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NATURAL FERTILITY IN THE PHILIPPINES

ENRICA G. AQUINO
Commission on Population, Region IV

This study examines the levels and patterns of fertility, by time and cross-section, with a view to analyzing the course of natural fertility during the process of modernization and suggests possible factors contributing to the observed trend in natural fertility in the Philippines. The data on age-specific marital fertility rates used were drawn from the 1973 National Demographic Survey.

The study concludes that the Philippines has exhibited a constant level of fertility as a result of the mutually cancelling out effects of increased natural fertility on the one hand and increased use of regulation on the other. Now that the increase in natural fertility is levelling off, it can be expected that the influence of regulation will become stronger.

Introduction

Much has been said (e.g. Srikantan 1977; Mauldin and Berelson 1978; Bulatao 1980) about the decline in fertility as being attributable to modernization. However, despite this emphasis, there is evidence that in some populations, the opposite association prevailed at the early stages of social and economic development (Jones 1977; Knodel 1977; Srinivasan and others 1978; Jejeebhoy 1980; Srinivasan and Jejeebhoy 1980), that is, fertility actually increases with modernization. It can be reasoned that improvements in living standards bring about improvements in nutrition, health and other factors. These factors of modernization may actually bring about a rise in fertility by removing the depressing effect of such physiological mechanisms as health and nutrition, and social mechanisms as lactation and abstinence practices that determine the level of natural fertility, or fertility in the absence of deliberate fertility regulation (Henry 1961).

The Philippines, a developing country in the Southeast Asian region, has had an experience of population growth which occured simultaneous with national development. The birth rate of 40-50 per thousand has been nearly constant for the past 70 years but the mortality level has declined from 23.5 per thousand in the 1930s to 14.5 in the late 1950s, to about 12 per thousand in 1970 (de Guzman 1977). It can be seen that in the process of modernization, the mortality transition is well on its way, but the fertility transition has not really followed. It is also noted that during this period, the average annual growth rate rose to the highest which is 3.05 percent, one of the highest rates of increase in the world, making the Philippines the 16th largest population in the world and ranking her 7th in Asia (Perez 1977). The extent of use of fertility regulation has been limited in the Philippines until after 1970 (Arat 1979), so that it may be said that fertility has been essentially natural. Thus, the Philippines provides an interesting location for the study of natural fertility.

The objectives of this paper are:

1. To examine the levels and patterns of fertility, by time and cross-section, with a view to analyzing the course of natural fertility during the process of such factors of modernization as improvement in health and nutrition, increase in education and others.

2. To suggest possible factors contributing to the observed trend in natural fertility.

Review of factors responsible for increasing natural fertility

The term "natural fertility" was introduced by Louis Henry (1961) and applies to marital

fertility which is fertility of couples in marriages or stable unions (for long term sexual unions whether or not "legally" married). It refers to fertility in the absence of any deliberate fertility regulation. It does not necessarily equal a biological maximum because it takes into consideration such factors (see Nag 1979 for a comprehensive review on this topic) as lactation and abstinence practices and other customs which may be undertaken in a society, but not with the expressed purpose of limiting fertility.

There is evidence that in several developed and currently less developed societies, fertility has actually increased in the course of modernization – England and Wales; Japan; the Cocos-Keeling Islanders of Australia; the Australian aborigines; the Kung bushmen of Africa, Rendille and Tikopia tribes in Kenya and the Yoruba of Nigeria (Potts and Selman 1979); James Bay Indians of Canada or the Canadian Eskimos (Romaniuk 1974); India (Srinivasan and others 1978; Srinivasan and Jejeebhoy 1980); Taiwan (Jejeebhoy 1980); and other societies (Malingreau 1978).

The main components of natural fertility are: 1) fecundability, 2) sterility in the form of post-partum amenorrhea, 3) intrauterine mortality, and 4) age at menarche and menopause. These components are affected by biological, environmental and cultural factors such as levels of health, disease and lactation, and intercourse taboos. The following section discusses theoretical evidence regarding the effects of health, nutrition, lactation and abstinence practices on natural fertility.

Health conditions in the form of diseases like venereal diseases, mumps, tuberculosis (Spring 1978; Potts and Selman 1979) and malaria (UN 1961; Gray 1974) have been shown to be positively related with infertility or subfecundity and foetal mortality. Improvements in health conditions have helped to decrease the wide incidence of such diseases. Secondly, improved nutrition affects natural fertility positively. Potts and Selman (1979) have observed that there is a critical weight at which menstruation ceases; in different societies where loss of weight is not self-inflicted but due to malnutrition, women may cease to menstruate and become infertile at times of hardship. Likewise, a woman must attain a certain body weight, and in particular, a certain level of fat stores, before pregnancy is possible. Bongaarts (1978) observed that well-nourished women have shorter periods of lactational sterility and lower foetal mortality than poorly nourished women.

Improved health and nutrition then affects natural fertility positively through four mechanisms: 1) by lowering the age at menarche and raising the age at menopause, 2) by regulating ovulatory cycles and therefore increasing fecundability, 3) by reducing the length of post-partum amenorrhea among lactating mothers and 4) by reducing foetal mortality. The incidence or length of lactation is known to have a positive relationship with postpartum amenorrhea and consequently a negative effect on natural fertility (Mosley 1978; Malingreau 1978). The incidence or length of lactation is primarily dictated by social and cultural factors. Changes from universal and prolonged lactation to infrequent or short period of lactation tend to increase natural fertility, thus re-establishing ovulation earlier, reducing the length of post-partum amenorrhea and the subsequent birth interval (Romaniuk 1974; Jain and others 1970; Knodel 1969).

Lastly, the breakdown of abstinence taboos, most commonly those related in the postpartum period tends to increase the frequency of intercourse which is another determinant in increasing fecundability (Malingreau 1978).

