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# Report on Birth Order Distribution as a Family Planning Programme Evaluation Indicator

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CONTENTS	
	Page
Acknowledgement	i
List of Table	iii
List of Figure	v
Introduction	1
Theoretical Framework	3
Research Design	3
Existence of the Data	4
Appraisal of the Existing Data	6
Results	16
Conclusion & Recommendation	34
References	36
Appendix	
- Birth Registration System	39
<ul> <li>The Second Part of Birth Certificate</li> </ul>	40
Content of Birth Certificate	41
<ul> <li>Report on Live Birth and Still Birth (MoPH)</li> </ul>	42
Tables A1 - A4, B1 - B8	43



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# LIST OF TABLES

			Page
Table	1	Contraceptive Prevalence Rate by province, 1980, 1985	10
Table	2	Crude Birth Rate by province, 1980, 1984, 1985	12
Table	3	Total Fertility Rate estimated from census by province, 1970-	14
		74 and 1975-79	
		Percentage of registered livebirths by birth order, Thailand	16
Table	4Ь	Percentage of registered livebirths by selected birth order,	16
<b>-</b>	_	Thailand	
Table	5	Percentage distribution of first order births to total registered	18
Tabla	_	births by province 1975, 1980 and 1985 (MoPH)	20
I able	0	Percentage distribution of first and second order births to total registered births by province 1980, 1984, 1985 (MoPH)	20
Table	7	Correlations between CPR - TFR, CPR - CBR	25
Table	8a	Correlations between birth order indicator and CBR, TFR and CPR 1975, 1980, 1985	25
Table	8Ь	Correlations between birth order indicator and CBR, TFR,	25
		CPR, 1980, 1984 and 1985	
Table	9	Correlations between CBR, TFR, CPR and proportion of FB,	27
		FSB and their predicted equations 1980	
Table	10	Correlations between CBR, CPR and proportion of FSB and	27
<b>-</b>		their predicted equations, 1984	
lable	11	Correlations between CBR, CPR and proportion of first, and	28
Tabla	12	first-second order birth their predicted equations, 1985 Percent of FB, FSB and unknown, by province, 1984	29
		Percentage of first birth or second order birth to mothers of all	30
Tuble	13	ages and to mothers aged less than 35 years, 1984 (Mol)	30
Table	14	Distribution of number of births registered in 1984 by month	31
	•	and by province	•
Table	15	Comparison of total registered births and FSB by district	33
		compared from two sources, Chiangmai, 1984	
Table	16	Proportion of FSB by district in Chiangmai province, 1984,	34
		1985 (BS)	
Table	Αl	Percentage distribution of unknown birth order to total regis-	43
		tered births, by province, 1980, 1984, 1985 (MoPH)	
I able	A2	Proportion of livebirths in government hospitals to total regis-	45
T.LI.	4.2	tered births, Thailand	45
i apie	A3	Differences between proportion of first and second births to	45
		total registered births, and to births in hospitals by province in 1984	
Table	ΔΔ	A comparison of birth order data from two difference sources,	47
. abic	, · · · · ·	1984	71

Table	<b>B1</b> Percent of first birth,	first and second order births and	48
	unknown, by district,	Chiangmai province, 1984	
Table	B2 Percent of first birth,	, first and second order birth and	48
	unknown, by district,	Lamphun, 1984	
Table	B3 Percent of first birth,	, first and second order births and	49
	unknown, by district,	Phrae, 1984	
Table	<b>B4</b> Percent of first birth,	, first and second order births and	49
	unknown, by district,	Songkhla, 1984	
Table	<b>B5</b> Percent of first birth,	, first and second order births and	50
	unknown, by district,	Narathiwat, 1984	
Table	<b>B6</b> Percent of first birth,	, first and second order births and	50
	unknown, by district,	Pattani, 1984	
Table	<b>B7</b> Percent of first birth,	, first and second order births and	51
	unknown, by district,	, Yala, 1984	
Table	<b>B8</b> Percent of first birth,	, first and second order births and	51
	unknown, by district,		

ri2 i	OF	FIGURE	

		Page
Figure	Trends of FSB Indicator by Province, Thailand, 1975, 1980 and 1985	23
_	Trends of CPR by Province, Thailand, 1980 and 1985 FSB Indicator, Chiangmai Province, 1984	24 32



#### INTRODUCTION

The success of the National Family Planning Programme in Thailand (NFPP) is evidenced by the consistent increase in contraceptive prevalence rate among married women of child bearing age (15-44 years) during the past 10 years, resulting in a significant reduction in fertility and the population growth rates. The targets of reducing the population growth rate since the Third, Fourth and Fifth National Development Plans have been achieved mainly because of the performance of the family planning effort. In the process of preparation for planning and implementation of the Sixth Plan (1987-1991), it was realized that a greater endeavour to be made to achieve the target set for 1991 because of the increasing number of married women of reproductive age (MWRAs) who will be entering the reproductive cohort during the five-year period.

The contraceptive prevalence rate (CPR) is used now among family, planners and demographers as a NFPP achievement indicator. The crude birth rate (CBR) and total fertility rate (TFR) on the other hand are measures of the fertility status of the population. Empirical evidence has shown a statisfically strong correlation between CPR and CBR, CPR and TFR, and CPR and growth rate (provided that the death rate is relatively constant and low). For example, 75 to 80 percent CPR would result in a growth rate of 1.1-1.2 percent (Bongaarts, 1984). If the CPR is about 75 percent the CBR would be in the range of 17-20 per 1,000 population (Northman, 1983). A CPR of 75 to 80 percents is consistent with replacement fertility. Theoretically, the real success of any population programme should ultimately be indicated by replacement level fertility, that is, an estimated TFR of 2.1 or 2.2. The Thai Government has indicated that an average family size of two children is a desirable and acheivable population goal — that is to keep its population size at a certain limit.

The fertility indicators of CBR and TFR used currently for planning and evaluation of the FP programme have some disadvantages. The CBR is a rough estimation and is easily affected by underregistration of the data. The TFR is a more comprehensive indicator, but the degree of reliability depends upon the sources of data and estimation methods adopted. The most reliable source of data is still the survey, which is always expensive, time consuming, and usually conducted on an ad hoc basis. At this stage of the family planning programme in Thailand what is needed is another fertility indicator with the following characteristics:

- 1) The indicator should be easily understood by administrators and policy makers.
- 2) The indicator should reflect the actual level of fertility in any administrative unit.
- 3) The indicator should be sufficiently sensitive in order to reflect rapid changes in fertility.

4) The data to be used in the calculation of this indicator should be easy to obtain for all important administrative units, i.e. national, provincial, district, and sub-district levels, for any given period of time.

The utility of an indicator with these characteristics in family planning implementation can be foreseen, for example:

- to identify target geographical areas for acceleration of programme inputs;
- 2) to monitor family planning performance in the administrative units of concern; and,
- 3) to measure the fertility impact of family planning, especially at the provincial and lower levels.

### THEORETICAL FRAMEWORK

Parity distribution and birth order distribution have long been used for estimation of fertility such as TFR, from existing incomplete data (Brass 1971)\*. The TFR could be estimated from birth certificate data with a high degree of precision. In addition, the proportion of first births and/or second births to total births derived from birth certificates has been suggested as a means of measuring fertility change. (Tieng Pardthaisong, 1978).

In a high fertility community the proportion of first births to total births tends to be low, perhaps 30 percent whereas it might be 60 percent in a low fertility community during a given period. Variations in the proportion of first births and/or second births could be observed among different communities and would be expected to vary over time. When a very high proportion of birth are of the first and second order, obviously very few couples will be having more than two children.

The evidence suggests that birth order could be such an indicator of the impact of a family planning programme. However, whether or not the model will be justified is the focus of this research.

The analysis of birth order distribution is simple and easily understood. The real advantage is that the data exist wherever there is a birth certificate.

The Thai birth certificate, even though generally incomplete with regard to its coverage, has fairly reliable content, especially the report of the birth order, mother's residence and mother's age. Furthermore, if it is hypothesized that incompleteness is evenly distributed among birth orders, then under-registration is a less important source of bias. The official figure for the coverage of birth registration was as high as 90 percent during 1984-1986 (SPC III).

## RESEARCH DESIGN

Before developing and field testing the indicator model, the investigators reviewed the current status and location of birth order data at the central, provincial and district levels. The findings are presented in an overview of where and how birth order data are collected, tabulated and stored. Then follows a description of the research tasks which include pre-testing the proposed indicator.

<sup>\*</sup>The birth order statistic is simply a calculation of the proportion of first delivery, second delivery, etc. to all deliveries.

Some data are already computerized but at central office level; other data are hand-tabulated for lower levels. However births are classified by place of delivery and not place of residence. Thus, to achieve comparability between the computerized and tabulated data, it was necessary to conduct direct tabulations from the birth registration forms. There are currently three different forms used by the Ministry of Public Health (MoPH) and the Ministry of Interior (Mol).

#### Construction of the indicator

Data source: Birth certificates from the MoPH/Mol birth registration

Variables: Birth order

Place of registration

Mother's residence, i.e., district, province

Mother's age Month of birth

Month of registration

Methodology: (1) To determine the distribution of birth order or parity distribution

(2) To examine the relationship of first and/or second order births

to other fertility and family planning indicators

(3) To develop the indicator

Level of analysis: National, Provincial, and District

Based on the findings, the investigators were able to assess the existing birth order data for various levels and propose a complete system for assessing NFPP programme performance and fertility at the central, provincial and district headquarters.

# EXISTENCE OF THE DATA

As a usual practice, the birth certificate consists of 3 parts. The first part of the birth certificate is given to the person registering the birth, the second is sent to the Ministry of Interior and the third is sent to the Ministry of Public Health. At the District Office of the Mol, a manual computation of births is performed for the Mol's own use. There is a similar process of reporting and compilation of birth certificate at the municipal offices. The second part of the certificate is then sent to the Central Registration Office of the Mol in Bangkok, and is recorded on microfilm. Some information is computer-coded before being sent back for retention at the original district office or municipal office.

However, the process of microfilm filing is rather slow due to the time spent in sending birth certificates to Bangkok and due to the large number certificates. For instance, in 1986 the office was still microfilm recording the 1984

birth certificates which amount to approximately one million copies.★

The third part (MoPH copy) of the birth certificate is sent to the Provincial Chief Medical Office (PCMO) of each province. Again, manual tabulation is done here for the provincial level and the aggregated report of number of live births (and still births) by birth order and sex classified by age of mother is submitted to the Division of Health Statistics, Ministry of Public Health on monthly basis, Most of the third parts are retained at the PCMO office. However, records of those deliveries which occurred in the government hospitals and health centers will be sent to the Division of Health Statistics MoPH in Bangkok. Computerization of births occurring in government hospitals started in 1980 and the most recent available report is for 1985.

With reference to the content of the different parts of the birth certificate, the "birth order" entry is recorded only on the third part of the birth certificate and not on the second part until 1984 when the Birth Certificate Form was revised to include the "birth order" entry on all 3 parts.\*\*In addition, in 1985 the Central Registration Office of the Mol launched a computerized civil registration system for the country, whereby an identification number was given to each Thai citizen, including the newborn baby. Apart from the microfilm filing of birth and death certificates at one unit of the Mol Registration Office, the second part of birth certificate is also computer recorded. It is unfortunate that this computerized transfer does not include the item on birth order.

In conclusion the information on "birth order" which can be utilized for this study is obtained from the following sources:

- 1. Monthly and annual reports of aggregate number of births by birth order, sex and age of mother classified by province. These reports are filed at the Division of Health Statistics, MoPH. A computerized transfer of the forms into diskette or magnetic tape has been undertaken since 1980 and is available until 1985. **(BS)**
- 2. Computerized transfer to the third part of birth certificate for those who were born in the government hospitals and health centers. Data are available from 1980 to 1986 (BH)
- 3. Microfilm files of the second part of birth certificates for every registered birth which contains "birth order" are available at the Central Registration Office, Mol. Up to the 1984, file is completed (BI)

After assessing these different data sources, it was then decided to process the data step by step in order to determine their availability and accessbility. Below is the summary table for availability of data sources selected for this research.

<sup>\*</sup>The microfilm recording of birth certificates has stopped after the 1984 file was completed. It has been replaced by a system of computer — recorded of some items from the birth certificates at the Central Registration Office of the Mol. Unfortunately the birth order data are not computer — recorded.

<sup>\*\*</sup>It should be noted here that on birth certificate form there is no entry for religion.

Data source	Available period	Nature of data	Level of analysis
BS	1980-1985	computerized aggregate data	National, provincial, district
вн	1980-1984	computerized individual forms	National, provincial
BI	1984	microfilm of individual forms	National, provincial, district

# APPRAISAL OF THE EXISTING DATA

The existing data mentioned in previous sections are sets of information on birth order from the available birth certificates. This information is available from different sources; therefore, the next step is to search for the most appropriate and convenient source. In addition, the data on fertility and family planning, specifically the CBR, TFR and CPR, also need to be assessed in terms of their availability and appropriateness for the analysis in order to establish the "indicator"

# 1. Birth order data

The model indicator tested here is then so-called "FSB indicator" which is the proportion of first or second births to total registered births. However, the proportion of first birhts to total births, FB, is also tested along with the FSB to see which one yields a more meaningful result.

Concerning the accessibility of the birth order data, three sets of data:BS, BH, and BI are equally accessible but with different degrees of difficulty. Through computer printouts, the BS and BH can be accessed. However, the BI data have to be manually transferred from the birth certificate microfilm copies at the Mol. Then, it is a question of conducting a consistency check of the registered births and birth order distribution of each data source for the period available, by province, by month, in order to select the most appropriate source suitable for implementation at each administrative level.

