s. However, socio-economic change is likely to continue to exert downward pressure on breastfeeding. Thus unless continued and sustained efforts are made, the measures taken to date may prove to have only temporarily stalled a longer term tendency towards reduced breastfeeding among Thai women

and children. For the time being, however, Thailand may well serve as an example of a Third World country where a concerted effort to stem the decline in breastfeeding succeeded.

NOTES

1 This resulted in information on the duration of breastfeeding for almost 4000 children born within the five years preceding the survey. Although the number of cases on which each table in the present study is based is not presented, results based on 20-49 unweighted cases are specifically indicated as such and results based on fewer than 20 unweighted cases are not shown.

2 In the present study, all results presented have been weighted although references to number of cases are in terms of unweighted cases.

3 Breastfeeding estimates based on all births in a given period immediately following the survey have a clear temporal definition while estimates based only on the most recent birth do not represent any defined period of time. For older women, the data will typically refer to an experience a long time ago while for younger women they will refer to a very recent period. This problem, however, can be easily overcome by restricting analysis to the most recent birth within a specified period of time. More serious, is the problem of representativeness associated with estimates based only on the most recent birth. Each respondent will be represented by just one child whose breastfeeding may well have been untypical of that woman's behavior with her other children (particularly likely is over representation of births followed by relatively long intervals with the seriousness of this problem increasing as the time period being specified is lengthened). In addition, by analyzing all births during a specified period, provided the period is long enough for at least some women to have had more than one birth, the estimates will be based on a larger number of births than if only the most recent birth is considered. For a full discussion of these issues see Page, Lesthaeghe and Shah (1982).

4 Response heaping with respect to duration of breastfeeding is evident in all the surveys utilized in the present report. For example, according to the TDHS, slightly more than one-third (34.6 percent) of weaned last-born children born between 13 and 48 months prior to interview were reported to be weaned at ages representing multiples of 6 months. This is approximately double the one-sixth that would be expected if no response heaping (or actual behavioral preference) were present.

5 See Page, Lesthaeghe and Shah (1982). Whether women-based or child- based estimates are more desirable depends on the purpose of the study. For example, if interest lies in the implications of infant feeding practices for child survival, child-based estimates are more relevant. If interest is in the determinants or consequences of women's breastfeeding behavior, woman-based estimates are appropriate.

6 Woman-based estimates are calculated following Page, Lesthaeghe, and Shah (1982) by weighting each birth during the 5 year period inversely according to the number of births the woman had during the period.

7 Since these results refer to the percentage of women still breastfeeding their children, they represent woman-based estimates. If information on the number of births that occurred at successive months prior to the survey were available, child-based estimates could also be calculated by assuming any child who is not the mother's most recent child was no longer being breastfed. However, such information is not available for several of the surveys shown thus preventing presentation of a comparable series of child-based estimates using current status data.

8 For all surveys except CPS2, for which only information on surviving children is available, the lower cumulative proportions of children surviving with successive durations since birth also contribute to this decline.

9 Life table calculations in the present study include mothers who did not breastfeed at all by treating them as having a duration of 0.0 months.

10 The SOFT results include non-surviving births If they were excluded the median duration would be even higher although only by a modest amount.

11 To some extent the TDHS estimates are slightly exaggerated relative to the CPS3 given somewhat greater heaping of responses at half-year durations in the TDHS. Thus it is likely, for example, that a somewhat higher proportion of women who weaned children at 10 or 11 months reported breastfeeding a full year in TDHS than in CPS3.

12 Comparison between the TDHS results for Bangkok and those from an earlier Population Council sponsored Bangkok survey conducted in 1982 based on a sample of 1422 mothers of surviving infants born between March 1981 and February 1982 lends further support to the finding that the decline in breastfeeding in urban areas has halted or even reversed during 1980s. According to the 1982 Bangkok study, 10 percent of women never breastfed (Winikoff, Castle and Laukaran, 1988). Results based on life table analysis of the duration of breastfeeding for the 90 percent of infants who commenced breastfeeding are also presented, however, only for various sets of categorizations of the sample and not for the total sample as a single unit. Nevertheless it is possible to approximate results for the total sample from those presented for separate categories by weighting by the number of cases in each category. To do this we have chosen to combine results presented by age of mother in Table 2.3 of Winikoff, Castle and Laukaran (1988). As weights we take the average of the number of children by age of mother who enter the life table and the number still in observation up to the duration in question. Given the nature of life table calculations this will not exactly replicate the results that would be yielded if the entire sample as a whole were subjected to life table analysis but should be extremely close.

Our calculations indicate that among children in the 1982 Bangkok study who were ever breastfed, 64 percent were still being breastfed by 3 months and 54 percent by 6 months following birth. Calculations based on TDHS data for Bangkok, after applying the same restrictions as hold for the 1982 Bangkok study (i.e. limiting to surviving children born in the 12 months prior to the survey), indicate that 91 percent were ever breastfed and that among those who commenced breastfeeding, 69 percent were breastfed at least 3 months and 53 percent were breastfed at least 6 months.

A comparison of current status data also suggests an increase in breastfeeding for short durations. Applying equal weights standardization to the percent currently breastfed by single months of age shows 61 percent of children 0-5 months old still being breastfed in the 1982 Bangkok study compared to 71 percent of the TDHS Bangkok sample.

13 For example, approximately 5 percent of the weighted sample of women interviewed were Moslems while almost all the remainder were Buddhists. The weighted proportion of children born during the last five years to Moslem mothers is approximately 8 percent of the total, reflecting the higher current fertility among Moslems compared to Buddhists.

14 Bottle feeding among non-breastfed children cannot be determined from the TDHS as only mothers who were currently breastfeeding their children were asked the series of questions on supplemental foods and use of bottles.

15 The following discussion draws on information provided by the Nutrition Division of the Ministry of Public Health in the form of undated mimeographed material in Thai describing activities to promote breast feeding as well as on Chatranon,1988.

16 It is interesting to note that shifts in the composition births during the five years preceding the TDHS would have led to a slight increase in the overall proportion of children who were never breastfed and a slight decrease in the overall median duration of breastfeeding. The reason for this is that the share of births coming from situations where breastfeeding was less extensive increased. For example, holding constant (at the levels shown in Table 3) the proportion who never breastfed and the median duration

of breastfeeding according to rural-urban residence and mother's education but allowing the composition of births with respect to these characteristics to shift as observed between the fourth and fifth years prior to the survey and the first three years prior to the survey leads to an increase in the proportion who never breastfed by 0.3 percentage points and a decline in the median duration of breastfeeding by 0.5 months. Thus the actually observed decrease in the proportion who never breastfed and the increase in the median duration are all the more impressive.

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Table 1 Percent of women currently breastfeeding their last born child by months since most recent birth

Months since most recent birth	SOFT (1975)	CPS2 (1981)	CPS3 (1984)	TDHS (1987)
0-5	83.5	85.7	82.2	87.7
6-11	76.6	65.7	73.0	74.1
12-17	72.0	57.5	54.4	54.0
18-23	57.1	33.5	35.0	35.9

Note: Results are standardized by applying equal weights standardization procedure to results tabulated in single successive months since last birth. Results for CPS2 exclude non-surviving births; all others include both surviving and non-surviving births.

Table 2 Breastfeeding indicators based on the most recent birth, by rural-urban residence, for women with a surviving birth in the 24 months preceding the survey, Thailand 1981, 1984, 1987

	National			Rural			Urban		
Breastfeeding indicator	**CPS2 1981**	**CPS3 1984**	**TDHS 1987**	**CPS2 1981**	**CPS3 1984**	**TDHS 1987**	**CPS2 1981**	**CPS3 1984**	**TDHS 1987**
Median duration (in months)	16.6	17.6	16.8	18.3	18.6	18.1	4.0	4.2	5.7
Proportion never breastfeeding	.091	.055	.032	.075	.040	.020	.167	.122	.089
Proportion breastfeeding at least:									
3 months	.819	.840	.862	.875	.906	.915	.565	.557	.620
6 months	.756	.794	.799	.824	.873	.865	.451	.457	.495
12 months	.660	.693	.713	.732	.784	.786	.338	.303	.380
18 months	.459	.484	.466	.520	.548	.510	.191	.210	.261

Note: Results are derived through the life approach. The second and third Contraceptive Prevalence Surveys are indicated by CPS2 and CPS3 and the Thailand Demographic Health Survey by TDHS.

Source: Results for CPS2 are from Knodel, Kamnuansilpa and Chamratrithirong, 1985. Results for CPS3 have been recalculated due to an error discovered in the original computations reported in previous published results.

Table 3 Child-based breastfeeding indicators, by selected background characteristics, based on children born in the 60 months preceding the survey, Thailand, 1987

	Median duration (in months)	Proportion never breastfeeding	Proportion breastfeeding at least			
			3 mo.	6 mo.	12 mo.	18 mo.
National	14.9	.06	.84	.77	.66	.40
Years born before survey						
0-2	15.4	.05	.84	.77	.67	.42
3-4*	14.6	.07	.84	.77	.65	.39
Rural-urban residence						
Rural	16.1	.04	.89	.84	.73	.45
Urban total	4.8	.12	.60	.47	.33	.19
Provincial urban only	5.4	.13	.61	.49	.34	.19
Region						
Bangkok	4.5	.11	.59	.45	.32	.19
Other central	12.6	.08	.76	.69	.58	.31
North	13.0	.04	.86	.80	.61	.27
Northeast	18.7	.02	.95	.92	.83	.56
South	16.6	.07	.81	.73	.65	.47
Religion						
Buddhist	14.6	.06	.84	.77	.65	.39
Islam	18.4	.08	.83	.77	.72	.55
Education of mother						
No schooling	15.6	.07	.85	.79	.71	.45
Primary	15.9	.04	.88	.83	.72	.44
Secondary	4.2	.15	.60	.44	.27	.15
Beyond secondary	2.5	.07	.46	.30	.18	.14
Residence and education of mother						
Rural						
Primary or less	17.0	.04	.91	.87	.76	.47
Secondary	6.6	.15	.69	.54	.36	.22
Beyond secondary	3.3	.04	.53	.35	.26	.20
Urban						
Primary or less	7.7	.12	.68	.56	.43	.25
Secondary	3.1	.15	.51	.33	.18	.07
Beyond secondary	1.9	.10	.38	.24	.12	.10

Note: Results are derived through the life table approach.

* Includes children born 60 months ago.

Table 4 Percentage given various types of liquids or foods by age of child, among currently breastfed children aged 0-23 months

% given	Age of child in months						
	0-3	4-7	8-11	12-15	16-19	20-23	Total
Plain water	91	95	94	96	99	97	95
Orange juice	18	32	21	17	18	17	21
Powdered milk (formula)	16	11	4	5	6	8	9
Cow's or goat's milk	3	1	2	3	7	2	3
Other liquid	3	11	11	19	16	14	12
Solid food	52	85	86	89	87	82	79
Any food or liquid other than water	68	91	89	92	91	86	85

Table 5 Percentage currently being breastfed and percent distribution according to frequency of breastfeeding during daytime and nighttime, by age of child, among children aged 0-23 months

	Age of child in months						
	0-3	4-7	8-11	12-15	16-19	20-23	Total
% currently being breastfed	91	82	74	60	42	36	63
(of children currently being breastfed)							
Number of feeds during previous daytime							
0-1	1	6	1	11	10	9	6
2	2	6	2	11	10	13	7
3	13	13	17	13	16	7	14
4	16	16	12	16	9	7	14
5+	28	29	30	16	19	38	26
As often as wanted	40	30	38	33	36	26	34
Total	100	100	100	100	100	100	100
Number of feeds during previous nighttime							
0-1	6	9	2	5	9	7	6
2	16	18	19	14	22	30	18
3	26	35	32	35	24	16	30
4	16	12	17	12	19	13	15
5+	22	16	21	14	16	5	17
Slept at breast	15	11	13	14	10	29	14
Total	100	100	100	100	100	100	100

Note: Percent distributions may not sum to 100 due to rounding.

Table 6 Among currently breastfed infants aged 0-23 months given supplemental liquid (including water) or food during previous day or night, percentage using bottle with nipple according to whether or not formula was given and percentage of bottle users given formula, by selected background characteristics

Residence and age	% using bottle among: Breastfed children given formula	Breastfed children not given formula	All breastfed children	% of bottle users given formula
National				
Under 12 months	95	41	46	22
12-23 months	(73)	13	16	27
Total	89	29	34	23
Rural				
Under 12 months	(96)	39	44	20
12-23 months	-	13	15	(15)
Total	(94)	28	32	20
Urban				
Under 12 months	(92)	56	64	34
12-23 months	-	13	26	-
Total	(78)	40	50	40

Note: Results in parentheses are based on 20-49 unweighted cases. Results based on less than 20 unweighted cases are omitted.

Table 7 Child-based breastfeeding indicators, by place of delivery and number of years born before survey, based on children born in the 60 months preceding the survey, Thailand, 1987

Place of delivery and years born before survey	Median duration (in months)	Proportion never breastfeeding	Proportion breastfeeding at least			
			3 mo.	6 mo.	12 mo.	18 mo.
Hospital or other health facility						
0-2 years	12.9	.04	.78	.70	.58	.34
3-4 years*	12.5	.10	.77	.68	.56	.31
Total	12.7	.07	.78	.70	.57	.33
Home**						
0-2 years	18.7	.03	.93	.90	.82	.56
3-4 years*	17.8	.02	.93	.89	.79	.49
Total	18.2	.03	.93	.89	.80	.52

Note: Results are derived through the life table approach.

* Includes children born 60 months ago.
** Includes a small number of cases coded as other.

Occurrence and Correlates of Diarrhea among Thai Children

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Introduction

Acute diarrhea is one of the important public health problems in developing countries. It is estimated that 750 million children below 5 years old in Asia, Africa,and Latin America suffer from acute diarrhea each year. Between 3 to 6 million die annually, 80 percent of deaths occur in the first year of life. It is a major contributor to malnutrition. In malnourished infants and young children, the disease is more common and more severe (WHO, 1986).

Diarrhea is a clinical syndrome of diverse etiology. The etiologic agents are bacteria, virus and parasites. Rotavirus are responsible for 50 percent of diarrhea in the children aged 6-24 months visiting treatment facilities. The other important pathogen is Enterotoxigenic Escherichia Coli which causes 25 percent of cases by its enterotoxin. The other causative agents such as Vibrio parahemolyticus, Giardia lamblia etc. are also found in developing countries.

It is difficult to give a definition of diarrhea. In general, diarrhea is a symptom of frequently passing loose or watery stools. However, the consistency and bulk of the stool depend very much on person and diet. For example, the stool of breast-fed infants is looser than of non-breastfed. After eating a lot of papaya people often pass loose stools. In some societies, it is believed that infants will pass loose stool at each step of development such as from sitting to standing. According to the WHO definition, passing three or more loose or watery stools in a day can be considered as diarrhea.

In Thailand, acute diarrhea is a major health problem. Approximately 20 percent of reported cases occur in infants and 44 percent among children under 5 years of age. Data in the National Surveillance System for reported diarrhea cases based on a passive surveillance network in each province of the country shows an increase in annual incidence. The morbidity rate per 100,000 children under 5 years of age rose from 1,282 in 1980 to 3,573 in 1986 with the peaks in December-January and also in May-June. The age specific incidence rate is highest in children age 0-4 which accounts for 40 percent of the total. The highest mean incidence rate for reported cases occurred in the central region. However, reported cases represent only a fraction of the total. The results of a survey in Thailand indicated that the annual number of episodes of diarrhea per children under 5 years of age is two on average (Prusaraj, 1989: Table 1:3).

Mortality rates of acute diarrhea in children under 5 years of age decreased from 26 per 100,000 in 1980 to 12 per 100,000 in 1986 (Mahidol University, 1986). Most of the deaths in acute diarrhea are due to dehydration which results from excessive loss of body fluid and electrolyte through stool, vomit, urine, and sweat. This symptom can occur in all types of acute diarrhea from various etiologic agents. The difference between the intake and the loss is the net deficit which needs to be replaced. The discovery of oral rehydration using a combination of glucose, sodium chloride, sodium bicarbonate and potassium chloride in a mixture known as ORS (Oral Rehydration Salts) dissolved in water to form ORS solution can save deaths from most cases of acute diarrhea in children. This solution is absorbed in the small intestine even during copious diarrhea. The Global Diarrheal Disease Control Program is intended to reduce deaths from acute diarrhea by using ORS and also acts as an effective entry point for the promotion of proper child care, breastfeeding and environmental health practices for reducing morbidity.

Treatment of diarrhea may be classified into 4 categories. The first is acute diarrhea without dehydration. Rehydration therapy is not required. The continuation of feeding the child while watching for

* The research team would like to express sincere appreciation to Prof. John Knodel for his valuable advice and time for this report.

the signs of dehydration is recommended. Locally available fluids such as plain water or rice water are advised to be given as a supplement to the normal intake of fluids. The second is acute diarrhea with mild dehydration. The treatment plan aims to treat dehydration and to prevent dehydration from coming back and to permit feeding to continue. ORS must be given to replace water and electrolytes already lost and to prevent further loss until the diarrhea stops. The third is acute diarrhea with moderate dehydration. The treatment plan is similar to the second but more fluid is needed and the rate of fluid given is quicker. The fourth is acute diarrhea with severe dehydration. Intravenous fluid is needed immediately followed by ORS solution. Antimicrobial drugs can be given if specific indications are present. No anti-diarrheal agents are recommended. The faculty of Public Health, Mahidol University conducted the National Morbidity Survey between April to May 1985 among children under 5 years of age. The number of children sampled were 3,636 with the percentage distribution for urban-rural 21 - 79 respectively. They found the prevalence rate by diagnosis to be 89 per 1,000 among children under five in urban areas and 141 in rural areas (Pongtong and Lochindarat, 1989:1). Both in urban and rural areas, the prevalence in children under two is higher than over two. The highest rates in urban areas are always for children under one while the highest rates in rural areas are among children 1-2 years old. The degree of severity in urban areas is mild or moderate but in rural areas severe cases are nearly equal to mild plus moderate cases.

In Thailand, the Ministry of Public Health launched a National Program for the control of diarrhea disease in 1986. The objective of the program is to reduce the mortality rate and malnutrition due to diarrhea in children under five by the use of ORS by means of a primary health care approach and to reduce the morbidity rate by supporting MCH, nutrition, provision of clean water and environmental sanitation programs.

The Primary Health Care Program in Thailand depends mainly on the use of village health communicators and village health volunteers. The village health communicators are trained before carrying out their functions. The course consists of 5 days orientation followed by the study of self-learning modules. They learn about utilization of household drugs, potable water and water for household use, construction of sanitary privies (latrines), garbage disposal, etc. The knowledge gained from these self-learning modules should help them to reduce morbidity from acute diarrhea. After six months, some of them are selected to be village health volunteers and receive an additional 15 days training course. After the training, they should be able to assist persons with diarrhea. ORS is provided to these volunteers. They can treat patients with mild dehydration and refer severe cases to health stations or hospitals.

In 1987, the joint government/WHO/UNICEF review of the Program for the Control of Diarrheal Diseases and the Expanded Program on Immunization took place. Key issues were identified and recommendations were given. The key constraints to the program's operation and acceptance included insufficient priority given to the program, inappropriate case management, difficulty in accurately preparing and administering ORS, multiplicity of ORS and commercial electrolyte preparations, inconsistent distribution of ORS, availability of potentially harmful antidiarrheal and antibiotic products, and insufficient promotion of other control programs. However, there were major achievements: the reported diarrhea mortality rate for children under 5 years of age has dropped; ORS access has increased significantly from 12 percent in 1981 to 70 percent in 1986; and ORS usage has increased from 12 percent to 25 percent during the same period. Also, the country is self reliant in the production of ORS. Virtually all health workers at all levels are familiar with ORS and it is available in most health facilities. In 75 percent of households interviewed, the respondent knew that ORS was used for diarrhea.

Since acute diarrhea is still a major health problem, measures to overcome obstacles and constraints on the use of ORS and ORT are needed. The reported morbidity rate is still high and possibly increasing. Further research is necessary. The present study examines the occurrence of diarrhea and types of treatment based on data collected by the 1987 Thailand Demographic and Health Survey (TDHS). In particular, this study tries to identify the complex of factors and the relationships between them that might have an effect on children under 5 years of age contracting diarrhea and on the type of diarrheal treatment provided. Although diarrhea was only one of the many topics covered by the survey, it provides considerable information relevant to the Diarrheal Disease Control Program.

Source of Data

Fieldwork for the TDHS took place in March through June 1987 and involved interviews with a nationally representative sample of 6,775 ever married women aged 15-49. The sample was designed to provide independent estimates for the four major regions of Thailand and the Bangkok Metropolitan Area, as well as for the urban and rural sectors collectively. Questions on diarrhea occurrence was asked for all living children born to respondents since January 1982. This resulted in the successful collection of information for 3,665 children (unweighted). Details of treatment were collected for the 528 children for whom an episode of diarrhea during the two prior weeks was reported.

Occurrence of Diarrheal Episodes

A complex of factors can contribute to a given episode of diarrhea at various levels: community, household and personnel. In this study, variables representing demographic, socio-economic and health characteristics are investigated at these three levels. At the community level, these factors include the climatic and geographic setting represented by region and place of residence (rural-urban). In addition, religio-linguistic ethnicity in relation to diarrheal occurrence is explored. Factors at the household level include sanitary facilities, source of water for household use and drinking, and food preparation and storage. For the individual level, variables such as sex, age of both child and mother, breastfeeding status of the child, mother's work status and education of mother are of potential relevance.

Table 1 examines the percentage of children having diarrhea in the past 24 hours and in prior 2 weeks in relation to demographic characteristics. The data indicate that overall 6 percent of children were experiencing diarrhea within 24 hours and 15 percent were experiencing diarrhea within the past two weeks. It is clear that children in rural areas are more likely than urban children to experience an episode of diarrhea. Approximately 16 percent of children in rural areas compared to 10 percent of children in urban areas had diarrhea in the past 2 weeks. This is probably due to poorer personnel hygiene as well as poorer environmental sanitation for the rural residents as compared to residents of the urban areas.

With respect to the age of the children, diarrhea is more common among those under 2 years old. This could be due to natural immunity which children have acquired when they get older. However, the occurrence of diarrhea is slightly lower for the children under 6 months of age, probably because most are still breastfeeding, some still exclusively so, while children between the age of 1-2 years old are more likely to be weaned and to be receiving various supplemental foods.

A study done by the Institute for Population and Social Research revealed that when asked about possible causes of diarrhea, among the 37 percent of the respondents who were able to spontaneously name at least one cause of diarrhea in children, the most frequency given cause was eating unclean food (Prasartkul et al., 1989:172). One report has indicated that for all the patients who have diarrheal disease, approximately 20 percent are patients whose age is less than 1 year old and 44 percent are children aged less than 5 years old (Pruksaraj, 1989:1). Thus the results from the analysis of TDHS data are consistent with previous findings that the youngest age groups are most affected. In the first few years of life, children probably develop intestinal immunity to the majority of enteropathogens in their environment. In contrast, acute diarrhea is relatively less frequent in older children and adults, which might be due to their acquired protective immunity and better standards of personal hygiene (Carpenter, 1984:6-9).

The TDHS data also show that boys experienced diarrhea more frequently than girls. Only 5 percent of girls experienced an incidence of diarrhea within the past 24 hours, and 14 percent during the past two weeks, compared to 7 and 17 percent for boys respectively. This might be due to Thai cultural values which encourage boys to be more active and aggressive than girls. In general, Thai boys are allowed more freedom when they play and their habits of eating are less restricted than Thai girls.

Although some differences in the prevalence of diarrhea by the age of the mother are evident, the relationship is not consistent. In general, children with a young mother (less than 20) tend to experience diarrhea more in the past 2 weeks than children of older mothers (more than 40). The trend seems to be

the same in both rural and urban areas. This might be due to the fact that young mothers may be less prepared for taking care of their children. Proper child care is quite crucial for preventing the children from contracting diarrheal disease, especially during the weaning period.

Table 2 examines the percentage of children having diarrhea in the past 24 hours and past 2 weeks according to socio-economic characteristics. As discussed above, a considerable rural-urban difference in the frequency of diarrhea is evident. However, regional differences in both the percentage of children having diarrhea in the prior 24 hours and within 2 weeks are minimal, except for Bangkok, the capital, where the prevalence of diarrhea is the lowest.

Education of the mother is one of the individual level variables well known to affect child health (Koenig et al., 1984; Ware, 1984). In this study, children of mothers who have a secondary or higher education are less likely to experience diarrhea than children of mothers who have not completed their primary education. The occurrence of diarrhea is somewhat higher among mothers who have beyond secondary education than among mother who have completed "only" secondary school. This might be related to the extent to which mothers work outside their homes and its consequences for care of their children.

Various studies indicate that culture and traditional ways of living play an important role in health behavior. Thus it is of interest that Islamic children in Thailand are more likely to experience an episode of diarrhea than Buddhist children. Considerable differences are also apparent according to religio-linguistic ethnicity. Both children who belong to Thai speaking Moslem families and Malay speaking Moslem families have the highest percentage experiencing diarrhea both in the prior 24 hours and within the last 2 weeks. Cambodian and hill tribe children also experience above average occurrence of diarrhea.

There is little relationship evident between the work status of the mother and the percentage of children having diarrhea in this study. Socio-economic status has a direct impact on sanitary conditions and influences parental knowledge and attitudes related to preventive measures and behaviors (Prasartkul et al., 1988:170). In this study, possession of vehicles has been used as an index for wealth. The data shows that children who lived in the households that have no vehicles at all are more apt to have had diarrhea in the prior 24 hours and 2 weeks. This is true in both rural and urban places.

Table 3 examines the percentage of children who had diarrhea in both the preceding 24 hours and 2 weeks according to health related characteristics. Both resources and behavior which are considered as factors at the household level are included. There are various studies indicating that source of water for both drinking and household use are the most crucial variables for contracting infectious diseases. This study indicates that children who have the highest rate of diarrhea are the ones who drink or use water from a river, spring and surface whereas the children who live in households that drink and use water coming from the well have the second highest rate of diarrhea. The lowest percentage of children having diarrhea are found among those households that drink water from the bottle. Piped water for household use is also associated with lower frequency of diarrhea.

Other factors at the household level including household sanitation are potentially important determinants of diarrheal disease. In this paper, toilet facilities, possession of soap and possession of refrigerator (indicating food storage) are used as variables to measure household sanitation. Their association with the percentage of children having diarrhea in both the prior 24 hours and within the last 2 weeks is also shown in Table 3. In Thailand many rural households have no toilet facilities. The results indicate that children who live in households with no toilet facilities or in households that use an open pit latrine show higher occurrence of diarrhea than households with toilet facilities. Having soap on the premises can have a bearing on general hygiene. In Thailand very few households are without soap. However, among those who live in the households that have no soap or are temporarily out of it, the percentage of the children having diarrhea is far higher than among those who have soap or who are temporarily out of it. The possession of a refrigerator can promote health since milk and food can be kept longer and can be protected from insects, especially in the rural areas. However very few rural households have a refrigerator. In urban areas refrigerators are more common. In both rural and urban areas, the percentage of children having diarrhea is lower in households with refrigerators. Immunization status of children shows only a weak association with having diarrhea.

The relationship between infant feeding practices and the occurrence of diarrhea is of interest. The TDHS results show a median duration of breastfeeding of over one year. The vast majority of Thai mothers breastfeed their children for at least some period of time (Chayovan, Kamnuansilpa and Knodel, 1988). Table 4 illustrates the percentage having diarrhea in the prior 24 hours and the prior 2 weeks among children under 2 years old comparing rural and urban areas. The data confirm that children still being breastfed have a smaller chance of getting diarrheal disease than children who are not being breastfed. This is true in both rural and urban areas.

Given the association between diarrhea and rural-urban residence and a number of the selected characteristics, it is useful to explore specific differentials in the percentage of children having diarrhea after statistically adjusting for related characteristics. The following analyses are done for national, rural and urban samples using Multiple Classification Analysis (MCA)[1]. MCA produces statistics which show how each independent variable related to the dependent variable both before (unadjusted) and after (adjusted) taking into account the effects of all other independent variables.[2]

Table 5 shows the percentage having diarrhea during the prior 2 weeks by selected characteristics, unadjusted and adjusted by MCA, among children born 1982-1987. For the national sample, the unadjusted results indicate that there is a higher percentage having diarrhea in rural than in urban areas (16 percent compared to 10 percent). The effect of rural-urban residence diminishes slightly as we adjust for other factors as indicated by the adjusted mean values for each category. That is, the rural-urban difference in the percentages having diarrhea declines from 6.5 to 4 percentage points, reflecting the fact that rural-urban residence is related to some extent with other selected characteristics.

With respect to child's age, children under 2 years old are about twice as likely to have experienced diarrhea during the prior two weeks as children age 2 years or more. This remains the case after adjusting for other characteristics. Mother's education is negatively related to the percentage of children having diarrhea. Even after adjustment for other characteristics, the percentage having diarrhea is less than half as great for children with mothers who have attended secondary school or higher education compared to children of mothers with less than the basic 4-6 years of primary education. Moslem children tend to be more likely to have had diarrhea than the Buddhist children or those of other religious groups with the same pattern persisting when adjusted for other characteristics.

Since children in the rural area tend to have higher percentages having diarrhea than those in the urban area, and because the relationship between diarrhea and other factors of interest sometimes differ between rural and urban areas, further analyses are shown separately for the rural and urban populations. For the rural areas, results from Table 5 show how diarrhea relates to age of children, mother's education, religion, type of toilet, source of drinking water and possession of soap. Results are shown both unadjusted and adjusted for the other selected characteristics. Adjustments are based on two different equations. Equation 1 includes all the above mentioned characteristics except possession of soap while equation 2 includes all the variables except religion. The same variables as in equation 1 for the rural sample are included in the single equation used to adjust the urban results.

Both in the rural and urban samples, the results show that children aged under two years old have higher percentages with diarrhea than children aged 2 years or more regardless of adjusting for other characteristics. In rural areas mother's education shows a persistent negative relation with diarrhea like the national results but in urban areas, the percentage of children having diarrhea differs little according to mother's education, especially after adjusting for other characteristics. Moslem children are more likely to have diarrhea than Buddhist children or other religious groups in rural areas regardless of adjustments but in the urban areas the percentage having diarrhea is similar for Moslem and Buddhist children. The result indicates that rural children in households without toilet facilities or with an open pit latrine tend to have diarrhea more than those in households with a sanitary pit latrine although the association is reduced when adjusted for other characteristics. Children in urban households with flush toilets tend to be better off with respect to diarrhea than those in households with a sanitary pit latrine or no toilet facilities.

The source of drinking water shows some relation to diarrhea. Children in rural households using rain water as a drinking source are characterized by the lowest degree of diarrhea followed by children in households with piped water. Children in households relying on wells and rivers or springs for water show higher rates of diarrhea. However, the association with the source of drinking water diminishes when adjusted for other selected characteristics, especially if possession of soap is included as a variable. For urban areas, households using bottled water have the lowest diarrhea followed by rain water, well and piped water, respectively. The result persists when adjusted for other independent variables.

In order to examine the effect of breastfeeding status on diarrhea within a multivariate framework, Table 6 focuses on children under two years of age. This table shows the percentage having diarrhea in the prior 2 weeks by breastfeeding status and other selected characteristics, unadjusted and adjusted by MCA. In general, the grand mean of having diarrhea, for national, rural and urban samples, is higher among children under two years than among the full set of children born 1982- 1987 as shown in the previous table. For the national sample the unadjusted results indicate that there is a higher percentage having diarrhea in rural than in urban areas. The difference is greater among children under two years of age than among the full set of children born 1982-1987. This remains the case after adjusting for other characteristics.

With respect to breastfeeding status, unadjusted results indicate that children who are not being breastfed tend to have slightly more frequent episodes of diarrhea than those still breastfeeding with the difference being around two percent. However, the difference becomes wider (around 6 percent) when adjusted for others characteristics. Mother's education is also negatively related to the percentage of children having diarrhea, similar to the findings in table 5 based on all children born during 1982-1987. This difference persists when adjusted for other factors.

Focusing separately on rural and urban samples, the results show that children not currently breastfeeding have slightly higher diarrhea than those in the still breastfeeding group for both samples. The difference is around 3 percentage points in rural areas and about 4 in the urban areas. However, the results become more pronounced when adjusted for other variables, for both rural and urban samples. Mother's education shows a persistent negative relation with diarrhea in the rural areas regardless of adjusting for other characteristics. However, in the urban areas, the percentage of children having diarrhea differs little according to mother's education. This is true both unadjusted and adjusted for effects of other variables.

Rural children in households without toilet facilities are more likely to experience diarrhea than those in households with open pit latrines and in the households with sanitary pit latrines. When adjusted for other characteristics, however, the association is reduced slightly. In urban areas children living in households with a flush toilet tend to have less diarrhea than children living in households with no toilet facilities; however, the samples in two categories are based on fewer than 50 cases.

For sources of drinking water, children in rural areas using piped water are characterized by the lowest degree of diarrhea followed by children in households using rain and well water, respectively, although these associations diminish slightly when adjusted for other selected characteristics. For the urban areas, households using bottled water have the lowest diarrhea followed by those with piped water. The result hold when adjusted for other characteristics. Possession of soap also has a negative relationship with diarrhea both unadjusted and when adjusted for other independent variables. In all, the relationship between diarrhea and selected characteristics seem to be in the same direction for both the full set of children born in 1982-1987 and children under two years of age even though the percentage having diarrhea is higher for the latter group.

Treatment of Diarrhea

Diarrhea is one of leading cause of death among infants and children in the developing countries (Chen et al., 1980). In 1982, diarrheal disease was the fourth leading cause of death among children under 5 years of age in this country (Institute for Population and Social Research, 1985). Although the death rate from diarrheal disease has declined in recent years, there are also other leading causes of death among young children which are closely related to diarrhea such as malnutrition and poor resistance to infectious diseases.

Morbidity studies have estimated the average incidence of diarrhea among rural Thai children to be 2.18 per child per year (Vorakitphokatorn, 1985:5).

Many studies reviewed the causes of infant mortality by two components, biological and behavioral (Koenig et al., 1984). Both components are proximate determinants of child health, and both must be considered when designing treatment programs (Mosley and Chen, 1984). An analysis of the relationship between individual health and health inputs should include the mediating effect of individual differences since the health inputs are affected by differences in health endowments and knowledge (Schultz, 1984).

One of the most important medical advances for the treatment of diarrhea has been the development of Oral Rehydration Therapy (ORT), a remedy which is simple, inexpensive and yet effective in the treatment of most cases of diarrhea. ORT consists of diluting Oral Rehydration Salts (ORS) with water and using it in a program of treatment. The technique was developed by the International Centre for Diarrheal Disease Research, Dhaka, Bangladesh.

Oral Rehydration Therapy using Oral Rehydration Salts was introduced in Thailand by the World Health Organization in 1978 and it has been playing an important role in the National Control of Diarrhea Diseases Program (NCDDP) under the provision of the Department of Communicable Diseases, Ministry of Public Health. ORS packets are provided by the Government Pharmaceutical Organization and are given throughout the country (Vorakitphokatorn, 1985:11).

Since knowledge of ORT is a prerequisite for the use of ORS, the TDHS has investigated this topic. Of all mothers with children under 5 years old, 78 percent know about ORT. However, there seems to be a positive association between education and knowledge of ORT (Chayovan, Kamnuansilpa and Knodel, 1988:110).

Table 7 represents the percentage distribution of action taken in cases of diarrhea episodes during the prior 2 weeks among children born between 1982-1987. Faced with a child having diarrhea, a mother may consult a health profession, give a child ORT, do both, or do neither. In 41 percent of cases a health professional was consulted and in 40 percent of cases the child received ORT. Not in all cases in which a health professional was consulted, however, was ORT given, nor vice versa. When a health professional was consulted, ORT was given in about two-thirds of the cases, and was not given in the remaining one-third. Similarly, among cases receiving ORT, two-thirds consulted a health professional, and one-third did not. The data indicate that the most common situation (46 percent) was neither to consult a health professional nor for the child to receive ORT. Both consulting a health professional and providing ORT are the second most common course (27 percent). Nevertheless, in a significant minority of situations a health professional was consulted but the child received no ORT or no health professional was consulted and the child received ORT. Comparing rural and urban areas, urban children are more likely to have someone consult a health professional and/or to receive ORT.

In this study, the percentage for whom a health professional was consulted, the percentage receiving ORT, and the percentage in neither situation are illustrated in Table 8 in association with the demographic characteristics of the child and the mother. The data indicates that both the percentage of children receiving ORT or whose mother consulted with a health professional is lowest for the youngest children. Boys are less likely to receive treatment but more likely to have a medical authority consulted than girls. Children of young mothers (aged 15-19) are less likely to receive ORT or to have a health professional consulted than children with mothers in any other age group.

Table 9 shows treatment for diarrhea in relation to socioeconomic characteristics. As indicated above, children having diarrhea in urban areas are more likely than rural children to have a health professional consulted or to receive ORT. In total, in 47 percent of rural cases neither was any health personnel consulted nor was ORT administered compared to 38 percent of urban children. This may be due to mothers in the remote villages not being able to provide ORT to their children due to low availability of ORS and limitations in health personnel and facilities in those areas at the present time. Since health personnel are the main source of information about ORT, even though it can be administered by parents themselves without having

to consult medical personnel, it may not be utilized as much as it should in rural Thailand (Vorakitphokatorn, 1985:174).

An examination of the differences in diarrheal treatment by regions reveals that the Central region has the highest proportion consulting health professionals and the Northeast has the highest percentage receiving ORT.

Many studies confirm that there seems to be a positive association between education and knowledge of ORT. The TDHS also found that the percentage of mothers who know about ORT increased from 57 percent among those with no education to 88 percent among those with more than secondary school. This positive relationship with education is observed for both urban and rural mothers and more or less in each region (Chayovan, Kamnuansilpa and Knodel, 1988:110). Table 9 indicates that treatment is also related to education. Both the percentage of children for whom a health professional was consulted and the percentage receiving ORT increases with the mother's educational level. The association is stronger for ORT treatment.

With respect to religion, there is little difference between Islamic and Buddhist children in terms of the percentage for whom a health professional was consulted or the percentage receiving ORT. Economic status often shows a very close relationship with obtaining medical services (Lu, 1966:447-456). Nevertheless in this study, neither possession of a vehicle, nor work status of women, show clear relations with the treatment for diarrheal disease.

Table 10 examines the association between percentage of children who neither received ORT nor for whom a health professional was consulted by selected characteristics utilizing Multiple Classification Analysis. For the all children sample, the unadjusted results indicate that there is a higher percentage not receiving ORT or consulting a health professional in rural than in urban areas (47 percent compared to 38 percent). The effect of rural-urban residence diminishes slightly after adjusting for other characteristics.

Mother's education is negatively related to the percentage who neither received ORT nor for whom a health professional was consulted. The results persist even after being adjusted by other independent variables. With respect to child's age, children under 6 months old (although this is based on only 20-49 unweighted cases) have a higher percentage not receiving ORT nor consulting health professional than children age 6 months or older. The results hold both unadjusted and when adjusted for other variables.

The patterns of the relationship between the percentage who neither received ORT nor for whom a health professional was consulted by selected characteristics also hold when the analysis is limited only to children under two (for the purpose of examining the relation with breastfeeding) rather than on the all children sample. That is, the rural sample shows a higher percentage not receiving ORT nor consulting health professional than the urban sample and the relationship diminishes slightly after adjusting for other independent variables. Mother's education and child's age also have a negative relationship with the dependent variable and this is true even when adjusted for other independent variables.

With respect to breastfeeding status, children in the still breastfeeding category show a lower percent not receiving ORT nor consulting a health professional than children not breastfeeding. However, the reverse is true when adjusted for other selected characteristics.

Discussion and Conclusion

Acute diarrheal disease is recognized as the leading cause of childhood mortality and morbidity in developing countries. Results from surveillance studies in Asia, Africa and Latin America show that each year approximately 150 million children below age 5 suffer from diarrheal ailments. Moreover, between 3 to 6 million in this age group die from acute diarrheal disease with 80 percent of these deaths occurring in the first 2 years of life (Vorakitphokatorn, 1985:1).

The present study shows that children under 2 years old are the ones who are more likely to experience diarrhea. Boys have a slightly higher occurrence of diarrhea than girls. Also, as commonly found

in other studies, children living in the rural areas are more likely to experience diarrhea than children in the urban areas. Diarrheal disease is transmitted through the mouth of the patient in food or water. Consistent with this is the finding in this study that water usage, drinking water, and toilet facilities are correlated with the percentage of children having diarrhea.

The data also confirm that the children whose source of drinking water is bottled water are least likely to experience diarrhea. However, when other sources of drinking water, such as rain or water from the river, are examined using multiple classification analysis, children have almost the same chance of having diarrhea. Therefore, further study examining the relationship with the source of water both for drinking and household use is necessary, especially since water supplies have been a serious problem in the remote villages in this country for a long time. The Ministry of Public Health has realized the situation and initiated a program called "Rural Water Supply Sanitation" in many parts of the country. Other related issues such as what kind of container should be used or how to make the water clean and preserve it for the whole year are valuable related issues.

Results concerning toilet facilities also show a correlation with diarrheal disease as do sanitation and infant feeding behavior. In this study, the lack of possession of soap, although rare, was associated with children having diarrhea.

Another important factor at the household level is feeding practices for young children. The data indicates that infants who are less than 6 months old show a lower percentage having diarrhea than the children aged 6-23 months old. This might be due to the fact that breastfeeding is common for the children between 0-5 months and supplemental foods less common. The data in this study indicate that children who are breastfeeding are less likely to have diarrhea than the children who are not being breastfed. Whoever takes care of the children during the weaning period should be aware of the risk of diarrheal disease that could arise by giving children powdered milk or supplementary foods. The Ministry of Public Health has initiated "The Primary Health Care Program" throughout the country which deals with this issue. In this program, village health volunteers are key persons for training and advising people especially for the mother's and child's health care. It is necessary to evaluate the success of the training program and its effects, particularly in the remote settlement areas.

Mother's education, as found in many studies, is positively related with health behavior. In this study, Islamic religious affiliation is associated with a higher percentage of children having diarrhea than other religious affiliations, probably reflecting differences in cultural beliefs and practices. Further study of the incidence rate of diarrhea needs to be conducted over the whole year so that any seasonal patterns that might exist can be detected.

Death from diarrhea has long been recognized as primarily the result of dehydration. ORT is a new promising treatment dealing with this problem. However, not all the children having diarrhea need to receive ORT since some patients pass watery stool 3-4 times a day but show no sign of dehydration. Analysis of TDHS data on treatment is necessarily limited to the few questions that have been asked on this particular topic. When comparing rural and urban areas, the data indicate that there are higher percentages of children for whom advice has been sought from a health professional and who received ORT in the urban areas than in rural areas. This might be due to the fact that in the urban areas there are more health facilities and services available for the patients than in the rural areas.

The village health volunteer can play an important role in providing the basic treatment for diarrhea or in cases of children who are not very seriously ill. Reliance does not necessarily have to rest on higher level health personnel. Thailand has included the ORT program in the National Primary Health Care Program since 1979 and has been working toward a goal of strengthening national self-reliance in the control of diarrheal disease. One study has observed that this improvement is related to ORS promotion activities being implemented through the national health service network (Vorakitphokatorn, 1985:100).

Despite substantial progress, mortality rates due to malnutrition and infectious diseases are still alarmingly high. Therefore, reducing the rate of malnutrition and mortality due to infectious diseases among Thai children under five may be regarded as a priority. Helping reduce the occurrence of diarrhea and providing proper treatment can play an important role.

NOTES

1 Multiple Classification Analysis is an extension of multiple regressing analysis using dummy variables. From a strict statistical point of view it is not appropriate for use with a dichotomous dependent variable such as used in the present analysis. In general, however, results rarely differ substantially from those based on more appropriate techniques such as logistic regression, and are easier to obtain and interpret. For this reason we rely on MCA in the present study.

2 MCA results are most readily interpretable when there are no significant interaction effects. The results show no significant two-way interaction effects for the variables being used in the analysis.

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Table 1 Percentage having diarrhea in prior 24 hours and prior 2 weeks, by demographic characteristics of the child and the mother and by rural-urban residence, among children born 1982-1987

Characteristic	% of children having diarrhea in prior		% of children having diarrhea in prior 2 weeks	
	24 hours	2 weeks	Rural	Urban
Total	5.8	15.3	16.3	9.8
Age of child				
0-5 months	8.3	17.9	20.0	8.5
6-11 months	9.0	23.1	24.5	17.1
12-23 months	8.6	23.8	25.4	16.5
24-35 months	6.9	14.9	16.6	6.7
36-47 months	2.0	10.6	11.1	8.11
48-59 months	5.0	9.3	9.8	6.4
60+ months	1.1	7.9	8.9	0.0
Sex of child				
Boy	6.8	16.8	17.9	10.8
Girl	4.8	13.7	14.7	8.9
Age of mother				
15-19	7.3	24.6	25.3	(18.3)
20-24	7.3	16.9	18.4	8.7
25-29	4.2	12.9	13.2	11.6
30-34	7.1	15.6	16.7	10.5
35-39	4.7	15.3	17.5	6.3
40-44	3.2	13.0	13.8	(3.2)
45-49	6.6	13.6	14.7	-

Notes: Results based on less than 20 unweighted cases are not shown; results based on 20-49 unweighted cases are enclosed in parentheses. The results shown are based on weighted calculations.

Table 2 Percentage having diarrhea in prior 24 hours and prior 2 weeks, by socio-economic characteristics and by rural-urban residence, among children born 1982-1987

Characteristic	% of children having diarrhea in prior		% of children having diarrhea in prior 2 weeks	
	24 hours	2 weeks	Rural	Urban
Total	5.8	15.3	16.3	9.8
Rural-urban residence				
Rural	6.2	16.3	16.3	-
Urban	3.8	9.9	-	9.9
Region				
Bangkok	3.7	10.6	-	10.6
Other central	5.7	13.8	14.0	12.5
North	7.0	17.2	17.8	9.1
Northeast	5.6	15.9	16.4	7.0
South	6.5	16.1	17.1	4.6
Education of mother				
0-3 years	7.9	21.1	21.9	11.7
4-6 years	5.8	15.3	16.1	9.8
Secondary	3.1	7.9	5.7	10.3
Beyond secondary	4.2	10.8	12.8	8.4
Religion				
Buddhist	5.4	14.5	15.5	9.8
Islam	10.6	23.4	26.0	9.2
Other	5.0	15.1	15.6	-
Religio-Linguistic Ethnicity				
Central dialect, Buddhist	6.4	15.0	17.8	9.4
Northeast dialect, Buddhist	4.8	15.6	15.8	13.4
Northern dialect, Buddhist	2.7	12.2	12.4	9.9
Southern dialect, Buddhist	3.3	8.7	9.3	1.9
Thai speaking Moslem	8.9	21.8	25.2	9.4
Malay speaking Moslem	15.3	28.3	28.7	-
Cambodian	12.2	17.7	17.5	-
Hill tribe	6.6	19.3	19.3	-
Others	1.9	8.4	(6.1)	(13.3)
Mother's work status				
Not working	5.8	15.7	16.8	10.7
Agriculture work	5.6	15.6	15.6	(12.8)
Non-agricultural work	6.2	13.9	16.8	8.9
Possession of vehicles				
None	6.7	18.6	19.9	12.5
Bicycle only	6.0	14.6	15.1	8.9
Motorcycle	4.7	13.3	14.2	8.2
Car, truck or minibus	5.2	12.0	14.3	8.5

Note: Results based on less than 20 unweighted cases are not shown; results based on 20-49 unweighted cases are enclosed in parentheses. The results shown are based on weighted calculations.

Table 3 Percentage having diarrhea in prior 24 hours and prior 2 weeks, by health related characteristics and by rural-urban residence, among children born 1982-1987

Characteristic	% of children having diarrhea in prior		% of children having diarrhea in prior 2 weeks	
	24 hours	2 weeks	Rural	Urban
Total	5.8	15.3	16.3	9.8
Source of drinking water				
Piped	4.6	12.8	14.4	12.0
Bottled water	1.2	4.1	-	4.2
Well	6.4	17.0	17.2	10.5
River, spring, surface	7.7	18.7	18.8	-
Rain water	5.0	13.3	14.1	6.0
Other	9.4	18.3	20.0	(9.0)
Source of water for household use				
Piped	4.8	12.0	14.9	9.8
Well	5.9	15.8	16.0	9.8
River, spring, surface	7.2	17.8	18.5	8.9
Other	6.3	19.2	19.6	-
Toilet facilities				
Flush	6.9	11.1	-	5.3
Septic tank	4.5	12.7	13.5	10.2
Pit	4.2	17.9	17.8	-
No facilities	7.6	18.8	18.9	11.7
Possession of soap				
Yes	5.6	14.6	15.7	9.9
Temporarily out	5.1	16.4	16.9	(6.2)
No soap	12.9	29.0	29.6	-
Possession of refrigerator				
Yes	4.3	10.1	16.1	7.9
No	6.2	16.8	17.1	12.8
Was child immunized				
Yes	5.3	15.0	16.1	9.7
No	8.2	16.8	17.1	11.3

Note: Results based on less than 20 unweighted cases are not shown; results based on 20-49 unweighted cases are enclosed in parentheses. The results shown are based on weighted calculations.

Table 4 Percentage having diarrhea in prior 24 hours and prior 2 weeks, by breastfeeding status and rural-urban residence, among children under 2 years of age

	% with diarrhea in prior 24 hours			% with diarrhea in prior 2 weeks		
	Total	**Rural**	**Urban**	**Total**	**Rural**	**Urban**
Breastfeeding status						
Not being breastfed	10.3	11.8	6.5	23.7	26.3	17.2
Still being breastfed	7.7	8.2	3.7	21.6	22.9	11.3
Total	8.6	9.3	5.4	22.4	24.0	14.9

Table 5 Percentage having diarrhea in prior 2 weeks, by selected characteristics, unadjusted and adjusted by multiple classification analysis, among children born 1982-1987

	National		Rural			Urban	
	unadj	adj	unadj	adj(1)	adj(2)	unadj	adj
Grand mean	15.2	15.2	16.3	16.3	16.3	9.8	9.8
Rural-urban residence							
Rural	16.3	16.1	x	x	x	x	x
Urban	9.8	11.1	x	x	x	x	x
Age of child							
Under 2 years	22.3	22.5	23.9	24.1	24.3	14.7	14.6
2 years on more	11.1	11.0	12.0	11.9	11.8	6.4	6.5
Mother's education							
0-3 years	21.0	20.9	21.8	21.3	20.8	11.7	10.3
4-6 years	15.3	15.1	16.1	16.1	16.2	9.8	9.2
Secondary or above	8.8	9.9	8.2	9.2	9.5	9.4	10.5
Religion							
Buddhist	14.5	14.7	15.5	15.8	x	9.8	9.7
Moslem	23.4	22.6	26.0	24.5	x	9.2	10.6
Other	15.1	12.4	15.6	11.6	x	-	-
Type of toilet							
Flush	x	x	-	-	-	4.4	4.7
Septic tank	x	x	13.5	14.7	14.6	10.2	10.1
Pit	x	x	17.8	17.6	17.4	-	-
No facilities	x	x	18.9	17.6	17.7	11.7	12.7
Drinking water source							
Piped	x	x	14.4	15.1	15.1	12.0	12.0
Bottled	x	x	-	-	-	3.6	3.8
Well	x	x	17.1	16.4	16.6	10.5	9.7
River or spring	x	x	18.8	17.7	16.9	-	-
Rain	x	x	14.1	15.9	16.0	6.0	6.1
Other	x	x	20.0	21.8	19.3	(9.0)	(8.5)
Possession of soap							
Yes (or temporarily out)	x	x	15.8	x	16.0	x	x
No	x	x	29.6	x	25.9	x	x

Note: x = not included in equation; - = less than 20 unweighted cases;
( ) = based on 20-49 unweighted cases.

Table 6 Percentage having diarrhea in prior 2 weeks, by selected characteristics, unadjusted and adjusted by multiple classification analysis, among children under two years of age

	National		Rural		Urban	
	unadj	**adj**	**unadj**	**adj**	**unadj**	**adj**
Grand mean	22.6	22.4	24.1	24.1	14.9	14.9
Rural-urban residence						
Rural	24.0	23.8	x	x	x	x
Urban	14.9	15.8	x	x	x	x
Breastfeeding status						
Not breastfeeding	23.7	25.7	26.3	28.0	17.2	17.6
Still breastfeeding	21.6	20.4	23.0	22.1	11.3	10.8
Mother's education						
0-3 years	29.8	29.6	30.9	29.0	(20.1)	(19.1)
4-6 years	22.6	22.5	24.0	24.0	13.9	14.3
Secondary or above	14.9	15.5	14.5	17.4	15.3	15.0
Type of toilet						
Flush	x	x	-	-	(13.7)	(13.1)
Septic tank	x	x	18.7	20.1	14.8	14.9
Pit	x	x	(20.1)	(18.1)	-	-
No facilities	x	x	29.2	27.8	(16.7)	(18.3)
Drinking water source						
Piped	x	x	18.4	20.2	17.8	17.8
Bottled	x	x	-	-	4.7	4.4
Well	x	x	25.7	25.1	(16.0)	(16.2)
River or spring	x	x	(26.8)	(25.5)	-	-
Rain	x	x	20.5	22.0	11.4	12.4
Other	x	x	-	-	-	-
Possession of soap						
Yes (or temporarily out)	x	x	23.3	23.5	x	x
No	x	x	(42.2)	(36.9)	x	x

Note: x = not included in equation; - = less than 20 unweighted cases; ( ) = based on 20-49 unweighted cases.

Table 7 Percent distribution of action taken in cases of diarrhea, percentage for whom a health professional was consulted, and percentage receiving ORT, among children born 1982-1987 who had diarrhea in prior two weeks

	Total	Rural	Urban
Health professional consulted			
Received ORT	27.3	26.9	30.3
Did not receive ORT	13.5	13.2	15.9
No health professional consulted			
Received ORT	13.0	12.7	16.0
Did not receive ORT	46.2	47.2	37.8
Total	100	100	100
% for whom health professional consulted	40.8	40.1	46.2
% receiving ORT	40.3	39.6	46.3

Table 8 Percentage for whom a health professional was consulted, percentage receiving ORT, and percentage in neither situation, by demographic characteristics of the child and the mother, among children born in 1982-1987 and who had diarrhea in prior 2 weeks

Characteristics	% for whom health professional was consulted	% receiving ORT	% neither
Total	41.1	40.5	45.7
Age of child			
0-5 months	(27.5)	(18.9)	(65.5)
6-11 months	47.9	39.9	43.9
12-23 months	37.1	42.1	48.4
24-35 months	51.1	42.7	41.4
36-47 month	40.9	51.2	35.3
48 +	40.0	39.7	43.1
Sex of child			
Boy	43.2	38.7	45.2
Girl	38.4	42.8	46.3
Age of Mother			
15-19	(35.6)	(27.0)	(59.7)
20-24	38.5	43.8	42.9
25-29	42.9	39.2	46.4
30-34	45.6	44.6	41.1
35-39	36.7	36.6	47.1
40 +	(42.7)	(38.5)	(53.4)

Note: Results based on 20-49 unweighted cases are enclosed in parentheses. The results shown are based on weighted calculations.

Table 9 Percentage for whom a health professional was consulted, percentage receiving ORT and percentage in neither situation, by socio-economic characteristics, among children born 1982-1987 who had diarrhea in prior 2 weeks

Characteristics	% for whom health professional was consulted	% receiving ORT	% neither
Total	41.1	40.5	45.7
Rural-urban residence			
Rural	40.5	39.8	46.6
Urban	46.2	46.7	37.5
Region			
Bangkok	43.1	43.3	41.6
Other Central	45.6	35.5	42.8
North	40.2	35.9	47.5
Northeast	40.7	44.9	45.8
South	37.8	40.9	47.7
Education			
0-3 years	37.0	34.1	50.6
4-6 years	42.0	40.4	45.6
Secondary or more	43.0	58.4	33.5
Religion			
Buddhist	42.3	40.9	44.5
Islam	40.6	40.4	47.5
Possession of vehicle			
None	39.5	40.4	45.5
Bicycle only	45.8	43.4	42.8
Motorcycle	42.2	36.9	49.5
Car, truck, minibus	(27.3)	(39.4)	(47.4)
Work status of women			
Not working	41.4	42.0	46.2
Agricultural work	43.7	37.3	45.9
Non-agricultural work	36.3	42.1	44.0

Note: Results based on 20-49 unweighted cased are enclosed in parentheses. The results shown are based on weighted calculations.

Table 10 Percentage who neither received ORT nor for whom a health professional was consulted, by selected characteristics, among children born 1982-1987 who had diarrhea in the prior 2 weeks

	All children		Children under 2 years old	
	Unadjusted	**Adjusted**	**Unadjusted**	**Adjusted**
Grand mean	45.7	45.7	50.2	50.2
Rural-urban residence				
Rural	46.6	46.2	51.9	51.3
Urban	37.5	41.3	37.7	42.4
Mother's education				
0-3 years	50.6	50.4	(50.0)	(49.4)
4-6 years	45.6	45.5	52.5	52.3
Secondary or beyond	33.5	35.6	(33.2)	(35.5)
Age of child				
Under 6 months	(65.2)	(65.2)	(65.2)	(65.9)
6 months or older	43.6	43.7	47.0	46.9
Breastfeeding status				
Still breastfeeding	-	-	47.3	52.8
Not breastfeeding	-	-	52.1	48.5

Notes: - = less than 20 unweighted cases; ( ) = based on 20-49 unweighted cases.

Nutritional Status of Children as Measured by Height and Weight

Chawalit Suntikitrungruang
Mayuree Nokyoongthong

INTRODUCTION*

Nutritional status is the physical health of a person as a result of consumption and utilization of food. The nutritional status of an individual is determined by the kind and amount of nutrients supplied to the body and how completely they are used to meet body needs (Obert, 1978:15). It is generally believed that undernourished people are more susceptible to infectious disease, have a low level of function, and that they may suffer from apathy, indifference, and lower intelligence (Obert, 1978: 353).

Malnutrition is a state of disease caused by deficiency, excess or imbalance of the supplies of calories, nutrients, or both, that are available for use in the body. It may be due to dietary content, to faulty utilization of food eaten, or to a combination of both. Faulty utilization may be due to poor digestion, impaired absorption, or a malfunction in metabolism (Obert, 1978: 353). Undernutrition is the body condition that results from inadequate amount of calories or nutrients, or both. Retarded growth, underweight and anemia are the most common evidences of undernutrition (Obert, 1978:353). Undernutrition was a contributing cause in perhaps one third of the estimated 14 million child deaths in the world in 1987. Although not having enough to eat is still a fundamental problem in some of the world's very poorest communities, the major cause of undernutrition in the world today is not a shortage of food in the home. It is rather a lack of basic services and a shortage of information about preventing infection and using food to promote growth (Grant, 1988:2). Overnutrition is the body condition that results from too high an amount of calories or nutrients (Obert, 1978:353). Obesity is the most common evidence of overnutrition.

Malnutrition can also be caused by too many births too close together. Poor nutritional health of the mother results in low birth weight and infection during pregnancy. Malnutrition can be caused by bottle-feeding rather than breastfeeding, introducing additional food too early or too late, ceasing breastfeeding too soon or too suddenly, feeding too infrequently, and feeding with bulky staples of which a child cannot eat enough to satisfy its energy needs. But the most important cause of all is the frequency of infections, especially diarrheal disease and measles, which can reduce the appetite and the intake and absorption of food. Therefore making sure that all parents know that they can protect their children's nutritional health by such means as birth spacing, care in pregnancy, breastfeeding, immunization, preventing illness, special feeding during and after illness, regularly checking their child's weight gain, and supporting parents in putting that knowledge into action, can overcome most, though not all, cases of malnutrition and poor growth in the world today.

In sum, most child malnutrition, as well as most child deaths, could now be prevented by parental actions which are almost universally affordable based on knowledge which is already available (Grant, 1988:2-3).

Malnutrition control is the prevention and treatment of malnutrition. The method of approach is identification of nutrition problems by anthropometric, biochemical, clinical, and dietary assessment of individuals. Anthropometric measures identify retarded growth and obesity. Biochemical determinations identify iron deficiency anemia, vitamin deficiency, and other problems. Clinical examinations can identify a variety of physical signs and symptoms of nutritional deficiencies as well as signs that are not related to nutritional status. Dietary assessment gives clues to the reasons for the signs of malnutrition and to the dietary changes needed to avoid future malnutrition (Obert, 1978:353-4).