Natural fertility then, is affected by biological and socio-cultural factors which are themselves affected by background factors associated with modernization. Previous research suggests a positive relationship between factors affecting natural fertility and

secular changes observed among such factors associated with modernization as education, urbanization, income (Easterlin 1972; Jain and others 1970) and family nucleation (Nag 1967).

The above review of previous research in the area raises the hypothesis that as modernization in terms of education, labor force participation and so on, progresses it affects such factors as health, nutrition, lactation practices and intercourse taboos in a manner such that fecundability increases, the birth interval is shortened and natural fertility increases. The following sections discuss the trends in natural fertility and possible factors contributing to it, with reference to the Philippines.

Data and methodology

The data used in this analysis are drawn from the 1973 National Demographic Survey. Fertility information was collected in the form of pregnancy rosters which described the fertility history of women by listing their dates of birth and marriage and the type and date of all their pregnancy terminations in chronological order.

Based on this, data on age-specific marital fertility rates, both for the periods and birth cohorts under study were derived. Marital fertility schedules were taken for those points in time and those cohorts which provide complete (taken here as 20-44) fertility histories. It is to be noted that the marital fertility of the 15-19 age group have not been taken because Henry considered that premarital conceptions have a large and irregular effect on teenage marital fertility (Coale and Trussell 1974). Moreover, there are wide fluctuations because of the marriage patterns and the presence of adolescent sub-fecundity. The period analysis covers the following years: 1953-57, 1958-62, 1963-67 and 1968-72, whereas, the cohort analysis covers the birth cohorts of 1913-17, 1918-22, 1923-27, 1928-32, 1933-37 or those who were aged 55-59, 50-54, 45-49, 40-44 and 35-39, respectively, in 1973 at the time of the survey. The 1933-37 birth cohort, although not having complete fertility history, was considered for comparative purposes.

Being a retrospective survey, it may have event displacement as a limitation, which is frequently present in data subject to recall errors.

To determine the presence, absence and time sequence of control of fertility, the m(a) index of fertility regulation was calculated from the basic equation given by Coale and Trussell (1974):

$$m(a) = \ln \left[\frac{r(a)}{M \cdot n(a)} \right] \Big/ v(a) \quad \ldots\ldots\ldots (1)$$

where *a* stands for age, *n(a)* is the empirically derived standard natural fertility schedule (derived from 10 out of 13 populations described by Henry as having natural fertility): *M* is a scale factor equal to the ratio r(a)/n(a) at ages 20-24, and *v(a)* is an empirically derived function (derived from 43 marital fertility schedules) expressing the typical age pattern of voluntary control of fertility. The values of n(a) and v(a) given by Coale and Trussell (1975) are:

Age group	20-24	25-29	30-34	35-39	40-44
n(a)	0.460	0.431	0.395	0.322	0.167
v(a)	0.000	−0.279	−0.677	−1.042	−1.414

The index of fertility is based on the age structure of marital fertility schedules relative to that of the natural fertility schedule. The assumption is that the pattern of marital fertility will be essentially parallel to the standard natural fertility schedule (see also Knodel 1977) if deliberate fertility regulation is not practiced, or will deviate from natural fertility in a manner that increases with age according to a typical pattern. The value of m(a) is consequently independent of the level of fertility and is a function of the age structure of fertility. The ratio of marital

fertility rate in the observed population to the standard natural fertility rate for women aged 20-24 (M) is used as scale factor in the calculation of natural fertility. Taking age-specific marital fertility at 20-24 as essentially natural, this adjustment factor determines the level of fertility in the schedule to be examined.

Calculations were done for both period and cohort analysis. In order to represent the extent of fertility regulation for the population at a particular time period or birth cohort, the M(a)s for the different age groups were averaged (m). Standard deviations were also calculated.

The interpretation of m is as follows. If the age structure of fertility in the population conforms to the pattern in the standard natural fertility schedule, [n(a)], m(a) equals 0, and it is assumed that the schedule is entirely natural. If the age structure of fertility indicates declines with age which are slower than that observed in n(a), negative m(a)s result and may be interpreted as essentially natural. The greater the value of m(a), the greater is the deviation from natural fertility, implying greater use of regulation. The means and standard deviations of the m values give an idea of the level and uniformity of the levels of age-specific m(a)s. On the one hand, as far as the average level is concerned, values of m less than 0.2 are assumed to represent natural fertility conditions (Coale and Trussell 1978). In other words, if the population under examination tends to have greater than average age-specific sub-fecundity or secondary sterility, the resulting natural marital fertility schedule would decline more sharply with age than the standard natural fertility schedule. In this case, an $m(a) \leqslant 0.20$ is held to approximate natural fertility. On the other hand, the standard deviation will be low if the age-specific pattern is uniform; however, as in the case of several less developed countries, if the pattern of regulation is age-specific, the standard deviation will be high.

In assessing the patterns of the age-specific marital fertility curves, an index using the age specific marital fertility rate at 20-24 equal to 100 was also constructed.

In order to estimate the natural age-specific marital fertility schedules, it is necessary to adjust the fertility rates at those ages where the m(a) index reveals the presence of deliberate regulation. It is assumed that, at those ages where m(a) is less than or equal to 0.10, observed fertility equals natural fertility and no adjustments are made. However, at those ages where m(a) is greater than 0.10, the age specific marital fertility rate is calculated using the formula (Coale and Trussell 1974):

$$r(a) = M \cdot n(a) \cdot e^{m \cdot v(a)} \quad \ldots\ldots(2)$$

holding m constant at 0.10. The adjusted rates are held to approximate marital fertility in the absence of deliberate fertility regulation.

Evidence of increasing natural fertility

Results suggest an increase in natural fertility during modernization in the Philippines, both when successive period and cohort rates are presented. The following section analyzes trends in marital fertility schedules with respect to period and cohort data.