**BS**, the computerized aggregrate data available at Division of Health Statistics of the MoPH, yields information on the proportion of first births as well as first and second births by province (of registration) from 1980 to 1985 or even earlier. The quality of birth order distribution data from this source depends

totally upon the manual tabulation done at the PCMO and the central office.

With regard to the quality of registration data on birth order which is partially reflected by the proportion of "unknown" or "blank entries", Table A1 reveals an improvement over time by the marked reduction in proportion of "unknown birth orders" over the five year period. It is worth pointing out here that the percentage of "unknown" birth orders by province has been reduced to a level of less than 5 percent by 1985 with a few exceptions, including Chachoengsao, Lopburi, Uthaithani, and Songkhla provinces. The birth order data from birth certificate records appears to be more precise. It can be improved further since we can now identify those provinces which record too much "unknown" information.

**BH** Births in hospitals or other health institutions are of greater accuracy with regard to coverage and quality of information because the delivery has taken place under the supervision of qualified health personnel. The data have been filed in computerized individual forms at the Division of Health Statistics of the MoPH if the births occurred in governments hospitals or health centers. If all births were to take place in hospitals or the like, BH would be an ideal source of data.

According to the Report on Births — Deaths in Government Hospitals disseminated by the Division of Health Statistics, the most recent of which was published in 1983, it was found that hospital deliveries accounted for 23 percent of all births in 1979 and 27.3 percent in 1983.\* These percentages might be high enough for the BH data to proportionally represent the total registered births (BS).

However, when the proportion of live births occurring in government hospitals compared to total registered births is taken into consideration by region or by selected provinces, the distribution is not consistent nor does it have discernible pattern (See Table A2). For example, the proportion of BH to BS in 1983 in the Northeast was 9.19 percent while in the North it was 27.1 percent, 53.1 in the central region, and 16.3 percent in the South. In the South, Yala, the proportion was 42.0 percent while in Satun it was 9.0 percent; in Chiangmai, in the North it was 52.4 percent and 27.7 percent in Lamphun. Thus, births occurring in hospitals should not be taken as representative of total registered births, even though their proportions tend to increase substantially over time.

With regard to birth order, it may be that lower birth orders were often likely to occur in hospitals than higher order births. As couples are more cautious with their first or second deliveries, better care from qualified health personnel is then sought. In addition, modern couples tend to have smaller families and therefore often want to have their babies delivered in hospitals.

<sup>\*</sup>Table 2, page 12, Report on Births — Deaths in the Government Hospitals, 1979-1983, Division of Health Statistics, Ministry of Public Health (in Thai)

It can be seen from Table A3 where a comparison is made between FSB to total registered births and FSB to births in hospials by province in 1984, FSB of hospital births appear to outnumber the FSB of provincial totals. For example, in Satun it was 23.9 percent higher. These differences are good example of birth order among hospital births.

Therefore, it has been decided not to use BH in any further analysis.

**BI**, the second part of birth certificate which is filed at the Central Registration Office of the Mol in the microfilm form, of which information on birth order is included since 1984. However at the time of this study records were available only through 1984.

Because of the tedious work of manually transferring the data from the birth certificates, it was decided to limit the number of study provinces yet, sufficiently large to ensure that meaningful results would be derived. Only 8 provinces were selected for indepth analysis; low fertility provinces of Chiangmai, Lamphun, Phrae and high fertility provinces of Songkhla, Pattani, Yala, Narathivat and Satun. Information from the second part of birth certificate was transferred to computerized format. Variables selected for coding were: province and district of registration, birth order, age of mother, month and year of registration. Total birth records by province are listed as follows:

Chiangmai		24,363
Phrae		6,727
Lamphun		3,726
Stun		5,249
Pattani		10,216
Yala		7,367
Narathivat		13,600
Songkhla		22,013
	Total	93,261

Comparison between total registered births, FSB and proportion of unknown birth orders among 8 provinces are made from two different sources, BS and BI for 1984 (Table A4). In terms of completeness, it seems that the differences observed are within an acceptable range. In an examination of the absolute number of registered births, the number of cases in BI are higher in 5 provinces (ranging from 39 to 3968 cases) while those of BS are higher in 3 provinces (ranging from 1386 to 8683 cases).

The percentage of first and second order births to total live births (all orders) as reported in BS and BI are also similar. Evidence from the 8 selected provinces shows that in 1984 the differences do not exceed 5 percent except for Songkhla where a difference of 8.27 percent was found.

When examining the percentage of "unknown" in birth order, there appears that such percentages are not much difference except for Phrae (Bs =

4.60, and BI = 8.34) and Songkhla (BS = 18.64 and BI = 7.23).

These differences observed in both the absolute number of registered births, the FSB and the unknown birth order are probably due to human error in tabulation as well as to discrepancies in collecting and reporting each part of the birth certificates in the MoPH and MoI systems.

In conclusion, the birth order data from the annual reports at the Division of Health Statistics (BS) are the most appropriate for use in constructing a family planning programme evaluation indicator for the national and provincial levels. As they are easy to access, easy to use, and are most complete among the three sources. In this study, the BS data are therefore selected as the source of birth order data and FB, FSB will be generated with selected fertility and family planning achievement indicators at provincial levels for the year 1980, 1984 and 1985. However, the BI in 1984 will be also used at the provincial and especially the district level in developing the model FSB indicator where applicable.

# 2. Fertility and Family Planning Indicators

After reviewing the sources of birth order data, the crude birth rate (CBR). total fertility rate (TFR) and contraceptive prevalence rate (CPR) were then selected to use for the analysis in each of the corresponding years.

2.1 Contraceptive prevalence rate (CPR), data is available from two sources. The first is the 1980 census, from which the CPR's by province and by method were calculated as a percentage of prevalence of contraceptive use per married woman of aged 15-49 years. In this study, it is called "CPR 80"

The second source is the NFPP estimates of active family planning users as of January 1985 and December 1985. The rate is available by province, by district and by method. It is the percentage of active users per married woman of aged 15-44 years, to be called in this study "CPR 85".

Table 1 illustrates the CPR 80 and CPR 85 province throughout the country.

- 2.2 *Crude birth rate by province (CBR).* The number of registered births was obtained from the Mol vital registration without adjustment for under-registration. The estimation of mid-year population from the Division of the Health Statistics, MoPH was adopted as the denominator for recalculating CBR in 1980, 1984 and 1985. The data are shown in Table 2.
- 2.3 **Total fertility rate (TFR).** The data on TFR 1970-74 and TFR 1975-79 by province and by district are adopted from the ESCAP Report No.62-A. Details of the estimation technique are provided in the report. The TFR 1970-74 and TFR 1975-79 by province are displayed in Table 3.

Although the fertility and family planning indicators used in this study are derived from different sources, internal consistency and reliability should be high within each individual set. Furthermore, in one analysis, the patterns of each indicator are more important than the magnitudes. It appears thus justified to use these data to establish our FSB indicator.

Table 1. Contraceptive Prevalence Rate by province 1980, 1985.

	CPR per 100 MWRA 15-49 (census 1980)	Estimated NFPP active users per 100 MWRA 15—44, 1985
CENTRAL		
Kanchanaburi	58.0	56.8
Chantaburi	69.8	66.1
Chachoengsao	57.2	58.4
Cholburi	61.7	61.7
Chainat	69.5	72.4
Trat	58.2	59.0
Nakorn Nayok	63.5	54.3
Nakorn Pathom	57.7	53.1
Nonthaburi	58.5	57.2
Pathum Thani	62.0	52.3
Prachuabkirikan	60.7	55.8
Prachinburi	65.2	64.1
Ayutthya	57.4	56.1
Petchaburi	52.7	49.3
Rayong	68.8	66.4
Ratchaburi	69.0	63.7
Lopburi	62.9	62.6
Samutprakarn	70.9	54.4
Samutsongkram	62.3	57.2
Samutsakorn	54.6	49.8
Saraburi	67.6	57.7
Singburi	76.9	77.3
Suphanburi	57.6	52.1
Angthong	65.6	63.0
NORTH		
Kampaengphet	47.7	54.9
Chiangmai	79.4	79.5
Chiangrai	74.3	70.5
Tak	64.6	66.4
Nakornsawan	56.9	55.4
Nan	80.5	78.3
Payao	73.6	66.8
Pichit	49.7	45.2
Pitsanuloke	64.7	61.8
Petchabun	54.8	37.7
Phrae	64.7	64.5
Mae Hong Son	61.5	56.7
Lampang	65.3	46.2
Lamphun	74.7	74.5
Sukothai	62.4	57.1
Uttaradit	65.3	52.9
Uthaithani	69.4	41.0

Table 1 (Cont.)

	CPR . per 100 MWRA 15-49 (census 1980)	Estimated NFPP active users per 100 MWRA 15-44, 1985
NORTHEAST		
Kalasin	70.1	66.3
Khonkaen	69.0	71.5
Chaiyaphum	55.4	50.7
Nakorn Panom	56.8	54.8
Nakorn Ratchasima	51.1	49.6
Buriram	53.5	52.6
Mahasarakham	59.8	60.5
Yasothorn	62.8	60.4
Roi Et	61.5	51.5
Loei	67.6	66.6
Sisaket	46.8	47.9
Sakon Nakorn	50.7	44.0
Surin	39.3	38.7
Nong Khai	57.6	54.8
Udorn Thani	55.1	54.5
Ubonratchathani	48.5	47.5
SOUTH		
Krabi	44.9	44.4
Chumporr <sup>.</sup>	61.7	54.2
Trang	48.3	46.0
Nakorn Sithammarat	52.5	48.5
Narathiwat	33.0	31.9
Pattani	28.9	25.0
Phang Nga	64.1	60.3
Pattalung	46.6	46.1
Phuket	68.3	68.6
Yala	37.9	35.2
Ranong	69.7	68.3
Songkhla	40.9	34.6
Satun	37.6	33.5
Suratthani	54.8	49.6
BANGKOK	_	_

Table 2 Crude Birth Rate by province, 1980, 1984, 1985.

