

THE DIFFERENTIAL FERTILITY AND POTENTIAL RATES OF GROWTH OF VARIOUS INCOME AND EDUCATIONAL CLASSES OF URBAN POPULA- TIONS IN THE UNITED STATES

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PAST studies of differences in fertility by socio-economic status have been restricted in large part to married women. This procedure has served to hold constant the variable of proportions married and in this sense has the virtue of any other type of standardization. Nevertheless, it is not through choice that there exist so few attempts at analyses of fertility of socio-economic classes based upon total female populations of childbearing age, irrespective of marital status. In view of the interest in reproduction rates (indices of the extent to which the fertility of population groups exceeds or falls short of replacement needs) as applied to large areas or countries as a whole, there is increasing desire to learn more about the potential rates of growth of groups classified along socio-economic lines. For a long time, too, students of population have recognized that a precise determination of variations in proportions married in relation to class differences in fertility constitutes one of the outstanding gaps in the literature.

Given the proper data, analyses of class differences in fertility, based upon all women of childbearing age regardless of marital status, would serve two important purposes. They would permit the computation of indices of population replacement and, used in conjunction with rates relating to marital fertility, would allow a more adequate interpretation of the character and trends of group differences in fertility. The latter function is of particular interest at the present time. Recent analyses have indicated that in so far

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as urban native-white married women are concerned, there has emerged an exception to the traditional pattern of consistent inverse association between nuptial fertility and socio-economic status.³ This exception consists in the failure of the wives of topmost socio-economic status to be universally characterized by lowest nuptial fertility. It is patently of interest to find out whether such indications persist when the analysis is made with reference to all women.

The dearth of studies of class differences in fertility relating to all women is due to the lack of available suitable data. Official data of the type required are available only for broad demographic groupings, such as those by area, type of community, color, or nativity. Furthermore, the requirements for analyses of this type have not generally been fulfilled by data collected under private auspices.

Although they afford no ideal approach to this problem, the fertility data collected by the National Health Survey have been studied from this point of view. Specifically, the present report is designed to give some indication of the potential rates of growth of urban white groups classified according to income and educational status, and to compare the present status of differential fertility in urban white populations when the factor of variation in proportions married is allowed to operate and when it is held constant.

SOURCE OF DATA AND DEFINITION OF TERMS

The National Health Survey was conducted by the United States Public Health Service, with assistance from the Works Progress Administration, during the fall and winter of 1935-1936. Though mainly designed to secure comprehensive data on incidence and severity of illness, material collected in the course of the *Survey* included

³ See (a) Notestein, F. W.: Differential Fertility in the East North Central States. The Milbank Memorial Fund *Quarterly*, April, 1938, xvi, No. 2, pp. 173-191. This study is based on previously unpublished family data from the 1930 Census for the East North Central States.

(b) Kiser, C. V.: Birth Rates and Socio-Economic Attributes in 1935. The Milbank Memorial Fund *Quarterly*, April, 1939, xvii, No. 2, pp. 128-151. This study is based on fertility data for urban married women of childbearing age canvassed by the National Health Survey.

important population data. Detailed records were secured in a house-to-house canvass of some 700,000 families in eighty-three cities⁴ of eighteen states. The present report, however, is limited to consideration of the urban white population, including approximately 632,000 families and about 2,250,000 persons, and embracing 596,474 females 15-44 years of age, of whom 336,226 reported themselves as married. A complete discussion of the method of selecting cities and sampling procedures is available elsewhere, so it is only necessary to state here that the procedure was designed to yield geographic representativeness of the urban population for the broad Eastern, Southern, Central, and Western areas. Because of administrative costs, there was no attempt to secure a representative distribution of the urban populations according to size of city. The proportion enumerated in large cities was too high and in smaller cities too low.⁵ In this report, however, efforts have been made to adjust the total urban rates for this deficiency.⁶ Furthermore, within each city chosen, attempts were made by the *Survey* to secure a

⁴ An additional city, Baltimore, was surveyed but was dropped from the tabulations due to atypical sampling procedure applied to its data. Special surveys were also conducted among about 37,000 households in selected rural areas of Michigan, Missouri, and Georgia, but they are not included in the present report.