Period. The fertility experience of the Philippines at five points during the process of modernization covering almost 15 years, from 1953-57 to 1968-72, may be seen in Tables 1-4 and Figure 1. Table 1 presents age specific marital fertility rates for each time. Table 2 presents age specific values of the m(a) index of fertility regulation in order to examine the extent of deliberate fertility regulation. Table 3 presents indexed values of ASMF rates assuming fertility at ages 20-24 = 100 (see Knodel 1977). Finally, in Table 4, the estimated natural fertility schedules at each time are presented.

The m(a) index of fertility regulation shows that at all times except in 1968-72, age specific marital fertility has been essentially natural [m(a) $\leq$ 0.2]. For ages above 30, age specific marital fertility deviates from natural, indicating the increasing presence of deliberate fertility regulation. Considering m, it is found to have increased across the different points of time to indicate that regulation (abortion is not included because it is illegal in the Philippines and is not to be done under any exception – Tietze 1979) is taking place. It can be pointed out that, although the Philippine government's program on family planning officially started only in 1970, reflected in the increased regulation (excluding sterilization which was allowed as a family planning method only in 1972 – Arat 1979) for that time, participation of the private sector in this endeavor in 1960s was already present (Concepcion and Smith 1977).

With regard to the spread of fertility regulation, it can be noticed that it has first occurred in the older ages, as evidenced by the declines in their fertility rates and increases in their m(a) values: the 1953-57 period is essentially entirely natural with some slight indications of movement towards regulation at ages 30-39: the 1958-62 period depicts some amount of regulation after 35 years; the 1963-67 period shows regulation by age 30, and the period 1968-72 shows regulation by age 25. Correspondingly, the standard deviations reflect that the pattern of regulation across the periods is shifting from one which reflects age-specific regulation at older ages, and therefore relatively higher standard deviations, gradually to one in which regulation is practiced more uniformly, thus indicating lower standard deviations. Therefore, in these cases, it will be necessary to estimate natural fertility.

It is clear from Table 1 that fertility at the younger ages has increased somewhat over the four points under observation.

Table 1. *Observed Age-Specific Marital Fertility Rates (Period)*

Age Group	*Observed ASMFR* 1953-57	1958-62	*Percent Change*	1963-67	*Percent Change*	1968-72	*Percent Change*
20-24	.403	.428	6.20	.434	1.40	.443	2.07
25-29	.369	.384	4.07	.388	1.04	.378	−2.58
30-34	.309	.325	5.18	.314	−3.38	.307	−2.23
35-39	.243	.233	−4.11	.237	−1.71	.217	−8.44
40-44	.144	.117	−18.75	.110	−5.98	.108	−1.82
TMFR (20-44)	7.340	7.435	1.29	7.415	−0.27	7.265	−2.02

Source: Computed from UNESCAP, 1978:123.

At ages 20-24 which is generally accepted as a period of minimal use of deliberate fertility regulation (Coale and Trussell 1974; Knodel 1977), observed fertility has increased by 6.2 percent in the five-year period 1953-57 to 1958-62, and by 1.4 percent between 1958-62 and 1963-67 and 2.1 percent between 1963-67 to 1968-72, respectively. By the last period under observation, natural fertility at ages 20-24 had increased by 10 percent from 1953-58. The 25-29 years age group records a similar trend. The decline in fertility over time by 1963-67 and 1968-72 reflects a departure from natural fertility

towards some deliberate regulation. At each time thereafter, the effect of deliberate fertility regulation may be witnessed at the earlier age. As a result of increasing natural fertility on the one hand and increased deliberate fertility regulation on the other, it may be observed that total marital fertility remained basically unchanged between 1953-57 and 1968-72, ranging from 7.27 to 7.44 percent.

From the observed marital fertility rates up to age thirty, it may be seen that the largest increase in ASMF occurs during the 1950s decade which coincides with a period of improvements in general health, nutrition and living conditions in the Philippines.

Table 2. *Index of Fertility Regulation m(a) (Period)*

Age Group	*Years* 1953-57	1958-62	1963-67	1968-72
M=r(20-24)				
n(20-24)	.876	.930	.943	.963
(25-29)	.0821	.1537	.1663	.3352
(30-34)	.1671	.1809	.2523	.3166
(35-39)	.1431	.2408	.2378	.3426
(40-44)	.0112	.2003	.2538	.2816
$\bar{m}$	.1009	.1940	.2276	.3190
S.D.	.0603	.0312	.0356	.0227

Source: Computed from Table 1.

