

FERTILITY

Chapter 5. Fertility

Analysis of fertility trends in the Pacific has never been abundant, and the Northern Mariana Islands is no exception. Although the Northern Mariana Islands has had regular censuses, and a great deal of information has been collected, there has been no systematic look at the fertility trends until recently (Levin and Retherford 1986).

The data on children ever born were derived from the answers to question 21a, which was asked of women 15 years old and over, regardless of marital status. Still-births, stepchildren, and adopted children were excluded. Ever-married women were instructed to include all children born to them before and during their most recent marriage, children no longer living, and children away from home, as well as children who were still at home. Never-married women were instructed to include all children born to them. Data on children ever born reported by never-married women should be viewed with caution because of the very high rates of nonresponse to the question and the anticipated underreporting of live births to these women.

In the 1980 census, a terminal category of "15 or more" was used for recording the number of children ever born. For purposes of computing the total number of children ever born, the terminal category was given a mean value of 15.

The data on the number of children still living were derived from answers to question 21b, which was asked of all women 15 years old and over who reported having had at least one child ever born in question 21a. For the purposes of computing the total number of children still living, the terminal category "15 or more" was given a mean value of 15. In addition, all women 15 years old and over who reported having had a child were also asked in question 21c if any children were born since April 1, 1979. Although the data were collected for women past age 50, subsequent editing procedures only accepted a "Yes" response for women 15 to 50 years old. Neither of these two questions had been asked in prior decennial censuses.

In 1980, there were 2161 children ever born for every 1000 women in the CNMI, and 2858 children still living per 1000 women; another way of stating this is that the average woman had had 3.1 children ever born, and 2.9 still alive (Table 5.1). Until the 55 to 59 year age group, there was a direct correlation between age and number of children ever born, that is, the older the age group of women, the higher the fertility. Of course, many of the young women had not finished their fertility, and, in the case of the 15 to 19 year old women, many had not even started having children.

For those women who had probably completed their fertility, there is evidence of a fertility decline. Women in the 35 to 44 year old age group had 5211 children per 1000 women, compared to 6751 for women 45 to 54 and 7215 for women 55 to 59. So, 55 to 59 year old women had had an average of about 7.2 children ever born, while those 45 to 54 had 6.7, and the 35 to 44 aged women had 5.2, still large numbers, but a decrease of an average of 2 children per woman. Older women had fewer children ever born, which was probably due to higher mortality earlier in the century and forgetting :

Table 5.1 . Children Ever Born, Still Alive, and Children Born in the Last Year: 1980

Age Group	Females	Numbers			Per 1000 Women		
		Children Ever Born	Children Still Alive	Births Previous Year	Children Ever Born	Children Still Alive	Births Previous Year
		Total.....	4591	14510	13122	...	3161
15 to 19 yrs.	861	152	148	47	177	172	55
20 to 24 yrs.	803	940	906	167	1171	1128	208
25 to 29 yrs.	710	1581	1491	145	2227	2100	204
30 to 34 yrs.	560	1892	1819	97	3379	3248	173
35 to 44 yrs.	648	3377	3210	59	5211	4954	91
45 to 54 yrs.	437	2950	2717	...	6751	6217	...
55 to 59 yrs.	163	1176	1021	...	7215	6264	...
60 to 64 yrs.	142	865	690	...	6092	4859	...
65 + yrs.....	267	1577	1120	...	5906	4195	...

Source: PC80-1-C/D57A, Table 19

The fertility of women born in the Northern Mariana Islands was higher than for women born elsewhere (Table 5.2). Although all women had 2217 per 1000 children ever born in 1980, women born in the CNMI had 2407 per 1000 compared to 1868 for women born outside the CNMI. The data for children still alive and children born in the year before the census followed the same trend.

Table 5.2. Children Ever Born, Surviving, Last Year by Birthplace of Mother: 1980

Fertility	Numbers			Per 1000 Women		
	Total	Born in CNMI	Not Born in CNMI	Total	Born in CNMI	Not Born in CNMI
		Females, 15 to 44.....	3582		2321	1261
Children ever born.....	7942	5587	2355	2217	2407	1868
Children still alive.....	7574	5302	2272	2114	2284	1802
Birth in year preceding census.	515	360	155	144	155	123.

