Methodological difficulties encountered in using own-children data: illustrations from the United States

by Ronald R. Rindfuss

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PREFACE

ABSTRACT   This paper illustrates some of the methodological difficulties encountered when the assumptions involved in the use of own-children data for the examination of differentials in fertility trends are not met. The two assumptions for estimating trends *for subpopulations with own-children data are constancy-of-group-membership and constancy-of-error. The paper provides techniques for detecting departures from these assumptions and discusses three examples of the effects of departures from them.*

INTRODUCTION

Own-children data from national censuses are increasingly employed by researchers to examine period fertility trends and differentials for a number of reasons. Vital registration data often are not available or do not provide sufficient detail on socioeconomic characteristics, and fertility surveys do not provide a sufficient number of respondents to permit reliable calculation of annual, age-specific fertility rates for various subgroups in the population. Furthermore, information is collected in most censuses in such a way that it is possible to link the records of children with the records of their mothers, and thus the cost of using the own-children approach to study fertility trends and differentials is minimal compared with that of collecting data specifically for that purpose.

In brief, own children are defined as all children who can be identified as residing with their mothers. The category thus includes some adopted children or step-children and excludes any offspring who may have died or live elsewhere. If a child cannot be matched to a "mother" residing in the same household, it is not defined as an "own child" and is thus excluded. Since the use of own-children data has been described elsewhere (Grabill and Cho, 1965; Cho, 1968; Cho, Grabill, and Bogue, 1970; Cho, 1971; Retherford and Cho, 1974; Cho, 1973), a lengthy exposition is unnecessary here; it will be assumed that the reader is familiar with this literature, particularly the construction of annual, age-specific fertility rates from census data.

ASSUMPTIONS IN USING OWN-CHILDREN DATA

If own-children data were used as recorded by the census, four implicit assumptions would be involved (Grabill and Cho, 1965; Cho, Grabill, and Bogue, 1970; Retherford and Cho, 1974): (1) that ages of

children are correctly reported; (2) that all children reside with their mothers; (3) that mortality is negligible for women and children; and (4) that all women and children are covered by the census. Elsewhere, I have shown that even when these four assumptions are not met, and a complete set of adjustment factors is not available—a fairly typical situation—census data on own children can be used to accurately estimate past fertility *trends* (both for such summary indices as total fertility rates and for age-specific rates), but that such data can be misleading regarding *levels* (Rindfuss, 1976). Unadjusted own-children data can be used to accurately estimate trends because the amount of error introduced by not adjusting for mortality, children not living with their mothers, age misstatement, and underenumeration is almost constant. Of course, if this "constancy of error" assumption is not met for a particular subgroup being examined, then the trend estimate for that group will be inaccurate.

In using own-children data for constructing annual fertility rates for various subgroups, we must make an additional assumption because we use the characteristics of the woman at the time of the census to project 15 years into the past. The person's status at the time of the census is assumed to be applicable (or adjustable) to each of the 15 years preceding the census. Stated somewhat differently, the assumption is that members of a group at the time of the census were members of that group during the 15 years preceding the census. Certain characteristics are essentially unchangeable, whereas other characteristics may be subject to considerable fluctuation in the course of 15 years.

This paper provides a few illustrations of the effects on fertility-trend estimates when this "constancy of group membership" assumption is not met and presents one example of the effect of not meeting the "constancy of error" assumption. In some cases the effects on fertility-trend estimates are surprising—indeed, counterintuitive. The illustrations are drawn from a project, in which I have been involved with James A. Sweet, that examines fertility trends and differentials within the United States since World War II. The results of this project will be published in a monograph (Rindfuss and Sweet, forthcoming).

EDUCATION AND THE ESTIMATION OF ANNUAL FERTILITY RATES

Estimating annual fertility rates from own-children data for women by years of education requires the assumption that the education of women at the time of the census is applicable to the years for which

estimates are made. We have calculated annual fertility rates for
women by education groups for the 15 years preceding the census.
Two successive decennial censuses have been used (1970 and 1960),
and thus the five-year period (1955—59) for which two estimates are
available provides an internal check for consistency of the estimates.
If the education of women at the time of the census is not applicable
to each of the 15 years preceding the census, then we would expect a
lack of agreement between the two estimates for the five-year period
when two estimates are available.