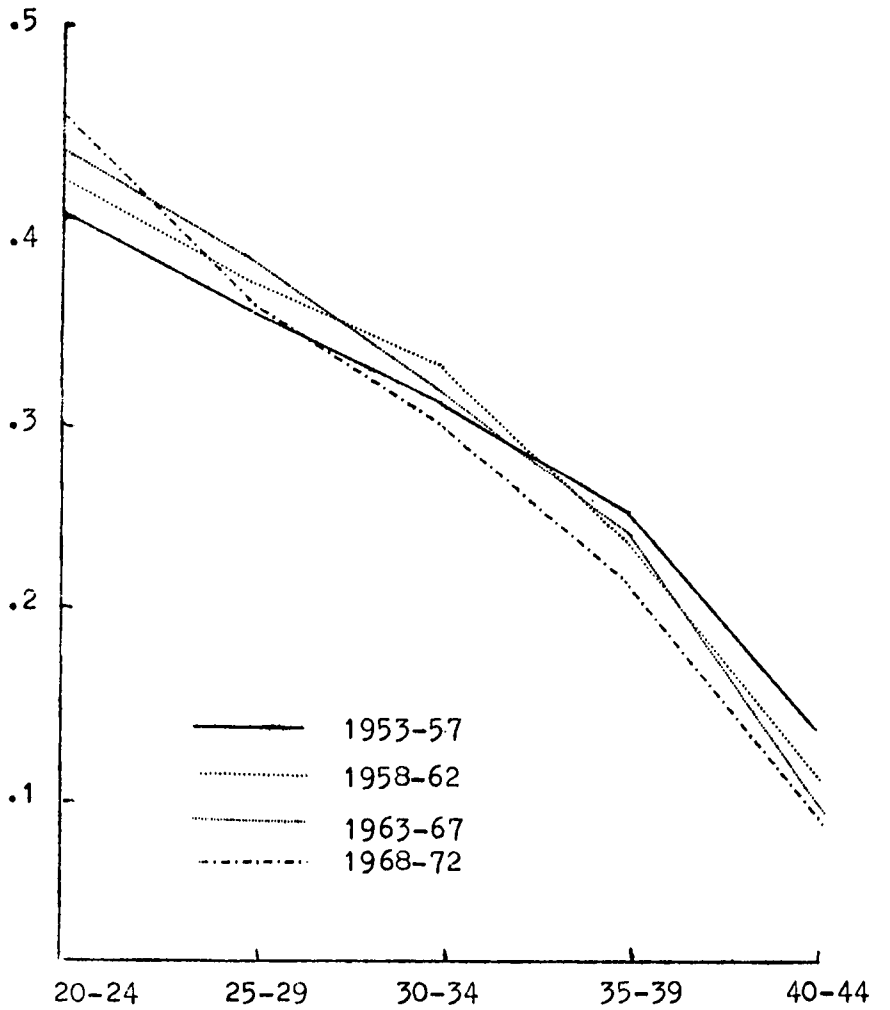
A look at Tables 1 and 2 suggests an increase over time in fertility rates at the younger ages. This trend is seen graphically in Figure 1a. Along with the increase in the level of natural fertility, the overall patterns of marital fertility are observed to be changing (Figure 1b). It is said (Knodel 1977) that the key feature of the age pattern of natural ASMFR is the rate at which marital fertility rates decline with age. When these rates are then plotted, the fertility curves are convex. Conversely, when fertility regulation is present, the curves become concave. Table 3 and Figures 1a and 1b show a similar tendency of the ASMF schedule to shift from convex to concave. It may be seen that at each age, the 1968-72 ASMF rates record a much steeper age specific decline in fertility, whereas the 1953-57 rates record the flattest decline. Clearly then, the pattern of fertility has shifted from one of entirely natural fertility progressively to one of some deliberate fertility regulation.

Table 3. *Index Values of ASMFR with the 20-24 Age Group Rate = 100*

Age Group	*Periods* 1953-57	1958-62	1963-67	1968-72
20-24	100.00	100.00	100.00	100.00
25-29	91.56	89.72	89.40	85.33
30-34	76.67	75.93	72.35	69.30
35-39	60.30	54.44	54.61	48.98
40-44	35.73	27.34	25.35	24.38

Source: Computed from Table 1.

Figure 1a. *Observed ASMFR curves (period).*



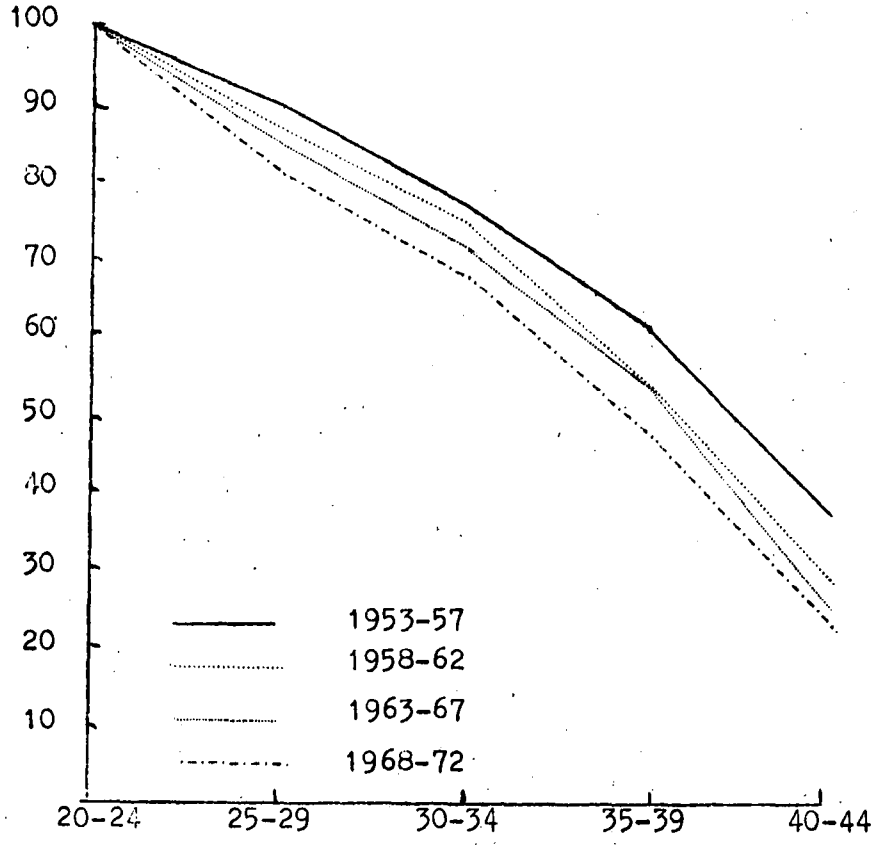
Source: Table 1.

Since at different points in time, the extent of deviation especially at the older ages, from natural fertility increases, it is necessary to adjust the observed age-specific marital fertility schedules in order to obtain natural marital fertility rates. The resulting natural fertility schedules are presented in Table 4.