Source: PC80-1-C/D57A, Table 24

Also, women who were not in the labor force in 1980 had higher fertility than women who were in the labor force (Table 5.3). Of course, some of the women who were not in the labor force may not have been in the labor force since they were having children, and caring for them while they were young. For females 16 years and over, there were 2338 children ever born per 1000 women. Women in the labor force had 2198 children ever born per 1000 women, compared to 2504 per 1000 for women not in the labor force. Although there

since they were having children, and caring for them while they were young. For females 16 years and over, there were 2338 children ever born per 1000 women. Women in the labor force had 2198 children ever born per 1000 women, compared to 2504 per 1000 for women not in the labor force. Although there were very few unemployed women, they tended to have lower fertility than employed women.

Table 5.3. Children Ever Born, Surviving, Last Year by Labor Force Participation: 1980

Labor Force Participation	Fe- males	Numbers			Per 1000 Women		
		Chldrn Ever Born	Chldrn Still Alive	Born Last Year	Chldrn Ever Born	Chldrn Still Alive	Born Last Year
Females, 16+ yrs.....	3393	7934	7567	514	2338	2230	151
In Labor Force.....	1838	4040	3873	256	2198	2107	139
Employed.....	1788	3946	3782	243	2208	2116	139
Unemployed.....	51	94	91	13	1784	1588	255
Not in Labor Force.....	1555	3894	3694	258	2504	2376	166

Source: PC80-1-C/D57A, Table 36

Table 5.4 shows comparative fertility data for the 1973 Trust Territory of the Pacific Islands for the CNMI, and the 1980 census. The ratios are expressed in children per woman rather than children per 1000 women. Although we are not looking at changing cohort fertility, a look at fertility by age group in the censuses is revealing. For example, the number of children ever born for females 30 to 34 decreased from 4.0 to 3.4 during the 7 years. More impressive, the number of children ever born for women aged 35 to 39 decreased from 6.3 in 1973 to 4.5 in 1980, a decrease of 1.8 children per woman during the period, evidence of a fertility decline.

The percentage of children surviving of children ever born increased from 95.6 percent to 97.4 percent during the 7 year period, indicating some mortality decline as well. Since larger percentages of older women have more children surviving, the mortality decline is probably for all ages (see Chapter 6).

Table 5.4. Children Ever Born and Children Surviving: 1973 and 1980

Age Group	1980						1973					
	Fe- males	CEB	CS	CEB/ Fmle	CS/ Fmle	Pnct CS	Fe- males	CEB	CS	CEB/ Fmle	CS/ Fmle	Pnct CS
15 to 19 yrs.	861	152	148	.2	.2	97.4	860	160	153	.2	.2	95.6
20 to 24 yrs.	803	940	906	1.2	1.1	96.4	667	865	822	1.3	1.2	95.0
25 to 29 yrs.	710	1581	1491	2.2	2.1	94.3	447	1214	1138	2.7	2.5	93.7
30 to 34 yrs.	560	1892	1819	3.4	3.2	96.1	304	1210	1123	4.0	3.7	92.8
35 to 39 yrs.	344	1557	1487	4.5	4.3	95.5	298	1868	1715	6.3	5.8	91.8
40 to 44 yrs.	304	1824	1726	6.0	5.7	94.6	241	1674	1519	6.9	6.3	90.7
45 to 49 yrs.	256	1669	1526	6.5	6.0	91.4	173	1240	1044	7.2	6.0	84.2
50 to 54 yrs.	181	1281	1191	7.1	6.6	93.0	189	1435	1142	7.6	6.0	79.6
55 to 59 yrs.	163	1176	1021	7.2	6.3	86.8	172	1131	797	6.6	4.6	70.5
60 yrs & over	407	2442	1810	6.0	4.4	74.1	336	2062	1287	6.1	3.8	62.4

Source: 1980 Summary Tape File 3, Table 31, and 1973 TTPI census

OWN CHILDREN FERTILITY ESTIMATION

Because census data for the Northern Mariana Islands are collected by household, and the own children method of fertility has been readily available in the Pacific, this method has been used to investigate changing fertility trends in the Northern Mariana Islands. Other demographic estimation techniques are included where appropriate.