18.22   18.22   18.22   18.22   18.22   18.23   18.44   16.93   18.44   16.93   18.44   16.93   18.44   16.93   18.44   16.93   18.44   16.93   18.44   16.93   18.45   18.46   18.70   18.7	1985	1984	1980	
18.22   18.22   18.22   18.22   18.22   18.23   18.44   16.93   18.44   16.93   18.44   16.93   18.44   16.93   18.44   16.93   18.44   16.93   18.44   16.93   18.45   18.46   18.70   18.7				CENTRAL
18.44   16.93   16.93   16.30   14.65   16.30   14.65   16.30   14.65   16.30   14.65   16.30   14.65   16.30   14.65   16.30   14.65   16.30   14.65   16.30   16.61   16.30   16.61   16.61   16.54   11.60   16.61   16.54   11.60   16.54   11.60   16.54   11.60   16.54   11.60   16.54   11.60   16.54   11.60   16.54   15.30   12.08   16.35   12.25   12.2	18.06	18.22	20.92	Kanchanaburi
24.11   20.73	20.99	21.89		Chantaburi
nolburi       24.11       20.73         nainat       16.30       14.65         rat       27.20       18.70         akorn Nayok       20.76       16.04         akorn Pathom       21.06       16.61         onthaburi       10.54       11.60         othum Thani       15.21       7.99         achuabkirikan       18.69       18.91         achuabkirikan       18.60       8.57         achuabkirikan       18.60       8.57	16.76	16.93	18.44	Chachoengsao
rat         27.20         18.70           akorn Nayok         20.76         16.04           akorn Pathom         21.06         16.61           onthaburi         10.54         11.60           athum Thani         15.21         7.99           achabkirikan         18.69         18.91           achinburi         21.77         13.59           yutthya         15.30         12.08           etchaburi         20.77         15.00           ayong         26.12         19.33           atchaburi         27.80         24.26           appour         27.80         24.26           appouri         13.00         14.75           amutprakarn         13.60         8.57           amutprakarn         17.72         14.76           amutsakorn         22.58         16.35           araburi         18.52         19.09           ingburi         25.44         20.31           uphanburi         22.03         16.65           ingthong         19.09         12.25           ORTH         20.82         16.37           hiangmai         15.02         11.50           ak	21.13	20.73	24.11	Cholburi
akorn Nayok         20.76         16.04           akorn Pathom         21.06         16.61           onthaburi         10.54         11.60           athum Thani         15.21         7.99           achuabkirikan         18.69         18.91           achinburi         21.77         13.59           yutthya         15.30         12.08           etchaburi         20.77         15.00           ayong         26.12         19.33           atchaburi         27.80         24.26           appuri         13.00         14.75           amutprakarn         13.60         8.57           amutsangkram         17.72         14.76           amutsakorn         22.58         16.35           araburi         18.52         19.09           ingburi         25.44         20.31           uphanburi         22.03         16.65           ingthong         19.09         12.25           ORTH         20.82         16.37           hiangmai         20.82         16.37           hiangmai         15.02         11.50           ak         21.30         16.59           lak	13.69	14.65	16.30	Chainat
21.06   16.61   10.54   11.60   11.6	19.71	18.70	27.20	Trat
conthaburi     10.54     11.60       athum Thani     15.21     7.99       achuabkirikan     18.69     18.91       achinburi     21.77     13.59       yutthya     15.30     12.08       etchaburi     20.77     15.00       ayong     26.12     19.33       atchaburi     27.80     24.26       appuri     13.00     14.75       amutprakarn     13.60     8.57       amutsongkram     17.72     14.76       amutsokorn     22.58     16.35       araburi     18.52     19.09       ingburi     25.44     20.31       iuphanburi     22.03     16.65       ingthong     19.09     12.25       ORTH     20.82     16.37       hiangmai     20.82     16.37       hiangmai     20.82     16.37       hiangmai     15.02     11.50       ak     21.30     16.59       lakn     21.30     16.59       lakn     21.60     48.46       ayoo     17.51     15.86       ichit     19.07     16.56       itsanuloke     22.74     17.85       etchabun     24.74     14.90       hrae	15.82	16.04	20.76	Nakorn Nayok
athum Thani     15.21     7.99       achuabkirikan     18.69     18.91       achinburi     21.77     13.59       yutthya     15.30     12.08       etchaburi     20.77     15.00       ayong     26.12     19.33       atchaburi     27.80     24.26       appburi     13.00     14.75       amutprakarn     13.60     8.57       amutsongkram     17.72     14.76       amutsakorn     22.58     16.35       araburi     18.52     19.09       ingburi     25.44     20.31       uphanburi     22.03     16.65       ingthong     19.09     12.25       ORTH       ampaengphet     20.35     17.96       hiangmai     15.02     11.50       ak     21.30     16.59       lak     21.30     16.59       lak     21.30     16.59       lak     21.60     48.46       ayao     17.51     15.86       ichit     19.07     16.56       itsanuloke     22.74     17.85       etchabun     24.74     14.90       hrae     17.19     13.85       Ace Hong Son     29.31     20.7	16.83	16.61	21.06	Nakorn Pathom
achuabkirikan       18.69       18.91         achinburi       21.77       13.59         yutthya       15.30       12.08         etchaburi       20.77       15.00         ayong       26.12       19.33         atchaburi       27.80       24.26         apburi       13.00       14.75         amutprakarn       13.60       8.57         amutsongkram       17.72       14.76         amutsakorn       22.58       16.35         araburi       18.52       19.09         ingburi       25.44       20.31         uphanburi       22.03       16.65         ingthong       19.09       12.25         ORTH         ampaengphet       20.35       17.96         hiangmai       20.82       16.37         hiangmai       15.02       11.50         ak       21.30       16.59         lakornsawan       19.36       17.05         lan       21.60       48.46         ayao       17.51       15.86         ichit       19.07       16.56         itsanuloke       22.74       17.85         etchabun </td <td>10.66</td> <td>11.60</td> <td>10.54</td> <td>Nonthaburi</td>	10.66	11.60	10.54	Nonthaburi
achinburi       21.77       13.59         yutthya       15.30       12.08         etchaburi       20.77       15.00         ayong       26.12       19.33         atchaburi       27.80       24.26         appburi       13.00       14.75         amutprakarn       13.60       8.57         amutsongkram       17.72       14.76         amutsakorn       22.58       16.35         araburi       18.52       19.09         ingburi       25.44       20.31         uphanburi       22.03       16.65         ingthong       19.09       12.25         ORTH         ampaengphet       20.35       17.96         hiangrai       20.82       16.37         hiangrai       15.02       11.50         ak       21.30       16.59         lan       21.60       48.46         ayao       17.51       15.86         ichit       19.07       16.56         itsanuloke       22.74       17.85         etchabun       24.74       14.90         hrae       17.19       13.85         Ace Hong Son       29.31	8.55	7.99	15.21	Pathum Thani
yutthya 15.30 12.08 etchaburi 20.77 15.00 ayong 26.12 19.33 atchaburi 27.80 24.26 appburi 13.00 14.75 amutprakarn 13.60 8.57 amutsongkram 17.72 14.76 amutsakorn 22.58 16.35 araburi 18.52 19.09 ingburi 25.44 20.31 uphanburi 22.03 16.65 ingthong 19.09 12.25  ORTH  ampaengphet 20.35 17.96 hiangrai 15.02 11.50 ak 21.30 16.59 lakornsawan 19.36 17.05 lan 21.60 48.46 ayao 17.51 15.86 ichit 19.07 16.56 itsanuloke 22.74 17.85 etchabun 17.96 45.85 amphun 15.16 9.19	19.07	18.91	18.69	Prachuabkirikan
20.77   15.00   20.77   15.00   20.79   26.12   19.33   26.12   19.33   26.12   27.80   24.26   20.20   27.80   24.26   20.20   27.80   24.26   20.20   27.2	9.39	13.59	21.77	Prachinburi
26.12 19.33 atchaburi 27.80 24.26 appburi 13.00 14.75 atmutprakarn 13.60 8.57 atmutprakarn 13.60 8.57 atmutprakarn 13.60 8.57 atmutprakarn 17.72 14.76 atmutprakarn 18.52 19.09 atmutprakarn 18.52 19.09 atmutprakarn 18.52 19.09 atmutprakarn 19.09 12.25 atmutprakarn 19.00 16.59 atmutprakarn 19.36 17.05 atmutprakarn 19.37 16.56 atmutprakarn 19.07 16.56 atmutprakarn 19.09 atmutprakarn 19.00 atmutprakar	10.95	12.08	15.30	Ayutthya
atchaburi       27.80       24.26         appburi       13.00       14.75         amutprakarn       13.60       8.57         amutsongkram       17.72       14.76         amutsakorn       22.58       16.35         araburi       18.52       19.09         ingburi       25.44       20.31         uphanburi       22.03       16.65         ingthong       19.09       12.25         ORTH         ampaengphet       20.35       17.96         hiangmai       20.82       16.37         hiangrai       15.02       11.50         ak       21.30       16.59         lakornsawan       19.36       17.05         lan       21.60       48.46         ayao       17.51       15.86         ichit       19.07       16.56         itsanuloke       22.74       17.85         etchabun       24.74       14.90         hrae       17.19       13.85         Aae Hong Son       29.31       20.71         ampang       17.96       45.85         amphun       15.16       9.19	14.84	15.00	20.77	Petchaburi
appburi     13.00     14.75       amutprakarn     13.60     8.57       amutsongkram     17.72     14.76       amutsakorn     22.58     16.35       araburi     18.52     19.09       ingburi     25.44     20.31       uphanburi     22.03     16.65       ingthong     19.09     12.25       ORTH       ampaengphet     20.35     17.96       hiangmai     20.82     16.37       hiangrai     15.02     11.50       ak     21.30     16.59       lakornsawan     19.36     17.05       lan     21.60     48.46       ayao     17.51     15.86       ichit     19.07     16.56       itsanuloke     22.74     17.85       etchabun     24.74     14.90       hrae     17.19     13.85       Aee Hong Son     29.31     20.71       ampang     17.96     45.85       amphun     15.16     9.19	19.33	19.33	26.12	Rayong
amuttprakarn       13.60       8.57         amutsongkram       17.72       14.76         amutsakorn       22.58       16.35         araburi       18.52       19.09         ingburi       25.44       20.31         uphanburi       22.03       16.65         ingthong       19.09       12.25         ORTH         ampaengphet       20.35       17.96         hiangmai       20.82       16.37         hiangrai       15.02       11.50         ak       21.30       16.59         lakornsawan       19.36       17.05         lan       21.60       48.46         ayao       17.51       15.86         ichit       19.07       16.56         itsanuloke       22.74       17.85         etchabun       24.74       14.90         hrae       17.19       13.85         Aae Hong Son       29.31       20.71         ampang       17.96       45.85         amphun       15.16       9.19	24.55	24.26	27.80	Ratchaburi
amutsongkram     17.72     14.76       amutsakorn     22.58     16.35       araburi     18.52     19.09       ingburi     25.44     20.31       uphanburi     22.03     16.65       ingthong     19.09     12.25       ORTH       ampaengphet     20.35     17.96       hiangmai     20.82     16.37       hiangrai     15.02     11.50       ak     21.30     16.59       lakornsawan     19.36     17.05       lan     21.60     48.46       ayao     17.51     15.86       ichit     19.07     16.56       itsanuloke     22.74     17.85       etchabun     24.74     14.90       hrae     17.19     13.85       Aae Hong Son     29.31     20.71       ampang     17.96     45.85       amphun     15.16     9.19	15.55	14.75	13.00	Lopburi
amutsakorn 22.58 16.35 araburi 18.52 19.09 araburi 25.44 20.31 aphanburi 22.03 16.65 angthong 19.09 12.25 <b>ORTH</b> ampaengphet 20.35 17.96 ahangrai 15.02 11.50 ak 21.30 16.59 alakornsawan 19.36 17.05 alan 21.60 48.46 ayao 17.51 15.86 aichit 19.07 16.56 aitsanuloke 22.74 17.85 atchabun 17.19 13.85 angpang 17.96 45.85 amphun 15.16 9.19	9.13	8.57	13.60	Samutprakarn
araburi       18.52       19.09         ingburi       25.44       20.31         uphanburi       22.03       16.65         ingthong       19.09       12.25         ORTH         ampaengphet       20.35       17.96         hiangmai       20.82       16.37         hiangrai       15.02       11.50         ak       21.30       16.59         lakornsawan       19.36       17.05         lan       21.60       48.46         ayao       17.51       15.86         iichit       19.07       16.56         iitsanuloke       22.74       17.85         etchabun       24.74       14.90         hrae       17.19       13.85         Aae Hong Son       29.31       20.71         ampang       17.96       45.85         amphun       15.16       9.19	13.58	14.76	17.72	Samutsongkram
Ingburi       25.44       20.31         Iuphanburi       22.03       16.65         Ingthong       19.09       12.25         ORTH         Image: ampaengphet organization of his parameters of	15.15	16.35	22.58	Samutsakorn
uphanburi       22.03       16.65         angthong       19.09       12.25         ORTH         ampaengphet       20.35       17.96         hiangmai       20.82       16.37         hiangrai       15.02       11.50         ak       21.30       16.59         lakornsawan       19.36       17.05         lan       21.60       48.46         ayao       17.51       15.86         ichit       19.07       16.56         itsanuloke       22.74       17.85         etchabun       24.74       14.90         hrae       17.19       13.85         Mae Hong Son       29.31       20.71         ampang       17.96       45.85         amphun       15.16       9.19	19.59	19.09	18.52	Saraburi
ORTH       ampaengphet     20.35     17.96       hiangmai     20.82     16.37       hiangrai     15.02     11.50       ak     21.30     16.59       lakornsawan     19.36     17.05       lan     21.60     48.46       ayao     17.51     15.86       iichit     19.07     16.56       itsanuloke     22.74     17.85       etchabun     24.74     14.90       hrae     17.19     13.85       Mae Hong Son     29.31     20.71       ampang     17.96     45.85       amphun     15.16     9.19	20.35	20.31	25.44	Singburi
ORTH         ampaengphet       20.35       17.96         hiangmai       20.82       16.37         hiangrai       15.02       11.50         ak       21.30       16.59         lakornsawan       19.36       17.05         lan       21.60       48.46         ayao       17.51       15.86         ichit       19.07       16.56         itsanuloke       22.74       17.85         etchabun       24.74       14.90         hrae       17.19       13.85         Mae Hong Son       29.31       20.71         ampang       17.96       45.85         amphun       15.16       9.19	16.98	16.65	22.03	Suphanburi
ampaengphet       20.35       17.96         hiangmai       20.82       16.37         hiangrai       15.02       11.50         ak       21.30       16.59         lakornsawan       19.36       17.05         lan       21.60       48.46         ayao       17.51       15.86         iichit       19.07       16.56         itsanuloke       22.74       17.85         etchabun       24.74       14.90         hrae       17.19       13.85         Mae Hong Son       29.31       20.71         ampang       17.96       45.85         amphun       15.16       9.19	14.77	12.25	19.09	Angthong
hiangmai 20.82 16.37 hiangmai 15.02 11.50 dak 21.30 16.59 lakornsawan 19.36 17.05 lan 21.60 48.46 dayao 17.51 15.86 dichit 19.07 16.56 ditsanuloke 22.74 17.85 etchabun 24.74 14.90 hrae 17.19 13.85 Mae Hong Son 29.31 20.71 dampang 17.96 45.85 damphun 15.16 9.19				NORTH
hiangrai 15.02 11.50 ak 21.30 16.59 lakornsawan 19.36 17.05 lan 21.60 48.46 ayao 17.51 15.86 iichit 19.07 16.56 iitsanuloke 22.74 17.85 etchabun 24.74 14.90 hrae 17.19 13.85 Mae Hong Son 29.31 20.71 ampang 17.96 45.85 amphun 15.16 9.19	18.45	17.96	20.35	Kampaengphet
ak     21.30     16.59       lakornsawan     19.36     17.05       lan     21.60     48.46       ayao     17.51     15.86       ichit     19.07     16.56       itsanuloke     22.74     17.85       etchabun     24.74     14.90       hrae     17.19     13.85       Mae Hong Son     29.31     20.71       ampang     17.96     45.85       amphun     15.16     9.19	12.24	16.37	20.82	Chiangmai
Idakornsawan     19.36     17.05       Ilan     21.60     48.46       ayao     17.51     15.86       iichit     19.07     16.56       iitsanuloke     22.74     17.85       etchabun     24.74     14.90       hrae     17.19     13.85       Mae Hong Son     29.31     20.71       ampang     17.96     45.85       amphun     15.16     9.19	11.54			Chiangrai
Idan     21.60     48.46       ayao     17.51     15.86       iichit     19.07     16.56       itsanuloke     22.74     17.85       etchabun     24.74     14.90       hrae     17.19     13.85       Mae Hong Son     29.31     20.71       ampang     17.96     45.85       amphun     15.16     9.19	16.82			Tak
ayao     17.51     15.86       ichit     19.07     16.56       itsanuloke     22.74     17.85       etchabun     24.74     14.90       hrae     17.19     13.85       Mae Hong Son     29.31     20.71       ampang     17.96     45.85       amphun     15.16     9.19	16.88			Nakornsawan
ichit     19.07     16.56       itsanuloke     22.74     17.85       etchabun     24.74     14.90       hrae     17.19     13.85       Mae Hong Son     29.31     20.71       ampang     17.96     45.85       amphun     15.16     9.19	17.81			Nan
itsanuloke     22.74     17.85       etchabun     24.74     14.90       hrae     17.19     13.85       Mae Hong Son     29.31     20.71       ampang     17.96     45.85       amphun     15.16     9.19	16.59			Payao
etchabun       24.74       14.90         hrae       17.19       13.85         Mae Hong Son       29.31       20.71         ampang       17.96       45.85         amphun       15.16       9.19	16.51			Pichit
hrae       17.19       13.85         Mae Hong Son       29.31       20.71         ampang       17.96       45.85         amphun       15.16       9.19	19.22			Pitsanuloke
Mae Hong Son       29.31       20.71         ampang       17.96       45.85         amphun       15.16       9.19	17.63			Petchabun
ampang 17.96 45.85 amphun 15.16 9.19	14.11			Phrae
amphun 15.16 9.19	20.94			Mae Hong Son
	15.86			Lampang
ukothai 19.25 14.74	9.79			Lamphun
	15.45			Sukothai
	16.85 19.34			Uttaradit Uthaithani

Table 2 (Cont.)