The trend of increasing fertility seen at the earlier ages is now observed at all ages. The magnitudes of the changes are similar to those observed from Table 1 for the younger ages. The implied total marital fertility rate increases systematically between 1953-57 and 1968-72, though the majority of the increase is recorded by 1960. For instance, between 1953-57 to 1958-62; natural fertility increased by 4.9 percent. In the following two intervals, in contrast, the recorded increase was 1.4 percent and 2.0 percent. Altogether, the increase in natural fertility between 1953-57 and 1968-72 was 8.5 percent.

Briefly, this section reveals the following results in terms of period fertility:

Figure 1b. *Patterns of ASMFR using index values (period)*



Source: Table 3.

Table 4. *Natural ASMF Schedule*

Age Group	*Natural ASMFRs (Period)*			
	1953-57	*1958-62*	*1963-67*	*1968-72*
20-24	.403	.428	.434	.443
25-29	.369	.390	.395	.404
30-34	.323	.343	.348	.355
35-39	.254	.270	.274	.279
40-44	.144	.135	.137	.139
TMFR				
20-44	7.465	7.830	7.940	8.10
(Percent change)		(4.89)	(1.40)	(2.00)

Source: Computed (underlined figures represent adjustments of Table 1).

1. the level of natural fertility has clearly increased over the 15-year period by about 10 percent, the bulk of the increase occurring in the 1950s decade.

2. the pattern of fertility reveals a shift from essentially natural to somewhat regulated, thereby providing for a pattern of change which is not uniform: increasing at younger ages and decreasing at older ages due to regulation.

3. appears that the relative stability in the observed TMFRs reveal the cancelling out effects of an increase in natural fertility accompanied by an increase in regulation at each time.

Cohort. The fertility experience of five cohorts of women born in the year 1913-17, 1918-22, 1923-27, 1928-32 and 1933-37 before and during the process of modernization, covering 20 years, may be seen in Tables 5-8 and Figure 2. Table 5 presents observed ASMFR for each cohort. Table 6 presents age-specific values of the m(a) index of fertility regulation. Table 7 presents the indexed values of the ASMFR rates, assuming fertility at ages 20-24=100. In Table 8, the estimated natural fertility schedules for each cohort are presented.

It is to be noted that the first three cohorts, 1913-17, 1918-22, 1923-27 were affected by the Second World War. Whereas the cohort of 1913-17 was aged 25-34, the 1918-22 cohort was aged 20-29 and the 1923-27 cohort was 20-24 during the years. Correspondingly, it is observed that marital fertility at those ages is somewhat depressed, since these cohorts were affected for the most part during the peak reproductive ages.

Table 5. *Observed Age Specific Marital Fertility Rates (Cohort)*

Year of Birth	OBSERVED ASMFR								
	1913-17	*1918-22*	*Percent Change*	*1923-27*	*Percent Change*	*1928-32*	*Percent Change*	*1933-37*	*Percent Change*
Age of Mother at time of survey	(55-59)		(50-54)		(45-49)		(40-44)		(35-39)
Age Group									
20-24	.365	.344[a]	−5.75	.332[a]	−3.49	.381	14.76	.403	5.77
25-29	.324[a]	.315[a]	−2.78	.332	5.40	.369	11.14	.384	4.52
30-34	.258[a]	.307	18.99	.309	0.65	.325	5.18	.314	−3.38
35-39	.254	.243	−4.33	.233	−4.11	.237	1.72	.217	−5.48
40-44	.144	.117	−18.75	.110	−5.98	.108	−1.82	n.a.	–
TMFR									
20-44	6.725	6.630	−1.4	6.580	−0.75	7.100	7.90	–	

[a]World War II Years; n.a. – not available
Source: Computed from UNESCAP, 1978:123.

The m(a) indices of fertility regulation, as well as m, show that all cohorts have been experiencing essentially natural fertility [m(a) $\leqslant$ 0.2]. However, the depressing effect of the war on fertility is observed for the 1913-17 cohort at ages 25-29 and 30-34, where m(a) rises to 0.19 and 0.29 respectively. Similarly, among the next two cohorts, the depressing effect of the war on fertility severely disturbs fertility at ages 20-24, which, through M, is held to determine the level of natural fertility (Coale and Trussell 1974). On the other hand, the youngest cohort, 1933-37 experiences some fertility regulation by ages

Table 6. *Index of Fertility Regulation m(a) (Cohort)*

	Birth Cohorts				
Age group	1913-17	1918-22	1923-27	1928-32	1933-37
$M=\frac{r(20\text{-}24)}{n(20\text{-}24)}$	.793	.748[a]	.722[a]	.828	.876
25-29	.1915[a]	.0830[a]	−.2321	−.1199	−.0607
30-34	.2865[a]	−.0567	−.1184	.0093	.1434
35-39	.0050	−.0085	−.0021	.1130	.2517
40-44	−.0592	.0463	.0649	.1747	n.a.
$\bar{m}$	.1060	.0160	−.0719	.0443	.1115
S.D.	.1390	.0531	.1134	.1117	.1299

Source: Computed from Table 5, same footnote.

35-39, which is similar to the pattern obtained from the period analysis. This increase in regulation has occurred in the period 1968-72, during which the family planning program gained momentum. The fluctuating standard deviations among the first three cohorts may be attributed to the disturbing age-specific effect of the war on fertility. The high standard deviations among the cohorts undisturbed by the war reflect the typical patterns of regulation at early stages of the fertility transition namely, a tendency to regulate at ages above 30.