⁵ For a list of the surveyed cities and full description of sampling procedures, see Perrott, G. St.J.; Tibbitts, C.; and Britten, R. H.: *The National Health Survey: Scope and Method of the Nation-wide Canvass of Sickness in Relation to its Social and Economic Setting. Public Health Reports*, September 15, 1939, 54, No. 37, pp. 1663-1687.

The following table concerning representativeness of the *Health Survey* urban population with respect to geographic region and city-size appears on page 1667 of the report.

REGION	REGIONAL DISTRIBUTION		SIZE	CITY SIZE DISTRIBUTION	
	Health Survey	1930 Urban		Health Survey	1930 Urban
ALL	100	100	ALL	100	100
Northeast	37	39	500,000 or More	43	29
North Central	33	33	100,000-499,999	31	23
South	18	18	25,000- 99,999	14	19
West	12	10	Under 25,000	12	29

⁶ The procedure was that of weighting the fertility indices for component area-size groupings according to the distribution of the 1930 Census urban population by corresponding area-size groups.

cross-section of its population with respect to socio-economic and demographic attributes. In all except one of the selected cities under 100,000 population, efforts were made at complete coverage of households, and within larger surveyed cities the sampling procedure was designed to be random.⁷

The *Survey* data pertinent to the present study include those concerning fertility and those permitting a classification of the population according to income and educational status. The births reported are those that occurred during the twelve months preceding the day of the canvass and are hence mainly as of the year 1935. The income recorded by the *Survey* relates to the total family⁸ and represents total amounts received⁹ during the survey year. Families identified as having been recipients of public assistance, such as work relief, direct relief, mothers' pension, pension for the blind, were classified "On Relief," irrespective of income.¹⁰

On the basis of returns concerning educational attainment of surveyed individuals, the females of childbearing age were divided for purposes of this study into the four groups: "entered college,"

⁷ Census Enumeration Districts were generally used as bases for selection of areas in sampled cities. The Enumeration Districts, or approximately equal portions of them, were listed in serial order and random selection was made by choosing every third, fourth, tenth, or eleventh unit, depending upon the predetermined sampling ratio. Areas thus chosen were scheduled for complete enumeration.

⁸ By coding definitions, the "family" included the head of the household and all persons in the household related to the head by blood, marriage, or adoption. If two or more unrelated persons made up a household, one was assigned as the head and only the income of the designated "head" was considered as the family income. For purposes of the present report, the income status of all persons unrelated to the head of the household was regarded as "unknown." See footnote 15.

⁹ Income was defined to include salaries, wages, business profits, receipts from boarders and lodgers, and income from investments. Families were not asked to report the exact amount of income but to designate which of several income intervals was appropriate to their respective situations. For a more detailed discussion of this aspect of the *Survey*, see National Health Survey: The Relief and Income Status of the Urban Population of the United States, 1935. Bulletin C, Division of Public Health Methods, United States Public Health Service, Washington, 1938.

¹⁰ Analysis of voluntary returns concerning income status of the relief group indicated that although a few reported receipts of \$1,000-\$1,499, the cases fell preponderantly in the "under \$1,000" category. Thus, although fertility and reproduction rates are presented separately for the "relief" and "nonrelief under \$1,000" groups, they are also shown in this study for the two groups combined.

“entered high school,” “entered seventh or eighth grade,” and “under seventh grade.” It should be emphasized that the highest educational level *reached* (not necessarily completed) was the determining criterion for this classification.

The various rates used in this report may be defined as follows:

Crude Birth Rate. The number of live births during one year per 1,000 total surveyed population.

Standardized Nuptial Fertility Rate. The number of live births during one year per 1,000 *married* women 15-44 years of age, in a standard married population. The rate was standardized here on the basis of the age distribution of the *married* white females 15-44 in the United States, as computed from the 1930 Census reports.