Table 1 shows the ratio of the 1960 Census estimates to the 1970
Census estimates for the five-year overlap period for each education
group for all women. Tables 2 and 3 show similar ratios for whites and
blacks, respectively.[1] Overall, the two sets of estimates are remarkably
close. Generally the two estimates are within 10 percent of one an-
other, and typically within 5 percent. The major exceptions are the
fertility of women 15—19 years old, and, to a lesser extent, that of
women 20—24 years old. For the less educated groups, the ratio of the
1960 Census estimates to the 1970 Census estimates for women 15—19
years old decreases from 1955 to 1959. For the better educated
groups, the pattern is reversed.

The primary reason for the lack of agreement between the rates of
the 15—19-year-old group is that, for most women, educational attain-
ment is changing at ages 15—19 and thus violating our assumption. For
example, the rates for 1959 from the 1960 Census are based on women
approximately 15 to 19 years old at the time of the census; many of
these women have not yet completed their education. The rates for
1959 from the 1970 Census are based on women approximately 25 to
29 years old; their educational attainment is comparatively fixed. For
the less educated group, the estimates from the 1960 Census for the

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1 Rates for black women with 13—15 and 16 or more years of education have
not been computed because the numbers of women involved are too small to
produce reliable rates. Rates also have not been computed for women with 0—4
years of education; there are a number of reasons for this decision. First, such
women constitute a very small proportion of women in the childbearing ages—
approximately 2 percent in 1970. Second, a nonnegligible proportion are in-
stitutionalized and therefore presumably not exposed to the whole range of
fertility decisions and actions. For example, in 1970 0.2 percent of all women
25—34 years old resided in institutions. However, among women with 0—4
years of education who were 25—34 years old, 6 percent resided in institutions.
A final reason for not calculating these rates is that we suspect that census data
on own children would be most deficient for women with 0—4 years of educa-
tion.

TABLE 1 Ratio of 1960 Census estimates to 1970 Census estimates for five-year overlap (1955—59), all women by years of education

Education group and years being compared	Age-specific fertility rate comparisons						Total fertility rate comparisons
	15—19	20—24	25—29	30—34	35—39	40—44	
5—8 years							
1959	.68	1.05	1.04	1.07	1.04	.88	.96
1958	.93	1.06	1.08	1.08	1.02	1.04	1.04
1957	.99	1.06	.99	1.00	.95	1.09	1.01
1956	1.08	1.12	1.00	.98	.98	.95	1.05
1955	1.13	1.06	1.03	1.03	.92	.83	1.04
9—11 years							
1959	.44	1.01	1.10	.97	1.03	1.01	.90
1958	.51	1.08	1.06	1.08	1.01	1.01	.94
1957	.61	1.04	1.04	1.00	1.02	1.03	.94
1956	.82	1.06	1.05	1.02	.96	1.07	.99
1955	.93	.99	.95	1.08	.97	.92	.98
12 years							
1959	1.65	1.04	1.02	1.05	1.05	.96	1.09
1958	1.23	1.04	1.04	1.07	1.05	.95	1.06
1957	1.02	1.05	1.00	1.00	.97	.97	1.01
1956	.87	1.04	1.02	1.02	1.00	.88	1.00
1955	.88	1.06	1.04	1.05	1.00	1.15	1.03
13—15 years							
1959	1.23	.78	1.02	.99	1.05	1.07	.94
1958	.91	.87	.95	1.01	1.02	.93	.94
1957	.65	.96	1.04	1.02	.99	.80	.98
1956	.57	.95	1.04	1.04	1.02	.86	.98
1955	.43	1.00	.93	.95	1.03	1.06	.95
16 or more years							
1959	8.92	1.37	1.08	1.13	1.26	.83	1.27
1958	2.78	1.17	1.07	1.07	1.04	1.09	1.11
1957	1.56	.97	1.06	1.06	1.02	.88	1.04
1956	.73	.98	1.04	.97	1.00	1.32	1.01
1955	.50	.85	.98	1.05	1.02	1.02	.97