Table 5 suggests a trend of increasing natural fertility over time, at each age, ignoring for the depressing effect of war on fertility. Thus, for instance, a look at changes in cohort fertility at ages 20-24, reveals a decline of 5.8 percent and 3.5 percent between the experiences of the 1913-17 to 1918-22, and 1918-22 to 1923-27 cohorts, respectively. If the war-affected years are ignored, changes in fertility may be examined for the cohorts under stable political conditions. At ages 20-24, fertility has increased by 4.4 percent and 10.4 percent between the experiences of the cohorts of 1913-17 and the cohorts of 1928-32, and 1933-37 respectively. At ages 25-29, ignoring the first two cohorts who were affected by the war, fertility increased by 11 percent between the experiences of the 1923-27 and 1928-32 cohorts, and another 4.5 percent between the 1928-32 and 1933-37 cohorts. A similar result is observed at ages 30-34. Nevertheless, by the older ages 30-44 some evidence of declining fertility is observed which may be due to the increased use of regulation as measured by the m(a) index.

The effects of the war are also seen when TMFR of the different cohorts are compared. There is a decrease of 1.4 percent when comparing the 1913-17 cohort with the 1918-22 and a decrease of 0.8 percent when the latter cohort was compared with the 1923-27. Inspite of this decrease, TMFR increased by 7.9 percent between the 2 younger cohorts and across the 20-year period presumably because of increased natural fertility. On the other hand, TMFR between the experiences of the 1913-17 and 1928-32 cohorts has increased by 5.3 percent reflecting the presence of the war in the earlier cohort and increased regulation at the latter. The age specific increases in observed marital fertility rates, record high increases during the 1950s decade after the war when national development was taking place. This supports the findings of the period analysis wherein the increases in ASMF coincided with improvement in living standards in the Philippines.

A look at Tables 5, 6 and 7 suggests an increase in natural fertility although age specific increases are not uniform.

This trend is seen graphically in Figures 2a and 2b. It may also be seen that steeper declines in fertility are observed among the youngest 2 cohorts while flatter declines are observed in the earlier cohorts. The oldest two cohorts indicate as expected, irregular pattern of fertility, due to the effect of the war. Thereafter, each successive cohort shifts from a convex to a concave pattern of fertility, attributable as in the period analysis, to increased use of deliberate fertility regulation.

Table 7: *Index Values of ASMFR with the 20-24 Age Group Rate = 100*

Age Group of mother at birth event	*Birth Cohorts*				
	1913-17	*1918-22*	*1923-27*	*1928-32*	*1933-37*
20-24	100.00	100.00	100.00	100.00	100.00
25-29	88.77	91.57	100.00	96.85	95.29
30-34	70.68	89.24	93.07	85.30	77.92
35-39	69.59	70.64	70.18	62.20	53.85
40-44	39.45	34.01	33.13	28.35	–

Source: Computed from Table 5.

Natural age specific marital fertility schedules are presented in Table 8, assuming that m = 0.10, as in the case of the period analysis. The estimated natural total marital fertility tends to increase if the cohorts heavily affected by the war are ignored.

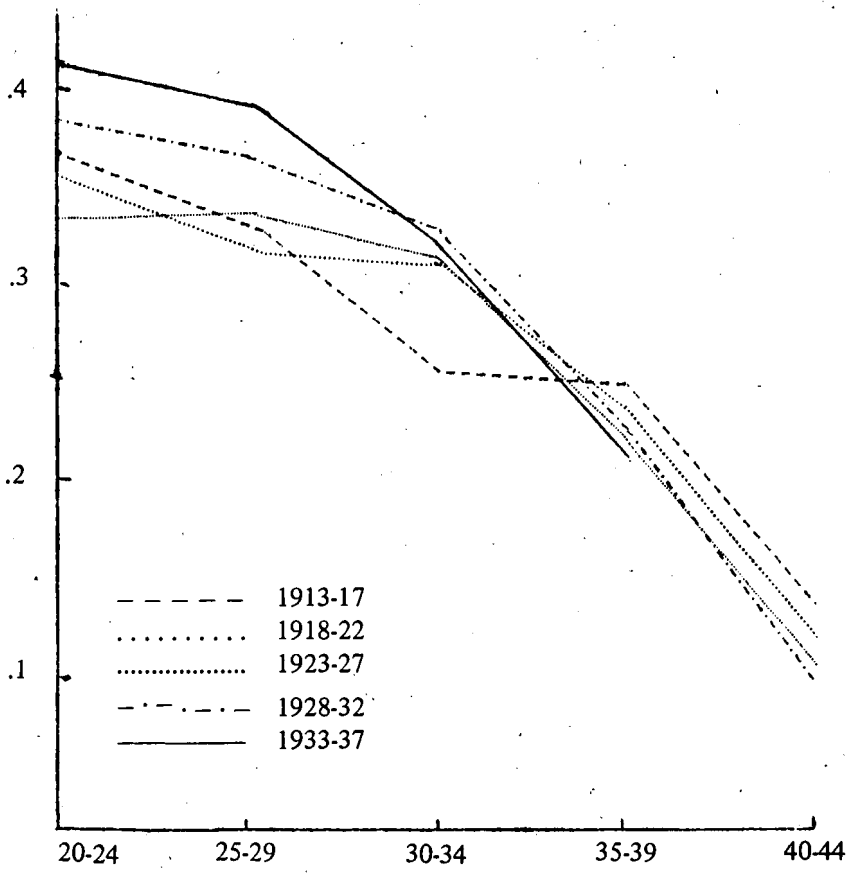
The effects of the war years are still indicated by the decrease of 4.5 percent in TMFR between the 1913-17 cohort (not affected by war) and the 1918-22 cohort (affected by war) and a decline of 0.8 percent between the 1918-22 and 1923-27 cohorts (affected by war). However, 9.1 percent increase is observed between the 1923-27 cohort (affected by the war) and the 1928-32 cohort which was not affected by the war. A 3.9 percent increase in TMFR was observed

Table 8: *Natural ASMF Schedule*

Age Group	*Natural ASMFRs (Cohort)*				
	1913-17	*1918-22*	*1923-27*	*1928-32*	*1933-37*
20-24	.365	.344	.332	.381	.403
25-29	.332	.315	.332	.369	.384
30-34	.293	.307	.309	.325	.323
35-39	.254	.243	.233	.240	.254
40-44	.144	.117	.110	.120	.127
TMFR (40-44)	6.94	6.63	6.58	7.17	7.457
% change		(–4.47)	(–0.75)	(9.07)	(3.91)

Source: Computed (underlined figures represent adjustments of Table 5).