The own children method has been described in earlier publications and needs only to be recapitulated briefly here. (For more detailed accounts, see, for example, Cho 1973, Retherford and Cho 1978, and Cho, Retherford, and Choe 1987; the current version of the own children computer programs uses formulas given in these sources.) The method is a census- or survey-based reverse survival technique for estimating age-specific birth rates for years previous to a census or household survey. Two different methods have been used here to match mothers and children within households as a first step in the fertility analysis. For 1973, enumerated children were first matched to their mothers within households on the basis of responses to questions on age, sex, marital status, relationship to householder, and number of children still living. For 1980, however, matching was based on a special question on mother's line number or person number on the household schedule, if the mother was present.

The matched (i.e. own) children, classified by child's age and mother's age, are reverse-survived to estimate numbers of births by age of mother in previous years. Reverse survival is also used to estimate numbers of women in previous years. Since there are no post-enumeration surveys in the American Pacific and no independent estimates of the population exist, no adjustments are made for underenumeration. After adjustments are made for unmatched (non-own) children, age specific birth rates are calculated by dividing the number of births by the number of women. Estimates are computed for each previous year or group of years back to fifteen years before the census. Estimates are not computed further back than 15 years because births must then be based on children at ages 15 or older at enumeration, a large proportion of whom do not reside in the same household as their mother and hence cannot be matched. All calculations are done initially by single years of age and time (years before the census). Estimates for groups of ages or groups of calendar years are obtained by appropriately aggregating numerators and denominators of single-year rates and then dividing the aggregated numerator by the aggregated denominator. For reasons of economy, the method is usually applied to census samples rather than complete counts, but because the population of the Northern Mariana Islands is so small, the complete counts were used.

Non-own (unmatched) children are allocated to mothers by multiplying each age-specific category of own (matched) children, specified by mother's age, by the corresponding age-specific ratio of all children to own children. Thus the number of own children at a given age is adjusted upward by the same factor regardless of mother's age, thereby introducing some error in the fertility estimates since the proportionate distribution of non-own children by age of mother generally differs somewhat from the proportionate distribution of own children by age of mother. It is, of course, impossible to specify non-own adjustment factors by mother's age since the mother of an unmatched child is by definition not in the household. Since older women are usually in more stable household situations than younger women, the nature of

the error from not specifying non-own adjustment factors by mother's age is usually to reallocate erroneously a certain proportion of non-own children of a given age from younger mothers to older mothers. This error, if present here, should have little effect on the total fertility rate, but it produces an age pattern of fertility that is too low at the younger ages and too high at the older ages. The error is minor if the adjustment factors for non-own children are low, but sometimes these factors can be quite high.

The non-own factors for the 1973 and 1980 censuses of the CNMI are shown in table 5.5. As noted earlier, household relationship was used to match mothers and children from the 1973 census, while the mother's person number was used to match mothers and children in 1980. The mother's person number is useful in matching where households are large and complex and non-own proportions are large (as is true for the CNMI), and usually results in a slight improvement in the accuracy of the fertility estimates (Levin and Retherford 1982).

Table 5.5. Percentage of Non-own children by age: 1973 and 1980

Census Year	Age of Child														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1973.....	8	8	11	12	14	13	13	12	11	13	12	14	14	17	20
1980.....	6	9	7	5	10	9	11	12	13	13	14	15	13	17	16

Source: Levin and Retherford, 1986

Reverse-survival requires life tables. For both the 1973 and the 1980 censuses, life tables were obtained through the use of census questions on number of children ever born and number of children still alive. By means of a method developed by Brass (1975), this child survivorship information was used to obtain estimates of child mortality that were in turn matched to the appropriate level of the Coale-Demeny Model West life table family (Coale and Demeny 1966). (The procedure for obtaining the usual Brass estimates and matching them to Coale-Demeny model life tables is built into the own-children computing package and was used here; see Midkiff and Choe 1978.) The level obtained in this way specified life tables that were then used to derive reverse-survival ratios (for details, Retherford and Cho 1978).

For the estimates derived for our fertility analysis, we have assumed constant mortality throughout the 15 year period in each case. The mortality estimates could be too low (see Chapter 6 on mortality), with life expectancy too high, because of a tendency for respondents to selectively omit mention of dead children when responding to the child survivorship questions. If such omissions occur, the reverse-survival factors for children would tend to be too low, and the own-children fertility estimates would tend to be biased downward. But at prevailing mortality levels (life expectancy of 67.1 years

at birth for females for 1973 and 68.6 years for 1980), the reverse-survival factors are already close to one and should be insensitive to errors of even several years of life expectancy. Retherford, Chamratithirong, and Wanglee (1980), for example, found that in Thailand, with an average life expectancy of around 60 years, a mortality estimation error as high as 16 years of life expectancy generated fertility estimation errors of 8 percent or less.