TABLE 2· Ratio of 1960 Census estimates to 1970 Census estimates for five-year overlap (1955—59), white women by years of education

Education group and years being compared	Age-specific fertility rate comparisons						Total fertility rate comparisons
	15—19	20—24	25—29	30—34	35—39	40—44	parisons
5—8 years							
1959	.77	1.09	1.04	1.06	1.00	.84	.99
1958	1.02	1.06	1.06	1.06	1.04	1.10	1.05
1957	1.06	1.08	.98	.93	.98	1.06	1.02
1956	1.12	1.13	1.01	1.01	.96	.98	1.06
1955	1.15	1.05	1.04	.99	.93	.83	1.04
9—11 years							
1959	.44	1.02	1.08	.98	1.04	1.05	.90
1958	.51	1.11	1.06	1.09	1.07	1.06	.96
1957	.61	1.05	1.04	1.00	1.06	.95	.94
1956	.85	1.07	1.06	1.04	1.00	1.05	1.01
1955	.97	1.01	.98	1.08	.96	.92	1.00
12 years							
1959	1.78	1.04	1.02	1.05	1.05	.97	1.10
1958	1.24	1.05	1.04	1.06	1.03	.96	1.06
1957	1.03	1.06	1.01	1.01	.96	.97	1.02
1956	.88	1.01	1.03	1.02	1.00	.91	1.00
1955	.90	1.07	1.04	1.06	1.00	1.19	1.04
13—15 years							
1959	1.35	.78	1.00	1.00	1.03	1.05	.94
1958	.97	.88	.94	1.01	1.00	.95	.94
1957	.69	.95	1.04	1.02	.98	.79	.98
1956	.58	.96	1.07	1.03	1.01	.85	.99
1955	.45	.99	.94	.95	1.01	1.02	.95
16 or more years							
1959	10.36	1.39	1.07	1.15	1.24	.79	1.27
1958	3.35	1.17	1.07	1.06	1.07	1.02	1.11
1957	1.66	1.00	1.06	1.08	1.01	.91	1.05
1956	.69	.97	1.03	.99	1.00	1.17	1.00
1955	.51	.86	.98	1.05	1.00	.97	.97

TABLE 3 Ratio of 1960 Census estimates to 1970 Census estimates for five-year overlap (1955—59), black women by years of education

Education group and years being compared	Age-specific fertility rate comparisons						Total fertility rate comparisons
	15—19	20—24	25—29	30—34	35—39	40—44	
5—8 years							
1959	.42	.87	.99	1.08	1.10	.95	.84
1958	.69	1.02	1.08	1.12	.95	:93	.96
1957	.78	.98	1.01	1.22	.79	1.22	.97
1956	.89	1.06	.95	.86	1.00	.86	.95
1955	1.04	1.05	.96	1.14	.88	.84	1.01
9—11 years							
1959	.50	.99	1.22	1.00	1.00	.82	.92
1958	.54	.97	1.07	1.09	.82	.86	.89
1957	.63	.97	1.05	1.03	.84	1.34	.92
1956	.71	.99	1.01	.91	.83	1.22	.91
1955	.78	.90	.86	1.09	1.01	.94	.90
12 years							
1959	.83	.98	.98	.99	.96	.75	.95
1958	1.12	1.01	1.15	1.22	1.23	.75	1.10
1957	.93	.84	.92	.89	.96	.95	.90
1956	.88	1.07	.96	1.21	1.18	.73	1.03
1955	.76	.92	1.00	.83	.94	.94	.91

years closest to the census are based on two types of women: (1) women who are not in school and who will remain in the given education classification; and (2) women who are in school and will eventually be in a higher education classification. Since teen-age women who are in school and will eventually attain a higher educational classification have lower fertility at ages 15—19 than teen-age women who are not in school, the inclusion of women still in school has the effect of depressing the estimates from the 1960 Census. For the better educated group, the estimates from the 1960 Census for the years closest to 1960 are based on a subset of all women who will eventually be in that educational category: women who completed a given amount of education at a comparatively early age. Presumably these women also

begin childbearing at a comparatively early age; therefore, the estimates for the 15−19-year-old group from the 1960 Census for the higher educational classifications are somewhat inflated. If it is ultimate, rather than current, educational attainment that is important with respect to fertility, then the somewhat paradoxical conclusion is reached that the fertility rate estimates for the 15−19-year-old educational groups are more accurate for the years more distant from the census than for the years closer to the census.

