

CHILD SPACING AS MEASURED FROM THE AGES OF CHILDREN IN THE HOUSEHOLD*

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INTRODUCTION

SINCE the end of World War II, attempts have been made to assess the significance of the high postwar fertility rates in terms of the pattern of family growth and the ultimate size of completed families. These efforts have been handicapped, however, by the absence of adequate information on the interval between marriage and childbearing, and between successive births.

In recent years, a number of demographers have addressed themselves to the problem of obtaining statistics on this aspect of fertility experience, carrying out studies for selected areas and population groups. Two current studies—"The Growth of American Families," and "The Study of American Family Life," promise to add considerably to our knowledge in this area.

The present paper concerns a project now nearing completion, which was undertaken cooperatively by the National Office of Vital Statistics and the Bureau of the Census, to develop by-product statistics on child spacing from cross-sectional census data.³ This approach is experimental. However, if found effective, it provides a means of obtaining nationwide information on the subject for white and nonwhite women of childbearing age by social and economic status, on a current and continuous basis.

The following paragraphs describe the derivation of child-spacing data from the 1950 Census of Population and Housing.

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¹ National Office of Vital Statistics.

² United States Bureau of the Census.

³ The full report, to be published by the National Office of Vital Statistics, will contain a detailed explanation and extensive tables.

Essentially the same method was applied also to information obtained from the April 1954 Current Population Survey. Although independently derived, the spacing data from the two enumerations can be used to form a comparable time series for the war and postwar years.

METHODOLOGY

In the course of the 1950 Census, information was obtained on the ages and present marital status of all persons in the household. Sample or supplementary questions provided information on the total number of children ever born alive to the mother, whether she was married more than once, and the number of years in her present marital status.⁴ From the total population from which such information was obtained a selection was made of women who were aged 15 to 44 years, married once, living with husband, and all of whose children were living and present in the household. This is the group for which child-spacing data were developed.

The basic procedure involved the conversion of the cross-sectional enumerated information for this group to longitudinal data. In other words, the interrelated age information for the children and the mother was transformed to a year-of-birth and year-of-marriage basis, and recorded on a family card showing chronologically the wife's fertility status and experience in each year since marriage. Child-spacing information was then derived by differencing the years in which the successive events occurred.

For example, in the case of a woman who was married in 1946 and gave birth to her first child in 1948, this birth was counted as occurring after an interval of two years. If she subsequently gave birth to a second child in 1949, the latter event was tabulated as occurring after an interval of one year since the previous birth, or three years since marriage.⁵

⁴ This information was not collected with child-spacing analysis in mind, and its utilization for this purpose, therefore, involves some limitations which can be avoided in future studies by anticipating certain specific requirements.

⁵ Strictly speaking, the years of occurrence (1946, 1948, and 1949) are not the calendar years, but the 12-month periods beginning with mid-April of the calendar years specified.

The restriction of the universe to women married once, was dictated by methodological considerations. According to the foregoing procedure, information on the spacing of the first child could only be obtained if the age of the mother when first married was also available. However, this age could be derived only for women who had married once. For women married more than once, the 1950 Census schedule asked for the number of years since last marriage.

Likewise, it was necessary to limit the universe to women whose children were all born alive and living in the household at the time of enumeration. The absence of information for any child leaves a gap in the mother's enumerated fertility history, and precludes identification of the birth order of each child. Such identification is necessary for the derivation of child-spacing data.

The foregoing considerations also applied in connection with the mechanics of obtaining spacing data from the April 1954 Current Population Survey (CPS). However, in the case of the latter enumeration, the supplementary questions were designed with this study in mind, and information was collected on age at *first* marriage, rather than age at *last* marriage. This made it possible to determine the spacing of first births for women married more than once. But, to maintain comparability with the data derived from the 1950 census, the main series of tabulations from the CPS were limited to *women married once*.

The family fertility information from the 1950 Census and the April 1954 CPS was tabulated to provide two basic series of data:

1. A frequency distribution of women by fertility-risk status as of the beginning of specified years, in terms of age, parity, and interval; and
2. A frequency distribution of women by their fertility experience during the year of observation.

Each of these tabulations can be used independently to obtain

various measures of fertility experience. In addition, they can be combined to form age, parity, interval specific annual birth rates. For this purpose, the first tabulation provides the denominator and the second the numerator.