Own-children estimates of age-specific marital birth rates were obtained in the following way: First, age-specific proportions currently married in five-year age groups were obtained from the 1967, 1973 and 1980 censuses and linearly interpolated between the censuses to get age-specific proportions currently married in five-year age groups in each intercensal year. For the early years, estimated from the 1973 census, the trend lines for age-specific proportions married were extrapolated backward in time from 1973 to 1967 and on back. In this way we obtained an array of age-specific proportions currently married, with age in five-year age groups along one dimension, and time in single calendar years (or midpoints of time periods) along the other dimension. The original own-children analysis provided a corresponding array of age-specific birth rates for all women. From these two matrices we obtained a third array of age-specific marital birth rates by dividing, term by term, the array of age-specific birth rates by the array of age-specific proportions currently married.

Marital total fertility rates (but not total fertility rates for all women) pertain only to ages 20 to 49. The MTFR including ages 15 to 19 is not a good measure because it weights the birth rate at ages 15 to 19, which is not high in the CNMI and would be based on too few women married because of moderately late marriage (as seen in Chapter 4). If the measure included the 15 to 19 year olds, then, a distorted picture of overall marital fertility trends would be produced.

Age-specific proportions never married were obtained in the same way as age-specific proportions currently married. Age-specific proportions never married were obtained in five-year age groups from the 1967, 1973 and 1980 censuses, and linearly interpolated between censuses to get age-specific proportions never married five-year age groups at mid-points of intercensal time periods or subperiods. Linear extrapolation was used for the early years. Each set of age-specific proportions never married so derived provided the basis for calculating a value of the singulate mean age at marriage (SMAM), which we have used as our summary measure of nuptiality and which was discussed in Chapter 4.

The Coale-Trussell m index of marital fertility control was computed. This index measures the deviation from the typical age pattern of natural fertility, defined as fertility in the absence of deliberate family limitation. The m index depends on the shape of the age-specific marital fertility schedule, not on the level of marital fertility. In the natural family situation, the shape of the schedule is convex throughout the reproductive ages, whereas in the family limitation situation it is concave at the older reproductive ages. For purposes of constructing the m index, the standard age schedule of natural fertility is obtained as the arithmetic average of ten of the age-specific natural marital fertility schedules designated by Henry (1961). If the observed age-specific fertility schedule has the same shape as that of the standard age-specific natural fertility

schedule, $m = 0$. If the observed schedule deviates from the standard schedule by an amount that is the average deviation of 43 reasonably reliable marital fertility schedules in the early 1960s, representing a range of differences in the extent of fertility control, then $m = 1$.

No adjustment was made for incorrect enumeration (age-selective undercount or age misreporting) because the data necessary to compute adjustment factors were unavailable. If the undercount is proportionately the same for each age, however, the own-children fertility estimates are unaffected, since estimated numerators and denominators of birth rates are subject to the same multiplicative errors, which cancel. Age misreporting is potentially a more serious problem. The jagged up-and-down trends in the annual fertility estimates for the CNMI indicate the presence of some age misreporting, so that some of the estimates must be viewed cautiously.

Results. In the CNMI, fertility began a definitive decline during the estimation period considered here. Fertility in the CNMI fell rapidly between the late 1960s and the mid-1970s, tending to level off in the late 1970s. The TFR fell from about 8 to 4 and the MFR from about 9 to 5.5 (Tables 5.6 and 5.7).

Table 5.6. Total Fertility Rates and Age-Specific Rates, Derived by the Own-Children Method: 1973 and 1980