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Nutrition as the basis of the health status of the population revealed an improving trend for the infant, children under five and primary school students since the beginning of using Primary Health Care as the planning and operational strategies in 1979. The National Survey on clinical signs of malnutrition in under five children revealed significant prevalence of anemia in 1988 (Thaineua, 1988:3). With the use of Thai weight for age standard in the nutritional surveillance carried out every 1-3 months by the village health volunteers in the Thai Nutrition Program, there is increasing coverage of areas and population with a sharp reduction of second and third degree malnutrition during 1982-1988 (Thaineua, 1988:4).

I. LITERATURE REVIEW

Nutrition is one of the determinants of human health and growth. Good nutrition is a basic component for health and quality of life of the population. Optimal growth of the human body is determined by genetic, metabolic, environmental and nutrition factors. Physical body growth mainly occurs in fetus, childhood and adolescent periods, while 80 percent of brain growth is achieved at the age of two (Brook, 1982). Growth in fetus, infancy and early childhood periods are therefore the most important part of human growth and later development of various parts of the body which are controlled by the central nervous system.

To determine fetal growth status in the human species may be impossible; it would require precise anthropometric measurements of the fetus in utero during the entire fetal life (Gracey and Falkner, 1985). However, with the advancement of echography and biochemistry, growth assessment for fetus becomes more and more feasible at the present time.

Fetal growth has commonly been assessed by birth weight. Optimal birth weight associated with the lowest perinatal mortality seems to vary considerably from one ethnic group to the other, from one population to the other, and even within the same ethnic group between socioeconomic classes. An international accepted level of 2500 grams is defined as the cut-off point for low birth weight which is a high risk condition for perinatal and early infancy mortality and morbidity.

Children with different birth weights are believed to be able to catch up to normal growth after one or two years of age with optimal nutrient and health conditions. However, with the interferences of food supply, infections and poor physical and psychological environment in most rural settings and urban slums of the developing or underdeveloping countries, growth of infant and preschool children are found to be retarded in most cases. Weaning from breastfeeding and the separation of mother and child, when mother has to return to her regular work, are the time periods when the child starts to experience less-hygienic and less adequate dietary care in most poor communities (Nagra and Gilani, 1986; Maffei et al., 1988; Alam et al., 1984; Isherwood et al., 1988; Hennart et al., 1987; Nagra et al., 1984; Chandra, 1983; King, 1988).

The World Health Organization and UNICEF have promoted growth monitoring for four decades as a measure to assure optimal growth for children. Growth monitoring together with nutritional surveillance has been implemented in most developing countries with the purpose of collecting and providing nutritional status information of the children to the family, community and supporting agency for better child nutrition promotion (Rohde, 1988). Growth information generated from growth monitoring and nutritional surveillance is also used for nutrition program planning, monitoring and evaluation purposes (Mason et al., 1984).

Anthropometric measurement is usually expressed in terms of standards of reference. Thus, the Harvard standards, proposed by Stuart & Stevenson in 1959, were first recommended by the World Health Organization to be the international reference standard in weight for age, height for age and weight for height of the under five children in 1966 (Jelliffe, 1966). The World Health Organization subsequently changed to a new standard using an international reference population collected by the United States National Center for Health Statistics in 1983 (WHO, 1983).

Several studies were able to demonstrate the potential of child growth independent from racial or ethnic origin (Habicht et al., 1974). These results thus support the use of an international anthropometric reference standard in most developing countries. However, the widespread use of the international

anthropometric reference has been challenged by the finding that maximal growth does not necessarily correlate with optimal health status (Goldstein and Tanner, 1980; Eusebio and Nube, 1981).

Gomez's classification (Gomez, 1955) for protein-energy malnutrition (PEM) was widely accepted as an anthropometric reference standard: [weight for age: 90% of the median is considered normal, 75-89% of the median = 1° PEM, 60-74% = 2° PEM and less than 60% = 3° PEM]. A few years later, 80 percent of the weight for height median was used as a measure of wasting in acute malnutrition and 90 percent of the height for age median was used for measuring stunting (Waterlow, 1973).

Although there are several other methods for measuring growth via anthropometric measures, in 1983 the World Health Organization suggested using only weight, height and age expressed in terms of either local or international standards, with interpretation through different combinations (WHO, 1983).

During 1970-1971, body mass indices (BMI), viz $Wt/Ht^{1.6}$ and Wt/Ht^2, (weight corrected for height indices) were introduced and it was claimed that these indices have the merit of not changing by age. Another advantage of using BMI is their self interpretation characteristics; there is no need to refer to any international or local anthropometric reference standard for interpretation.

In 1984 a study in the Philippines confirmed the advantages of these two weight corrected for height indices from their high correlation with relative weight for age, low coefficient of variation (CV) and independence from age and reference standards (Johnson et al., 1984). These weight corrected for height indices are commonly called "Body Mass Indices" and are also commonly used in obesity assessment for adults and adolescents (Lee et al., 1981; Lee and Kolonel, 1984).

In Thailand, several growth standards of children had been proposed by many institutes and research authorities since 1930. Zimmermann included weight and height of rural children in his survey and Monkolsamai collected and analyzed weight and height of children in his longitudinal studies during 1940-1960 (Chutima,1939; and Monkolsamai, 1939).

Smith and Hauck were able to demonstrate heavier and taller status in boys than girls of the same age. They also found weight faltering starting at the age of 6 months which they believed to be caused by maternal malnourishment (Smith and Hauck, 1961).

A cross-sectional anthropometric survey in 1970 by Rajatasilapin demonstrated the differences in body length of children aged 0 to 24 months and in weight after 6 months in urban and rural children (Rajatasilapin et al., 1970). In 1972, Rajatasilapin compared child weight and height values to previous studies and was not able to demonstrate any changing trend of child weight and height over a period of twenty years. He concluded that it was because of the difference in socioeconomic and residential background of the studied populations. He also believed there was a trend toward better growth and nutritional status and that periodic anthropometric surveys would demonstrate this in populations of the same socioeconomic setting (Rajatasilapin, 1972).

Khanjanasthiti et al. (1973) studied growth of infants and preschool children. The objective of the study was to find the mean level of growth of infants and preschool children of middle and professional class families who probably grow up to their genetic potential with little interference from environmental factors. The anthropometry of growth of infants and preschool children was a joint project of the Department of Pediatrics, Ramathibodi Hospital, Chulalongkorn Hospital, Mother and Child Health (M.C.H.) Bangkok Training Center and Municipality Health Authority Bangkok. The sample included 2,026 infants and preschool children 0-6 years of age attending well baby clinics and kindergartens in Bangkok. The study criteria excluded those who were born prematurely or of low birth weight; those who had congenital malformation, sickness or were physically or mentally handicapped; and those who showed signs of malnutrition and deficiency diseases (Khanjanasthiti et al., 1973:88). The weight and height of these Bangkok children, when compared to North American and European, were smaller at birth. However, they were able to catch up during the first 6 months. After six months growth the curves of Thai children are lower than those of North Americans. Environmental and genetic factors cannot be excluded as causes for this difference (Khanjanasthiti

et al., 1973:99). Since there was no available standard the data in this study can be temporarily referred to as standard for Thai children; and according to the objective of the researchers the study can be used as a reference standard for Thai children at that time.

In 1975 the Nutrition Division, Department of Health, Ministry of Public Health conducted a nutritional status survey of infants and preschool children in five provinces of Thailand by measuring weight and height. At that time there was not a standard for normal weight and height of Thai children suiTable for comparison The Harvard standard was used at that time (Tantiwongse et al., 1979:95).

Tantiwongse, Pariwatpasa and Kangrang (1979) prepared the first Thai National weight for age standard of children aged below 5 years using anthropometric data of 7,354 children from well-being families of Bangkok with the exclusion of all abnormal cases. The weight for age standard was then used in the national child nutrition program for growth monitoring at the individual and community level, and for nutritional surveillance and planning at the local and national level. By 1988 the weight for age standard has been used by over 2.4 million children with a coverage of 80.3 percent of the overall rural under five population (Suntikitrungruang, 1988:4).

This preliminary study is based on Bangkok middle class children and tried to prepare a Thai standard of normal weight and height. In preparing for the standard, it is necessary to compare with the survey of rural children conducted in 1975. A retrospective study of Bangkok children in the same year had been approached. The three criteria used were a sufficiently large sample size, a good sample distribution and reliable weight and height measurements. The data were collected from four government hospitals, six Bangkok Metropolitan Administration health centers and four schools, both public and private. In this study, the mean age of both sexes in single months was used to plot a regression curve inasmuch as differences by sex were not significant. The degree of malnutrition was derived by applying the Gomez nutrition classification. Compared to the standard, 89-75 percent of the median of normal weight is considered to be first degree of malnutrition, 74-60 percent second degree and less than 60 percent of the median third degree. For height standard, 95 percent of the median of normal height is considered to be first degree of malnutrition, 90 percent second degree and 95 percent for third degree.

In 1986, the Nutrition Division with support from UNICEF conducted a child anthropometric survey based on a national sample using a multistage random sampling method. The sample was 49,756 children, with a history of full term delivery and birth weight between 2,500-4,000 grams, from birth to 19 years of age, excluding sick, handicapped and malnourished cases. Weight for age, and height for age standards were found not to be different from the first Thai weight for age standard in the under five age group. However, the research showed an improvement in weight of Thai preschool children during the last 10 years as compared the 1979 first Thai weight for age standard. That standard was based on Bangkok children who were considered to have a higher standard than children from all regions in the national sample group in the 1986 study (Department of Health, 1987).

The Thai Demographic and Health Survey was conducted by the Institute of Population Studies, Chulalongkorn University with publication of a first report in May 1988, in which a section on nutrition anthropometric results was included. The results showed a lower weight for age, height for age and weight for height than the World Health Organization recommended international standard (NCHS) in children aged 3 to 36 months. More undernourished children were reported in the over 2 years age group, rural residents, Northeastern, and Southern regions and mothers with lower education. Twenty-six percent of the studied cases were found to be lower than 2 standard deviations (S.D.) from the reference weight for age. The corresponding figures were 6 percent for weight for height and 22 percent for height for age. Two percent were found to be both lower than 2 S.D. of weight for height and height for age (Chayovan et al., 1988:111-26).

Use of Weight for Age, Weight for Height and Height for Age in the Assessment of Nutritional Status of Children: Advantages and Disadvantages

Weighing and measuring children are important elements in assessing the nutritional status of a population. Weight alone is not a good guide to measure level of growth, but it is easier to measure in field

work and is very sensitive to a child's nutritional status and also beneficial for short term follow up of nutrition clinics. Obtaining accurate measures of height is rather difficult, especially the measurement of recumbent length.

(i) Weight for Age

Weight for age is a composite index of weight for height and height for age. It is used in reported statistics, clinical settings to monitor the growth of children on a longitudinal basis and clinical weight programs.

Weight for age reflects long term chronic undernutrition and recent acute undernutrition. As a composite index of weight for height and height for age, it does not provide information beyond that of weight for height and that of height for age. The important disadvantage is that weight for age does not distinguish a child who is underweight because of thinness from the one who is underweight because of shortness. Moreover, loss or gain of body weight occurs rapidly and shows seasonal fluctuations. It can be seen that only a single point estimate is difficult to interpret particularly when compared with other estimates obtained at different time periods.

Weight for age is a measure used in clinical and longitudinal weight programs. Weight measurements, unlike those for height, are probably not systematically biased because the method is simpler. Errors in reading weight undoubtedly occurred, but there is no obvious reason why such errors would be biased in a particular direction.

The two most useful measures for evaluating growth are weight for height and height for age.

(ii) Weight for Height

Weight for height which measures thinness - fatness is the ratio of weight observed to weight expected for the height and sex. This reflects the recent state of undernutrition or overnutrition. It measures body mass in relation to body length. The advantage of weight for height is that it is not influenced by misreporting of age by the mother. In addition, height measurement can be underestimated but weight will not be. Two or more standard deviations below the mean of NCHS, CDC and WHO should be considered thin for age or wasted or acutely undernourished. When it falls in the top 5 percent, it is indicative of future obesity.

(iii) Height for Age

Height for age which measures shortness-tallness is the ratio of height observed to height expected. This is the best measure for use in identifying short stature caused by malnutrition in mother or child. Height for age reflects long-term undernutrition that has caused stunted growth. In the CDC nutritional surveillance system, it is believed that children whose height for age is in the lowest 5 percent of the reference population have probably had long-standing undernutrition. Height for age is a measure of linear growth. Two or more standard deviations below the mean of NCHS, CDC and WHO should be considered short for age or stunted or chronically undernourished. Height for age by weight for height is an indicator of children who are both wasted and stunted and is used to identify children who are currently the most severely undernourished.

The disadvantage of height for age is that height measurement may be biased downward. Underestimation of height (length) is typically associated with young infants. If height is underestimated, the results on height for age will show lower values compared to the international reference than is in fact the true situation. As a result, the extent of stunting will be overestimated.

II. METHOD OF MEASURING HEIGHT AND WEIGHT

A survey of nutritional status should show the relationship between food and nutrients ingested, their use in the body, and general health. Nutritional status is assessed by anthropometric, clinical and biochemical

methods. One of the methods used to determine nutritional status is anthropometry or body measurements. Height and weight are used to identify overweight, underweight and retarded growth. Many studies have used skinfolds, that is caliper measurements of thickness of a fold of tissue, usually from the upper arm, below the shoulder blade or from the upper abdomen. Measurements used for infants include recumbent height, head circumference, chest circumference and triceps skinfold (Obert, 1978:15).

Measurements and method usually depend on age. Those commonly taken for infants are recumbent height and head circumference. Measurements often used for children over two years of age and for adults include chest circumference, arm circumference, and skinfolds of triceps and subcapular area (Obert, 1978:192). Measuring recumbent length is always used for a child under 24 months and may be used for a child 24 to 36 months; measuring standing height is used for a child after 36 months of age (Obert, 1978:193).

A. Child Length

Anthropometry is the technique that deals with the measurement of the size, weight and proportions of the human body. The anthropometric measurements used in the TDHS are recumbent length and weight. Length is the distance from the crown of the head to the bottom of the feet or heels while the child is measured supine (United Nations, 1986:67). Two operators are necessary to use the required special equipment. A height measuring board, that can be used to measure either standing height or recumbent length, was used for recumbent length only in the TDHS. The board has a measuring scale, a fixed headboard or headpiece and a movable footboard or footpiece. The footpiece is moved against the child's feet to obtain a measure of length.

B. Child Weight

Weight is the measurement of a child's total body mass undressed (United Nations, 1986:67). In the TDHS, a portable, lightweight and durable hanging scale suitable for field surveys was used. The child is weighed in light clothing. The weighing equipment includes scales, weighing pants, infant sling or basket and a five foot piece of rope for attaching the scale to a tree branch or ceiling beam. Weighing pants are used to hold children one year or older during the weight measurement procedure. Infants, children less than one year of age, are placed in the infant sling or basket for the weight measurement procedure.

C. Mother's Height

Measuring standing height is used for a mother. The equipment used in the TDHS is a measuring tape. The individual stands on the floor or other flat, bare surface and is directed to stand as tall as possible with the head, shoulders, buttocks, and heels touching a wall. The measurer brings a ruler to the crown of the individual's head and takes a measurement.

D. Mother's Weight

Weight was taken for mothers of all children measured in the TDHS. Balance platform scales were used. Ideally adults should be weighed nude; in practice in the TDHS, mothers were weighted in clothes without shoes. The individual stands on the platform facing the scale while the measurer adjusts weights to balance.

III. OBJECTIVES

Accurate measurements are required to classify children's growth properly using internationally accepted reference standards. Great care was taken in the TDHS in training of interviewers to take measurements of height/length and weight. Supervisors also checked procedures being used, and we are confident that the results are of high quality.

Four standard indices of physical growth are used in the TDHS. These are height for age, weight for height, height for age by weight for height; and weight for age. Each index provides different information

on the nutritional status of children. A total of 2,003 children were identified between ages 3 and 36 months and hence eligible for anthropometric measurement. Only 27 of these lacked detailed information on birth dates (or age in months) and were excluded from the analysis. An additional 13 cases, had an improbable height and/or weight recorded. These cases represent errors of measurement or data entry or both and are excluded. Also excluded are another 111 children, or 5.5 percent, who were neither weighed nor measured for length either because the mother refused, the child was not present at the time of measurement, or some other problem prevented measurement. Finally, 3 children have been excluded because they do not have both height and weight recorded due to some difficulty during the measurement process which prevented completion. This total of 1,849 children (unweighted), or 92 percent of those originally identified as eligible, serve as the basis for the following analysis.

IV. RESULTS

Weight, height and age of 1,849 children age 3 to 36 months were obtained from the Thai Demographic and Health Survey (TDHS), a national representative sample survey which was conducted during March-June 1987. The sample cases were weighted in order to compensate for differences in sampling probabilities, response rates and regional, urban-rural distribution with reference to the most recent population projections (Chayovan et al., 1988).

After weighting, the total cases equal 1,884. The number of boys was slightly more than girls, and somewhat larger for the older age group. With respect to residence 84 percent were rural and 36 were in the Northeastern region, 20 percent in the Northern, 19 percent in the Central, 16 in the Southern region, and 10 percent in Bangkok. Eighty six percent of children had mothers who had education at the primary level or below (Table 1). The weighted sample distribution of children is close to the standard distribution but is slightly shifted towards more southern and northeastern rural cases with fewer central region cases than the standard distribution for the total population of eligible women. In the tables that follow weighted values are given, unless otherwise specified.

A. National average of weight and height indices 1987

The weighted mean, standard deviation, and median (P50) of weight and height are given in Tables 2 and 3. Also, children were ranked high to low by weight and height, and average values are given below which the lowest 5 percent (P5) fall, the lowest 10 percent (P10) and so on for percentages 25, 75, 90 and 95. For example, 5 percent of three month old children weighed less than 4.9 kilograms and 5 percent more than 7.2 kilograms. Both weight and height increase with age, and the rate of increase was more rapid for the younger age group (Figures 1 and 2).

As expected, the mean and median of weight were found to increase by height from 57 to 95 centimeters (Table 4 and Figure 3). Boys were found to be heavier and taller than girls of the same age or height.

Median weight at three months of age was almost the same in all regions (Figure 4), but substantial differences developed thereafter, with the Northeast having the lowest median weights for ages six months or more. Children living in Bangkok had the highest median weights at 24 months up to 36 months. Among the other three regions there were not consistent differences over time, although by 36 months the Southern region had a lower median weight than did the Northern and Central regions. After three months of age children living in rural areas weighed less than those living in urban areas, with the difference being about one-third of a kilogram at 36 months of age.

Height by age (Figure 5), and weight by height (Figure 6) showed similar patterns by region. The Northeastern region was the worst and the Central region and Bangok were the best in these indices.

Three weight for height, or body mass, indices (BMIs), viz Wt/Ht, $Wt/Ht^{1.6}$, Wt/Ht^2 were calculated from weight (Wt) in kilograms and height (Ht) in meters of the studied children. Wt/Ht was found to

increase by age while $Wt/Ht^{1.6}$ was slightly varied between 13.60-14.51. Wt/Ht^2 was inversely associated with age (Table 5).

Body mass indices were found to be greater in value in boys than girls in every age group. When analysis was done separately for different regions, Bangkok was found to have the highest value, followed by Central and Southern regions, with the lowest in Northeastern region.

B. Comparison of national average of weight and height indices 1987 with national standards 1986

The weight, height and age of the studied children can be expressed as a percent of the median weight by age, height by age and weight by height of the 1986 national standards. The mean and standard deviation of the transformed values for the mean percent weight by age (MPWA), the mean percent height by age (MPHA), and the mean percent weight by height (MPWH) for boys and girls are presented in Table 6 and Table 7 respectively. Median weight by height of Thai children aged 3 to 36 months as measured by the 1987 TDHS were lower than the median weight and height of the 1986 national standards for both Thai boys and girls. Weight by age in the TDHS was only 93 percent of the median of the 1986 national standard for boys and for girls; height by age in the TDHS was 98 percent for boys and for girls of the median of the 1986 standard; and weight by height in the TDHS was 98 percent for boys and 96 percent for girls of the median of the 1986 national standards.

Median weight by age was found to be lower than 90 percent of the national standard starting at the age of 18 months in boys and 30 months in girls. Median height by age and weight by height were found to be greater than 95 percent of the national standard except for the age group 15-17 months in boys and 18-20 months in girls in weight by height.

Using Gomez's classification for percent weight by age of the 1986 national standard, slightly less than five percent of boys (4.8) and girls (4.9) were found to be moderately malnourished (2° PEM). The proportions severely malnourished (3° PEM) were very small, 0.08 percent of boys and 0.29 percent of girls. Approximately 95 percent of both sexes were normal and borderline (1° PEM) cases, with the proportion being slightly lower for girls. The North and Northeastern regions had about six percent moderately malnourished, while Bangkok had the least, based on child's weight by age (Table 8). Height by age shows the same patterns of differences by regions and by sex.

When values of weight by height of the studied children are expressed as a percent of the equivalent median value taken from the Thai standard schedule, boys in Northeast and Central regions are found to be more underweight (weight by height < 90%) than the national average, while girls in the North and Northeast regions are more underweight than the national average.

The weight, height, and Wt/Ht (WH1) indices were found to be highly correlated with age (correlation coefficient > 0.50) in both boys and girls. Weight was correlated with height, Wt/Ht (WH1) and $Wt/Ht^{1.6}$ (WH2). Wt/Ht (WH1), $Wt/Ht^{1.6}$ (WH2) and Wt/Ht^2 (WH3), all body mass indices were highly correlated with percent weight by age (MPWA) and percent weight by height (MPWH).

Percent weight by age was found to be highly correlated with percent height by age ($r = 0.74$, $p = 0.0001$) and percent weight by height ($r = 0.82$, $p = 0.0001$) in boys. Among girls these indices were also highly correlated. The correlation coefficient between percent weight by age and percent height by age was 0.76 and percent weight by height 0.81. Weak correlations were found between percent height by age and percent weight by height in boys ($r = 0.25$) and girls ($r = 0.25$).

Frequency distributions of percent weight by age, height by age and weight by height showed a direct association between weight by age and height by age and between weight by age and weight by height. Weight by height and height by age were not closely associated except in boys between < 90 percent weight by age and 90 percent or more of weight by age.

The average weight by age of the present study was found to be higher than in studies surveyed in 1939, and 1952-54 for both boys and girls after 3 months of age. When compared to the 1971 and 1986

survey which selected only a physically well-being group, the present study was lower in weight for each identical age group (Table 9).

The mean height by age in this study, when compared to the studies in 1939, 1952-54, 1971 and 1986, also showed the same pattern of differences as the comparisons using weight by age in both boys and girls (Table 10).

C. Interrelationships between various demographic variables and weight and height indices 1987

The indices of average weight, height, $Wt/Ht^{1.6}$ and Wt/Ht^2 were found to be higher in boys than girls when adjusted for age (Table 11), and the differences were statistically significant.

An interesting and significant finding is that children of maternal parity more than 3 were significantly lower in weight and height (and in the values for $Wt/Ht^{1.6}$ and Wt/Ht^2) when adjusted for age, than were children of maternal parity 1-3 (Table 12). Similarly, parities four and higher had larger proportions below the norm for height by age and also for weight by height.

V. DISCUSSION AND CONCLUSIONS

The findings of this study provide an analysis of the present situation in weight and height status of Thai children age 3 to 36 months. The weight and height of Bangkok children and children living in different regions of the country are different. Those who live in Bangkok have the best status, while those living in Central, South, North are incrementally lower, with the Northeastern children being the worst. This finding corresponds with the surveillance report from the Ministry of Public Health (Department of Health, 1988) and the National Food and Nutrition Survey in 1987 (Mahidol University, 1988).

Using the Thai national standard for child nutritional status in 1986 as a reference, this study strongly suggests that the goal of nutritional status improvement in the fifth National Economic and Social Development Plan was achieved. The second and third degree protein and energy malnourished cases (PEM) were 4.8 percent of children between the ages of 3 and 36 months which is lower than the target of reducing prevalence of second and third degree (PEM) to less than 7 percent by 1986 (Ministry of Public Health, 1982).

Even though at the national level and the regional level the nutritional situation indicated by weight for age in this study satisfies the previous national plan target the high prevalence of first degree PEM is apparent in every region and Bangkok ranging from 27 to 41 percent in boys and 26 to 56 percent in girls. The prevalence of overall PEM (1°, 2°, 3° PEM) for boys in the Central region was surprisingly high when compared to other regions, while in girls, the worst situation was found in the Northeastern region. First degree PEM cases as a major determinant for the fluctuation of second and third degree PEM has been mentioned by several previous evaluative studies (Mahidol University, 1984, 1987, 1988). This high prevalence of first degree PEM in the regions will certainly become a major barrier that needs to be removed for preventing new cases of 2° and 3° PEM in the present 6th National Economic and Social Development Plan (1987-1991).

The findings in this study indicate a constantly lower weight for height and height for age in girls when compared to boys using sex specific standard reference. One possible explanation for this phenomenon can be the higher social and family expectations for boys in Thai society which affects the level and quality of nurturing during the childhood period; the success of the family planning program effects greatly in the reduction of number of children per family, hence, provides the families with opportunity of allocating more available resources for the care of the boys.

The Northern and Northeastern regions had relatively higher prevalence of low weight by age, height by age, and weight by height cases. This finding is in accord with the National Food and Nutrition Survey in 1987 (Mahidol University, 1988) and the nutritional surveillance report from the Ministry of Public Health (Department of Health, 1988). The differences between the undernutrition prevalence and other studies are

the better height by age status in Northeastern region boys when compared to Northern region and the relatively high prevalence of low weight by age boys in central region.

The higher prevalence of undernutrition children in Northern region is believed to be related to two predisposing conditions which are also found to be high in the region. They are the high incidence of low birth weight (Suntikitrungruang, 1988) and the high prevalence of iodine deficiency disorders (Suntikitrungruang, 1988). Although the Northeastern region was in a better height by age situation than the Northern region, it has long been known as the highest prevalence area for protein-energy malnutrition (Department of Health, 1988) and is still the worst child nutritional status situation area in this study when weight by height was taken into consideration. The low income (Kanchanaraksa, 1987), seasonal shortage of food (Fordeyn et al., 1986), and the high prevalence of childhood illnesses (Mahidol University, 1984, 1987) may be responsible.

The finding of a high prevalence of underweighed children in Central region especially in boys is surprising due to its high income, high agricultural productivity and high access to food (Center for Agricultural Statistics, 1987). A possible explanation is from the observation that most of the slum dwellers in Bangkok and the heavily industrialized area sent their children to stay with their grandparents in their rural home villages because of the time-lacking for child care in the urban working setting (Siriwanarangsan, 1986). The different status between boys and girls,however, is still unexplainable from the present existing knowledge.

Weight by age in this study was highly correlated and associated with height by age and weight by height. This is also found in many other studies (Johnson et al., 1984; Department of Health, 1987; WHO, 1983). The present study gives a clear evidence in justifying the use of weight by age as a single community based indicator for child growth monitoring in the on-going National Child Nutrition Improvement program.

A set of indicators using various functions of weight and height (Wt/Ht, $Wt/Ht^{1.6}$, Wt/Ht^2) which are called body mass indices were investigated in this study. The result which is similar to some other previous studies (Dugdale, 1971; Visweswara and Singh, 1970; Johnson et al., 1984; Lee et al., 1981; Suntikitrungruang, 1989) confirms their properties of simplicity and reference-standard independency. They can be very useful for the estimation of the actual weight change in children from various child nutritional status determining factors (Suntikitrungruang, 1989). The body mass indices in this study were not totally age independent as mentioned previously in the original studies proposing these measures (Dugdale, 1971; Visweswara and Singh, 1970). This difference is mainly from the different increasing velocity between weight and height in children where measuring at the same age period. Wt/Ht1.6 is found to be the most relatively age independent body mass index.

Education background of mothers is proved to be statistically associated with nutritional status of the studied children expressed by either weight, height, $Wt/Ht^{1.6}$, Wt/Ht^2, height by age or weight by height. Education of parents and other socio-cultural factors were found to be associated with child nutritional status in many other studies (Nagra et al., 1984; King and Bratt, 1988; Gomez et al., 1955). The finding in this study gives clear evidence of approximately a 0.4 kilograms increase in mean weight for either a stepping-up from primary to secondary education of the mother or secondary to college education level after adjusting for height and age.

The analysis for association between maternal parity and children's nutritional status showed statistically significant differences between the under 4 parity group and the 4 or over parity group. The children who were not born as the first three parity suffered a lower weight and height status during the age of 3 to 36 months.

The comparison between weight and height of the present study to the 1986 National Nutritional Standards and various other past studies in Thailand revealed a definite increase in weight and height in the age group after three months old between the present study and the studies in 1939 and 1952-54 (Bangkok and Minburi children respectively).

The 1971 survey (Khanjanasthiti et al., 1973) found children to be taller than the present study in the identical age group comparison for both weight and height. The main reasons are the differences in the

two studied populations. The 1971 survey collected anthropometric data from children attending well baby clinics and kindergartens in Bangkok who were considered to be more healthy and have better nutritional status than the present study which used samples drawn from children all over the country. However, when compared to the 1971 survey result with the children from Bangkok in this study, the Bangkok children in this study were heavier after age 18 months and taller after age 12 months.

The 1986 National Nutritional Standards were heavier and taller (larger) in all age groups than in the 1987 TDHS. This is due to the 1986 survey including only physically well-being children in the sample used for establishing National Standards. The present study provides data on a probability sample of all children in Thailand and reflects national averages rather than a Standard.

In conclusion, the present survey results gives evidence of an increase in weight and height of Thai children when compared to the 1939, 1952-54 and to some extent the 1971 survey results. However, this interpretation should be interpreted with caution due to the differences in study population groups among different surveys. The use of height or length data in this study should also be expected for some limitation due to interobservers' variation and variation in children's response to standard length measurement methods in the field data collection.

FINDINGS

In brief the present analysis of anthropometric data from the Thai Demographic and Health Survey 1987 yields the following results:

(a) The weight and height of the studied children age 3 to 36 months are heavier and taller than the earlier studies of Thai children in 1939, and 1952-54. The present study gives evidence of a better nutritional status (heavier and taller) after one and a half years in age as compared with Bangkok children in 1971.

(b) Boys are heavier and taller than girls of the same age.

(c) Maternal education and parity are associated with children's anthropometric indices.

(d) Body mass indices are highly correlated with weight by age and weight by height of the children.

RECOMMENDATIONS

With the above findings, the following recommendations are formulated:

(a) The anthropometric indices are considered to be national and regional averages in 1987 and are useful for any program planning monitoring and evaluation which requires assessment of nutritional status of children age 3 to 36 months.

(b) The priority areas for child nutrition improvement program should be in the North and Northeastern regions. Research should be carried out to find the causes of the underweight in boys of Central region.

(c) In the prevention of undernutrition, low maternal education level and children of above third parity should be considered high risk group and should be closely monitored for growth and development.

(d) Body mass index can be considered to be an alternative anthropometric indicator for real weight change estimation after height adjustment in the on-going child nutrition improvement program and research works.

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Table 1 Distribution of children aged 3-36 months according to background characteristics before and after weighting[a]

Background characteristics	Unweighted (as enumerated)	After weighting
Sex		
Male	925 (50)	951 (50)
Female	924 (50)	933 (50)
Age in months		
3-11	482 (26)	554 (29)
12-23	689 (37)	626 (33)
24-36	678 (37)	704 (37)
Residential area		
Urban	614 (33)	310 (16)
Rural	1,235 (67)	1,574 (84)
Region		
North	348 (19)	372 (20)
Northeast	388 (21)	672 (36)
Central	353 (19)	349 (19)
South	423 (23)	300 (16)
Bangkok	337 (18)	191 (10)
Education of mother		
No education	134 (7)	170 (9)
Primary	1,346 (73)	1454 (77)
Secondary	244 (13)	171 (9)
College and higher	125 (7)	89 (5)
All children	1,849 (100)	1,884 (100)

[a]Weighting for differences in sampling probabilities, response rate, regional and urban-rural distribution

( ) Per cent

Table 2 Weighted mean,standard deviation (SD), median (P50), P5, P10, P25, P75, P90 and P95 of weight in kilograms by age group of children aged 3-36 months

Age (month)	N	Mean	SD	P5	P10	P25	P50	P75	P90	P95
3	34	5.8812	0.65111	4.9	5.1	5.30	5.80	6.20	6.90	7.20
4	49	6.3627	0.89823	5.1	5.2	5.60	6.30	7.00	7.70	7.90
5	57	6.9195	0.80095	5.0	5.6	6.40	6.90	7.30	7.90	8.30
6	59	7.1678	0.99794	6.1	6.1	6.60	7.00	7.60	8.90	9.10
7	56	7.4441	0.97718	6.1	6.4	6.80	7.30	8.20	8.70	9.10
8	50	7.7280	1.03683	6.1	6.7	7.40	7.90	8.40	9.05	9.40
9	57	7.7313	1.09420	6.3	6.4	7.20	8.00	8.90	9.20	9.90
10	59	8.1002	1.05004	6.7	6.9	7.40	8.20	9.00	9.90	10.10
11	61	8.1865	1.03824	7.0	7.1	7.60	8.10	9.20	10.00	10.20
12	65	8.3706	1.14782	6.7	7.1	7.50	8.40	9.20	10.00	10.80
13	56	8.7043	1.23872	7.1	7.7	8.15	8.80	9.75	10.30	11.00
14	64	8.7076	1.12431	7.0	7.5	8.35	8.90	9.70	10.20	10.50
15	64	9.0688	1.06758	7.7	8.0	8.50	9.00	9.90	10.70	11.10
16	69	9.2568	1.19273	7.7	7.9	8.50	9.20	10.00	11.00	12.00
17	54	9.3706	1.04671	8.0	8.3	8.70	9.30	10.00	10.70	11.50
18	45	9.3116	1.14592	7.9	8.0	8.40	9.40	10.00	10.70	11.20
19	57	9.7282	1.53495	7.5	8.1	9.10	10.00	11.00	11.80	12.00
20	55	9.5019	1.30138	7.8	8.0	8.80	9.40	10.20	11.30	12.00
21	56	9.7978	1.26601	8.0	8.5	9.35	10.05	10.50	11.40	13.00
22	54	9.8366	1.53923	8.2	8.4	9.00	9.90	10.70	12.00	14.00
23	50	10.4412	1.19095	8.6	9.0	9.80	10.45	11.00	11.80	14.00
24	57	10.5778	1.28082	8.0	8.9	9.70	10.60	11.70	12.40	12.80
25	67	10.3531	1.39376	8.6	9.2	9.90	10.60	11.40	12.20	12.80
26	50	10.4324	1.20430	9.0	9.4	9.90	10.50	11.50	12.40	14.00
27	59	0.8241	1.60031	8.4	8.5	9.80	10.90	12.00	12.60	13.30
28	59	10.8073	1.43447	8.7	9.5	10.30	11.00	12.00	13.00	13.60
29	52	10.9498	1.21401	9.3	9.8	10.20	11.00	12.00	12.70	13.00
30	37	11.3734	1.37490	9.2	9.8	10.60	11.40	12.30	13.50	14.30
31	43	11.2884	1.26684	9.5	10.0	10.50	11.00	12.40	12.50	13.00
32	64	11.8633	1.31603	10.0	10.4	11.00	11.80	13.00	13.90	14.50
33	58	11.4260	1.23852	9.4	10.0	11.00	11.50	12.00	13.40	13.80
34	40	11.8074	1.57183	10.2	10.7	11.10	12.00	13.00	14.80	15.75
35	47	12.0929	1.34974	9.6	10.0	11.00	12.00	13.00	14.40	14.50
36	45	12.0345	1.67400	9.7	10.2	11.00	12.10	13.40	13.90	14.10

Table 3 Weighted mean, standard deviation (SD), median (P50), P5, P10, P25, P75, P90 and P95 of height in centimeters by age group of children aged 3-36 months

Age (month)	N	Mean	SD	P5	P10	P25	P50	P75	P90	P95
3	34	59.1292	2.03442	56.2	56.50	57.40	59.25	60.40	62.40	63.30
4	49	61.2953	2.83440	56.6	58.00	59.70	61.00	63.20	65.50	66.70
5	57	63.5863	2.47033	58.6	60.20	61.90	63.30	64.90	66.40	69.80
6	59	64.8009	3.19418	60.4	62.00	63.30	65.00	67.00	69.40	70.70
7	56	66.2282	2.47697	61.1	63.00	64.85	66.50	68.30	69.50	70.20
8	50	67.9850	2.79291	64.0	64.85	66.40	67.75	70.00	72.20	73.10
9	57	68.7608	2.35133	64.9	65.40	67.30	69.10	71.10	72.00	73.00
10	59	70.0333	2.60485	66.2	67.00	68.10	70.00	72.20	74.20	75.00
11	61	71.0463	2.85200	66.6	67.40	69.10	71.00	73.90	75.10	75.00
12	65	71.8851	2.53642	68.2	68.50	70.30	72.30	73.90	75.10	75.50
13	56	73.3929	3.80525	69.5	70.20	71.75	73.20	76.00	78.40	80.30
14	64	74.0142	3.42517	69.2	71.20	72.40	74.80	76.70	78.40	78.70
15	64	75.2649	2.68218	71.0	71.90	73.20	75.60	77.65	79.50	80.00
16	69	76.0004	2.79569	72.0	72.40	74.10	76.00	78.10	80.00	81.20
17	54	77.3616	3.59811	71.7	73.70	75.00	77.15	79.20	81.80	85.90
18	45	78.0360	3.15237	73.4	74.00	76.00	77.60	80.40	82.10	82.90
19	57	79.1492	4.09468	73.6	74.60	77.20	79.40	82.70	84.40	85.00
20	55	78.4528	3.91850	72.9	74.40	76.30	78.00	81.50	84.00	88.00
21	56	79.6790	3.47363	74.9	76.80	78.30	80.15	82.30	84.10	85.40
22	54	80.4013	3.80307	75.3	77.40	78.50	80.00	83.20	87.30	89.40
23	50	82.2540	3.57223	77.0	78.00	79.90	82.50	84.20	86.35	87.60
24	57	81.8684	3.54454	75.3	76.20	80.10	82.00	85.50	87.40	89.00
25	67	82.4569	3.56359	77.1	78.10	81.00	82.80	85.40	87.90	88.80
26	50	83.3313	3.54254	77.3	78.70	81.60	83.95	86.30	88.55	91.30
27	59	83.7330	4.41883	75.0	77.10	81.40	84.50	87.00	88.60	90.00
28	59	83.5540	5.29841	77.1	79.30	82.60	85.80	89.10	91.00	92.70
29	52	84.9813	4.16345	81.5	82.10	82.40	85.35	87.15	92.20	93.10
30	37	86.9934	4.01614	79.6	82.10	84.50	86.90	90.00	93.30	94.60
31	43	87.4343	3.66435	81.6	82.70	86.30	88.00	90.40	91.50	92.20
32	64	88.6177	3.09592	84.3	84.70	86.80	89.00	90.60	94.00	95.10
33	58	88.1813	3.23456	83.7	84.00	85.20	88.85	90.80	92.70	93.60
34	40	88.1769	3.37445	83.7	85.50	86.50	88.85	91.60	95.45	96.35
35	47	89.4188	3.81638	81.3	82.40	87.10	89.40	92.50	95.30	96.00
36	45	89.3603	4.76464	82.9	83.50	87.20	90.10	93.20	95.10	96.00

Table 4 Weighted mean, standard deviation (SD), median (P50), P5, P10, P25, P75, P90 and P95 of weight in kilograms by height of children aged 3-36 months

Height (cm.)	N	Mean	SD	P5	P10	P25	P50	P75	P90	P95
57	10	5.4361	0.44545	4.7	4.85	5.10	5.30	5.50	5.90	6.1
58	10	5.6188	0.35182	4.9	4.95	5.10	5.55	5.80	5.90	6.0
59	9	5.8490	0.54693	5.3	5.30	5.30	5.60	6.00	6.60	6.6
60	23	5.8437	0.58932	5.0	5.20	5.50	5.80	6.30	6.60	6.7
61	21	6.6253	0.74366	5.3	5.70	6.10	6.60	7.10	7.40	7.7
62	23	6.3932	0.58119	5.5	5.80	6.10	6.40	7.00	7.20	7.6
63	35	6.7876	0.83951	5.6	5.90	6.30	6.50	7.00	7.40	8.1
64	25	6.9440	0.51075	6.2	6.30	6.70	7.00	7.20	7.70	8.2
65	39	7.0948	0.72862	6.1	6.30	6.70	7.00	7.50	8.40	8.6
66	34	6.9291	0.88044	6.0	6.10	6.60	6.80	7.40	7.80	8.6
67	46	7.7464	0.67194	6.7	7.00	7.20	7.70	8.10	8.90	9.2
68	39	7.5484	0.81163	6.7	6.90	7.20	7.60	8.10	8.60	9.1
69	58	7.5021	0.76665	6.6	6.70	7.20	7.70	8.20	8.70	9.3
70	47	7.9067	0.79723	6.8	7.10	7.50	8.00	8.50	8.90	9.2
71	55	8.1414	0.74306	7.1	7.30	7.70	8.20	8.80	9.10	9.4
72	53	8.4075	0.58746	7.5	7.60	8.00	8.40	8.90	9.00	9.2
73	64	8.5006	0.75961	7.4	7.60	8.00	8.50	9.00	9.60	9.9
74	58	8.9419	0.67507	7.9	8.00	8.50	8.90	9.40	9.90	10.1
75	80	8.9784	0.84707	7.9	8.05	8.50	9.00	9.70	10.25	10.7
76	69	9.1095	0.88172	7.9	7.90	8.60	9.00	9.80	10.20	10.5
77	73	9.0700	0.76403	8.0	8.20	8.70	9.10	9.90	10.10	10.7
78	68	9.6733	0.80180	8.4	8.50	9.05	9.65	10.25	11.10	11.7
79	71	9.5804	0.73879	8.6	8.90	9.20	9.70	10.10	10.80	11.0
80	69	9.7753	1.01140	8.6	9.00	9.50	10.00	10.50	11.00	11.8
81	53	10.0063	0.80538	9.0	9.00	9.40	10.00	10.90	11.30	11.9
82	85	10.3439	0.71942	9.4	9.50	10.00	10.30	10.70	11.10	11.5
83	75	10.5291	0.79062	9.2	9.40	10.00	10.50	11.00	11.50	12.0
84	72	10.6929	0.87547	9.8	9.90	10.05	10.60	11.25	11.60	12.0
85	67	10.9727	0.96202	9.9	10.00	10.40	11.00	11.90	12.50	12.5
86	61	11.0276	0.80347	10.0	10.20	10.70	11.00	11.60	12.40	12.8
87	58	11.1849	0.66154	10.1	10.50	10.80	11.20	11.70	12.00	12.4
88	62	12.0105	0.82177	10.6	11.00	11.50	12.00	12.50	13.00	13.8
89	52	12.1849	0.95293	10.5	11.00	11.55	12.00	12.75	13.10	13.6
90	42	12.1974	0.89391	10.5	10.80	11.30	12.00	12.80	13.50	14.0
91	42	12.5539	0.88420	11.2	11.30	11.90	12.50	13.30	14.00	14.5
92	26	12.9131	1.01142	11.5	11.50	12.00	13.00	13.50	14.50	15.0
93	21	13.0898	0.87600	12.0	12.00	12.50	13.00	14.00	14.50	15.5
94	16	12.9741	0.87305	11.2	11.80	12.10	12.85	13.25	14.50	15.6
95	14	13.6331	0.74005	12.0	12.30	13.00	13.50	14.10	14.50	15.2
96	9	14.2686	0.92834	12.0	12.00	13.80	14.50	15.40	16.00	16.0
97	6	15.0269	0.88011	12.7	12.70	14.40	14.80	16.30	16.50	16.5

Table 5 Body mass indices by age

Age Group (month)	Wt/Ht	$Wt/Ht^{1.6}$	Wt/Ht^2
3	9.93	13.60	16.79
6	11.03	14.31	17.02
9	11.49	14.10	16.12
12	11.74	14.05	15.85
15	12.09	14.11	15.64
18	12.08	13.97	15.40
21	12.27	14.05	15.39
24	12.88	14.51	15.72
27	12.88	14.32	15.37
30	13.04	14.17	14.99
33	12.94	13.94	14.66

Table 6 Weighted mean, standard deviation, maximal and minimal value of anthropometric indices, boys aged 3-36 months

Variable	Mean	SD	Minimum	Maximum
MPWA	92.65	11.80	59.14	136.36
MPHA	97.69	4.12	82.95	117.42
MPWH	97.65	8.68	75.31	133.33

N = 925
MPWA = mean percent weight by age
MPHA = mean percent height by age
MPWH = mean percent weight by height

Table 7 Weighted mean, standard deviation, maximal and minimal value of anthropometric indices, girls aged 3-36 months

Variable	Mean	SD	Minimum	Maximum
MPWA	92.57	12.77	59.22	171.88
MPHA	97.95	4.50	85.08	118.32
MPWH	96.13	8.67	68.03	156.41

N = 924

Table 8 Frequency of weight by age (per cent) (Gomez's classification)[a] by regions (with reference to Thai National Standards 1986)

Region	Boys				Girls			
	Normal	1°PEM	2°PEM	3°PEM	Normal	1°PEM	2°PEM	3°PEM
North	58.26	35.65	5.64	0.44	48.49	5.49	6.02	0.00
Northeast	55.54	38.17	6.29	0.00	37.31	55.80	6.06	0.84
Central	53.61	41.20	5.20	0.00	63.70	32.76	3.54	0.00
South	61.25	36.97	1.78	0.00	61.69	32.90	5.40	0.00
Bangkok	70.90	27.33	1.78	0.00	73.76	25.56	0.68	0.00
National	**58.16**	**36.98**	**4.78**	**0.08**	**52.07**	**42.71**	**4.93**	**0.29**

[a] Gomez's classification (Normal = > 90 per cent of standard median weight for age, 1°PEM = 75-89 per cent, 2°PEM = 60-74 per cent, 3°PEM = < 60 per cent)

Table 9 Comparison of body weight of children aged 3-36 months among studies in 1939, 1952-54, 1971, 1986 and present study (1987)

Age Group (month)	Boys' weight					Girls' weight				
	1939[1]	1952-54[2]	1971[3]	1986[4]	1987[5]	1939[1]	1952-54[2]	1971[3]	1986[4]	1987[5]
3	5.24	6.1	6.34	5.85	6.00	4.90	5.7	5.61	5.50	5.50
6	7.33	7.2	7.74	7.50	7.40	6.90	6.6	7.33	6.85	7.00
9	7.99	7.6	8.62	8.55	8.15	7.60	7.0	7.97	7.85	8.00
12	8.65	8.2	-	9.30	8.75	8.39	8.0	-	8.70	8.00
15	-	8.6	9.45	10.00	9.20	-	8.2	9.05	9.40	9.00
18	9.05	9.3	-	10.65	9.60	8.43	8.2	-	10.10	9.00
21	-	9.7	10.37	11.20	10.20	-	9.7	10.26	10.70	10.00
24	9.39	10.1	-	11.70	11.00	9.39	9.9	-	11.30	10.40
27	-	10.2	-	12.20	11.15	-	9.3	-	11.80	0.50
30	10.93	10.7	12.26	12.70	11.00	10.09	10.0	12.27	12.25	11.70
33	-	11.2	-	13.10	11.70	-	10.3	-	12.65	11.35
36	11.58	12.0	-	13.55	12.50	11.02	11.8	-	13.05	11.20

[1]Monkolsamai, using children attending well-baby clinic in Siriraj Hospital, Bangkok.
[2]Smith and Hauck, using longitudinal study data from children living in Minburi, Bangkok.
[3]Khanjanasthiti, using physically and mentally well-being children who attended well baby clinics and kindergartens in Bangkok.
[4]National survey conducted by Ministry of Public Health using physically well-being children who attended nurseries, kindergartens or residents of sampled villages.
[5]Present study.

Table 10 Comparison of body height of children aged 3-36 months from various previous studies

Age (month)	Boys' height					Girls' height				
	(1)[a]	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
3	58.39	59.4	62.04	60.0	59.50	56.98	59.0	60.30	58.4	59.10
6	64.36	64.8	67.83	66.2	66.00	63.70	62.8	65.81	64.4	64.40
9	68.80	68.2	71.88	70.8	70.05	67.20	65.3	69.82	69.0	68.90
12	72.80	70.9	-	74.2	73.00	71.60	69.5	-	72.6	71.10
15	-	73.3	76.50	77.2	75.65	-	72.1	74.66	76.0	75.30
18	76.09	76.7	-	80.0	78.70	73.40	72.6	-	78.6	76.80
21	-	79.0	81.39	82.6	81.50	-	77.6	81.37	81.2	79.50
24	79.25	79.1	-	85.0	83.20	79.25	79.2	-	83.4	81.50
27	-	81.3	-	87.4	84.35	-	78.4	-	86.0	84.50
30	84.44	84.0	88.47	89.6	86.70	81.60	80.7	89.85	88.2	87.50
33	-	86.2	-	91.6	88.55	-	83.4	-	90.4	89.20
36	86.15	87.9	-	93.6	90.40	85.06	88.1	-	92.4	89.80

[a](1), (2), (3), (4), (5) as Table 9

Table 11 Comparison between weighted mean weight, height, $Wt/Ht^{1.6}$ and Wt/Ht^2 of boys and girls adjusted for age*

	Mean		Adjusted mean		p-value**
	Boys	Girls	Boys	Girls	
N	925	924	925	924	-
Weight	9.72	9.30	9.70	9.25	0.0001
Height	78.03	77.10	77.98	76.83	0.0001
$Wt/Ht^{1.6}$	14.34	13.97	14.34	13.97	0.0001
Wt/Ht^2	15.89	15.55	15.89	15.57	0.0001

* Least square mean using analysis of covariance
** t test for hypothesis LS Mean (boys) = LS Mean (girls)

Table 12 Comparison between weighted mean weight, height, $Wt/Ht^{1.6}$ and Wt/Ht^2 of different maternal parity adjusted for age

	Adjusted mean of parity group				Statistical significance between pair of comparison
	1	2	3	^ 4	
N	627	620	317	285	
Weight	9.59	9.51	9.59	9.06	1,2,3 > 4**
Height	77.75	77.70	77.45	76.10	1,2,3 > 4**
$Wt/Ht^{1.6}$	14.23	14.13	14.30	13.93	3 > 2* 1,3 > 4** 2 > 4*
Wt/Ht^2	15.78	15.67	15.89	15.59	3 > 2* 1 > 4* 3 > 4**

* p - value < 0.05
** p - value < 0.01

Table 13 Comparison between weighted mean weight, height, $Wt/Ht^{1.6}$ and Wt/Ht^2 of different maternal education group adjusted for age

	Adjusted mean of maternal education group				Statistical significance between pair of comparison
	No education (1)	Primary (2)	Secondary (3)	College (4)	
N	134	1346	244	125	
Weight	9.12	9.38	10.10	10.50	1<2<3** 3<4*
Height	75.8	77.2	79.0	79.9	1<2<3**
$Wt/Ht^{1.6}$	14.09	14.07	14.58	14.95	1,2<3** 3<4*
Wt/Ht^2	15.79	15.65	16.07	16.42	2<3** 1,2<4** 3<4*

* p - value < 0.05
** p - value < 0.01

Fig.1

Weighted Median, 10th, and 95th Percentiles of Weight by Age, Thailand, 1987

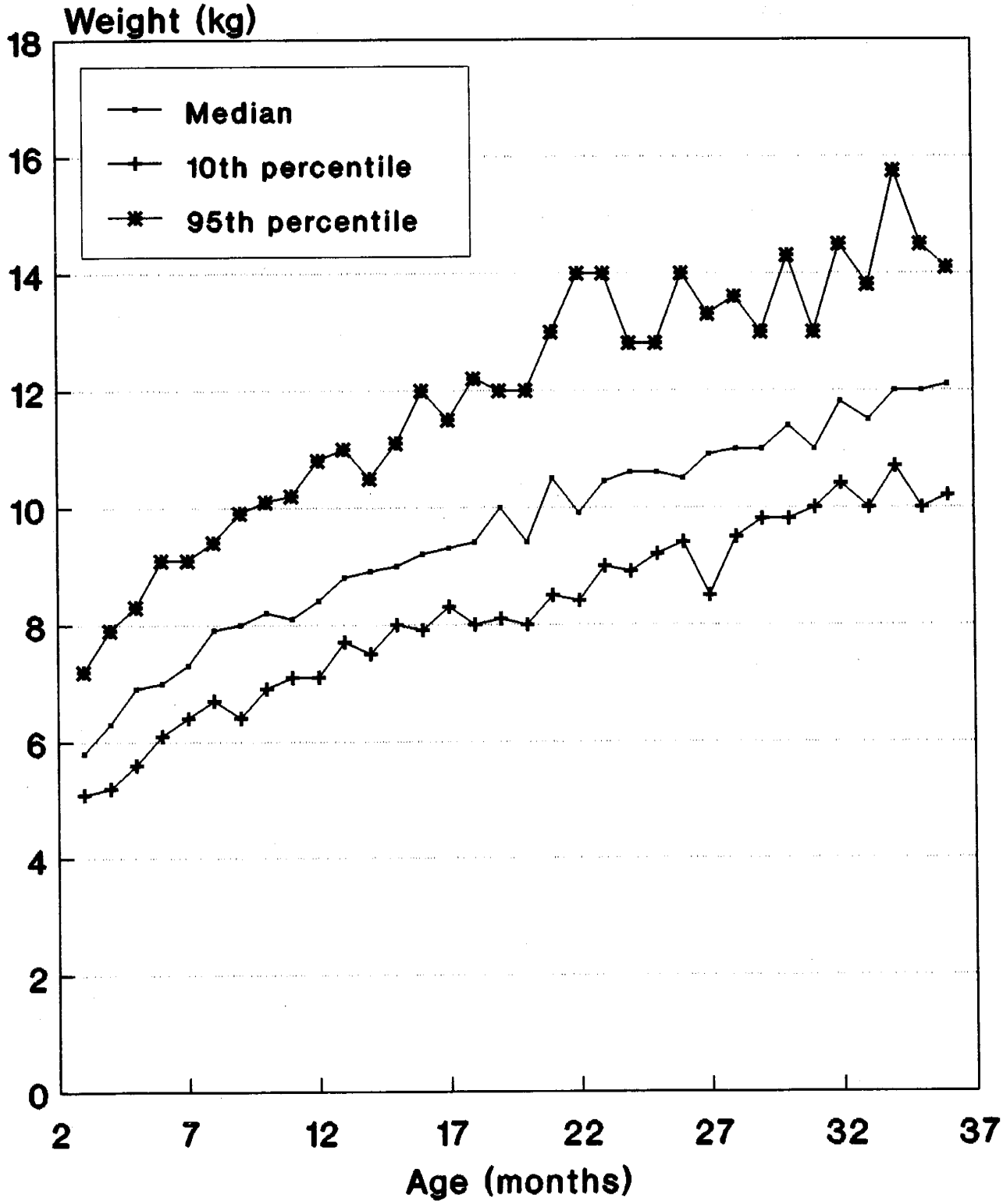


Fig.2

Weighted Median, 10th, and 95th Percentiles of Height by Age, Thailand, 1987

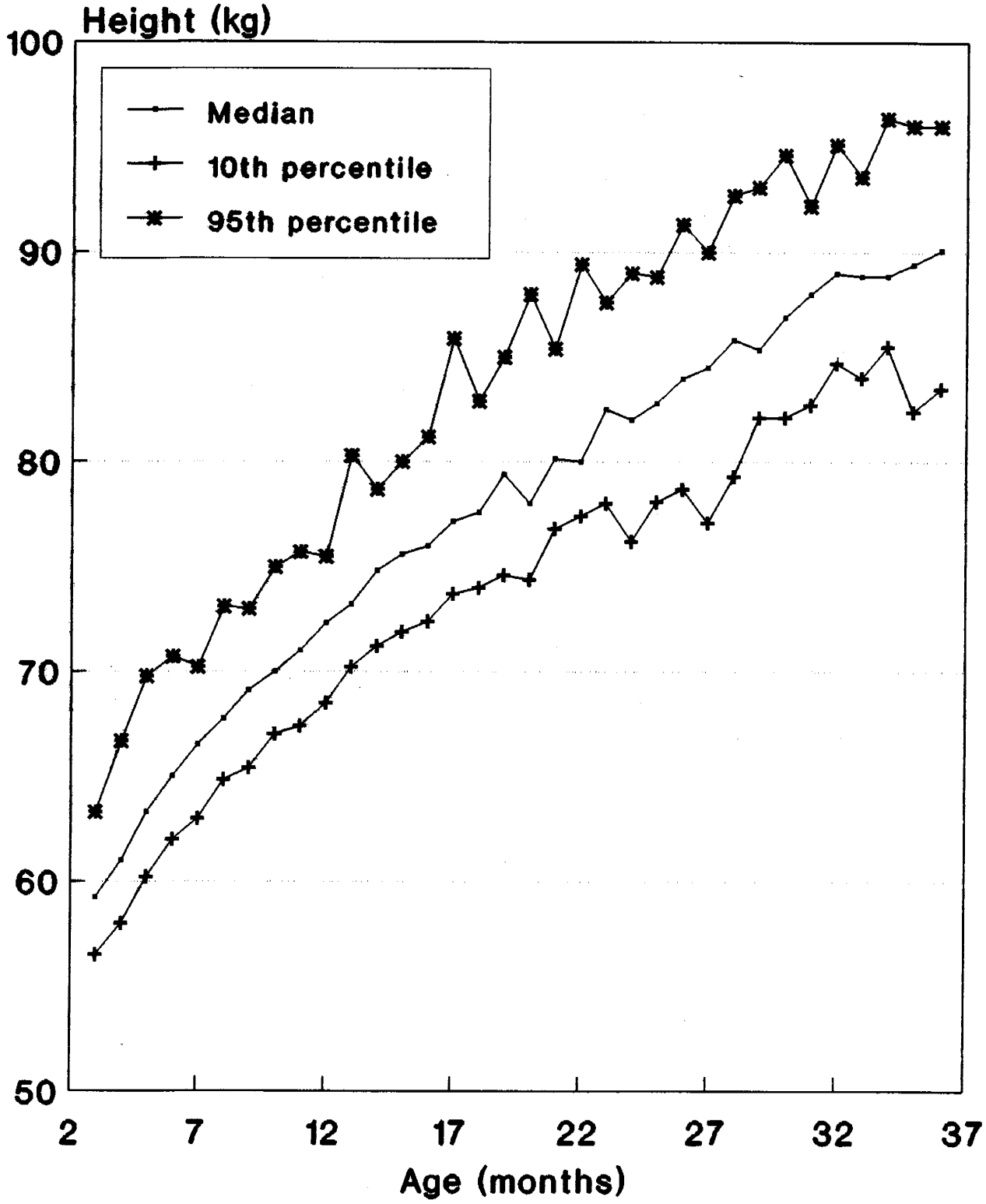


Fig.3
Weighted Median, 10th, and 95th Percentiles of Weight by Height Thailand, 1987