MIGRATION AND THE ESTIMATION OF ANNUAL FERTILITY RATES

In order to examine the effect of minority status on fertility, we constructed annual fertility rates for a variety of racial and ethnic groups who could be identified in the census, including blacks, American Indians, Japanese-Americans, and Chinese-Americans. Filipino-Americans were also originally included in the analysis. Because a number of these minorities are numerically small, all six 1 percent Public Use Samples from the 1970 Census had to be combined in order to obtain reliable estimates. Since only a single 1 percent sample was available from the 1960 Census, it was not possible to obtain estimates from the 1960 Census.

Because we do not have two sets of estimates for the period 1955−59, an internal check for the consistency of the estimates was not available for these minority groups. The results obtained for Filipino-Americans, however, suggested that the constancy-of-group-membership assumption might be violated. This suspicion is based on one of our most persistent findings: that the fertility trends in the United States since World War II were pervasive. Almost every group examined experienced an increase in fertility during the 1950s and a decrease in fertility during the 1960s (Rindfuss and Sweet, forthcoming). Among young Filipinas (15−29 years old), however, there was an actual increase in fertility during the period 1955−69, but this increase is artifactual rather than real.

An understanding of the increase in fertility among young Filipinas and the fact that it is artifactual begins with the realization that the composition of the Filipino-American population has been changing rapidly since 1965. The Immigration Act of 1965 eliminated the national origins system; instead, immigrant visas were to be issued on a first-come, first-served basis with the provision that no country could use more than 20,000 visas a year (Keely, 1974; Boyd, 1974). In addition, a limited number of visas have been issued in accordance with

special public laws. The effect of this change can be seen by looking at the numbers of Filipinos admitted to the United States. Between 1953 and 1965, the average number of Filipinos coming to the United States was 2,477. By 1968, this number had increased to 16,391 (Keely, 1971), and in 1969, 23,339 were admitted (Tidalgo, 1974). Because of the initial small size of the Filipino-American population, this influx of migrants has had a considerable impact: more than one-third of the Filipino women 15—44 years old enumerated by the 1970 Census had come to the United States in 1965 or later.

Not only has there been a recent influx of Filipinos, but also these recent migrants differ from other Filipino-Americans with respect to fertility and fertility-related characteristics. To illustrate these differences we will use 1970 Census data with women 30—34 years old as an example. Among Filipinas who arrived in 1965 or later, the average number of children ever born is 1.3; among other Filipinas, the average is 2.5. If the foregoing calculation is restricted to ever-married women, the means become 1.5 and 2.8, respectively. Also, median age at first marriage is three years higher for those who arrived in 1965 or later.

Contrary to what might be expected, the influx of a sizable proportion of low-fertility Filipinas has had the effect of lowering the pre-1965 rates relative to the post-1965 rates. Furthermore, the effect has been greatest on the age-specific rates of the youngest groups. Between 1957 and 1969, the age-specific rates of women 15—19 years old increased 109 percent, the rates for women 20—24 years old increased 8 percent, and the rates for women 25—29 years old declined 7 percent.

The effect of increased immigration can perhaps best be illustrated by contrasting the estimation of the fertility rate for women 15—19 years old in 1969 with the estimation of the same rate in 1959. The same principle applies to the rates for women 20—24 years old and 25—29 years old, but to a lesser extent. The 1969 rate for women 15—19 years old is based on women approximately 15—19 at the time of the 1970 Census; the rate for 1959 is based on women approximately 25—29 years old at the time of the 1970 Census. In the 1970 Census, the proportion of Filipino women 15—19 years old who had recently migrated to the United States is 13 percent; and again in the 1970 Census the comparable figure for women 25—29 years old is 58 percent. Thus the effect of migrants will be greater on the earlier (1959) rate than on the later (1969) rate. The relative difference between the fertility of recent migrants and that of other Filipinas completes the effect. The effect of recent migrants diminishes for the older

groups because the discrepancies in the proportion of recent migrants diminish and the fertility discrepancies between the two groups also diminish.