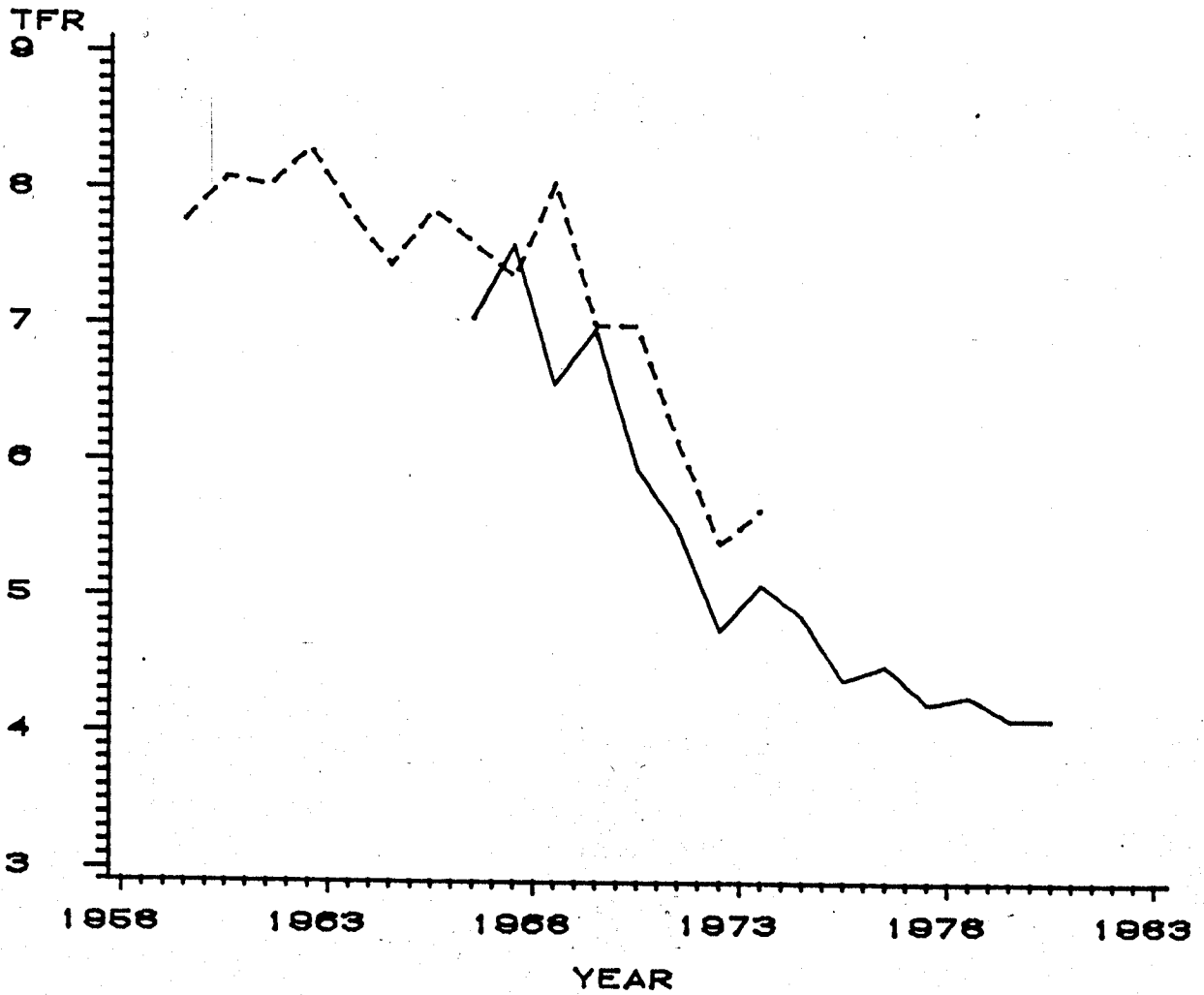
Age Group	1980			1973		
	1976-1980	1971-1975	1966-1970	1969-1973	1964-1968	1959-1963
TFR.....	4.24	4.90	6.81	6.20	7.68	8.00
15 to 19 yrs.	103	83	94	105	101	110
20 to 24 yrs.	227	241	294	297	329	351
25 to 29 yrs.	208	235	326	291	376	415
30 to 34 yrs.	163	189	269	252	352	320
35 to 39 yrs.	86	139	251	204	243	259
40 to 44 yrs.	42	75	96	73	108	126
45 to 49 yrs.	17	18	32	16	27	19

Source: Levin and Retherford, 1986

Estimated trends from successive censuses agree fairly well during the period of overlapping estimates. The Singulate Mean Age at Marriage (SMAM) increased over the estimation period. Age Specific Birth Rates (ASBRs) and Age Specific Marital Birth Rates (ASBMRs) fell at all ages, indicating practice of birth control for spacing as well as for limiting births. The figures, age-specific rates for the earlier period are based on the 1973 census and age-specific rates for the later period are based on the 1980 census. When, alternatively, the change in the age pattern of fertility is estimated solely from the 1980 census, the numbers are somewhat different, but it is true that fertility declines at all ages, indicating birth control for spacing as well as limiting.