	1980	1984	1985	
NORTHEAST				
Kalasin	25.54	21.31	18.43	
Khonkaen	27.32	21.07	20.12	
Chaiyaphum	22.31	17.83	16.64	
Nakorn Panom	27.03	20.05	19.15	
Nakorn Ratchasima	24.11	18.23	18.41	
Buriram	24.44	18.81	19.77	
Mahasarakham	22.33	16.47	16.04	
Yasothorn	23.79	18.24	19.09	
Roi Et	23.45	18.81	19.30	
Loei	22.94	19.48	19.87	
Sisaket	27.23	21.92	18.77	
Sakon Nakorn	29.30	23.31	22.13	
Surin	19.15	21.16	17.26	
Nong Khai	30.58	21.38	19.67	
Udorn Thani	28.50	19.89	21.26	
Ubonratchathani	26.58	13.76	18.41	
SOUTH				
Krabi	33.02	22.58	19.67	
Chumporn	20.46	19.82	19.42	
Trang	29.03	25.25	25.35	
Nakorn Sithammarat	25.21	22.06	22.90	
Narathiwat	24.86	26.57	26.72	
Pattani	24.09	24.82	23.11	
Phang Ngo	28.57	21.82	22.23	
Pattalung	21.68	20.96	18.51	
Phuket	28.26	21.44	21.09	
Yala	32.97	29.19	28.19	
Ranong	27.02	23.43	24.15	
Songkhla	22.92	32.39	32.05	
Satun	30.66	28.56	26.49	
Suratthari	23.78	22.60	23.15	
BANGKOK	24.31	24.59	24.38	

Note: Recalculated CBR using the number of registered births from Mol and mid-year population estimation fram Health Statistics Division.

Table 3 Total Fertility Rate estimated from census by province, 1970-74 and 1975-79

	TFR 1970-74	TFR 1975-79
CENTRAL		
Kanchanaburi	5.14	4.25
Chantaburi	4.16	3.43
Chachoengsao	4.45	3.56
Cholburi	4.26	3.45
Chainat	3.81	2.89
Trat	4.78	4.05
Nakorn Nayok	4.34	3.39
Nakorn Pathom	4.08	3.45
Nonthaburi	3.19	2.65
Pathum Thani	3.88	3.32
Prachuabkirikan	5.03	4.03
Prachinburi	5.40	4.30
Ayutthya	4.28	3.36
Petchaburi	4.49	3.52
Rayong	4.93	3.82
Ratchaburi	4.45	3.56
Lopburi	4.24	3.25
Samutprakarn	3.33	2.89
Samutsongkram	4.08	3.20
Samutsakorn	3.97	3.27
Saraburi	4.34	3.27
Singburi	3.36	2.76
Suphanburi	4.21	3.52
Angthong	3.79	3.04
NORTH	•	
Kampaengphet	5.20	4.23
Chiangmai	3.00	2,61
Chiangrai	4.39	3.25
Tak	4.91	4.01
Nakornsawan	4.41	3.39
Nan	4.24	3.36
Payao	4.37	3.15
Pichit	4.61	3.45
Pitsanuloke	4.72	3.64
Petchabun	5.18	4.07
Phrae	3.66	2.70
Mae Hong Son	5.11	4.64
Lampang	3.75	2. <b>7</b> 9
Lamphun	2.97	2.33
Sukothai	4.72	3.47
Uttaradit	4.63	3.39
Uthaithani	4.43	3.52

Table 3 (Cont.)

	TFR	TFR	
	1970-74	1975-79	
NORTHEAST			
Kalasin	6.28	4.50	
Khonkaen	5.55	4.18	
Chaiyaphum	5.51	4.05	
Nakorn Panom	6.29	5.22	
Nakorn Ratchasima	5.59	4.48	
Buriram	6.52	5.26	
Mahasarakham	5.95	4.27	
Yasothorn	6.29	4.62	
Roi Et	6.26	4.60	
Loei	5.26	4.13	
Sisaket	6.30	5.03	
Sakon Nakorn	6.75	5.28	
Surin	6.01	4.90	
Nong Khai	6.79	5.45	
Udorn Thani	6.57	5.22	
Ubonratchathani	6.59	5.07	
SOUTH			
Krabi	6.37	5.37	
Chumporn	5.01	3.84	
Trang	5.38	4.40	
Nakorn Sithammarat	6.15	4.94	
Narathiwat	5.34	4.57	
Pattani	5.22	4.32	
Phang Nga	4.87	4.01	
Pattalung	5.84	4.44	
Phuket	3.55	3.11	
Yala	4.65	3.86	
Ranong	5.31	4.48	
Songkhla	4.91	3.95	
Satun	5.76	4.90	
Suratthani	5.49	4.25	
BANGKOK	2.58	2.31	

Source : ESCAP Report No. 62-A1

#### **RESULTS**

This section reviews the trend of the birth order distribution and FSB at the national level from 1971 to 1983. Then follows a description of the trends and patterns of FB and FSB by province in 1975, 1980, 1984 and 1985. The second step is to test the proposed FSB indicator. Correlation analysis is performed between FB, FSB and CBR, TFR and CBR. A fitted regression line is adopted for deriving at the birth order indicator which best suited for implementation in the second phase of the project and to be recommended for future adoption.

### 1. Trends and patterns of Birth order Distribution

At the national level, the birth order distribution to total births of known order for the period 1971 to 1983 are shown in Table 4a and Table 4b. There is a clearly observed increase in proportion of lower birth orders over the study period. The proportion of first order births was 23.8 percent in 1971 which then increased to 41.7 percent in 1983. In 1971 and decreased to a level of 6.1 percent in 1983. The evidence clearly indicates a sharp reduction in births of higher order during the past decade.

Table 4a Percentage of registered livebirths by birth order, Thailand

Birth order	1971	1974	1977	1980	1983
1	23.8	28.8	36.4	39.9	41.7
2	18.6	19.9	22.9	25.1	26.3
3	15.1	14.7	14.3	14.5	14.5
4	12.1	11.1	9.1	8.1	7.3
5	9.5	8.2	6.0	4.5	4.1
6+	20.9	17.3	11.3	7.9	6.1
Total (of known orders)	1,117,772	995,048	833,097	846,466	835,003

Source: Recalculated from Division of Health Statistics, Ministry of Public Health, *Public Health Statistics*, 1975, 1977-1981, 1983.

Table 4b Percentage of registered livebirths by selected birth order, Thailand

Birth order	1971	1974	1977	1980	1983
1 + 2	42.4	48.7	59.3	65.0	68.0
1 + 2 + 3	57.5	63.4	73.6	79.5	82.5
5+	30.4	25.5	17.3	12.4	10.2

Source: Recalculated from Division of Heolth Statistics, Ministry of Public Health, *Public Health Statistics*. 1975-1971-1981, 1983.

When birth orders are regrouped into  $1^{st} + 2^{nd}$  (FSB),  $1^{st} + 2^{nd} + 3^{rd}$ , and  $5^{th}$  and over, it can be clearly seen that in 1983 more than 80 percent of all registered births were in the group of  $1^{st}$  to  $3^{rd}$  order births and only 10 percent were classified as births of fifth and higher order. (Table 4b)

At the provincial level, Table 5 shows the percentage distribution of first births to all registered births (FB) in 1975, 1980 and 1985. The increasing trend of FB is observed for almost every province during this 10 year period. It should be noted that among the low fertility province, ie., Chiangmai, Chiangrai, Lamphun and Bangkok, the FB in 1985 were in 1985 were in the range of 50 percent, whereas in the southernmost provinces of the country, where fertility is prominently high, the FB was around 30 percent.

Table 6 shows the FSB or percentage distribution of first and second births to total registered births by province in 1980, 1984 and 1985. A significant increased in proportion of FSB was observed in almost every province, except Bangkok, In 1985, FSB was 80 percent and over for the exceptionally low fertility provinces such as Chiangmai, Chiangrai, Payao, Lampang, Lamphun and Uttaradit, all of which are located in the northern part of Thailand.

The central region shows changes in FSB from 60 percent in 1980 to 70 percent and over in 1985. The Northeast also reveals an increase in FSB during this 5-year period. It is observed that the group of province in the southern part of the northeastern region and these along the eastern border of the country appear to have higher fertility than the rest. The FSB in these higher fertility areas increased from 50 percent in 1980 to 60 percent and over in 1985. The rest of the region seems to have attained the 70 percent and over by 1985.

In the South, with the exception of the 5 southern most provinces, there was evidence of an FSB in the range of 60 percent. The two outstanding provinces in terms of FSB were Phuket and Chumporn where the level of FSB was over 70 percent.

The change in FSB from 1975 to 1985 are illustrated in Figure 1.

The changing patterns of FSB are associated with changes in the CPR (1980-1985) as seen in comparing Figures 1 and 2. The high CPR provinces had a higher FSB. On the contrary the lower CPR provinces, ie., below the national average had a lower FSB, in the range of 50-60 percent.

Table 5 Percentage distribution of **first order births** to total registered birth by province, 1975, 1980 and 1985 (MoPH)

	1975★	1980	1985
CENTRAL			
Kanchanaburi	26.9	32.5	39.9
Chantaburi	32.4	40.4	40.2
Chachoengsao	22.6	39.4	38.4
Cholburi	32.4	39.8	40.6
Chainat	40.0	46.6	46.5
Trat	32.6	38.2	37.7
Nakorn Nayok	32.2	31.2	41.5
Nakorn Pathom	33.9	38.1	38.4
Nonthaburi	30.3	37.4	46.1
Pathum Thani	30.8	36.9	37.0
Prachuab Kirikan	22.0	36.0	39.6
Prachinburi	26.2	35.9	43.2
Ayudhya	34.1	41.9	42.0
Petchaburi	31.0	37.3	40.0
Rayong	31.1	35.7	38.4
Ratchaburi	29.6	39.6	41.6
Lopburi	31.8	40.6	44.8
Samutprakarn	36.7	40.3	42.4
Samutsongkram	40.9	35.1	42.4
Samutsakorn	34.2	36.2	39.2
Saraburi	32.5	38.9	43.8
Singburi	45.3	47.2	46.2
Suphanburi	34.2	38.9	41.0
Angthong	31.3	44.8	44.8
NORTH			
Kampaengphet	31.2	38.7	43.7
Chiangmai	51.0	51.3	51.0
Chiangrai	15.8	47.7	50.8
Tok	30.4	42.2	43.1
Nakornsawon	31.6	41.5	46.1
Nan	35.8	43.3	44.9
Payao	<del>-</del>	48.1	46.2
Pichit	32.9	42.9	44.5
Pitsanuloke	33.4	41.5	45.1
Petchabun	31.2	35.4	41.6
Phrae	42.1	49.0	50.2
Moe Hong Son	34.2	31.1	36.8
Lampang	41.8	49.9	50.8
Lamphun	49.8	54.2	49.6
Sukhothai	34.0	45.2	48.5
Uttaradit	35.6	52.8	50.0
Uthaithani	37.4	42.7	45.7

Table 5 (Cont.)

	1975	1980	1985
NORTHEAST			
Kalasin	29.8	37.1	43.5
Khonkaen	34.5	38.9	45.0
Chaiyaphum	33.4	41.1	47.4
Nakorn Panom	24.9	30.4	34.0
Nakorn Ratchasima	29.3	34.5	41.6
Buriram	25.1	31.1	39.1
Mahasarakham	29.2	35.6	47.3
Yasothorn	_	35.7	41.9
Roi Et	13.3	34.9	40.7
Loei	33.5	42.7	44.6
Sisaket	24.8	33.3	37.8
Sakon Nakorn	14.9	28.6	35.2
Surin	25.3	30.3	34.8
Nong Khai	25.6	31.9	37.4
Udorn Thani	26.8	30.1	40.4
Ubon Ratchathani	22.8	31.2	32.8
SOUTH			
Krabi	25.8	29.0	31.8
Chumporn	29.3	37.1	42.8
Trang	28.7	32.4	34.8
Nakorn Sithammorat	25.5	30.2	32.6
Narathiwat	26.6	32.6	30.0
Pattani	30.5	30.7	31.1
Phang Nga	31.1	37.0	35.7
Pattalung	26.5	30.3	33.6
Phuket	40.0	45.7	46.5
Yala	29.4	35.0	35.2
Ranong	24.2	35.4	33.5
Songkhla	30.3	37.2	36.8
Satun	27.5	28.3	30.0
Suratthani	26.7	20.2	34.7
BANGKOK	46.3	57.5	49.6

<sup>★</sup> Source : Tieng Pardthaisong, 1980.