Unfortunately, there are insufficient numbers of Filipino-Americans to construct reliably two sets of annual fertility rates, one for those who came to the United States in 1965 or later and one for those who were in the U.S. prior to 1965. Because of the synthetic nature of the Filipino-American rates, they have not been analyzed.

An example of migration not seriously affecting the results is found in the estimation of annual fertility rates for rural and urban groups. Since rural-urban residence is both changeable and reversible (see Schnore, 1961), and since there has been considerable rural-to-urban migration within the United States, we initially had misgivings about constructing valid fertility-trend estimates for rural and urban groups. As was the case with the educational group fertility-trend estimates, fertility rate estimates are available for each of 15 years preceding the 1960 and 1970 Censuses; it is thus possible to compare the correspondence of the two sets of estimates for the period 1955–59 (Table 4).

The bottom panel of Table 4 shows that the two sets of estimates are remarkably close for all age groups for both the total rural group and the total urban group. This suggests that whatever change in status did take place, it was not sufficient to affect significantly our estimates of rural and urban fertility rates. Since there was a net rural-to-urban migration during the decade, the probable explanation for the stability of the estimates is twofold: the rural emigrants had fertility patterns similar to those of their contemporaries who remained in rural residences; and they were not numerous enough to affect the urban rates. Neither of these explanations was applicable to the Filipino-American situation.

An examination of the remainder of Table 4 reveals the effect of changes in educational status. For the older women, the two sets of rates tend to be close in every education and rural-urban category. For the younger women, however, changes in educational status affect the comparisons of the two rates. This effect is the same in both the rural and the urban subgroups. This lack of agreement between the two sets of rates for younger women by education is the same as that described earlier in this paper, and the reasons for the lack of agreement are exactly the same.

TABLE 4   Ratio of 1960 Census estimates to 1970 Census estimates
and urban or rural residence

Education group and years being compared	Age-specific fertility rate comparisons					
	15—19		20—24		25—29	
	Urban	Rural	Urban	Rural	Urban	Rural
5—8 years						
1959	.87	.63	1.14	.99	1.09	.95
1958	1.14	.86	1.12	.96	1.09	1.02
1957	1.18	.88 .	1.16	.95	.99	.95
1956	1.17	1.03	1.14	1.09	1.03	.95
1955	1.22	1.03	1.13	.93	1.09	.96
9—11 years						
1959	.46	.40	1.02	.98	1.06	1.12
1958	.51	.49	1.13	1.06	1.03	1.12
1957	.64	.59	1.05	1.05	1.03	1.05
1956	.86	.85	1.08	1.08	1.06	1.08
1955	.97	1.00	1.00	1.03	.96	1.01
12 years						
1959	1.80	1.72	1.04	1.06	1.03	.99
1958	1.25	1.28	1.04	1.05	1.03	1.04
1957	1.01	1.14	1.06	1.07	1.00	1.02
1956	.82	1.07	1.00	1.02	1.02	1.05
1955	.89	.98	1.04	1.11	1.05	1.01
13 or more years						
1959	2.17	2.09	.93	1.14	1.01	1.07
1958	1.48	1.56	.97	1.10	.98	1.02
1957	.77	1.47	.98	1.06	1.05	1.05
1956	.64	1.17	.95	1.11	1.03	1.07
1955	.57	.61	.97	1.00	.96	.89
Total						
1959	1.09	.82	1.03	1.04	1.03	1.02
1958	1.06	.91	1.06	1.06	1.02	1.04
1957	1.03	.98	1.06	1.04	1.01	1.01
1956	.96	1.10	1.03	1.06	1.03	1.04
1955	1.01	1.07	1.03	1.05	1.01	.99

NOTE: Women with 0—4 years of education are included in the total.