Standardized General Fertility Rate. The number of live births during one year per 1,000 females 15-44, regardless of marital status, in a standard total population. This rate was standardized on the basis of the age distribution of the *total* white female population 15-44 years of age in the United States, as computed from the 1930 Census reports.

Gross Reproduction Rate. The average number of daughters that would be borne to each individual woman among a cohort of females who start life together, on the assumption that all females will live through the complete childbearing span and that their fertility at successive ages will conform to age-specific fertility rates existing at the present time (in this case, in 1935). The rate is computed by adding existing age-specific fertility rates for women of given groups, regardless of marital status, and expressing the sum on the basis of number of *daughters per woman*.

Net Reproduction Rate. The rate is derived by reducing the age-specific fertility rates in accordance with age-specific mortality rates prevailing among the groups considered. It removes the assumption that the women will live through the entire childbearing period and is therefore designed to indicate the average number of daughters that would be borne to each individual woman under existing age-specific *fertility* and *mortality* conditions applicable to the group.

Limitations of Data. Certain limitations accompany the data and these are described at this point. It was not possible to secure a satisfactory test of the completeness of enumeration of births in the

Survey, due to the lack of official resident birth rates for white urban populations at the time of the investigation. For the past several years the Bureau of the Census has simply published numbers of births (instead of birth rates) for urban populations, due to uncertainties of population estimates for cities since 1930. It may be noted, however, that the official crude birth rate for the total rural and urban populations, white and colored combined, was 16.9¹¹ in 1935 and on this basis the rate of 13.8 derived from the *Survey* data for urban white populations may not appear unreasonably low. There are, however, internal indications of some underenumeration, particularly in the South. Preliminary investigations have indicated that this factor is not of sufficient seriousness to affect greatly either the absolute height of the rates or the relative differences of the rates for socio-economic classes in the combined areas. Further study is needed to determine a satisfactory method of adjusting for this factor of underenumeration. In the meantime, the reader must bear in mind the possibility of some underenumeration in considering the various rates presented.

Since the present report includes rates for total and married female populations of childbearing age, questions arise concerning the general representativeness of the *Survey* with respect to proportions married. It was found that the proportions of surveyed white females reported as married were consistently smaller than the proportions married among white females of comparable age and city of residence in the 1930 Census.¹²

The highest relative, although low absolute, differences occurred in the 15-19 age group. After age 25, the relative and absolute disparities were slight but still in the same direction. In view of the drastic slump in the marriage rate during the early years of the

¹¹ Bureau of the Census: Vital Statistics, Special Reports. Washington, Department of Commerce, January 19, 1937, iii, No. 1, p. 1.

¹² Typical of the comparisons are those given below for cities of 100,000-500,000 population, by geographic area of city and by age of women. The Census ratios pertain not to all

(Continued on page 373)

depression, it appears likely that the discrepancies in marriage frequencies of the younger age groups evident in the comparison of the 1935 *Survey* and the 1930 Census may be in major part an actual difference rather than an underenumeration of marriages by the *Survey*. The *Survey*-Census variations in classification of separated women may partially account for the small discrepancies at older ages. A woman who was neither widowed nor actually divorced, but to all intents and purposes permanently separated from her former husband, was coded by the Census as "married" but as "WDS" (widowed, divorced, or separated) by the *Survey*. When these situations are taken into account, the surveyed sample seems to be substantially representative with respect to proportions married.

Perhaps more important are possible biases accompanying classification of the population by socio-economic status. When studies of class differences in fertility are not restricted to married women, it is essential that the criterion of classification be equally applicable to women who are single and to those who are married.¹⁸ A corollary of this requirement is that the criterion selected should be of such nature that a woman's status is not changed by the event of marriage

cities of designated size and area but to weighted ratios for groups identical with those in the *Survey*. The weighting was done according to distribution of surveyed women by individual cities within the respective groups.

Percentage married—cities 100,000-500,000 population.