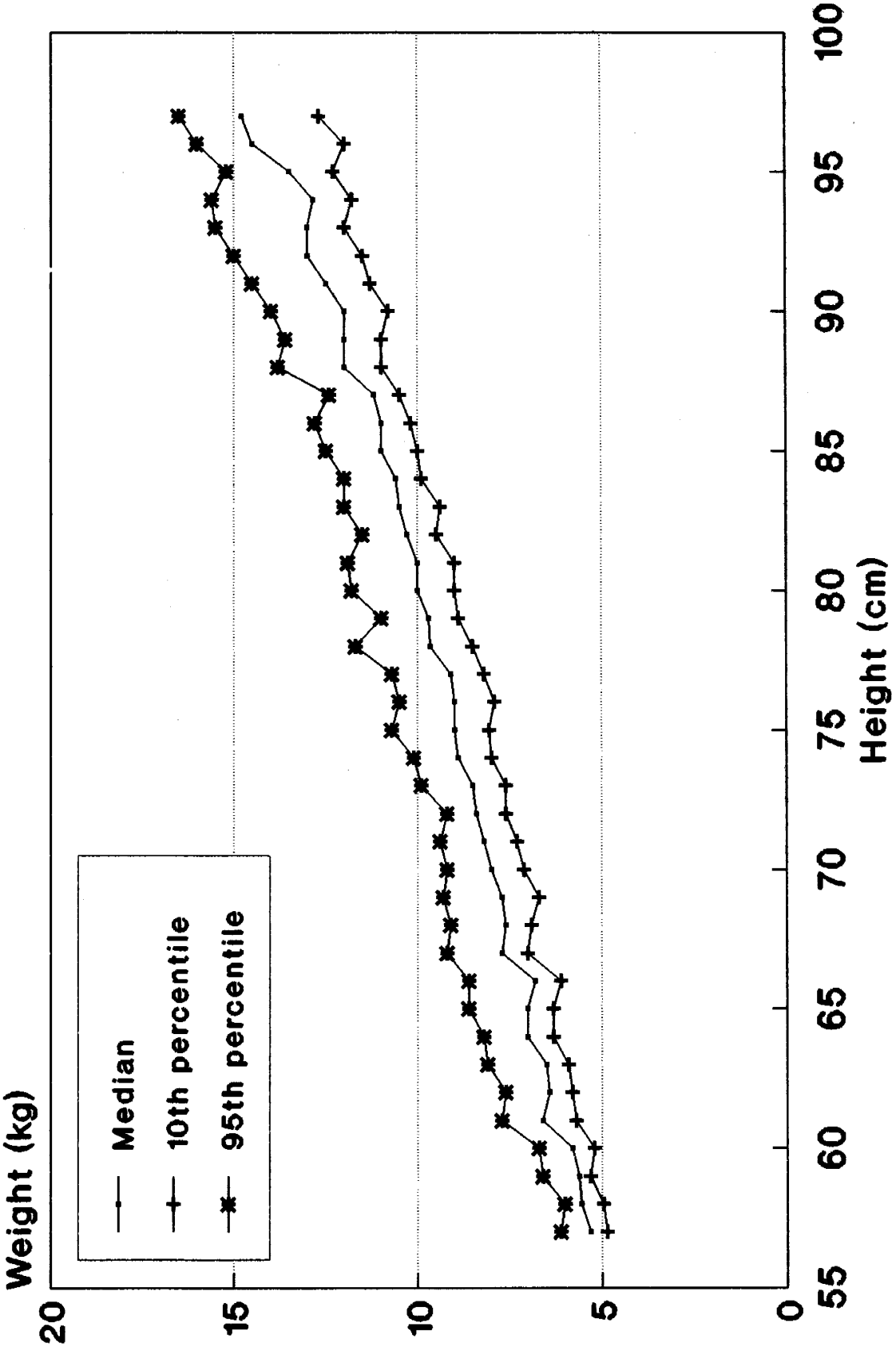


Fig.4

Median Weight by Age, by Region, Thailand 1987

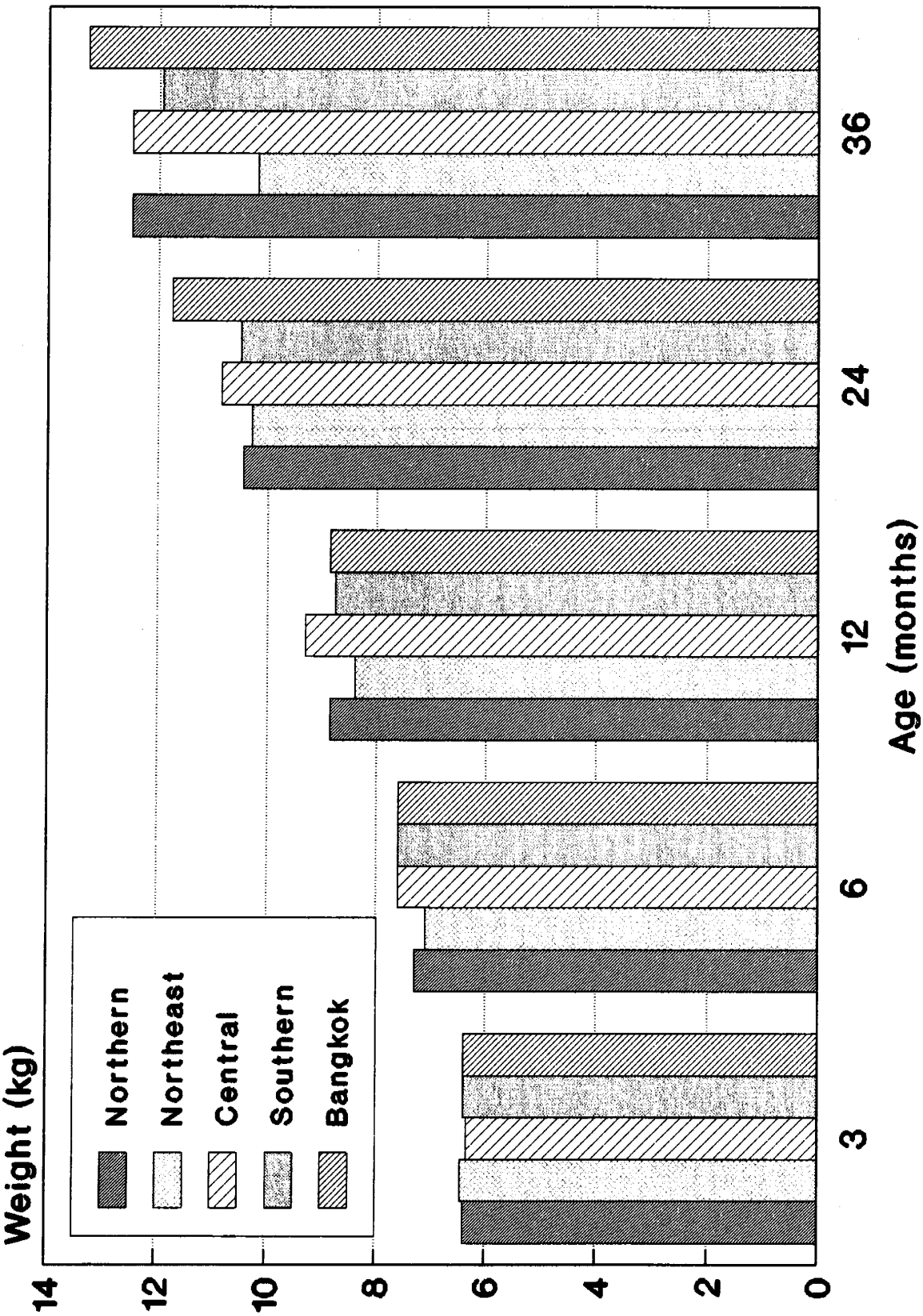


Fig.5

Median Height by Age, by Region, Thailand 1987

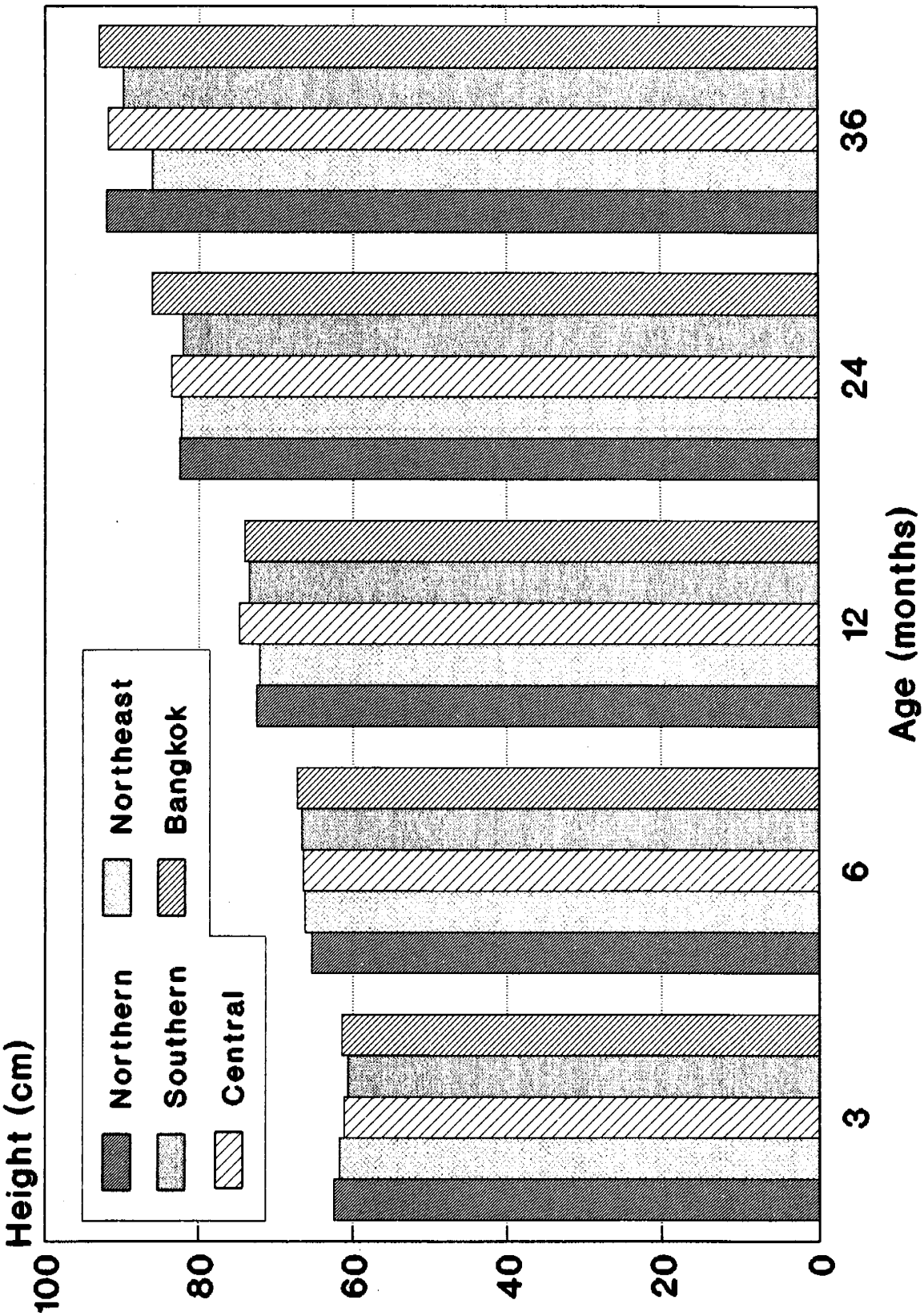
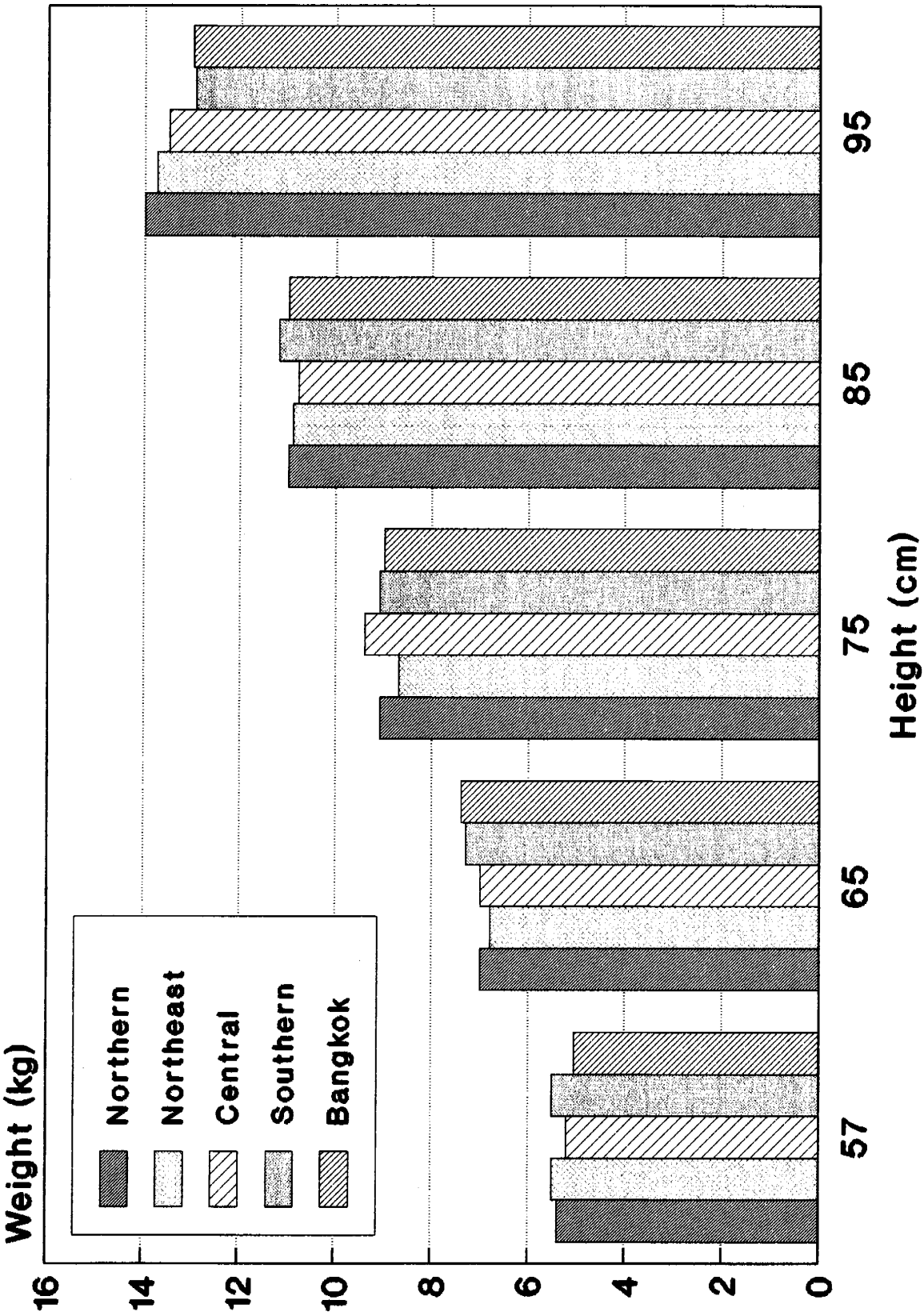


Fig.6


Median Weight by Height, by Region, Thailand 1987
Weight (kg)
16
14
12
10
8
6
4
2
0
Northern
Northeast
Central
Southern
Bangkok
57
65
75
85
95
Height (cm)

Maternal Health Care: Recent Trends, Differentials and Correlates

Pichit Pitaktepsombati
Kua Wongboonsin

Abstract

Based on TDHS data on approximately 3,900 births since January 1982 to the time of the survey, it was found that a majority of mothers received prenatal care from health professionals, received tetanus toxoid injections, received assistance at delivery from health professionals and delivered at health facilities. However, the in-depth analysis indicated substantial variation in utilizing these services on the basis of differences in place of residence, in number of years since last birth occurred, in age of mother at the time of child's birth, in region of residence, in religio-linguistic ethnicity, in case of access to health facilities and in levels of education and family wealth. For example, 73 percent of mothers who lived in the most rural areas received prenatal care from health professionals compared to 96 percent of those who live in Bangkok. The results suggest that rural mothers did not fully use the nearest health personnel and facilities but rather chose to utilize health facilities in semi-urban or urban areas or to follow traditional practices. Thus, any strategies to persuade rural women to more fully utilize the nearest health facility-health center will be beneficial to both government programs and the mothers.

1. Introduction

Medical and health services have been a priority area for the government of Thailand for quite some time as it has long been recognized that the health of its population is essential for its well being and the process of development. The Sixth National Socioeconomic Development Plan for the years 1987-1991 provides details of the current Health Plan. The objective of Health Plan is to promote and support the population in both rural and urban areas in order that they will have good physical and mental health. The important aims of this plan are as follows: to provide accessibility to the basic social services that are needed for disease control and medical care, especially for children of various ages and pregnant women. This includes providing vaccinations and care by trained government personnel or traditional midwives with the goal of reducing child and infant mortality rate. The Ministry of Public Health set a target to reduce the infant mortality rate to 39 per 1,000 live births by 1991 (NESDB, Sixth Plan, 1987-1991, pp. 87-91).

As national statistics for 1981-1985 show, medical and health services are increasing.

	1981	1982	1983	1984	1985
Population per doctor	6,851	6,333	6,259	6,254	5,978
Population per nurse	2,423	2,119	1,870	1,583	1,336
Population per midwife	5,537	5,478	5,435	5,878	7,003
No. of hospital beds (total)	58,602	61,112	64,796	67,289	69,049
No. of deliveries by personnel and traditional midwives	432,008	475,539	445,222	488,031	551,456

Source: Health Statistics Division, Ministry of Public Health, Public Health Statistics 1985, Tables 3.2, 3.6, and 4.1.

From the above statistics, it was shown that the government increased personnel and medical and health services from 1981 to 1985. The population per midwife in 1984 and 1985 increased as compared with earlier years; however, this should not be interpreted that services were not improving. On the contrary the government or the Ministry of Public Health has increased the better educated and trained personnel such as doctors and nurses. Also, midwives have a chance to become more educated and trained, and then to be categorized as a higher level personnel after finishing the required course.

The target population that will be the major users of these government services are married women and their children. Therefore whether this target population will use the service or not is very important for the main objective which is the good health for all. The study on level and trend of maternal health care will be very important for the medical and health policies.

2. Objective

The objective of this paper is to study the level and trend of maternal health care in Thailand in 1982-1987 and how various factors such as place of residence (rural or urban), region, religion, language, availability of health facilities,women's and husband's education, and level of family wealth affect the level of maternal and child health services used. These are examined in a bivariate and then a multivariate framework utilizing multiple classification analysis.

In this analysis, the data used are from the Demographic and Health Survey of Thailand (TDHS) which is part of the International Demographic and Health Surveys Project. The Institute of Population Studies, Chulalongkorn University conducted the TDHS, collecting data during March to June 1987, and interviewed 6,775 married women aged 15- 49 years. The sample design is national and allows for estimates for the four regions and Bangkok,and both urban and rural sectors. Details are in the Country Report (Chayovan, Kamnuansilpa, and Knodel 1988).

The sample used in this analysis are births since the beginning of 1982. A total of 3,900 births are involved. Information is reported by characteristics of the mother.

3. Results

The maternal and child health services examined in this analysis are prenatal care, tetanus toxoid injection, type of assistance during delivery and place of delivery of each birth. The preliminary results are reported on page 94-98 of the Country Report. For tetanus toxoid injection, there might be a problem of confusing it with other injections especially for mothers in rural areas. One reason given for the higher rate of tetanus toxoid injection in rural areas than urban areas and in other regions than Bangkok, was that obstetrical surgeons of the hospitals in urban areas and in Bangkok believe that hygienic conditions there are good. Therefore, the need for vaccination for pregnant women delivering in such places is less compared to those delivering in rural areas and other hospitals outside Bangkok.

The results in Table 1 on prenatal care show that for 76 percent of births since 1982, the mothers went to see doctors, nurses and midwives for prenatal care; for the other 22 percent of births, the mothers did not go to see any doctors, nurses and midwives for prenatal care. Ninety-five percent of mothers in urban areas went to see modern medical personnel for prenatal care while only 73 percent of mothers in rural areas have this type of prenatal care.

In addition, for 66 percent of pregnancies or births since 1982, the mothers received a tetanus toxoid injection. There is little difference between mothers in rural areas and those in urban areas.

Deliveries of two-thirds of the births since 1982 were looked after by modern medical personnel and about 60 percent were delivered in places suitable and safe for delivery, i.e. hospitals, health stations and clinics. However, almost all deliveries in urban areas were looked after by modern medical personnel and

were delivered in modern health facilities. This is expected because maternal and health services are more readily available in urban areas than in rural areas. However, it is worth noting that 31 percent of mothers in rural areas were still delivered with the assistance of traditional birth attendants and for almost half (46 percent) the place of delivery was at home. The rate is still high even though nowadays there is a health center with at least one midwife in each tambol. Therefore it poses a challenge to determine how to persuade these women to use the health center services given the importance for maternal and child health of taking advantage of these resources.

The data in Table 2 show trends in the use of maternal and child health services. In general, high use of services is associated with more recent births (1985-1987), births to younger mothers (less than 30 years), and births of low orders (first and second). A higher proportion of mothers of such births go for prenatal care, vaccination and delivery under the care of doctors, nurses and midwives, and delivery at the hospitals, health centers and clinics. For example, 80 percent of women who delivered during 1985-1987 went to see modern medical personnel for prenatal care compared to about 74 percent of those who delivered during 1982-1984; 73 percent of women who delivered their first child during 1982-1987 delivered at a modern service place while only 14 percent of those with eight or more children delivered at the modern service places.

The study also finds that rural-urban residence, region, religio-linguistic ethnicity and type of health facility within 5-kilometer or 20-minute travel time is clearly related to the level maternal health care (Table 3). For example, the percentage of children whose mother received prenatal examination from a doctor, trained nurse or midwife increases from 71 percent, for women who live outside a sanitary district in rural areas, to 88, 92 and 96 percent for those who live inside the sanitary district in rural areas, in provincial urban and in Bangkok, respectively.

Women who live in the central region (excluding Bangkok Metropolis) have the highest level of maternal health care. Those in the Southern region have the lowest percentage of prenatal care and tetanus toxoid injection, while women in the northeast region have the lowest percentage delivering in the hospital.

The results show with respect to religio-linguistic ethnicity, nearly all of the women who do not belong to the Thai-speaking Buddhists or Thai-speaking Moslems categories receive less maternal health care than these two groups. Thai-speaking Buddhists have a higher level of maternal health care than Thai-speaking Moslems who in turn are better off than Malay-speaking Moslems. Cambodians and hill tribes women receive the least maternal health care as compared with other groups.

The type of health facility within 5-kilometers or 20-minutes travel time show a strongly positive relation with maternal health care. For example, in areas where a health facility is unavailable within 5-kilometers or 20-minutes travel times only 50 percent of mothers had a prenatal examination. In contrast, in urban areas where most facilities are available, the figure is 95 percent.

Education of parents also has a positive effect on maternal health care before or after delivery. For example, the percentage of deliveries at health facilities increased from 30 percent of women whose husbands had not finished the primary grades to 56 and 90 percent, respectively, when husbands had completed elementary grades and secondary or higher grades (Table 4).

Combining the schooling of both husbands and wives, it was found that education has a strong positive effect on the use of maternal health services. When both had the lowest educational level (below grade 4), only 35 percent of mothers received prenatal examination. The figure increased to 78 and 99 percent when both had a primary education or secondary or beyond, respectively. When prenatal care, health personnel and place of delivery are considered, similar patterns are found.

The level of family wealth also has a strong and positive effect on the use of maternal health services. Mothers in better-off families who had prenatal examinations, whose children were delivered by modern medical personnel at better equipped and safer places represented a much larger proportion than those less well off (Table 5). This was true in rural areas both in and outside of sanitary district as well as in urban areas. However, it was not the case if tetanus toxoid injection was given. It was found that mothers in the

highest wealth category in sanitary districts and urban areas had lower percentages of tetanus toxoid injection than those in families with less wealth. As was pointed out in Table 1, mothers from the wealthier families tend to have their children delivered by better trained personnel and at safer facilities; therefore, they do not feel that the vaccination is necessary. In other wealth categories, however, about equal proportions of women in rural and urban areas received a tetanus toxoid injection.

Combining the effect of both levels of urbanization and family wealth it was found that, of mothers living in the least urban areas, i.e. rural areas outside sanitary districts and who belong to families with the lowest level of wealth, half or less used maternal health services. Fifty-four percent of them had prenatal examinations, 49 percent had tetanus toxoid injections, 40 percent had their children delivered by medical or paramedical personnel and 35 percent delivered their babies at modern facilities. These figures are all low compared to other groups of respondents. For mothers living in urban areas and belonging to families with high or medium levels of wealth, nearly all received these services except for the injection.

Given the association between maternal health care (type of prenatal care, tetanus toxoid injection, type of assistance during delivery and place of delivery) and these selected characteristics i.e. education of women, wealth level of household, birth order, type of health facility within 5 kilometers and religio-linguistic ethnicity, it is useful to examine their effects within a multivariate framework. The following analysis explore specific differentials in the percentage of maternal health care after adjusting for related characteristics using Multiple Classification Analysis (MCA).[1] MCA produces statistics which show how each independent variable relates to the dependent variable both before (unadjusted) and after (adjusted) taking into account the effects of all other independent variables.[2]

Only two dependent variables are selected for use in the MCA analysis: the percentage of children whose mother received prenatal care from a health professional and the percentage who were delivered at a health facility. The reasons for using only the above-mentioned variables derive from the results shown in Table 6. For the tetanus toxoid injection variable, certain problems of interpretation arise given that the previous analysis shows that women in rural areas kin the highest wealth category have higher percentages obtaining tetanus toxoid injection than the corresponding group in urban areas. For reasons mentioned in the previous discussion, it is unlikely that means that the former have better health care than the latter. Thus, this variable is excluded from the MCA analysis. Since, the variable measuring assistance at delivery (the percentage of mothers who received assistance at delivery from a doctor or trained nurse and/or midwife) has a highly positive correlation with place of delivery, it is of little value to examine both variables in the MCA analysis. Thus, place of delivery is used as a dependent variable in the MCA analysis.

Table 7 shows the percentage of children whose mothers received prenatal care from a health professional and who were delivered at a health facility by selected characteristics, unadjusted and adjusted by MCA.

The unadjusted results from column 1 indicate that education of women is positively associated with the percentage of children whose mothers received prenatal care. The percentage receiving prenatal care increase from 49 to 79 to 97 percent for women with 0-3 years, 4-7 years of education and secondary or beyond, respectively. The effect of the level of education diminishes somewhat after we adjust for other factors as indicated by the adjusted mean values for each category, reflecting the fact that education is related to some extent with other selected characteristics. The results from rural population also have the same pattern as the total sample.

Place of delivery also has a positive relationship with the education of women. The association decreases when adjusted for other selected characteristics but remains strong and positive. For the rural population, women with 0-3 years of education have a slightly higher percentage delivered at a health facility than those with 4-7 years of education when adjusted for other characteristics. In addition, the difference in the percentage delivering at a health facility between women with secondary education or beyond and those with 0-3 years of education is far less pronounced when compared between unadjusted and adjusted columns. That is, the difference drops from 56 to 11 percentage points. The results reflect the fact that education is strongly related with other independent variables.

The wealth level of the household also has a positive effect on the prenatal care variable. This is also the case after adjusting for other characteristics. The results for the rural population also have the same pattern as the total sample. The relationship between place of delivery and the wealth variable is also positive. Only 38 percent of children from households with the lowest wealth level were delivered at a health facility compared to 87 percent of those from households with the highest wealth level. The association however, is reduced (49 and 72 percents) when adjusted for other characteristics.

Birth order shows a negative relation, for both the total and rural sample, with the percentage of children whose mothers received prenatal care from a health professional as well as who were delivered at a health facility. The results are quite consistent even after adjusting for other characteristics with a clear inverse association persisting. We note that for higher birth orders e.g. birth orders 5-7 and birth orders 8 or higher the adjusted column shows a higher degree of maternal health care than do the unadjusted figures. This reflects to some extent that birth order is related to other selected characteristics. The type of health facility within 5 kilometers or 20 minutes travel time also has a clear effect on prenatal care as well as place of delivery although the association is reduced when adjusted for other characteristics.

For religio-linguistic ethnicity, the analysis is done only for the rural population since there are several minorities are concentrated almost entirely in rural areas. The results are quite consistent before and after adjustment except for the hill tribes category. In general, Thai Buddhist have the highest prenatal care followed by Thai Moslem, Malay Moslems, Cambodian and hill tribes, respectively. Thai Buddhists also have the highest percentage delivered at a health facility followed by Thai Moslem, hill tribes, Cambodian and Malay Moslems.

Summary and Recommendations

The research findings may be summarized as follows:

1. Almost all pregnant women in urban areas receive prenatal care from a doctor or other trained medical personnel. In rural areas, however, one-quarter of pregnant women do not receive prenatal care from trained medical personnel.

2. Almost all urban women (96 percent) are attended by trained medical personnel at delivery, whereas in rural areas about 40 percent are attended by traditional midwives or other non-trained personnel. Among urban women, 95 percent deliver their babies in hospitals, health stations, or private clinics. In rural areas 46 percent deliver at home, although in rural sanitary districts 8 in 10 deliver at a hospital, health station or private clinic. In rural areas there is a strong negative association between distance from and delivery in health facilities.

3. Birth order, age of mother at the time of pregnancy or delivery and other variables also influence the extent of use of services and facilities.

From these results it may be concluded that poorer, less educated rural women are underutilizing maternal and child health services that are available to them in the Ministry of Public Health centers in rural areas.

NOTES

1 Multiple Classification Analysis is an extension of multiple regression analysis using dummy variables. From a strict statistical point of view it is not appropriate for use with a dichotomous dependent variable such as used in the present analysis. In general, however, results rarely differ substantially from those based on more appropriate techniques such as logistic regression and are easier to obtain and interpret. For this reason we rely on MCA in the present study.

2 MCA results are most readily interpretable when there are no significant interaction effects. We have checked the significance of interaction effects and found no significant two-way interaction effects for the variables being used in the analysis.

REFERENCES

Ministry of Public Health. 1988. Division of Health Statistics. Public Health Statistics A.D. 1985. Bangkok.

Napaporn Chayovan, Peerasit Kamnuansilpa, and John Knodel. 1988. Thailand Demographic and Health Survey 1987. Bangkok: Institute of Population Studies, Chulalongkorn University.

National Economic and Social Development Board. 1987. The Sixth National Economic and Social Development Plan (1987-1991). Bangkok.

Table 1 For births since January 1982, the percent distribution according to type of prenatal care, type of assistance during delivery, and place of delivery, by urban-rural residence

	National	Rural	Urban
Type of prenatal care			
Doctor	45	38	83
Trained nurse/midwife	31	35	12
Other	1	1	0
None	22	26	5
Total	100	100	100
Tetanus toxoid injection			
Received	66	66	65
Not received	34	34	35
Total	100	100	100
Type of assistance during delivery			
Doctor	44	35	83
Trained nurse/midwife	22	24	13
Traditional birth attendant	26	31	2
Other	7	9	1
None	1	1	1
Total	100	100	100
Place of delivery			
Government hospital	46	40	77
Private hospital	4	2	13
Government health station	8	9	2
Private clinic	3	3	3
Home	39	46	4
Other	1	1	1
Total	100	100	100

Note: Some percents do not add to totals because of rounding.

Table 2 For births since January 1982, the percentage of children whose mothers received prenatal care from a health professional, received a tetanus toxoid injection, received assistance at delivery from a health professional, and delivered at a health facility, by selected demographic characteristics

	% of children whose mothers received:			
Characteristic	**Prenatal exams from doctor or trained nurse/midwife**	**Tetanus toxoid injection**	**Assistance at delivery from doctor or trained nurse/midwife**	**Delivered at hospital, health station or clinic**
Total	77	66	65	60
Years of birth				
1982-84	74	61	62	57
1985-87	80	71	70	64
Age of Mother at time of childbirth				
Less than 30	79	69	67	62
30 or over	72	55	61	55
Birth order				
1	85	73	77	73
2	82	70	66	62
3	75	60	65	58
4	64	53	51	48
5-7	58	51	43	36
8 +	31	27	19	14

Table 3 For births since January 1982, the percentage of children whose mothers received prenatal care from a health professional, received a tetanus toxoid injection, received assistance at delivery from a health professional and delivered at a health facility, by rural-urban residence, region, religio-linguistic ethnicity, and access to health facilities

Characteristic	% of children whose mothers received: Prenatal exams from doctor or trained nurse/midwife	Tetanus toxoid injection	Assistance at delivery from doctor or trained nurse/midwife	Delivered at hospital, health station or clinic
Total	77	66	65	60
Rural-urban residence				
Rural, total	73	66	59	53
Outside sanitary district	71	64	56	50
Inside sanitary district	88	78	85	79
Urban, total	95	65	96	96
Provincial urban	92	74	95	94
Bangkok	96	59	97	96
Region				
Central (excluding, Bangkok)	85	65	85	84
North	71	64	64	61
Northeast	75	71	50	42
South	66	59	58	50
Religio-linguistic ethnicity				
Thai-speaking Buddhists	83	70	72	67
Thai-speaking Moslems	64	52	49	44
Malay-speaking Moslems	49	47	18	10
Cambodians	33	35	13	12
Hill tribes	27	33	20	18
Other	91	69	96	94
Type of health facility within 5 km. or 20 minutes travel time				
None	50	46	35	32
Health station only	73	67	53	47
Hospital	80	68	74	69
Urban area	95	65	96	95
Total	77	65	65	60

Table 4 For births since January 1982 the percent of children whose mothers received prenatal care from a health professional, received a tetanus toxoid injection, received assistance at delivery from a health professional, and delivered at a health facility, by education of parents

Maternal health care measure and education of woman	Education of husband			
	0-3 years	4-7 years	Secondary or beyond	Total*
% received prenatal care from health professional				
0-3 years	35	57	(70)	49
4-7 years	60	78	94	79
Secondary or beyond	-	89	99	97
Total	45	76	95	77
% received tetanus toxoid injection				
0-3 years	40	49	(56)	46
4-7 years	53	68	76	68
Secondary or beyond	-	72	74	73
Total	45	66	74	66
% assisted by health professional at delivery				
0-3 years	29	52	(65)	43
4-7 years	43	62	87	64
Secondary or beyond	-	93	97	97
Total	35	62	91	65
% delivered at a health facility				
0-3 years	26	49	65	40
4-7 years	36	56	84	59
Secondary or beyond	-	92	96	95
Total	30	56	90	60

Notes: Results based on less than 20 unweighted cases are not shown; results based on 20-49 unweighted cases are enclosed in parentheses. The results shown are based on weighted calculations.

* Includes women with husband's education unknown

Table 5 For births since January 1982, the percentage of children whose mothers received prenatal care from a health professional, received a tetanus toxoid injection, received assistance at delivery from a health profession, and delivered at a health facility, by rural-urban residence and level of household wealth

Maternal health care measure and wealth level	National	Rural			Urban
		Total rural	Outside sanitary district	Inside sanitary district	
% received prenatal care from health professional					
Lowest	56	55	54	(64)	(96)
Below average	77	75	74	86	89
Average	85	82	80	93	95
Above average	88	84	81	93	98
Highest	93	87	85	(96)	99
% received tetanus toxoid injection					
Lowest	50	50	59	(61)	(50)
Below average	68	68	67	76	68
Average	72	72	71	80	70
Above average	75	76	73	85	73
Highest	63	74	73	(77)	51
% assisted by health professional at delivery					
Lowest	44	43	40	(81)	(91)
Below average	58	53	51	72	93
Average	77	73	69	91	96
Above average	85	80	75	93	99
Highest	91	83	80	(97)	99
% delivered at a health facility					
Lowest	38	37	35	(77)	(88)
Below average	53	46	45	61	92
Average	73	68	64	90	95
Above average	81	76	71	87	98
Highest	87	77	73	(92)	99

Notes: Results based on 20-49 unweighted cases are enclosed in parentheses. The results shown are based on weighted calculations.

Table 6 For births since January 1982, associations among maternal health care measures

Status regarding health care measure	% of children whose mothers received: Prenatal exams from doctor or trained nurse/midwife	Tetanus toxoid injection	Assistance at delivery from doctor or trained nurse/midwife	Delivered at a hospital, health station or clinic
Received professional prenatal care				
No	-	13	23	21
Yes	-	82	78	72
Received tetanus toxoid injection				
No	41	-	45	43
Yes	95	-	76	69
Received professional assistance at delivery				
No	49	46	-	0
Yes	92	76	-	92
Delivered at a health facility				
No	54	51	12	-
Yes	92	75	100	-

Table 7 For births since January 1982, the percentage of children whose mothers received prenatal care from a health professional and who delivered at a health facility, by selected characteristics, unadjusted and adjusted by Multiple Classification Analysis

	% received prenatal care from a health professional				% delivered at a health facility			
	Total sample		Rural only		Total sample		Rural only	
	Unadj	Adj	Unadj	Adj	Unadj	Adj	Unadj	Adj
Grand mean	77	77	73	73	60	60	53	53
Education of woman								
0-3 years	49	60	46	63	40	54	36	55
4-7 years	79	79	77	75	59	60	53	52
Secondary or beyond	97	82	95	79	95	70	92	66
Eta	.30	.16	.29	.11	.30	.08	.25	.08
Wealth level of household								
Lowest	56	63	55	62	38	49	37	45
Below average	77	77	75	73	53	54	46	45
Average	85	82	82	79	73	70	68	65
Above average	88	85	85	83	81	72	x	x
Highest*	93	86	x	x	87	72	x	x
Eta	.28	.19	.25	.16	.34	.20	.29	.22
Birth order								
1	85	82	82	79	73	69	67	63
2	82	81	79	78	62	60	55	53
3	75	75	71	72	58	59	52	53
4	64	67	61	63	48	53	41	47
5-7	58	66	55	62	36	44	29	38
8 or higher	31	43	30	43	14	25	12	21
Eta	.28	.19	.27	.19	.28	.20	.27	.20
Type of health facility within 5 km or 20 minutes travel time								
None	47	63	53	66	32	44	32	45
Health station only	73	75	73	73	47	50	47	47
Hospital	80	78	63	75	69	68	69	65
Urban area	95	86	x	x	95	85	x	x
Eta	.26	.13	.19	.05	.40	.28	.23	.18
Religio-linguistic ethnicity								
Thai Buddhists	x	x	81	79	x	x	61	60
Thai Moslems	x	x	54	57	x	x	29	32
Malay Moslems	x	x	48	53	x	x	8	0**
Cambodians	x	x	32	37	x	x	12	23
Hill tribes	x	x	27	50	x	x	18	30
Other	x	x	(87)	(83)	x	x	(91)	(78)
Eta	x	x	.37	.27	x	x	.34	.31

* Combined with above average for rural sample

** Adjusted result is a negative value

POPULATION STUDIES

Contraceptive Initiation Patterns in Thailand

John Knodel
Napaporn Chayovan

The rise in contraceptive use, generally from negligible levels, throughout much of the Third World during the last two decades represents one of the most fundamental social changes of our times having a major impact on both fertility levels and patterns of reproductive behavior. The basic contours of this phenomenon are apparent from the levels of contraceptive prevalence derived from the various so-called KAP surveys (of knowledge, attitude and practice relating to family planning) conducted earlier and more recently from the two large-scale international survey projects known as the World Fertility Survey (WFS) and the Contraceptive Prevalence Survey (CPS). As a recent review of these two major projects has indicated, however, surprisingly little effort beyond documenting levels of use has gone into analyzing the anatomy of this remarkable change in contraceptive prevalence (Cleland, 1986).

One of the aspects of contraceptive use that has received relatively little attention is the process of contraceptive initiation, both in terms of first post-marital use and in terms of initiation of particular episodes, and how the pattern of initiation changes with rising levels of overall use. The present study focuses on contraceptive initiation in Thailand where, in the course of the last two decades, contraceptive use rose from 15 to 68 percent among currently married women aged 15-44 and fertility levels fell by well over half (Chayovan, Kamnuansilpa and Knodel, 1988; Knodel, Chamratrithirong and Debavalya, 1987; Knodel, Chayovan, and Frisen, 1988). More specifically, this study examines the pattern of first post-marital contraceptive use in relation to the stage of family building, with particular attention to use before the first pregnancy, and the initiation of contraceptive use following childbirth, with particular attention to the timing of initiation relative to the immediate postpartum period and the return of menses.

Data Source

The present study is based on data from the Thailand Demographic and Health Survey (TDHS) carried out in 1987 as part of the international Demographic and Health Surveys project. Details of the survey methodology and sample as well as the principal findings have been published in a country report (Chayovan, Kamnuansilpa and Knodel, 1988). A probability sample of 6,775 ever-married women aged 15-49 were interviewed. This includes 2,347 currently married women who gave birth within 48 months preceding interview, of importance to the present study since much of the analysis of initiation of contraception following childbirth is based in this subset of women. The sample was designed so that approximately equal numbers of women would be interviewed in Bangkok, provincial urban areas, and each of the rural areas of the four major regions. Through appropriate weighting, nationally representative results can be obtained.[1]

The standard core questionnaire section on contraception has been substantially modified in the TDHS for the explicit purpose of permitting analysis of the initiation of contraceptive use. Questions were added to provide information on the first post marital method used, whether contraception was practiced before the first pregnancy and, if so, how long after marriage use was first initiated. When answers to these questions are combined with the information provided by standard core questions on the number of living children the respondent had at the time of first use, whether or not the respondent wants more children, and the respondent's preferred number of children, it is possible to examine in some detail first use of contraception in relation to the couple's stage in their family building process. Moreover, respondents who first used contraception for spacing purposes can be distinguished from those who started to practice only after their desired family size was reached or exceeded.

Other modifications in the questionnaire provide information permitting a thorough analysis of initiation of contraceptive use following childbirth. In particular, the questions incorporated in the TDHS allow determination of the first method used following the birth of the most recent child and the timing of

its use relative to childbirth and the return of menses.[2] For example, respondents were asked directly whether or not the first method used since last childbirth was adopted after menses returned and if so, how long after. Thus the TDHS is unique among the international series of Demographic and Health Surveys in providing detailed data on a variety of aspects of contraceptive initiation patterns.[3]

First Contraceptive Use

The stage of family building at the time contraception was first used can be inferred by comparing the number of living children that the respondent had at the time of first use with her current stated preferred family size. Respondents who indicate that they had fewer living children at the time of first contraceptive use than their preferred number presumably initiated contraception as a means to space births (i.e., delay the next pregnancy) while those whose living children at the time of first use equalled or exceeded their preferred number presumably began use to limit family size (i.e., to prevent further births entirely). Determination of the stage of family building and intended purpose of use in this way is admittedly inferential since respondents were not directly asked about their motivations for practicing contraception at time of first use. Some error is thus to be expected in classifying respondents since the preferred number of the children that respondents indicate at the time of the survey may differ from the number that they preferred at the time of first use. For example, some women may have increased their preferred number as an ex post facto rationalization of having children who were unintended at the time of pregnancy while others may have lowered their preferred number in response to changes in circumstances since the time of first use or in accordance with the general trend towards smaller family size preferences that has occurred during the last decade and a half (Knodel, Chayovan and Frisen, 1988). Nevertheless, the classification should be roughly correct.

The percent distribution of respondents according to the inferred stage of family building at the time of first contraceptive use is shown in Table 1 including, as a separate category, those who never used contraception. Results are presented according to the number of years since first marriage.[4] The percentage of women in any particular marriage cohort who could initiate first contraceptive use after attaining their preferred family size is necessarily constrained by the proportion who had attained their preferred number of children by the time of the survey. Thus this percentage as well as the mean preferred number of children are also shown. As would be expected, the percentage who attained their preferred family size increases rapidly with marriage duration. For example, only 11 percent of women married 0-4 years have already attained their preferred number compared to 81 percent of those married 20 years or more. In interpreting the results of Table 1, this constraint needs to be taken into account. In addition, the mean preferred family size increases with marriage duration, probably reflecting a combination of ex post facto rationalization of actual fertility and trends over time in the preferred number of children.

The results shown in Table 1 suggest that a major transformation in the pattern of initiation of first contraceptive use has occurred over the course of Thailand's fertility transition. A clear shift over the course of the last several decades from initiating contraception for the purpose of limiting to initiating for the purpose of spacing is clearly evident. Women who married 20 or more years ago are far more likely than any more recently married cohort to have first use contraception only after exceeding their preferred number of children and far less likely to have initiated contraception before attaining their preferred number. In addition, except for the most recently married women, among whom many non-users will initiate contraception in the future, women married 20 or more years ago are most likely to have never used contraception. In contrast, for the more recent marriage cohorts, initiation of contraceptive use prior to attaining the preferred family size, and thus presumably for spacing purposes, has become very common.

Among women first married 5-9 years ago, almost three-fourths used contraception prior to achieving their preferred number of children and among the most recently married women, two-thirds had already started using contraception before attaining their preferred number of children. The percentages will undoubtedly increase in the future for these cohorts since they are still predominantly at early stages of family building as indicated by the low percentages who had already achieved their preferred family size.

Evidence of a major shift in the pattern of initiation of first contraceptive use in relation to the process of family building is also evident in Table 2 which examines the timing of first use relative to the birth of the first and second child for women with at least two children and married at least 5 years. Again results are presented according to marriage cohort. By excluding women with fewer than two children from the analysis, complications of interpretation arising from the fact that different cohorts are at different stages of family building are effectively avoided. Moreover, the vast majority of Thai women both prefer and expect to have a minimum of two children and this has not changed over the course of Thailand's fertility transition (Knodel, Chayovan and Frisen, 1988). Thus the large majority of women who use contraception before their second child can be safely assumed to have done so for spacing purposes. Women married less than 5 years are omitted from the analysis because, given their limited exposure time to the reproductive process, those who already had two children would be self-selected with respect to a low likelihood of contraceptive use prior to having a second child and would therefore provide a distorted picture of the cohort's eventual pattern of first contraceptive use.[5]

A clear trend toward initiating contraception earlier in the family building process is evident in the results in Table 2. The more recent the marriage cohort, the higher the percentage of women who initiated contraceptive use when they had no child or when they had only one living child and the lower the percentage who waited until the second birth to use contraception. In addition, older marriage cohorts are more likely to have never used contraception.

The shift in the pattern of first contraceptive use in Thailand reflects at least in part the relatively sudden nature of the spread of contraception which in turn is almost certainly the result of the massive increase in availability of contraception associated with the establishment of the National Family Planning Program during the late 1960s and early 1970s. Many women in the older marriage cohorts had already attained or exceeded their preferred number of children by the time the program reached them and thus if they initiated contraceptive use, it would necessarily be to prevent further childbearing.[6] As contraceptive practice became widely available and commonly used, and the concept of fertility regulation became commonplace, contraception became extensively used for both birth spacing and limiting. Under these conditions, first contraceptive use was initiated before the preferred number of children was attained, at a stage when the women were still at low parities or had yet to begin childbearing.

Contraceptive initiation prior to first pregnancy

The extent to which post-marital contraceptive use is initiated before the first pregnancy is of particular interest in connection with the study of contraceptive initiation. Marital reproductive activity can be considered to be under full deliberate control once contraception is practiced by a significant proportion of couples to limit family size, to space between births, and to delay the start of marital childbearing. While a universal pattern may not hold for all societies, as contraception becomes widespread, one typical pattern may be that use of contraception for delaying the start of childbearing within marriage remains the last aspect of full control to take hold. Under such circumstances, the extent to which married couples initiate contraception prior to the first pregnancy can serve as an indicator of how advanced a population is in terms of the process through which full deliberate control over marital reproduction becomes firmly established.

Table 3 summarizes responses to the special questions added to the TDHS that asked respondents if contraception was practiced after marriage but before the first pregnancy and, if so, how long after marriage contraception was first used.[7] Results are shown according to marriage cohort. Also indicated is the percent who ever practiced contraception. Clear trends are evident. Despite the fact that a substantial majority of each marriage cohort has used contraception, initiation of contraception to delay the start of childbearing was virtually absent among the oldest marriage cohort and has become quite common only among the more recent cohort. For women who first married less than five years prior to the survey, 42 percent had initiated contraceptive use prior to becoming pregnant compared to only 1 percent of women married 20 or more years before the survey. Moreover, the mean delay before initiating use among women who used before their first pregnancy has decreased steadily. Among the most recently married women who used contraception before the first pregnancy, the vast majority had done so within one or two months of marriage and the mean delay was only one month.

The persistent increase in the tendency to delay the start of childbearing within marriage in Thailand over recent decades is evident in Figure 1 which shows two year moving averages of the percent initiating contraceptive use prior to the first pregnancy for single year marriage cohorts. From the late 1960s on, when contraceptives first became widely available through the establishment of the National Family Planning Program, a steady trend of increase ensued.

Table 4 indicates the percentage initiating contraception prior to the first pregnancy according to marriage cohort and selected background characteristics (rural-urban residence, region and education.)[8] A marked and steady increase between the older and the more recent marriage cohorts is apparent in every category. For no group was it common for women married 20 or more years ago to practice contraception before the first pregnancy, although women with a secondary or higher education are noticeably more likely to have done so than women in any other category. For women married less than five years before the survey, pronounced rural-urban, regional and educational differentials are apparent.

Delaying the start of marital childbearing is substantially more common among recently married rural than urban women and was the case for earlier marriage cohorts as well. Regionally contraceptive use before the first pregnancy for the most recent cohort is highest in the north followed by Bangkok and the remaining central region and far less common in the northeast and the south. This corresponds to the timing of the rise in overall contraceptive prevalence in as much as the northeast and, even more so, the south lagged behind the other regions (Knodel et al., 1982). At present, both regions are characterized by below average overall contraceptive prevalence although proportionately less so than the percentages using before the first pregnancy would indicate.[9] Education shows a positive association with the percent initiating use prior to the first pregnancy. Women with secondary or higher education are characterized by substantially higher percentages than either of the two lower educational categories. Better educated women are also a group that led in the adoption of contraception in the early stages of the rise of contraceptive use although at present educational differentials are minimal (Knodel et al., 1982; Chayovan, Knodel and Kamnuansilpa, 1988).

Comparison of contraceptive initiation patterns among different ethnic groups in Thailand is also of interest since there is considerable evidence that several ethnic groups are distinctive in their reproductive behavior. In general, the Thai population can be considered relatively homogeneous culturally, at least with respect to religion and language. Of the total weighted TDHS sample of ever-married women, 88 percent are Thai-speaking Buddhists. The remainder are either a minority in the sense of religion, language or both and to varying degrees are culturally distinct. Even among Thai-speaking Buddhists some cultural differences exist associated with the four major Thai dialects: Central Thai which is the predominant dialect in Bangkok, the central region and the lower (southern) north; Lao which is the predominant dialect of the northeastern region and several fringe areas in the north and the central region; Northern Thai which is the predominant dialect in the upper north, and Southern Thai which predominates in the south (Brown, 1966).

The TDHS sample was unusually dispersed geographically, incorporating clusters in almost all provinces. As a result, respondents from all major dialect groups and a variety of ethnic minorities, many of whom are concentrated in relatively local areas, were interviewed. Although the TDHS sample was not designed for estimating parameters for ethnic minorities and the number of respondents interviewed for some is quite small, results referring to them are suggestive. [10]

In considering the definition of culturally distinctive minorities, it is useful to take into account both religion and language. Moslems, who represent about 4-5 percent of the population, are the only religious group other than Buddhists of any substantial size and are considered by the majority Buddhists as well as by themselves as being culturally distinctive. Indeed, Moslems differ considerably from the majority Buddhists in terms of their reproductive behavior and attitudes (Knodel, Chamratrithirong and Debavalya, 1987). Moslems themselves are divided into two linguistic groups: native Thai-speakers and Malay-speakers. The latter are concentrated in several southern provinces bordering on Malaysia while Thai-speaking Moslems are divided mainly between the south and the central region including Bangkok. Christians are few in number and little research has been conducted to determine if they have a strong sense of cultural identity or if their reproductive patterns are distinctive.

Although the various hill tribes are quite distinctive from each other both linguistically and culturally, they are treated as a single group in the present analysis because of their limited numbers in the sample. Besides hill tribes and Malays, the one other linguistic group identified for the purpose of the present analysis are Cambodians, who are located in the northeastern provinces bordering Cambodia.[11]

Table 5 indicates the percentage of ever-married women who initiated contraceptive use prior to the first pregnancy according to religio-linguistic ethnicity. Results are shown for all marriage cohorts combined as well as for the women married less than five and less than ten years. By grouping together women who first married during the ten years prior to the survey, the problem of insufficient cases on which to base a relatively recent measure for several of the ethnic minority groups can be partially overcome.

Among the Thai-speaking Buddhist majority, pronounced differences are apparent according to dialect. Most striking is the fact that 81 percent of recently married Northern Thai speakers have initiated contraception prior to the first pregnancy. This finding is consistent with the extremely high current contraceptive prevalence among this dialect group generally. According to the TDHS, 80 percent of currently married northern Thai speaking women age 15-44 are currently practicing contraception compared to the national average of 68 percent (Chayovan, Knodel and Kamnuansilpa, 1988). In addition, the upper north, where the group is located, is noted for being the leading area in the decline in fertility and early widespread acceptance of contraception as well as currently low levels of fertility (e.g., Pardthaisong, 1986). Northern Thai dialect speakers are clearly at an advanced stage of marital fertility control. In sharp contrast are recently married Lao and Southern Thai dialect speakers, among whom only 30 percent have initiated contraception before the first pregnancy. This conforms with the relatively lagging position of the northeast and south, the regions where these two groups are located, in the spread of contraception generally (Knodel et al., 1982).

Contraceptive use prior to the first pregnancy varies considerably among the religio-linguistic ethnic minorities as well. Overall, Moslems are characterized by a considerably lower percent postponing the start of marital childbearing than are Thai-speaking Buddhists. Sharp differences among the Moslems, however, are apparent. Among Malay-speakers, contraceptive initiation before the first pregnancy is virtually absent, even for the most recently married women. Thai-speaking Moslems in the south are also characterized by low percentages using contraception before the first pregnancy, although the percentage is somewhat higher than for the Malay-speakers. However, Thai-speaking Moslems outside the south are characterized by far higher levels of contraceptive initiation before the first pregnancy and indeed are quite similar in this respect to recently married women overall in Bangkok and the remaining central region where they are concentrated (see Table 4).

The differences among the various groups of Moslems is consistent with differences in overall current contraceptive prevalence among currently married women aged 15-44 which is lowest (18 percent) among Malay-speakers, somewhat higher (30 percent) among Thai-speakers in the south and by far highest (59 percent) among Thai-speakers outside the south (Chayovan, Knodel and Kamnuansilpa, 1988).

Among the remaining groups shown, contraceptive initiation to delay the start of childbearing is relatively common among recently married Thai-speaking Christians, who resemble the majority Thai-speaking Buddhists in this respect. In contrast, both Cambodians and hill tribes are considerably less likely to have initiated childbearing prior to the first pregnancy than the majority population.

Table 6 examines the method of contraception first used according to whether use was first initiated to postpone the start of childbearing, to space between births, or to limit family size. Among respondents who initiated use prior to the first pregnancy, almost three-fourths started with oral contraceptives. Use of less efficient methods, mainly the condom, periodic abstinence, and withdrawal, although not common as the first method at any stage of use, are nevertheless more commonly chosen as the first method for those who are delaying the start of childbearing and least common as the first method for those who first initiate contraceptive use to prevent further births. Not surprisingly, male and female sterilization, are not adopted by those who initiate use before the first pregnancy but become relatively common as the first method when contraception is initiated to limit family size. The small proportion of respondents who start contraceptive

use with permanent methods before reaching their stated preferred number of children probably reflects the imprecision discussed above in the determination of the stage of family building at first use. Nevertheless, the fact that the proportion who indicated sterilization as their first method among respondents classified as not yet reaching their predefined family size at the time of first use is an encouraging sign that the amount of measurement error is reasonably low.

Contraceptive Initiation Following Childbirth

Although it is now becoming common in Thailand for married couples to start using contraception before the first pregnancy, most couples practicing contraception at any given time already have children and thus necessarily initiated their current episode of contraceptive use subsequent to the birth of their most recent child. An analysis based on the 1984 CPS3 indicated that the large majority of Thai women initiate contraception soon after giving birth but that the pattern of initiation differs according to the method used. Most sterilized women undergo the operation immediately following childbirth while women adopting temporary methods appear to wait for menses to return before starting to contracept (Knodel and Kamnuansilpa,1988). The analysis of the CPS3 data is handicapped, however, by the fact that the time to initiation of use had to be limited to the current method (as opposed to the first method since childbirth). This resulted in overestimating the time of initiation of first use in cases where the respondent switched methods and missing the initiation of use among those who started to use a method but then discontinued sometime during the period since childbirth. In addition, CPS3 did not include a direct question on the timing of use in relation to the return of menses. Thus the analysis had to rely on a comparison of the reported number of months to return and the reported duration of current contraceptive use to determine the relationship between contraceptive initiation following childbirth and return of menses. As discussed in the section on the source of the data, both of these problems are overcome by the design of the TDHS questionnaire.

Through the application of life table methodology to women who have had their most recent birth during some specified period prior to the survey, it is possible to estimate the proportion of women who have initiated contraception by successive periods of time since childbirth. The duration of the period prior to the survey covered by the analysis, however, has potential implications for the results. For example, a trend over time towards increasing contraceptive initiation subsequent to childbirth, as is likely to be the case in Thailand, would influence results. Under such circumstances, the closer the specified period under consideration is to the survey, the higher the level of initiation that would be indicated. On the other hand, extending the duration of the period under consideration creates a progressive influence in the opposite direction because there is a tendency for women with more extended open intervals to be self-selected for being effective contraceptive users. Women who do not initiate contraceptive use or are ineffective users are more likely to become pregnant sooner and have another birth and thus to be under-represented among women with longer open birth intervals at the time of interview.

Table 7 indicates the cumulative proportion of women estimated as having initiated contraception by elapsed months since last giving birth based on women whose last birth occurred during periods of different specified durations preceding the survey. The results indicate that, in fact, the selection of the period on which the analysis is to be based makes little difference in the results, at least within the range of the specified periods shown.[12]

In general, the proportion initiating contraception by any particular number of months since childbirth increases modestly as the base group of women incorporated in the analysis extends from those whose most recent birth occurred within the 12 month period preceding the survey to those whose most recent birth occurred within a 36 month period. Thereafter, however, it decreases modestly as the base group of women is further expanded to include those whose most recent birth occurred within a 60 month period. For example, the proportion who initiated contraception within six months of childbearing increases from .55 to .60 as the period on which this calculation is based extends from 12 to 36 months and then decreases to .58 when all women with a birth in the prior 60 months are considered. This pattern undoubtedly reflects the two countervailing influences described above. Initially, as the period under consideration is expanded, the effect of self-selection of contraceptive users associated with longer open intervals predominates but as

the period under consideration is further extended, the effect of a likely trend over time toward rising levels of initiation predominates.

The subsequent analyses focus on women whose last birth occurred during the 48 months preceding the survey. The choice of a 48 month reference period has the advantage of including a larger number of women on which to base the analysis than would be the case if a shorter period were chosen but also ensures that the analysis reflects relatively recent experiences. In any event, the results of Table 7 make clear that regardless of the reference period chosen, contraceptive initiation following childbirth is both extensive and rapid in Thailand.

Method specific estimates, in reference to the first method adopted following childbirth, as well as estimates for all methods combined, are presented in Table 8 based on women whose most recent birth occurred within 48 months preceding the survey.[13] A comparison of female sterilization and other methods is also shown graphically in Figure 2. For all methods combined, the results indicate that half of all women initiate contraceptive use within four months of childbirth. By the end of the first year almost three-quarters have initiated contraception and by the end of the second year 85 percent have done so.

The timing of initiation is quite different for female sterilization compared to other methods. When female sterilization is the first method used after childbirth, it takes place almost exclusively during the immediate postpartum period, reflecting the tendency for women to undergo sterilization following delivery while still in the hospital. By the end of the first postpartum month, 18 percent of women are already sterilized. Initiation of other methods is not linked to the immediate postpartum period but occurs at a substantial pace throughout the first year or so following childbirth. Thus initiation of combined methods other than sterilization increase from 3 percent by the end of the first month to one third of women by the end of the fourth month and to two thirds of women by the end of the first year.

The preceding analysis focused on the first method used following childbirth. As a permanent method of contraception, however, sterilization is necessarily the last method adopted by any particular couple. The vast majority of women who eventually become sterilized initiate sterilization immediately following childbirth. Only a small number first practice a temporary method following their last childbirth and then later switch to sterilization. For example, among currently sterilized women whose most recent birth occurred within the preceding 48 months, only 2 percent practiced some temporary method subsequent to the birth but before becoming sterilized. However, among the few women whose husband was vasectomized, 31 percent practiced some temporary method before the husband underwent a vasectomy.

In Thailand, female sterilization is almost exclusively performed in hospitals, primarily government run ones. Among all sterilized women interviewed in the TDHS, 90 percent reported that their sterilization took place in a government hospital and most of the remainder reported that they were sterilized at a private hospital (Chayovan, Knodel and Kamnuansilpa, 1988). A substantial proportion of births also take place in hospitals. According to the TDHS, 51 percent of births delivered in the previous 5 years occurred in hospitals, 11 percent in health stations or clinics, and almost all of the remainder at home. Since most female sterilization occurs during the immediate postpartum period, the place of delivery is likely to be related to the timing and method of contraception initiated following childbirth.