for five-year overlap (1955—59), white women by years of education

30—34		35—39		40—44		Total fertility rate comparisons	
Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
1.01	1.14	1.10	.87	.85	.83	1.05	.90
1.06	1.05	.94	1.19	1.06	1.12	1.09	.99
.94	.91	.99	.95	.94	1.14	1.07	.93
.99	1.01	.97	.92	.85	1.09	1.07	1.02
.98	.99	.97	.87	.79	.82	1.09	.96
.98	.97	1.01	1.15	1.16	.90	.91	.87
1.08	1.11	1.09	1.03	1.00	1.25	.96	.95
.96	1.07	1.06	1.03	.99	.82	.94	.94
1.04	1.00	.96	1.06	1.14	.94	1.01	1.01
1.05	1.15	.92	1.10	1.01	.76	.98	1.03
1.04	1.04	1.10	.91	.88	1.22	1.10	1.10
1.07	1.00	1.05	.91	.99	.89	1.06	1.05
1.02	1.01	.98	.95	.97	.95	1.02	1.04
1.04	.95	.99	.98	.83	.97	.99	1.01
1.07	1.02	.99	1.04	1.23	1.06	1.04	1.05
1.06	1.06	1.10	1.13	.89	.97	1.04	1.13
1.05	.94	1.07	.97	.88	1.23	1.01	1.05
1.00	1.16	.90	1.23	.83	.86	.99	1.10
.99	1.10	.96	1.17	.96	1.11	.98	1.10
.95	1.04	1.01	.97	1.05	.80	.96	.94
1.03	1.05	1.07	.98	.92	.94	1.04	1.00
1.07	1.04	1.04	1.03	.97	1.14	1.05	1.03
1.00	1.04	.97	1.02	.93	1.01	1.02	1.02
1.01	1.01	.97	1.02	.90	1.06	1.01	1.05
1.02	1.04	.98	1.00	1.01	.91	1.02	1.03

RACE AND THE ESTIMATION OF ANNUAL FERTILITY RATES

The comparison of the two sets of fertility rates obtained for the period 1955—59 by using estimates from the 1970 Census and the 1960 Census seeks to answer two questions: (a) Are the characteristics of the women stable over time? and (b) Are departures from the four assumptions approximately constant over time? Race is fixed, so a comparison of the two sets of estimates for the overlap period will show whether there are substantial net departures from the constancy assumption.

Table 5 presents the ratio of the 1960 Census estimates to the 1970 Census estimates for the five-year overlap period for whites and blacks. Looking first at the upper panel, we can see that the ratio for each white comparison is close to unity. In only one comparison is the ratio as low as 0.93 and in only three cases is it as high as 1.06. For blacks (lower panel), however, two observations can be made. In the first place, the deviations from unity tend to be greater than those found for whites—largely because of greater sampling errors. Second, and more intriguing, the ratios for women 15—19 years old are substantially below unity. Not only are they below unity, but also they tend

TABLE 5 Ratio of 1960 Census estimates to 1970 Census estimates for five-year overlap (1955—59), white and black women

Racial group and years being compared	Age-specific fertility rate comparisons						Total fertility rate comparison
	15—19	20—24	25—29	30—34	35—39	40—44	
White							
1959	1.00	1.03	1.03	1.04	1.05	.93	1.03
1958	1.01	1.06	1.03	1.06	1.04	1.03	1.04
1957	1.01	1.06	1.01	1.01	1.00	.97	1.02
1956	1.00	1.04	1.03	1.01	1.00	.97	1.02
1955	1.02	1.04	1.01	1.03	.99	.99	1.02
Black							
1959	.66	.96	1.09	1.03	1.08	.93	.96
1958	.81	.99	1.11	1.13	.99	.92	1.01
1957	.81	.94	1.01	1.07	.87	1.15	.96
1956	.85	1.04	.98	.97	1.00	.99	.98
1955	.87	.98	.95	1.03	.95	.96	.96

TABLE 6   Ratio of 1960 Census estimates to 1970 Census estimates
for five-year overlap (1955—59): Single year age-specific
fertility rate comparisons for black women

Years being compared	Age					
	15	16	17	18	19	20
1959	.31	.54	.67	.68	.83	.94
1958	.59	.62	.71	.95	.98	.91
1957	.57	.70	.82	.86	.90	.87
1956	.63	.83	.87	.87	.90	.99
1955	.82	.89	.82	.83	.90	.96

to get progressively lower from 1955 to 1959. Note that the ages of
the women on which the ratios are based decrease from 1955 to 1959.