GEOGRAPHIC AREA	TOTAL 15-44		15-19		20-24		25-34		35-44	
	Survey	Census	Survey	Census	Survey	Census	Survey	Census	Survey	Census
East	51.8	56.2	3.5	6.0	32.9	39.5	68.1	73.8	76.5	79.6
Central	55.6	57.5	6.6	9.1	39.4	43.0	69.9	71.8	75.9	76.7
South	59.4	60.4	11.6	13.8	47.6	51.8	71.9	75.1	75.5	75.7
Mountain	57.4	58.1	7.9	9.0	45.9	47.0	76.7	77.7	79.7	80.7
Pacific	59.1	60.1	6.1	8.7	44.7	46.3	73.6	74.6	78.4	78.4

¹⁸ In a recent study based upon English materials, Tietze essayed to solve some of this difficulty by computing paternity rates according to occupational status of males. That is, he related births not to females but to males, using single as well as married men in the base populations. Of course, this procedure did not remove the factor of possible shifts in occupational status during the reproductive period. See Tietze, Christopher: Differential Reproduction in England. The Milbank Memorial Fund *Quarterly*, July, 1939, xvii, No. 3, pp. 288-293.

itself. Unless such conditions are met, part of the derived class differences in fertility may be of spurious nature, arising from undue selections in proportions married.

From theoretical considerations it would appear that a classification based upon family income does not meet the above conditions. As previously defined, "family income" relates to income of the head of the household and of resident persons related to the head by blood, marriage, or adoption. As used in individual cases, the attribute thus lacks uniformity of meaning and temporal stability. These deficiencies, of course, are present when the attribute is used for classifications of married women. When, for purposes of fertility analyses, the attribute is used for classification of females regardless of marital status, there would appear the possibility of an additional type of bias accruing from an unwarranted selection of unmarried (and therefore infertile) females into upper income brackets. Several factors would seem to lead toward this result. In the first place, there is the possibility of a "forced" selection of unmarried females into higher income categories simply by virtue of the greater likelihood that unmarried females 15-44 are gainfully employed and thus supplement the earnings of the household head. Even in cases where the family income represents the earnings of only one person, it is possible that the selective factors operate in the same direction in so far as females in the youngest age groups are concerned. In such cases the status of the unmarried female is likely to be determined by earnings of a middle-aged father, while that of the young married woman may depend upon earnings of a young husband who is just beginning his employment career.

There are, of course, situations serving to offset in some degree the biasing factors described above. The recorded status of the wife, like that of unmarried daughters, may be raised by multiple gainful employees within the household.¹⁴ Furthermore, unmarried wo-

¹⁴ There are, however, increased chances that the wife is 45 years of age and over and therefore not included in the tabulations if the household includes gainfully employed offspring.

men living alone and those coded as "heads" in abnormal (partner) households were classified according to their personal incomes.¹⁵ Whatever may be the net effect of possible biases accruing from the income classification, they should be kept in mind in considering the results presented.

Since it is not possible to test directly the importance of the above limitations, it is fortunate that similar analyses of fertility differentials could be made on the basis of educational status of females 15-44 years of age.¹⁶ "Educational attainment" is a highly personal attribute possessing uniformity of meaning when applied to unmarried and married females. It is not subject to immediate change in the event of marriage *per se*. Furthermore, its generally stable character would appear to give it better suitability for use in con-

¹⁵ It should be stated, however, that enumerated persons unrelated to household heads were deliberately consigned to the "unknown income" category in order to prevent their classification according to income status of the families with whom they resided in the capacity of roomers, servants living in, etc. The original coding procedure was to assign these persons to the income group corresponding to that of the family with whom they lived. The original type of classification was found to be of minor consequence in so far as nuptial rates are concerned because such unrelated persons constituted a negligible proportion of the married white females 15-44 years of age. For all other fertility rates by income status, it was found desirable deliberately to relegate unrelated persons to the "unknown income" category. This appeared especially wise in so far as resident servants were concerned. Since these were mainly unmarried and attached to families earning \$3,000 and over, their inclusion would have lowered unduly the fertility rates of the higher income group. Of the 9,000 female servants 15-44 years of age, about 60 per cent were employed by families earning \$3,000 and over. It would have been preferable to have the actual income status of unrelated members of households, but in view of the above situation, exclusion seemed preferable to retention in specific family income classes. It should be emphasized that unrelated persons were not excluded from the base populations when the rates pertained to all incomes, and it should also be emphasized that unrelated persons were included and classified in their own right on the basis of educational attainment.