Table 9 presents life table estimates of the cumulative proportion of women who initiated contraception by elapsed months since childbirth according to the place of delivery. For all methods combined, initiation levels are higher among women delivering in hospitals and lowest at most durations following childbirth in women who deliver at home. Initiation of female sterilization is far higher for women delivering in hospitals than those delivering elsewhere. This accounts for most of the difference in overall initiation rates between women delivering in hospitals and those delivering at other health facilities as revealed by the comparison between initiation levels for methods other than female sterilization. Women delivering at home, however are characterized by lower initiation rates even when sterilization is excluded. For example, by six months following childbirth, only 30 percent of women who delivered at home had initiated use of some method other than female sterilization compared to 47 percent of women who delivered in hospitals and 46 percent who delivered at a health station or clinic.

While more extensive analysis would be required before any firm conclusion could be drawn about the actual influence of place of delivery on contraceptive initiation following childbirth, the very strong association between hospital delivery and female sterilization is very likely to be direct and operate in two directions. A decision before delivery to undergo postpartum sterilization undoubtedly leads some women to deliver in a hospital specifically for this purpose. At the same time, the easier accessibility to postpartum sterilization for women delivering in the hospital and the possible encouragement of hospital staff undoubtedly increases the likelihood that a woman will decide to undergo the operation at the time of delivery even if she had not made such a decision in advance.[14]

Contraceptive use patterns differ considerably according to religio-linguistic ethnicity in Thailand. Both the level of contraceptive prevalence and, as shown above, the probability of initiating contraceptive use prior to the first pregnancy differ substantially among the different ethnic groups (Chayovan, Knodel, and Kamnuansilpa, 1988). As the results presented in Table 10 show, contraceptive initiation following childbirth also varies considerably according to ethnicity. The Thai-speaking Buddhist majority overall is considerably more likely to initiate contraception relatively sooner after childbirth than the other groups shown. For example, over 60 percent of Thai-speaking Buddhists have initiated contraception by the sixth month following delivery compared to only one third of Moslems and Cambodians and less than half of the hill tribe women. However, considerable variation is also evident among the Thai-speaking Buddhists according to the dialect group to which they belong as well as among the categories of Moslems shown.

Contraceptive initiation following childbirth among Thai-speaking Buddhists is highest for northern Thai-speakers reaching 85 percent by six months following childbirth and a remarkable 94 percent by the end of a year. In contrast, southern Thai speakers initiate contraception at a distinctly lower frequency than other dialect groups. Extremely low levels of contraceptive initiation following childbirth characterize Malay-speaking Moslems and generally low frequencies characterized Thai-speaking Moslems in the south. However, contraceptive initiation is quite high among Moslems living outside the south, with levels resembling central Thai-speaking Buddhists, amongst whom they generally reside.

Subsequent to childbirth, women typically do not experience the immediate return of menses but rather a period of postpartum amenorrhea, the duration of which is substantially influenced by the duration and intensity of breastfeeding (McCann et al., 1981). Estimates based on the TDHS indicate that the median duration of postpartum amenorrhea for Thai women is approximately five months (Chayovan, Kamnuansilpa, and Knodel, 1988). If ovulation occurs during the period of postpartum amenorrhea, menses virtually always follows within two weeks unless conception occurs first. Typically the proportion of women who conceive prior to the return of menses is quite small, not only because such women are at risk for only one cycle prior to when menses would return, but also because a substantial proportion of women remain anovulatory after the return of menses (McCann et al., 1981; Anderson, 1983:28; Gray et al., 1986). A recent study based on a small sample of Bangkok women found that for less than half, ovulation preceded the return of menses after childbirth (Israngkura et al., forthcoming).[15]

Since the proportion of women who have not yet resumed ovulation following the return of menses declines rapidly with each subsequent menstrual cycle, the return of menses serves as a reasonably accurate indicator of the time when a woman is first at risk of pregnancy following childbirth. Hence information on the initiation of contraception relative to the return of menses is of particular interest given that it more directly reflects the extent to which women remain unprotected from the risk of pregnancy than does information on contraceptive initiation according to the number of months since childbirth.

Since female sterilization in Thailand is predominantly performed during the immediate postpartum period, its initiation virtually always precedes the timing of the return of menses. The fact that the return of menses serves as an important stimulus for the initiation of other methods, however, is clearly apparent in Table 11, which summarizes responses to direct questions about the timing of first contraceptive use since childbirth in relation to when menses first returned. Over half of the women who initiated some method other than sterilization as their first method following childbirth did so within the first month after the return of menses, and generally within the first week. This compares to only slightly more than one fifth who initiated during the entire period before menses returned. In sharp contrast, almost all women who underwent sterilization as their first method since childbirth did so before the return of menses.[16]

The fact that many women wait until the return of menses before initiating contraceptive methods, especially pills and injectables, may reflect in part policies and practices of the Ministry of Public Health. Government health personnel, who provide a large share of oral and injectable contraceptives, are trained to instruct clients to start pill use on the fifth day after menses begins. This is likely to affect the timing of disbursement of pills to clients as well as the instructions given at the time of disbursement. Likewise, providers may be reluctant to start a woman on injectables unless there is some certainty that the woman is not pregnant. The return of menses could serve this purpose.

Application of life table methodology permits estimation of the cumulative proportion initiating contraceptive use by successive months following the return of menstruation.[17] To the extent that the return of menses signifies the resumption of ovulation, the proportion who have not initiated contraception subsequent to the return of menses indicates the proportion of women who remain at risk of a pregnancy. Results presented in Table 12 are shown for all methods combined as well as for female sterilization separately and for all other methods excluding female sterilization combined. The importance of the return of menses as a major prompt for the initiation of contraceptive methods excluding female sterilization is clearly apparent.

Based on all methods, including sterilization, approximately one third of women initiate contraception during the period prior to the return of menses and fully another third do so during the first month following the return of menses. When methods other than female sterilization are examined, the results show an even more pronounced increase in initiation associated with the period immediately following the return of menses. Only 14 percent of women adopted methods other than sterilization prior to the return of menses compared to the 46 percent who had adopted by the end of the first month following menses' return. If sterilization is included, almost two thirds of women are protected by the first month following the return of menses and close to three quarters are protected by the third month. Thus most Thai women are protected by contraception relatively soon after becoming at risk of pregnancy following childbirth.

Life table estimates of contraceptive initiation following childbirth are presented in Table 13 according to a series of background characteristics. Results are shown both in relation to the number of months since childbirth and the return of menses. With respect to the latter, results are presented for the total sample and, in addition, for the Thai-speaking Buddhist majority.

Differences in the extent and timing of contraceptive initiation in relation to the number of months since childbirth are apparent within the total sample for most of the background characteristics presented. A considerably more rapid initiation is apparent for urban than rural women with the result that a substantially higher proportion of urban women adopt contraception by three or six months after childbirth than is the case for rural women. The difference diminishes somewhat by the end of the first year. Regionally, contraceptive initiation appears to be most rapid in Bangkok, although by 12 months following childbirth there is little difference in the proportion who have initiated contraceptive use among those in Bangkok, the remainder of the central region, and the north. Initiation of contraception is clearly slower and remains at lower levels throughout the first year in the northeast and, to an even more pronounced degree, in the south.

Women with secondary education adopt contraception most rapidly after childbirth while those with three years or less of schooling do so least rapidly. Current work status also shows a substantial relationship to the pace of contraceptive initiation following childbirth with women who are working characterized by higher levels of initiation than those who are not working. Finally, desire for additional children shows a pronounced association with the pace of contraceptive initiation following childbirth. Women who want no more children initiate contraception considerably earlier than those who do not want more. This is attributable in large part to the fact that only women in the latter category undergo sterilization and do so almost exclusively during the immediate postpartum period. The difference between these two categories diminishes fairly rapidly within the first year following childbirth reflecting the widespread use of contraception for spacing births as well as for limiting family size.

Many of these same background characteristics are associated with differences in the duration of postpartum amenorrhea. As a result, the differentials in contraceptive initiation as related to the number of months since childbirth do not necessarily reflect differences in the extent to which these background characteristics are associated with remaining unprotected against the risk of pregnancy. For example, the mean duration of postpartum amenorrhea is substantially shorter for urban women than for rural women, for women in Bangkok than for women in other regions, and for women with secondary or higher education compared to women with lesser education (Chayovan, Kamnuansilpa and Knodel, 1988). Thus a rather different pattern of differentials is evident when contraceptive initiation is related to the return of menses rather than months since childbirth.

Based on the total sample, when contraceptive initiation is related to the return of menses, the contrast between rural and urban women is substantially reduced as is the difference between Bangkok and other regions and the contrast between women with secondary schooling or above and those with lesser education. Indeed, contraceptive initiation in relation to the return of menses is more rapid in the north than in any of the other regions including Bangkok. The difference between the northeast and regions with more extensive levels of initiation is also reduced considerably. However, the south remains distinctive with respect to substantially lower rates of contraceptive initiation even when initiation is related to the return of menses. Differences still persist between working and nonworking mothers and between those desiring more children and those not wanting any more. The differences, however, are generally less pronounced in relation to return of menses than in relation to time since childbirth.

As noted above, the various minority groups in Thailand are characterized by distinctive contraceptive initiation patterns. These groups are not distributed randomly, however, either geographically or in relation to many other background characteristics. As a result, they can potentially exert a compositional influence on the extent of apparent differentials in the pace and level of contraceptive initiation after childbirth with respect to these characteristics. Thus it is of interest to examine the association between contraceptive initiation and background characteristics separately among the majority Thai-speaking Buddhists, the group that constitutes the relatively culturally homogeneous core of the Thai population.

Restriction of analysis to the Thai-speaking Buddhist majority further diminishes some of the differentials under examination. Among the majority population, virtually no difference is apparent between rural and urban women in terms of contraceptive initiation in relation to return of menses. In addition, the north stands out even more clearly as the region with the most rapid initiation of contraceptive use. For the south, contraceptive initiation among the Thai-speaking Buddhists is substantially more rapid and at a higher level when minorities are excluded from the analysis than when minorities are included. This is largely because of the substantially lower levels of initiation among Moslems who represent a considerable proportion of the south's population.

Educational differentials are also diminished further when limited to Thai-speaking Buddhists. The reason for this is that those minority groups which are characterized by lower initiation levels, such as Moslems and hill tribes, are also ones which are disproportionally concentrated among the least educated women. Restricting consideration to Thai-speaking Buddhists only modestly affects the differences in contraceptive initiation evident according to work status and desire for additional children. However, it increases slightly the levels of initiation for each of the categories. Judging from the very substantial levels of contraceptive initiation by the end of the first month following the return of menses among those women who want no more children, few women among Thai-speaking Buddhists remain exposed to the risk of an unwanted birth once the risk of pregnancy returns. Moreover, even among women who want additional children, only a minority do not initiate contraceptive use shortly after the return of menses, clearly signifying their intention to space future births.

Overall the findings on initiation of contraception following childbirth in Thailand provide further testimony to the maturing of the transition from natural fertility to full fertility control that has been taking place. Previous studies examining contraceptive prevalence levels in Thailand have commented on the remarkable pervasiveness of changing reproductive behavior with respect to socioeconomic groupings (Knodel, Chamratrithirong, and Debavalya, 1987; Chayovan, Knodel, and Kamnuansilpa, 1988). Contraceptive initiation patterns further confirm the pervasiveness of reproductive change. When contraceptive initiation among the

culturally homogeneous Thai-speaking Buddhist majority is related to the return of risk of pregnancy, as signified by the return of menses, there is little difference in the rapid and extensive adoption of contraception with respect to rural-urban residence or education, two fundamental socioeconomic dimensions. While some differences still persist with respect to region of residence, these may well reflect more of a cultural dimension than differences in socioeconomic conditions. Likewise the distinctive patterns among religio-linguistic minority groups underscore the importance of the cultural context in contrast to socio-economic characteristics in conditioning reproductive behavior in Thailand at this point in time.

Thus both contraceptive prevalence levels and initiation patterns suggest that Thailand's reproductive revolution has taken firm hold throughout the core of Thai society.

Conclusions

There is unlikely to be a single universal path all societies follow with the respect to the evolution of contraceptive initiation patterns within marital unions as contraceptive use becomes widespread within the population. Nevertheless, one common path may well involve an initial stage during which contraception is first adopted primarily after a couple reaches its desired family size reflecting a stronger motivation to limit family size than to space births. As deliberate control of fertility becomes more common, couples attempt to space births and initiate first contraceptive use after childbearing has begun but before the desired family size is reached. Finally, full control is achieved when the most common timing for first contraceptive use occurs prior to the first pregnancy. In brief, a shift occurs in the predominant pattern of contraceptive initiation from initiation for primarily limiting births, to initiation for spacing between births, and finally to the initiation for the purpose of delaying the start of childbearing. Moreover, each successive stage encompasses the preceding one: couples who initiate contraception to space between births will also use contraception to limit family size while those who initiate to delay the start of childbearing will also practice contraception to space between births and to limit the number of children.

Results from the TDHS documenting the patterns of contraceptive initiation in Thailand appear to be consistent with such an overall pattern and suggest that the transformation may occur quite rapidly. At present, very few couples in Thailand fail to initiate contraception prior to the end of their reproductive span. The vast majority also practice contraception before they achieve the number of children they wish to have. Moreover, contraceptive use is initiated rapidly after childbirth with few couples, even among those who intend to continue childbearing, leaving themselves exposed to the risk of pregnancy without some deliberate delay for spacing purposes. In addition, there has been a steady and rapid rise in the percentage of married women who initiate first contraceptive use before their first pregnancy. Clearly Thailand is rapidly approaching a stage of full fertility control where most couples will deliberately chose the time that childbearing begins following marriage, deliberately decide on the timing of the birth of each of their children, and deliberately limit the number of children they have to some family size they choose as appropriate.

NOTES

1 In the present study, all results presented have been weighted. References to number of cases, however, are in terms of unweighted cases. Although the number of cases on which each table is based is not presented, results based on 20-49 unweighted cases are specifically indicated as such and results based on less than 20 unweighted cases are not shown.

2 It is not possible with the standard DHS core questionnaire to determine either the first method used since childbirth or its timing in cases in which a women used more than two methods since childbirth. In addition, no questions directly asking about the timing of use relative to the return of menses are included.

3 It should be noted that it is not possible with the TDHS data to examine use of contraception prior to marriage. Single women were not included in the sample and no questions specifically about use prior

to marriage were included. Moreover, although questions were asked about first use relative to the number of living children, no respondent explicitly indicated that she was married (for the first time) after having a birth. Those few respondents who volunteered that they had been already practicing contraception before marriage in response to a question on how soon after marriage contraception was first used are treated as having started contraception at the time of marriage.

4 Since only ever-married women in the ages 15-49 at the time of the survey were interviewed, marriage cohorts are progressively censored with respect to age at marriage the further back in time the cohort originates. Thus women who were aged 40 or over at the time of first marriage and who married 10 or more years ago will not have been included in the sample because they were past age 49 at the time of the survey. The effect of such censoring is likely to be minimal in the context of the present analysis since the vast majority of Thai women marry for the first time before age 30 and only marriage cohorts married before 20 or 25 years are differentiated from each other in the tabulations.

5 Such a bias may also affect the 5-9 years marriage duration group,although considerably less so. To the extent such a bias is operating, it would decrease the proportion of women in this cohort who practiced contraception before the second birth.

6 In Thailand there was little practice of contraception prior to the introduction of modern methods which occurred largely through the National Family Planning Program. In particular, neither abstinence nor withdrawal were practiced to any significant extent during the recent past and indeed any traditional repertoire of fertility regulating methods appears to be largely lacking. For evidence on this point as well as a description of the National Family Planning Program see Knodel, Chamratrithirong and Debavalya, 1987, Chapters 6 and 9.

7 The percentage of women using before the first pregnancy can be roughly determined from information on the percent of women who had no living children at the time of first use based on responses to the question in the standard core DHS questionnaire on the number of living children at the time of first use. However, such a measure would slightly overestimate the percentage using before first pregnancy since it would include women who used after a miscarriage but before the first live birth occurred as well as women who used after having given birth to a first child that did not survive until the time use was initiated. Based on the total TDHS sample (weighted), the percent who first used before becoming pregnant is 17.7 percent compared to 18.6 percent of women who had no living children at the time of first use.

8 Due to changes in the educational system over the lifetime of respondents, it is not a straightforward matter to equate years of schooling and level completed. Most significantly, compulsory primary education was raised from four to six years. Thus all respondents in the 0-3 years category have less than the minimum compulsory education. Most respondents with four or six years have typically completed compulsory primary and whether they terminated their education at four or six years is determined mainly by which system they studied under. Thus 4-6 years can be treated as largely made up of persons who have completed compulsory primary education (but did not go beyond). In addition, during part of the period during which respondents were in school, primary education was divided into a compulsory lower level of 4 years and a non-compulsory upper level consisting of 5th through 7th grade. Respondents who graduated 7th grade under this system are included with the 4-6 years of education category.

9 The percentages of currently married women aged 15-44 who are currently practicing contraception according to the TDHS are 67 in Bangkok, 71 in the remainder of the central region, 75 in the north, 67 in the northeast, and 52 in the south (Chayovan, Kamnuansilpa and Knodel, 1988).

10 In addition to problems of estimation associated with small numbers, the respondents for several ethnic groups are highly clustered, in some cases being based on only a few sample villages or urban blocks. Thus high sampling variance will be associated with estimates for these groups.

11 In constructing the religio-linguistic classification of ethnicity utilized in the present analysis, linguistic characteristics of non-Thai dialect speakers took precedence over religion. However, with the exception

of hill tribes, there was rarely conflict between these two criteria. All Malay speakers are Moslems and almost all remaining Moslems interviewed speak one of the Thai dialects. All Cambodians identified by language are Buddhists. A substantial proportion of Christians are members of hill tribes, however, and in these cases it is likely that hill tribe membership is a more important determinant of cultural identity than religious affiliation.

12 One of the objectives of the present study is to calculate life table estimates of contraceptive initiation in relation to the return of menses. In order to do this it is necessary to incorporate information on the duration of the period from last birth to the return of menses. This information was collected in the TDHS only from women whose last birth occurred during the last five years (i.e., since January 1982). Thus there is little point in the context of the present study to explore the role of contraceptive initiation since childbirth based on periods longer than five years.

13 When specific methods are considered, two types of life table estimates can be made: gross and net estimates. Gross estimate relate acceptance of a specific method to all women still in observation regardless of whether use of an alternative method has been initiated. In the calculation of net estimates, women are removed from observation for a specific method at the point at which use of an alternative method is initiated and thus net estimates represent the probability of initiating use of a specific method only among those women who have yet to initiate use of any contraceptive method. Net estimates necessarily yield higher estimates of the proportion initiating use of any specific method since in effect the numerators (number initiating use each month) remain the same as in the calculation of gross estimates but the denominators (number at risk each month) are reduced. The present analysis relies on gross estimates.

14 A recent analysis of the situation in Mexico found an association between several types of modern health care, including assistance at delivery by a doctor or nurse, and higher use of modern contraception following childbirth, even after introducing a number of statistical controls for potentially confounding influences (Potter, Mojarro and Nunez, 1987). The authors argue that professional health personnel are favorable towards longer birth spacing and low fertility and therefore encourage women to adopt contraception, including temporary methods.

15 There is some evidence that ovulation is more likely to precede menstruation in cycles occurring later in lactation (Howie et al., 1982; Perez et al., 1972). Thus a higher proportion of rural women may experience the return of ovulation prior to first menses given that they experience postpartum amenorrhea for longer periods after childbirth than do urban women.

16 A potential complication in interpreting analysis relating contraceptive practice and amenorrhea is the possible contamination of reports on amenorrheic status and duration of postpartum amenorrhea for women who have adopted either oral or injectable contraception subsequent to the birth of their most recent child. Since pill use results in withdrawal bleeding each month, women using the pill would report a return of menses regardless of their status at the initiation of contraception and regardless of the probability that they would have remained amenorrheic without using contraception. In contrast, use of injectables often results in amenorrhea. Thus, women who initiate use prior to the return of menses might report themselves as still amenorrheic at the time of interview, even though in some cases menses would have returned had they not used injectables. Since the potential biases associated with pills and injectables run in opposite directions, they will tend to offset each other when treated together. Moreover, they affect only those women who initiate use of the pill or injectables prior to the resumption of menstruation. As is evident in Table 11, only a small minority of women who initiate use of these methods after childbirth, reported doing so prior to the return of menses.

17 Results are restricted to women who had already experienced the return of menstruation by the time of the survey and thus exclude the few women who became pregnant prior to the return of menses. However, women who are pregnant at the time of the survey and had not initiated contraception subsequent to the birth of the previous child are included and treated as not initiating contraception throughout the period of observation.

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Table 1 Percent distribution according to inferred stage of family building at first use of contraception, mean preferred number of children, and percentage achieving or surpassing preferred number of children, by number of years since first marriage, among ever-married women aged 15-49

	Number of years since first marriage					
	0-4	5-9	10-14	15-19	20+	Total
% distribution according to stage of family building at first use						
Never used	30	13	10	12	25	19
Living children below preferred number*	67	74	65	52	23	55
Living children equalled preferred number	4	12	20	24	22	16
Living children exceeded preferred number	0	2	5	12	31	11
Total	100	100	100	100	100	100
Mean preferred number of children	2.3	2.5	2.7	3.0	3.4	2.8
% achieving or surpassing preferred number	11	42	60	74	81	53

* Includes women who ever used contraception and indicated they still wanted more children at the time of the survey regardless of whether or not the number of living children at first use was below their stated preferred number

Table 2 Among ever-married women aged 15-49 with at least 2 living children and married at least 5 years, percent distribution of timing of use of first contraception relative to number of living children at time of first use, by years since first marriage

	Years since first marriage					
	5-9	10-14	15-19	20-24	25+	Total
Never used	9	5	7	12	30	12
No living children	20	13	5	2	1	9
Had one living child	37	35	22	8	3	22
Had 2 or more living children	34	47	66	77	66	57
Total	100	100	100	100	100	100

Note: The percent distributions may not sum to 100 because of rounding.

Table 3 Percentage who have ever used contraception and percentage who used contraception before the first pregnancy, among all ever-married women aged 15-49, and the mean number of months to first use and the percentage who used in the first month of marriage, among ever-married women who used before the first pregnancy, by years since first marriage

	Among all ever-married women		Among women who used before 1st pregnancy		
				% initiating within	
Years since 1st marriage	% ever used contraception	% used before 1st pregnancy	Mean number of months before using	1st month of of marriage	2 months of marriage*
0-4	70	42	1.0	72	86
5-9	87	26	1.7	68	80
10-14	90	13	2.2	64	75
15-19	88	5	4.8	61	72
20+	75	1	(9.5)	(56)	(59)
Total	82	18	1.7	69	81

Note: Results include women who never became pregnant. Results in parentheses are based on less than 50 unweighted cases.

* Includes both 1st and 2nd months of marriage

Table 4 Percentage using contraception before first pregnancy by number of years since first marriage and selected background characteristics, among ever-married women age 15-49

Background characteristic	Years since first marriage					Total
	0-4	5-9	10-14	15-19	20+	
Rural-urban residence						
Rural	38	24	11	4	1	15
Urban	56	37	23	12	5	29
Region						
Bangkok	56	33	27	12	6	30
Other central	49	27	15	8	1	20
North	62	46	21	5	2	28
Northeast	27	15	5	2	0	10
South	24	16	8	5	2	10
Education						
0-3	31	16	11	5	0	8
4-6*	39	24	12	4	1	16
Secondary or beyond	56	45	30	18	11	41

* Includes women with 7 years of education who graduated during the period when the upper primary level included 7th grade

Table 5 Percentage who used contraception before first pregnancy by number of years since first marriage and religio-linguistic ethnicity, among ever-married women aged 15-49

Religio-linguistic ethnicity	Women married less than 5 years	Women married less than 10 years	All ever-married women
Thai-speaking Buddhists			
Central Thai	53	42	23
Lao*	30	23	11
Northern Thai**	81	70	36
Southern Thai	30	24	11
Total	45	36	19
Moslems			
Thai-speakers			
In south	(9)	14	8
Outside south	(47)	38	22
Total	23	24	13
Malay-speakers	(3)	(1)	1
Total***	18	18	10
Thai-speaking Christians	-	(49)	36
Other linguistic groups			
Cambodian	-	(6)	3
Hill tribes	(16)	(18)	11

Notes: Several religio-linguistic groups are omitted because of insufficient cases. Results based on less than 20 unweighted cased are not shown; results based on 20-49 unweighted cases are enclosed in parentheses. The percentages practicing contraception are based on weighted calculations.

* Includes women coded as "Lao", "Northeastern dialect" and "Yo"
** Includes Thai Yai (Shan) speakers
*** Excludes two Moslems (unweighted) who do not speak Thai or Malay

Table 6 Percent distribution of first contraceptive method used, by stage of family building at time of first use, among ever-married women aged 15-49

Method	Stage of family building at the time of first contraceptive use			
	Before 1st pregnancy	Before reaching preferred number	After preferred number reached or exceeded	Total*
Pill	73	56	44	56
IUD	0	11	11	8
Injection	5	18	12	13
Condom	12	4	2	5
Female sterilization	0	5	24	11
Vasectomy	0	1	6	3
Periodic abstinence	6	2	1	3
Withdrawal	4	2	1	2
Other**	0	0	0	0
Total	100	100	100	100

Note: The percent distributions may not sum to 100 because of rounding.

* Includes a small number of cases for which the stage of family building at the time of first use cannot be determined

** Less than one half of one percent at each stage of family building

Table 7 Cumulative proportion who initiated contraception since last childbirth by elapsed months since childbirth and selected periods since last birth, among currently married women aged 15-49

Women with a birth during last	Proportion who initiated contraceptive use by					
	1 mo.	3 mo.	6 mo.	12 mo.	18 mo.	24 mo.
12 months	.19	.42	.55	.71	-	-
18 months	.20	.43	.58	.72	.82	-
24 months	.20	.43	.59	.73	.82	.86
30 months	.20	.43	.59	.74	.82	.86
36 months	.20	.42	.60	.74	.83	.87
48 months	.21	.42	.59	.72	.82	.85
60 months	.21	.42	.58	.70	.81	.84

Note: Results are based on the life table method.

Table 8 Cumulative proportion who initiated contraception since last childbirth by elapsed months and first method used since childbirth, among currently married women aged 15-49 who gave birth within the prior 48 months

Elapsed months since childbirth	All methods	Female sterilization	Other methods	Other specific methods			
				Vasectomy	Pill	IUD	Injection
1	.21	.18	.03	.01	.01	.00	.01
2	.33	.18	.15	.01	.04	.03	.06
3	.42	.18	.24	.01	.07	.04	.09
4	.50	.18	.33	.01	.10	.06	.12
5	.55	.18	.37	.01	.12	.07	.13
6	.59	.18	.41	.01	.13	.08	.14
9	.68	.18	.50	.01	.17	.09	.18
12	.72	.18	.53	.01	.19	.09	.19
18	.82	.18	.63	.02	.24	.10	.22
24	.85	.18	.66	.02	.25	.10	.23

Note: Results are based on the life table method.

Table 9 Cumulative proportion who initiated contraception since last childbirth, by elapsed months since childbirth and place of delivery, among currently married women aged 15-49 who gave birth within the prior 48 months

Method used and place of delivery	Months since childbirth			
	1	3	6	12
All methods				
Hospital*	.28	.55	.71	.81
Health Center or clinic	.10	.28	.52	.66
Home**	.13	.25	.41	.59
Female Sterilization				
Hospital*	.24	.24	.25	.25
Health Center or clinic	.07	.07	.07	.07
Home**	.11	.11	.11	.11
All other methods				
Hospital*	.04	.31	.47	.56
Health Center or clinic	.03	.22	.46	.59
Home**	.02	.14	.30	.47

Note: Results are based on the life table method.

* Includes Bangkok health centers

** Includes a small number of women who deliver in places other than a health facility but not in their own home

Table 10 Cumulative proportion who initiated contraception since last childbirth, by elapsed months since childbirth and religio-linguistic ethnicity, among currently married women aged 15-49 who gave birth within the prior 48 months

Religio-linguistic ethnicity	Months since childbirth			
	1	3	6	12
Thai-speaking Buddhists				
Central Thai	.21	.49	.67	.78
Lao*	.25	.38	.56	.70
Northern Thai**	.25	.73	.85	.94
Southern Thai	.12	.32	.50	.65
Total	.22	.45	.62	.75
Moslems***				
Thai-speaking				
In south	.07	.18	.28	.37
Outside south	.26	.58	.72	.80
Total	.13	.31	.43	.51
Malay-speaking	.02	.05	.10	.18
Total	.10	.24	.33	.41
Cambodians	(.08)	(.16)	(.32)	(.49)
Hill tribes	(.07)	(.29)	(.44)	(.69)

Note: Several religio-linguistic groups are omitted because of insufficient cases. Results in parentheses are based on less than 50 unweighted cases.

* Includes women coded as "Lao", "Northeastern dialect" and "Yo"
** Includes Thai Yai (Shan) speakers
*** Includes two moslems (unweighted) who do not speak Thai or Malay

Table 11 Percent distribution of timing of adoption of first contraceptive method used since childbirth relative to return of menses, by method, among currently married women aged 15-49 who gave birth 12 to 48 months prior to interview and who experienced the return of menses

Timing of adoption of method relative to return of menses	All methods	Female sterilization	All other methods	Vasectomy	Pill	IUD	Injection	Others
Before return	38	97	21	(54)	14	36	16	32
During 1st week following return	32	0	42	(4)	48	37	45	21
During remainder of 1st month	10	0	13	(2)	12	8	14	21
During 2nd month	4	1	5	(4)	6	1	4	8
After 2nd month	16	2	20	(36)	20	18	21	18
Total	100	100	100	100	100	100	100	100

Note: The percent distributions may not sum to 100 because of rounding. Results in parentheses are based on less than 50 unweighted cases.

Table 12 Cumulative proportion who initiated contraception since last childbirth, by method and elapsed months since the return of menses, among currently married women aged 15-49 who gave birth within the prior 48 months and who experienced the return of menses

Number of elapsed months since return of menses	All methods	Female sterilization	All others
Before return	.33	.18	.14
1	.64	.18	.46
2	.70	.18	.52
3	.73	.18	.55
6	.79	.18	.61
9	.82	.18	.64
12	.85	.19	.66

Note: Results are based on the life table method.

Table 13 Cumulative proportion who initiated contraception since last childbirth, by elapsed months since childbirth and elapsed months since return of menses and selected background characteristics, among currently married women aged 15-49 who gave birth within the prior 48 months, for the total sample and for Thai-speaking Buddhists

Background characteristic	Total sample							Thai-speaking Buddhists		
	Months since childbirth				Months since menses returned			Months since menses returned		
	1	3	6	12	Before return	1	3	Before return	1	3
Rural-urban residence										
Rural	.20	.38	.55	.70	.32	.63	.72	.34	.67	.76
Urban	.23	.58	.73	.80	.35	.68	.76	.34	.68	.77
Region										
Bangkok	.21	.57	.73	.77	.32	.66	.74	.31	.66	.74
Other central	.21	.46	.65	.78	.32	.68	.80	.31	.69	.79
North	.22	.52	.68	.82	.39	.72	.81	.41	.78	.87
Northeast	.24	.35	.53	.69	.36	.63	.71	.37	.63	.71
South	.10	.26	.40	.53	.19	.49	.58	.23	.59	.70
Education										
0-3	.12	.31	.44	.59	.24	.52	.57	.30	.62	.68
4-6*	.22	.41	.57	.71	.34	.65	.74	.35	.68	.76
Secondary & beyond	.19	.57	.80	.87	.33	.67	.83	.33	.67	.83
Current work status										
Not working	.19	.37	.54	.69	.30	.62	.70	.32	.65	.74
Working	.26	.56	.72	.82	.39	.71	.81	.39	.72	.82
Desire for additional children										
Want more	.02	.31	.51	.70	.18	.58	.69	.20	.61	.73
Want no more	.33	.50	.64	.74	.43	.68	.76	.44	.71	.78

Note: Results are based on the life table method; results referring to the timing of initiation relative to the return of menses are restricted to women who had experienced the return of menses by the time of interview.

Oral Contraceptive Use

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Abstract

The study of oral contraceptive use in Thailand utilizing data collected from the Thai Demographic and Health Survey (TDHS) has investigated four topics related to oral contraceptive use: (1) differentials in use among married women of different demographic and socio-economic backgrounds; (2) the source of supply in relation to the cost of the most recent cycle and the background characteristics of users; (3) the patterns of switching to or from use of oral contraceptives (4) and the extent to which users forget to take a pill daily.

The principal findings on oral contraceptive use are:

1. There are substantial differences in prevalence of use among according demographic and socio-economic background characteristics. The percentage of women in the oldest age group who have ever used pills is relatively low reflecting the low availability of oral contraceptives on a national level in the contraceptive market prior to widespread distribution through the National Family Planning Program. The prevalence of current oral contraceptive use also reveals differences in the purpose for which contraceptive is practiced. Among all temporary methods used, pills dominate slightly more among urban than rural women. The highest prevalence is found in the North followed by Bangkok, the remainder of central, the Northeast and the South respectively. Women of 4-6 years of education are more likely to practice pills in higher proportions than women of other educational levels. The oral contraceptive prevalence rate of Buddhists is twice that of Moslems.

2. The local government health center is the most prevalent source of oral contraceptives in rural areas. In urban areas, the private sector, particularly the pharmacy, is the predominant urban source. Rural women are more likely to receive pills free from government sources. For those who have to pay for pills, the clients of government outlets pay less than the clients of private sectors. The decision as to whether or not a client of a government source must pay for pills appears to be based primarily on factors other than the economic and social circumstances of the clients.

3. The majority of women who initially use pills switch to injection and female sterilization. More than one in three of women who started using some other temporary method rather than the pill shifted to the pill at sometime. The relationship between the pill and injection is prominent when the relationship between current use and use of previous methods is examined. An association with use of "ineffective" methods such as periodic abstinence or withdrawal is also detected in this study. The shift of use from condom, periodic abstinence and withdrawal to other methods reflect the inefficiency of these methods.

4. One-fourth of current pill users reported forgetting to take the pills at least once during the previous month. Women in Bangkok were most likely to forget to take pills followed by provincial urban

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and rural women respectively. Older women forgot to take pills more times in a month than younger women. Women with less schooling are less likely to forget a pill than women with higher education. Women who do not want more children and presumably have stronger contraceptive motivation than women who still want more children tend to forget to take the pill less. Women of highest economic status and women who work in agriculture are less likely to forget to take pills than women of lower economic status and women who work outside agriculture. Women who obtained pills from government sources and obtained them free take pills more correctly than women who purchased pills from private sectors. The extent of oral contraceptive compliance may depend on the interaction between pill acceptors and pill providers. The availability and accessibility of pills are not the main factors that have a significant impact on fertility control. The performance of the providers has to be taken into consideration for the effective use of pills as a means to control fertility.

Aims of the Study

Among a number of developing countries with high fertility levels in the past, Thailand has succeeded in reducing the rate of population growth within a short period of time. The country has moved from the stage of demographic transition characterized by falling mortality in the presence of high and relatively stable fertility to the stage in which fertility has declined remarkably. Several studies on fertility, family planning and related fields demonstrate that the rapid fertility decline taking place in Thailand was accounted for by the dramatic increase in the use of modern contraceptive methods during the last two decades. The contraceptive prevalence rate has increased substantially from less than 15 percent in 1969-1970 to 68 percent in 1987 (Knodel, Chamratrithirong and Debavalya, 1987; Chayovan, Kamnuansilpa and Knodel, 1988).

Among the contraceptive methods used, oral contraceptives have been the most common for much of the period of rising prevalence being surpassed by sterilization only recently (see also Table 1). However, there is substantial variation in oral contraceptive use among married women of different demographic and socio-economic backgrounds. This study begins with an examination of the association between socio-economic and demographic characteristics of women and the use of oral contraceptives.

The impact of oral contraceptive use on fertility limitation will be compromised if the method is not practiced correctly for substantial continuous periods. One factor that potentially can play a significant role in contraceptive failure associated with pill use is the extent to which pills are not taken on their prescribed daily basis. This study will also examine the frequency of forgetting to take pills in relation to demographic and social characteristics of pill users and several other factors of potential relevance such as the sources from which pill users obtain their supplies and the cost paid for oral contraceptives by the user. Switching patterns between oral contraceptives and other methods are of interest since switching to or from pills may reflect the user's satisfaction with pills or the effective use of pills. In addition, knowledge of switching patterns contributes to an understanding of the total picture of contraceptive behavior.

A policy to provide pills free in Thailand, which was made effective in the fourth quarter of 1976, was apparently associated with an increase in new pill users (Knodel, Bennett and Panyadilok, 1984). Of related interest is the extent to which the free pill policy is actually followed and the cost of pills when users are charged; these topics are included in the present study. Moreover, the individual characteristics of pill users in association with free pill services will also be examined.

Source of data

The present study is based on data collected by the Thai Demographic and Health Survey (TDHS) which is a nationally representative sample survey conducted by the Institute of Population Studies, Chulalongkorn University during March to June 1987. A total of 6,775 ever-married women aged 15-49 were interviewed in order to collect data on fertility, family planning, and child and maternal health.

The relatively large sample size and the extensive questions on family planning, particularly on oral contraceptives, included in the TDHS questionnaire provide considerable potential for a study on oral

contraceptive use. Questions relating to oral contraception dealt with a number of topics including the extent to which current users remember to take the pills every day; the source from which pill users obtained their supply; and the price users paid for their last package.

In the present analysis results are weighted[1] to reflect both sample design and the fact that the response rates are not uniformly distributed. The weighting is done in such a way that the regional and urban-rural distribution of the weighted TDHS sample correspond to the distributions indicated by the most recent population projections and evidence available from other reliable sources.

Historical Background and Trends of Oral Contraceptive Use in Thailand

Historically, Thailand had a pronatalist policy, whereby large families and a high rate of population growth were encouraged. It was not until 1958, when a World Bank Economic Commission first recommended that the high rate of population growth was adversely affecting Thailand's development efforts, the government officials started to reconsider the population policy (Prachuabmoh, 1978). In 1970 the Thai Cabinet adopted a formal population policy aimed at slowing population growth. Although the official population policy was declared in 1970, a number of population activities to limit family size took place earlier. In 1965 four major government hospitals in Bangkok opened family planning clinics. In 1967 the Family Health Research Project was started in the Ministry of Public Health which led to a number of activities in family planning starting in 1968, although these were carried out quietly and with many restraints (National Family Planning Program, 1972).

The major contraceptive methods offered by the Family Health Project were intrauterine contraceptive device (IUD), oral contraceptives and tubal ligation. During the early years, over 65 percent of the acceptors chose the IUD. The number of monthly oral contraceptive acceptors in Thailand rose from 8,000 in April 1970 to 31,000 in December 1971. A target of 300,000 new acceptors of all contraceptives had been set for 1971, but this was surpassed with the final figure exceeding 400,000 and with oral contraceptives accounting for 73 percent of this total (Kleinman, 1977). Between 1970 and 1972, the annual number of new users of oral contraceptives jumped from 132,000 to 328,000 women (Knodel, Bennett and Panyadilok, 1984). The enormous increase in the rate of oral contraceptive acceptors occurred primarily because of a policy starting in mid-1970 which permitted distribution of oral contraceptives by auxiliary midwives[2] in the more than 3,500 rural health centers throughout the country. Prior to that time, oral contraceptives were available through government channels only at clinics staffed by a physician (Kleinman, 1977).

There has also been major activity in the commercial sector through the sale of oral contraceptives over the counter without a doctor's prescription. During 1969 and 1970, an average of 250,000 cycles of oral contraceptives were sold commercially throughout Thailand every month, primarily in urban areas (National Family Planning Program, 1972).

The number of new users of pills declined substantially from 328,000 in 1972 to 269,000 in 1973 due to a change in the brand of oral contraceptives supplied by family planning program. The decline was attributed to the new brand having more side effects associated with it (Research and Evaluation Unit, National Family Planning Program, 1976). However, after the problem was corrected, the number of new users started to increase again and reached 345,000 women in 1975 which exceeded the 1972 figures.

In general, it is obvious that since official implementation of the national family planning program in 1970, awareness and practice of contraception have substantially increased and become widespread throughout the country. Among modern methods of contraception, oral contraception was the most widely used for much of this period. It is evident that the rate of oral contraceptive use has increased remarkably during the 1970's and remained virtually constant at a high level over a considerable period of time since then.

The result from a series of more or less equivalent national surveys, documented in Table 1, reveals the increase in oral contraceptive prevalence over the last two decades in Thailand. It is clear that in 1969-70, just as the family planning program was about to be implemented, oral contraceptives were not commonly used among currently married women in the reproductive age span, with only 4 percent of currently married

women practicing this method. However, the percentage rose to 11 percent by 1972-1973 following adoption of the policy to allow auxiliary midwives to distribute oral contraceptives. This policy was a major factor in expanding the availability of oral contraceptives throughout Thailand and resulted in a substantial increase in the number of oral contraceptive acceptors. The survey results show a further increase in the percentage of women practicing oral contraceptives from 11 percent in 1972-1973 to 15 percent in 1975.

Prior to the last quarter of 1976, the Ministry of Public Health had been charging acceptors 5 baht per cycle of oral contraceptives. Starting with the last quarter of 1976, a new policy of providing oral contraceptives free at all government health outlets was instituted. Although the policy was not always implemented as stipulated, previous independent survey evidence has indicated that most women who obtain oral contraceptives from a government source do in fact obtain them free, and for those who have to pay, the charge is often less than the former charge of 5 Baht (Knodel, Chamratrithirong and Debavalya, 1987).

After the free pill policy was instituted in 1976, a marked and sustained increase in the number of pill acceptors occurred without a compensating decline in acceptors of other methods or in commercial sales. The survey results in Table 1 indicate a considerable rise in percentage of currently married women practicing oral contraceptives from 15 percent in 1975 to 22 percent in 1978-1979. Since then the level of use has remained virtually constant over the subsequent decade. The large increases in oral contraceptive use during the several years following 1976 were probably influenced by the free pill policy.

Although it is evident that the private sector and nongovernmental organization including the Community Based Family Planning Services (CBFPS), a division of the Population and Development Associated (PDA), drugstores, shops, and private clinics were involved in providing oral contraceptives, the evidence available makes clear that the government, particularly through Ministry of Public Health outlets, is the major provider of contraception on the national level. Results from the Contraceptive Prevalence Survey in 1984 revealed that though urban women are most likely to report buying oral contraceptives in a drugstore, the township (tambol) health stations are clearly the most important source of oral contraceptives for rural women, with more than half obtaining their supply from them (Kamnuansilpa and Chamratrithirong, 1985). Moreover, in most cases, oral contraceptives are provided free of charge at local health stations, so there is little problem with affordability. Therefore, it is clear that the remarkable increase in the proportion of oral contraceptive use took place primarily through services provided by government organizations.

Differentials in Oral Contraceptive Use: Findings from TDHS

Reproductive behavior is shaped by the array of attitudinal, demographic, social and economic characteristics of women and their husbands that influence desired family size as well as interest and willingness to adopt contraception. This analysis of oral contraceptive use based on TDHS data begins, therefore, with an investigation of the differentials in oral contraceptive practice according to demographic and social backgrounds of survey respondents. In the TDHS, ever-married and currently married women were asked which contraceptive methods they have ever used. The results indicate that the vast majority of ever-married (82 percent) or currently married women (84 percent) aged 15-49 have used some contraceptive method at some time. Among all contraceptive methods, the pill is by far the most common method ever used, with 56 percent of ever-married women and 57 percent of currently married women reporting use at some time (see Table 4.5 in Chayovan, Kamnuansilpa and Knodel, 1988).

As revealed in Tables 2 and 3, the percentage of either ever-married women or currently married women who have ever used pills is relatively low among women in the oldest age group. This is likely related to the past trends in the availability and accessibility of oral contraceptive. The extensive distribution of oral contraceptives through the family planning program took place on a wide scale only after nurse-midwives were permitted to distribute the method in the early 1970s. By that time, a substantial proportion of women who are now in the older reproductive ages, primarily women in the age group 45-49, would have already achieved their desired number of children and hence have turned to permanent contraceptive methods such as sterilization to terminate their fertility, or would have been approaching an age past which they felt they were unlikely to conceive.

With respect to current contraceptive use, the results shown in Table 3 illustrate that contraceptive prevalence among currently married women 15-44 reached 68 percent by 1987. This represents an increase over the equivalent prevalence rate of 65 indicated by the 1984 Contraceptive Prevalence Survey. From the TDHS results, sterilization is the most common contraceptive method currently practiced. The results show 28 percent of currently married women and their husbands practicing sterilization (22 percent female sterilization and 6 percent vasectomy). Oral contraception is the second most common method and is practiced by 20 percent of currently married women 15-44.

Even though oral contraception is commonly practiced among currently married women, the prevalence level of current oral contraceptive use is not the same among currently married women in different age groups. The percentage using rises with age reaching a peak among women in their 20's and then declines. This phenomenon undoubtedly is due to differences in the purposes for which contraception is practiced according to the age of the users. Younger currently married women in the reproductive age span tend to use contraceptives for delaying having a first birth and for child spacing and thus use a temporary method such as oral contraception. A high proportion of women age over 30 have already achieved their desired family size and hence are likely to switch from the pill to a permanent contraceptive method, i.e., sterilization, to terminate their childbearing. It is noticeable that the age pattern of pill use and sterilization follow opposite directions.

Overall oral contraception constitutes about half of all use of temporary methods and approximately 30 percent of all methods used. Moreover, it is clear that younger currently married women practice oral contraception in higher proportions than do older women. Among currently married women who practice any temporary method, 58 percent of younger women aged 15-19 use pills as compared with 41 percent of women aged 40-44. The proportionate share of overall use represented by pills use follows a similar pattern. In addition, the difference in pill use between younger and older currently married women is even more pronounced when pill use is calculated as a percent of all methods.

There is virtually no difference in the prevalence rate of pill use between rural and urban women, with 20 percent of women in each group practicing oral contraception. Nevertheless pill use as a percent of all temporary methods is higher in urban than in rural areas (55 percent compared to 50 percent). This result is caused by a larger proportion of urban women being sterilized than among rural women.

Regional differences in oral contraceptive use are also of interest. Oral contraceptive prevalence in the North is the highest (28 percent) followed by Bangkok and the remainder of the central region (23 percent and 21 percent respectively). The pill prevalence rate is slightly lower in the Northeast (16 percent), and is lowest in the South (12 percent), where overall prevalence is also lowest (52 percent). Oral contraceptive prevalence rates in different regions derived from the TDHS followed the same pattern as those found in the 1984 Contraceptive Prevalence Survey and 1985 Survey of Fertility in Thailand, although the TDHS pill prevalence rates are somewhat lower in most regions than those obtained from the 1984 and 1985 surveys (Kamnuansilpa and Chamratrithirong, 1985; Chintana Pejaranonda and Sureerat Santipaporn, 1986). As a share of all temporary methods, pills are most dominant among women in Bangkok followed by the remainder of the central region and the North.

With respect to educational level, oral contraceptive use is highest among women with 4-6 years of education (the basic primary level), followed by women who finished secondary level (19 percent). In terms of religious differentials, Moslems are characterized by only half the overall rate experienced by Buddhists. The gap between the two religious groups with respect to the oral contraceptive prevalence rate follows the same pattern as that of the overall rate. Oral contraceptive use as a share of all temporary methods is higher among Buddhists than among Moslems (51 as compared with 41 percent. The variation in current oral contraceptive practice according to the number of living children and desire for additional children based on non-pregnant currently married women aged 15-44 is shown in Table 4. The results indicate that the association between number of living children and oral contraceptive practice is somewhat curvilinear being lowest among women with 4 or more living children and highest among women with one or two children.

When desire for additional children is taken into consideration, variation in pill use among women with the same number of children is detected. Women who have one, two or three children are more likely to use the pill if they still want to have additional children than if they want no more children. The oral contraceptive prevalence rates for both women who want more children and do not want more children generally decrease as the number of living children increase. Women who have no children, and say they want no more, report higher pill use than those who have no children but want more children (but the number of women having no children and not wanting any are few, and the sampling errors of the responses are large). This phenomenon implies that women who have no children and reported that they do not want more children have not made an irreversible decision to terminate their childbearing and thus practice temporary methods such as oral contraceptives.

In sum, the findings from this section reinforce the results presented in the previous section that married women practice oral contraceptives during the early period of family building process to delay the time of the first birth or to space between consecutive births before they achieve their desired number of children.

Supply Source of Oral Contraceptives

In many countries, including Thailand, regulations that are supposed to limit oral contraceptives to doctors' prescription are generally ignored. The Ministry of Public Health believes that whoever normally meets the health needs of the community, whether doctor, nurse, auxiliary midwife, traditional midwife, pharmacist or even storekeeper, can be an appropriate person to distribute oral contraceptives. Pill users who can afford to purchase pills from commercial outlets do so without medical supervision. In other words, the places to go for oral contraceptive services are varied and not limited to health facilities.

For the purpose of the present study, sources of contraceptive methods are classified into two main categories: government and private outlets. The series of Contraceptive Prevalence Surveys together with information on contraceptive supply sources from the TDHS consistently reveal that the vast majority of contraceptive practitioners, approximately 80 percent, received services from government outlets with a slight increase in the overall share from government sources over time (Kamnuansilpa and Chamratrithirong, 1985; Chayovan, Kamnuansilpa and Knodel, 1988). With respect to oral contraceptives, the percentage of users who obtained their method from a government outlet varies somewhat among the different surveys with the TDHS estimate of 70 percent being about average.

A detailed picture of the source for pills derived from the TDHS is presented in Table 5. The type of government outlet that accounts for most oral contraceptives is the health center which consists primarily of township (Tambol) health stations but also includes Bangkok Metropolis Health Centers. Village Health Volunteers, who are permitted to resupply the pill, account for 6 percent of rural users of the pill, or just under 5 percent of all users of the pill in Thailand. Among various private sectors, the pharmacy is clearly the predominant source of oral contraceptive services and supplies. Private hospitals or clinics play a significant secondary role in providing oral contraceptive but private family planning clinics have almost no significant role in the provision of pills.

Comparison of these sources of oral contraceptives among the rural, provincial urban and Bangkok populations revealed that government outlets, particularly the health center, are overwhelmingly the most important supply source in rural areas with 79 percent of all rural pill users receiving services and supplies from them. In the urban setting, the percent who obtain oral contraceptives from the government sector is considerably lower being 38 percent in provincial urban areas and 24 percent in Bangkok. In urban areas the most important source of oral contraceptives is the pharmacy, accounting for 61 percent of cycles among Bangkok users and 48 percent in provincial urban areas. These results undoubtedly reflect differences between rural and urban areas in terms of availability and accessibility of the different sources. In rural areas, government health centers are far more widespread than other sources, particularly those in the private sector. There are few pharmacies in rural areas while in urban places they are very common. In addition, the fact that government health centers provide pills free or at a small charge in contrast to commercial outlets may act as a greater incentive for rural residents to obtain pills from a government source than would be the case

for the generally more affluent urban population. Although the government also provides oral contraceptives free or at a prices below the private sector, particularly pharmacies, government agencies are a less popular source for urban women than outlets from the private sector. The government practice of providing free or reduced cost pills probably is a weaker incentive for urban pill users than in rural areas, since urban women may be more time conscious and prefer the convenience of purchasing pills at the many private sector outlets.

One issue related to the source of contraceptives in Thailand is the government's policy since 1976 to provide oral contraceptives free to both rural and urban clients. Previous analysis has indicated that the free pill policy boosted oral contraceptive use and ultimately contraceptive prevalence to some modest extent (Knodel, Bennett and Panyadilok, 1984). In practice, government outlets do not always provide pills free but may instead impose a charge or request a "donation".

Based on the TDHS, the percentage of current pill users who received their current cycle free and the cost of the cycle, if there was a charge, by source of supply is presented in Table 6. At the national level, almost six out of ten pill users who obtained their most recent cycle from government outlets were not charged. This is quite similar to results from previous studies. For example, according to the 1981 Continuation Rate Survey which followed a national sample of women who obtained oral contraceptives from government outlets from 1977 to 1979, 56 percent received their supply free (Knodel, Bennett and Panyadilok, 1984). According to the 1984 Contraceptive Prevalence Survey, 61 percent of pill users obtaining the last cycle from a government outlet were not charged (Kamnuansilpa and Chamratrithirong, 1985). Thus actual compliance with the policy seems to have changed little over the period since it was first implemented.

There is a slightly greater tendency for rural than for urban pill users to receive their supplies free, apparently attributable to a greater tendency for rural (district) hospitals to not charge compared to urban government hospitals. Even when clients of government outlets have to pay for oral contraceptives, the cost is considerably less on average than if pills are obtained through the private sector. Nationally, clients of government outlets who pay for their pills are charged on average less than one third of the cost paid by clients of private sources. There is a considerable urban-rural difference in the amount charged as well, with urban clients of government outlets being charged considerably more than rural clients, although still less than clients of private sources.

The percent receiving contraceptive pills from a government source, the percentage obtaining pills free among those who obtain pills from a government source, and the mean cost of the most recent cycle of pills charged for those who were charged by a government source are shown in Table 7 in association with background characteristics of the user. This information is useful for assessing whether or not government outlets "adjust" the free pill policy to match the ability of clients to pay. For the total sample, the majority of women who practice oral contraceptives receive the pills from a government source (70 percent). Women in rural areas are more likely to receive oral contraceptives from a government source than women in urban areas (86 as compared with 62 percent). However, the difference in proportions receiving pills free from a government source are much smaller, 60 percent among rural and 55 percent among urban women. For those who pay for pills, however, urban women pay more.

There are considerable differences in the percent who receive pills from a government source, the percent receiving pills among government clients free and the mean cost of pills charged from government sources with respect to region. Women in the Northeast (88 percent) are most likely to receive pills from a government source. Women in the South, however, were most likely to receive pills free from a government source followed by women in the Northeast, the Central region (excluding Bangkok) and the North. With respect to the price paid for pills among those who are charged, women in the Northeast pay least for pills with the cost averaging only 3 baht per cycle. Women in Bangkok have to pay the most for government pills, averaging 11 baht per cycle. These charges, however, are all well below the cost of pills from a private source.

The difference in the percentage receiving pills from a government source and obtaining the pill free between Buddhists and Moslems is relatively small. Moslems, however, are charged more although this finding is based on only a small number of respondents and therefore may not be reliable. There is little

variation in the percentage receiving pills from a government source according to duration of pills use. Women with a shorter duration of pills use are somewhat more likely to receive pills free from the government than those with longer duration of use. However, there is no noticeable differences in mean cost of pills among women of different duration of pills use.

The relationship between receiving pills from the government, receiving pills free, and mean cost of pills from a government source and the economic status of women, as measured in terms of possession of a vehicle suggests that the higher the economic status, the lower the proportion to obtain pills, and to receive pills free, from a government source and the more money women have to pay for pills. The degree of differences, however, is relatively small.

Women who do not work and who work in agriculture are more likely to obtain pills from a government source and receive the pills free than women who work in nonagricultural jobs. This pattern holds true even when rural-urban residence is controlled. Moreover, women who work in nonagricultural jobs are likely to pay more for pills than others. Women with less than a secondary education are more likely to go to a government outlet for pill supply than women with a secondary or higher education. The proportion who receive the pill free among government clients, however, is notably lower only for women with more than a secondary education. Women with less than a secondary education, however, pay less for pills if charged than those with a secondary education.

Women who have income in cash are less likely to obtain pills from a government source or to receive the pill free; and they pay more for pills than women who have income in kind. These findings are consistent with those found when the effect of women's work status is examined. This reflects the high correlation between work status and type of payment. Women who work in agriculture are likely to receive their income in kind and they are inclined to receive pills from a government source, and they pay less for pills.

Overall the results do not suggest that breaches in the implementation of the free pill policy are finely turned to the economic or social circumstances of the client. Apparently decisions as to whether or not a client must pay are based primarily on considerations other than the clients characteristics. In any event, government clients who do pay are charged only modest amounts compared to the commercial market price.

Method switching in relation to oral contraceptive use

Information on switching contraceptive methods is useful for determining the most appropriate type and balance of methods to be made available in a family planning program. However, it is a complex issue as it deals with several points of time and can be influenced by many factors including number of living children, age of women, information given on methods, knowledge of and attitudes towards the service delivery system, satisfaction with methods and places where methods can be obtained.

From the perspective of this study, patterns of switching to or from use of oral contraceptives are of interest. Thus we examine several features of switching among those who have some experience with oral contraceptive use: 1) the extent to which they have ever shifted to or from any other method; 2) the relationships between different methods and oral contraceptive use and 3) how switching related to the proportion who remain practicing oral contraception.

As noted above, oral contraception is the most common method of ever use among Thai women. Results from the TDHS indicate that more than half (56 percent) of ever-married women indicated use of oral contraceptives at sometime. Injection, the second most common method of ever use, was practiced by only a little more than one in four (27 percent) of ever-married women (Chayovan, Kamnuansilpa and Knodel, 1988).

In the present study, an attempt is made first to examine the pattern of change in methods among women at the time of their first contraceptive use. In the TDHS survey, women were asked about their method of first use. Based on this information, women can be classified into two groups: those whose first

method was oral contraception and those who initiated use with some other method. One way to determine the pattern of switching from the pill to some other method is to examine the proportion who report ever using some other method among those whose first method was oral contraception. By definition those women will have shifted at some point in time to other methods from the pill. As seen in Table 8, some of those who first used oral contraception indicate experience with other methods. It is clear that many women who initially use the pill switch to other methods, particularly injection and female sterilization. Thirty percent of ever-married women who first use the pill have shifted to injection at sometime and 21 percent become sterilized. Lower proportions report experience with the IUD and condom, and far lower percentages report experience with male sterilization, periodic abstinence, withdrawal and other methods.

To gain more insight into the pattern of change in contraceptive methods among pill users, Table 9 presents the percentage of ever-married women who ever use the pill and currently married women who are currently using the pill, by method of their first use. Sterilization is omitted in this table since once a permanent method is initiated there is no longer an option to switch to a temporary method such as the pill. Generally, a substantial proportion of women who have initiated their use of contraception with some other temporary method also had experience with oral contraception. More than one in three women who started using contraception with some other temporary method shifted to the pill at sometime. The highest percentages shifting to the pill are found among women who have used injection (44 percent) or the condom (46 percent) as their first method.

The large majority of women who initiated contraceptive use with oral contraception had either switched to another method or were not using any method by the time of the survey as indicated by the fact that only 29 percent were current pill users among currently married women. Women who initiated their use with other temporary methods, however, had shifted to the pill and were current users at the time of interview.

Women who first used injection or condoms were most likely to be current users of oral contraception constituting 24 and 20 percent for initial injection and condom users respectively. Those who started contraceptive use with the IUD, periodic abstinence or withdrawal were less likely to be current pill users at the survey time. The fact that the percent currently using oral contraception among those who initiated use with another method is markedly lower than the percent who ever used the pill indicates that the pill was a transition method for many. It is quite plausible that the switch from the pill is affected by changes in the number of living children as women who already reached their ideal family size shift to sterilization.

Further evidence of the pattern of method switching since the time of first contraceptive use is shown in Table 10. The results suggest that initial users of the pill and contraceptive injection are similar in their pattern of switching. More than 60 percent who started with the pill or injection have ever used other methods. However, approximately one in four of women who first used either the pill or injection are still using the initial method. Moreover, more than half of those who started contraception with the pill or injection and are still using those methods have never used another method. A relatively small proportion, 10 percent, of women who first used the pill but then switched to another method were currently using the pill. The proportions who returned to used of injections or IUDs after switching to another method were even lower. However, among those who initially used the pill or an injection and who have never used another method, more than half still use those methods. For the IUD, the proportion continuing to use that method, if they never switched to another method is very high, more than 80 percent (37/44).

Unlike the pill and injection, the switching pattern of IUD users is quite different. A lower percentage of initial users of the IUD have ever used other methods subsequently. This may reflect the fact that the IUD can be retained as a method for relative long periods of time without any further action required of the user, unlike the case with the pill or injection. Almost 40 percent of initial IUD users are still using the initial method and the percentage of these women who never used other methods is distinctively higher at 83 percent.

As with the condom, periodic abstinence and withdrawal are used relative rarely and the small number of cases available prevent drawing firm conclusions about switching patterns involving these methods.