Note:1) does not include Mukdaharn province in 1980, 1985 and Payao 1975

<sup>2)</sup> data from monthly reports of registered births, Public Health Statistic Division, MoPH

<sup>3)</sup> births to women aged 15-49 years

Table 6 Percentage distribution of first and second order births to total registered births, by province, 1980, 1984, 1985. (MoPH)

	1980	1984	1985
CENTRAL			
Kanchanaburi	58.8	67.7	66.3
Chantaburi	67.0	67.6	70.0
Chachoengsao	64.7	66.5	67.2
Cholburi	67.0	71.3	70.0
Chainat	74.2	80.1	77.9
Trat	63.4	63.0	65.3
Nakorn Nayok	54.0	68.5	70.0
Nakorn Pathom	64.7	66.5	67.9
Nonthaburi	62.2	73.3	76.8
Pathum Thani	76.8	63.5	66.4
Prachuab Kirikan	62.7	67.2	68.8
Prachinburi	63.1	67.4	71.5
Ayudhya	68.7	69.8	71.0
Petchaburi	62.9	66.8	68.2
Rayong	62.6	67.9	68.0
Ratchaburi	66.6	69.5	71.4
Lopburi	68.0	71.8	75.8
Samutprakarn	67.6	70.4	71.9
Samutsongkram	59.2	71.5	71.9
Samutsakorn	61.4	66.3	67.3
Saraburi	66.0	72.4	73.9
Singburi	77.2	80.2	79.6
Suphanburi	66.5	71.5	71.3
Angthong	73.9	75.3	76.3
NORTH			
Kampaengphet	65.0	70.5	72.3
Chiangmai	79.7	79.7	82.5
Chiangrai	77.8	86.3	82.3
Tak	68.9	71.9	72.3
Nakornsawan	67.4	72.6	75.0
Nan	72.2	75.7	77.4
Payao	76.4	80.4	80.6
Pichit	69.8	72.8	74.6
Pitsanuloke	66.9	70.7	77.0
Petchabun	62.9	68.5	71.2
Phrae	81.9	86.1	86.2
Mae Hong Son	53.1	62.3	63.6
Lampang	78.7	80.2	82.6
Lamphun	79.0	78.1	80.9
Sukhothai	70.1	76.4	77.3
Uttaradit	76.5	77.9	80.3
Uthaithani	68.6	72.7	73.8

Table 6 (Cont.)

	1980	1984	1985
NORTHEAST			
Kalasin	63.9	72.0	75.0
Khonkaen	65.1	73.3	74.9
Chaiyaphum	67.8	65.7	76.1
Nakorn Panom	52.7	58.3	60.1
Nakorn Ratchasima	59.9	66.7	69.0
Buriram	53.7	63.3	66.4
Mahasarakham	63.5	75.5	78.9
Yasothorn	61.3	68.3	72.1
Roi Et	61.6	69.1	72.4
Loei	68.5	73.6	76.0
Sisaket	57.8	65.0	65.4
Sakon Nekorn	49.2	59.6	62.2
Surin	54.7	59.3	61.2
Nong Khai	55.7	60.8	64.5
Udorn Thani	53.4	63.0	69.4
Ubon Ratchathani	53.1	55.6	60.2
SOUTH			
Krabi	52.6	54.7	55.2
Chumporn	61.9	69.6	71.7
Trang	57.9	58.4	60.8
Nakorn Sithammarat	53.3	55.7	58.0
Narathiwat	55.9	59.2	52.1
Pattani	53.9	52.0	54.3
Phang Nga	62.3	62.8	62.3
Pattalung	54.1	57.9	59.1
Phuket	75.9	75.6	78.0
Yala	60.1	57.6	61.0
Ranong	60.4	59.9	60.0
Songkhla	58.4	63.8	64.1
Satun	51.5	50.2	51.5
Suratthani	38.7	39.3	60.5
BANGKOK	79.5	77.3	78.1

### 2. Correlation and Regression Analysis.

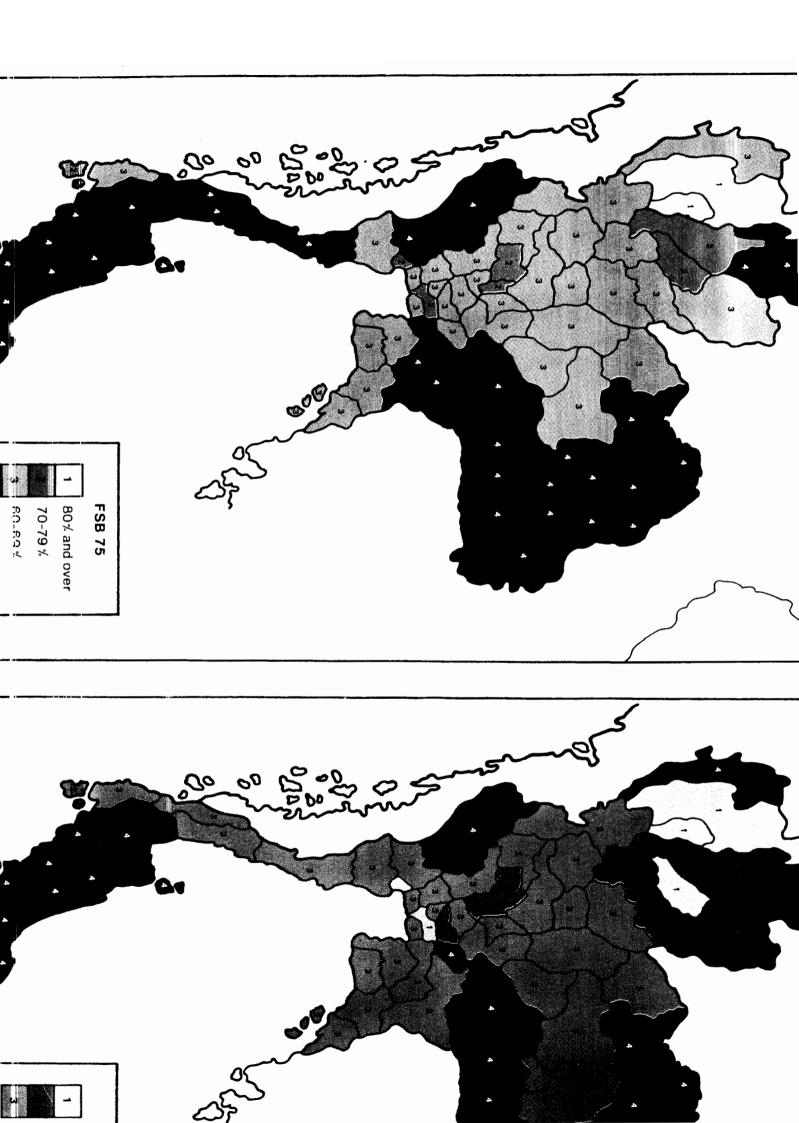
The analysis in this section seeks to identify the association between FSB and fertility (TFR, CBR) and family planning (CPR) indicators by using simple correlation techniques. Unfortunately, Bangkok and Mukdaharn had to be excluded because of unavailability of CPR data. Only 71 provinces were included in the analysis.

2.1 Table 7 reveals the correlations between CPR and TFR, CPR and CBR at various points in time. The values of "r", the correlation coefficient, denote the strength of the statistical association. It was found that all "r's" are statistically significant and as expected demonstrates an inverse relationships between CPR and the fertility indicators.

If the magnitude of "r" were used for choosing the better indicator of CPR in another words, between TFR and CBR which is more highly correlated with CPR, the r of -.615 between CBR 1985 and CPR in January 1985 is best. The CBR, eventhough no adjustment was made for underregistration, yields a higher correlation.

2.2 Correlations between birth order indicators, the FB, FSB and CBR, TFR, CPR in 1980, 1984 and 1985 are shown in Table 8.

When FB was taken into consideration, it was found to have a stronger association with CBR than the FSB for 1980 and 1985. However, the TFR reveals to have a higher correlation with FSB than FB for the 1980 data (-0.77 vs - 0.786).





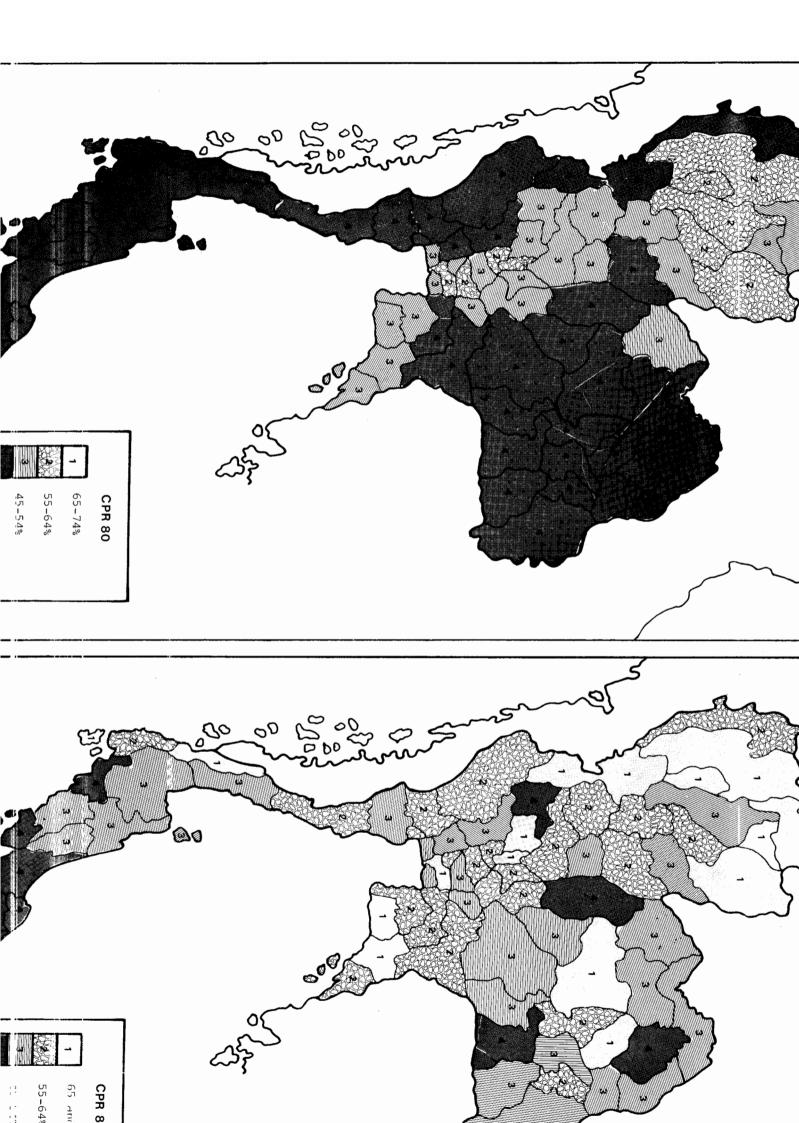




Table 7 Correlations between CPR - TFR, CPR - CBR

	CPR <sub>1980</sub>	CPR <sub>J1985</sub>	CPR <sub>D1985</sub>	
TFR <sub>1975"9</sub>	-0.563			
CBR <sub>1980</sub>	-0.319			
CBR <sub>1984</sub>		-0.258		
CBR <sub>1985</sub>		-0.615	-0.432	

Table 8 a Correlations between birth order indicator and CBR, TFR, and CPR 1975, 1980, 1984, 1985

	FB <sub>75</sub>	FB <sub>80</sub>	FSB <sub>80</sub>	FSB <sub>84</sub>	FB <sub>85</sub>	FSB <sub>85</sub>
CBR <sub>80</sub>		-0.528*	-0.514			
CBR <sub>84</sub>				-0.251		
CBR <sub>85</sub>					−0.571 <b>*</b>	-0.569
TFR <sub>70-74</sub>	-0.723*					
TFR <sub>75-79</sub>	-0.770	-0.786*				
CPR <sub>80</sub>		0.612	0.650*			
CPR <sub>Jan85</sub>				0.815*	0.839	0.879*
CPR <sub>Dec85</sub>					0.703	0.739*
VSC <sub>85</sub>						0.484

Note: 71 provinces, excluding Bangkok and Mukdahorn

Table 8b Correlations between birth order indicator and CBR, TFR, CPR, 1980, 1984 and 1985

	FSB <sub>80</sub>	FSB <sub>84</sub>	FSB <sub>85</sub>	
CBR <sub>80</sub>	-0.514			
CBR <sub>84</sub>		0.251		
CBR <sub>85</sub>			0.569	
TFR <sub>1975-79</sub>	-0.786			
CPR <sub>80</sub>	0.650			
CPR <sub>Jan 85</sub>		0.815	0.879	
CPR <sub>Dec 85</sub>			0.739	

Note: 71 provinces, excluding Bangkok and Mukdahorn.