¹⁶ It should be stated that although they are designed to relate to the total surveyed urban white female population 15-44 years of age, the general fertility and gross and net reproduction rates according to educational status were derived in part on a sampling basis. The numbers of white births by age and educational status of the mother were available from tabulations of the complete data that had been made for computation of nuptial fertility rates. Due to the absence of cross classification by education and age (in five-year groups) for all urban white females 15-44 years of age in the total survey, however, the base populations were secured from tabulations of a 0.5 per cent random sample of the punch cards which had previously been mechanically established for sundry uses in connection with analyses of *Health Survey* data. This established sample has been tested by machining items which were tabulated in full. The derived number of women by five-year age groups in each of the four broad educational classes of this sample was multiplied by 200, and the resulting numbers were related to the actual corresponding distribution of births for the computation of rates.

nection with reproduction rates than is afforded by an index based upon family income. This latter point will be discussed in a later section but suffice it to say here that the differentials in general fertility and reproduction by income status may perhaps be better evaluated by comparison with corresponding analyses based upon educational attainment.

ANALYSIS OF THE DATA

Crude Birth Rates. Before considering refined fertility rates based upon female populations of childbearing age, it may be of interest to observe the character of crude birth rates per 1,000 total surveyed urban population in the various family income classes. These rates

Table 1. Crude birth rates, standardized general and nuptial fertility rates, and gross and net reproduction rates in 1935 among the white urban populations in the National Health Survey, by socio-economic classes.¹

SOCIO-ECONOMIC CLASS	CRUDE BIRTH RATES	STANDARDIZED FERTILITY RATES ²		REPRODUCTION RATES	
		Nuptial	General	Gross	Net ³
(1)	(2)	(3)	(4)	(5)	(6)
<i>Annual Family Income</i>					
\$3,000 and Over	7.8	84.6	31.1	.46	.42
\$2,000-\$2,999	10.4	84.8	41.6	.61	.55
\$1,500-\$1,999	12.8	93.0	48.4	.70	.63
\$1,000-\$1,499	15.8	102.5	60.5	.86	.75
Under \$1,000 (Relief and Non-relief)	17.3	132.9	82.1	1.17	.96
Under \$1,000 (Nonrelief)	15.5	110.1	66.1	.93	.79
On Relief	19.6	166.3	99.4	1.43	1.15
<i>Educational Attainment</i>					
College	—	96.9	39.1	.57	.52
High School	—	102.5	53.7	.77	.68
7th or 8th Grade	—	117.5	71.0	1.00	.86
Under 7th Grade	—	130.7	82.9	1.18	.97
TOTAL POPULATION	13.8	108.9	56.8	.81	.70

¹ Based on data from the National Health Survey, conducted by the United States Public Health Service, 1935-1936. All rates were adjusted according to the distribution of the urban population in the United States by geographic region and size of city, as in the 1930 Census.

² The nuptial fertility rates were standardized for age on the basis of the white married female population (15-44) in the United States, 1930, and the corresponding total female population (15-44) was used for standardizing the general fertility rates.

³ Differential mortality rates used for computing net reproduction rates by economic class were based on Hauser's data for Chicago (see footnote 24).