However, it is interesting to note that high percentages of initial users of these methods have subsequently used other methods. For example, 83 percent of those who first used condoms and periodic abstinence, and 66 percent of those who started with withdrawal have shifted methods some time in the past. This may reflect concern over the inefficiency of these methods.

So far we have examined method switching in relation to the method of first use. We now shift the focus to the method of current use. In this way we can address the question as to whether those who are currently using particular methods of contraception have ever used oral contraceptives before. Table 11 investigates the relationship between current use and use of previous methods. Of current users, almost half of those using oral contraception (49 percent), 38 percent of IUD users and more than one in four of injection users (28 percent) indicate that they have never switched methods. For both female and male sterilization, more than one third indicate that they have never used other methods and thus started using contraception with sterilization.

For those who have ever switched to other methods, the pill is the most common method previously used for all current users. Nevertheless, there is some variation in the percent who used the pill previously according to the specific method currently being used. Those who are using injection or condoms are more likely to have used the pill than their counterparts currently using other methods. Thus 62 and 60 percent respectively of current injection and condom users have previously used the pill. More than half of current users of the IUD and female sterilization also reveal previous experience with use of the pill.

For current pill users, the most common previous method is injection. The relationship between the pill and injection is always apparent in this study. Also of interest is the finding that there is an association within the "inefficient" methods. As shown in Table 11, among current users of periodic abstinence, high percentages have previously used the condom (55 percent) and withdrawal (33 percent). Similarly, 30 percent of current users of withdrawal have ever used the condom and 21 percent of those who are currently using the condom have ever used withdrawal. This evidence may be behind the distinctively high percentages who reported that they ever used other methods among initial users of inefficient methods as shown in Table 10.

Oral Contraceptive Use Compliance

Although oral contraception is potentially one of the most effective methods available, in actual use the effectiveness depends on the woman's consistency in taking the pill on a regular daily basis. In the TDHS, current pill users were asked if they had forgotten to take a pill during the last month and if so, how many times they had forgotten. The analysis presented in this section examines the responses to these questions and attempts to trace the possible factors that play a significant role in the variation with respect to the extent to which current pill users took the pill every day during the month prior to the time of interview.

Table 12 shows the percentage of pill users who reported forgetting to take a pill during the previous month as well as the number of times the user forgot. Forgetting multiple times has more serious implications for potential failure than forgetting a single pill. The results indicate that one-fourth of current pill users reported that they forgot to take the pill at least once during the previous month. The proportion of rural women who forgot to take the pill is lower than for women who reside in Bangkok or provincial towns. Moreover urban women, especially women in Bangkok, who forgot to take pill were more likely than rural women to forget three or more times.

The relationship between the pattern of correct pill use and age reveals that the younger the pill users are, the higher the proportion who forgot to take the pill daily. However, among those who forgot to take the pill, the relationship between the **frequency** of forgetting and age is less consistent, although there is some indication that women at older ages tend to forget to take pills more frequently than younger users. With respect to educational level, women with less schooling are less likely to forget a pill than women with higher education. However, among those who forgot to take the pill, users with higher education are less likely to forget to take the pill three or more times than those with lower education.

The desire for more children shows a clear association with correct pill use. Among women who want more children, the percentage who forgot to take pill is far higher than those who do not want more children, (31 compared to 19 percent, respectively). The findings imply that women who do not want more children are more likely to have a stronger motivation to use contraceptives than those who still want more children. Thus they may have felt greater pressure to use pills correctly.

Women who have used pills for more than three years tend to use the pill more effectively than women with shorter duration of pill use. This may be because taking a pill daily becomes a matter of habit for women who have used pills for a long period. Women who just started using pills may more easily forget to take them on a strict daily basis because they have not yet became fully accustomed to the method. Alternatively, the association with duration of use may arise because women who frequently forget to take the pill switch to other methods or become pregnant.

Women of highest economic status, i.e., women in households with a car, truck or mini-bus, are less likely to have forgotten to use the pill at least once than women of low economic status. Women in households with motorcycles or bicycles and those who do not own a vehicle have about the same proportions who forgot to take the pill, about one-quarter. Among those who forgot, women in households that own a motorcycle are most likely to have forgotten three or more times. With respect to women's work status, the proportion who forgot to take a pill at least once is highest among women who work in nonagricultural jobs, but the difference is small. Among those who forget, women who are not working tend to forget a little more frequently than women who have jobs.

Besides the background characteristics of women, other factors such as the supply source for oral contraceptives and free provision are potential factors that might explain variation in oral contraceptive use compliance. The statistics in Table 13 indicate that women who obtained pills from government outlets are less likely to forget to take a pill than women who obtained them from a private source, particularly a pharmacy or shop. Interestingly, when free provision is taken into account, women who obtained pills free from the government are less likely to forget to take them daily than women who did not obtain them free.

The variation in oral contraceptive use compliance with respect to the sources of supply and free provision status may stem from differences in the extent of instruction and supervision provided. Women who obtain pills from government health personnel are more likely to be given information and supervision regarding use than are women who purchase pills in shops or commercial drugstores where typically no instruction is provided unless specifically requested and even then may not be given or stated correctly.

Inasmuch as there are many variables that contribute to the variation in forgetting to take pills and the number of times they are forgotten, it is useful to examine the association with particular factors after controlling statistically for the others. Multiple Classification Analysis (MCA) was employed to examine the adjusted effect of each explanatory variable on the variation in forgetting to take pills at least once and the number of times a pill was forgotten. The relationship between each potentially important explanatory variable and pill use compliance is examined after being adjusted for the effect of a selected group of other explanatory variables. In this analysis, 4 control variables are analyzed. The results are based on additive models since the models assume that each explanatory variable affects the criterion variables independently of the values of other predictors, i.e., the interaction effects between the explanatory variables are assumed to be negligible.

The results from MCA are summarized and shown in Table 16. The core model consists of three demographic variables: age, duration of pill use and desire for more children. The background characteristics of women such as place of residence, education and other factors related to supply source and free-pill provision were introduced into the core model in various combinations.

Considering the results from the core model, the differences in percentage of forgetting to take pills among women of different age groups are considerably reduced when the effect of duration of pill use and desire for more children are controlled. The findings imply that it is not age alone that causes the variation on forgetting to take pill, but duration of pill use and desire for more children are also potential factors that contribute to the variation. However, the two factors do not seem to have significant effects on the number

of times the pill was forgotten since the mean times forgotten to use pills among women of different age groups remain unchanged when the effect of the two factors are controlled.

The association of the duration of pill use is reduced modestly once effects of other predictors are taken into account. The results show the percentage forgetting to use pills among women who use pills less than 3 years decreases while that of those who use pills 3 years or more increased, thus narrowing the difference somewhat. However, the mean number of times forgotten to use pills among women of different duration of pill use continues to show virtually no association when the effect of other explanatory variables are taken into account.

The impact of desire for more children on the percentage of forgetting to take pills and mean number of times forgotten to take pills changes when adjusted for the effect of women's age and duration of pill use. The differences between the percentage of forgetting to take pills between women who want more children and those who do not want more children decreases. Nevertheless the basic pattern remains unchanged. The adjusted mean times forgotten to use pills are reversed compared to the unadjusted results. Women who still want more children, regardless of their age and duration of pill use, tend to forget to take pills more frequently than women who do not want more children, although the difference with respect to number of times forgotten is small. The effect of desire for more children is apparently suppressed by other explanatory variables.

The difference in the percentage forgetting to take pills between rural and urban women is reduced when the effect of education and demographic variables are held constant. Nevertheless rural women, irrespective of controlling for their demographic and social background, show smaller proportions forgetting to take the pill and they forgot to take pills less frequently than urban women.

The effect of education after adjustment for the effect of demographic variables and place of residence reveals an interesting result. The adjusted percentage forgetting to take pills among women of educational backgrounds lower than secondary level increases while their mean times a pill was forgotten did not vary significantly. In contrast, the adjusted percentage drops significantly among women with secondary education or above. Nevertheless adjusted results based on model 2 indicate the persistence of educational differences, with the percent of the least educated who forget to take the pill being the lowest of the three groups show.

Introduction of supply source in the model reveals a strong effect on the percentage forgetting to take pills, even though it does not have any impact on the mean number of times the women forgot to use pills. The adjusted percentage of forgetting to take pills shows a higher proportion of users who obtained pills from a pharmacy or shop forgot to take pills than users who received the pills from government sector and private hospitals or clinics even though the differences are not as high as those found in the unadjusted results. The effect of free-pill provision on the model follows the same pattern as when the effect of supply source is presented. Even though the percentage forgetting to use pills among women who received pills free from government increases when the effect of other factors are held constant, the percentage is somewhat lower than those found among women who received pills from private sources and from government sources where a charge was required. The mean number of times a woman forgot to take pills, however, is not altered when the effect of other explanatory variables are controlled.

In sum, the MCA results indicate that most demographic and social factors persist in their relationship to oral contraceptive compliance even when statistically adjusted for each other. The extent that the associations are modified, however, indicates that subsets of selected variables share their effects with others.

The supply source of oral contraceptives and free-pill provision continue to be associated with considerable differences in use compliance, particularly in the percentage forgetting to take pills even after other factors are controlled. The pill users who obtained pills from government personnel or outlets are inclined to use the pills more correctly than those who purchased pills from commercial shops or drugstores. Moreover, a higher degree of correct pill use is found when the pills are provided free. A possible

explanation for these findings is that greater supervision and more information on oral contraceptive use may be provided by the pill providers in government sources. Correct pill use is affected by the interaction between the acceptors and the providers of pills. Thus not only availability and accessibility of methods but also the performance of providers may determine the impact of pill use on fertility control.

Conclusion

The study of oral contraceptive use in Thailand based on the results from a series of more or less equivalent national surveys together with the data collected from the Thai Demographic and Health Survey (TDHS) reveal a substantial increase in oral contraceptive prevalence in Thailand during the 1970's but with the trend leveling off in the 1980's. Currently about one fifth of married women in reproductive ages use the pill. Among the contraceptive methods used, oral contraceptives have been the most common for much of the period of rising prevalence, being surpassed by sterilization only recently.

The present study has investigated four topics related to oral contraceptive use: (1) differentials in use among married women of different demographic and socio-economic backgrounds; (2) the source of supply in relation to the cost of the most recent cycle and the background characteristics of users; (3) the patterns of switching to or from use of oral contraceptives and (4) oral contraceptive use compliance.

The results indicate that oral contraception is the most common method ever used among ever-married and currently married women aged 15-49. There are considerable differences, however, in the extent of use among women of different demographic and socio-economic backgrounds. The percentage of women in the oldest age group who have ever used pills is relatively low reflecting the low availability of oral contraceptives on a national level in the contraceptive market prior to widespread distribution through the National Family Planning Program. The prevalence of current oral contraceptive use also reveals differences in the extent of use related to the purpose for which contraception is practiced. Younger currently married women use oral contraceptives primarily for delaying a first birth and for child spacing while older women switch away from the pill to permanent contraceptive methods to terminate their child bearing after achieving their desired number of children. There is virtually no difference in the prevalence rate of pill use among rural and urban women. Regional differences in oral contraceptive use reveal the highest prevalence in the North followed by Bangkok, the remainder of the Central region and the Northeast. The lowest prevalence rate is found in the South. Among women of different educational levels, oral contraceptive use is highest among women with 4-6 years of education (the basic primary level). In terms of religious differentials, Moslems are characterized by only half the oral contraceptive prevalence rate experienced by Buddhists.

A detailed picture of the sources of supply of the oral contraceptives indicate that the majority of contraceptive practitioners received services from government outlets. The local government health center is the outlet that accounts for most oral contraceptives in rural areas. The private sector accounts for most of the supply in urban areas with the pharmacy being the predominant urban source. At the national level, almost six out of ten pill users who obtained their most recent cycle from government outlets were not charged. There is a slightly greater tendency for rural than for urban pill users who use government sources to receive their supply free. Clients of government outlets who pay for their pills are charged less than one third of the cost paid by clients of private sectors. However, there is no evidence that the government outlets "adjust" the free pill policy to match the ability of clients to pay. The data show that the decision as to whether or not a client must pay appears to based primarily on considerations other than the economic and social circumstances of the clients.

Analysis of the patterns of switching to or from use of oral contraceptives reveals that many women who initially use the pills switch to injection and female sterilization, with lower proportions switching to the IUD and condom, and far lower percentages report experience with male sterilization, periodic abstinence, withdrawal and other methods. Among women who started using a temporary method other than pills, more than one in three shifted to the pill at some time. Women who have used injection and condom as their first method are the two groups that shifted to the pill in the highest proportions. Those who started contraceptive use with the IUD, periodic abstinence or withdrawal were less likely to be current pill users at the time of the survey.

The pattern of method switching since the time of first contraceptive use suggests that initial users of the pill and contraceptive injection are similar in their pattern of switching but the switching pattern of IUD users is different from users of these two methods. It is evident that the high percentage of initial users of condoms, periodic abstinence and withdrawal have subsequently used other methods, which reflect the inefficiency of these methods. The relationship between current use and use of previous methods reveal that the pill is the most common method previously used for all current users. The relationship between the pill and injection is always apparent. An association with use of the "ineffective" methods is also detected in this study.

The analysis of oral contraceptive use compliance shows that one-fourth of current pill users reported that they forgot to take the pill at least once during the previous month. The proportion of rural women who forgot to take the pills is lower than for women who reside in Bangkok or in provincial urban areas. Higher proportions of younger than older women forgot to take the pill at least once but among those who forgot older women forgot more times in a month than the younger users. Women with less schooling were less likely to forget a pill than women with higher education but the pattern is reversed with respect to the frequency of forgetting among those who forget.

Women who do not want more children are far less likely to forget to take pills than women who still want more children, probably reflecting stronger contraceptive motivation to use pills correctly. Women with longer duration of pill use tend to use the pills more correctly than women with shorter duration of pill use. This may be because taking pills has become a habit for women who have used them for a long period. Women of highest economic status use pills more effectively than women of lower economic status. Women working in agriculture are less likely to forget to take pills than women who work outside agriculture or do not work. Women who obtained pills from government sources and women who obtained pills free are more likely to take pills correctly than women who purchased the pills from private sources.

Results based on Multiple Classification Analysis (MCA) reveal that most demographic and social factors persist in their relationship to oral contraceptive compliance but the pattern of correct pills use with respect to any specific variable is modified somewhat when some subsets of other variables are taken into account.

The source of supply and free provision of pills are associated with considerable differences in oral contraceptive use compliance. This suggests that the pattern of correct pills use may depend on the interaction between the pills acceptors and the pills providers. It is not only availability and accessibility of the pills but also the performance of the providers that may determine the impact of pills use on fertility control.

NOTES

1 For detailed information see Appendix A in Napaporn Chayovan, Peerasit Kamnuansilpa and John Knodel. Thailand Demographic and Health Survey 1987. Chulalongkorn University Printing House, Bangkok, July 1988. pp.129-139.

2 Auxiliary midwife refers to a woman with an 18-month training in midwifery and public health.

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Table 1 Percentage currently practicing specific methods of contraception among currently married women aged 15-44, 1969-87

				Sterilization					
Year	**Survey**	**Pill**	**IUD**	**Male**	**Female**	**Injection**	**Condom**	**Others**	**All methods***
1969/70	LS1	3.8	2.2	2.1	5.5	0.4	0.0	0.7	14.8
1972/73	LS2	10.6	4.7	2.8	6.8	0.9	0.1	0.5	26.4
1975	SOFT	15.2	6.5	2.2	7.5	2.1	0.5	2.8	36.7
1978/79	CPS1**	21.9	4.0	3.5	13.0	4.7	2.2	4.2	53.4
1981	CPS2	20.2	4.2	4.2	18.7	7.1	1.9	2.7	59.0
1984	CPS3	19.8	4.9	4.4	23.5	7.6	1.8	2.6	64.6
1987	TDHS	20.0	7.2	5.5	22.4	9.2	1.2	2.0	67.5

Notes: LS1 and LS2 refer to rounds 1 and 2 respectively of the National Longitudinal Study of Social, Economic and Demographic Change; SOFT refers to the Survey of Fertility in Thailand; and CPS1, CPS2, and CPS3 refer respectively to the first, second and third Contraceptive Prevalence Surveys. Results for LS1 and LS2 are derived by combining separate rural and urban surveys taken one year apart and weighting the results to reflect the different sampling fractions used.

* Rounding errors, minor coding discrepancies, and users of unspecified methods account for the small differences between the sum of the percentages practicing individual methods and the percentage for all methods.

** Excluding provincial urban.

Source: Chayovan, Kamnuansilpa and Knodel, 1987.

Table 2 Percentage ever practiced methods of contraception, by age, among ever married women aged 15-49

Current age	Ever use among ever-married women			
	Pill	Other temp method	Sterili-zation	Any method
15-19	48.4	34.1	.6	64.0
20-24	61.9	50.2	5.4	77.8
25-29	64.7	60.1	19.9	87.0
30-34	58.8	53.4	39.5	88.6
35-39	58.1	50.5	39.4	85.9
40-44	49.6	38.1	41.3	81.0
45-49	36.5	28.1	31.0	67.2
15-44	58.5	50.4	27.5	83.4
15-49	55.9	47.8	27.9	81.5

Table 3 Percentage currently practicing methods of contraception by background characteristics, among currently married women aged 15-44

					Pill as % of	
	Pill	Other temporary methods	Sterilization	Any method	All temp. methods	All methods
Total	20.1	19.6	27.9	67.6	50.6	29.7
Age						
15-19	24.7	17.7	.6	43.0	58.2	57.3
20-24	27.6	17.7	.6	43.0	58.2	57.3
25-29	25.2	23.5	20.4	69.1	51.7	36.4
30-34	16.7	17.7	40.6	75.0	48.4	22.2
35-39	16.0	16.9	40.4	73.3	48.7	21.8
40-44	11.0	15.6	43.0	69.5	41.3	15.8
Urban-Rural Residence						
Urban	20.3	16.7	31.6	68.7	54.8	29.6
Rural	20.0	20.3	27.1	67.3	49.6	29.7
Region						
Bangkok	22.6	15.2	29.8	67.6	60.0	33.5
Other central	21.4	15.4	34.6	71.4	58.2	30.0
North	27.9	21.8	25.0	74.7	56.1	37.4
Northeast	16.5	22.0	28.0	66.5	42.8	24.8
South	12.2	20.1	19.5	51.8	37.7	23.6
Education						
0-3	16.5	16.6	28.1	61.2	49.8	26.9
4-6*	21.0	19.6	28.2	68.9	51.8	30.6
Secondary	18.7	20.6	25.9	65.3	47.6	28.8
Beyond Secondary	16.6	24.0	26.1	66.6	40.9	25.0
Religion						
Buddhist	21.0	19.9	28.8	69.7	51.4	30.2
Islam	10.0	13.9	11.3	35.1	41.4	28.4

* Includes women with 7 years of school under the old system in which primary education extended to 7 years

Table 4 Percentage currently practicing methods of contraception by number of living children and desire for additional children among non-pregnant currently married women aged 15-44

	Number of Living Children				
	0	1	2	3	4+
Want more children					
Pill	25.9	31.3	30.3	27.3	12.0
Other temporary	5.7	31.2	32.3	27.0	11.7
Any method	31.6	62.5	62.6	54.3	23.7
Want no more children					
Pill	(44.5)	29.4	19.2	15.0	12.9
Other temporary	(4.1)	31.7	20.5	17.0	16.7
Sterilization	(10.7)	13.6	48.4	57.7	49.1
Any method	(59.3)	74.7	88.2	89.7	78.7
Total*					
Pill	27.5	30.8	22.1	16.4	13.1
Other temporary	5.3	31.2	23.9	18.3	16.6
Sterilization	1.0	3.4	35.7	50.6	45.7
Any method	33.8	65.3	81.7	85.4	75.4

* Total includes those uncertain about desire for additional children. Results in parentheses are based on less than 50 unweighted cases. The results shown are based on weighted calculations.

Table 5 Percent distribution of current pill users according to most recent source for supply, by residence

Source	National	Rural	Provincial urban	Bangkok
Government sectors				
Government hospital	9.2	9.7	19.1	6.7
Health center	55.9	63.7	18.9	16.8
Village Health Volunteers	4.9	6.0	-	-
Private sector				
Family planning clinic	0.5	.2	2.1	1.5
Private hospital or clinic	4.6	3.4	8.9	10.6
Pharmacy	20.6	12.6	47.7	60.6
Shop	2.3	2.6	.9	1.2
Indeterminate				
Mobile clinic	0.1	.1	-	-
Friend/relative	1.0	.7	2.5	2.2
Others	0.8	1.0	-	.4
Total				
Government	70.0	79.4	38.0	23.5
Private	28.0	18.8	59.5	73.9
Indeterminate	2.0	1.8	2.5	2.6
Total percent	100.0	100.0	100.0	100.0
Weighted number of women	1,169	953	75	141

Table 6 Percentage receiving pills free and mean cost of the most recent cycle of oral contraceptives by source of supply

Source of Supply	% Free			Mean cost if charged		
	National	Urban	Rural	National	Urban	Rural
Government						
Hospital*	63	48	67	9.3	16.2	6.7
Health center**	63	59	66	3.9	9.6	3.5
Health volunteer	16	-*	16	3.4	-*	3.4
Total	59	55	60	4.5	12.5	3.8
Private						
Drugstore	-*	-*	-*	15.9	19.0	12.7
Other	4	8	2	15.5	23.6	12.0
Total	-*	-*	-*	15.8	19.7	12.5

* Includes regional MCH centers

** Consists primarily of township (Tambol) health centers but also includes Bangkok Metropolis Health Centers

Table 7 Percentage of oral contraceptive users receiving pills free and mean cost of the most recent cycle of pills for those who pay for pills, by background characteristics

Background characteristic	% receiving pills from government source			% free among those obtaining from government source			Mean cost in bahts if charged from government source		
	National	Rural	Urban	National	Rural	Urban	National	Rural	Urban
National	70.4	79.4	28.5	59.4	59.7	55.2	4.5	3.8	12.5
Region									
Bangkok	23.4	-	23.5	(42.7)	-	(42.7)	10.8	-	10.8
Central exclude BNK	60.8	65.5	26.2	70.9	70.8	-	7.9	7.3	-
North	76.3	78.2	41.5	43.8	43.0	-	3.8	3.7	-
Northeast	88.4	89.2	63.1	62.9	62.9	-	2.9	2.5	-
South	77.9	83.7	37.3	84.9	85.6	-	5.7	4.2	-
Religion									
Buddhism	70.1	79.3	28.0	59.4	59.6	57.3	4.5	3.8	12.5
Islam	59.0	84.8	43.3	(57.8)	-	-	(7.2)	-	-
Duration of use									
Less than 1 year	66.1	76.0	28.9	64.9	66.7	(45.6)	6.4	5.1	14.6
1-2 years	66.9	78.4	26.3	57.8	57.4	-	4.2	3.5	(12.9)
3 years or more	75.3	82.7	30.8	57.0	56.8	(60.4)	3.7	3.4	(8.8)
Possession of vehicle									
None	68.8	82.9	28.9	63.3	66.0	(41.6)	4.8	3.2	(12.0)
Bicycle only	79.9	83.3	32.5	58.6	58.9	-	3.9	3.8	-
Motorcycle	65.3	74.9	30.3	57.1	55.2	-	5.1	4.3	-
Car, truck, mini-bus	41.3	55.3	22.7	(57.0)	(56.3)	-	6.0	(4.5)	-
Woman's work status									
Work in agriculture	84.7	85.0	47.8	57.2	57.2	-	3.3	3.2	-
Work (not agriculture)	53.4	72.7	27.9	51.3	51.0	(52.9)	7.1	5.5	(13.1)
Not working	66.4	75.5	28.6	66.5	67.1	(59.7)	4.4	3.6	(11.2)
Educational level									
0-3 years	74.2	78.6	26.5	60.4	60.3	-	3.1	3.0	-
4-6 years*	73.3	80.3	27.7	59.5	9.7	(55.3)	4.2	3.8	11.0
Secondary	51.7	88.0	32.6	(63.5)	-	-	8.9	-	-
Beyond secondary	32.3	41.8	27.7	(44.4)	-	-	12.1	-	-
Type of payment for work									
In cash	68.5	78.9	8.4	53.6	53.7	(52.5)	4.6	3.8	(13.3)
In kind	94.0	94.5	-67.9	67.9	-	3.1	3.1	-	

Note: Results based on less than 20 unweighted cases are not shown; results based on 20-49 unweighted cases are enclosed in parentheses. The results shown are based on weighted calculations

* Includes women with 7 years of school under the old system in which primary education extended to 7 years.

Table 8 Percentage who ever used another method among ever-married women aged 15-49 who first use oral contraceptive method

Other method	Ever used
IUD	13.9
Injection	30.2
Condom	12.2
Female sterilization	21.4
Male sterilization	5.5
Safe period	4.6
Withdrawal	5.1
Other	1.0
No other method	36.1
Any other method	63.9
(N)	(3078)

Table 9 Percentage who ever used the pill (among ever married women, 15-49) and percentage currently using the pill by first method used (among currently married women, 15-49)

Method first used	Percentage who have ever used 'PILL'	Percentage Currently using 'PILL'
Pill	100.0 (3078)	29.0 (2890)
IUD	34.5 (460)	16.3 (437)
Injection	43.5 (725)	24.0 (698)
Condom	46.4 (260)	19.8 (245)
Safe period	37.7 (138)	13.1 (130)
Withdrawal	37.2 (109)	15.3 (107)
Other	- (32)	- (27)
Any temporary method other than pill	40.4 (697)	19.5 (1644)

Table 10 Percentage currently married women aged 15-49, who still use the initial method and who ever used other method by method of first use

Method of first use	% who ever used another method		Never used other method		% now using 1st method
	Total (a)	Currently use 1st method (b)	Total (c)	Currently use 1st method (d)	(e)
Pill	64.7	9.5	35.3	19.5	29.0
IUD	55.8	1.3	44.2	36.8	38.1
Injection	62.0	5.3	38.0	21.0	26.3
Condom	83.2		16.8		9.8
Periodic abstinence	82.5		17.5		17.8
Withdrawal	65.9		34.1		25.9

Note: (b)+(d)=100; (c)+(e)=(f)

Table 11 Percentage who previously used specific methods among currently married women aged 15-49 by current method

Ever use	Method of Current use								
	None	Pill	IUD	Inj.	Condom	FS	MS	Period	Withdrawal
Never used other method	47.7*	48.6	37.5	27.7	22.0	37.6	34.5	20.0	41.4
Pill	40.1	-	52.9	62.4	60.3	50.9	48.8	43.2	34.0
IUD	5.8	12.6	-	8.5	18.0	13.0	12.0	10.4	1.3
Injection	18.7	3.7	18.7	-	20.0	16.3	22.5	16.0	17.8
Condom	8.4	13.0	14.5	13.5	-	10.5	21.7	54.7	29.6
MS	.2	.3	-	.4	-	.6	-	-	-
Period	4.1	4.8	5.0	2.9	18.8	5.1	6.9	-	15.9
Withdrawal	4.4	4.8	6.0	3.8	21.1	4.6	1.7	33.4	-
Other methods	.9	.7	.5	.5	2.8	1.0	1.3	3.0	1.5
(N)	(2149)	(1161)	(429)	(529)	(67)	(1421)	(356)	(56)	(54)

Note: FS means female sterilization and MS means male sterilization.

* Refers to percent who never used any method

Table 12 Percentage of oral contraceptive users who forgot to take the pill at least one time during the previous month and percent distribution of those who forgot according to number of times pills were forgotten, by background characteristics

	% forgot at least one time	Percent distribution of times forgotten among those who forgot at least once		
		1	2	3+
Total	24.4	30.9	31.9	37.2
Residence				
Rural	23.2	32.0	31.9	36.1
Provincial urban	29.8	2.1	39.8	38.1
Bangkok	29.9	29.8	27.7	42.5
Age				
15-19	38.1	(29.2)	(33.0)	(37.8)
20-24	28.5	27.4	43.8	28.9
25-29	24.4	35.5	35.5	29.0
30-34	24.9	34.5	17.3	48.2
35-39	15.4	(19.4)	(16.7)	(63.9)
40-44	17.0	-	-	-
45-49	(19.0)	-	-	-
Education				
0-3	20.0	(39.9)	(10.4)	(49.7)
4-6*	23.8	28.1	34.2	37.7
Secondary	36.6	(53.8)	(23.9)	(22.3)
Beyond secondary	30.8	(24.5)	(43.2)	(32.3)
Desire for more children				
Want more	30.9	31.2	32.2	36.6
Want no more	19.0	32.1	30.5	37.4
Uncertain	(25.0)	-	-	-
Duration of pill use				
Less than 1 year	28.1	29.3	26.0	44.7
1-2 years	29.8	28.5	43.2	28.3
3 or more years	17.4	32.4	29.2	38.4
Possession of vehicle				
None	26.5	24.0	43.2	32.8
Bicycle only	23.0	35.6	26.9	37.5
Motorcycle	27.8	31.0	26.1	42.8
Car, truck, mini-bus	16.2	32.9	34.7	32.4
Woman's work status				
Work in agriculture	22.9	36.1	34.7	29.3
Work (not agriculture)	25.9	32.3	29.6	38.2
Not working	24.6	25.5	31.8	42.8

Notes: Results based on less than 20 unweighted cases are not shown; results based on 20-49 unweighted cases are enclosed in parentheses. The results shown are based on weighted calculations.

* Includes women with 7 years of school under the old system in which primary education extended 7 years.

Table 13 Percentage of oral contraceptive users who forgot to take the pill at least once during the previous month and percent distribution according to number of times forgotten, by supply source and free provision status

	% forgot at least one time	Percent distribution of times forgot		
		1	2	3+
Total	24.4	30.9	31.9	37.2
Source of Oral Contraception				
Government hospital	21.8	(34.7)	(29.7)	(35.6)
Government health center	23.6	40.1	28.9	31.1
Government Health Volunteers	(17.3)	-	-	-
Private Hospital/Clinic	22.4	-	-	-
Pharmacy	30.1	20.3	34.2	45.5
Shop	(28.0)	-	-	-
Others	(20.7)	-	-	-
Free provision status				
Free from government	20.6	33.8	32.8	33.4
Not free from government	26.0	42.2	23.8	34.0
Private	28.3	19.6	35.6	44.8

Notes: Results based on less than 20 unweighted cases are not shown; results based on 20-49 unweighted cases are enclosed in parentheses. The results shown are based on weighted calculations.

Table 14 MCA result of percent forgetting to take pills and mean times forgot to use pill for a selected set of socio-economic and demographic backgrounds of women

Background characteristics	% forgetting to take pills					Mean times forget to use pills				
	unadj	adj(1)	adj(2)	adj(3)	adj(4)	unadj	adj(1)	adj(2)	adj(3)	adj(4)
Number of women	1149	1149	1149	1139	1143	274	274	274	271	272
Grand mean	24.2	24.2	24.2	24.1	24.2	2.4	2.4	2.4	2.4	2.4
Women's age										
15-19	36.5	30.8	31.0	31.2	30.3	(2.7)	(2.6)	(2.7)	(2.5)	(2.5)
20-34	25.7	24.3	24.1	24.1	24.1	2.3	2.3	2.3	2.3	2.3
35 and over	16.7	22.2	22.6	22.3	22.7	(3.1)	(3.1)	(3.1)	(3.1)	(3.1)
Duration of pill use										
less than 3 years	28.8	27.3	27.0	26.7	27.2	2.4	2.4	2.4	2.4	2.4
3 years or more	17.4	19.7	20.1	20.3	19.6	2.6	2.5	2.5	2.5	2.5
Desire for more children										
want more	30.7	28.6	28.6	28.7	28.7	2.4	2.5	2.5	2.5	2.5
not want more	18.8	20.6	20.6	20.8	20.5	2.5	2.3	2.3	2.3	2.3
uncertain	25.0	22.8	(22.6)	(15.3)	(22.3)	-	-	-	-	-
Rural-urban residence										
rural	22.9	x	23.5	23.5	23.5	2.4	x	2.3	2.4	2.4
urban	30.1	x	27.6	27.1	26.9	2.7	x	2.8	2.5	2.6
Women's education										
0-3 years	20.6	x	22.6	22.8	23.0	(2.8)	x	(2.7)	(2.7)	(2.7)
4-6 years*	23.4	x	23.8	23.6	23.7	2.5	x	2.5	2.5	2.5
secondary on	33.8	x	29.1	29.1	28.9	(2.0)	x	(1.9)	(1.9)	(2.0)
Supply source										
government sector	22.7	x	x	23.7	x	2.2	x	x	2.2	x
private hospital/ clinic	22.4	x	x	20.0	x	-	x	x	-	x
pharmacy/shop	29.5	x	x	27.0	x	2.9	x	x	2.9	x
Free-pill provision										
free from government	20.5	x	x	x	21.4	2.1	x	x	x	2.2
not free from government	25.8	x	x	x	26.8	2.3	x	x	x	2.3
private	28.0	x	x	x	25.5	2.9	x	x	x	2.9

Note: x = not included
- = based on less than 20 unweighted cases; results based on 20-49 unweighted cases. All results shown are based on weighted calculations

* Includes women with 7 years of school under the old system in which primary education extended to 7 years.

Contraceptive Sterilization in Thailand

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I. Introduction

The prevalence of sterilization has been increasing steadily since the 1970's in both developed and developing countries, including the United States, United Kingdom, China, India, and Thailand. In 1979, approximately 90 million couples had been sterilized compared to only 20 million couples in 1970. Excluding China, the two most prevalent methods of contraception are sterilization and the pill (Ross 1985).

Statistics on sterilization acceptors in Thailand indicate a steady increase since 1965. During the three year period 1965-1967 a total of only 36 thousand women were sterilized compared to 160 thousand in 1985 alone. Likewise, the number of vasectomy acceptors increased from 3 thousand in 1973 to 37 thousand in 1985 (Knodel, Chamratrithirong, and Debavalya, 1981). The Population Plan incorporated in the 6th National Social and Economic Development Plan for the years 1987-1991 set a target of 6.65 million new acceptors of contraceptive methods. Among these new acceptors, 950,000 people or 14.3% were expected to undergo sterilization.

As a general policy, the 4th and 5th National Economic Development Plans emphasized providing permanent methods of contraception. The 6th National Social and Economic Plan, however, did not explicitly mention sterilization as the major method. Instead, the operational plan for providing family planning services by the Ministry of Public Health, the implementer, indicated that "both permanent and semi-permanent methods will be promoted among couples with 2 or more children ... "

According to the 6th National Social and Economic Development Plan, the population growth rate will be reduced to 1.3% by the end of the plan (1991) and the rate of current contraceptive prevalence will increase to 75% of currently married women in the reproductive ages. Sterilization has played and will continue to play a major role in reducing the growth rate and in increasing the rate of contraceptive prevalence. Thus, further understanding of the factors that affect the choice of sterilization, including whether tubal ligation or vasectomy is selected, can help program planners in selecting the appropriate combination of IEC, provider training and new facilities to reach these targets. Also, information on regret and its correlates can serve to develop counselling programs targetted at those most likely to experience regret.

The present study utilizes data from the 1987 Thai Demographic and Health Survey (TDHS) to examine various aspects of contraceptive sterilization in Thailand.[1] Following a brief review of trends in sterilization, the analysis examines differentials in sterilization according to a number of background characteristics. The analysis then goes on to compare factors affecting the choice of male or female sterilization. The distribution of cases according to whether they are tubal ligations or vasectomers is examined over time and according to background characteristics. Finally, the correlates of regret are examined.

II. Trends in Sterilization

The first reliable national data on the prevalence of sterilization based on survey data are available for 1969/70. At that time 7.6 percent of currently married women or their spouses were sterilized. As indicated in Table 1, the percentage of couples protected by sterilization increased steadily through 1984 but remained unchanged over the period 1984-1987. The per cent of couples selecting female sterilization also increased through 1984 but has changed little since then. The prevalence of women reporting that their spouses had a vasectomy has increased steadily since 1975. However, this increase in the percentage of couples protected by vasectomy has been much smaller than for female sterilization.

In 1969/70, just over half of all contracepting couples were protected by sterilization. But by 1972/73, the proportion of couples protected by sterilization had declined to 36% and has fluctuated in the range 26% to 43% through 1987. Since 1981, the proportion of contracepting couples protected by sterilization has remained almost unchanged.

III. Factors affecting choice of sterilization

Two of the factors most likely to be associated with the choice of sterilization are age and number of children. The greater the number of children, the more likely couples are to have reached their preferred number of children. Consequently, the greater the likelihood that they are interested in a permanent method of family planning. The older the women the more children she is likely to have and therefore the greater her interest in sterilization. Moreover, younger women, even if they no longer want more children, may delay the decision to choose a permanent method until they are "sure" that they want no more children.

Table 2 presents information on the impact of age, number of children, and on the difference between desired and actual number of children, on the percentage of women protected by sterilization, and on the selection of tubal ligation or vasectomy. The variable "living children relative to preferred number" is derived from two variables, the number of living children and the woman's answer to one of the following two questions: for women with children, "If you could go back to the time you did not have any children and could choose exactly the number of children to have in your whole life, how many would that be?" and for women without children, "If you could choose exactly the number of children to have in your whole life, how many would that be?" The percentage of couples protected by sterilization increases, as expected, with the woman's age up to the age range 30-34, then remains fairly constant over the range 30-44 and declines for the group 45-49. The pattern of increase for both male and female sterilization follow a similar pattern. At ages under 35, 4-5 times as many women as men are sterilized and the differences are only slightly smaller at ages 35 and over.

As expected, the proportion of women protected by sterilization is very low for those with no child or one child and many of these sterilizations may have been medically indicated. Proportions sterilized increase rapidly up to three living children and then decline for those with larger families. This same pattern is observed for overall contraceptive use as well (Chayovan, Kamnuansilpa and Knodel, 1988). The lower percentages practicing contraception (and sterilized) that are associated with families of increasing numbers of children beyond three probably reflects a selection process whereby couples who do not choose contraception (including sterilization) are more likely to reach higher family sizes than those who do. The prevalence of both male and female sterilization follows a similar pattern except that male sterilization does not decline for couples with five or more children.

The proportion of couples sterilized is much higher among those reporting that the number of living children is at least equal to the preferred number although there is little difference between those meeting and exceeding their preferred target. But why should anyone choose to be sterilized who has less than the preferred number of children? There are a number of explanations. Some women or their husbands are sterilized because pregnancy may endanger the health of the woman. Such couples may very well not have reached their preferred family size. But, probably more important, some women may change their mind about the number of children that they prefer after they or their spouse has been sterilized. As economic conditions in Thailand have improved, some couples may have felt that they could support more children now than they did at the time that they made the decision to terminate childbearing. Finally, women may have responded to the question about the preferred number of children without really taking into consideration their ability to support children, but may have been engaging in wishful thinking "about what could have been."

As in most other countries in Asia, with the exception of India and Nepal, the percentage of women who have had a tubal ligation is much higher than the percentage of their partners who have had a vasectomy. At ages under 35, 3-5 times as many women as men are sterilized and the differences are only slightly smaller

at ages 35 and over. Similar differences are found with respect to the number of living children except that for women with none or one child, both tubal ligation and vasectomy are rare.

Table 3 presents information on the proportion of women protected by sterilization according to both age of the woman and the number of living children, and to age and living children relative to preferred. In general, controlling for the number of living children, the proportion sterilized reaches a maximum in the age range 30-44. The jump in the proportion sterilized from the age group 25-29 to the age group 30-34 may be explained by women wishing to delay making a final decision about their fertility (as mentioned earlier) or by the difficulty of arranging for a sterilization if women are below some threshold age. Controlling for age, the proportion sterilized increases through 3 children, is similar or lower for women with four children, and is generally lower for those with five or more children.

The percentage sterilized also increases, at least through the age group 30-34 and then remains roughly the same controlling for whether the woman has reached, exceeded or not met her preferred family size. Consider the group that has fewer than the preferred number of children. For younger women, those under 30, the proportion sterilized is very low; but, for those over 30, where the interview is likely to have occurred at a longer interval since the sterilization, and where women have had more of a chance to engage in "wishful thinking", the proportion sterilized is fairly high (24-33%).

IV. Other characteristics and the choice of sterilization

Table 4 provides information on the percentage of women who are protected by sterilization because either they or their husbands have been sterilized according to a number of characteristics. Also, these percentages are presented for those women who have at least two children. The percentage sterilized is higher in urban than in rural areas, and is lowest in the South with the second lowest rate in the North; the highest percentage sterilized is in the other central region (other than Bangkok). The percentage of women with a sterilization is lowest in the South where the Moslem population predominate and the percentage of spouses with a vasectomy is lowest in the Northeast. Although the percentage of women with a female sterilization is higher in urban than in rural areas, the percentage of their spouses with a vasectomy does not vary with residence.

There is no association between the wife's education and female sterilization or vasectomy. However, among women with at least two children, there is a strong association between education and tubal ligation. This difference in the relationship between education and female sterilization for the two groups of women may be explained by the increase in number of years of education among successive cohorts of women. Therefore the higher the woman's education, the younger she is likely to be and the fewer the number of children she is likely to have. Selecting for women with two children will "control" for this effect. However, among women with two or more children, there is a U-shaped relationship between education and vasectomy.

As with the wife's education, the relationship between husband's education and sterilization is strongest for the sub-group of women with at least two children. The difference in proportions with a female sterilization varies from a low of 19% for husbands in the lowest education group to 48% for the highest education group. As with the wife's education, there is no strong relationship between husband's education and vasectomy although there is some suggestion of a U-shape; percentages sterilized are highest in the lowest and highest education groups. This difference may be related to the lack of a rural-urban difference in proportions of husbands sterilized; men in the lowest education group are most likely to be rural residents, whereas, men in the highest education group are most likely to be urban residents.

The next section of the table shows the relationship between socioeconomic status and sterilization. The index of SES is based on vehicle possession, toilet facilities, and type of flooring. It takes into consideration the number of different types of vehicles but only quality of the other two indicators. As anticipated, the relationship between SES and sterilization is similar to that between husband's education and sterilization. This is because the number and quality of the family's possessions is related to the earning power of the husband which is in turn related to his education. The main difference is that there is no relationship between SES and vasectomy.

Women who are Moslems are much less likely to be sterilized themselves or to be married to a vasectomized man. This is consistent with the prevailing belief among Thai Moslems that sterilization is proscribed by Islam (Knodel, Chamratrithirong and Debavalya, 1987).

The percentage of women who have been sterilized is much higher for those whose last delivery was a cesarean one than for women with a normal delivery. The very high percentage sterilized among those with cesarean sections may be explained by a number of factors. Women with cesarean sections are more likely to have experienced problems in their most recent delivery and some of these may have led to sterilizations for medical reasons. Also women with a third or fourth cesarean section will often be sterilized because of the dangers of uterine rupture in pregnancies of high gravidity. Finally it should be remembered that most sterilizations are postpartum and while some of the women with home deliveries (included in the normal group) can return for a postpartum sterilization, access to sterilization for these women is limited. This speculation is discussed below.

Husband's occupation shows the same relationship to sterilization as does residence. Of particular interest is the fact that there is almost no difference in levels of vasectomy between men engaged in agriculture and those outside of agriculture. Considering that agricultural pursuits often involve heavy physical work, the fear that vasectomy physically weakens men does not seem to have a dominant influence. In contrast, women whose husbands work in agriculture as well as women who work in agriculture themselves are less likely to be sterilized than women whose husbands work outside agriculture or who themselves work outside of agriculture.

V. Child death and sterilization

Uncertainty about the possible death of a child may cause some couples not to choose sterilization. Couples who have already experienced the death of a child may thus be reluctant to get sterilized. Table 5 presents information on the proportion of women or their spouses sterilized by the number of living children and whether a child has died. For sterilized couples, these variables are calculated at the time that the sterilization was done. For non-sterilized couples, it refers to the situation at interview. For women with three or more living children, female sterilization is clearly more likely if there has been no child death than if child loss has occurred. Curiously, vasectomy shows little association with child death.

Why should the results be different for the two types of sterilization? One possibility contributing to this difference is that the information on number of children and child deaths refer to the wife's reproductive history and thus, in cases of remarriages, the husband's reproductive history may be different. This is unlikely to explain the whole difference and thus the lack of association between vasectomy and child deaths remains puzzling. Another possibility is that other factors not controlled for affect the selection of sterilization and may also be correlated with child death. For example, couples in rural areas are more likely to experience the death of a child than are couples in urban areas and while female sterilization is more likely to be selected by urban couples, vasectomy is not associated with residence. To sort out these possible effects, multivariate analysis is necessary. Another possibility is that women selecting sterilization get sterilized at delivery and a high proportion of child deaths occur in the first few days of life and women whose child is sickly or who dies will not select sterilization. Men, on the other hand, who choose sterilization are unlikely to time the surgery so close to the birth of a child, a time when the probability of death is highest.

VI. Place/type of delivery

Either accessibility or selectivity as well as medical factors may affect the decision of a woman to choose sterilization. Women with a birth in the last five years were asked the place of delivery; women with a birth in that period may be divided according to both the type and place of delivery. Table 4 has already shown that women whose last delivery was a cesarean were more likely to be sterilized than were women with a normal delivery (although not all women were sterilized at the time of delivery). What this table also shows is that women who delivered in a hospital were far more likely to get sterilized than were women who

delivered in a health center or at home. Although postpartum sterilization is available to women with a home delivery, distance and child care responsibilities may make it difficult for such women to follow through and get sterilized. It is interesting to note that even in the non-hospital delivery group that almost all sterilizations were done postpartum. Even for women who do not deliver in hospital, interval sterilization is rarely selected. (Interval sterilization is expected to be low for this group as all had a recent birth.) On the other hand, selectivity is important; women interested in getting sterilized are likely to choose to deliver in a hospital in part for that reason.

VII. Characteristics of sterilized couples.

This section concerns women who are protected against pregnancy by sterilization either because they or their husbands have been sterilized; in other words, attention now focuses on the numerators presented in the prior tables. Sterilizations may be divided according to type of sterilization, male or female, and of female sterilizations whether the surgery was performed at or close to the time of delivery (postpartum) or subsequent to delivery (interval). If performed at delivery, sterilization can be further divided according to whether the mother had a caesarean or a normal delivery. The results are remarkably stable from year to year with just over 80% of women reporting that they were sterilized, and 20 percent reporting that their husbands were sterilized. These results are very similar to those reported in table 1; one might have expected differences as current survey data would exclude women who have passed age 49 and such women, if sterilized in earlier time periods, may have been more likely to have chosen interval sterilization, a procedure more often selected by older women who have decided to get sterilized after the birth of their youngest child than by women still eligible for interview who would have been quite young at the time of sterilization (e.g. no more than 30 if sterilized in 1970). However, the low popularity of interval sterilization in Thailand may make this effect unimportant.

Table 8 divides sterilizations in a similar manner to that shown in Table 7 and shows the distribution of sterilizations according to various background characteristics. There is little association of age or number of living children with whether the women or her husband is sterilized. But there is an association between age and type of female sterilization. The older the woman is the older are her children and the greater the likelihood that she chooses to be sterilized sometime after she has completed her family. With respect to other background characteristics, however, there is very little variation in the proportion of female sterilizations that are postpartum, which is uniformly high.

There is an important regional variation with respect to choice of male compared to female sterilization; vasectomy accounts for a much smaller proportion of sterilizations in the Northeast than in other regions of the country. The most interesting finding with respect to education and SES is the high proportion of vasectomies among the lowest education group. Perhaps vasectomy services targetted at low SES groups account for this pattern. A similar relationship is found for both husband's occupation and wife's work status, i.e. agricultural work is associated with a higher proportion of vasectomies. Finally, for those few Moslem couples who choose sterilization, husbands are more likely to get a vasectomy than is the case for Buddhists.

The percentage of women sterilized postpartum with a cesarean delivery varies with a number of characteristics. This percentage decreases with the number of living children and, as discussed above, this is probably related to medical reasons playing a greater role in sterilizations among women with two or fewer children than among women with more children. Also CS/sterilizations account for a larger proportion of sterilizations in urban than in rural areas. This may be related to the greater number of hospital deliveries in urban than in rural areas. This explanation may also account for the higher proportion of CS/sterilizations in Bangkok than in other regions. While this explanation undoubtedly accounts for some of the reason why the proportion of CS/sterilizations are highest in the highest education and SES groups, it may not account for all of it. The probability that a women has a CS may itself be related to education. Further study of the relationship between SES and method of delivery is necessary.

Table 9 provides information on the distribution of sterilizations according to whether the woman reports that she has not reached, has reached, or exceeded her preferred family size. Except for women sterilized before 1968, the results are remarkably consistent over time in terms of the percentage (19% to

25%) of women reporting that they have less than the preferred number of children. However, a reduction in the percentage who had exceeded their preferred number and a concomitant increase in those who have exactly their preferred number is evident.

Table 10 provides information on the distribution of women protected by sterilization according to the relationship between preferred and actual number of living children. The distributions are very similar for male and female sterilization. The most striking relationship with age is with respect to differences in the group for which the actual exceeds the preferred number of children. Women sterilized at age 35 or older are twice as likely as are younger women to report that they had already exceeded their preferred family size when they got sterilized. Also as anticipated, as the number of children increases, the proportion who report that actual exceeds family size preferred increases and the proportion who report that actual is less than preferred decreases. The high percentage reporting that actual is less than preferred in the group with two children and the extremely high percentage in the group with 0-1 child may be explained by the fact that many sterilizations to these women are done for medical and not demographic reasons.

As the wife's education increases the percentage who report that actual family size exceeds preferred decreases. The pattern is similar for husband's education. This finding is probably related to the fact that education is negatively associated with age and the number of children. However, there are no clear relationships with respect to SES.

Sterilization regret

One of the most important issues that policy makers must address is the issue of regret. Counselling programs should pay special attention to men and women who are not appropriate candidates for sterilization. Even with the best counselling, however, some men and women will change their minds and later regret the decision to have been sterilized. Also even if it were determined that young age or low parity were associated with regret, those findings should not be used to restrict sterilizations to those not in such identified risk groups, but only to indicate that such individuals may need more extensive counselling. If criteria for sterilization were too restrictive, some persons would end up regretting that they did not receive the method that they wanted or received it later than they wanted.

The percentage of women who are classified as regretters is dependent on the question posed on regret (Warren, et al., 1988; Haupagalle, et al., 1989). In this survey, the question posed on regret is as follows: Do you regret that you (your husband) had the operation not to have any more children? Eleven per cent of women responded positively, 10% in rural areas and 13% in urban areas.

Table 11 presents information on the percentage of women who say that they regret having been sterilized by background characteristics controlling for residence. Regret is much higher for women who had a tubal ligation than for women whose husbands had a vasectomy. Studies in Asia show that men with vasectomies are more likely to regret than are females with tubal ligations (Philliber and Philliber, 1985). These results, however, are not comparable to ours as only women were interviewed in this survey. Why are women more likely to regret if they had the surgery themselves? Table 10 showed that the distribution of women according to preferred vs. actual number of children is similar among women who were sterilized and women whose husbands were sterilized indicating that differences in number of children probably do not explain the findings.[2]

Both the possible range of responses to the question on regret and the fact that only women were asked about it may explain this result. Regret among women with tubal ligations may occur either because they want more children or because of pain and inconvenience associated with the surgery or health problems subsequently attributed to it. However, regret among women whose husbands had had a vasectomy is unlikely to be associated with pain and inconvenience so that "side effects" of the method do not become a factor in regret and regret likely occurs only because of desire for additional children. Unfortunately the survey did not specifically ask women the reasons why they regretted either their own or their spouse's sterilization so this hypothesis can not be explored.

Women who had a cesarean section for their last delivery are more likely to regret than are other women. However, in urban as compared with rural areas, the level of regret is lower for the CS group and is similar to that found for women with interval sterilizations. In rural areas, home delivery is more common and CS is probably restricted to women at very high risk. Such women may disproportionately have sterilizations for medical reasons. In urban areas, CS is more common and some women may be having a routine CS. Therefore, the group in urban areas may be made up of a smaller proportion that have sterilizations for medical reasons. Why regret should be higher for women with interval sterilizations is not clear.

As anticipated, regret is strongly and negatively associated with the number of living children and is highest for women who report that they have fewer than their preferred number of children. The death of a child subsequent to sterilization is also a factor associated with regret. In this study, regret was almost three times higher among women one of whose children died subsequent to surgery than among women none of whose children died. Regret among women with a child death subsequent to sterilization was also much higher in a group of sterilized Sri Lankan women (Hapugalle et al., 1989)

The education of the woman was positively associated with regret; however, once residence was controlled for this relationship was apparent only in rural areas. Similarly, while education of husband was also positively associated with regret, once residence was controlled for this association remained only among rural residents. Regret was not associated with SES. Regret was higher among women whose husbands occupation was non-agricultural as compared with agricultural. This difference was greater than the rural-urban difference in regret. Region and religion also appear to be important correlates of regret. Regret is far lower in the North than in other regions and highest among Moslems and lowest among Christians.

In order to control for regret associated with sterilizations likely to have been carried out for medical reasons, we reran Table 11 dividing sterilizations into two groups: less than two children at time of sterilization or sterilized concurrently with CS, and all others. As anticipated regret was far higher in the former group (22.4%) as involuntary sterilization are likely to be high than among all other women (9.5%). However, no significant changes in the associations between the variables in Table 11 and regret occur when the analysis is limited to women among whom reasons for sterilization are likely to be "voluntary" and not medical.

Further analyses of these data could be useful to program personnel and counsellors so that they could have more precise estimates of how background characteristics affect the probability of regret. These could then be used in determining how to allocate resources to provide more counselling for couples in high risk groups in an effort to reduce regret.

VIII. Discussion

The prevalence of sterilization has grown rapidly in Thailand over the past two decades with the percentage of women protected by sterilization having risen from 7.6% in 1969/70 to 27.9% in 1987. About 80% of sterilizations are tubal ligations and the remaining 20% are vasectomies. The failure of the percent sterilized to increase over the period 1984-87 may indicate that sterilization has reached a plateau in Thailand. Over one third of women with two children and half of those with three children are protected by sterilization. Given the relatively high current prevalence of sterilization, it will be interesting to observe if significant increases in these percentages will continue to occur over the next several years. Quite possibly, with the availability of long-acting temporary methods like NORPLANT, there may be a decline in the choice of sterilization among women with two and three children.

Although this report did not fully analyze the reasons why some couples opted for female sterilization while others chose vasectomy, the survey findings do suggest that accessibility of services may play a role. While the prevalence of female sterilization is positively correlated with education and SES, the prevalence of vasectomy is not. Moreover, the prevalence of female sterilization is far higher in urban than in rural areas (particularly when the comparison is limited to women with two or more children) while the prevalence of male sterilization is roughly equal in the two residence groups. If the prevalence of sterilization is to

increase in the coming years, then it may be necessary to expand service delivery programs to reach those in rural areas and those with less education and of lower SES.

Most tubal ligations in Thailand are postpartum sterilizations. The percentage of women with a sterilization is much lower among women whose last delivery was at home than among women with a hospital delivery. While selectivity or confounding may partially account for this relationship, it is also likely that lower accessibility to hospitals makes it more difficult for rural women compared to urban women to get sterilized. The recent decision of the Ministry of Health to train nurse-midwives at community and provincial hospitals to do postpartum sterilization should make it easier for rural women to arrange to get sterilized. Even if women deliver their babies at home, they will be able to come in during the next few days and be sterilized. This effort may result in an increase in sterilization in rural areas.

About 10% 0f postpartum sterilizations are done at the time of cesarean section. Many of these are undoubtedly for medical reasons. However, the survey results hint at some potentially disturbing findings. The proportion of CS/sterilizations is strongly associated with education and SES status; among women whose husbands have more than a secondary school education, 40% said that their last delivery was a cesarean section. While differences in place of delivery (home vs. hospital) associated with these characteristics may play a role in accounting for this relationship, it may also be that the cesarean section rate is positively associated with SES. While there is no indication that these CSs are carried out to facilitate sterilization, unnecessary CSs endanger the health of mothers.

Because sterilization is usually considered to be an irreversible procedure, there is a great deal of interest in determining the level and correlates of regret. Such information could be useful in designing counselling programs with special efforts targetted at those most likely to experience regret. In this survey, 11% of women protected against pregnancy by sterilization reported that they regretted having been sterilized. Regret was especially high among those women who likely underwent sterilization for medical reasons, including many of those with two or fewer children and many of those whose last delivery was a cesarean section. Since many of these sterilizations were not done for contraceptive reasons, regret in this group will not be sensitive to counselling aimed at helping couples make contraceptive choices. Regret was also very high among women who had a child die subsequent to the sterilization. Since the prediction of which women will have a child die subsequent to sterilization is not easy, this component of regret also is difficult or impossible to reduce. However, for the majority of couples considering a permanent method of contraception, a counselling program particularly targetted at couples in which regret is likely to be high, could reduce this level. With contraceptive sterilization such an important method in Thailand, efforts to keep regret low should work toward maintaining a favorable environment for sterilization.

NOTES

1 The TDHS was carried out by the Institute of Population Studies at Chulalongkorn University as part of the international program of Demographic and Health Surveys sponsored by the Institute for Resource Development at Westinghouse. Fieldwork took place during March through June 1987 and involved interviews with a nationally representative sample of 6,775 ever-married women aged 15-49. The sample was designed to provide independent estimates for the four major regions of Thailand and the Bangkok Metropolitan Area, as well as for the urban and rural sectors collectively. A more detailed description is available in the country report (Chayovan, Kamnuansilpa and Knodel, 1988).

2 To further explore reasons why regret was low among women whose husbands had been sterilized as compared with cases in which they themselves had been sterilized, Table 11 was rerun controlling for who was sterilized. In almost every cell, regret was higher among women who themselves had been sterilized as compared with women whose husbands had been sterilized.

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Table 1 Percentage of women or spouse sterilized and percentage currently using contraceptive methods among currently married women aged 15-44, 1969-87

Year of survey	Sterilization			All methods	% of contraceptors protected by sterilization	% female sterilized of all sterilized couples
	Male	Female	Either			
1969/70	2.1	5.5	7.6	14.8	51.4	72.2
1972/73	2.8	6.8	9.6	26.4	36.4	70.8
1975	2.2	7.5	9.7	36.7	26.4	77.3
1978/79	3.5	13.0	16.5	53.4	30.9	78.8
1981	4.2	18.7	22.9	59.0	38.8	81.7
1984	4.4	23.5	27.9	64.6	43.2	84.2
1987	5.5	22.4	27.9	67.5	41.3	80.2

Source: Adapted from Chayovan, Kamnuansilpa and Knodel, 1987, Table 4.7, p. 57

Table 2 Percentage of women or spouse sterilized, by age of woman, number of living children, and number of living children relative to preferred number of children, among currently married women aged 15-49

	Method of sterilization		
	Female	**Male**	**Either**
Age of women			
15-19	0.4	0.1	0.6
20-24	4.4	1.0	5.5
25-29	17.2	3.3	20.4
30-34	33.3	7.3	40.6
35-39	32.0	8.4	40.4
40-44	32.8	10.2	43.0
45-49	26.3	7.6	33.9
Number of living children			
0	0.1	0.7	0.7
1	1.6	1.7	3.3
2	27.1	7.5	34.6
3	40.6	8.7	49.3
4	36.9	7.2	44.1
5+	31.0	7.3	38.3
Living children relative to preferred number			
Less than preferred	10.9	2.9	13.8
Equal to preferred	33.0	7.4	40.3
Greater than preferred	34.2	9.6	43.8
Total	22.8	5.7	28.6

Table 3 Percentage of women or spouse sterilized by age of woman and number of living children, among currently married women aged 15-49

Number of living children	Age of woman						
	15-19	20-24	25-29	30-34	35-39	40-44	45-49
0	0.3	0.9	0.7	0.0	(2.1)	(2.3)	-
1	0.0	0.4	1.5	6.3	13.9	16.4	(17.4)
2	-	15.6	29.7	45.0	39.2	44.4	36.4
3	-	(27.9)	43.0	58.8	49.6	45.8	45.4
4	-	-	36.0	42.0	47.2	48.0	40.3
5+	-	-	-	53.4	40.4	45.3	29.9
Living children relative to preferred number							
Less than preferred	0.2	1.6	10.9	24.2	32.6	30.6	30.0
Equal to preferred	(5.9)	18.9	32.5	52.6	40.3	46.0	38.5
Greater than preferred	-	(29.9)	47.4	51.9	48.2	46.3	33.0

Notes: Results based on less than 20 unweighted cases are not shown; results based on 20-49 unweighted cases are enclosed in parentheses. The results shown are based on weighted calculations.