Figure 2a. *Observed ASMFR Curves (Cohort)*



Source: Table 5.

between the 2 postwar cohorts. Overall, the experiences of the 1913-17 and the 1933-37 cohorts record an increase in natural fertility of 7.5 percent.

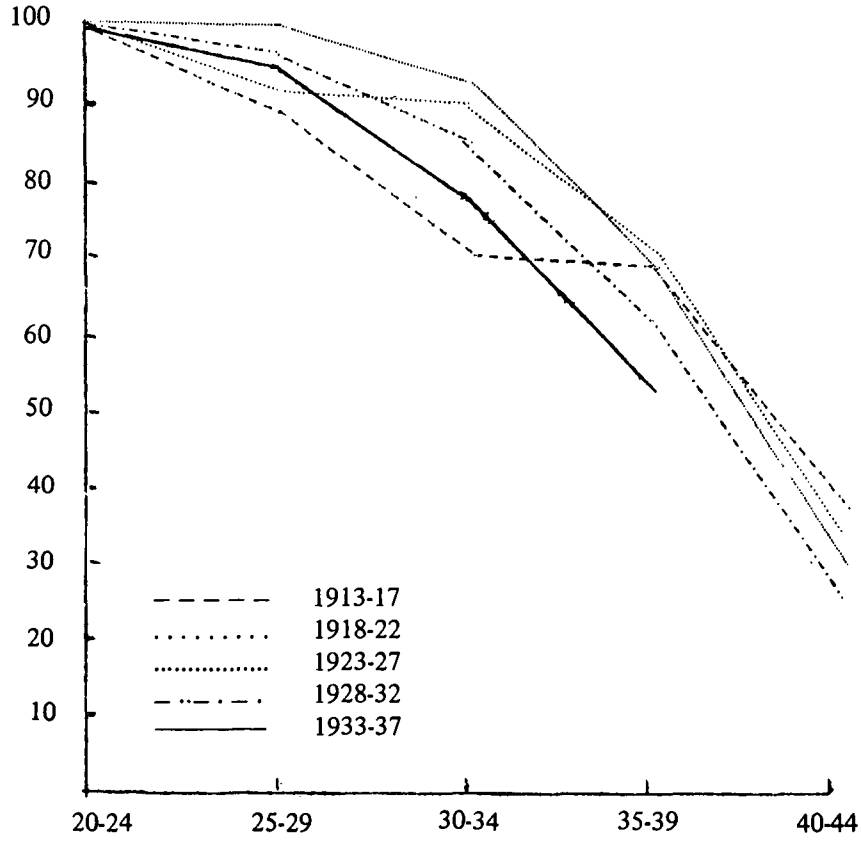
It must be mentioned that the effect of the war has somewhat confounded the analysis of cohort trends in natural fertility, since it is not possible to present a time trend of undisturbed changes in cohort natural fertility. Results then may be interpreted cautiously. This section has revealed the following points regarding cohort natural fertility in the Philippines:

1. The cohorts have essentially experienced natural marital fertility. It is only among the youngest cohorts that regulation occurs in a limited manner.

2. The level of natural total marital fertility has increased by about 7.5 percent over the 20-year period. Similarly, observed fertility at younger ages has increased systematically, suggesting real increases in the level of natural fertility. The bulk of increase occurs during the postwar years which supports the findings in period analysis, that the increase occured mainly in the 1950s decade.

3. Inspite of fluctuations and little observed regulation, there is evidence of a shift from a convex to concave age pattern of fertility.

Figure 2b. *Patterns of ASMFR Using Index Values (Cohort)*



Source: Table 7.

Factors responsible for increasing natural fertility in the Philippines

It has been shown earlier that several factors like health, nutrition, lactation and abstinence practices affect natural fertility. During the course of modernization in terms of increasing educational levels and labor participation, urbanization, family nucleation and generally increasing living standards, these factors determine natural fertility to a large extent.

This section contains data on the immediate and background factors which raise the level of natural fertility observed in the Philippines.

Health conditions are very important factors which heavily affect natural fertility. Table 9 presents changes in the conditions related to health.

It can be seen that steadily improving health conditions in terms of infant mortality rate, $e^{o}_{o'}$ and foetal losses have been experienced by the Philippines. With regard to morbidity, a disease known to be associated with sterility is malaria. The mortality rates which show the state of health on malaria also reflect a decline.

In the absence of direct data, nutrition can be assessed indirectly by consumption and less

Table 9: *Health Conditions, Philippines: 1948, 1960 and 1970*

Year	IMR[a]		Expectation of Life				Still Births		Malaria[g]	
	Rate	Percent Change	Males	Percent Change	Females	Percent Change	Rate	Percent Completeness	Death Rate	Percent Change
1948	125.5		48.8[b]		53.3		14.6[d]	66.0	11.8[h]	
1960	84.3	−32.8	–		–		14.5[e]	84.0	5.0	57.6
1970	67.3	−20.2	57.1[c]	18.2	60.9	14.2	14.0[f]	93.0	1.8	64.0

Sources: a (UNESCAP 1973) b (for 1946-49, UN 1970) c (for 1970-75, Gonzalez and others 1979) d (rate for 1951, UN 1953) e (rate for 1959, UN 1963) f (rate for 1962, UN 1965) g (de Guzman 1977) h (rate for 1946).

precisely by measuring production and the flow of food stuffs at the level of the over all population (Centrelle and Ferry 1978). For the Philippine situation, consumption is depicted in the daily calories intake: 1,908 calories in 1961-65 and 1,947 calories in 1966-67 (Iio and others 1979). Though this is a slow increase, it nevertheless shows an improvement in the average daily food intake. Rice, which is the staple food, has been seen to be sufficiently increasing by looking at the percentage growth of rice production in the provinces which belong to the main rice producing areas (there was 136.19 percent growth in rice production comparing 1948 with 1960 – UNESCAP 1975). There was also an increase in the annual availability of all cereals (in 000 metric tons) from 4,565 in 1961-65 to 6,155 in 1970-72 (Iio and others 1979). By considering the food consumption, production and flow of foodstuffs as proxies for nutrition it can be hypothesized that nutrition has improved in the Philippines and has helped in increasing natural fertility.