(Table 1, Column 2) ranged from 7.8 for populations in family income classes of "\$3,000 and over," to 17.3 for all in the "under \$1,000" group (regardless of relief status), and to 19.6 for the relief group considered separately.¹⁷

Crude birth rates, of course, are not only influenced by proportions married but also by factors such as age-composition and sex ratios. As presented here, however, they serve to give some indication of the character of differentials in birth rates by income¹⁸ when the total white urban population is used as the base and when all variables, as actually found in such populations, are allowed to operate. Such data are rarely found in the literature on differential fertility, and it is mainly for this reason that they have been included in this report.

Nuptial Fertility Rates. As previously mentioned, former fertility studies based upon data from the present *Survey* have been confined to married women. These have suggested that in so far as *marital* fertility is concerned there may be some departure from the traditional inverse association between fertility and socio-economic status. An outstanding aspect of this situation is summarized in Figure 1 (based on Table 1, Column 3) which pertains to standardized nuptial fertility rates of surveyed urban white wives according to family income and educational status. Although the general picture is one of inverse association between nuptial fertility and amount of family income, it is seen that the average fertility rates were about the same for wives reporting family incomes of "\$3,000 and over" and for those reporting "\$2,000-\$2,999."¹⁹ On a straight

¹⁷ The reader is cautioned against attributing excessive fertility among relief recipients to the extension of relief itself. A selective factor is doubtless inherent in the greater tendency of welfare organizations to grant assistance to families with infants or expectant mothers than to other indigent families.

¹⁸ Tabulations were not made to permit the computation of crude birth rates according to educational status.

¹⁹ This situation is consistent with what has been reported in a previous analysis for *native* white wives in combined areas of the *Survey*. Subdivisions of those data by area and size of community, however, indicated that in some area-size groups nuptial fertility rates

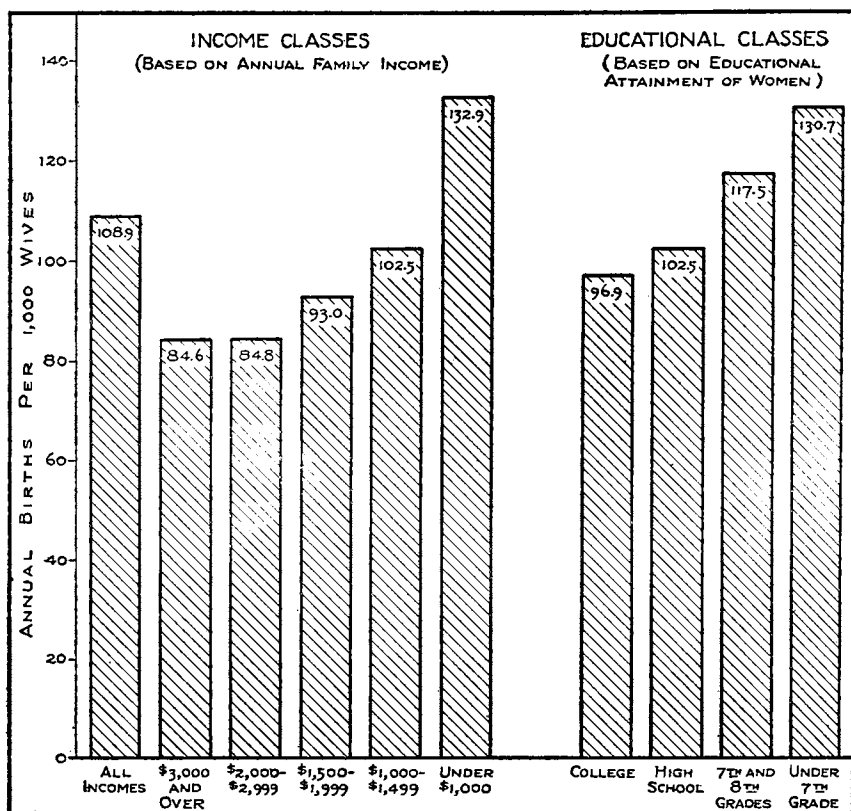


Fig. 1. Standardized nuptial fertility rates for 1935 among white urban wives of childbearing age, in the National Health Survey, by family income and educational status. (From Table 1, Column 3.)