To investigate this issue further, the same ratios were calculated for
blacks using single-year age-specific rates instead of the usual five-year
rates. Table 6 shows that as age increases (reading either horizontally
or vertically), the ratio of the two estimates approaches unity. Our sus-
picion is that, in the case of illegitimate births occurring to 15- and 16-
year-old black women,[2] there is a tendency for the biological mother
not to be recorded as the mother of the child until she reaches the age
of 18, 19, or 20. This practice, of course, would violate the assumption
that the proportion of children not living with their mothers is approxi-
mately constant over time. This phenomenon could take a number of
different patterns, all of which stem from the fact that a 15- or 16-year-
old mother is generally ill equipped to take care of a child. One pos-
sible pattern is that the biological mother and her child live with the
child's maternal grandmother, forming a three-generation household.
Probably the biological mother is attending school and her mother is
responsible for the infant's care. Under such circumstances, it is quite
possible that the infant is reported as the "grandmother's" child rather
than the "mother's" child. As the "mother" ages (and finishes school),
she may leave her parents' household (perhaps in order to get married),
bringing her child with her. In this case, it would be expected that the
child would subsequently be correctly reported as the "mother's"
child. Another possible pattern is that the child might be raised for a
few years by a friend or relative until the biological mother is in a po-

2   Illegitimate fertility is a substantial portion of all childbearing occurring to
black women 15 and 16 years old.

sition to raise the child. The point is that there appears, from the point of view of the census user, to be a pattern of young biological mothers becoming social "nonmothers" and then, subsequently, becoming social mothers.

There is another possibility that could explain the pattern in Table 6: black women who become mothers at ages 15, 16, and, to some extent, 17 are likely to be underenumerated in the census until they reach ages 18, 19, or 20. Both explanations are probably operating, and both are departures from the assumption that the amount of error introduced by not adjusting for mortality, children not living with their mothers, age misstatement, and underenumeration is approximately constant over time. Nevertheless, to put this discussion in perspective, it should be noted that this phenomenon has essentially no effect on the total fertility-trend estimates for blacks and has an effect on the age-specific estimates only at the youngest ages.

CONCLUSIONS

This paper has illustrated some of the possible pitfalls when all of the assumptions involved in the use of own-children data for the examination of differentials in fertility trends are not met. The intent was not to provide an exhaustive treatment of all possible effects of not meeting these assumptions, but rather to illustrate that when they are not met the effects on the resultant fertility-trend estimates can be substantial.

The largest effects occur when the constancy-of-group-membership assumption is violated through a *large* influx (or outflow) of people who are *dissimilar* to those they join (or leave). The one case that we found in our analysis of a violation of the constancy-of-error assumption did not have a great effect. In other settings, however, departures from this latter assumption could produce substantial effects.

The results shown in this paper also point out the utility of having data from two or more consecutive censuses. If annual fertility rates are estimated for each of the 15 years preceding the census,[3] then two estimates are available for a five-year overlap period. These two estimates can then be contrasted to provide clues as to whether or not the assumptions of using own-children data for the examination of differentials in fertility trends are being met.[4]

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3 Fifteen years is the maximum time period feasible in the United States (see Rindfuss, 1976).

4 The comparison of these two estimates does not address the issue of the accuracy of the *level* of the fertility rate estimate. The estimates are independent in that they are obtained from two different censuses, but the same methodology is used to obtain both sets of estimates.

Finally, it should be noted that, when own-children data are used to examine differentials in fertility trends in areas where only one census exists and little is known about the trends being examined, the analyst must be particularly sensitive to the possibility that the composition of socioeconomic groups has undergone recent change. Not only will the analyst not have the benefit of overlap period contrasts to identify possible pitfalls, but also the timing of a nation's first census or the first census to be released for analysis often occurs during a period of rapid social change, when the composition of socioeconomic groups is changing.