FIGURE 5.2

ANNUAL T.F.R. FOR NMI: 1973 - 1980



The marital birth rate at ages 15 to 19 shows a very large decline starting from an extremely high level. This finding is unquestionably spurious, as the estimated birth rate is many times higher than ever reliably documented in any other population. Evidently many births at 15 to 19 (and probably a good many at 20 to 24 as well) are occurring in unions not recorded as marriages in the census.

Table 5.7. Marital Total Fertility Rates and Marital Age-Specific Fertility Rates: 1973 and 1980

Age Group	1980			1973		
	1976-1980	1971-1975	1966-1970	1969-1973	1964-1968	1959-1963
MFR.....	5.49	6.18	8.20	7.67	9.11	9.11
15 to 19 yrs.	1035	1058	1635	1461	1994	3716
20 to 24 yrs.	428	433	505	527	558	572
25 to 29 yrs.	290	311	413	381	470	497
30 to 34 yrs.	202	216	286	282	367	312
35 to 39 yrs.	105	164	287	239	275	284
40 to 44 yrs.	52	89	107	85	118	132
45 to 49 yrs.	22	24	40	21	34	24

Source: Levin and Retherford, 1986

Recall that we estimate age-specific marital birth rates by dividing age-specific birth rates for all women by corresponding age-specific proportions currently married; therefore, to the extent that births occur in consensual unions, our estimates of age-specific marital birth rates are inflated. The fact that our estimate of marital fertility at 15 to 19 falls so dramatically may indicate that the prevalence of consensual unions is declining, or that the 1980 census definition of marriage was broadened to include more consensual unions, or both. The m index of fertility control also increased, and the agreement of overlapping trends in m from successive censuses is fairly good. (Because the m index, like the MFR, is calculated using marital birth rates starting at age 20, it is unaffected by the highly biased rate at ages 15 to 19.)

There is no formal government family planning program in the CNMI. The comparisons of TFRs estimated by the own-children method with TFRs estimated from vital registration data in Table 5.8. suggest that birth registration is essentially complete. The apparent over-registration of about 10 percent in 1967 probably occurs because of the 1967 census undercount, which has the effect of inflating birth rates estimated from vital registration data.