In principle, data were obtained from the CPS showing the fertility-risk status and experience in each of the four years of observation ending in mid-April 1951, 1952, 1953, and 1954. Since there were only about 7,000 cases in the sample, and in view of the extensively detailed cross-classifications involved, the decision was made to consolidate the data for these years.

In the tabulation of child-spacing data from the 1950 Census, the principle of consolidating several years of experience is also being followed. Present plans call for the tabulation of data for these groups of years:

April 1941–March 1944,
April 1944–March 1946,
April 1946–March 1948, and
April 1948–March 1950.

A total of 164,000 family cards were obtained from the decennial census. However, a lesser number is available for use in these earlier periods. This stems from the fact that the cohort selected for study was limited to women 15 to 44 years of age at the time of enumeration. The age composition of this group becomes successively younger as the cohort is tabulated with reference to earlier points in time, and an increasing number are excluded because they then drop below 15 years of age. As of 1941, for example, the cohort was 6 to 35 years of age.

SOME FINDINGS

The tabulation of child-spacing statistics from the 1950 Census is still in process. However, data are now available from the 1954 CPS, and some preliminary findings are presented here, for the purpose of illustrating the kinds of measures obtained.

One such measure is the age, parity, interval specific birth

rate. The age, parity birth rate—omitting the specification of interval—defines the female population at risk of pregnancy in terms of the age of the woman and the order of birth to which she is subject. An age-parity-interval specific rate goes further in delineating the risk group, specifying the length of time elapsing since the previous birth or marriage. This becomes important when comparing fertility over a period of years and in assessing the extent to which postponement or catching-up of births affects changes in the overall rate.

The data for 1950–1954 show a rate of 197 first births annually per 1,000 zero-parity women (Table 1). However, among women of zero parity in the one-year interval group; i.e., those who had married in the preceding year, the rate was 285 per 1,000, and in the two-year interval group, 451 per 1,000. As would be expected, the first birth rate declined with increasing intervals, dropping to 27 per 1,000 among those married 10 years or more.

In addition to providing rates for zero parity women, the data throw light on the rate at which women of first and higher parity give birth after specified intervals have elapsed since their previous childbirth. For instance, among two-parity women who had given birth in the preceding year, the third birth rate during the year of observation was 127 per 1,000. Of those who had given birth two years before, the corresponding rate was 188 per 1,000. Obviously, as the interval increases the population base becomes more selective in terms of fertility potential, since it includes a growing proportion of women who cannot, or do not choose to have another child. On the other hand, such factors as birth control, and the normal length of time it takes to conceive, as well as unusual circumstances like the wartime absence of men in the armed forces play an important part in determining the pattern of these rates.

The data derived from this study can also be used to obtain percentage distributions of births of specified order, according to the time elapsed since the previous birth, or since marriage.

AGE OF WOMAN AND INTERVAL SINCE PREVIOUS EVENT	TOTAL	PARITY					
		0	1	2	3	4	5 and Over
Total Women							
15-44 Years Old	156	197	187	108	109	129	218
Interval—							
1 Year	184	285	192	127	120	141	150
2 Years	287	451	291	188	184	203	384
3 Years	230	273	307	179	147	130	256
4 Years	178	203	255	130	113	155	...
5 and 6 Years	131	164	189	92	84	85	...
7 to 9 Years	55	84	73	35	36	42	...
10 Years or More	23	27	21	23	14	0	0
Women 15-24 Years Old	320	366	293	254	286	...	...
Interval—							
1 Year	263	311	246	205	220	...	...
2 Years	420	514	326	334	...	...	0
3 Years	354	338	373	324	...	...	—
4 Years	280	268	326	...	...	—	—
5 Years or More	210	229	...	...	0	—	—
Women 25-34 Years Old	163	165	210	126	130	173	247
Interval—							
1 Year	125	203	128	93	100	177	153
2 Years	237	335	281	167	189	237	396
3 Years	220	222	299	187	155	159	...
4 Years	196	185	273	162	133	...	...
5 Years or More	112	113	151	81	90	87	...
Women 35-44 Years Old	42	24	39	38	45	56	171
Interval—							
1 Year	68	...	...	50	72	...	...
2 Years	113	...	...	64	48	...	...
3 Years	95	...	135	68	87	...	...
4 Years	69	...	68	47	80	...	...
5 Years or More	27	16	28	32	27	44	72

Table 1. Birth rates per 1,000 women by age, parity, and interval since previous childbirth, or, if no previous birth, since marriage: United States annual averages for the period mid-April 1950 to mid-April 1954. (Spacing in terms of live births. Women married once, husband and all children ever born present in household in April 1954. Age as of end of each year in period. Data exclude the relatively few births at intervals of less than 1 year from marriage of women or from a previous childbirth.)