CPR, the family planning achievement indicator, is highly correlated with the FSB, the birth order indicator, for every time period examined. The correlation coefficients were high and statistically significant, especially for the 1985 data with correlation of 0.879 and 0.739 for at January and December 1985 respectively.

2.3 Using regression analysis, the predicted equations for CBR using FSB, the birth order indicator, in the three different years are demonstrated as follows.

a) 
$$CBR_{80} = 41.129 - 0.29 FSB_{80}$$
;  $R^2 = 0.264$  if  $FSB_{80} = 80\%$ ,  $CBR = 17.9/1000$   
b)  $CBR_{84} = 32.754 - 0.197 FSB_{84}$ ;  $R^2 = 0.063$  if  $FSB_{84} = 80\%$ ,  $CBR = 17.0/1000$   
c)  $CBR_{85} = 41.154 - 0.327 FSB_{85}$ ;  $R^2 = 0.324$  if  $FSB_{85} = 80\%$ ,  $CBR = 15.0/1000$ 

From the above equations, it can be concluded that FSB can be used to predict CBR. If FSB is 80 percent, CBR would be in the range of 15-18 per 1000. However the precision of the predicted equation as indicated by  $R^2$  and SE of the estimates is relatively low, since the  $R^2$  were 0.264., 0.063 and 0.324 for the 1980, 1984 and 1985 equations respectively.

2.4 For TFR, only the TFR 1970-74 were used in the analysis and data available for the birth order indicator are FB 1975. The correlation coefficient for these two variables was -0.723. The regression equation is

$$FB_{75} = 55.74 - 5.053 \text{ TFR}_{70/74}$$
;  $R^2 = 0.52$   
If  $FB = 45.6\%$ , the  $TFR = 2.0$ 

It should be noted here that the  ${\sf R}^2$  of 0.5 indicates a higher degree precision of the estimate.

2.5 Data for 1980 are richer since there are several indicators available for the analysis, including CBR, TFR, CPR and FSB. The correlation coefficients and the predicted equations for each pair of indicators are shown in Table 9.

The r's are high and statistically significant, except for CBR and CPR. Among all the predicted equations, the highest  $R^2$  observed is 0.618 when FSB is predicted by the TFR.

Assumming all 4 equations are to be used in the prediction and estimation of CPR, it can be concluded that when FSB = 80%, CPR = 90%, TFR = 2.0 and CBR = 18.2 per 1000.

Nevertheless, the CPR is observed to be relatively higher than expected from this calculation. The low  $R^2$  of the predicted equation when CPR is involved may explain this discrepancy.

Table 9 Correlations between CBR, TFR, CPR and proportion of FB, FSB and their predicted equation, 1980.

1980	FB <sub>80</sub>	FSB <sub>80</sub>	CBR <sub>80</sub>	TFR <sub>75/79</sub>
CBR <sub>80</sub>	-0.528	-0.514	1.00	
TFR <sub>75-79</sub>	-0.770	-0.786		1.00
CPR <sub>80</sub>	0.612	0.650	-0.319	-0.563

2.6 Table 10 shows the correlation between CBR, CPR and FSB in 1984, along with their predicted equations. All r's were statistically significant, especially FSB and CPR. The  $R^2$  is 0.664 when FSB was predicted by CPR. (Table 10)

A conclusion to be drawn from these equations is :

$$FSB = 90\%$$
,  $CPR = 75\%$ , and  $CBR = 15/1000$ 

Table 10 Correlations between CBR, CPR and proportion of FSB and their predicted equations, 1984.

1984	$FSB_{(BH)}$	FSB <sub>(BS)</sub>	CBR <sub>84</sub>
CBR <sub>84</sub>	-0.052 <sub>NS</sub>	-0.251	1.00
CPR <sub>Jan85</sub>		0.815	-0.258

2.7 Data from 1985, which is believed to be the best quality of all indicators used, yielded the correlations between CBR, CPR and FSB. Similarly all r's were high and statistically significant with a high precision of predicted equations, especially when using CPR to predict the FSB. (Table 11).

The statistics drawn from the 4 regression equations are:

If 
$$FSB = 91.4\%$$
,  $CPR = 75\%$  and  $CBR = 15$  or 16 per 1000

Table 11 Correlations between CBR, CPR and proportion of first, and first-second order births; their predicted equations, 1985

1985	FB <sub>85</sub>	FSB <sub>85</sub>	CBR <sub>85</sub>
CBR <sub>85</sub>	-0.571	-0.569	1.0
CPR <sub>Jan85</sub>	0.839	0.879	-0.6147
CPR <sub>Dec85</sub>	0.703	0.573	-0.432

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I CBR<sub>85</sub> = 37.62 - 0.47 \text{ FB}_{85}; R^2 = 0.326

if FB = 45.6\%, CBR = 16.2/1000

II CBR<sub>85</sub> = 27.21 - 0.17 \text{ CPR}_{85}; R^2 = 0.187

if CPR = 75\%, CBR = 14.5/1000

III FSB<sub>85</sub> = 43.988 + 0.632 \text{ CPR}_{Jcm85}; R^2 = 0.772

if CPR = 75\%, FSB = 91.4\%

Note: CBR = 15-16/1000, CPR = 75%, FB = 45.6%, FSB = 91.4%
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- 2.8 Supposing the FSB were to be obtained using CPR as the predictor, the following equations for different time periods are:
  - a) FSB = 32.982 + 0.52 CPR<sub>80</sub>; R<sup>2</sup> = 0.423 if CPR = 90.4%. FSB = 80%
     b) FSB = 41.804 + 0.635 CPR<sub>Jan 85</sub>; R<sup>2</sup> = 0.664 if CPR = 75%; FSB = 89.4%
     c) FSB<sub>85</sub> = 43.988 + 0.632 CPR 1985; R<sup>2</sup> = 0.772 if CPR = 75%, FSB = 91.4%

It is worth nothing that the 1984 and 1985 data yielded similar findings, with a higher degree of precision than the 1980 data. FSB apparently can be used as an indicator of CPR, with a high degree of reliability and precision especially since the birth order data from birth certificates tends to be of higher quality than previous years and with better coverage of births across the country.

It can be concluded with a fair degree of reliability that province which attained a CPR of 75% would also achieve an FSB of 90 percent and a CBR of 15-16 per thousand, and replacement level fertility (2.0) would be achieved.

### 3. Findings from the 1984 Bl.

A total of 93,261 individual records obtained from the second part of birth certificate which is filed at the Central Registration Office of the Mol in 8 purposively selected provinces were analysed.

3.1 Table 12 shows the proportion of FB, FSB and "unknown" birth order by province. It can be seen that an FSB of 78-85 percent was found among the low fertility provinces. ie., Chiangmai, Lamphun and Phrae, whereas an FSB of between 50-60 percent was found in the higher fertility five southernmost provinces. (This difference was pronounced when indicated by the FSB). In addition, the "unknown birth order" from the BI was less than 10 percent among these provinces.

Table 12 Percent of FB, FSB and unknown, by province, 1984.

Province	FB*	FSB*	% Unknown	N
Chiangmai	49.41	79.71	4.36	24312
Lamphur	46.61	78.23	8.27	3726
Phrae	50.41	84.90	8.34	6727
Songkhla	33.23	60.13	7.23	22015
Narathiwat	26.42	50.00	6.40	13602
Satun	26.31	49.83	7.83	5249
Pattani	29.15	53.59	9.02	10215
Yala	32.23	57.52	3.03	7237

<sup>\*</sup>excluding "unknown"

3.2 It is generally accepted that younger mothers have a lower birth order than older mothers. From the data it was found that the FSB among mothers aged less than 35 years has less within group variation than is the case with older mothers. In high fertility provinces, the FSB's for younger mothers clustered around 60 percent and around 83-84 percent for younger mothers in low fertility provinces (Table 13). Differences between the two groups of provinces was easily seen when using the FSB indicator for mothers aged less than 35 years.

N = total registered births (MoI)

Table 13 Percentage of first birth or second order birth to mothers of all ages and to mothers aged less than 35 years., 1984. (MoI)

	mothers	mothers aged less than 35 yrs.			
	FB	FSB	FB + FSB	mothers of all ages	
Low fertility					
Chiangmai	53.1	31.5	84.6	79.7	
Lamphun	50.4	33.4	83.8	78.2	
Phrae	52.7	35.5	82.2	84.9	
High fertility					
Songkhla	36.9	29.3	66.3	60.1	
Narathiwat	31.1	27.1	58.2	50.0	
Satun	31.0	26.8	57.8	49.8	
Pattani	33.3	27.6	60.9	53.6	
Yala	36.2	27.6	63.8	57.5	

3.3 If it could be demonstrated that births are evenly distributed among the 12 months of each year, it would therefore be possible to use the data for only one or two months to represent the annual data of registered birth. Under these particular conditions, the FSB for any month should be adequate for measuring the current fertility or family planning situation at the provincial level.

Table 14 shows of the distribution of registered births by month and by province. The Index of Dissimilarity\* was used to indicate the variation within the distributions.

Taking Chiangmai province as a standard distribution, magnitudes of the Index of Dissimilarity among the 7 provinces were in the range of 2 to 8. It can be concluded that the distribution of births by month in the other 7 provinces is more or less similar to that for Chiangmai for the period of 1984.

If this trend were found in all other provinces over time, the FSB for any given month could be used as the indicator for the provincial level, especially when the norms of two-child family are well established among Thai population.

<sup>\*</sup>The Index of Dissimilarity (ID) ranges from 0 to 50. When the ID equals zero, the distributions are absolutely similar, and absolute dissimilarity is indicated by ID = 50.

Table 14 Distribution of number of births registered in 1984 by month and by province

Month	Chiangmai	Lamphun	Phrae	Songkhla	. Narathiwat	Satun	Pattani	Yala
Jan.	8.4	6.8	8.3	8.0	9.8	8.6	7.6	7.4
Feb.	8.2	8.8	8.0	7.5	8.9	8.4	6.6	8.0
Mar.	8.4	8.5	9.2	8.5	8.1	7.5	7.3	9.8
Apr.	8.4	7.2	8.7	8.6	8.0	10.0	8.7	9.1
May	8.4	8.8	8.1	9.5	8.5	9.1	9.0	10.5
Jun.	8.0	8.1	7.4	8.3	7.5	9.4	7.5	7.1
Jul.	8.4	8.2	8.7	8.8	8.7	8.1	9.7	10.2
Aug.	9.1	9.0	8.9	8.5	8.4	8.7	8.7	8.8
Sep.	8.2	8.8	8.5	7.9	11.7	8.8	12.8	8.0
Oct.	9.4	10.2	8.7	8.8	7.4	8.0	6.0	7.7
Nov.	7.7	7.7	7.6	8.5	7.1	7.6	8.9	7.5
Dec.	7.3	7.9	7.8	7.1	5.9	5.8	7.2	5.8
Total	100	100	100	100	100	100	100	100
ID, of Dis	similarity	3.15	2.20	2.85	5.95	4.65	7.95	6.0

Note: Incex of Dissimilarity (ID) ranges from 0 to 50

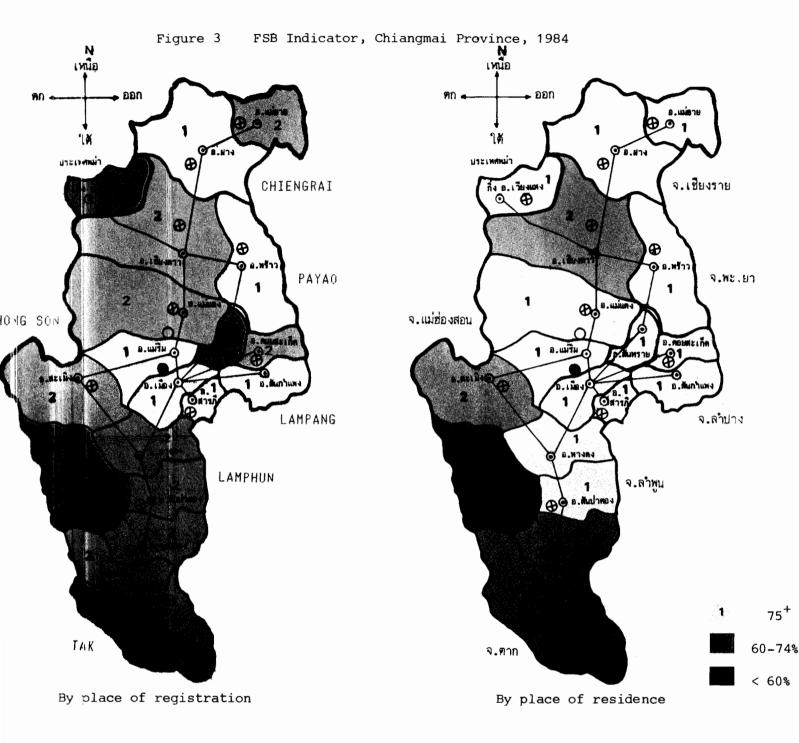
4. In order to use the FSB indicator for planning and evaluation of family planning performance at the provincial level, births in different districts should be taken into consideration. The problem of the difference between number of births counted at the place of registration and those at the place of residence has been recognized. Rural mothers with first or second order births tend to have their babies in provincial or district hospitals which results in higher birth rates for unban centres where hospitals are located compared to rural areas.

If the FSB is to be used to identify lower performance districts in a province, place of residence and place of registration need to be examined in order to determine whether they bias the results.

Chiangmai province was chosen as a case study. From the records at the Provincial Chief Medical Office, the CPR in 1986 was estimated to be 79 percent and the TFR has been at replacement level -2.0 or lower - for the past few years. However, when looking at district data, substantial variation was found for CBR and CPR.