FIGURE 5.3

ANNUAL M.F.T.R. FOR NMI: 1973 - 1980

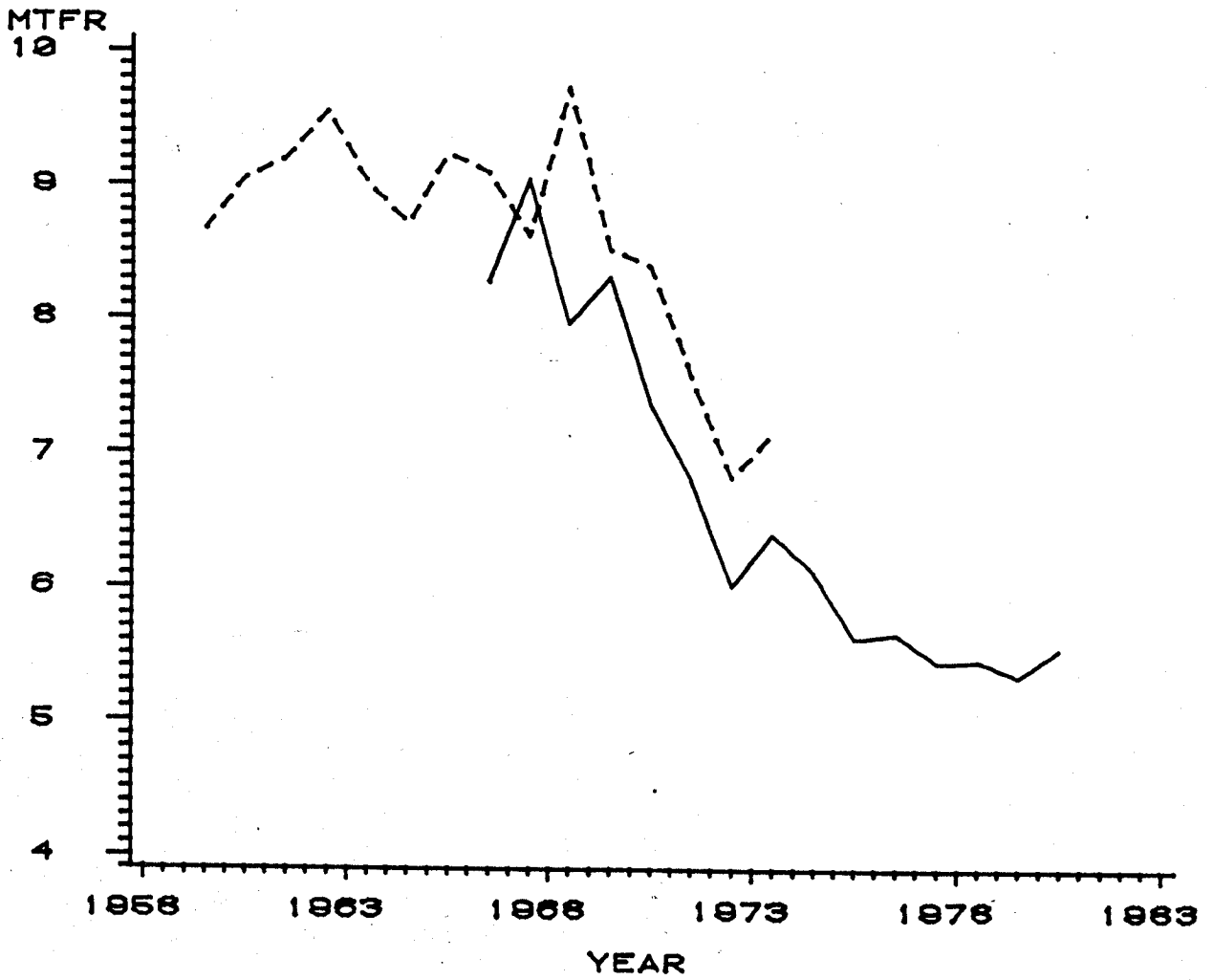


FIGURE 5.4
M - INDEX FOR NMI: 1973 - 1980

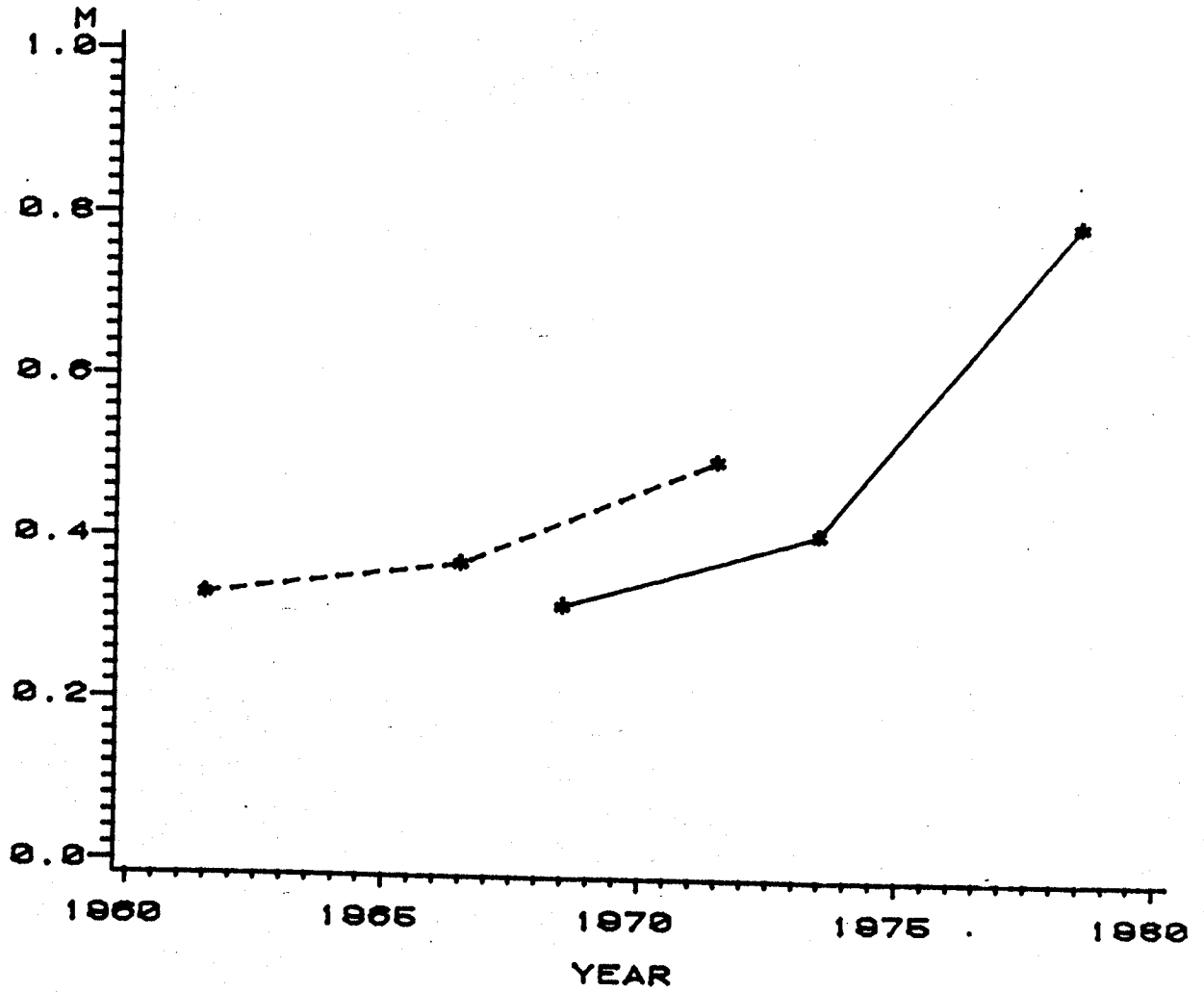


Table 5.8. Ratios of Fertility Estimates derived by the Own-Children (OC) method to Fertility Estimates based on Alternative Sources(AS)

OC/AS ratios										
Year of Estimate	ASFRs									
	TFR (OC)	TRF (AS)	TFR	15-19	20-24	25-29	30-34	35-39	40-44	45-49
1967	7.60	8.40	.90	.80	.78	.89	.78	1.20	1.18	1.15
1973	5.09	5.14	.99	.84	.87	.93	.84	1.38	1.24	16.50

Source: Levin and Retherford, 1986

FAMILY PLANNING

The CNMI has had only one survey which collected data on family planning practices. In 1970, a Knowledge, Attitudes, and Practices (KAP) survey was collected by the Department of Public Health, University of Hawaii.

Maps from the 1967 Peace Corps census were used to obtain a sampling frame. After "Capitol Hill" was excluded because of the large number of Trust Territory personnel living there, 174 of the 1921 households were chosen (about 9.1 percent). Of these, 40 had no women aged 15 to 45. Then, 21 more houses were eliminated because they contained Americans or Palauans. A total of 164 interviews were completed.

In the 1970 survey, 33 (20 percent) of the 161 women responding to questions about contraceptive use, were actually practicing contraception when interviewed. Of the others, 43 (54 percent) said they had considered preventing pregnancy, but had never actually done so. When asked if they had ever practiced contraception in the past in order to space their children, 12 percent stated that they had, and 15 percent indicated that they had tried to stop having children altogether.