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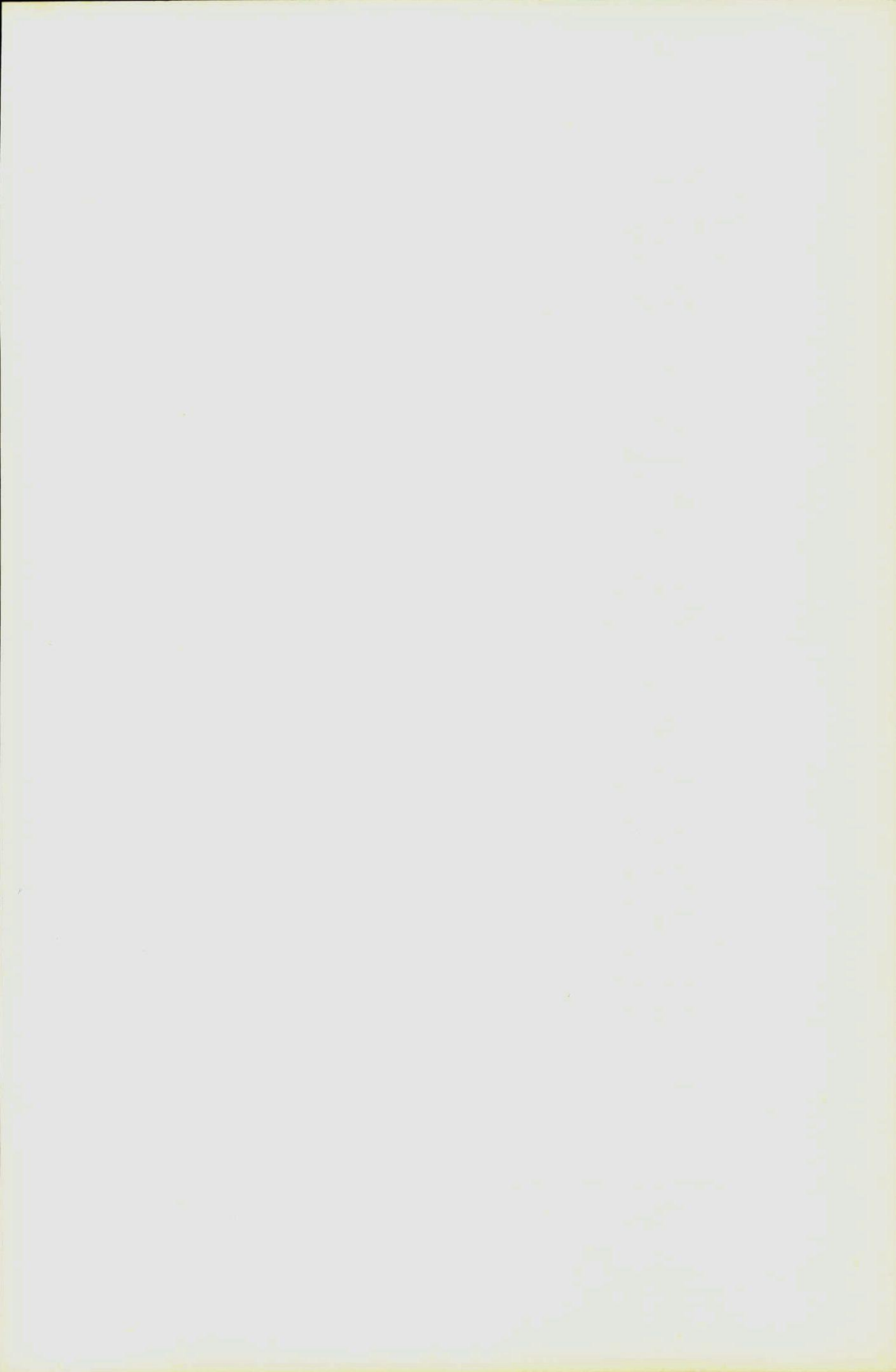
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