Table 4 Percentage of women or spouse sterilized, by selected characteristics, among all currently married women aged 15-49 and among those with at least two living children

	All women			2 or more living children		
	Female sterilization	Male sterilization	Either	Female sterilization	Male sterilization	Either
National	22.8	5.7	28.6	32.8	7.7	40.5
Rural-urban residence						
Rural	21.9	5.7	27.6	30.5	7.5	38.1
Urban	27.1	5.9	33.0	45.2	8.6	53.8
Region						
Bangkok	24.1	6.9	31.0	40.9	10.3	51.2
Other central	26.1	9.6	35.7	37.2	12.8	50.0
North	19.4	6.0	25.4	30.2	8.8	39.0
Northeast	25.5	2.8	28.3	34.7	3.7	38.4
South	14.5	5.6	20.0	19.1	7.3	26.4
Wife's education						
0-3 years	20.6	8.1	28.7	25.3	9.4	34.7
4-6 years	23.5	5.2	28.7	33.4	6.7	40.3
Secondary	21.0	5.8	26.9	41.4	11.3	52.7
Beyond secondary	21.9	6.3	28.2	45.6	11.7	57.3
Husband's education						
0-3 years	15.9	7.4	23.3	19.0	8.8	27.7
4-6 years	23.8	5.5	29.3	32.7	7.1	39.8
Secondary	21.0	5.6	26.6	40.3	9.3	49.5
Beyond secondary	24.6	6.8	31.3	47.7	11.7	58.4
Wealth level						
Lowest	17.9	6.1	24.0	24.0	7.9	32.1
Low	22.0	4.4	26.3	31.1	5.9	37.0
Middle	21.7	5.8	27.5	32.5	8.0	0.5
High	29.1	8.4	37.5	42.0	11.5	53.5
Highest	29.2	7.1	36.3	43.4	9.2	52.5
Religion						
Buddhist	23.8	5.7	29.5	34.3	7.7	42.0
Moslem	8.0	2.7	10.7	10.9	3.8	14.7
Christian	19.4	17.3	36.8	28.5	26.9	55.3

Table 4 (continued)

	All women			2 or more living children		
	Female sterilization	**Male sterilization**	**Either**	**Female sterilization**	**Male sterilization**	**Either**
Type of delivery						
Caesarean	50.3	2.2	52.4	71.3	2.9	74.2
Normal	24.3	6.5	30.8	31.2	7.9	39.1
Husband's occupation						
Agricultural	20.2	5.7	25.9	27.4	7.5	34.9
Non-agricultural	26.7	5.7	32.4	41.8	8.1	49.9
Wife's work status						
Working-agricultural	18.5	7.1	25.5	24.9	8.8	33.3
Working-nonagricultural	30.1	6.1	36.3	44.8	8.6	53.3
Not working	21.7	4.3	26.1	32.5	6.1	38.6

Notes: Results based on 20-49 unweighted cases are shown in parentheses. The results shown are based on weighted calculations.

Table 5 Percentage of women or spouse sterilized, by number of living children and number of child deaths, among currently married women 15-49

Number of living children and number of child deaths (For sterilized couple, number of living children and child deaths at time of sterilization)	Method of sterilization		
	Female	Male	Total
1 living child			
No deaths	1.3	1.6	2.9
1 or more deaths	1.9	2.7	4.6
2 living children			
No deaths	26.6	7.4	34.0
1 or more deaths	25.2	7.0	32.3
3 living children			
No deaths	43.6	8.8	52.4
1 or more deaths	29.2	9.2	38.4
4 living children			
No deaths	40.2	7.7	47.9
1 or more deaths	24.8	5.9	30.7
5 living children			
No deaths	36.3	6.9	43.2
1 or more deaths	22.8	8.0	30.7

Table 6 Percentage of women sterilized, and percentage of sterilization done postpartum by place and type of delivery among currently married women aged 15-49 who gave birth during five years prior to the survey

	% Sterilized		
	All women	Women with two or more living children	Of female sterilizations, % postpartum
Hospital	27.0	44.1	93.8
Caesarean	35.8	64.4	98.8
Normal	26.0	42.0	92.9
Health center/clinic	10.2	15.5	(78.6)
Home or other	12.3	15.7	93.4
Total	19.7	29.0	92.7

Table 7 Percent distribution of type of sterilization, percentage of female sterilizations done postpartum, and percentage of postpartum female sterilizations that are associated with Caesarean section, by year of sterilization, among sterilized couples in which the wife is aged 15-49

Year of sterilization	Type of sterilization			Of female sterilization, % postpartum	Of postpartum female sterilization, % Caesarean
	Female	Male	Total		
Before 1968	(61.6)	(38.4)	100	(66.1)	(19.2)
1968-72	79.3	20.7	100	83.5	12.7
1973-77	81.3	18.7	100	85.3	8.6
1978-82	80.8	19.2	100	81.1	10.5
1983-87	80.0	20.0	100	81.8	10.7
Total	80.0	20.0	100	82.0	10.4

Notes: Results based on less than 20 unweighted cases are not shown; results based on 20-49 unweighted cases are enclosed in parentheses. The results shown are based on weighted calculations.

Table 8 Percentage of sterilized couples with vasectomy, percentage of female sterilizations done postpartum, and percentage of postpartum female sterilizations associated with Caesarean section by selected characteristics, among sterilized couples in which the wife is aged 15-49

Characteristic	Of sterilized couples, % with vasectomy	Of female sterilizations, % postpartum	Of postpartum female sterilizations, % Caesarean
Total	20.0	82.0	10.5
Age of woman			
under 25	18.7	(93.4)	(6.9)
25-34	17.3	87.9	9.5
5 or over	22.2	76.4	11.6
Number of living children			
0 or 1	(56.7)	-	-
2	21.6	80.4	16.9
3	17.7	86.9	7.9
4 or more	17.7	80.5	5.3
Rural-urban residence			
Rural	20.6	82.6	8.4
Urban	17.9	80.0	18.1
Region			
Bangkok	22.4	82.5	20.9
Other central	26.8	81.7	11.5
North	23.8	79.1	9.3
Northeast	10.0	83.6	6.4
South	27.8	81.0	15.3
Education of woman			
0-3 years	28.1	77.0	9.2
4-6 years	18.1	83.0	8.3
Secondary	21.7	80.5	19.1
Beyond secondary	22.4	82.9	39.9
Education of husband			
0-3 years	31.9	73.7	14.2
4-6 years	18.7	83.3	8.3
Secondary	21.0	80.5	13.0
Beyond secondary	21.7	79.9	26.5
Religion			
Buddhist	19.3	81.9	10.4
Moslem	25.6	(85.5)	(17.7)
Christian	(47.1)	(81.6)	-

Table 8 (continued)

Characteristic	Of sterilized couples, % with vasectomy	Of female sterilizations, % postpartum	Of postpartum female sterilizations, % Caesarean
Wealth level			
Lowest	25.3	88.7	5.2
Low	16.7	82.2	7.8
Middle	21.0	79.8	9.7
High	22.4	80.0	13.4
Highest	19.5	82.1	21.2
Husband's occupation			
Agricultural	22.1	82.2	6.9
Nonagricultural	17.7	82.0	14.3
Wife's work status			
Working - agricultural	27.7	82.0	8.9
Working - nonagricultural	16.9	81.4	15.8
Not working	16.6	82.8	6.9

Notes: Results based on less than 20 unweighted cases are not shown; results based on 20-49 unweighted cases are enclosed in parentheses. The results shown are based on weighted calculations.

Table 9 Percentage distribution of sterilized couples according to the number of living children compared to the preferred number of children, by year of sterilization

Year of sterilization	Number of living children compared to preferred number of children			
	Less than preferred	Equals preferred	Exceeds preferred	Total
Before 1968	(10.9)	(51.7)	(37.4)	100
1968-72	25.1	36.6	38.3	100
1973-77	19.3	39.1	41.5	100
1978-82	23.4	42.6	34.0	100
1983-87	24.3	51.8	23.9	100
Total	22.7	45.4	31.9	100

Note: Results based on 20-49 unweighted cases are shown in parentheses.

Table 10 Percent distribution according to number of living children relative to preferred number of children by selected characteristics, among sterilized couples in which the wife is aged 15-49

Characteristic	Living children compared to preferred number			Total
	Less than preferred	Equals preferred	Exceeds preferred	
Total	22.7	45.4	31.9	100
Method Used				
Female sterilization	22.5	46.4	31.2	100
Male sterilization	23.8	41.3	34.9	100
Age of Woman				
Under 25	23.8	59.9	16.3	100
25-34	27.3	52.3	20.4	100
35 or over	19.1	39.0	41.9	100
Number of Living Children				
0 or 1	79.7	15.3	5.0	100
2	36.8	59.1	4.2	100
3	18.8	49.3	31.8	100
4 or more	8.9	31.8	59.2	100
Rural-Urban Residence				
Rural	22.8	46.2	30.9	100
Urban	22.3	42.0	35.7	100
Region				
Bangkok	25.0	36.5	38.6	100
Other central	25.3	43.7	31.0	100
North	19.0	54.5	26.5	100
Northeast	22.8	46.0	31.2	100
South	19.8	40.3	39.9	100
Education of Wife				
0-3 years	26.2	37.9	35.9	100
4-6 years	21.5	46.5	31.9	100
Secondary	22.4	48.9	28.7	100
Beyond secondary	32.7	43.7	23.6	100
Education of husband				
0-3 years	28.7	36.0	35.3	100
4-6 years	22.0	46.0	31.9	100
Secondary	22.7	44.7	32.6	100
Beyond secondary	22.3	50.1	27.6	100

Table 10 (continued)

Characteristic	Living children compared to preferred number: Less than preferred	Equals preferred	Exceeds preferred	Total
Religion				
Buddhist	22.1	45.9	32.0	100
Moslem	(25.3)	(29.0)	(45.7)	100
Christian	(50.4)	(32.7)	(16.9)	100
Type of delivery				
Caesarean	35.9	42.6	21.5	100
Normal	21.3	45.8	32.9	100
Wealth level				
Lowest	20.3	44.7	34.9	100
Low	23.4	49.6	27.0	100
Middle	24.2	41.5	34.3	100
High	18.2	44.3	37.6	100
Highest	25.6	42.9	31.4	100
Women's work status				
Working-agricultural	21.8	46.7	31.5	100
Working-nonagricultural	23.6	46.6	29.8	100
Not working	22.8	43.2	34.0	100
Husband's Occupation				
Agricultural	22.4	47.3	30.3	100
Nonagricultural	23.1	43.3	33.7	100

Table 11 Percentage who regret sterilization by selected characteristics among currently married women age 15-49 who are sterilized or whose spouse is sterilized

	Total	Rural	Urban
Total	10.9	10.4	12.6
Method of sterilization			
Female	11.7	11.2	13.3
Male	7.7	7.3	9.5
Type of female sterilization			
Postpartum	11.3	11.1	12.1
Normal	10.0	9.8	11.0
Caesarean	22.1	24.9	17.0
Interval	13.5	12.2	17.8
Living children			
0-1	31.0	(36.2)	-
2	16.8	16.3	18.4
3	9.5	9.1	10.9
4	6.4	6.5	6.0
5+	4.7	4.2	7.6
Living children compared to preferred number			
Less than preferred	34.7	34.6	35.0
Equals preferred	3.2	2.5	6.1
Exceeds preferred	4.8	4.4	6.2
Number of children dying subsequent to sterilization			
None	10.2	9.7	(12.0)
One or more	27.7	(27.2)	(29.8)
Region			
Bangkok	15.0	-	15.0
Other central	14.6	15.1	9.6
North	3.7	3.1	8.4
Northeast	10.3	10.3	9.7
South	11.9	12.4	10.2
Education of wife			
0-3 years	7.9	7.6	9.3
4-6 years	10.9	10.4	13.6
Secondary	11.2	12.7	9.9
Beyond secondary	20.2	(26.3)	15.4
Education of husband			
0-3 years	6.3	6.2	(6.4)
4-6 years	11.0	10.4	14.8
Secondary	10.9	12.9	8.5
Beyond secondary	13.8	(10.2)	16.4

Table 11 (continued)

	Total	Rural	Urban
Religion			
Buddhist	10.8	10.4	12.5
Moslem	(22.3)	(23.5)	(20.5)
Christian	(3.1)	-	-
Wealth level			
Lowest	12.2	11.7	-
Low	8.1	7.3	13.1
Middle	13.5	13.8	12.7
High	7.9	7.4	9.0
Highest	15.7	17.5	13.7
Husband's occupation			
Agricultural	8.5	8.4	(15.9)
Nonagricultural	13.8	14.6	12.6
Wife's work status			
Working-agricultural	7.8	7.9	-
Working-nonagricultural	13.6	13.2	14.4
Not working	10.9	11.1	10.1

Notes: Results based on less than 20 unweighted cases are not shown; results based on 20-49 unweighted cases are enclosed in parentheses. The results shown are based on weighted calculations.

Educational Expectations and Attainment Patterns for Thai Children

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One of the major social changes taking place in Thailand, as in much of the Third World, is a rapid increase in educational levels experienced by successive cohorts. Providing adequate education to children to enable them to function efficiently in the continually evolving socio-economic environment is usually considered to be a high priority by both individual families and the governments under which they live. Determination of the levels, trends, and determinants of educational attainment is thus of critical importance to the study of the ongoing process of development currently taking place in the Third World.

Most demographic surveys in Thailand, as elsewhere, collected educational achievement information only for the respondent and the spouse. At best, information on education of children is available from a household schedule and includes only those children who are still household members. The recent Thailand Demographic and Health Survey (TDHS) is one of the few exceptions. Although the primary purpose of the TDHS was to provide data on fertility, mortality and family planning, a special set of questions were incorporated to determine educational achievement of each of the respondent's children as well as the mother's aspirations and expectations concerning their future education if the child was still in school. Such data are potentially useful for examining educational levels and trends as well as the determinants of educational attainment.

The value of the TDHS data for exploring these issues is potentially enhanced by the fact that the information collected includes the current grade and educational expectations for children who have not completed their schooling as well as the actual completed attainment for children who have finished their education. If accurate and sufficiently precise, the data on expectations permit overcoming an inherent problem in assessing the current situation with respect to educational attainment patterns, namely that actual completed schooling can only be determined with reasonable certainty for children who are past the ages at which a significant proportion attend school. Provided parents have a realistic idea of how far their children will study, and are able to report this in a survey, it would be possible to determine the educational attainment of both children who finished their schooling and those still attending school, thus permitting a comprehensive and up-to-date analysis of educational differentials for families included in surveys like the TDHS.

An evaluation of the quality and completeness of data on educational expectations is an important prior step to any substantive analysis. Thus the present study consists of two parts. The first involves a methodological evaluation of the attempt made in TDHS to ascertain educational expectations of respondents for children currently enrolled in school. To be addressed are the questions of whether or not respondents are able to state expectations and, more specifically, if they can differentiate how far they would like to send their children from how far they feel they can afford to send their children to school. The second part presents a substantive analysis of completed or projected educational attainment patterns of children and is based on the highest grade completed for children who already finished school and expected educational achievement for children still in school. More specifically, the influence of family background, school availability, and parental educational preferences on educational attainment and expectations are examined.

I. The Thai Educational System

Before proceeding to the methodological assessment of TDHS questions on educational expectations, it is useful to briefly describe some features of the Thai educational system with respect to primary and secondary education.[1] Although universal compulsory education was enacted into law in 1921, the educational system and its implementation have undergone a number of changes since then. The present discussion is limited to the two systems that prevailed since 1960 as children enumerated in the 1987 TDHS were born too late to have experienced the earlier systems.

According to the educational scheme in effect between 1960 and 1977, children were required to enter school between ages 6 and 8. Primary education was divided into a lower and upper level. The lower level consisted of the first four grades (Pratom 1-4) and was compulsory throughout the country as it had been previously. The upper level consisted of three grades (Pratom 5-7). The 1960 education plan called for the gradual extension of compulsory education from 4 to 7 years (i.e., through the upper primary level) with the timing of the change to depend on the resources and readiness of the locality. Implementation began in 1963 and proceeded slowly at first. By 1971 compulsory education had been expanded to only 18 percent of all communes; by 1978, when the educational system was again revised, 57 percent of communes had expanded the compulsory level to 7 years.

Secondary education, according to the 1960 scheme, consisted of a general and a vocational stream. The general stream was divided into a lower level consisting of 3 years (Maw Saw 1-3) and a higher level consisting of 2 years (Maw Saw 4-5). The vocational stream in principle also had 2 levels with the number of years in each level depending on the particular vocational area. In actuality very few students entered the vocational stream at the lower secondary level (i.e., directly following primary school). Instead, it was far more common to start most types of vocational training at the upper secondary level after first finishing lower secondary schooling in the general stream.[2] Thus for practical purposes, the vocational stream can be considered to start after the lower secondary level.

Starting in 1978, based on a plan adopted in 1977, primary education was redefined to consist of one level covering 6 grades (Pratom 1-6) and is compulsory for the entire country. The new system was implemented rapidly as evident from the fact that by 1980, 94 percent of communes had complied with the change. The age at which children are required to enter school remains at between 6 and 8. Secondary education is divided into two levels. The lower level consists of a single general stream and covers three grades (Maw 1-3). Upper secondary is divided into a general stream which covers three grades (Maw 4-6) and a vocational stream consisting of two levels. The lower vocational level generally takes three years. The upper vocational level takes an additional two to four years and is considered as higher education parallel to the university system.

In practice, gaining a higher education within the Thai educational system involves a sequence of several critical transitions. The most important of these is between completion of the compulsory level and the start of the next level. In the context of the current system, this involves the transition from primary to lower secondary schooling. In recent years, the vast majority of children complete compulsory primary schooling while considerably less than half continue on to lower secondary education. Once in a particular level, however, a student is likely to complete that level. Thus the second critical transition point occurs between lower secondary and upper secondary (either in the general or vocational stream). In the previous system, the transition between lower and upper primary levels was usually the most critical in the sense that most students dropped out after completing the first four primary grades.[3]

II. Methodological Assessment

The TDHS was conducted by the Institute of Population Studies at Chulalongkorn University as part of the international program of Demographic and Health Surveys sponsored by the Institute of Resource Development. The fieldwork was conducted in 1987 during the months of March through June and involved interviews with a nationally representative sample of 6,775 ever-married women aged 15-49. The sample was designed to provide independent estimates for the four major regions of Thailand and the Bangkok Metropolitan Area, as well as for the urban and rural sectors collectively. Nationally representative results can be obtained by applying appropriate weights. The weighting of the sample was designed so that the sample distribution would correspond to the latest official projections indicating the number of women by age in the different regions and to the 1984 results of the Survey of Population Change, which established regional marital status distributions by age. In the first part of the present study dealing with the methodological assessment of the data on educational attainment and expectations, unweighted results are presented. In the second part, which focuses on the substantive analysis, results are based on weighted calculations.

Although the primary purpose of the TDHS was to collect information on fertility, mortality, family planning and health issues using a prescribed questionnaire, a number of modifications and additions were made to the standard core questionnaire to accommodate interests of the local research team. Among the additional items added were a series of questions about the educational status of each living child age 6 and over and, if the child was still in school, the mother's educational expectations for the child (see appendix A). More specifically, the respondent was asked if the child had ever started school and if so, had the child completed his or her schooling. For children who had completed their schooling, the highest grade attained was recorded. For children still in school, the current grade was recorded and the respondent was further queried concerning the grade to which she wanted the child to study and the grade to which she felt she could actually afford to send the child to study.

The inclusion of separate questions concerning the desired and affordable levels of education was prompted by concern arising during the pretest that if only one general question about the expected level of education were asked, some respondents would state an ideal desire rather than a realistic expectation that took into account the family's financial constraints. The explicit distinction between the desired and affordable level is intended to permit the construction of a measure of the most likely level to which the child would study and which is less ambiguous in meaning than would be a measure based on responses to a single question.

The unweighted distribution of responses to these various questions on children's education are shown in Table 1 for the total sample of children age 6 or over. Note that the desired and affordable levels were not asked for children who had not yet entered school. Given that Thai law requires children to start school by age 8, however, those who had not yet entered school and were age 10 or older are highly likely to remain without schooling indefinitely and, for the purpose of the present study, are treated as having no schooling with respect to their final completed education. Children who were under age 10 and had not entered school, are excluded from the tabulations altogether since a substantial portion of them will enter school shortly but no information on their likely final level is available from the survey.

Responses concerning the desired and affordable level of education have been combined in an attempt to project how far a child who is still in school will eventually study. Only about half of the responses to the questions on the desired and affordable levels of education were stated in terms of specific grades. Most of the remainder of the responses indicated either that the child would study as high as possible or that the child's future education would depend on the child's will or ability to continue to higher levels or on the family's future economic situation.

Overall, in more than half of the cases, the responses to the questions on desired and affordable level of education were the same in terms of the categories shown in Table 1. For those cases in which the responses were not the same, the choice of the response selected as the projected outcome was guided by an assessment of which one would appear to be the more likely predictor of the actual outcome whenever this seemed evident. For example, it is assumed that a family will not send a child for education beyond the level they wish their child to study even if they can afford to do so. Likewise, it is assumed that a family will only send a child as far as they can afford to even though they may ideally wish to send the child to an even higher level.

Based on the above stated assumptions, in cases where a specific level is stated for both the desired and the affordable level, the lower of the two is taken as the projected level. In cases where the two responses differed but only one stated a specific level, the specific level is chosen provided there does not appear to be a logical reason to prefer the other response. An example of such an exception would be a case for which a specific desired level above primary was stated but for which the respondent indicated that the level to which they could afford to send the child depended on the future economic situation. In these cases, the response to the affordable level, i.e., "up to the economic situation", is chosen. Details of the scheme used to combine responses concerning the desired and the affordable level into a single projected level are provided in Appendix B. A specific projected level could be determined for 53 percent of children still in school while the remaining 47 percent fell in categories that do not indicate a specific level of education.

In order to estimate the final level of education for all children, information on the completed level for those children who finished their schooling is combined with the projected level for children still in school. In this way a final specific level can be determined or estimated for 74 percent of the children over age 6 (excluding those under 10 who had not yet entered school).

To help to assess whether the attempt to distinguish between the desired and the affordable level of education was successful, responses to each of the respective questions are compared in Table 2. Grade six is distinguished as a separate level since it represents the final year of primary school and the current compulsory level to which parents are required to send their children. As noted above, respondents tend to give the same answer to questions about the desired and the affordable level (e.g., the responses to the two questions were the same for 59 percent of children in terms of the categories shown in Table 2). This probably reflects the fact that some respondents already took affordability into account when responding to the desired level while others may not have understood the intended distinction between the two questions.

An indication that some respondents had difficulty understanding the intended distinction between desired and affordable levels is evident from the fact that some persisted in stating that the affordable level was up to the child's will or ability and in other cases even switched their responses to this category after stating a specific desired level. Such a response would seem to be an inappropriate answer to the question on the affordable level. Nevertheless, there are also cases where the combination of questions appear to elicit a more realistic assessment of the child's likely future schooling. For example, a respondent was more likely to indicate a lower affordable than desired level for her child when the desired level was moderate or high than she was to indicate a higher affordable than desired level when the desired level was low. Such a pattern is logical if, as expected, there is a tendency to want to send children to study to a high level of education even when it can not be afforded. Moreover, most respondents who indicated they desired their child to study as high as possible indicated either a specific affordable level or indicated that the affordable level would depend on the economic situation. In addition, as evident from results in Table 1, "up to the future economic situation" was a considerably more common response overall to the question on the affordable level than to the question on the desired level. Such a result would be expected if the question on affordable education is correctly understood by respondents.

The most encouraging indication that the combined responses on the expected and affordable levels of education yield a realistic assessment of the likely final educational attainment of children still in school is the fact that the distribution of projected education for those younger children for whom a specific level could be determined is quite consistent with actual achieved education of older children. For example, among children aged 6-9, an age group in which virtually all children had yet to complete their schooling, 29 percent of rural children and 75 percent of urban children, for whom a specific projected level could be determined from responses to the questions on the desired and affordable levels, are projected to study at least to the secondary level. These estimates can be compared to the actual educational attainment of children 15-19, an age group in which almost all children would be past the age at which they would start secondary school. Among this older group, 32 percent of rural children and 77 percent of urban children have in fact at least started secondary education, indicating a considerable degree of agreement with the projected levels for the younger children. Thus, there does not seem to be evidence of mothers exaggerating the expected educational outcome of children still in school.

Results in Table 3 indicate that the percentage of children still in school for whom a specific level of education can be projected does not vary substantially with the age of the child. Nevertheless, since the proportion who have already finished their education is strongly associated with age, the proportion of all children for whom a specific level of education is known or can be projected, increases rapidly with age.

By taking into account for children still in school whether or not the child is already beyond a particular level of education as well as the projected level for those still in school but who are not yet beyond the level and combining this with information on the final grade completed for those who have already finished their schooling, it is possible to estimate for a substantial proportion of children whether or not a child has or will complete a particular level. Moreover, even when the projected level for those who are still in school but have not yet passed beyond the particular grade is not stated in terms of a specific level, it is possible to make a reasonable assessment for some of these children as to whether or not the child will

complete the level in question based on the nature of the response provided and the grade at which the child is currently studying. For example, the vast majority of students who enter either the lower or upper secondary level complete the full three years of the particular level. Hence it is reasonable to assume that a child currently in grades one to three of secondary school will complete the lower secondary level and that a child currently studying in grades four to six of secondary school will complete the upper secondary level.

The present study focuses on two measures of educational attainment: 1) actual or likely completion of the lower secondary level and 2) actual or likely completion of the upper secondary level (or its vocational education equivalent).[4] The choice of these two particular measures as the variables of central interest is based on the fact that completion of primary schooling is now close to universal in Thailand and considerable differentiation is evident only at the secondary level. The details of how these two measures were determined are provided in Appendix C. For many children, whether or not the child had finished either of the two levels in question can be directly determined from information on their actual completed education to date. Thus whether or not a child has completed lower secondary schooling, or whether or not the child has completed upper secondary schooling, is directly observable, and hence known with certainty, for all children who had already finished their education by the time of the survey as well as for all children who were still attending school but had already passed beyond the level in question. Information about the projected level derived from responses to questions about the desired and affordable levels, or based on assumptions about completing the level already entered, needs to be utilized only in cases where the child was still attending school but had not yet passed the level in question. The possibility of making a reasonable determination for these cases as to whether or not the child will finish either lower or upper secondary schooling depends on how the child is categorized with respect to his or her projected level. Thus for only some of these children is a determination of either of the two key measures possible.

Table 4 shows the distribution of children in the TDHS data set with respect the determination of the two key measures according to the age of the child. Of particular relevance to any subsequent analysis of these two measures, is the extent to which the measures can be determined (either based on direct observation or on the projected level). The results show that determination of actual or likely completion of the lower secondary level can be made for all children aged 15 or over, for 90 percent of children age 12-14, but can not be made for a substantial proportion of younger children. Similarly determination of actual or likely completion of the upper secondary (or lower vocational) level can be made for almost all children 18 or over, for over 90 percent of children 15-17, but for considerably lower proportions of children under age 15. Given that the determination of these two measures can not be made for large portions of children below certain ages, analyses focusing on the proportion who completed or are likely to complete lower secondary schooling are restricted in the present study to children who are age 12 and over while analyses focusing on the proportion who completed or are likely to complete upper secondary (or lower vocational) are restricted to children who are age 15 and over.

It is also of interest to examine how frequently the measures of whether or not a child completes lower or upper secondary education can be directly observed compared to how frequently they need to be based on projecting completion status. To some extent this serves as an indication of how much is gained from including questions on the desired and affordable levels of education, bearing in mind that projecting completion status in some cases is based simply on the current grade in which the child is enrolled. The results in Table 4 show that among children for whom the two key measures can be determined, their status with respect to completing lower or upper secondary schooling is directly observed for the large majority of older children but for successively lower proportions of younger children. Given that subsequent analysis focusing on completion of lower secondary deals only with children 12 and older, it is of interest that for over half of the 12-14 year olds for whom a determination is possible, the determination is based on projecting completion status. Thus if it were not possible to project whether or not the level will be completed, the proportion of the 12-14 age group that would have been indeterminate with respect to this measure would be too high to justify their inclusion in the analysis. Likewise, with respect to completion of upper secondary schooling, the determination for a third of children in the ages 15-17 for whom a determination could be made rests on being able to project their completion status. Responses to questions on the derived and affordable levels in combination with a set of reasonable assumptions as to what they mean are thus an important component of the information used to project completion status.

III. Educational Attainment Patterns

A. Demographic Characteristics and Family Background

Completion of primary education is close to becoming universal in Thailand. Data from the TDHS indicate that over 95 percent of the respondents children in the ages 16-19 have completed grade 4, the minimum compulsory level until 1978. While somewhat lower proportions of children have completed grade 6, the new universal compulsory level starting in 1978, a clear increasing trend is evident and already approaches 90 percent (Wongsith and Knodel, 1989). In contrast, educational attainment past the primary level is far less common. As indicated by results presented in Table 5, at the national level, approximately one third (34 percent) of the respondent's children aged 12 and over either have completed or are expected to complete lower secondary schooling and one quarter (24 percent) of children aged 15 or older will complete upper secondary schooling.

Table 5 also shows the percentage of respondents' children who have completed or are expected to complete lower and upper secondary school according to a number of demographic and socio-economic characteristics of the family that could potentially exert an influence on educational achievement. Clearly there is very substantial variation in educational attainment among different groups of children. As would be expected, given a trend towards increasing proportions of children going to secondary school, older children are less likely to complete lower and upper secondary school than younger children. However, the lack of a clear age pattern in Table 5 with respect to completion of lower secondary school among children 20 and under and with respect to completion of the upper secondary level among children 24 and under should not be interpreted as indicating the lack of a trend in more recent years. As discussed in the section dealing with the methodological assessment of the data, the educational measures used in the present analysis incorporate projected completion levels for children still in school but not yet past the level in question and necessarily exclude some children at the younger ages with an indeterminate completion status. Thus the measure is too imprecise to measure gradual trends affecting children at these ages.

With respect to the sex of the child, boys are more likely to complete lower secondary school than are girls but almost no difference between the sexes is evident in the percentages completing upper secondary school.[5] The reasons underlying this intriguing pattern can not be determined from the information available in the TDHS. It seems reasonable to assume, however, that the higher proportion of boys going to lower secondary school reflects some preference for educating sons. Nevertheless, decisions as to whether a child will continue at each juncture in the educational system also depends on the scholastic performance of the child, including in many cases the ability to pass an entrance exam. Quite plausibly, sex role differences emerge among teenagers that on average favor girls in terms of study habits and enable higher proportions of them to do well both in the classroom and in entrance exams.

In the TDHS sample, areas officially designated as municipalities as well as the entire Bangkok Metropolis are defined as urban while all remaining areas are considered to be rural. Based on this definition, pronounced rural-urban differences in educational attainment of children are evident with far higher proportions of children from urban families completing lower and upper secondary school than children from rural families.[6] Children from Bangkok families are also considerably more likely to attain either level of secondary education than children from other regions although not more likely than urban children overall. Regional differences are also apparent even after excluding Bangkok, with higher proportions of children from the central region and the south completing the two levels of secondary education than children from the north and northeast.

Although the Thai population consists mainly of Thai-speaking Buddhists (representing 88 percent of the TDHS sample of ever-married women), there are also a number of ethnic minorities, defined in terms of religion, language or both, who are culturally distinct. Moslems, who constitute 4-5 percent of the population, are the only religious group other than Buddhists of any substantial size and are themselves divided between native Thai-speakers and Malay-speakers. The latter are concentrated in the southern most provinces while Thai-speaking Moslems are divided mainly between the south and the central region including Bangkok.

Other minority groups include the hill tribes residing mainly in the North and Cambodians located primarily in the northeastern provinces bordering Cambodia. Although the TDHS sample was not designed for estimating parameters for ethnic minorities and the number of respondents interviewed for several minority groups is quite small, results referring to them can be suggestive.[7]

Several contrasts in educational attainment are evident among the different religio-linguistic groups. Malay-speaking Moslem, Cambodian, and hill tribe children are considerably less likely to attain a lower and upper secondary education than the majority Thai- speaking Buddhists. In addition, while higher proportions of Thai-speaking Moslem children complete lower secondary compared to Thai speaking Buddhists, probably reflecting their disproportionate concentration in Bangkok and the central region, the reverse is true at the upper secondary level.

A clear positive association between children's education and the education of both the mother and father is apparent. Particularly pronounced is the difference between children whose mother or father attended secondary school and those whose mother or father only completed primary school (i.e., 4-7 years of schooling). This difference is even greater in the case of the mother's than the father's education, probably reflecting the fact that fewer women than men in the parental generation went beyond primary school and hence families in which the mother attended secondary school are more selective than families in which the father did.

In order to measure the economic status of a household from information collected in the TDHS, an index of the household's wealth level has been devised based on the types of vehicles possessed by the household, the type of flooring in the house, and the type of toilet facility.[8] It is assumed that there is a general set of preferences with respect to these items and that actual possession depends on the household's purchasing ability, thus reflecting the level of wealth. In constructing the index, electric appliances are deliberately avoided since their possession is dependent on the availability of electricity in the community and thus would not necessarily reflect the household's ability to buy the item. For purposes of presentation, households are grouped into five categories according to their wealth score. As the results show, the percentage of children completing either lower and upper secondary school appears to be quite sensitive to this simple index of current wealth, showing a clear inverse relationship.

Limited information on the type of work of the respondent and her husband was collected in the TDHS.[9] Respondents were asked what type of work their husbands as well as they themselves did. If the husband's work was non-agricultural in nature, the respondent was asked if the husband received a regular wage or salary. While the fact of not receiving a regular wage or salary can reflect a variety of situations, presumably one important component of this category will be own account workers. If the work of either the husband or the respondent was in agriculture, the respondent was asked in each case if the work was primarily on land of their own, their family, or someone else. Based on this information, a rough classification of the type of work for both of the child's parents can be constructed.

While the resulting classification is necessarily crude given the relatively sparse information available, it potentially reflects several dimensions that might exert influence on decisions concerning the children's pursuit of education.[10] In particular, modern education of the type provided in formal schools might be perceived as less relevant to agricultural or to non-agricultural own account households in the informal sector than to others. Moreover higher opportunity costs associated with the time of school attendance and the consequent loss of the child's labor for helping the parents with farm work or own account activities could be an additional factor in discouraging education for children in such families compared to others. In addition, agricultural work on someone else's land probably reflects landlessness and as such may indicate a dimension of poverty beyond that represented by the index of household wealth.

Sharp differentials in the proportion of children completing lower or upper secondary school are apparent according to their parent's type of work. Nonagricultural work is associated with considerably higher proportions of children going to either level of secondary school than is nonagricultural work or, in the case of mothers, not working at all. Moreover, children with fathers working outside agriculture who received a regular wage or salary are considerably more likely to get a secondary education of either level than those whose fathers did not receive regular wages or salaries. Agricultural work on someone else's land is

associated with a lower proportion of children receiving secondary education than is agriculture work on the parent's own or family farm.

The results presented in Table 5 show a strong association between the likelihood of a child completing either lower and upper secondary school and the educational attainment of both the mother and the father. Since there is a substantial correlation between the mother's and father's education, it is interesting to examine whether each is independently associated with the child's education and which of the two exerts a greater influence. Table 6 shows the percentage of children completing lower and upper secondary school according to the joint levels of the parent's education. The results indicate that both the mother's and the father's education exert independent influences. Thus for each level of the father's education, the likelihood of the child completing either level of secondary school increases with increasing levels of the mother's education. Likewise, for each level of the mother's education, the likelihood of the child completing either level of secondary school increases with increasing levels of the father's education. In addition, the extent of the influence of each appears to be approximately equal in terms of the increase in the percentage of children completing lower or upper secondary school observed for each increment in the education of either parent for a given level of education of the other parent.

One interesting feature of the results is clear effect of either parent having an education at the secondary level or beyond. A far higher proportion of children complete lower or upper secondary school when at least one parent studied beyond the primary level than when neither did. Moreover, the additional increases in the percentage of children obtaining a lower secondary education associated with both parents having at least a secondary education versus only one parent is quite modest compared to the additional increase associated with one parent having at least a secondary education versus neither parent. The effect of both parents having at least a secondary education versus only one parent is somewhat greater on the percentage of children completing the upper secondary level but still less than the additional increases associated with one parent having at least a secondary education versus neither parent.

There also appears to be a distinct negative effect on children's education associated with at least one of the parents not completing four years of primary school, the former compulsory level of schooling. If both parents have a complete primary education (4-7 years of schooling), the proportion of their children attaining some secondary education is noticeably higher than if one or both did not complete primary school. These differences, however, are considerably less than between children with at least one parent having a secondary education and those with both parents having completed only the primary level.

The results presented in Table 5 revealed strong associations between children's education and a number of socio-economic characteristics of the family which are highly interrelated themselves. For example, rural-urban residence, parent's education, and the household wealth level are all highly intercorrelated: Rural residents are less educated and less wealthy on average than urban residents and less educated couples tend to be less wealthy than better educated couples. Nevertheless, as results in Table 7 show, each of these variables continue to show a clear association with children's education independent of the others. This is true with respect to the percentage of children completing lower as well as upper secondary school.

Without exception, at each level of household wealth in both rural and urban areas, far higher proportions of children complete lower or upper secondary school if at least one parent studied beyond the primary level than if neither did. Likewise, with only minor exceptions, the household wealth level shows a consistent positive association with the proportion of children completing lower or upper secondary school in both rural and urban areas and regardless of the educational level of the parents (as measured by whether at least one parent studied beyond the primary level). Finally, at each level of household wealth and parent's education for which there are sufficient cases to make the comparison, urban children are more likely than rural children to complete lower and upper secondary school. Clearly in Thailand, socio-economic factors have a substantial influence on the chances for a child to study at the secondary school level.

B. Availability of Schools

In addition to a variety of demographic and socio-economic characteristics affecting the chances of a child attending school at the secondary level, the availability of schools is also likely to play an important role. Information about the distance to the nearest lower and upper secondary schools, the travel time, and the type and cost of transportation was collected for each village in the rural sample of the TDHS through a community level questionnaire administered to community leaders. Although no equivalent community level information was collected for the urban sample, it can be assumed that all urban areas have both a lower and upper secondary school and thus that secondary school availability in urban areas is uniformly high.

For the purpose of the present study, availability is defined simply in terms of distance.[11] An important limitation of the information on availability of schools is that it refers only to the situation at the time of the survey and does not reflect recent changes that may have occurred. Since the number of secondary schools, especially at the lower secondary level, have been expanding rapidly, the current distance to the nearest school becomes an increasingly poor measure of availability for children at progressively older ages who graduated primary school further and further in the past.[12] Thus it is important to consider the age of the child when examining the association between the availability measure and the percentage completing lower and upper secondary education.

The association between availability of schools and the percentage completing lower and upper secondary education are presented in Table 8. The results show a consistent negative relationship between the proportion of rural children finishing lower secondary school and distance to the school for age-groups under 20. For older children the association with current availability is less consistent, probably reflecting the changing availability over the recent past. A general negative association between the percentage of children completing upper secondary school and distance to the nearest school is also evident. Since the number of upper secondary schools are not expanding in rural areas as rapidly as lower secondary schools, the results do not differ as much by age.[13] In general, urban children are more likely to complete both levels of secondary education than rural children regardless of how near the school is to the rural village.

Communities which differ in terms of accessibility to educational facilities are also likely to differ with respect to the socio-economic backgrounds of the resident families. For example, more remote villages are more likely to be characterized by greater poverty and lesser educated parents in general than are less remote villages. Thus differentials in educational attainment of children according to wealth levels or parental education may reflect in part the influence of school availability. In addition, the influence of school availability on children's education may differ according to the family's wealth level or educational background.

Table 9 examines the proportion of rural children completing or expecting to complete lower and upper secondary school as jointly related to the distance to the nearest lower and upper secondary school and both the family wealth level index and the parent's education. The results are limited to children aged 12-19 in the case of the proportion completing lower secondary schooling and children 15-24 in the case of upper secondary schooling in order to reduce the potential distortion that could arise due to changes in school availability over the recent past as discussed above.

Clearly both wealth level and parent's education continue to show a strong association with children's education regardless of the distance to secondary schools. The association between availability of schools and proportions obtaining a lower or upper secondary education also continues to be evident after controlling for wealth level and parent's education with the interesting exception of families in the lowest wealth category. This may reflect a general inability or unwillingness of the poorest segments of rural Thai society to afford to send their children to secondary school regardless of how available schools are. Without at least some minimum level of financial resources, it may not be possible for very poor families to take advantage of the increasing availability of educational facilities in rural areas.

Another interesting feature of the results is the somewhat different pattern evident with respect to upper secondary education for families in the moderate wealth level category and those in the higher category. For the former group, a considerably higher proportion of children complete upper secondary education if the school is within 15 kilometers than if it is either of the more distant categories. However, for the better

off families, a substantially lower proportion complete upper secondary only when the school is in the most distant category (i.e., more than 30 kilometers away). This could reflect an association between a family's financial status and the point at which the additional cost of sending children further distances has an impact. In general, the wealthier the family, the greater the distance a school needs to be before availability has a substantial negative impact on sending children to upper secondary school. The results for lower secondary school, however, are only partially consistent with this pattern. Having a lower secondary school in or very near the village seems to promote attendance among both the moderately wealthy and the better off families over situations where the school is somewhat further away. Nevertheless, the decline in the proportion of children completing lower secondary is considerably more for those with moderate wealth backgrounds than for those who come from better off families. This again suggests that the influence of school availability may depend on the wealth level of the family.

C. Parental preference for education

Given that attendance of primary school is compulsory in Thailand, parental preferences in regards to education has relatively little bearing on whether or not a child receives primary level schooling. In contrast, parent's attitudes towards the value and necessity of secondary education is one of several important factors, along with the family's economic ability, the availability of schools, and the child's academic aptitude and performance, that determines whether a child continues schooling beyond the primary level. In an attempt to gain a rough measure of parental attitude towards secondary education, respondents in the TDHS (i.e., ever-married women in reproductive ages) were asked the following question: "Do you think that for a person nowadays completing lower secondary school is sufficient or should they study beyond this level?" Responses to this question are likely to be in part subject to a respondent's wish to rationalize the actual educational outcomes with respect to their own children. Nevertheless, the fact that in many cases the response is at variance with their children's actual attainment suggests it is tapping a more general opinion about the importance of education in the context of present day Thailand and can serve as a rough indicator of parental preference for children's education.

Table 10 summarizes the opinions about the sufficiency of a lower secondary education among those TDHS respondents with at least one child aged 12 or older. Overall, two-thirds indicated that a lower secondary education is not sufficient for children nowadays, a little over one-fifth indicated a lower secondary education is sufficient, and the remainder indicated it depends on a variety of conditions. Opinions differed relatively little according to the age of the mother but show distinct, if generally moderate,differences according to several socio- economic background characteristics. Urban women are more likely to indicate that a lower secondary education is insufficient than are rural women. In addition, the proportion indicating that the lower secondary level is not enough increases consistently with both the woman's own educational attainment and the household wealth level. The majority Thai-speaking Buddhists are also more likely than religio-linguistic minority groups to consider a lower secondary education to be not sufficient although the higher proportions providing a conditional answer suggests that some of these groups, especially the hill tribes, may have had particular difficulty in understanding the question.

Some differences are also evident with respect to the work situation of the respondent's husband as well as her own. Employment in agriculture of either the respondent or her husband is associated with a greater likelihood to believe that lower secondary schooling is sufficient. When agricultural work is on someone else's farm, parental preferences for education seem to be lowest judging from the fact that the percent who explicitly respond that lower secondary is not sufficient is lowest among this group. Among respondents whose husbands work outside of agriculture, those who receive a regular wage or salary are least inclined towards believing that lower secondary education is sufficient and most likely to reply that a higher level is necessary nowadays.

Generally, the socio-economic differences in parental preferences for education as measured by the mother's opinion regarding the sufficiency of a lower secondary schooling are far less pronounced than actual differences in the educational attainment of their children. There is fairly widespread agreement that nowadays children need to study beyond the lower secondary level and far more mothers indicate that a lower secondary education in not sufficient than actually send their children to school beyond this level. Thus it

seems reasonable to conclude that opinions expressed in response to the question on attitudes towards secondary education are not simply rationalizations of their children's educational outcomes.

Results presented in Table 11 permit an assessment of the extent to which attitudinal differences towards the necessity of lower secondary education account for variations in the children's educational attainment according to differences in household wealth levels. Generally a pronounced positive association between the percentage of children completing either lower or upper secondary school and wealth level persists regardless of the mother's opinion concerning the sufficiency of lower secondary education. Furthermore, this pattern characterizes both rural and urban residents. At the same time, however, the mother's opinion towards secondary education is clearly associated with the child's educational attainment. Without exception, a higher percentage of children whose mothers indicate that a lower secondary education is not sufficient complete lower and upper secondary school than children whose mothers indicate that a lower secondary education is sufficient regardless of the household wealth level or rural-urban residence. In addition, children whose mothers who provide a conditional answer with respect to the sufficiency of lower secondary education are intermediate in terms of the percentage completing the two levels of secondary school. This clear association between the mother's attitude and the child's education probably reflects some combination of rationalization of actual educational outcomes and a genuine impact of prior attitudes towards education on these outcomes.

D. Multivariate Analysis

Given that virtually all of the factors that we have been examining in connection with their potential influence on educational careers of children are themselves interrelated to varying degrees, it is of considerable interest to reexamine their impacts within a more extensive multivariate framework. To do this we employ Multiple Classification Analysis (MCA).[14] Table 12 presents MCA results for both percentages completing lower and upper secondary school incorporating most of the family background characteristics examined above as well as the measure of parental preference. The results also incorporate a statistical control for the age of the child. The adjusted results indicate the net influence of each independent variable after taking into account the influence of all the others. As indicated by the squared value of the multiple correlation coefficient (.31 and .32 respectively), the variables included in the analyses together account statistically for almost a third of the total variance.

The degree of association between each of the independent variables and children's education as measured by the percentage completing either lower or upper secondary school is reduced after adjustment by MCA. This is reflected by the higher values of the Eta compared to the Beta statistic, which respectively serve to summarize the degree of association between each particular independent variable and the dependent variables before and after adjustment for other independent variables. Thus for each of the independent variables at least part, and in some cases most, of the unadjusted level of association with children's education can be attributed to their association with other factors included in the analysis that also affect children's education. Nevertheless, the educational background of the parents, the household wealth level, and to a somewhat lesser extent the father's type of work all continue to show substantial influences on the percentage of children obtaining either a lower or upper secondary education following adjustment by MCA. For example, children who have at least one parent with a secondary education are close to three times as likely to obtain a lower secondary education and more than three times as likely to obtain a upper secondary education than those with a parent who did not complete primary school after the impact of other family background characteristics and parental educational preferences are taken into account. Likewise, a similar magnitude of differences persist between children from the poorest and those from the wealthiest households. Children from families in which the father has a non- agricultural job continue to show higher percentages obtaining lower and upper secondary education than those from agricultural families, especially when the father receives a regular wage or salary. The difference between children from agricultural families in which the father works on his own or family land and those whose fathers work on someone else's farm, however, is almost eliminated after adjustment.

Much of the influence of rural-urban residence, the mother's work and the mother's opinion concerning the importance of lower secondary education can be accounted for by the other factors included in the analysis. In each case, however, the original pattern of differences is still evident in the adjusted results although in an attenuated form. In the case of mother's work, the adjusted differences are particularly small

and children whose mothers work on someone else's farm no longer exhibit an unusually low proportion obtaining secondary education at either the upper or lower level compared to other children whose mothers work on their own or family's farm or are not currently working.

Results presented in Table 13 indicate the effect of introducing availability of secondary schools (measured in terms of distance to the nearest school of each level) into the analysis. For the reasons discussed above, the results are limited to children aged 12-19 when focusing on lower secondary education and children aged 15-24 when focusing on upper secondary education. In addition, the rural- urban residence variable is not included since the availability measure incorporates this dimension. The adjusted patterns for the family background characteristics and mother's opinion concerning the importance of lower secondary education are quite similar to those presented in the previous table when school availability was not included. The addition of a measurement of availability has little effect on these associations perhaps because the rural-urban residence measure in the previous analysis already captured a considerable amount of the effect of availability. Although the degree of association with children's education is considerably reduced following adjustment for family background and the mother's educational preference, school availability continues to show a marked independent influence, particularly in the case of lower secondary education.

The earlier analysis indicated that the effect of school availability on the extent to which children continue on to secondary school in rural areas might depend on the economic ability of the parents to take advantage of nearer schools. To explore this possibility further, the association between the distance to school and children's education for rural families at different wealth levels is examined while statistically adjusting the results through MCA for other possible confounding influences. The analyses are done separately for families grouped into three categories determined by their household wealth levels. The particular division into wealth categories is designed to achieve a relatively even distribution among the categories for rural families and thus does not correspond exactly to the division used to define categories used in previous tables. Results are presented in Table 14 incorporating statistical adjustment for parents' education, father's work and mother's opinion about lower secondary education.

In general, the results are similar to those presented earlier based on cross-tabular analysis. Regardless of distance to the nearest school, children from families in the high wealth category are the most likely to obtain either a lower or upper secondary education and children from families in the low wealth category are the least likely to do so.

Perhaps the most interesting aspect of the results are the relatively clear but distinctive patterns of association between distance to school and lower secondary education found within each of the three wealth categories. For the poorest group, the adjusted results show little relationship between distance to school and the percent obtaining a secondary education. Regardless of how near the school is, only a modest percent of children from the poorest households go beyond the compulsory primary level. Among the wealthiest group, the adjusted results indicate that distance is only a barrier to high percentages obtaining a lower secondary education when the school is quite far away. For the middle group, there is a consistent and sharp reduction in the percentages obtaining a lower secondary education with each increase in distance to the school.

Obtaining an upper secondary education shows virtually no relationship to distance to the nearest upper secondary school for children of the poorest families once the results are adjusted for other potentially confounding influences. Distance also appears to play only a minor role for the moderate wealth category judging from the adjusted results, although a weak inverse relationship is evident. A somewhat stronger and generally inverse association between obtaining a upper secondary education and distance to school is evident for the wealthiest rural families. The contrast between the patterns of association between distance to school and children's education for the middle and higher wealth groups, however, is not as clear with respect to upper secondary education as it is for the lower secondary level.

Since additional details of the constraints felt by rural families with respect to sending their children past the compulsory primary level were not solicited from respondents in the TDHS, interpretation of these findings is necessarily speculative. Quite possibly, for poor families the costs involved in sending children to lower secondary school (including opportunity costs) other than those simply incurred through commuting

are sufficient to deter attendance. For families who are better off, but whose means are still quite modest, increases in daily commuting costs (including the additional opportunity costs implied by longer commuting times) associated with even modest increases in distance may play an important role in determining whether children continue to secondary school. For families in higher wealth categories, a deterring effect may emerge only once the school is too far away to permit daily commuting and differences in distances within the commuting range and the associated differences in transportation costs may be relatively unimportant. Differences between rural families of different wealth levels with respect to the pattern of effects of school accessibility on upper secondary education may be less clear because the distances involved are so much greater than for lower secondary education. Hence convenient daily commuting is feasible in far fewer cases.

If this interpretation is correct, it appears that rural families with modest financial resources are the most sensitive to school accessibility and stand the most to gain when lower secondary schools become available in or near to the community. Since increases in the number of upper secondary schools, at least initially, would reduce distances in most cases to moderate but not very near levels, the wealthiest rural families, who are less constrained by distance to school provided the distance is not excessive, would probably be the ones to benefit most. Middle wealth level families might find the commuting costs (and perhaps the opportunity costs) too prohibitive even when a lengthy daily commute is possible. In contrast, poor rural families appear to lack the resources to send their children on past the compulsory level even when lower secondary schools are nearby. Thus to substantially improve the proportion of poor rural children who pursue a secondary education more than making schools available nearby is probably needed. Measures directed at this group might require extensive programs of direct financial aid if a significant improvement is to be effected.

IV. Conclusions

Results from the TDHS illustrate that valuable information on children's education can be collected through supplementary questions added to demographic or related surveys that enumerate the full set of the respondents' children. This approach has considerable advantages over collecting educational information only for children present in the household. Given that attendance of even secondary levels of schooling often require residing apart from the parental household, especially in developing countries, limiting educational information to only children who currently reside in a household can yield very misleading results with respect to the extent to which children are educated as well as with respect to associations between children's education and parental characteristics.

The TDHS also illustrates that by including questions on educational expectations for children, reasonable estimates of the likely educational outcome for a substantial proportion of children still in school can be ascertained thereby enlarging the set of children on which analyses of final educational attainment can be based. Difficulties in determining realistic and specific educational expectations, however, should not be underestimated. Not all parents have clear ideas about how far their children will study. Indeed, in reality the actual outcome will depend on a number of contingencies that are recognized by parents and thus it may not be possible to avoid having at least some responses stated in terms of such contingencies. The particular approach used in the present study to elicit more realistic expectations by attempting to distinguish desired from affordable levels seemed to have had some success but not to such an obvious degree that could justify recommending it without considerable reservations.

Despite the variety of difficulties involved, a substantial proportion of parents in most societies probably have a reasonably realistic idea of the general level to which a child will study even if they can not specify an exact final grade. An even higher proportion will probably know at least the minimum level to which their child will study. Information on these expectations together with the actual educational attainment up to the time of the survey can serve as the basis for constructing useful measures of the likely eventual level of education for a large proportion of children in the sample, especially those at or above ages at which critical steps in the education system are reached.

Analysis of the TDHS results reveals clear and pronounced associations between the chances of a child receiving a lower or upper secondary education and the child's family background. Both the educational attainment of parents and the household wealth level appear to exert strong independent influences. Children

from families in which at least one parent has attended secondary or higher levels of schooling and children from the wealthiest stratum have far higher probabilities of going to secondary school than children from the least educated or poorest families. Likewise children from non-agricultural families, and especially ones in which the father receives a regular wage or salary, are considerably more likely to obtain a secondary education than children from agricultural families. Parental educational preferences, as indicated by the mother's opinion about the importance of secondary education, also exert some influence but appears to be less critical than family background, probably because of relatively widespread agreement among most segments of Thai society that secondary education is important nowadays.

While family background exerts considerable influence on children's educational chances, so does the availability of schools. Overall, children living in urban areas or those in rural areas with nearby secondary schools are more likely to attain a secondary education than those who must travel further distances. The rapid expansion of the number of secondary schools, especially at the lower secondary level, undoubtedly continues to have considerable potential to contribute to the rising proportions of children who are studying beyond the compulsory primary level. Given the strong association between parents' and children's education, the trend being fostered by increased school availability should reinforce itself in succeeding generations. The TDHS results also suggest, however, that the poorest families in rural areas appear to be least responsive to improved school availability, presumably because financial constraints prevent them from sending children to school even when the school is nearby. In these cases, measures beyond the expansion of schools are called for to overcome the overwhelming disadvantages of severe poverty if more equitable access to secondary education is to be achieved.

NOTES

1 Much of this discussion is based on the descriptions of the Thai educational system provided in the Statistical Yearbook and the series entitled Final Report on Educational Statistics, both issued by the National Statistical Office.

2 According to enrollment figures for 1975, only 1.7 percent of vocational students were in the lower secondary level. This declined to 0.4 percent by 1978, the last year for which a lower secondary level existed for the vocational stream.

3 The situation was changing, however, as the number of communes in which compulsory schooling was extended through the upper primary level increased.

4 In the present study, lower vocational education is treated as equivalent to the upper secondary level. As noted in the discussion of the Thai educational system, a very small proportion of children who received lower vocational education under the system existing prior to 1978 may have the equivalent of only a lower secondary education. In the TDHS data it is not possible to distinguish these from the vast majority of children with lower vocational education at the upper secondary level. Since only a very small number of cases are likely to be misclassified, the results are unlikely to be affected in any perceptible way.

5 Data from the 1980 census reveal a similar pattern. For example,among 20-24 year olds, 25 percent of males compared to 19 percent of females completed at least lower secondary school while 15 percent of males and 14 percent of females had at least an upper secondary level education.

6 In the TDHS data set, residence refers to where the child's mother is currently residing and not to the child's place of current residence. Thus a child attending school in an urban area but whose mother lives in a rural village is classified as rural.

7 Although the various hill tribes differ from each other both culturally and linguistically, they are treated as a single group in the present study because of limited numbers. There are also other ethnic groups among the Thai population but they either can not be identified on the basis of information in the TDHS questionnaire or are represented by too few cases to be examined separately.

8 More specifically, the index is the sum of points scored by the household according to the following scheme: 1 point for having a bicycle, 3 for a motorcycle, 5 for a car/truck/minibus; 1 point for a septic tank/sanitary pit type toilet, 3 for a flush toilet; 1 point for unpolished wood as flooring, 3 points for a cement/vinyl/asphalt floor and 5 for a parquet/polished wood/tile type floor. No points are given for an open pit toilet (or the absence of toilet facilities) or a dirt/sand floor. Note that a household may have several types of vehicles and thus receive points for each but has only one type of toilet or flooring for the purpose of this scale. Note also that the wealth index reflects the current situation of the household at the time of the survey and not necessarily the situation at the time the children were (or will be) at the critical transition points in their educational careers. This drawback may not be particularly serious in the present analysis since wealth levels are likely to correlate over time and the status of the household with respect to the particular items included in the index may not change frequently.

9 In cases in which the respondent was not currently married, she was asked about her most recent husband's work at the time they lived together.

10 Note that generally the indicators of work for both the respondent and her husband refer to the present time and do not necessarily reflect the situation at the time when critical decisions are (or will be) made about any particular child's education. Nevertheless, given the likelihood of considerable continuity in at least the broad type of work done by a couple, the work indicators are probably still of considerable potential relevance.

11 For several villages information on the distance to either lower or upper secondary school was missing in the original community questionnaire and had to be estimated indirectly based on other available information (e.g., travel time, taking into account the means of transportation used).

12 For example, according to statistics published by the National Statistical Office, the number of public secondary schools more than tripled from 515 to 1630 between 1970 and 1984.

13 Although published statistics are not available to determine trends in the number of secondary schools by levels in rural areas, the slower expansion of upper secondary can be inferred by their far greater distances than lower secondary schools for the vast majority of villages included in the TDHS community survey.

14 Since the dependent variables are dichotomous, a technique such as logistic regression would be preferable from a technical statistical vantage point. Nevertheless the results yielded by MCA are unbiased and are unlikely to differ greatly from those yielded by technically more appropriate techniques, especially since the two dependent variables in the present analysis are not extremely skewed. MCA has the advantage of yielding results that are easier to present and interpret.

Table 1 The percent distribution of the achieved level of education among children who have finished their schooling, the percent distributions of the current level of schooling, the final level desired by the mother, the highest level the mother believes can be afforded, and the projected final level among children still in school, and the percent distribution of the combined achieved and projected final level among all children 6 years old or over

	Finished schooling	Still in school				
	Achieved level	Current level	Desired level	Affordable level	Projected level	Combined achieved and projected level
No schooling	2.8	0.1	-	-	-	1.3
Primary	74.8	70.2	18.9	23.0	23.9	46.9
Lower secondary	7.9	15.1	6.5	7.9	6.7	7.3
Lower vocational	4.1	4.0	1.9	1.9	1.9	2.9
Upper secondary	6.0	6.4	7.3	8.5	6.9	6.5
Upper vocational	2.4	1.2	2.4	1.7	2.2	2.3
Bachelor's degree	1.8	2.7	11.2	8.2	9.8	6.2
Graduate degree	0.0	0.0	1.6	1.1	1.3	0.7
Lower level occupation	-	-	0.8	0.2	0.2	0.1
High as possible	-	-	7.1	1.5	2.4	1.3
Up to child's ability	-	-	20.6	21.1	19.6	10.8
Up to child's will	-	-	12.3	7.0	12.3	6.8
Up to economic situation	-	-	3.6	11.4	7.3	4.0
Don't know	0.2	0.2	5.0	4.4	4.5	2.6
Other	0.0	0.1	0.8	2.2	0.9	0.5
Total percent	100	100	100	100	100	100
Total N	5,316	6,508*	6,480	6,480	6,480	11,796

Note: Results presented in this table are unweighted. Children who have not yet entered school and are under age 10 are excluded. Results for the achieved level assume "no schooling" for children aged 10 and older who have not entered school. The projected level is constructed from combining the desired and affordable levels as described in the text. The combined achieved and projected level is constructed from the achieved level for children who finished school and the projected level for those still in school.