The KAP survey considered women who had had surgical sterilization, tubal ligation or more radical procedures to be "contraceptors." So, although 12 women (36 percent) of the 33 contraceptors used oral contraceptives, 7 had had tubal ligations, and 3 reported that their husbands had had vasectomies. The numbers are too small to make any statements about contraceptive use for 1970.

Of the 128 nonusers, 40 (31 percent) were not "at risk" of pregnancy (because of natural infertility, menopause, current pregnancy, or no opportunity for sexual relations). Women who said that they wanted to have more children, and those who had religious objections to contraception, were mostly older women (aged 30 to 45 years). A majority (65 percent) of women who wanted more children had had only 1 to 4 living children, which, given the data for children ever born in the CNMI, was a "small" family: 80 percent of the women having 1 to 4 children wanted to have 6 children.

It is important to remember that the KAP survey was taken in 1970. Even then, knowledge of family planning was beginning to take hold, and was reflected in the data:

"It seems, thus, that times are changing. Older women have had little knowledge of spacing and limiting pregnancies and only recently have come to the hospital to get advise. The younger generation, however, has had considerably more information in school, and apparently have discussed contraception more frequently. It seems reasonable to assume that such knowledge is gained from non-medical sources available in the community, such as schools, the mass media, and "relatives and friends." One can assume perhaps that, with continued interest and education, a large proportion of the younger women will be able to decide on the use of contraception on the basis of sufficient and accurate information." (KAP 43-44)