Source: April 1954 Current Population Survey.

SYMBOLS: Three dots (...) Rate not computed because population base was less than 200,000
One dash (—) Both population base and numerator were zero in frequency table.

They show that among women giving birth for the first time, 27 per cent did so in the year following marriage, and 33 per cent in the second year. The proportion dropped off sharply thereafter, with only 12 per cent giving birth to a first child in the third year, and 7 per cent in the fourth (Table 2).

As will be explained later, a distribution of births by discrete intervals of elapsed time cannot be obtained directly from the data. However, a method is available for estimating this distribution in terms of 12-month intervals, and of deriving therefrom measures of the estimated average spacing.

With respect to births classified by type of work of father,

Table 2. Number of births of specified order and per cent distribution by interval since mother's previous childbirth or if no previous birth, since marriage: United States, mid-April 1950 to mid-April 1954. (Spacing in terms of live births. Women married once, husband and all children ever born present in household.)

INTERVAL SINCE PREVIOUS EVENT	TOTAL	ORDER OF BIRTH: MOTHER'S—					
		First Child	Second Child	Third Child	Fourth Child	Fifth Child	Sixth or More
Number of Births (Thousands)	10,244	3,425	3,160	1,995	907	386	371
Per Cent	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Less than 1 Year	2.8	5.5	0.5	1.6	3.1	4.4	0.5
1 Year	23.4	27.0	20.5	20.5	24.1	29.3	24.0
2 Years	29.4	32.8	26.4	25.3	28.8	29.5	46.9
3 Years	16.9	11.8	21.1	19.7	17.2	12.7	15.1
4 Years	10.1	6.7	13.0	11.9	10.5	11.4	5.9
5 and 6 Years	10.7	8.3	12.5	12.9	11.2	9.1	6.5
7 to 9 Years	4.2	4.3	4.1	5.2	4.1	3.6	1.1
10 Years or More	2.5	3.6	1.9	3.0	1.0	0	0
Median Spacing (Years)	2.3	1.5	2.6	2.6	2.3	2.1	2.0
Live Births to All Women, from Annual Vital Statistics Corrected for Underregistration (Thousands) ¹	15,444	4,660	4,460	2,840	1,496	780	1,208
Per Cent of Births for which Spacing is Shown Above	66.3	73.5	70.9	70.2	60.6	49.5	30.7

¹ Derived from 1/4 of births in calendar year 1954, all of births in calendar years 1953, 1952, 1951, and 3/4 of births in calendar year 1950.
Source: April 1954 Current Population Survey.

the data show a median interval between marriage and first birth of about 2.3 years for the white-collar group, 2.0 years for the manual or service workers, and 2.0 years for the farmers and farm laborers. A similar association is observed between income and the spacing of first births, the median interval increasing from 1.6 years at the \$2,000 level, to 2.3 years among those earning \$5,000 or more. However, this appears to be largely a function of the differential age composition of the respective income groups. When the data are standardized for age, little relationship between income and spacing interval is evident.

NATURE AND LIMITATIONS OF THE DATA

Representativeness. Restricted as it is to women with husband and all children ever born present in the household, this population tends to be selective in terms of age and parity. Obviously, it will include a larger proportion of younger women with smaller and younger families than is found in the total married female population of reproductive age (Table 3). The child-spacing patterns, no doubt, are also different for the selected group.

The Time Unit Used to Measure Intervals. The interval classifications are shown as "one year," "two years," etc. As previously indicated, these numbers represent the difference

Table 3. Per cent of women who had all their children ever born living with them in April 1954, for women 15 to 44 years old, married once and husband present, none to four children ever born, by age of women, for the United States. (Data partly estimated.)

AGE OF WOMAN IN 1954	NUMBER OF CHILDREN EVER BORN				
	No Children	1 Child	2 Children	3 Children	4 Children
15 to 19 Years	100	98	0.0	0.0	0.0
20 to 24 Years	100	98	95	81	0.0
25 to 29 Years	100	94	91	86	79
30 to 34 Years	100	92	95	84	76
35 to 39 Years	100	89	89	77	70
40 to 44 Years	100	74	72	56	38

Source: April 1954 Current Population Survey.