* Includes 28 children for whom the desired or affordable level is coded as 'no response'.

Table 2 Percent distribution of the highest level of schooling the mother believes she can afford for the child by the highest level desired for the child, among children aged 6 and over who are still in school

Affordable level	Desired level									
	Less than grade 6	Grade 6 exactly	Lower secondary	Lower voc./ upper sec.	Upper vocational	BA or higher	High as possible	Up to child's will/ability	Up to econ. situation	All else
Less than grade 6	71.1	0.2	0.0	0.0	0.6	0.0	0.0	0.1	0.4	0.0
Grade 6	2.6	89.4	10.4	8.2	0.0	3.7	19.0	5.0	14.1	10.7
Lower secondary	0.0	1.9	63.7	6.4	4.5	1.9	8.9	3.5	6.0	6.7
Lower voc./ upper sec.	2.6	0.5	0.7	60.7	4.5	4.2	13.5	7.3	7.7	4.9
Upper vocational	0.0	0.0	0.0	0.0	48.4	0.4	0.9	1.1	1.3	0.5
BA or higher	0.0	0.0	0.2	0.5	1.3	52.0	6.1	5.8	0.9	2.1
High as possible	0.0	0.1	0.0	0.3	3.2	1.1	7.8	1.8	1.3	1.2
Up to child's will/ability	5.3	1.9	8.5	7.6	27.4	25.6	22.2	59.6	5.6	17.6
Up to economic situation	5.3	3.0	14.7	10.1	6.4	6.9	17.2	11.5	54.7	13.7
All else	13.2	3.2	1.7	6.2	3.8	4.2	4.4	4.3	8.1	42.5
Total percent	100	100	100	100	100	100	100	100	100	100
Total N	38	1,186	422	595	157	829	459	2,129	234	368

Note: Results presented in this table are unweighted

Table 3 Among children still in school, the percentage for whom a specific level of education can be projected and among all children aged 6 and over, the percentage who finished their schooling and percentage for whom a specific final level of education is known or can be projected

	Current age of child							
	6-8	**9-11**	**12-14**	**15-17**	**18-20**	**21-24**	**25+**	**Total**
Of children still in school								
% for whom a specific level of education can be projected	54	57	49	45	46	56	61	53
Number of children still in school*	1,874	2,138	1,258	7441	348	108	13	6,480
Of all children*								
% who finished schooling	0	3	39	62	77	92	98	45
% for whom a specific final level of education is known or projected	54	59	69	79	88	96	99	74
Total number of children*	1,885	2,125	2,072	1,949	1,556	1,355	809	11,841

Note: Results presented in this table are unweighted.

* Excluding children under 10 who have not entered school and children for whom current status with respect to school attendance is unstated

** The number of children on which the specific results are based varies slightly due to exclusion of cases with non-stated information

Table 4 Percent distribution of children according to the type of determination of whether or not they have or will complete lower and upper secondary school (or the vocational equivalent), by age of child

	Current age of child							
	6-8	9-11	12-14	15-17	18-20	21-24	25+	Total
Completion of lower secondary school								
Of all children:								
Directly observed	0	3	40	86	99	100	100	53
Projected	57	58	50	14	1	0	0	31
Indeterminate	43	38	10	0	0	0	0	16
Total percent	100	100	100	100	100	100	100	100
Total number	1874	2207	2064	1942	1548	1343	802	11775
Of children for which measure is determinate:								
Directly observed	0	5	45	86	99	100	100	63
Projected	100	95	55	14	1	0	0	37
Total percent	100	100	100	100	100	100	100	100
Total N	1067	1356	1851	1933	1542	1343	802	9894
Completion of upper secondary school (or vocational equivalent)								
Of all children								
Directly observed	0	3	39	63	86	99	100	47
Projected	54	56	31	30	13	1	0	31
Indeterminate	46	41	30	7	1	0	0	22
Total percent	100	100	100	100	100	100	100	100
Total N	1874	2203	2062	1942	1549	1342	802	11774
Of children for which measure is determinate:								
Directly observed	0	6	56	67	87	99	100	60
Projected	100	94	44	33	13	1	0	40
Total percent	100	100	100	100	100	100	100	100
Total N	1017	1298	1435	1805	1538	1341	802	9234

Note: Results presented in this table are unweighted and exclude children under 10 who have not entered school and children for whom current status with respect to school attendance is unstated.

Table 5 Percentage of children completing or expected to complete lower and upper secondary school, by selected demographic and socio-economic background characteristics

	Completion of lower secondary school (children 12 and over)		Completion of upper secondary school (children 15 and over)	
	Weighted %	Unweighted N*	Weighted %	Unweighted N*
Total	34	7471	24	5484
Age of child				
12-14	36	1851	-	-
15-17	36	1933	24	1803
18-20	36	1542	25	1538
21-24	32	1343	24	1341
25+	27	802	18	802
Sex of child				
Boy	37	3784	24	2787
Girl	31	3687	23	2697
Rural-urban residence				
Rural	28	5391	19	3985
Urban	72	2080	56	2499
Region				
Bangkok	69	1049	54	764
Other central	41	1657	26	1244
North	29	1530	19	1158
Northeast	23	1638	17	1160
South	41	1597	27	1158
Religio-linguistic ethnicity				
Thai-speaking Buddhists	35	6622	24	4870
Thai-speaking Moslems	40	424	19	303
Malay-speaking Moslems	21	136	9	105
Cambodian	7	80	4	50
Hill tribe	20	111	8	80
Other	79	98	68	76
Education of mother				
0-3 years	20	1947	12	1536
4-7 years	36	4968	24	3571
Secondary	92	418	85	290
Beyond secondary	100	138	99	87
Education of father				
0-3 years	18	1119	11	901
0-7 years	30	5051	18	3675
Secondary	79	989	70	692
Beyond secondary	100	223	96	152

Table 5 (continued)

	Completion of lower secondary school (children 12 and over)		Completion of upper secondary school (children 15 and over)	
	Weighted %	Unweighted N*	Weighted %	Unweighted N*
Household wealth level				
Lowest	11	828	5	593
Low	22	2645	13	1949
Moderate	39	2116	27	1624
High	62	1026	48	738
Highest	75	847	61	572
Father's work**				
Non-agricultural with regular wage or salary	70	1528	59	1077
Non-agricultural without regular wage or salary	51	1596	38	1159
Agricultural on own or family farm	23	3353	13	2482
Agricultural on someone else's farm	17	863	8	664
Mother's work				
Non-agricultural	57	22000	42	1553
Agricultural on own or family farm	27	2105	17	1542
Agricultural on someone else's farm	18	705	10	533
Not working	29	2433	21	1839

Note: The percentage completing the stated level includes both those who had already completed the level plus those projected to complete the level.

* The number of cases for the different categories of a particular background variable may not sum to the overall total due to differences in the number of cases with unknown values for the particular variable.

** Refers to current or most recent husband by respondent.

Table 6 Percentage of children completing or expected to complete lower and upper secondary school, by education of father and mother

A. Percentage completing lower secondary school among children aged 12 or older

	Education of mother			
Education of father*	**0-3 years**	**4-7 years**	**Secondary or above**	**Total**
0-3 years	16	20	-	18
4-7 years	18	32	83	30
Secondary or above	73	76	98	82
Total	20	36	94	34

B. Percentage completing upper secondary school among children aged 15 or older

	Education of mother			
Education of father*	**0-3 years**	**4-7 years**	**Secondary or above**	**Total**
0-3 years	10	13	-	11
4-7 years	10	20	68	18
Secondary or above	52	67	96	74
Total	12	24	88	24

Note: Results based on less than 20 cases are not shown. All results shown are based on weighted calculations.

* Refers to current or most recent husband of respondent. Results are not shown for cases for which the father's education is unknown.

Table 7 Percentage of children completing or expected to complete lower and upper secondary school, by parents' education, rural-urban residence and household wealth level

Rural-urban residence and household wealth level	Educational measure for child and whether at least one parent studied beyond primary school					
	% completing lower secondary school (children 12 and over)			% completing upper secondary school (children 15 and over)		
	Neither parent	At least one parent	Total*	Neither parent	At least one parent	Total*
National						
Lowest	10	(45)	11	4	(31)	5
Low	20	68	22	11	53	13
Moderate	33	77	39	20	69	27
High	54	89	62	36	88	48
Highest	58	98	75	41	90	61
Total**	27	82	34	16	74	34
Rural						
Lowest	9	(42)	11	4	(26)	5
Low	19	60	20	10	47	11
Moderate	29	74	34	18	68	24
High	49	84	55	32	87	42
Highest	49	96	65	29	86	48
Total**	24	76	28	14	68	19
Urban						
Lowest	(32)	-	(40)	(16)	-	(30)
Low	40	78	50	22	62	32
Moderate	59	84	67	39	72	50
High	70	96	80	48	90	64
Highest	85	100	94	75	94	86
Total**	59	91	72	41	81	56

Note: Results in parentheses are based on less than 20-49 unweighted cases; results based on less than 20 unweighted cases are not shown. All results shown are based on weighted calculations. In cases where the father is education is unknown, determination of the whether at least one parent studied beyond secondary school is based on the mother only.

* Including cases with unknown values for parents' education
** Including cases with unknown values of household wealth

Table 8 Percentage of children completing or expected to complete lower and upper secondary school, by distance to schools and age of child

	Age of child				
	12-14	**15-19**	**20-24**	**25+**	**Total**
Distance to lower secondary school					
	% completing lower secondary				
Urban	79	76	66	49	72
Rural					
0-2 km.	47	44	35	31	41
3-5 km.	35	35	38	40	37
6-10 km.	27	28	24	15	26
11-15 km.	20	22	21	24	21
16+ km.	13	11	8	2	10
Distance to upper secondary school					
	% completing upper secondary				
Urban	-	63	53	37	56
Rural					
0-5 km.	-	48	44	(76)	53
6-15 km.	-	22	23	14	21
16-30 km.	-	22	19	8	19
31+ km.	-	14	16	9	14

Note: Results in parentheses based on less than 50 unweighted cases. All results shown are based on weighted calculations.

Table 9 Percentage of children of rural families completing or expected to complete lower and upper secondary school, by distance to schools, household wealth level and parents' education

	% completing lower secondary school among children ages 12-19		
	Distance to lower secondary school		
	0-5 km	6-10 km	11+ km
Household wealth level			
Lowest	13	17	8
Low	30	18	12
Moderate	47	37	18
High and highest	70	53	46
Parents' education			
Neither above primary	34	25	15
At least one above primary	80	75	53

	% completing upper secondary school among children ages 15-24		
	Distance to upper secondary school		
	0-15 km	16-30 km	31+ km
Household wealth level			
Lowest	5	8	5
Low	18	14	10
Moderate	33	21	22
High and highest	52	47	35
Parents' education			
Neither above primary	21	15	13
At least one above primary	80	61	60

Table 10 Percent distribution of mothers with at least one child aged 12 and over according to opinion as to whether lower secondary education is sufficient for a young person nowadays, by selected background characteristics

Total	Sufficient	Depends	Not sufficient	Total percent	Unweighted N
Total	22	11	67	100	2750
Age of mother					
Under 35	24	9	67	100	479
35-39	20	13	67	100	786
40-44	23	10	67	100	754
45-49	22	11	67	100	731
Rural-urban residence					
Rural	24	11	65	100	1908
Urban	10	12	77	100	842
Education of mother					
0-3 years	25	18	57	100	588
4-7 years	23	9	68	100	1906
Secondary or above	3	8	89	100	256
Religio-linguistic ethnicity					
Thai-speaking Buddhists	22	10	68	100	2446
Thai-speaking Moslems	28	17	55	100	139
Malay-speaking Moslems	31	7	62	100	60
Cambodians	27	13	61	100	31
Hill tribes	13	35	51	100	34
Other	16	19	65	100	40
Household wealth level					
Lowest	31	14	54	100	285
Low	27	9	63	100	852
Moderate	17	12	71	100	750
High	14	12	74	100	404
Highest	9	10	81	100	357
Husband's work					
Non-ag., regular pay	10	11	79	100	671
Non-ag., no regular pay	18	13	69	100	609
Ag., own or family farm	27	10	64	100	1149
Ag., other's farm	27	14	59	100	289
Respondent's work					
Non-agricultural	16	12	72	100	909
Ag., own or family farm	24	10	67	100	727
Ag., other's farm	29	16	55	100	235
Not working	23	10	67	100	879

Table 11 Percentage of children completing or expected to complete lower and upper secondary school, by mother's opinion as to whether lower secondary education is sufficient for a young person nowadays, by rural-urban residence and household wealth level

Rural-urban residence and household wealth level	% completing lower secondary school (children 12 and over)			% completing upper secondary school (children 15 and over)		
	Sufficient	Depends	Not Sufficient	Sufficient	Not Depends	Not Sufficient
Total	18	33	40	9	25	29
National						
Lowest	7	11	15	4	5	6
Low	12	17	28	5	11	17
Moderate	25	38	43	11	29	31
High	53	55	65	36	45	50
Highest	49	86	78	31	70	65
Total	18	33	40	9	25	29
Rural						
Lowest	8	11	14	4	4	6
Low	11	14	25	5	10	15
Moderate	23	36	37	11	27	27
High	48	41	59	32	33	45
Highest	43	(78)	67	(23)	(53)	52
Total	16	26	34	8	19	23
Urban						
Low*	29	39	57	11	(19)	39
Moderate	44	51	73	15	41	57
High	(72)	90	80	(51)	(75)	65
Highest	(76)	97	95	-	(91)	86
Total	46	67	76	27	53	61

Note: Results in parentheses are based on 20-49 unweighted cases; results based on less than 20 unweighted cases are not shown. All results shown are based in weighted calculations

* Includes "lowest" category

Table 12 Multiple classification analysis of the percentage of children completing or expected to complete lower and upper secondary school incorporating selected characteristics of the parents

	Completion of lower secondary (children 12 and over)		Completion of upper secondary (children 15 and over)	
	Unadjusted	**Adjusted**	**Unadjusted**	**Adjusted**
Overall mean	34	34	24	24
Parents' education*				
One or both not completed primary**	19	22	11	15
Both completed primary	32	35	20	23
One or both beyond primary	82	59	74	53
Eta/Beta	.40	.22	.44	.27
Household wealth level				
Lowest	11	20	5	13
Low	22	27	13	18
Moderate	39	38	27	26
High	62	51	48	37
Highest	75	57	61	44
Eta/Beta	.40	.23	.39	.21
Rural-urban residence				
Rural	29	33	19	23
Urban	72	45	56	31
Eta/Beta	.31	.09	.30	.07
Father's work***				
Non-ag., regular pay	70	48	59	39
Non-ag., not regular pay	51	40	38	29
Ag., own or family farm	23	30	13	20
Ag., someone else's farm	17	29	8	18
Eta/Beta	.39	.15	.42	.17
Mother's work				
Non-agricultural	57	39	42	27
Ag., own or family farm	27	36	17	24
Ag., someone else's farm	19	31	10	22
Not working	29	30	21	22
Eta/Beta	.27	.08	.25	.05
Mother's opinion about lower secondary education				
Sufficient	18	27	9	17
Depends	33	33	25	24
Not sufficient	40	37	29	26
Eta/Beta	.19	.09	.19	.08
Total R-SQUARED	-	.31	-	.32

Note: Results are based on cases with non-missing values for all variables shown and thus unadjusted results may differ slightly from those presented in previous tables. Adjusted results reflect an additional adjustment for the age of child achieved by entering the child's age and the square of the age as covariates in the MCA.

* If father's education is unknown it is assumed to be the same as the mother's education.

** Excluding cases in which one has secondary education.

*** Refers to current or most recent husband.

Table 13 Multiple classification analysis of the percentage of children completing or expected to complete lower and upper secondary school incorporating selected characteristics of the parents and distance to the nearest secondary school

	Completion of lower secondary (children 12-19)		Completion of upper secondary (children 15-24)	
	Unadjusted	**Adjusted**	**Unadjusted**	**Adjusted**
Overall mean	36	36	25	25
Parents' education*				
One or both not completed primary***	20	26	11	15
Both completed primary	33	36	21	24
One or both beyond primary	84	58	74	53
Eta/Beta	.40	.20	.44	.26
Household wealth level				
Lowest	13	23	5	13
Low	24	29	14	19
Moderate	42	40	28	27
High	63	53	50	39
Highest	78	58	62	43
Eta/Beta	.42	.23	.39	.21
Distance to secondary school (in kilometers)***				
Lower Urban / Rural	77	52	60	36
Upper Urban / Rural				
0-2 / 0-5	46	43	48	36
3-5 / 6-15	36	36	23	24
6-10 / 16-30	28	33	21	23
11-15 / 31+	21	30	15	21
16+	12	23	-	-
Eta/Beta	.40	.18	.36	.12
Father's work****				
Non-ag., regular pay	70	46	59	36
Non-ag., not regular pay	55	42	42	30
Ag., own or family farm	25	33	15	21
Ag., someone else's farm	20	32	9	19
Eta/Beta	.38	.11	.41	.14
Mother's work				
Non-agricultural	61	41	44	28
Ag., own or family farm	29	39	18	26
Ag., someone else's farm	22	33	11	23
Not working	29	32	21	22
Eta/Beta	.29	.08	.26	.06

Table 13 (continued)

	Completion of lower secondary (children 12-19)		Completion of upper secondary (children 15-24)	
	Unadjusted	**Adjusted**	**Unadjusted**	**Adjusted**
Mother's opinion about lower secondary education				
Sufficient	20	28	10	18
Depends	33	36	24	24
Not sufficient	43	39	30	27
Eta/Beta	.20	.09	.19	.09
Total R-SQUARED	-	.32	-	.32

Note: Results are based on cases with non-missing values for the variables shown. Results for completion of the upper secondary level reflect an additional adjustment for the age of child achieved by entering the child's age and the square of the age as covariates in the MCA.

* If father's education is unknown it is assumed to be the same as the mother's education.

** Ecluding cases in which one has secondary education.

*** Distance to lower secondary school is considered when examing completion of the lower secondary level; distance to upper secondary school is considered when examining completion of the upper secondary level

**** Refers to current or most recent husband.

Table 14 The percentage of rural children completing or expected to complete lower and upper secondary school by household wealth level and distance to nearest secondary school, unadjusted and adjusted for selected characteristics of parents

Dependent variable and distance to corresponding school*	Low wealth		Middle wealth		High wealth	
	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.
% completing lower secondary (children 12-19)						
0-2 km.	17	16	53	48	69	63
3-5 km.	17	15	38	38	73	68
6-10 km.	16	15	30	32	53	56
11-15 km.	8	9	24	25	67	73
16+ km.	8	10	14	18	23	34
Eta/Beta	.11	.08	.26	.20	.30	.21
% completing upper secondary (children 15-24)						
0-15 km.	10	8	28	25	52	50
16-30 km.	8	7	22	23	41	43
31-60 km.	8	8	20	21	36	44
61+ km.	4	9	18	19	32	34
Eta/Beta	.07	.06	.09	.16	.16	.11

Note: Results are based on cases with non-missing values for all variables included in the analysis of schooling at the particular level (i.e., lower or upper secondary). Statistical adjustment is made through Multiple Classification Analysis and incorporates parents' education, father's work, and mother's opinion about the sufficiency of lower secondary education as categorized in the previous table. Household wealth level has been recategorized compared to levels shown in previous tables in order to obtain a more even distribution for rural households.

* Distance to lower secondary school is considered when examining completion of the lower secondary level; distance to upper secondary school is considered when examining completion of the upper secondary level

Appendix A Reproduction of questions used to determine educational attainment and expectations for children 6 years old and over

Questions on educational attainment and expectations, asked for each living child aged six and over, were annexed to the birth history section of the standard DHS questionnaire. These questions were asked and the answers recorded within the framework of the birth history form which contained identifying information for each child.

*218A Ask only about those 6 years old and older : Has (Name) entered school yet?	*218B Is (Name) still in school or has (Name) finished school?	*218C What level is (Name) studying/finished?	For only those still in school : *218D To what level of schooling would you like to send (Name)? *218E To what level of schooling do you think you can afford to send (Name)? (Probe)
YES .... 1 → NO .... 2 ↓	IN SCHOOL ...... 1 FINISHED 2	GRADE ☐☐	*218D GRADE ..... ☐☐ *218E GRADE ..... ☐☐
YES .... 1 → NO .... 2 ↓	IN SCHOOL ...... 1 FINISHED 2	GRADE ☐☐	*218D GRADE ..... ☐☐ *218E GRADE ..... ☐☐
YES .... 1 → NO .... 2 ↓	IN SCHOOL ...... 1 FINISHED 2	GRADE ☐☐	*218D GRADE ..... ☐☐ *218E GRADE ..... ☐☐
YES .... 1 → NO .... 2 ↓	IN SCHOOL ...... 1 FINISHED 2	GRADE ☐☐	*218D GRADE ..... ☐☐ *218E GRADE ..... ☐☐
YES .... 1 → NO .... 2 ↓	IN SCHOOL ...... 1 FINISHED 2	GRADE ☐☐	*218D GRADE ..... ☐☐ *218E GRADE ..... ☐☐
YES .... 1 → NO .... 2 ↓	IN SCHOOL ...... 1 FINISHED 2	GRADE ☐☐	*218D GRADE ..... ☐☐ *218E GRADE ..... ☐☐
YES .... 1 → NO .... 2 ↓	IN SCHOOL ...... 1 FINISHED 2	GRADE ☐☐	*218D GRADE ..... ☐☐ *218E GRADE ..... ☐☐
YES .... 1 → NO .... 2 ↓	IN SCHOOL ...... 1 FINISHED 2	GRADE ☐☐	*218D GRADE ..... ☐☐ *218E GRADE ..... ☐☐
YES .... 1 → NO .... 2 ↓	IN SCHOOL ...... 1 FINISHED 2	GRADE ☐☐	*218D GRADE ..... ☐☐ *218E GRADE ..... ☐☐
YES .... 1 → NO .... 2 ↓	IN SCHOOL ...... 1 FINISHED 2	GRADE ☐☐	*218D GRADE ..... ☐☐ *218E GRADE ..... ☐☐
YES .... 1 → NO .... 2 ↓	IN SCHOOL ...... 1 FINISHED 2	GRADE ☐☐	*218D GRADE ..... ☐☐ *218E GRADE ..... ☐☐
YES .... 1 → NO .... 2 ↓	IN SCHOOL ...... 1 FINISHED 2	GRADE ☐☐	*218D GRADE ..... ☐☐ *218E GRADE ..... ☐☐

Appendix B Determination of projected level of education when response categories for desired and affordable levels of education differed

Response category of desired level	Response category of affordable level	Category chosen for projected level
specific level	specific level	lower of the two
	"up to economic situation"	"up to economic situation"
	all other categories	specific desired level
low level occupation	all categories	affordable category
"high as possible"	specific level	specific affordable level
	"up to economic situation"	"up to economic situation"
	all other categories	desired category
"up to child's ability"	primary level or less	specific affordable level
	all other levels or categories	"up to child's ability"
"up to child's will"	all categories	"up to child's will"
"up to economic situation"	specific level	specific affordable level
	all other categories	"up to economic situation"
"don't know"	primary or less	specific affordable level
	all other categories	"don't know"
other	all categories	other

Appendix C Determination of achieved or likely levels of educational attainment

Outcome category	Achieved or likely completion of lower secondary level	Achieved or likely completion of upper secondary or lower vocation level
No	If finished school no school completed less than Maw 3	If finished school no school completed less than Maw 6 or lower vocational
	If still in school projected specific level below Maw 3	If still in school projected specific level below Maw 6 or lower vocational
Yes	If finished school completed Maw 3 or above	If finished school completed Maw 6, lower vocational or above
	If still in school Current grade Maw 1 or above* Current grade below Maw 1 and projected education: - specific level at least lower secondary - "as high as possible"	If still in school Current grade Maw 4 or 1st year vocation or above* Current grade below Maw 4 or 1st year vocational and projected education a specific level above Maw 6 or lower vocational Current grade Maw 3 and projected education "high as possible"
Indeterminant	Still in school, current grade less than Maw 1 and projected education: - "up to future economic situation" - "up to child's will or ability" - low level occupation - "don't know - other	Still in school, current grade Maw 3 or less, and projected education: - "up to future economic situation" - "up to child's will or ability" - low level occupation - "don't know" - other Still in school, current grade Maw 2 or less, and projected education "high as possible"

* It is assumed that children currently in lower secondary, upper secondary or lower vocational will eventually complete that level irrespective of the response to questions on the desired and affordable level

Marriage Registration among Thai Women

Napaporn Chayovan

Abstract

This paper examines the types of marriage among Thai women. Special attention is given to the trends and the prevalence of marriage registration and its correlates. The study utilizes existing data from the 1987 Thailand Demographic and Health Survey (TDHS) conducted by the Institute of Population Studies, Chulalongkorn University. The information used is based on additional questions unique to TDHS. The two questions added are:

Q 502A - Did you officially register your marriage?
Q 502B - Did you have any ceremony?

Since information on the year (or duration) of marriage is only available with respect to a respondent's first marriage, and since questions on registration and ceremony refer to the current marriage, the determination of trends has to be based on women who have been married only once. The types of marriage are divided into four categories: consensual union, marriage by ceremony only, marriage by registration only, and marriage by both ceremony and registration. It is found that the most popular form of marriage among Thai women is to have both a ceremony and marriage registration; the other forms in order of popularity are marriage by ceremony only, consensual union, and marriage by registration only. Overall 80 percent of ever married women aged 15-49 are married by ceremony and more than half (55 percent) register their marriages. Due to data limitations the prevalence of marriage registration could be overestimated and the consensual union could be underestimated. Since the reference period was not stated in the questions on marriage ceremony and registration, information on the type of marriage (either with regards to ceremony or registration) provided does not refer to the status of the marriage when it was initiated but incorporates events that could have taken place after the actual event of living together by forming a consensual union. The decline in the prevalence of consensual union and an increase in the proportion of marriages by registration according to age or marriage duration strongly suggest the presence of a delay in the registration of marriage. The extent and the duration of postponement in marriage registration, however, cannot be determined.

It was expected that with the increase in education and awareness of family laws marriage registration should increase over time. Results of this study, however, do not reflect the expected trends in marriage registration. Instead the level of marriage registration is found to increase with marriage duration, reflecting the likelihood of postponement in registration of marriage.

Concerning factors related to marriage registration, it is found that women married only once are more likely to register their marriage than women married more than once. Education is positively associated with marriage registration. Among women married only once, 90 percent of those with high education registered their marriage compared to one-fourth of women in the uneducated category. Variation in marriage registration by education reflects differences in knowledge and understanding of family laws and the importance of marriage registration among women in different categories of education.

Marriage registration differs by region. Registration of marriage is highest among women in the South and lowest in the Northeast. Regional differentials in marriage registration remain unchanged after other factors are controlled. It is interesting to find that after adjusting for the effects of other factors, Bangkok women show a lower level of marriage registration than the national average. The low level of marriage registration among women in Bangkok can be partly explained by its socio-economic environment associated with urbanization and westernization. The loosely structured nature of urban society, individualism and legal reasons including avoidance of a higher taxation could discourage couples from registering their marriage.

1. Introduction

It is generally accepted that marriage is an important intermediate variable which has a direct bearing on fertility. Changes in marriage patterns and age at first marriage in some countries have been shown to have a strong impact on fertility changes. Compared to other demographic areas, studies of marriage-related topics, however, have been more limited by data quality and availability.

In demographic research, marital status is normally classified into four categories: currently married, widowed, divorced and separated. Problems related to the classification of marital status categories are the lack of clear definitions for some marital status categories and misunderstanding by the interviewers. For example, some interviewers may fail to determine whether women who are currently married but not living with spouse (because the husbands are working elsewhere) are currently married or are separated. These women may report that they are not living with their husbands without further explanation. If the interviewers do not probe they may classify these women as being separated. It is also possible that some women whose husbands work elsewhere because they are actually separated may report themselves as currently married and hence be classified as being married. Classification of divorced and separated categories is also problematic. In general, women are considered divorced only if their marriages were registered. However, in Thailand some couples who did not register their marriage but want to legally end it may seek a written agreement (to be used as a legal document). This agreement is normally witnessed by the government officials at the district office or police station. In this case, these women might report themselves as being divorced and the interviewers might classify them in either the divorced or separated category.

Collection of data on marital status in a census or survey is often faced with these problems, particularly when the criteria used for the classification are not clearly defined. In most developed countries, these problems are less serious as most marriages are registered either according to law or religious practices. On the contrary, consensual union or cohabitation is normally practiced in many developing countries and the extent to which marriages are registered is not known due primarily to data limitation.

Lack of clear definitions for marital status categories is also a major problem faced in most demographic research in Thailand. Before 1935, customary marriage was the most socially accepted type of marriage. Marriage was usually celebrated according to Thai custom with a religious ceremony normally performed followed by a wedding celebration. Consensual union and elopement were also practiced. Since the promulgation of the Family Registration Act in 1935, a marriage is considered legal only if it is registered. The exception is when the marriage occurs outside the Thai Kingdom. If both or either of the parties are Thai nationals, the couples may choose to marry under the Thai law or under the law of the country where the marriage takes place. Islamic laws are applied to marriages of Islamic parties in the four Southernmost provinces of Thailand. In addition, according to the Civil and Commercial Code, section 1448 revised in 1976, the conditions of marriage with respect to minimum age of legal marriage are as follows:

"A marriage can take place only when a man and a woman have attained their seventeenth year of age. However, the Court may, on reasonable grounds, permit them to marry before attaining that age.... In the case of a marriage of a minor, the consent of his or her parents or guardians, or the order of the Court's permission to marry is required." (D. Thamarak et al., 1980:51).

Despite the presence of the marriage law which states that marriage under the Code shall be effected only on registration being entered, consensual union and customary marriage are still widely practiced in Thai society. The classification of marital status in the census or survey, therefore still has to depend heavily on the answers given by the respondents regardless of the type of marriage. As a result, errors in the data obtained cannot be avoided whether due to the interviewer, the respondent or both.

Completeness of marriage statistics is another problem in the studies of marriage. Similar to other demographic data sources, the three main sources of marriage data are censuses, registration and surveys. Apart from the problems of definition of marital status categories, marriage data from censuses lack detail and are not up to date. Use of census data for marriage analysis is therefore limited. On the other hand,

marriage statistics from registration are known to be incomplete. The results of the 1985-86 Survey of Population Change indicate that the completeness of birth and death registration in Thailand is 88 and 76 percent respectively. The underregistration level of marriages is not known but is believed to be much higher than that of birth and death registration. In addition, only data on the total number of marriages are published. Incompleteness of marriage registration and data availability problems partly explain the relatively limited utilization of registered marriage statistics. Most studies on marriage thus have to rely on supplemental data from surveys.

Reliability of information on marital status is likely to affect the accuracy of fertility estimation. Supplemental data on types of marriage unique to the Thai Demographic and Health Survey (TDHS) may be used to cross check the accuracy of information on marital status and help in improving questionnaire design on marital status in future surveys. In addition, information on differentials of marriage registration would contribute to a better understanding of the limitations of marriage statistics which in turn could be used as a basis for improving the marriage registration system. This study will focus on three main issues: types of marriage, levels and trends of marriage registration and factors associated with marriage registration.

2. Data source

The present study utilizes data from the 1987 Thai Demographic and Health Survey. The TDHS was carried out by the Institute of Population Studies at Chulalongkorn University as part of the international program of Demographic and Health Surveys. It was a nationally representative survey and the field work took place from March to June 1987. A total of 9,048 households and 6,775 ever married women aged 15-49 years old were interviewed. The sample of TDHS was designed to provide independent estimates for each of the rural areas of the four major regions of Thailand, for the provincial urban areas and for the Bangkok Metropolitan Area. Through appropriate weighting, nationally representative results can be obtained. A more detailed description of the sample is available in the Country Report (Chayovan et al, 1988). All results presented in this study are weighted.

3. Types of marriage

According to the United Nation's definition, "marriage is the act, ceremony or process by which the legal relationship of husband and wife is constituted. The legality of the union may be established by civil, religious or other means as recognized by the laws of each country" (United Nations, 1973:13).

In view of the above definition the state of marriage in Thailand can be constituted through one of the three forms, including registration, religious or traditional ceremony and consensual union or cohabitation. In the TDHS additional questions on marriage were :

- Did you officially register your marriage (with your current or last husband)?
- Did you have any ceremony?

Types of marriage can be inferred using information obtained from these two additional questions. Four types of marriage can be classified: consensual union or cohabitation (neither registration nor ceremony held), marriage by ceremony only, marriage by registration only and marriage by both ceremony and registration. The types of marriage formed using this additional information, however, have some limitations. The first is that religious or customary ceremony was not clearly defined. The definition was left to the respondent. The religious or traditional ceremony can take one of the following forms: pouring lustral water on the couple's hands, holding a wedding reception and/or tying knots on the couple's wrists. These forms of marriage usually take place before the marriage is consummated. The last form of ceremony, however, can be held at the time of marriage or after a consensual union or elopement. In this case, it is usually done as a symbol of asking the pardon of the parents. These limitations could result in inaccuracies in estimating the level of registration or ceremony. Interpretation of the data has to take these limitations into consideration.

Table 1 presents the percentage distribution of ever married women aged 15-49 years according to type of marriage by selected background characteristics. The results indicate that the most popular form of marriage in Thailand is marriage by both ceremony and registration (43 percent), followed by marriage by ceremony only (34 percent), consensual union (13 percent) and marriage by registration only (10 percent).

The examination of types of marriage by current marital status suggests some inconsistencies in the data. Women who are currently divorced should report the last marriage as by registration only or by both registration and ceremony unless they were married before 1935 when the Family Registration Act became active. All women in this survey, however, were married after that date. Results in Table 1 show that one-fourth of divorced women reported having a consensual union or marriage by ceremony only. It is possible that some of these women, although they did not register their marriages, ended them by written agreement at a government office and accordingly reported their marital status as being divorced. Moreover, misclassification of marital status could be due to interviewers' errors. Interviewers may classify women who reported themselves as "not living together" into the "separated" or "divorced" category. A definite conclusion cannot be reached with regard to the inconsistencies between the types of marriage and the marital status categories for women in the categories of currently married, widowed or separated.

Since information in the TDHS on the date of marriage is only available with respect to the respondent's first marriage and the type of marriage referred to in this study is the present or latest marriage, the examination of types of marriage by age at first marriage or duration since first marriage has to be restricted to women who have been married only once. For women who have been married more than once, their age at the time of the latest marriage and its duration would differ from their age and the duration reported for the first marriage. Inclusion of these women in the analysis could result in biased results.

Results in Table 1 reveal that the type of marriage differs by age at first marriage. In each age group one-half or more of marriages are registered and three-fourths or more are characterized by ceremony. However, women whose age at first marriage was below 20 years tend to be married by consensual union or by ceremony only to a larger extent than do other age groups. Marriage by both ceremony and registration is more common among women who marry at age 20 or higher, and increases up to age 30.

The type of marriage also varies by current age of women. The prevalence level of marriage by ceremony only and by consensual union declines as age increases as shown in Table 1. Marriage by registration only and marriage by both ceremony and registration are positively associated with women's age. An explanation for the decline with increasing age in the level of marriage by ceremony only and by consensual union is the presence of law which specifies the minimum age for marriage and registration of marriages. As stated earlier, the minimum age for marriage of both men and women is 17 years old. If either or both of the parties are under 20 years, the registration of marriage can be effected only when the consent of his or her parent or guardians or a Court Order Permission is given. The rise in the percentage of marriage by registration only or by both ceremony and registration with the increase in the age of women does not truly mean a decline in the level of registration of marriage over time. Instead, it suggests a delay in the registration of marriage. This is also evident in the positive association between the duration of marriage and the percentage of women married by registration only or by both ceremony and registration. Some couples may not register their marriages on the date cohabitation actually occurs. This issue will be discussed in greater detail in the next section.

In terms of urban-rural residence and type of marriage, it is evident that marriage by both ceremony and registration is the most popular form of marriage in all areas. It is interesting to find that the percentage of marriages by consensual union is highest among women in Bangkok while rural women show the highest level of marriage by ceremony only. The higher level of consensual union among women in Bangkok could be partly explained by life styles and relatively loose social control associated with urban structure and environment. Norms which emphasize individualism and less stringent social sanctions could facilitate the prevalence of consensual union in the urban areas.

With respect to regional differentials, the lowest percentage of women who were married by consensual union and by registration only are found in the Northeast. Compared to women in other regions

Northeastern women show the highest level of marriage by ceremony only. The marriage ceremony in the Northeast is relatively simple compared to that in other regions. Regional variation in the extent to which a ceremony is celebrated or performed could partly account for the relatively high prevalence of marriage by ceremony in this region. The percentage of women married by registration only is highest in the Central and Northern regions. Women in the South show the highest level of marriage by both ceremony and registration followed by women in Bangkok.

The results also reveal educational differences in the type of marriage. The majority of women with higher than secondary education prefer marriage by both ceremony and registration. The prevalence of consensual union is lowest among women with higher than secondary education and highest among women with no education. About one-fifth of women with no education married by consensual union. Similar differences in the type of marriage are also found by the husband's or couple's education.

Women who have been married only once and those who have been married more than once differ in their type of marriage. About one-third of women who have been married more once were married to the last husband by consensual union and another one-third married by ceremony only. For women who have been married only once, the type of marriage practiced most is by both ceremony and registration. The prevalence of marriages by ceremony only among these women does not significantly differ from women who have been married more than once.

Both Buddhist and Muslim women are likely to marry by both ceremony and registration. Muslim women are less likely to practice consensual union but more likely to practice marriage by ceremony only than Buddhist women.

There appears to be no significant differences in the types of marriage among women who have worked and those who have not worked before the first marriage. Work before the first marriage thus is not significantly related to the type of marriage.

4. Levels and trends of marriage registration

Of main interest to most demographers are the levels, trends and patterns of marriage. Estimates of age at first marriage of both women and men and their trends, and the level and trends of divorce are usually desired. The use of marriage statistics from the registration system for the analysis of levels, trends and patterns of marriage, however, has been limited due to the problems of data completeness and availability. Information on some important characteristics of the couples such as age at first marriage, number of times married or marriage history, and education are not recorded in the marriage registration form in Thailand. Information contained in the form includes nationality, age, birth date, residence, occupation, place of birth, and names and country of birth of parents of each party. These data, unfortunately, are not made available to the public. Only the total number of marriages by year of registration is published in the Annual Statistics Report by the Administrative and Civil Registration Division, Department of Local Administration, of the Ministry of Interior. It should be noted that the total number reported includes both first and later marriages. In addition registration of marriage with more than one woman by some men cannot be identified. Statistics are reported by date of registration, not the date of occurrence. The date of registration is considered to be the date of marriage by the Family Registration Act. In practice, dates of these two events tend to differ. Availability of data on background characteristics of the registered couple would facilitate the analysis of patterns of marriage registration and differentials and their analysis would enhance the understanding of marriage behavior among Thai couples, which in turn might provide some guidance for improving the completeness of the marriage registration system. Such data, unfortunately, are not available to the present study.

This study attempts to estimate the level and trend of marriage registration among ever married women aged 15-49 years old using the TDHS data. It was expected that results of this study would provide some insight to the prevalence of registration of marriage and the completeness level of marriage statistics. According to the Annual Statistics Report of the Ministry of Interior, the total number of marriages has increased steadily from 411,680 in 1957-61 to 647,368 in 1967-71, and 1,466,835 in 1982-86 (Administrative and

Civil Registration Division, Department of Local Administration, Ministry of Interior, 1987). These statistics in combination with socio-economic and cultural changes trending toward Western characteristics have led us to believe that the level of marriage registration should increase over time.

The trend in the level of marriage registration can be examined through the percentage of women who have registered their marriages, classified by marriage cohort as measured by duration of marriage. If the trend in the marriage registration level shows an increase over time the percentage registering recent marriages among currently married women should be higher than that of women with longer marriage duration, such as those married 15 years or more. As only information on the age and the date of the first marriage are available but the type of marriage asked refers to the current or the last union, the analysis of the trend in marriage registration has to be restricted to women married only once. These women constitute about 90 percent of all ever married women interviewed.

Table 2 shows the percentage registering marriages among ever married women age 15-49 years old who have been married only once, according to the duration of first marriage and selected characteristics. Fifty-five percent of Thai women who have been married only once registered their marriages. It is evident that the percentage registering marriages does not increase over time. Only 31 percent of women married less than 5 years registered their marriages compared to 70 percent of those married 20-24 years. The lower percentage registering marriages among women married 25 years or more compared to those married 20-24 years does not appear to be a significant decline.

In contrast to expectation, the positive relationship between marriage registration and the duration of marriage implies a declining trend in the marriage registration level. An explanation for this unexpected result derives from data limitations. In TDHS the additional questions on marriage registration ask neither about the date of registration nor the date of cohabitation. The additional questions simply asked whether or not the marriage was registered and whether or not the marriage ceremony was held. It is believed that many couples postpone the registration of marriage. Reasons for the delay in marriage registration may include the problem of accessibility to a registration office, the uncertainty of the marriage and the under-marriageable ages of either party, etc. Unfortunately, reasons for registering or not registering the marriage as well as reasons for its delay were not asked in the TDHS. In view of this, despite the result of the increase in the percentage registering marriage by marriage duration, this cannot lead to the conclusion that the prevalence of marriage registration has declined over the last 20 years or so. Instead it reflects the extent to which the registration of marriage has been delayed.

Regardless of the differences in the age at first marriage, current age of women, region and educational level of women, the positive association between marriage registration and duration of marriage still holds. However, regardless of the duration of marriage, the percentage registering marriages differs significantly by each of the background characteristics. That is, in every marriage cohort women with a higher age at first marriage exhibit a higher proportion of marriage registration than women with a lower age at first marriage. Similarly, women in the older age groups are more likely to register marriages than women in the younger age groups. The percentage of women with higher education who registered marriages is higher than that of women with lower education.

It is interesting to note that the variation in the prevalence of marriage registration by marriage cohorts for higher educated women is substantially smaller than that of lower educated women. Similarly the differences in the prevalence of marriage registration among different marriage cohorts for women in Bangkok is small compared to women in other regions. For women with higher than secondary education, 82 percent of the women married 0-4 years and all of those married 15-19 years registered their marriages, while for women with primary education 25 percent of the former group and 66 percent of the latter group had done so (differences of 18 versus 41 percentage points). In the Bangkok area, 46 percent of women married 0-4 years and 74 percent of women married 15-19 years registered marriages compared to 23 and 59 percent of women in the same marriage cohorts in the Northeast, (differences of 18 versus 36 percentage points).

Although results shown in Table 2 indicate an increase in the percentage registering marriages by duration of marriage, this increase varies by background characteristics. Regionally it is found that for the most recent marriage cohort almost half of the women in Bangkok compared to about one-third of those in

other regions registered their marriages. More than 80 percent of women with higher than secondary education as compared to only one-fourth of women with primary education registered marriages.

This result supports the assumption of the prevalence of a delay in registering the marriage. It also suggests that the time lag between cohabitation and registration is relatively long. Postponement of marriage registration is found among women of all age groups, all regions and all educational levels. Women in Bangkok, however, appear to delay registering marriages less than women in other regions. Similarly, women with higher education tend to postpone marriage registration for a shorter period than do women with lower education.

It is unfortunate that results of this study do not provide sufficient evidence for drawing a conclusion with respect to the trend in marriage registration. Only a rough estimate of marriage registration level could be obtained. The findings which indicate low prevalence of marriage registration among more recent marriage cohorts suggest that completeness of marriage registration is relatively low, particularly among women in the Northeast and women with lower education.

5. Correlates of marriage registration

Despite the continuing effort of the government to promote registration of marriages, many couples still fail to comply. One reason for the failure in motivating couples is that the promotion campaign has not been strong. Registration of any vital events is known to be passive. In addition, it is felt that the negative effect of non-registration at the societal level is small relative to the individual level. Although government's attempts have been made to point out some legal rights gained from registering the marriages as its advantages, but at the individual level registration of marriage has both advantages and disadvantages. Some couples may not want to register the marriage for income tax reasons or for reasons related to the legal management of property and business.

Another reason that reduces the importance of marriage registration is that its effect on children of non-registered couples is almost negligible. A child of a non-registered marriage couple is considered a legal child of the mother only. If the father wants to legally accept the child, he can do it by applying for registration of legitimation provided that the child or the mother of the child does not object that the applicant is not the father. Even if the father did not apply for registration of legitimation but there has been a continuous common repute of being a legitimate child, i.e., by showing the relationship as father and child as evidenced by the fact that the father provides for the child's education or maintenance or that he has allowed the child to use his family name or by other facts, the child is considered his "statutory heir." The additional questions in the TDHS did not include questions on reasons for registering the marriage and reasons for not registering the marriage. This information if available would contribute to an understanding of factors associated with registration of marriage. An examination of marriage registration by background characteristics should, however, provide some indirect information with respect to factors associated with marriage registration. The results of the study will help in identifying the target groups for marriage registration campaigns in the future and in assessing the potential for improving of marriage registration levels.

Table 3 provides information on the percentages of women who have registered current or last marriages according to a number of characteristics. Also these percentages are presented separately for all women, women who have been married only once, and women who have been married more than once. Results shown in Table 3 indicate that nationally, 53 percent of ever married women in Thailand registered their marriages. Women who have been married more than once are less likely to register the last marriage compared to women who have been married only once (34 versus 55 percent). The uncertainty of the stability of the new marriage or not wanting a legal commitment could partly explain the low prevalence of marriage registration among women who have been married more than once.

For women who have been married only once, the prevalence of marriage registration among currently married women is higher than among women who are divorced, widowed or separated. The higher prevalence of marriage registration of the former group could be explained by the fact that, given the prevalence of delays in registration, women who are still living with their spouses still have a chance of

registering the marriages even if it is a late registration. The chance of late marriage registration for women who have been separated or widowed is small, especially if the separation or the death of the husband occurred a long time ago. For women who have been married more than once, the differences in the proportion of marriage registration among different marital status categories are insignificant due to small sample size.

Both for women who have been married only once and those married more than once, the proportion of marriage registration increases as age at first marriage, current age and duration of marriage increases, reflecting the postponement of marriage registration. Regardless of the number of times married, the wife's or husband's or couple's education is strongly positively associated with marriage registration. Nationally, the better educated women are more likely to register the marriage. The percentage registering marriage for women with higher education is twice as high as that of those with lower education. Regionally, women in the South are characterized by the highest percentage registering marriages and women in the Northeast show the lowest. The prevalence of marriage registration is about the same for Bangkok, Central and the North. This pattern of regional differences in marriage registration is found both for women who have been married only once and those married more than once.

There is no significant difference between the percentage registering marriage among Buddhist and Muslim women, especially for women who have been married only once.

Women who had a ceremony for the marriage are more likely to register the marriage. The prevalence of marriage registration for women who worked before marriage is slightly higher than for those who never worked before marriage.

The association between each of the background characteristics and marriage registration is indicated by the value of ETA and its level of statistical significance. Results shown in Table 3 reveal that every characteristic considered is statistically significant in determining marriage registration. In particular the age at first marriage, duration of marriage, education and region appear to be important factors associated with the registration of marriage.

Equations 1 to 6 in Table 4 provide information on the adjusted percentages of ever married women aged 15-49 years old who have registered marriages according to a number of characteristics, using Multiple Classification Analysis (MCA). This value of multiple R^2 indicates the explaining power of all variables considered in the equation. Results shown in equation 6 of Table 4 reveal that current age, couple's education, region, number of times married, marriage by ceremony and religion together could explain about one-fifth (18.9 percent) of variance in marriage registration. It is noted that the adjusted percentages registering marriage remain relatively unchanged after other factors are controlled, reflecting the independent relationship of each characteristic to marriage registration. Current age and couple's education together explain 15 percent of variation in the marriage registration (equation 1 in Table 4). When region was added the total of explained variance increased to 16 percent (an increase of 1.1 percentage points). Addition of a factor on marriage by ceremony increases the explaining power to 17 percent. Religion appears to be relatively insignificant in determining the extent of marriage registration.

Table 5 provides information on the adjusted percentages of women married only once aged 15-49 years old who have registered marriages according to each of background characteristics, using Multiple Classification Analysis (MCA). The variables considered are current age, couple's education, region, religion, whether or not ceremony was held at marriage, and age at first marriage as a co- variate. By and large, the results of this analysis do not differ significantly from results of the analysis based on all ever married women. Results in Table 5 reveal that all variables combined explain one fifth (19 percent) of variance in the marriage registration (equation 5 in Table 5). Current age and age at first marriage together could explain only 12 percent of the variation in the marriage registration. After the couple's education was added, the variance explained was raised to 17 percent, an increase of 5 percentage points (equation 2 in Table 5). The addition of region into the equation increases the explained variance by another 1.3 percentage points (equation 3 in Table 5). Religion and marriage by ceremony appear to be insignificant in determining marriage registration since the inclusion of these two variables increases the variance explained by only 0.6 percentage points. Examination of the F statistics of each variable after controlling other variation in the model indicates that

each variable is statistically significant in determining the marriage registration. Current age, age at first marriage, couple's education and region are key factors associated with the registration of marriage.

6. Conclusions

This paper utilizes the available data unique to the TDHS to examine the type of marriage and its correlates. Results indicate that the most popular form of marriage in Thailand is marriage by both ceremony and registration. The other forms of marriage, in order of preference, are marriage by ceremony only, by consensual union and by registration only. Nationally, almost eighty percent of all ever married women aged 15-49 years old in Thailand were married by ceremony and 53 percent registered their marriages. The estimated prevalence level of marriage registration in this study is likely to be inflated as a substantial proportion of women in the older cohorts had postponed the registration of marriage. In contrast, the prevalence of cohabitation or consensual union may be understated since no reference period was specified with respect to the question on marriage registration or ceremony. Registration or a ceremony of marriage could be performed either immediately or long after cohabitation. Evidence of the delay in the registration of marriage is the decreasing trend in consensual unions and the increasing trend in marriage registration as age and marriage duration increase. The extent and duration of delay in marriage registration, however, cannot be determined.

It is unfortunate that results of this study cannot be used to provide conclusive evidence on the trend over time in marriage registration due to limitations of the data available. The study clearly indicates the incompleteness and the postponement in the registration of marriage. The issues of the prevalence and the length of delay should be further investigated.

With respect to background characteristic differentials in the marriage registration, it is found that women married more than once are characterized by a lower proportion of marriage registration compared with women married only once. Education is clearly a key determinant of marriage registration for both groups of women. After other factors are controlled the percentage of women married only once who have registered marriages is as high as 90 percent for high educated women while only one-fourth of uneducated women did so. The substantial difference in the level of marriage registration among women with high and low education suggests the variation in the knowledge and understanding of laws related to family and marriage registration. Given the trend toward an increasing proportion of women with higher education, the prevalence of marriage registration is likely to increase in the future.

Regional differences in the marriage registration level reflect cultural variation with regard to marriage customs. Women in the South are characterized by the highest prevalence of marriage registration. It is interesting to find that the level of marriage registration for Bangkok women is lower than that of the national average. An explanation for the low marriage registration prevalence in Bangkok is its social, economic and cultural conditions which do not motivate a couple to register the marriage. Individualism, and relatively weak social controls in urban sectors, are favorable to cohabitation or consensual union. Economic reasons such as avoidance of higher income tax brackets or concerns over loss of freedom in management of one's own property and business could discourage a couple from registering the marriage.

NOTE

1 Since the relationship between husband's and wife's education is relatively high (r=.64), a combined index of husband's and wife's education was constructed. The score of the index ranges from 0 to 6. The scores were grouped into 4 categories representing different levels of education: 0 = no education, 1-2 = low level of education, 3-4 = medium level of education; and 5-6 = high level of education.

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Table 1 Percent distribution of ever married women aged 15-49 according to type of marriage and selected background characteristics

Background Characteristic	Consensual union	Ceremony only	Registration only	Both ceremony and registration	Total	Weighted N
Marital Status						
Married	11.6	33.5	10.1	44.9	100	5,901
Married, husband working elsewhere	18.2	32.3	9.7	39.8	100	316
Widowed	13.2	47.9	9.7	29.3	100	210
Divorced	7.7	17.6	9.5	65.1	100	77
Separated	30.7	49.5	7.0	12.8	100	240
Age at first marriage*						
< 15	18.4	43.7	7.8	30.1	100	197
15-17	12.8	38.3	11.0	37.9	100	1,661
18-19	12.1	35.5	10.9	41.4	100	1,528
20-21	8.8	33.7	9.6	47.9	100	1,149
22-24	7.3	27.7	8.3	56.7	100	913
25-27	6.4	29.	14.2	60.3	100	448
28-29	3.2	28.7	3.1	65.1	100	107
30+	6.5	38.1	7.4	48.0	100	136
Duration of marriage*(Years)						
0-4	17.3	52.2	3.0	27.5	100	1,342
5-9	10.9	38.6	7.5	43.0	100	1,319
10-14	8.0	30.4	11.4	50.2	100	1,191
15-19	6.7	24.5	13.1	55.7	100	867
20-24	7.3	22.7	13.3	56.8	100	724
25+	8.8	24.3	14.3	52.6	100	703
Current age						
15-19	24.9	65.4	0.4	9.3	100	339
20-24	18.3	51.9	4.9	24.9	100	1,001
25-29	13.7	37.9	9.4	39.0	100	1,305
30-34	10.0	29.4	11.0	49.6	100	1,324
35-39	8.6	26.4	11.9	53.1	100	1,104
40-44	9.1	24.7	13.3	52.8	100	871
45-49	12.0	22.2	13.0	52.8	100	801
Urban-rural residence						
Bangkok	17.7	25.8	9.5	47.1	100	726
Other urban	13.3	22.0	8.2	56.4	100	498
Rural	11.8	36.5	10.2	41.5	100	5,521
Region						
Bangkok	17.7	25.8	9.5	47.1	100	726
Central	17.6	26.2	14.6	41.6	100	1,446
North	14.8	28.7	14.6	42.0	100	1,393
Northeast	7.6	46.7	4.8	40.9	100	2,349
South	10.0	29.8	9.0	51.2	100	831

Table 1 (continued)

Background Characteristic	Consensual union	Ceremony only	Registration only	Both ceremony and registration	Total	Weighted N
Woman's education						
No education	17.9	38.4	13.1	30.6	100	656
Primary	12.4	36.7	9.9	41.0	100	5,291
Secondary	12.8	19.9	9.3	58.0	100	518
Higher than secondary	2.6	5.7	3.7	88.0	100	281
Husband's education						
No education	18.6	42.6	9.9	28.9	100	338
Primary	12.7	37.4	10.2	39.7	100	4,957
Secondary	12.2	24.1	10.4	53.3	100	1,024
Higher than secondary	3.5	10.2	6.2	80.1	100	355
Couple's education						
No education	16.7	48.8	8.1	26.4	100	206
Low	12.9	37.6	10.3	39.3	100	4,976
Middle	12.9	25.8	10.9	50.4	100	1,132
High	2.7	6.1	4.0	87.2	100	359
Number of marriages						
Once	10.5	34.5	9.5	45.5	100	6,145
More than once	34.4	31.8	14.4	19.5	100	591
Religion						
Buddhist	13.1	33.6	10.3	43.0	100	6,239
Islam	7.0	39.2	6.2	47.0	100	357
Christian	2.5	4.7	4.2	51.6	100	111
Other	8.1	88.0	3.9	-	100	26
Work before first marriage						
Yes	15.1	29.8	9.7	45.4	100	2,046
No	11.4	36.2	10.0	42.3	100	4,696
Total	12.6	34.3	9.9	43.2	100	6,745

Note: Total number of cases for different variables may vary due to variation in the number of unknown cases.

* Includes women married only once

Table 2 Percentage of women married only once aged 15-49 who registered their marriage, by duration since first marriage and selected background characteristics

Background Characteristic	Duration (in year) since first marriage						Total
	0-4	5-9	10-14	15-19	20-24	25+	
Age at first marriage							
< 15	9.3	18.4	41.1	54.3	70.1	37.5	37.8
15-17	12.5	40.6	50.7	68.3	70.2	65.7	48.9
18-19	24.6	42.8	58.8	66.4	66.1	70.6	52.3
20-21	32.2	51.2	70.0	65.8	69.3	75.3	57.6
22-24	44.7	66.5	72.4	73.3	77.9	77.6	65.0
25-27	53.3	62.6	71.2	77.9	66.7	( )	64.6
28-29	59.3	58.5	83.1	( )	( )	-	68.1
30+	47.7	64.3	47.6	( )	-	-	55.0
Current age							
15-19	10.1	( )	-	-	-	-	10.0
20-24	27.6	36.8	( )	-	-	-	30.6
25-29	52.5	49.8	49.7	( )	-	-	50.5
30-34	54.5	62.7	62.9	66.7	( )	-	63.1
35-39	( )	65.1	73.8	66.9	66.1	( )	67.9
40-44	( )	( )	61.5	76.1	71.0	62.2	68.9
45-49	-	( )	( )	70.1	74.0	68.5	69.7
Region							
Bangkok	46.1	53.5	66.9	73.7	68.7	67.5	59.3
Central	28.1	54.3	65.6	75.9	72.6	74.9	58.5
North	33.4	54.8	70.5	74.2	66.7	65.8	58.7
Northeast	23.3	42.3	47.8	58.7	66.8	59.6	47.0
South	34.0	56.5	74.6	75.5	79.2	74.7	63.0
Woman's education							
No education	9.8	25.7	59.5	70.7	57.6	46.2	45.8
Primary	24.6	44.7	58.5	65.8	70.7	72.9	52.7
Secondary	40.5	79.6	86.1	85.6	89.6	( )	68.0
Higher than secondary	82.0	96.5	98.5	100.0	( )	( )	91.5
Total	30.5	50.5	61.5	68.8	70.1	66.9	55.0

Note: ( ) = Less than 20 weighted cases

Table 3 Percentage of women aged 15-49 who registered their marriage, by selected background characteristics and number of marriages

Background characteristic	Total		Married only once		Married more than once	
	(%)	Weighted N	(%)	Weighted N	(%)	Weighted N
Marital Status						
Married	54.9	5,914	56.6	5,411	37.0	496
Married, husband working elsewhere	49.6	317	53.7	283	11.0	33
Widowed	39.0	210	39.2	198	( )	12
Divorced	74.6	77	77.9	65	( )	12
Separated	19.8	240	20.3	193	16.3	47
ETA	.148		.147		.176	
Age at first marriage						
< 15	37.5	245	37.8	197	36.2	48
15-17	46.9	1,920	48.9	1,661	33.8	257
18-19	50.7	1,677	52.3	1,531	34.1	144
20-21	55.5	1,240	57.5	1,149	29.2	88
22-24	64.4	949	65.0	913	46.1	33
25-27	63.7	463	64.6	448	( )	14
28-29	64.0	114	68.1	107	( )	7
30+	56.2	141	55.0	137	( )	4
ETA	.142		.138		.149	
Duration since first marriage						
0-4	30.0	1,373	30.5	1,343	2.7	26
5-9	48.6	1,418	50.5	1,320	23.2	94
10-14	59.1	1,308	61.6	1,191	33.8	116
15-19	64.8	993	68.7	869	37.1	121
20-24	65.7	827	70.0	724	35.6	103
25+	63.5	839	66.9	703	45.5	135
ETA	.263		.293		.204	
Current age						
15-19	9.7	340	10.0	331	( )	7
20-24	29.9	1,001	30.6	948	14.7	52
25-29	48.4	1,305	50.5	1,200	25.1	101
30-34	60.5	1,328	63.1	1,207	34.5	121
35-39	64.9	1,107	67.9	997	37.4	109
40-44	66.3	873	68.9	768	46.6	105
45-49	65.9	803	69.7	698	39.9	104
ETA	.320		.344		.206	
Woman's education						
No education	43.7	656	45.8	575	29.0	81
Primary	50.9	5,303	52.7	4,805	33.5	490
Secondary	67.3	518	68.0	498	49.3	20
Higher than secondary	91.8	281	91.5	271	( )	9
ETA	.190		1.85		.181	

Table 3 (continued)

Background characteristic	Total (%)	Total Weighted N	Married only once (%)	Married only once Weighted N	Married more than once (%)	Married more than once Weighted N
Husband's education						
No education	38.8	338	39.4	294	34.8	44
Primary	49.9	4,970	51.6	4,504	33.1	458
Secondary	63.7	1,025	65.1	958	42.3	65
Higher than secondary	86.3	355	86.7	343	( )	12
ETA	.194		.194		.129	
Couple's education						
No education	34.5	206	35.4	187	25.8	20
Low	49.6	4,989	51.3	4,503	33.5	479
Middle	61.3	1,132	62.7	1,059	41.0	72
High	91.3	360	91.1	350	( )	8
ETA	.210		.208		.164	
Urban-rural residence						
Bangkok	56.6	726	59.3	668	25.0	58
Other urban	64.6	499	67.8	450	34.2	47
Rural	51.7	5,533	53.3	5,030	35.5	495
ETA	.072		.081		.065	
Region						
Bangkok	56.6	726	59.3	668	25.0	58
Central	56.3	1,447	58.5	1,322	31.1	121
North	56.6	1,393	58.7	1,230	40.8	163
Northeast	45.7	2,360	47.0	2,200	29.6	155
South	60.2	832	63.0	728	40.6	104
ETA	.112		.124		.123	
Religion						
Buddhist	53.3	6,259	55.3	5,712	32.3	538
Islam	53.6	359	54.5	312	47.9	46
Christian	55.8	111	54.2	96	( )	15
Other	3.9	26	3.9	26	-	-
ETA	.061		.067		.139	
Had marriage ceremony						
Yes	55.8	5,226	56.9	4,916	38.1	303
No	44.1	1,519	47.6	1,229	29.5	288
ETA	.098		.075		.091	
Work before marriage						
Yes	55.0	2,052	56.7	1,864	38.7	182
No	52.3	4.703	54.3	4,282	32.5	418
ETA	.025		.023		.060	
Total	53.2	6,758	55.0	6,149	34.4	591

Note: ( ) = Less than 20 weighted cases

Table 4 Adjusted[1] percentages of ever married women aged 15-49 registering their marriage, by selected background characteristic (Multiple Classification Analysis, MCA)

Background characeteristic	Weighted N	Percentage registering the marriage (adjusted) (1)	(2)	(3)	(4)	(5)	(6)
Current age							
15-19	332	10	10	10	8	9	9
20-24	991	29	28	28	27	28	28
25-29	1,287	47	47	47	47	47	47
30-34	1,309	60	59	59	59	59	59
35-39	1,094	65	65	65	65	65	65
40-44	862	67	68	68	69	69	69
45-49	787	68	68	69	69	69	69
Significance level of F statistic		**	**	**	**	**	**
Couple's education							
No education	205	29	25	24	24	24	25
Low	4,969	49	49	49	49	49	49
Middle	1,130	66	66	66	65	65	65
High	350	89	89	87	87	85	85
Significance level of F statistic		**	**	**	**	**	**
Region							
Bangkok	707	-	48	49	48	49	49
Central	1,418	-	54	55	54	55	55
North	1,383	-	60	61	61	61	61
Northeast	2,337	-	47	46	47	46	46
South	816	-	59	59	60	60	59
Significance level of F statistic			**	**	**	**	**
Number of marriages							
Once	6,092	-	-	-	55	55	55
More than once	570	-	-	-	30	32	31
Significance level of F statistic					**	**	**
Had marriage ceremony							
Yes	5,168	-	-	55	-	55	55
No	1,494	-	-	44	-	47	47
Significance level of F statistic				**		**	**
Religion							
Buddhist	-	-	-	-	-	-	53
Islam	355	-	-	-	-	-	53
Christian	111	-	-	-	-	-	59
Other	26	-	-	-	-	-	22
Significance level of F statistic							*
Mean percentage registering marriage	6,661	53	53	53	53	53	53
Multiple R^2		.153	.164	.172	.183	.188	.189

Note: [1]The percentage are adjusted for all other factors in the equation by MCA.