The incidence of breast feeding behaviour in the Philippines is decreasing. Osteria (1978) in her urban study found out that there has been a shift from breast feeding to mixed and bottlefeeding (see Table 10).

Ginneken (1978) in his study of low income countries, has found out that in the Philippines, the mean duration of lactation (for women whose children were weaned) was

Table 10: *Changes in infant feeding patterns (in percent)*

Type of Feeding	1958	1974
Breast	64.2	26.5
Mixed	12.7	44.1
Bottle	23.1	29.4

Source: Osteria 1978.

10 months. Further, post partum amenorrhea was for only 6 months (Ginneken 1979). In this latter study, he also found out that lactating women had 24 months of birth interval as compared to 16 months for non-lactating ones. The decline in breastfeeding (Popkin 1978 in his study of a rural area in the Philippines) has occurred concurrently with vast social and economic changes in the status of women, household size and income, wage rates, food prices, and even the nature of the work undertaken by the women. Osteria (1978) and Ginneken (1978) have observed that incidence and duration of breastfeeding has decreased due to a number of modernization processes: (a) exposure of mothers to highly commercialized milk substitutes brought about by improved food and dairy industry technology, widespread use of advertising and sales promotion techniques, and negative attitudes of medical personnel towards breastfeeding, and (b) employment outside the home.

Summarizing the findings in the studies: breastfeeding is less common and practiced for shorter periods of time in urban areas, among younger women, among women with higher levels of education and among women who were employed and need to return to their jobs soon after delivery.

All of the above have pointed out changes in lactation practices among Filipino women. There is strong evidence then, that this mechanism has affected the trend of increasing levels of natural fertility in the Philippines.

With regard to abstinence practices, unfortunately, there is little evidence regarding either the existence or the breakdown of those taboos in the Philippines.

The changes in the above factors have occurred in the course of modernization. Table 11 shows some indicators of modernization which have affected the factors which have contributed to the increase in the levels of natural fertility. Though there is little direct data available, there appears to be a positive association between these aggregate social and economic indicators associated with modernization and natural fertility. The table shows that urbanization (Pernia 1976), non-agricultural labor force participation (Hicks and McNicoll 1968; ILO 1969) and especially literacy rates (UNESCAP 1978) as well as the GNP index (ADB 1969) have increased systematically during the approximate period under observation. Similarly family nucleation, a social factor, is shown to have occurred. Osteria (1978) and Ginneken (1979) found out that this factor affects lactational practices. Among nuclear families, they noted the inadequate socialization in nursing techniques, due to the absence of relatives who have had experience with nursing. As far as Philippine conditions are concerned, the nuclear family as an individual economic and emotional unit appears to have been common in the Philippines since 1950, at least (Madigan 1977). Supportive to this is the finding of Concepcion and others (1975) that women residing in nuclear households reported more children on the average, than their counterparts living in extended households.

In short, increases in these factors are argued to bring about on the one hand, corresponding improvements in sanitation, health and living conditions, thereby resulting in increased natural fertility (Easterlin 1972). On the other hand, they are held to bring about behavioural changes in lactation such that natural fertility will be positively affected (Ginneken 1979).

Table 11. *Some Indicators of Modernization (Philippines)*

	Literacy[a]					*Labor Force*[g]	
Year	*Both sexes*	*Male*	*Female*	*Urbanization*[b] *(%)*	*GNP Index*[c] *1961=100 constant 1955 prices*	*Modern*[h] *Sector*	*Female*[h] *participation Modern Sector*
1948	59.8	62.8	56.9	27.0	49.9[d]	–	–
1960	72.0	73.6	70.6	29.8	73.6[e]	39.8	64.96
1970	83.4	84.6	82.2	32.9	147.7[f]	44.4*	66.05**

Sources: a (UNESCAP 1978) b (Pernia 1976) c (Asian Development Bank 1969) d (for 1950) e (for 1955) f (for 1968) g (Hicks and McNicoll 1968) * (for 1965) h (ILO 1966) ** (for 1966).

Conclusion

This study reveals that, for the most part, there has been a consistent increase in observed marital fertility for the younger ages 20-29. When natural marital fertility schedules are estimated, it is clear that there has been a consistent increase in the level of natural fertility. Simultaneously, there has been a trend for the ASMF curves to shift from convex to concave that is, each successive cohort or period schedule exhibits higher marital fertility than the previous one at the younger ages, and lower natural fertility at the older ages. Consequently, at each time the age specific curve becomes steeper.

These changes have occurred primarily in the 1950s decade when considerable changes in socio-economic conditions took place; the rate of change in natural fertility has slowed down since then, while the rate of increase in regulation has gone up. Indirect evidence supports the hypothesis that such immediate factors as health, nutrition and lactation practices as well as such background modernization indicators as education, labor force, urbanization, family nucleation and GNP have changed simultaneously with, and may have contributed to, the observed increase in natural fertility.

One reason then that the Philippines has exhibited a constant level of fertility may be a result of the mutually cancelling out effects of increased natural fertility on the one hand and increased use of regulation on the other. Now that the increase in natural fertility is levelling off, it can be expected that the influence of regulation will become stronger.

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