With respect to Bl data-births by place of registration — the FSB by district in Chiangmai province yielded some unexpected results. For example, San Sai district which is located next to Chiangmai township had FSB as low as 48.2 percent. Thus, it appears that over half of all births in this particular district were third or higher order births. Furthermore, similar findings were discovered in other districts, including, Mae Taeng, Hang Dong, Omkoi, Hod and Ging Wiang Hae, despite the fact that the FSB for the province as a whole was 80 percent in 1984.







Fortunately, the data on registered births by place of residence was available at the Health Planning Section of the Provincial Chief Medical Office of Chiangmai province for the period since 1981.\* The number of total registered births by district was compared for the two sources, by place of registration (BI) and by place of residence (BS) in Table 15, along with the FSB in 1984. The maps in Figure 2-illustrate the importance of redistributing registered births into the place of residence. It should be noted that almost all districts in Chiangmai had FSB more than 70 percent except for Mae Chaem which had the lowest FSB at 53 percent, availability and accessibility to modern health outlets and the overall level of development should prove to be significant variables accounting for these variations.

FSB by place of residence yields meaningful results for identifying target districts for planners and implementators in this field of fertility and family planning performance. Thus, when the district is the unit of analysis, the FSB by place of residence is highly recommended.

Table 15 Comparison of total registered births and FSB by district compared from two sources, Chiangmai, 1984

	B:	Total regist	ered births	FSB		
	District	B <sub>I</sub>	B <sub>S</sub>	B <sub>S</sub>	Bı	
1.	Muang Chiang Mai	14,250	950	81.6	86.0	
2.	Chom Thong	1,124	1,611	72.8	73.1	
3.	Mae Ai	396	356	77.6	73.1	
4.	Chiang Dao	207	695	74.3	69.5	
5.	Doi Saket	117	832	88.0	72.8	
6.	Doi Tao	347	399	67.6	65.7	
7.	Fang	1,736	1,864	86.9	90.0	
8.	Phroo	475	661	85.2	85.0	
9.	Mae Chaem	1.225	1,308	53.4	52.9	
10.	Mae Taeng	525	1,046	78.4	66.9	
11.	Mae Rim	656	1,162	83.5	76.0	
12.	Samoeng	319	436	67.6	60.9	
13.	San Kamphaeng	157	1,157	88.0	80.9	
14.	San Sai	59	1,031	87.8	48.2	
15.	San Pa Tong	641	1,594	83.8	73.7	
16.	Saraphi	117	957	89.3	84.2	
17.	Hang Dong	113	885	83.3	64.2	
18.	Omkoi	645	299	61.3	52.2	
19.	Hod	174	967	65.7	63.1	
20.	Sub-district Wiang Hae	199	354	76.1	58.2	

 $B_S$  = by place of residence (MoPH)

 $B_1$  = by place of registration (MoI)

<sup>\*1981</sup> was the first year of the Fifth National Development Plan.

Table 16 Proportion of FSB by district in Chiangmai province, 1984, 1985 (B<sub>S</sub>)

	District	FSB 1984	FSB 1985
1.	Muang Chiang Mai	81.6	82.4
2.	Chom Thong	72.8	77.5
3.	Mae Ai	77.6	75.2
4.	Chiang Dao	74.3	73.1
5.	Doi Saket	88.0	88.7
6.	Doi Tao	67.6	77.8
7.	Fang	86.9	86.1
8.	Phrao	85.2	85.2
9.	Mae Chaem	53.4	51.6
10.	Mae Taeng	78.4	77.9
11.	Mae Rim	83.5	80.5
12.	Samoeng	67.6	65.6
13.	San Kamphaeng	88.0	88.7
14.	San Sai	87.8	91.3
15.	San Pa Tong	83.8	84.7
16.	Saraphi	89.3	88.6
17.	Hang Dong	83.3	86.6
18.	Omkoi	61.3	53.2
19.	Hod	65.7	66.8
20.	Sub-district Wiang Hae	76.1	78.8

### **CONCLUSION & RECOMMENDATIONS**

This research is aimed at deriving a simple indicator for measuring fertility and family planning programme output at various administrative levels of the country. The FSB, the proportion of first and second order births to total registered births, is recommended as model indicator, primarily at the provincial and national level.

The *FSB indicator* is an ideal measure. It is simple to analyze and understand, it can be obtained wherever there is a birth certificate and it is highly correleated with the CPR, CBR and TFR.

At the national level, the FSB indicator could be adopted for future use

- 1) to evaluate the family planning performance by province, or to validate the reported CPR;
- 2) to identify particular administrative areas requiring additional inputs to accelerate family planning performance; and
  - 3) to assess the achievement of the "Two-Child family" norms.

At the provincial level, if the FSB indicator is to be used as an indicator of family planning achievement, births by place of residence need to be considered. Recommendations regarding the refinement of the FSB indicator will be discussed under Phase  ${\mathbb I}$  of the project.

With reference to the source of data appropriate for derivation of the FSB indicator, the following recommendations are made:

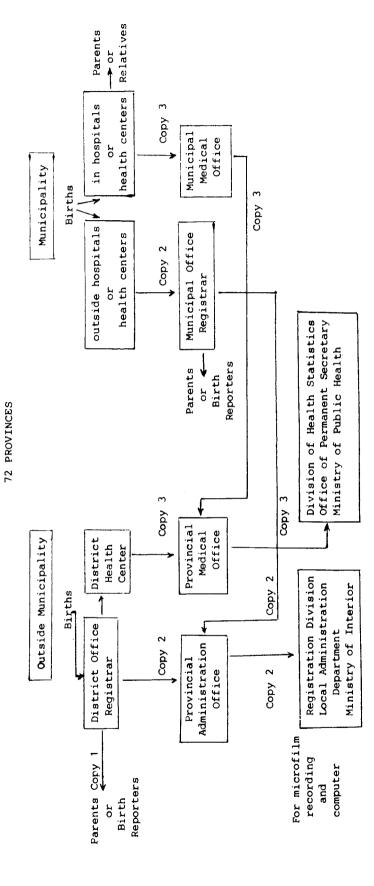
- 1) At the Central Health Office in Bangkok, the monthly and annual reports of aggregate number of registered births by birth order, sex and age of mothers by province which are now obtainable from the Division of Health Statistics, MoPH can be easily retrieved since they were already computerized. The only bias that might effect the reliability of the indicator is human error in manual tabulation of the data at the provincial level offices.
- 2) At the Central Registration Office of the Mol, if information on birth order found on the second part of the birth certificate were to be routinely coded computerized, it would be of great advantage.
- 3) At the provincial level, the officer in charge of Health Planning Section of the PCMO office responsible for consolidation of the reports on births and deaths, should reallocate the birth certificates according to place of mother's residence. If this reallocation were to occur, the FSB indicator by district could be used effectively.
- 4) At the district level, birth certificates from both sources, ie., District Administration Office and District Health Office, are equally accessible. The FSB indicator can be calculated simply and updated for any period of time, provided that there will be not many births delivered outside the district.
- 5) The local registrar should be oriented on the significance and importance of good birth order information so they will carefully fill out the entries on the birth certificate, especially the birth order.

#### REFERENCES

- Bongaarts, John "A Simple Method for Estimating the Contraceptive Prevalence Required to Reach a Fertility Target" *Studies in Family Planning* Vol. 15 Nov. 4, 1984: 184-90
- Brass, William. 1975. *Methods for Estimating Fertility and Mortality from Limited* and Defective Data. Laboratories for Population Statistics. An Occasional Publication.
- Dorothy I,. Nortman. *Population and Family Planning Programs: A Compendium of Data Through 1981*. Eleventh Edition. 1982.
- Ministry of Public Health, Thailand. 1984. *Report of Births and Deaths in Government hospitals, 1979-1983*. Division of Health Statistics of the Office of the Permanent Secretary. Bangkok (Thai)
- Ministry of Public Health, Thailand. 1985 Annual Report of Family Planning Acceptors. Research and Evaluation Unit, Family Health Division, Department of Health. Bangkok (Thai)
- Office of Prime Minister. *Thailand Population and Housing Census 1980*: National Statistical Office.
- Pardthaisong, Tieng. 1980. *Population Reduction and the Implementation of National Family Planning Program in 71 Provinces of Thailand.* Research Paper No. 13. Thai Studies Institute of Thammasart University.
- Pardthaisong, Tieng. 1978. *The Recent Fertility Decline in the Chiangmai Area of Thailand*. Papers of the East-West Population Institute. No.47. Honolulu: East-West Centre.
- Pejaranonda, Chintana. 1985. *Decline in Fertility by District in Thailand: An Analysis of the 1980 Census*. Asian Population Studies Series. No.62-A ESCAP. BANGKOK UNITED NATIONS.

	APPENDIX		





BIRTH REGISTRATION SYSTEM

## The Second Part of Birth Certificate (in use until 1983)

	· · · · · · · · · · · · · · · · · · ·	
	Birth Certificate	No.
	Registration Office	
New t	oorn	
1.1 1.2 1.3 r 1.4	birth date monthyear time AmPmlunar calendar daymonthyea	
Month	ner	
2.1 2.2 2.3 2.4		
Fathe	er	
3.1 3.2 3.3	first namelast name age nationality	
birth	n informant	
4.1 4.2 4.3	first namelast name	cial
Date	of registrationdaymonthyea	r
Date	of name change	
	1.1 1.2 1.3 1.4 1.5 Month 2.1 2.2 2.3 2.4 Fatho 3.1 3.2 3.3 birth 4.1 4.2 4.3 4.4 Date Birth signs	Registration Office  New born  1.1 first namelast name

### Content of Birth Certificate (in use since 1984 to the present)

### Birth Certificate

Registra	tion office	Identfication	no.
1. New 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 1.10	first namelast  sex	) F e hyear ssdelivery e	 TBA others
2. Moth 2.1 2.2 2.3 2.4 2.5 2.6	first namemaid I.D. No age nationality birth place province address of residence	i Oother	
3. Fath 3.1 3.2 3.3 3.4 3.5 3.6	first namelast I.D. No age nationality	i Othercountry	
4. Birt 4.1 4.2 4.3 4.4 4.5	h informant first namelast n I.D. No age address relationship to new born hh. head father relative mother document certifying birth birth notification informant signature	birth attendant_	other no no
		signature of hirth re	ogietrar

signature of birth registrar

date of registration

REPORT ON LIVE BIRTH AND STILL BIRTH (Planning unit, PCKO Officer) Ministry of Public Health

	YEAR		
LOGALITY	FONTHYEAR	COMPILER SIGNATURE POSITION	
			ĺ

Item	Ĭ	Total	Less	Less than 15	15-19		20-24	25-29	30-34	$\vdash$	35-30	3	+		5.0	-		ſ
	Ma le	female	z	í.	2,	E L	-	ž	+	+		40-44	-†	65-65	and over	er don't	r know	3
1) Total live births Total					-	-	+-		ε .	<u>.</u>	ц Д	Z	Σ.	Įė,	E E	æ	Ĺų	
birth order 1												_						·
2																		
3																		
7																		
5									_									
9							_		_									
7					-													
8									_			_					_	
6												_			_			
10																		
11																		
12																		
13							_								_			
14																		
15																		
Don't know																		
					_	_		_	_						_			
2) Jotal Still births										-	-	-	+		1	+		
			_	_		_	_	_	_	-		_	_		_	-	_	

Table A1 Percentage distribution of *unknown birth order* to total registered births, by province, 1980, 1984, 1985, (MoPH)

	1980	1984	1985
CENTRAL			
Kanchanaburi	16.4	3.4	2.4
Chantaburi	6.5	5.2	2.5
Chachoengsao	17.1	8.8	9.5
Cholburi	11.8	3.3	0.7
Chainat	38.1	4.5	0.7
Trat	11.9	3.3	0.9
Nakorn Nayok	35.7	2.8	1.1
Nakorn Pathom	25.6	4.7	3.4
Nonthaburi	73.3	11.3	3.5
Pothum "Thani	0.1	11.4	5.2
Prachuat: Kirikan	0.0	4.1	1.1
Prachinburi	0.1	0.1	0.0
Ayudhya	29.5	4.6	2.6
Petchaburi	50.7	10.8	4.0
Royong	7.8	2.6	1.1
Ratchaburi	26.9	4.1	5.9
Lopburi	15.2	19.6	11.0
Samutprckarn	31.1	3.5	2.2
Samutsorigkram	28.0	6.9	5.6
Samutsakorn	1.1	6.8	2.5
Saraburi	9.0	10.6	5.1
Singburi	7.0	0.3	0.1
Suphanburi	33.4	7.2	3.6
Angthong	17.8	7.4	4.0
NORTH			
Kompaengphet	14.7	4.7	3.5
Chiangmai	14.5	4.6	3.0
Chiangrai	23.2	5.4	1.7
Tak	26.3	6.4	6.1
Nakornsawan	2.0	3.7	3.0
Non	11.7	5.2	2.6
Payao	26.2	6.6	3.2
Pichit	30.3	6.3	4.0
Pitsanuloke	19.8	5.3	4.2
Petchabun	10.4	7.9	3.2
Phrae	30.5	4.6	1.2
Mae Hong Son	31.0	5.9	3.2
Lampang	24.9	6.9	2.6
Lamphun	45.0	6.9	3.3
Sukhothai	18.2	4.2	2.6
Uttaradit	14.0	7.4	8.6
Jthaithani	27.7	5.6	3.5

Table A1 (Cont.)