* Denotes F statistic significant at .01 or better
** Denotes F statistic significant at .001 or better

Table 5 Adjusted[1] percentages of women married only once aged 15-49 registering their marriage, by selected background characteristic (Multiple Classification Analysis, MCA)

Background characteristic	Weighted N	Percentage registering the marriage (adjusted) (1)	(2)	(3)	(4)	(5)
Age at first marriage (covariate)[2]		.015	.016	.016	.016	.016
Significance level of F statistic		**	**	**	**	**
Current age						
15-19	325	11	8	9	8	9
20-24	941	31	29	28	29	29
25-29	1,190	50	49	49	49	49
30-34	1,197	63	63	63	62	62
35-39	984	68	68	69	69	69
40-44	762	69	71	72	72	71
45-49	687	70	73	73	73	73
Significance level of F statistic		**	**	**	**	**
Couple's education						
No education	183	-	28	23	24	25
Primary	4,496	-	50	51	51	51
Secondary	1,057	-	68	68	68	68
Higher than secondary	350	-	91	90	90	89
Significance level of F statistic			**	**	**	**
Region						
Bangkok	651	-	-	51	51	52
Central	1,306	-	-	57	57	58
North	1,224	-	-	62	62	63
Northeast	2,190	-	-	49	49	48
South	715	-	-	62	62	62
Significance level of F statistic				**	**	**
Religion						
Buddhist	5,657	-	-	-	55	55
Islam	310	-	-	-	54	53
Christian	94	-	-	-	62	60
Other	26	-	-	-	28	26
Significance level of F statistic					**	**
Had marriage ceremony						
Yes	4,869	-	-	-	-	57
No	1,217	-	-	-	-	48
Significance level of F statistic						**
Mean percentage registering marriage	6,085	55	55	55	55	55
Multiple R^2		.120	.171	.184	.185	.190

Notes: [1]The percentages are adjusted for all other factors in the equation by Multiple Classification Analysis (MCA) and covariate

[2]Denotes unstandardized regression coefficient of covariate (age at first marriage)

* Denotes F statistic significant at .01 or better

** Denotes F statistic significant at .001 or better

Analysis of Postnuptial Residence Patterns of Thai Women

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Abstract

This analysis has a dual purpose: to determine patterns and trends in post-nuptial residence, and to examine how different types of postnuptial residence influence the initiation of contraceptive use, and among recently married couples, if postnuptial residence influences fertility desires and expectations. The analysis was based on data on 6,775 ever married women of reproductive ages interviewed in the 1987 TDHS.

The results illustrate clearly that the availability of parents at the time of marriage, a critical factor in constraining the choice of postnuptial residence, has been increasing over time, presumably due to improvements in adult mortality. The probability of a married couple to coreside with one or both parents of a particular side is usually greater if one or both parents of the other side are not alive at the time of marriage. However, whether the absence of one or both parents from a particular side leads more to coresidence with the other side or to neolocal residence (living away from both the husband's and wife's relatives) depends on the specific combination of parents available. Despite the improvement of mortality among the Thai population, there has been little change in the proportions of women who lived with their parents among the different marriage cohorts covered by the TDHS. Moreover, the findings obtained from this analysis are consistent with those of previous studies further confirming lack of major change. Thus despite the rapid socio-economic change that has engulfed Thailand in recent decades, patterns of postnuptial coresidence with parents have remained relatively stable.

Independent of the extent of parental availability, there is a significant role played by region, rural-urban residence, religio- linguistic ethnicity, education and working experience (in the non-farm sector) before marriage in determining types of postnuptial residence. The pattern of residence with the wife's parents is the most prevalent among rural northeastern and northern populations while patterns of neolocal residence are most evident in the Bangkok Metropolis as well as in other urban areas. In the Central and the Southern regions where there are greater numbers of persons of Chinese origin than in the other regions, the pattern of coresiding with husband's parents i.e. is widely practiced.Higher education and having working experience before marriage encourages a greater independence to live neolocally after marriage. Duration of coresidence with parents after marriage averages 36 months both in rural and urban areas as well as for both women who live with wife's parents and those who lived with husband's side.

Through the use of cross tabulations and multiple classification analysis, the relationship between patterns of post-nuptial residence and reproductive behavior is examined. Comparatively, women in urban areas, and more recently married women marry at elder average age. More women in urban than rural areas, and among those who are more recently married than those who are married longer used contraception both before the first regnancy and before having the second birth. Although no difference is found in the ideal number of children among women with different types of postnuptial residence (neolocal, matrilocal, and patrilocal) some difference are apparent in their reproductive behavior. Women who lived neolocally are more likely to have used contraceptives before first pregnancy, or before having a second child than women in other postnuptial residence arrangements. However, this difference is quite modest. This may result from

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the fact that the length of coresidence with parents is on average short and in addition is consistent with the general Thai norm assigning considerable autonomy to adult children in their reproductive decisions.

Postnuptial Residence Patterns of Thai Women

There is some evidence that despite the rapid socio-economic change that has engulfed Thailand in recent decades, normative preferences and expectations concerning postnuptial coresidence with parents have remained relatively stable (Knodel, Chamratrithirong and Debavalya, 1987). Anthropologists have frequently remarked about postnuptial residence patterns and previous survey data has documented substantial regional differences (Limanonda, 1979). Only limited information has been available on a systematic basis concerning trends in actual coresidence behavior. There are reasons to expect such patterns to change at least in response to demographic changes such as rural to urban migration, reduced family size and increased survival probabilities for parents.

Although fertility decline is of too recent an origin to have greatly affected family size among families with married children, it will be useful to document the current situation and recent trends in order to establish an important baseline against which future changes, which will reflect the impact of smaller family sizes, can be measured. Moreover, it is of interest to determine whether or not traditional patterns of coresidence are changing in response to social and economic changes taking place. The impact could be either on initiation of postnuptial residence or on the duration of coresidence or on both. The general expectation embodied in the sociological literature on the family is that modern social and economic change undermines coresidence. Thus, establishing if the probability or duration of postnuptial coresidence has changed during recent years in Thailand can be informative for understanding the interaction between modern development and the family.

There is also a considerable literature about the impact of household structure and coresidence on reproductive behavior. Generally. the expectation is that living in an extended family environment promotes fertility (i.e. Davis, 1955; Lorimer, 1954 cited in Limanonda, 1978). Nevertheless, qualitative evidence from Thailand suggests that parents have relatively little influence over the reproductive decisions of their adult children (Knodel, Havanon and Pramulratana, 1984). Thus, it will be interesting to examine if there is behavioral evidence of a relationship between contraceptive initiation and postnuptial residence. Likewise, determining the nature and extent of association between postnuptial residence and fertility preferences and expectations will be of relevance to this broader issue.

This study has the dual purposes of a) determining patterns and trends in postnuptial residence and b) examining if different types of postnuptial residence influence the initiation of contraceptive use and, among recently married couples, if postnuptial residence influences fertility desires and expectations.

Postnuptial residence patterns will be explored in terms of whether the couples lived with the husband's or wife's parents either for a short or for a longer time following marriage. Detailed estimates of the duration of postnuptial residence will also be made. Regional, rural-urban, and other socio-economic differences relating to linguistic group, education, wife's employment status prior to marriage are examined. Trends over time in the patterns of postnuptial residence and duration of coresidence with parents are also explored. The analyses take into account which sets of parents were alive at the time of marriage and addresses how the availability of parents influences postnuptial residence. Several questions related to this issue are addressed. For example, in areas where coresidence with the wife's parents is customary, do couples live neolocally (living away from both the husband's and wife's relatives) or with the husband's parents if the wife's parents are not alive? Is coresidence more or less likely if only one rather than both parents of a particular spouse is alive?

The second part of the study examines the association between different types and duration of postnuptial residence and reproductive behavior and attitudes. More specifically, the relationship between postnuptial residence and the initiation of contraceptive use early in the family building process, defined alternatively as before the first pregnancy or before the birth of the second living child,is examined. Among recently married couples, defined as those married less than five years, postnuptial residence is examined in

relation to desired and expected family size, the latter being defined as the number of living children plus the number of additional children wanted.

Data

This study is based on the Thailand Demographic and Health Survey (TDHS) carried out as part of the international Demographic and Health Surveys (DHS) project. The TDHS questionnaire contains an expanded set of questions on postnuptial residence in comparison to the standard DHS core. It is possible to determine which set of parents if any, the couple lived with after the wife's first marriage, the duration of any period of coresidence, and whether they are still living with either set of parents. In addition, detailed information was collected about which parents were alive at the time of the wife's first marriage thus permitting the analysis to control for the potential availability of particular postnuptial residence arrangements. Information on initiation of first use of contraception is also available since questions on use prior to the first pregnancy and the precise timing of use following marriage were specially added to the TDHS to supplement the standard DHS core. Desired and expected family size are also available from the questionnaire.

Methods

Postnuptial residence patterns can be represented in several alternative ways. In particular, a distinction can be made between couples who spend any time immediately following marriage living with parents and those who are coresident for at least some minimal time, such as six months, the minimum duration specified in the standard DHS core. Obviously when using some minimum duration of coresidence as part of definition, analysis must be limited to couples married at least as long as the minimum duration. More generally, the analysis needs to take into account the availability of parents at the time of marriage. For some purposes, analysis is thus limited to couples with both parents or at least one parent of each spouse alive at the time of marriage. However, it will also be of interest to examine the way in which the absence of particular parents affects the coresidence patterns, and thus comparisons are also made between couples with different sets of parents alive in some of the analyses.

An examination of the duration of particular coresidence patterns is made utilizing life table methodology. Such an approach enables the analysis to include both censored (i.e. information for couples still living with parents at the time of interview) and non-censored observations as well as to avoid the necessity of restricting the analysis to couples who have been married for at least some minimum duration of time.

Trends in postnuptial residence patterns are estimated from data internal to the TDHS by cross tabulating by year of marriage. Analysis of the influence of postnuptial residence on reproductive behavior and attitudes (initiation of first use of contraception, desired and expected family size) employ both cross tabulation and multiple classification analysis.

Patterns of Postnuptial Residence in Thailand: Findings from previous studies

While studies on family types in Thailand have been done by a number of sociologists and anthropologists, little attention has been given to patterns of postnuptial residence, particularly on the national scale. Most of these studies were limited in scope and being restricted to selected villages in particular regions. (Anuman Rajadhon, 1953; De Young 1956; Kaufman, 1960; Mizuno, 1968, 1971; Lux, 1969). It was not until 1969-1970 that data from the national representative samples of the National Longitudinal Surveys were collected, offering a wide range of information necessary for the analysis of postnuptial residence of both rural and urban populations (Limanonda, 1979). Based on these surveys, it was obvious that patterns of postnuptial residence are different between the rural and urban populations. The majority of urban couples lived neolocally after marriage while a far lower proportion of women in rural areas did the same. Among urban women who lived with parents, it was evident that majority of women in Bangkok, Central and Southern areas coresided with husband's parents (patrilocal residence). This pattern reflected the large

proportion of Chinese population in urban areas who prefer to have daughter-in-laws to live with them. Patterns of postnuptial residence were also different by regions generally. Living with the wife's parents (matrilocal residence) was the most prevalent in the Northeast and the North while the majority of couples in central area, particularly in Bangkok, preferred to live neolocally; otherwise they tended to live with the husband's family.

With respect to attitudes toward coresidence after marriage, it was found that parents in urban areas preferred their children to live independently while rural parents wanted the children to live with the wife's family. Data from the national survey conducted in 1979 made it possible to assess changes in patterns of postnuptial residence during the preceding 10-year period. A comparison with the National Longitudinal Surveys indicated little changes in attitudes toward postnuptial residence among the rural population (Knodel, Chamratrithirong and Debavalya, 1987).

However, data obtained from previous surveys did not provide the same detailed information available in the 1987 TDHS. Information on availability of parents at the time of the respondents' first marriage as well as duration of coresidence with parents provided by the TDHS permits the researcher a chance to conduct a more detailed study of postnuptial residence.

Findings from TDHS:[1]

Information on availability of parents at the time of the respondents' first marriage is included in the present analysis. This variable is considered to be a critical factor in constraining the choice of postnuptial residence.

The first panel of Table 1 shows the percentage distribution of women who reported about the availability of parents at the time of their first marriage classified by duration of marriage. The results clearly indicate that the availability of parents at the time of first marriage has been increasing over time. This is presumably due to improvement in adult mortality. Fifty-five percent of women who were married less than 5 years reported that parents of both sides were alive at the time of their first marriage while only 37 percent of women with marriage duration of 25 years or more reported the same. Similarly, 93 percent of women married less than five years reported that at least one parent of both husband and wife were alive as compared with 81 percent of women married 25 years or more. On the other hand, there was but little variation over time in the proportion having at least one parent alive. For women married less than 5 years more than 99 percent reported some parent alive, and among those married 25 years or more the proportion was about two percentage points less, 97 percent. These findings imply that the choices of postnuptial residence of women of different marriage cohorts were under somewhat different constraints.

The second panel of this same Table summarizes data from the first panel and shows more simply that availability of parents changed, and hence constraints on the choices of women in establishing residence after marriage also changed.

Because of the rapid socio-economic changes in Thailand during recent decades, it might be expected that patterns of postnuptial residence would be affected by such changes. Table 2 displays patterns of postnuptial residence classified by duration of marriage and the availability of parents at the time of respondents' first marriage. Data in the first panel include all women with different durations of marriage. No change is evident in patterns of postnuptial residence. About half of women of less than 5 year's marriage duration and those who are married for 25 years or more live with wife's parents. For the rest, the proportions of women who established their own house independently and those who live with husband's parents, are fairly similar.

The second panel presents data including only women for whom all parents of both sides were alive, and the third panel is for women whose at least one parent of each side were alive. The results found in these two panels show a similar pattern found in the first panel. Although the conditions of the availability of parents of women of these two groups are quite different, the majority of women with different marriage durations tend to live with the wife's parents in the first place. A smaller proportion of women selected to live neolocally or live with the husband's family. The data obtained in this Table confirm that despite the

rapid socio-economic changes that have engulfed Thailand, the prevalence of matrilocal residence has remained relatively stable.

Tables 3 and 4 present both detailed and summary data on postnuptial residence classified by availability of parents at the time of respondents' first marriage.

In Table 3, a very interesting pattern is found. In the case that parents of both sides were alive, 51 percent of women selected to live with the wife's parents while only 28 percent lived with husband's parents. Living with wife's parents is still a dominant pattern among women with only one parent alive but whose husband's parents were both alive. Under these circumstances, 49 percent lived with the wife's mother, but a much smaller proportion, 39 percent lived with the wife's father. The trend to live with wife's parents is obvious when both parents of women were alive and only a father or mother of the husband was alive; more than 50 percent live with the wife's parents.

It is more interesting to find that when at least one parent of each side was alive, but not both, the couple prefers to live with the wife's parent. More than 50 percent of couples in these situations lived with the wife's parent except when the husband's mother was alive and only the wife's father. In that case 35 percent lived with the wife's father, 24 percent with the husband's mother, and 42 percent lived neolocally.

When only one parent is alive, 58 percent live with the wife's mother, but in all other cases a majority live neolocally. Only 38 percent with the wife's father, when he is the sole surviving parent.. Even smaller proportions live with the husband's surviving parent, 32 percent with the husband's mother, and only 18 percent with the husband's father.

The data in this Table indicate that the availability of the wife's mother is the most important factor in the couple's decision of where to live after marriage.

Table 4 is a summary of data in Table 3. When the wife's mother was alive with or without the father and with at least one parent of the husband alive, 52 percent of the couples choose to live with wife's mother while only 26 percent lived with husband's parents. When only the wife's father was alive, the proportion of women who choose to live with the father is reduced to 40 percent and the percent who live independently is larger. The least common choice is to live with the husband's parents. Interestingly, when only the wife's parents were available, 62 percent of women lived with the wife's family. On the contrary, if only the husband's parents were alive, only 38 percent of couples lived with the husband's family.

Overall, 80 percent of women in this study reported that at the time of their first marriage, their mothers were alive with or without the father and with at least one of the husband's parents alive. The remaining 20 percent of women belong to various categories of availability of parents as shown in Table 4. For the sake of convenience, the first group of respondents will be used throughout as a unit of analysis in this study.

In Table 5, patterns of postnuptial residence are shown by regions. The patterns found in the present analysis are similar to those of previous studies (Limanonda, 1979; Podhisita, 1984; Knodel, Chamratrithirong and Debavalya, 1987). Patterns of postnuptial residence are varied according to geographical regions. In the Northeast, more than 70 percent of women establish their residence with the wife's mother (matrilocal residence). The next largest group (57 percent) living with the wife's parent is found in the North. Moreover, in these two regions only small proportions of women reported living independently immediately after marriage compared to those in other regions. In the Central area (excluding Bangkok) and in the South, although a larger proportion of women reported living with wife's parents, the proportion of those living with the husband's family is also quite substantial. This is likely influenced by the larger size of the Chinese population in these two regions who prefer to have their daughter-in-law living with them (Limanonda, 1979).

In Bangkok, the most urbanized area where there is also a large number of Chinese population (Prachuabmoh et al, 1971), 48 percent of women reported living independently while 29 percent live with husband's family, and only 22 percent live with wife's parents.

Apart from the important influence of geographical regions determining variation in patterns of postnuptial residence, previous studies found that rural-urban residence also played a role in determining such variation (Limanonda, 1979; Podhisita, 1984). Table 6 shows the clear picture of the relationship between patterns of postnuptial residence and rural-urban residence. About half of urban women (49 percent) live independently immediately after marriage and 27 percent live with husband's parents. On the contrary, 54 percent of rural women live with the wife's parents, 25 percent live with the husband's parents, and only 20 percent of them live neolocally.

Table 7 indicates the combined effects of region and residence in determining patterns of postnuptial residence. In rural areas, although matrilocal residence is the dominant pattern, variation in degree is still found among different regions. That is, while 72 percent of rural women in the Northeast and 59 percent in the North live with the wife's parents, only 40 percent of rural women in the Central and 44 percent of those the South do the same. Moreover, in the 2 latter regions, a much higher percentage of women lived independently after marriage.

In contrast, in urban areas the majority of women reported living independently. Among women who resided independently, the highest percentages are found among women in Bangkok (48 percent), in the South (47 percent) and in the North (46 percent). The lowest (37 percent) is in the Northeast where about the same proportion lived with the wife's family. The next prevalent pattern found in the urban area is establishing residence after marriage with the husband's family. The highest percentages in this category are found among urban women in the Central and South regions (31 percent), and in Bangkok (30 percent). Findings obtained from Table 7 indicate the importance of regions and residence in determining patterns of postnuptial residence of the Thai population.

Even more important than regions and residence, which are purely locational variables, are the cultural or traditional factors that exists in each region. The data in Table 8 indicate that 71 percent of women classified as 'Laotian/Northeastern speaking Buddhists', 66 percent of 'Northern speaking Buddhists' and 63 percent of 'Cambodians' lived with the wife's parents after marriage. Among both 'Thai speaking Moslem' and 'Malay Moslems', 50 percent also live with the wife's parents. For 'Central speaking Thai Buddhists' and 'Southern speaking Thais', the proportions of women who lived with the wife's family is similar to the proportions who lived with the husband's family. At the same time, very small proportions of 'Laotian/Northeastern speaking Buddhists' (10 percent) and 'Northern speaking Buddhists' (17 percent) lived neolocally. It is obvious from these data that patterns of postnuptial residence of Thai women vary substantially according to their cultural background as represented by the 'religio-linguistic ethnicity' variable.

This analysis is also interested in assessing the influence of modern forces such as women's educational attainment and working experience (outside the agricultural sector) before marriage in determining patterns of postnuptial residence. It is assumed that couples with a lower level of education may need, more than better educated couples, to coreside with their parents after marriage until they could support themselves socially and economically. In Table 9, all respondents (6,773 women) are classified according to their own and their husband's education, and patterns of postnuptial residence are shown for each educational category. Women with primary education tend to live with parents, especially with the wife's side (45 percent for women of less than 4 years of education, and 54 percent for those with 4-6 years of education). On the other hand, larger proportions of women who had higher levels of education live neolocally after marriage (44 percent for women with secondary education and 54 percent for those who had higher level of education). The same pattern of relationship between education and postnuptial residence is found according to husbands' education. In other words, couples who had higher levels of education tend to exercise greater choices in establishing their own residence after marriage.

Although the relationship between education and patterns of postnuptial residence is quite clear as shown in Table 9, the association may be due to other factors that play a part in determining variations in patterns of postnuptial residence. For instance, women with higher levels of education tend to live in urban areas where the majority of people establish their home independently after marriage. This analysis therefore attempts to bring in other variables thought to be relevant for such relationships. To reduce the complexity in presenting the results, the unit of analysis in this part is confined to women who are 'Thai speaking

Buddhists, the large majority of the TDHS sample, and whose mothers were alive with or without fathers and at least one of the husbands' parents were alive at the time of their first marriage. The variables that are brought into the analysis include rural-urban residence, and level of education of both women and their husbands. Since linguistic dialect is strongly associated with the patterns of postnuptial residence, the linguistics or language spoken is also used as a control variable in this part of analysis. In rural samples, women are classified into two language groups that were shown to be culturally similar with respect to postnuptial residence patterns: Northeast and North, South and Central. A similar classification is not undertaken for the urban sample since the preceding analysis showed that patterns of postnuptial residence in this area are more influenced by 'urban way of living' which leads the urban population prefer to live independently after marriage than by regional cultural differences.

Data from Table 10 clearly indicate the influences of rural areas and regions combined and of education on patterns of postnuptial residence. In the rural Northeastern and Northern language groups, more than 70 percent of women with less education (primary level) establish their residence after marriage with the wife's parents. Only 13 percent of women with less than 4 years of education and 8 percent of those with 4-6 years of education live independently. Moreover, it is interesting to find that a much smaller percentage of women with a higher education level live with the wife's parents (47 percent) than is the case with women of less education, and a larger proportion (37 percent) of women in this same group also live independently after marriage. This result reflects the influences of both 'being rural' and 'high level of education'.

Patterns of postnuptial residence found among the rural Central and Southern speaking groups are different from those of Northeastern and Northern speaking group. Among women whose education was less than the secondary level, the proportions who lived with the wife's parents were far less than among the same groups in the North. The proportions living with the husband's parents after marriage are about twice as high as among the Northern/Northeastern dialects. This could be the combined result of 2 factors; living in rural areas where matrilocal residence is prevalent on the one hand and the larger proportion of Chinese in the area who prefer patrilocal residence on the other. The proportion of women with secondary or higher levels of education who live neolocally is almost twice as high as among women with lower levels of education.

For women in urban areas, about 40-50 percent at each educational level live independently after marriage. However, education still plays a role in determining patterns of postnuptial residence. The linear relationship between education and living independently is still evident among urban women. Among women with a secondary level of education and higher, 50 percent live neolocally after marriage. The proportions living independently decreases for lower educational level (46 percent for women with 4-6 years of education and 41 percent for those with less than 4-years education). The next most common pattern found in the urban area is living with husband's parents. However, higher proportions of women with less education (i.e. less than 4 years) tend to live with parents (39 percent) than those with higher education (25 percent for those with secondary or college education). The proportion of urban women living with wife's parents, which is the least common pattern, is about the same for each level of education. A similar relationship between education and postnuptial residence is found with respect to the women's husband.

Table 11 presents patterns of postnuptial residence classified by women's working experience (in the non-agricultural sector) before marriage. It is assumed that working for pay before marriage would enhance women's ability to support themselves economically. With this ability, they would be more independent and have more choices in selecting their own residence, usually living neolocally after marriage.

It is clear that 55 percent of women who never worked before marriage established their residence after marriage with the wife's family. Possibly most of these women lived in rural areas, worked in agriculture and therefore tended to live with their own parents. Only 20 percent of them live independently after marriage. For women who reported having worked before marriage, the proportions of those living independently and those who live with the wife's parents are about the same, with the proportion of women living with the husband's parents being appreciably smaller.

The relationship between these two variables is examined further in Table 12 by adding 2 more control variables: linguistic category and rural-urban residence. The group of rural women once again are

classified into two language groups: Northeastern and Northern combined and Central and South combined while the urban sample is not controlled for language for the reasons discussed previously. After controlling by two variables, it is found that although living with the wife's parent is the dominant pattern practiced among the rural Northeastern and Northern speaking group, women who never worked practiced matrilocal residence in higher proportions than those who ever worked before marriage (74 percent vs. 64 percent).

On the other hand, the proportion of women who worked before marriage who live independently after marriage is higher than those who never worked (17 percent vs. 8 percent). Only 20 percent of rural women, both among those who ever worked and those who never worked before marriage established their residence with the husband's family. For women in the Central and Southern speaking group, patterns of postnuptial residence are obviously different between women who ever worked and who never worked. That is, 45 percent of women who never worked established their residence after marriage with wife's parents and only 20 percent of them lived independently. In contrast, 40 percent of women who ever worked before marriage lived independently and only 28 percent choose to live with the wife's family. Interestingly enough, when compare with Northeastern and Northern speaking group, much higher proportions of women of the Central and South speaking group living with the husband's family. This is true for both women who never worked (35 percent) and those who ever worked before marriage (32 percent). With regard to women in the urban area, among women who never worked, proportions of those who lived with wife's family, with husband's family or lived neolocally are about the same. However, among women who ever worked, a larger proportions (53 percent) lived neolocally after marriage. The results obtained from Table 12 confirm the assumption made previously that women's working experience, ability to earn and to support themselves economically, is as important as level of education in leading women to be more independent in making choices in establishing their own residence after marriage. However, it cannot be denied that the influence of culture, particularly linguistics, as well as type of residence (rural-urban) are still strong in determining variations in patterns of postnuptial residence of Thai women.

Through the use of the life table approach, Table 13 presents median survival time of coresiding with a parent after marriage among Thai women. One of the advantages of this approach is that both women who have been living with their parents since the beginning until the time of the interview (censored observations) and women who used to live with parents but have separated themselves at the present time (uncensored observations) could be included into the analysis to calculate the survival time. In this last Table, 4 variables have been brought in; rural-urban residence, patterns of postnuptial residence; living with wife's parents and living with husband's parents. Throughout the analysis, it is clear that patterns of postnuptial residence of Thai women vary substantially according to a number of factors including region, residence, linguistics, education and working experience before marriage. However, the survival time of coresidence (before separating themselves to establish their own residence) obtained through life table analysis is almost identical for women in rural (36.6 months) and in urban areas (36.5 months). Moreover, duration of coresidence with wife's parents and with husband's parents is about the same (36.6 months and 36.5 months respectively).

Median survival time obtained from this analysis could be used to confirm the results from qualitative studies conducted in Thailand previously by anthropologists (Foster, 1975; Kaplan, 1981; Smith, 1979 cited in Knodel, Chamratrithirong and Debavalya, 1987). These studies reported that young couples usually coreside with their parents' family for some period of time, but the duration of coresidence is not fixed. The time to leave the parental home depends on the ability of the couples to support themselves economically, or when the next daughter of the family gets married, or when the couple has the first child.

Patterns of Postnuptial Residence and Reproductive Behavior

The second part of the analysis examines the relationship between patterns of postnuptial residence and women's reproductive behavior and attitude. It is interesting to observe whether different patterns of postnuptial residence are associated with differentials in both reproductive behavior and attitudes of women. There have been debates over this issue in the demographic literature for some time. The work by Davis (1955) and Lorimer (1954), cited in Limanonda (1978), concluded that fertility of women living in extended families is higher than that of women in nuclear families because of the support received from kin. On the contrary, the work by Nag (1965) and Pakrasi and Malarker (1967) (cited in Limanonda, 1978) found the

reverse pattern of relationship between fertility and a nuclear family. This study examines the relationship between postnuptial residence and reproductive behavior and attitudes. This analysis recognizes that coresidence with parents among Thais often is for a relatively short period of time (usually less than 5 years as discussed in the first part of this analysis). Thus the impact of coresidence on fertility preference and expectations is likely to be strongest early in marriage. The variables used to represent reproductive behavior and attitudes include initiation of contraceptive use before the first pregnancy and use before having the second child, total number of children ever born, expected number of children, and ideal number of children.

Table 14 presents the mean age at marriage of women classified by patterns of postnuptial residence, duration of marriage, and rural- urban residence. Although marriage occurs before establishing postnuptial residence, the decision on when to marry may be affected by prior consideration of where to live. Hence causal relationships can be in either direction. In any event, the two variables should show an association to some extent. Interesting results concerning marriage patterns emerge. The marriage age of rural women is usually lower than that of urban women (Limanonda 1983, 1987). This pattern appears clearly among women of every marriage duration. The distinctly lower marriage age among women who married 25 years ago or longer is probably attributable in large part to a truncation bias (i.e., women at longer marriage duration who married at older ages would be excluded from the sample since they would be age 50 or above at the time of the survey). In both rural and urban areas, women who live with the husband's family and those who live with the wife's family have similar mean ages at marriage but the age at marriage is a little more than a year higher for women who live neolocally after marriage. This pattern is found among women of each marriage cohort married less than 20 years, but no differences are found among those married 20 or more years. This finding may reflect that women who live independently after marriage usually have higher education, probably work for pay before marriage, and do not rely on the parental support. As a result, this group of women usually have slightly higher marriage ages than the other two groups.

Tables 15 and 16 display the percentage of women using contraceptives before first pregnancy and before having a second child. It is clear that few women attempted to prevent having the first birth immediately after marriage. Overall 79 percent of respondents reported not using any method while only 21 percent used some method to prevent the first birth. However, much greater percentages of women later used contraceptives before having a second child. The percentage using contraceptives before a second birth (among all women including those who have not yet had a second birth) is 47 percent which is almost equal to the proportions of those not using contraceptives (53 percent). This indicaters that about half of Thai women plan their fertility from an early point in the family building process.

Table 17 shows the percentage of women using contraception before the first pregnancy, classified by patterns of postnuptial residence, duration of marriage and rural-urban residence. A higher proportion of urban women of every marriage cohort used contraceptives before first pregnancy than rural women. Also, both in rural and urban areas, women in each lower marriage duration cohort (who are usually women in younger age groups) used contraception before first pregnancy in a higher percentage than did those in a higher marriage duration cohort. Thus the proportions using contraceptives decreased as marriage duration increased. For instance, in rural areas 48 percent of women with less than 5 years marriage duration who lied neolocally used contraceptives before the first pregnancy while only 1 percent of women of older marriage cohorts did the same. This reflects the effects of the government's anti-natalist policy and the increasingly widespread availability contraception in recent years. In both rural and urban areas, the proportions using contraceptives before first pregnancy is found highest among women who live neolocally after marriage. This is obvious among recently married women (less than 10 years of marriage). The proportions using contraceptives among women who live with the wife's parents and with the husband's parents, are about the same. A possible interpretation of this finding is that women who live neolocally may not receive kin's support or help as much as the other two groups of women. Therefore, they may have more need to plan the timing of their children. Moreover, they might be more independent in making decisions about whether or not to use contraceptives to delay or prevent births.

The relationship between patterns of postnuptial residence and proportion using contraceptives before having the second living child is shown in Table 18. The pattern of relationship evident are similar to those found in Table 17. That is, lower proportions of rural women use contraception during each specified period than urban women. Also women of older marriage cohorts use contraceptives less than those of younger

cohorts. However, the overall percentages using contraceptives before having the second birth is much higher than during the first pregnancy. This is particularly true among urban women. For example, more than 55 percent of women in each marriage cohort of less than 15 years used contraception, including those married less than 5 years. Among those married less than 10 years 75 percent or more used contraception, except for the group married 0-4 years who were living with the wife's parents, among whom 69 percent reported using contraception before having a second birth. Once again, it is evident that women who live neolocally after marriage are more likely to use contraception than the other two groups of women who establish residence with the husband's or wife's family.

The total number of children ever born classified by patterns of postnuptial residence, duration of marriage and residence are presented in Table 19. On average, the number of children ever born to urban women is smaller than to rural women although no difference is found for the number of children ever born among women of younger marriage cohorts (less than 5 years). The differentials are greater among women who have been married longer, and is greatest among women who have been married 25 years or longer. The influence of pattern of postnuptial residence on number of children ever born is not obvious although the number of children ever born among rural and urban women of almost every marriage duration who live independently tends to be smaller compared to that of women who live with either the husband's or wife's parents. However, among both rural and urban women who have been married longer than 15 years, the number of children ever born is highest among women who establish their residence with the husband's parents. A plausible explanation for such a finding is that women who establish their residence with their husband's parents are disproportionately of Chinese descent and share cultural values which promote parental control and larger numbers of children. Moreover, this result is quite consistent with the data shown in Table 18 which found that women living with the parents' family were less likely to use contraception than those who lived independently.

Table 20 presents data on the expected number of children (derived from the number of living children plus the additional number of children wanted) classified by patterns of postnuptial residence, duration of marriage and residence. Similar patterns of relationship to those in Table 19 are found.

Although no difference is found in the expected number of children among urban-rural women who have been married less than 15 years, among those who are married longer, rural women expressed a higher expected number of children than urban women (i.e., 3-5 children for rural and 2-4 for urban). Patterns of postnuptial residence have little effect on the expected number of children. On average the expected number of children reported by women who live neolocally, or women who live with husband's or wife's parents, are almost the same. However, by examining data in more detail, some differentials in number of children expected are evident. That is, the expected number of children of women who live with the husband's parents is found to be higher than the other two groups. This is especially true for women who have been married for more than 25 years whose reported number of children is as high as 5.

Results obtained from Tables 18, 19 and 20 are quite consistent in the direction of the relationship shown. That is, compared to the other 2 groups, women who establish residence independently after marriage are most likely to use contraceptives before first pregnancy and before having second living child. As a result, they have a lower number of children ever born and a lower number of expected children than those who lived with parents after their marriage. However, the difference is not substantial. This small difference in reproductive behavior and attitude of women who experience different patterns of postnuptial residence is investigated further by examining additional information on coresidence. Results show that only a small proportion of women have coresided with parents of either the husband or wife since the time of marriage until the present time and that which the majority lived with parents but only a short period of time before separating to establish their own households:

Coresidence with parents	Percent
Never coresided since marriage	32.1
Lived with wife's parent but not at present	30.2
Lived with husband's parent but not at present	19.5
Have lived with wife's parent until present	11.4
Have lived with husband's parent until present	6.6
	100.0

Reproductive behavior and current attitudes of the majority of women reflect the situation after the separation of the household from parents of either side and are likely to be only minimally affected by different types of postnuptial residence. This is quite consistent with the general Thai norm of assigning considerable autonomy to adult children in their reproductive decisions (Knodel, Havanon and Prammalratana, 1984).

In the TDHS Survey, two questions were asked to yield information on ideal number of children. The question for women who do not have living children is "If you could choose exactly the number of children to have in your whole life, how many would that be?" And for those who have living children, the question is "If you could go back to the time you did not have any children and could choose exactly the number of children to have in your whole life how many would that be?"

Data on ideal of number of children presented in Table 21 are classified by patterns of postnuptial residence, duration of marriage and residence. Generally the ideal number of children reported by urban women is smaller than that of rural women. In both rural and urban areas, the ideal number of children increases with marriage duration. This most probably reflects the trend over time of a desire for fewer children. To some extent, however, women with longer marriage durations rationalize their desired family size or ideal number of children to correspond with their actual number

Patterns of postnuptial residence are found to have little influence on the ideal number of children as shown in previous tables. Women who live in 3 different types of postnuptial residence have about the same ideal number of children, although women who live independently, especially in urban areas, tend to have a smaller ideal number of children.

For rural areas, no obvious relationship between residence after marriage and ideal number of children is evident, i.e., it is not apparent if living independently or living with parents leads to a higher ideal number of children. The underlying reasons for a lack of association may be similar to those discussed for the minimal differentials in expected number of children observed in Table 20.

Table 22 presents results obtained from a Multiple Classification Analysis (MCA). Dependent variables examined in the equations include age at first marriage, initiation of contraceptive use before first pregnancy, and before having a second child, the total number of children ever born, and the expected and ideal number of children. The independent and control variables incorporated in the analysis include the patterns of postnuptial residence, rural-urban residence, region, education of women and duration of marriage. In order to simplify the presentation of findings, only the relationship between reproductive behavior and attitude and patterns of postnuptial residence are presented in form of both unadjusted and adjusted values of each set of variables. Interpretation refers only to adjusted values of each dependent variable since the focus is on effects of postnuptial residence after controlling for effects of other variables included in the model.

The highest age at marriage (20.1 years old) is found for women who lived independently. The next highest is found among women who lived with the wife's family (19.6 years) and the lowest is among women in patrilocal residence (19.1 years). Women who lived independently after marriage are most likely to use contraceptives both before pregnancy (21 percent) and before having a second living child (46 percent). Next

highest is among women who lived with the wife's family (17 percent for before first pregnancy and 43 percent for before second child). The least is in the group of women who lived with the husband's parents; 16 percent using contraceptives before first pregnancy and 41 percent using before having a second child.

The adjusted values for the total number of children (2.9) and expected number of children (3.2) is found to be highest among women who lived with the husband's parents. However, it is not very different from those of the other two groups, indicating little influence of different types of postnuptial residence on women's reproductive behavior and attitudes. No difference is found for ideal number of children among the 3 groups of women, 2.8 children in all three cases. These results could be explained by the short duration of postnuptial residence characteristic of most couples. Short durations of coresidence would be expected to bear little influence on behavior and attitudes on fertility that characterized later stages in the family building process.

Summary

The 1987 TDHS Survey provides data which can be used for analysis on patterns of postnuptial residence of Thai women. The results obtained from this analysis are consistent with those of previous studies in many aspects. By comparing patterns of postnuptial residence practiced by women of younger and older marriage cohorts, the data confirm the absence of major change in patterns of postnuptial residence despite the rapid socioeconomic change that has engulfed Thailand in recent decades. The results also illustrate clearly that the availability of parents at the time of marriage has been increasing over time, presumably due to improvement of adult mortality. Availability of parents at the time of marriage is a critical factor either constraining or facilitating the choice of women in establishing residence after marriage. Culture as represented by linguistic group and religion as well as ethnicity, regional and rural-urban residence, education, and working experience before marriage are all found to be strongly related to the patterns of postnuptial residence. It will be interesting for future research to assess changes in patterns of postnuptial residence that may occur once Thailand has changed its socio-economic structure into a more industrialized society. Also, determining reasons of women for leaving the parental home immediately after marriage or after living with them for some period of time would have value for understanding better how establishing of residence after marriage takes place.

The analysis of the relationship between patterns of postnuptial residence and women's reproductive behavior and attitudes yielded interesting findings. Women of different age group, different marriage cohorts, and living in different types of areas have different reproductive behavior and attitudes. Women in urban areas, in younger age groups, and younger marriage cohorts were more likely to practice contraception and have a smaller size of family. Socio-economic conditions and the government's promotion of small family size are likely influences in this respect. However, there appears to be little influence of different patterns of postnuptial residence on differences in reproductive behavior and attitudes. Women who lived neolocally are more likely to have used contraceptives before their first pregnancy or before having a second child and tend to have fewer children ever born than women in other postnuptial residence arrangements. But differences in attitudes of women who resided in different types of postnuptial residence are very small. This results from the fact that the length of residence with parents is on average short. This pattern is also consistent with the general Thai norm assigning considerable autonomy to adult children in their reproductive decisions.

NOTE

1 The number of women provided in the Tables in this report are based on weighted calculations. However, the weighting system is designed so that the total number of unweighted and weighted cases are equal. Thus in most categories the weighted and unweighted numbers do not differ greatly.

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Table 1 Percentage distribution of respondents classified by the availability of parents at the time of respondent's first marriage and duration of marriage

Combination of set of parents at the time of first marriage	Duration of marriage (years)					
	0-4	5-9	10-14	15-19	20-24	25+
Detailed Classification						
Four parents	55.3	51.2	51.2	45.6	41.0	37.2
Only 3 parents	31.1	34.1	33.1	34.5	34.0	32.0
One from each side	6.4	6.2	6.3	8.1	8.2	12.0
Two from one side	5.5	5.6	6.5	7.6	10.6	12.0
One parent	1.4	2.8	2.7	3.5	5.2	4.2
None	.4	.2	.2	.6	1.0	2.8
Total	100.0 (1,371)	100.0 (1,293)	100.0 (1,185)	100.0 (870)	100.0 (688)	100.0 (678)

Table 2 Percentage distribution of respondents classified by patterns of postnuptial residence, availability of parents at the time of respondent's first marriage and duration of marriage

Patterns of postnuptial residence, availability of parents	Duration of marriage (years)					
	0-4	5-9	10-14	15-19	20-24	25+
All respondents						
Live with wife's parents	48.0	46.5	50.6	50.7	50.7	50.7
Live with husband's parents	28.1	25.6	24.7	23.1	22.0	25.1
Live neolocally	23.9	28.0	24.7	26.2	27.3	24.2
Total	100.0 (1,375)	100.0 (1,422)	100.0 (1,311)	100.0 (995)	100.0 (828)	100.0 (824)
Parents of both sides were alive						
Live with wife's parents	49.1	51.5	51.2	52.7	52.9	52.4
Live with husband's parents	32.2	25.7	28.2	25.1	26.1	29.2
Live neolocally	18.7	22.9	20.6	22.2	20.9	18.4
Total	100.0 (758)	100.0 (724)	100.0 (670)	100.0 (449)	100.0 (339)	100.0 (311)
At least one parent of each side was alive						
Live with wife's parents	49.0	48.2	51.8	53.0	52.9	53.3
Live with husband's parents	29.5	26.6	26.7	24.6	23.5	27.6
Live neolocally	21.5	25.2	21.4	22.5	23.6	19.2
Total	100.0 (1,271)	100.0 (1,293)	100.0 (1,185)	100.0 (870)	100.0 (688)	100.0 (678)

Table 3 Postnuptial residence patterns classified by the availability of parents at the time of respondent's first marriage

Availability of parents at the time of respondents' first marriage	Postnuptial residence patterns			Total
	Live with wife's parents	Live with husband's parents	Live neolocally	
Four from both sides	51.3	28.0	20.7	100.0 (3,251)
Husband's parents/ wife's mother	49.1	27.9	23.0	100.0 (750)
Husband's parents/ wife's father	39.3	33.4	27.3	100.0 (284)
Wife's parents/ husband's mother	52.0	24.7	23.3	100.0 (843)
Wife's parents/ husband's father	55.1	23.3	21.6	100.0 (352)
Husbands's mother/ wife's mother	59.8	16.4	23.8	100.0 (263)
Husband's mother/ wife's father	34.8	23.5	41.6	100.0 (98)
Husband's father/ wife's mother	52.7	15.7	31.7	100.0 (108)
Husband's father/ wife's father	53.5	26.1	20.3	100.0 (37)
Husband's parents	-	44.1	55.9	100.0 (167)
Wife's parents	66.5	-	33.5	100.0 (334)
Husband's mother	-	31.6	68.4	100.0 (59)
Husband's father	-	17.6	82.4	100.0 (26)
Wife's mother	57.6	-	42.4	100.0 (84)
Wife's father	38.3	-	61.7	100.0 (38)
None	-	-	100.0	100.0 (48)
Total	49.4	25.1	25.4	100.0 (6,740)

Table 4 Summary table of postnuptial residence patterns classified by the availability of parents at the time of respondent's first marriage

Availability of parents at the time of respondent's first marriage	Postnuptial residence patterns			Total
	Live with wife's family	Live with husband's family	Live neolocally	
Wife's mother with/ without father and husband's father or mother	51.8	26.4	21.8	100.0 (5,567)
Only wife's father and husband's father or mother	39.5	30.5	30.1	100.0 (418)
Only wife's parents	62.5	-	37.5	100.0 (455)
Only husband's parents	-	38.5	61.5	100.0 (252)
None	-	-	100.0	100.0 (48)

Table 5 Postnuptial residence patterns of respondents whose mother with/without father and any of husband's parents were alive at the time of respondent's first marriage, classified by region

Region	Postnuptial residence patterns			Total
	Live with wife's family	Live with husband's family	Live neolocally	
Bangkok	21.9	29.5	48.5	100.0 (607)
Central (excl. Bangkok)	39.1	34.1	26.8	100.0 (1,222)
North	57.1	24.2	18.7	100.0 (1,146)
Northeast	70.3	19.8	10.0	100.0 (1,896)
South	40.8	31.9	27.4	100.0 (696)

Table 6 Postnuptial residence patterns classified by rural-urban residence

Residence	Postnuptial residence patterns			Total
	Live with wife's family	Live with husband's family	Live neolocally	
Rural	54.9	24.7	20.4	100.0 (5,540)
Urban	23.9	26.7	49.4	100.0 (1,233)
Total	49.2	25.1	25.7	100.0 (6,773)

Table 7 Postnuptial residence patterns of respondents whose mother with or without father and any of husband's parents were alive at the time of respondent's first marriage classified by rural-urban residence and region

Rural-urban residence and region	Postnuptial residence patterns			Total
	Live with wife's family	Live with husband's family	Live neolocally	
Rural				
Central (excl. Bangkok)	40.4	34.5	25.2	100.0 (1,096)
North	59.3	24.3	16.4	100.0 (1,058)
Northeast	72.4	19.4	8.2	100.0 (1,782)
South	43.5	32.0	24.5	100.0 (608)
Urban				
Bangkok	21.9	29.5	48.5	100.0 (607)
Central (excl. Bangkok)	28.2	31.2	40.5	100.0 (127)
North	31.0	23.2	45.8	100.0 (88)
Northeast	36.5	26.4	37.2	100.0 (114)
South	21.9	30.8	47.2	100.0 (88)

Table 8 Postnuptial residence patterns of respondents whose mother with or without father and any of husband's parents were alive at the time of respondent's first marriage classified by religio-linguistic ethnicity

Religio-linguistic Ethnicity	Postnuptial residence patterns			Total
	Live with wife's family	Live with husband's family	Live neolocally	
Central Thai Buddhist	34.5	32.4	33.1	100.0 (2,090)
Laos/Northeastern Buddhist	70.9	18.6	10.5	100.0 (1,875)
Northern Buddhist	65.5	16.8	17.7	100.0 (526)
Southern Buddhist	36.5	33.9	29.6	100.0 (436)
Thai Moslem	51.2	29.0	19.8	100.0 (221)
Malay Moslem	56.8	24.5	18.7	100.0 (71)
Cambodian	62.9	29.7	7.3	100.0 (152)
Hill tribe	49.4	43.2	7.4	100.0 (117)
Other	26.6	38.9	34.5	100.0 (79)

Table 9 Postnuptial residence patterns classified by education of respondent and husband

Education	Postnuptial residence patterns			Total
	Live with wife's family	Live with husband's family	Live neolocally	
Respondent's				
Less than gr.4	44.6	28.1	27.1	100.0 (995)
Grades 4-6	53.5	24.5	21.9	100.0 (4,975)
Secondary	28.0	28.3	43.7	100.0 (521)
Higher than secondary	28.5	17.7	53.8	100.0 (281)
Total	49.2	25.1	25.7	100.0 (6,773)
Husband's				
Less than gr.4	50.1	27.0	22.9	100.0 (580)
Grades 4-6	54.1	24.9	21.0	100.0 (4,730)
Secondary	36.3	27.3	36.4	100.0 (1,025)
Higher than secondary	26.1	19.3	54.7	100.0 (355)
Total	49.2	25.1	25.7	100.0 (6,773)

Table 10 Postnuptial residence patterns of Thai speaking Buddhist respondents whose mother with/without father and any of husband's parents were alive at the time of respondent's first marriage, classified by level of education, dialect and rural-urban residence

Education	Rural								Urban			
	Northern/Northeastern dialects				Central/Southern dialects							
	With wife's family	With husband's family	Live neolocally	Total	With wife's family	With husband's family	Live neolocally	Total	With wife's family	With husband's family	Live neolocally	Total
Respondent's												
Less than gr.4	71.9	15.2	12.9	100.0(202)	33.2	38.8	28.0	100.0(252)	20.2	38.7	41.1	100.0(75)
Grades 4-6	73.4	18.3	8.3	100.0(1,930)	44.3	33.6	22.1	100.0(1,309)	25.8	28.5	45.8	100.0(510)
Secondary and higher	46.9	16.5	36.6	100.0(99)	24.1	31.1	44.8	100.0(200)	24.8	25.2	50.0	100.0(350)
Husband's												
Less than gr.4	69.0	18.7	12.3	100.0(110)	37.1	34.8	28.1	100.0(118)	17.1	46.9	36.0	100.0(31)
Grades 4-6	74.1	17.9	8.1	100.0(1,862)	43.2	35.3	21.5	100.0(1,245)	26.8	28.6	44.6	100.0(393)
Secondary and higher	59.5	18.1	22.5	100.0(248)	33.0	30.9	36.1	100.0(377)	24.0	26.0	50.0	100.0(488)

Table 11 Postnuptial residence patterns classified by respondent's working experience (outside agriculture) before marriage

Working experience before marriage	Postnuptial residence patterns			Total
	Live with wife's parents	Live with husband's parents	Live neolocally	
Never worked	55.1	25.0	19.9	100.0 (4,703)
Ever worked	36.1	25.4	38.5	100.0 (2,054)
Total	49.3	25.1	25.5	100.0 (6,758)

Table 12 Postnuptial residence patterns of Thai speaking Buddhist respondents whose mother with/without father and any of husband's parents were alive at the time of respondent's first marriage classified by working experience (non-agriculture) before marriage, dialect and rural-urban residence

Working experience before marriage	Rural								Urban			
	Northern/Northeastern dialects				Central/Southern dialects							
	With wife's family	With husband's family	Live neolocally	Total	With wife's family	With husband's family	Live neolocally	Total	With wife's family	With husband's family	Live neolocally	Total
Never worked	74.4	17.7	7.9	100.0(1,719)	44.8	34.9	20.3	100.0(1,289)	30.6	31.2	38.2	100.0(368)
Ever worked	64.4	18.6	17.0	100.0(511)	28.6	31.8	39.6	100.0(471)	21.3	26.0	52.7	100.0(566)

Table 13 Median survival time of postnuptial residence classified by rural-urban residence and type of coresidence (life table approach)

Variable	Median survival time of postnuptial residence (months)
Rural	36.6
Urban	36.5
Live with wife's family	36.6
Live with husband's family	36.5

Table 14 Age at first marriage of respondents classified by postnuptial residence patterns, duration of marriage and rural-urban residence

Rural-urban residence and duration of marriage (year)	Postnuptial residence patterns		
	Live with wife's parents	Live with husband's parents	Live neolocally
Rural			
0-4	19.7	19.4	21.2
5-9	19.9	19.5	21.2
10-14	19.6	19.0	19.8
15-19	19.1	18.7	20.0
20-24	19.1	18.5	18.8
25 and over	17.5	17.6	17.6
Mean	19.3	18.9	19.9
Urban			
0-4	21.6	21.5	22.3
5-9	20.6	20.6	22.1
10-14	20.2	20.1	21.7
15-19	19.4	19.7	20.9
20-24	20.0	18.8	20.0
25 and over	17.9	17.9	18.2
Mean	20.3	20.2	21.4

Table 15 Percentage of respondents using contraceptives before first pregnancy

Did you use contraception before 1st pregnancy?	Percent	Number
Did not use	78.8	5,337
Used	20.9	1,418
Total	100.0	6,775

Table 16 Percentage of respondents using contraceptives before having a second birth

Did you use contraceptives before having second birth?	Percent	Number
Did not use	53.0	3,587
Used	47.0	3,177
Total	100.0	6,764

Table 17 Percentage of respondents using contraceptives before first pregnancy classified by postnuptial residence patterns, duration of marriage and rural-urban residence

Rural-urban residence and duration of marriage (in years)	Postnuptial residence patterns		
	Live with wife's parents	Live with husband's parents	Live neolocally
Rural			
0-4	35.7	35.6	48.4
5-9	22.4	23.0	27.7
10-14	10.7	8.2	16.5
15-19	2.3	1.7	9.5
20-24	1.0	1.3	2.5
25 and over	0.0	0.1	1.3
Mean	14.0	14.8	18.7
Urban			
0-4	49.9	52.7	60.6
5-9	38.2	31.7	39.5
10-14	18.5	27.1	23.0
15-19	10.9	8.7	14.5
20-24	4.5	7.4	11.4
25 and over	2.4	0.0	1.4
Mean	26.0	27.1	32.5

Table 18 Percentage of respondents using contraceptives before having a second birth classified by postnuptial residence patterns, duration of marriage and rural-urban residence

Rural-urban residence and duration of marriage (years)	Postnuptial residence patterns		
	Live with wife's parents	Live with husband's parents	Live neolocally
Rural			
0-4	60.3	64.3	73.2
5-9	64.1	57.0	64.0
10-14	48.7	43.0	52.5
15-19	25.9	21.2	34.2
20-24	9.2	9.9	9.5
25 and over	1.9	3.6	7.1
Mean	39.3	39.0	42.7
Urban			
0-4	68.7	75.5	81.6
5-9	77.2	75.0	79.6
10-14	58.6	64.2	55.7
15-19	42.7	38.7	44.1
20-24	28.0	24.5	32.1
25 and over	2.4	10.7	5.7
Mean	54.6	56.6	60.2

Table 19 Number of total births of respondents classified by postnuptial residence, duration of marriage and rural-urban residence

Rural-urban residence and duration of marriage (years)	Postnuptial residence patterns		
	Live with wife's parents	Live with husband's parents	Live neolocally
Rural			
0-4	.8	.8	.7
5-9	1.9	1.9	1.9
10-14	2.6	2.7	2.5
15-19	3.4	3.9	3.2
20-24	4.4	5.1	4.3
25 and over	5.6	5.9	5.5
Mean	2.8	3.0	2.9
Urban			
0-4	.6	.8	.7
5-9	1.6	1.7	1.5
10-14	2.4	2.4	2.1
15-19	2.8	3.3	2.7
20-24	3.1	3.8	3.2
25 and over	4.9	5.6	4.6
Mean	2.2	2.4	2.0

Table 20 Respondent's expected number of children classified by postnuptial residence patterns, duration of marriage and rural-urban residence

Rural-urban residence and duration of marriage (years)	Postnuptial residence patterns		
	Live with wife's family	Live with husband's family	Live neolocally
Rural			
0-4	2.1	2.0	1.9
5-9	2.4	2.5	2.4
10-14	2.7	2.9	2.8
15-19	3.3	3.7	3.2
20-24	4.0	4.7	4.1
25 and over	4.9	5.2	4.9
Mean	3.1	3.2	3.1
Urban			
0-4	1.8	1.9	1.8
5-9	2.1	2.1	2.1
10-14	2.5	2.5	2.4
15-19	2.9	3.2	2.8
20-24	3.1	3.7	3.1
25 and over	4.5	5.2	4.3
Mean	2.5	2.8	2.5

Table 21 Respondent's ideal number of children classified by postnuptial residence patterns, duration of marriage and rural-urban residence

Rural-urban residence and duration of marriage (years)	Postnuptial residence patterns		
	Live with wife's family	Live with husband's family	Live neolocally
Rural			
0-4	2.4	2.2	2.2
5-9	2.6	2.7	2.5
10-14	2.8	2.9	2.7
15-19	3.1	3.1	2.9
20-24	3.5	3.3	3.4
25 and over	3.5	3.5	3.7
Mean	2.9	2.8	2.9
Urban			
0-4	2.1	2.2	2.1
5-9	2.4	2.3	2.2
10-14	2.5	2.4	2.5
15-19	2.8	2.7	2.4
20-24	2.9	3.1	2.8
25 and over	3.4	3.6	2.9
Mean	2.5	2.6	2.4

Table 22 Multiple Classification Analysis of respondents' reproductive behavior and attitudes, and postnuptial residence patterns

Reproductive behavior and attitude	Postnuptial residence patterns		
	Live with wife's family	Live with husband's family	Live Neolocally
Age at marriage			
Unadjusted Value	19.4	19.1	20.4
Adjusted Value*	19.6	19.1	20.1
eta^2 0.02			
beta 0.09			
Percentage using contraceptives before first pregnancy			
Unadjusted Value	15.0	17.2	23.5
Adjusted Value*	17.0	15.9	20.8
eta^2 0.008			
beta 0.05			
Percentage using contraceptives before having second birth			
Unadjusted Value	40.7	42.4	48.8
Adjusted Value*	42.9	41.0	45.7
eta^2 0.005			
beta 0.03			
Total number of births			
Unadjusted Value	2.8	2.9	2.6
Adjusted Value*	2.7	2.9	2.7
eta^2 0.003			
beta 0.05			
Expected number of children			
Unadjusted Value	3.1	3.1	2.9
Adjusted Value*	2.9	3.2	2.9
eta^2 0.004			
beta 0.06			
Ideal number of children			
Unadjusted Value	2.9	2.8	2.7
Adjusted Value*	2.8	2.8	2.8
eta^2 0.003			
beta 0.02			

* Adjusted values are adjusted for the effects of rural-urban residence, region, education and duration of marriage.

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