SYMBOL; 0.0 means percent is more than 0, but less than 0.5.

obtained by subtracting the "calendar" years in which the successive events occur. The precise duration of time in terms of months or days elapsing between these events is not known, since information is lacking as to when, within the respective years, these births occurred. In the case of intervals between successive births, the one-year interval actually represents a range of from about 9 months to 23.9 months, the two-year interval 12.0 to 35.9 months, the three-year interval 24.0 to 47.9 months, and so on. The result is a series of overlapping intervals, each of which, except the first, covers a spread of 24 months.

Approximate transformations of these data to a frequency distribution involving discrete class intervals of elapsed time have been made by assuming that the one-year interval represents a period of 6.0 to 17.9 months, the two-year interval 18.0 to 29.9 months, and so on. The theoretical basis and the degree of reliability of this transformation will be discussed more fully in a forthcoming report on child spacing.

In processing data from the April 1954 CPS, it was necessary to subtract the age of the woman at marriage from her age at the survey date to determine the number of years she had been married. The "calendar" year of marriage could then be determined by counting backwards from the survey date the number of years the woman had been married. (No similar subtraction was necessary in processing 1950 Census data which obtained direct information on number of years the woman had been married). Because of the extra subtraction, the intervals *between marriage* of the woman and the *birth of a child* have the following interpretation: the two-year interval shown in the tables actually represents a range of about 9 months to 36 months, the three-year interval 12 to 48, the four-year interval 24 to 60, and so on. The result is a series of overlapping intervals, each of which, except for the first two, covers a spread of 36 months. (Tables 1, 2, and 4.)

A transformation of these data to a frequency distribution involving discrete class intervals of elapsed time may be made

by assuming that the one-year interval represents a period of 9.0 to 11.9 months, the two-year interval 12.0 to 23.9 months, the three-year interval 24.0 to 35.9 months, and so on. A more precise transformation could be achieved by a mathematical interpolation and re-combination of the data, but the method is beyond the scope of the present paper.

Socio-Economic Variables. Tables from the 1950 Census on fertility by occupation of husband were prepared for each of the years beginning with April, 1941. However, the occupation by which each family was classified in these earlier years was not the husband's contemporaneous occupation, but the one he held at the time of the 1950 enumeration. The same is true also for other characteristics such as income, place of residence, and whether husband was present in household; neither of these could be reconstructed historically on the basis of cross-sectional information enumerated in 1950.

Table 4. Spacing between marriage of mother and birth of children in period mid-April 1950 to mid-April 1954, for women married once, husband and all children ever born present in household in April 1954. (Data exclude children whose ages were equal to mother's marriage duration.)

SPACING INTERVAL SINCE MARRIAGE ¹	TOTAL	ORDER OF BIRTH: MOTHER'S—					
		First Child	Second Child	Third Child	Fourth Child	Fifth Child	Sixth or More
Number of Births (Thousands)	9,961	3,235	3,145	1,964	879	369	369
Per Cent	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1 Year	9.5	28.6	0.8	0	0	0	0
2 Years	14.3	34.7	9.7	0	0	0	0
3 Years	10.7	12.5	18.3	4.3	0	0	0
4 Years	9.7	7.1	16.3	11.0	0.6	1.6	0
5 and 6 Years	19.1	8.7	26.2	28.5	24.1	4.1	2.4
7 to 9 Years	17.0	4.5	18.1	27.9	30.5	35.0	8.1
10 to 14 Years	14.3	3.1	8.5	21.8	33.0	45.8	45.8
15 to 19 Years	4.7	0.5	1.7	6.1	10.9	11.7	37.4
20 Years or More	0.7	0.2	0.4	0.4	0.9	1.9	6.2
Median Spacing (Years)	4.6	1.6	4.4	6.7	8.5	10.0	13.3

¹ Median spacing based on data including the events occurring in the same year as marriage is 1.5 years.

Source: April 1954 Current Population Survey.

Sampling Error. The problem of sampling error is an important one in these studies. The consolidation of several years of data, of course, reduces the amount of sampling variability associated with individual cell frequencies, but any inferences regarding the significance of small differences should be made with caution.

Notwithstanding the foregoing qualifications, the method of deriving child-spacing data from enumerated age information as outlined herein is believed to have worthy potentialities and, in the opinion of the authors, merits further study and development.