	1980	1984	1985
NORTHEAST			
Kalasin	36.4	9.8	5.7
Khonkaen	28.7	3.3	3.7
Chaiyaphum	33.9	8.0	3.2
Nakorn Panom	39.6	5.5	1.4
Nakorn Ratchasima	17.4	4.9	1.5
Buriram	12.1	4.4	3.4
Mahasarokham	12.2	9.0	3.4
Yasothorn	27.3	9.3	3.1
Roi Et	37.9	9.7	3.7
Loei	23.0	4.3	2.9
Sisaket	51.1	19.4	6.0
Sakon Nakorn	12.9	8.0	2.7
Surin	31.7	11.0	6.3
Nong Khai	5.9	3.8	1.6
Udorn Thani	33.3	9.6	3.0
Ubon Ratchathani	16.8	18.0	2.4
SOUTH			
Krabi	7.6	7.9	2.5
Chumporn	21.4	6.3	4.0
Trang	10.9	4.1	1.8
Nakorn Sithammarat	9.2	4.4	2.1
Nr rathiwat	37.9	7.5	4.1
Pattani	23.7	7.7	5.1
Phang Nga	16.7	3.2	2.2
Pattalung	16.8	7.5	2.8
Phuket	7.0	4.9	1.5
Yala	14.7	4.5	4.2
Ranong	14.9	3.5	1.8
Songkhla	25.2	18.6	8.2
Satun	22.7	6.3	3.7
Suratthani	13.2	5.8	5.6
BANGKOK	9.9	2.9	3.6
	•••	,	2.0

Table A2 Proportion of livebirths in government hospitals to total registered births, Thailand

	1980	1983	
Whole Kingdom	23.7	27.3	
North	17.3	27.1	
Northeast	7.3	9.2	
Central	51.3	53.1	
South	15.4	16.3	
Bangkok	82.8	75.4	
Chiangmai	40.6	52.4	
Lamphur	8.4	27.7	
Phrae	29.8	44.8	
Satun	8.3	9.0	
Songkhla	11.4	15.6	
Pattani	7.6	10.4	
Yala	41.1	42.0	
Narathivet	10.7	12.4	

Table A3 Difference between proportion of first and second births to total registered births, and to births in hospitals by provinces in 1984.

	to total births	to births in hospitals	difference
CENTRAL			
Kanchanaburi	67.68	73.65	-5.97
Chantaburi	67.61	71.89	-4.28
Chachoengsao	66.51	74.13	-7.62
Cholburi	71.73	75.32	-3.59
Chainat	80.07	82.73	-2.66
Trat	62.98	64.67	-1.69
Nakorn Nayok	68.52	75.32	-6.80
Nakorn Pathom	66.47	68.91	-2.44
Nonthaburi	73.27	76.07	-2.80
Pathum Thani	63.47	73.89	-10.42
Prachuabkirikan	67.19	72.75	-5.56
Prachinburi	67.44	74.70	-7.26
Ayutthya	69.77	73.65	-3.88
Petchaburi	66.80	69.72	-2.92
Rayong	67.92	69.56	-1.64
Ratchaburi	69.51	72.31	-2.80
Lopburi	71. <b>7</b> 9	79.21	-7.42
Samutprakarn	70.43	72.03	-1.60
Samutsongkram	71.49	73.59	-2.10
Samutsakorn	66.25	67.76	-1.51
Saraburi	72.39	76.10	-3.71
Singburi	80.22	80.92	70
Suphanburi	71.48	80.86	-9.38
Angthong	75.28	75.77	49

Table A3 (Cont.)

	to total	to births	difference
	births	in hospitals	
NORTH			
Kampaengphet	70.46	77.06	-6.60
Chiangmai	79.72	86.16	-6.44
Chiangrai	86.27	91.90	-5.63
Tak	71.92	82.01	-10.09
Nakornsawan	72.59	74.50	-1.91
Nan	72.59	83.49	-10.90
Payao	80.39	85.21	-4.82
Pichit	72.81	74.88	-2.07
Pitsanuloke	70.74	70.23	.51
Petchabun	68.49	77.03	-8.54
Phrae	86.14	87.19	-1.05
Mae Hong Son	62.31	83.07	-20.76
Lampang	80.17	87.65	-7.48
Lamphun	78.05	85.80	-7.75
Sukothai	76.41	81.52	-5.11
Uttaradit	77.88	81.21	-3.33
Uthaithani	72.70	79.08	-6.38
NORTHEAST			
Kalasin	71.98	80.41	-8.43
Khonkaen	73.33	76.77	-3.44
Chaiyaphum .	65.70	80.01	-14.31
Nakorn Panom	58.34	72.86	-14.52
Nakorn Ratchasima	66.74	75.68	-8.94
Buriram	63.30	70.11	-6.81
Mahasarakham	75.46	79.14	-3.68
Yasothorn	68.25	73.75	-5.50
Roi Et	69.15	77.03	-7.88
Loei	73.60	85.35	-11.75
Sisaket	65.02	73.95	-8.93
Sakon Nakorn	59.56	73.81	-14.25
Surin	59.35	75.33	15.98
Nong Khai	60.76	80.43	-19.67
Udorn Thani	63.04	76.02	-12.98
Ubonratchathani	55.63		

Table A3 (Cont.)

	to total births	to births in hospitals	difference
SOUTH			
Krabi	54.75	73.90	-19.15
Chumporn	69.59	79.75	-10.16
Trang	58.40	63.28	-4.88
Nakorn Sithammarat	55.68	65.31	-9.63
Narathiwat	59.23	72.58	-13.35
Pattani	52.04	69.07	-17.03
Phang Nga	62.83	72.33	-9.50
Pattalung	57.92	69.52	-11.60
Phuket	75.62	72.14	3.48
Yala	57.60	67.79	-10.19
Ranong	59.92	68.67	-8.75
Songkhla	63.75	71.90	-8.15
Satun	50.19	74.15	-23.96
Suratthani	39.32		
BANGKOK	77.34	73.81	-3.53

Table A4 A comparison of birth order data from two difference sources, 1984.

Province		MoPH (BS	)	Mol (BI)		
	Total cases	1 <sup>st</sup> + <sub>order</sub> 2 <sup>nd</sup> (percent)	unknown (percent)	Total 1 <sup>s</sup>	st+ <sub>order</sub> 2 <sup>nd</sup> (percent)	unknown (percent)
Chiangmai	20,344	76.04	4.61	24,312	79.71	4.36
Lamphun	3,563	72.66	6.90	3,726	78.23	8.27
Phrae	6,488	82.16	4.60	6,727	84.90	8.34
Songkhla	30,698	51.86	18.64	22,015	60.13	7.23
Pattani	11,601	48.09	7.56	10,215	53.59	9.02
Yala	8,558	55.03	4.45	7,237	57.52	3.02
Satun	5,210	47.02	6.31	5,249	49.83	7.83
Narathiwat	12,812	54.80	7.47	13,602	50.00	6.40

Table B1 Percent of first birth, first and second order births and unknown, by district, Chiangmai Province, 1984.

District	FB	FSB	Unknown	Number of case
1. Muang Chiang Mai	53.4	86.0	2.5	14250
2. Chom Thong	44.2	73.1	7.9	1124
3. Mae Ai	46.3	73.1	5.0	396
4. Chiang Dao	44.7	69.5	4.8	207
5. Doi Saket	41.8	72.8	12.0	117
6. Doi Tao	39.3	65.7	8.4	347
7. Fang	59.3	90.0	2.8	1736
8. Phrao	56.7	85.0	5.7	475
9. Mae Chaem	29.9	52.9	7.2	1255
10. Mae Taeng	42.6	66.9	7.8	525
11. Mae Rim	48.9	76.0	7.2	656
12. Samoeng	31.9	60.9	12.5	319
13. San Kamphaeng	50.4	80.9	3.2	157
14. San Sai	30.4	48.2	5.1	59
15. San Pa Tong	43.0	73.7	6.9	641
16. Saraphi	54.5	84.2	13.7	117
17. Hang Dong	33.0	64.2	3.5	113
18. Omkoi	26.9	52.2	18.6	645
19. Hod	37.0	63.1	5.1	974
20. Sub-district Wiang Hae	31.2	58.2	5.0	199
Provincial average,	49.4	79.7	4.4	24312

Table B2 Percent of first birth, first and second order births and unknown, by district, Lamphun, 1984.

District	FB	FSB	Unknown	N
1. Muang Lamphun	51.9	85.3	4.8	1241
2. Sub-district				
Hua Chang	38.2	62.8	4.4	411
3. Ban Hong	45.8	80.0	7.2	318
4. Pa Sang	50.2	82.6	3.9	587
5. Mae Tha	42.2	77.6	25.7	300
6. Li	41.8	71.5	12.4	869
Provincial average	46.6	78.2	8.3	3726

 $\mathsf{Source}:\mathsf{Mol}$ 

Table B3 Percent of first birth, first and second order births and unknown, by district Phrae 1984.

District	FB	FSB	Unknown	N
1. Muang Phrae	52.0	86.8	3.4	3481
2. Den Chai	45.2	76.0	2.2	362
3. Rong Kwang	42.8	80.8	20.2	478
4. Long	49.9	83.4	15.5	830
5. Wang Chin	47.7	80.2	11.2	489
6. Song	55.2	87.9	19.2	574
7. Sung Men	47.4	84.9	8.2	513
Provincial average	50.4	84.9	8.3	6727

Table B 4 Percent of first birth, first and second order births and unknown, by district, Songkhla, 1984.

District	FB	FSB	Unknown	N
1. Muang Songkhla	35.8	64.9	3.8	5243
2. Sub-District Na Mom	25.5	62.8	67.5	157
3. Chana	25.9	51.5	6.4	1232
4. Thepria	31.2	53.6	9.8	963
5. Na Thawi	32.0	58.3	40.9	953
6. Ranot	26.1	53.4	3.4	1160
7. Rattanaphum	25.2	49.7	7.8	1656
8. Sathing Phra	19.9	43.2	2.6	764
9. Sadao	30.3	50.7	12.8	1255
10. Saba Yoi	29.5	51.1	3.5	837
11. Hat Yai	38.4	66.8	4.3	7589
12. Sub-District Krasae Sin	19.2	47.6	9.2	206
Provincial average	33.2	60.1	7.2	22015

Source : Mol

Table B 5 Percent of first birth, first and second order births and unknown, by district, Narathiwat, 1984.

District	FB	FSB	Unknown	N
	21.1	E4.4	2.4	3351
1. Muang Narathiwat	31.1 22.5	56.6 42.3	0.6	1333
2. Tak Bai		· — · <del>-</del>	• • •	1171
3. Bacho	24.5	48.6	11.4	
4. Yi-ngo	26.2	47.3	2.9	797
5. Rangae	24.9	48.2	16.0	2987
6. Ruso	27.7	51.7	7.0	1137
7. Waeng	26.3	49.3	2.9	904
8. Si Sakhon	23.9	46.6	5.2	362
9. Sub-district Sukhirin	28.9	53.1	3.0	235
10. Sungai Padi	22.0	47.2	1.8	911
11. Sungai Kolok	23.7	46.7	0.2	414
Provincial average	26.4	50.0	6.4	13602

Table B 6 Percent of first birth, first and second order births and unknown, by district, Satun, 1984.

District	FB	FSB	Unknown	N
1. Muang Pattani	31.8	58.0	5.7	2536
2. Khok Pho	28.6	55.5	4.4	1452
3. Sub-District				
Thung Yang Daeng	30.3	56.7	4.0	623
4. Panare	29.2	53.2	9.4	970
5. Yarang	26.1	48.6	6.7	1490
6. Yaring	29.5	51.3	10.7	1043
7. Sai Buri	28.6	54.8	17.8	769
8. Nong Chik	28.9	48.6	20.2	1169
9. Sub-district Mai Kaen	16.7	42.7	6.8	161
Provincial average	29.2	53.6	9.0	10215

Source : Mol

Table B 7 Percent of first birth, first and second order births and unknown, by district, Yala 1984.

District	FB	FSB	Unknown	N
1. Muang Yala	35.4	61.9	1.7	4638
2. Sub-district Thab	20.3	37.5	3.5	199
3. Bannang Sata	22.9	44.2	5.0	717
4. Betong	31.0	57.7	3.9	929
5. Yaha	26.4	47.2	8.1	754
Provincial average	32.3	57.5	3.0	7237

Table B 8 Percent of first birth, first and second order births and unknown, by district, Satun, 1984.

District	FB	FSB	Unknown	N
1. Muang Satun	30.4	53.4	4.7	2101
2. Khuan Ka Long	26.1	52.7	15.8	760
3. Sub-district Khuan Don	25.0	52.2	6.4	342
4. Sub-cistrict Tha Phae	22.8	44.3	12.8	1137
5. Thung Wa	20.7	45.6	1.2	523
6. La-ngu	23.2	44.4	4.9	386
Provincial average	26.3	49.8	7.8	5249

Source : Mol



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- (110) Institute for Population and Social Research, Mahidol University, The Mid-Interval Survey Report, Community Based Integrated Rural Development (CBIRD) Evaluation Project, September, 1986.
- (111) อภิชาติ จำรัสฤทธิรงค์ และมะลิ ลิวนานนท์ชัย, สถิติเกี่ยวกับการใช้และการเข้าถึงบริการคุมกำเนิดจาก แหล่งบริการของรัฐและเอกชนในประเทศไทย จากการศึกษาสภาวะการคุมกำเนิดของประเทศไทยในปี พ.ศ. 2527
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