income basis, the widest disparity in fertility of wives in successive income classes was that observed between the "under \$1,000" and "\$1,000-\$1,499" groups. Class variations in fertility appeared to be of relatively small import above the \$2,000 income level.

were in some instances higher and sometimes lower among native-white wives reporting family incomes of "\$3,000 and over" than for those reporting \$2,000-\$2,999. The data for all urban native-white wives classified by educational status also indicated a pattern of differentials in nuptial fertility similar to that observed in the present analysis for the urban white married women regardless of nativity. When the native-white wives were classified according to occupational status of the head, the average urban fertility rate for wives of professional men was somewhat higher than for wives of business men. The point to be emphasized here, however, is that the inclusion of foreign wives in the present total urban white sample did not substantially alter the character of variations in nuptial fertility according to income or educational status.

See Kiser, C. V., *op cit*, pp. 136-138.

Essentially the same type of situation is true of nuptial fertility rates according to education of the married women. After differences in age-composition were standardized, the fertility rate for college wives was only a little below that for wives reporting high school status. It is well known, however, that whatever may be the fertility rates of college women who marry, marriages are later and less frequent among college women than in the general population.²⁰ The effect of class differentials in marriage frequencies at different ages is given full play in the general fertility rates and in gross and net reproduction rates presented in the following pages.

Standardized General Fertility Rates. Our attention is turned now to the character of differential fertility by income and educational classes when the data relate to all surveyed urban white females of childbearing age, married and unmarried combined. The standardized general fertility rates (Table 1, Column 4) represent the average number of births during one year per 1,000 surveyed females 15-44 years of age, grouped according to family income status and according to educational attainment of the women. It is readily apparent that when the analysis is not restricted to married women, the traditional inverse association between fertility and income status is sharply manifested. Attention is directed especially to the consistent extension of this type of relation into the upper income categories. In contrast to the equality of nuptial fertility rates for married women in the two highest income classes, the general fertility rate for the "\$2,000-\$2,999" group was about 34 per cent higher than that for the "\$3,000 and over" group.

A consistently sharp inverse association is also found in the standardized general fertility rates for women classified according to educational attainment. The rate for women reporting less than seventh grade formal education was a little over twice as high as that for women reporting college attendance, and the rate for wo-

²⁰ For studies bearing on this point, see Lorimer, F. and Osborn, F.: *DYNAMICS OF POPULATION*. New York, The Macmillan Company, 1934, pp. 320-325.

men of high school status surpassed that for college women by 37 per cent. When the analysis was confined to married women (nuptial fertility rates), it was found that the rate for wives of high school rank was only 6 per cent higher than that for married women of college attainment. Thus, when the influence of class differences in proportions married is brought into the picture, no exception is found to the inverse order of income and educational classes with respect to fertility.

Gross Reproduction Rate. Despite differences in base populations, all three types of rates presented in foregoing pages are annual rates. In order named, the crude birth rates, the nuptial fertility and general fertility rates represent average number of live births during one year per 1,000 total population, per 1,000 married women 15-44 years of age, and per 1,000 females of childbearing age regardless of marital status. A different concept is introduced by the gross reproduction rate, although this index is derived from the basic age-specific fertility data needed for computing the standardized general fertility rate discussed above. As stated before, this rate is designed to represent the average number of *daughters* that would be borne throughout the entire childbearing period among a cohort of females starting life together, under the assumption that existing levels of age-specific fertilities will prevail and under the further assumption that all such women survive the complete childbearing span.²¹ The assumption that each female will live through the complete childbearing age is unwarranted, but the gross reproduction rate is merely a device to portray the fertility of the group apart from mortality. The age-specific mortalities are taken into account in the net reproduction rates to be considered in later pages. It is, of course, also unlikely that existing age-specific fertilities will persist

²¹ The rate is computed by the simple addition of age-specific birth rates of females irrespective of marital status, the sum multiplied by five if quinquennial age groups are used. In this study the resulting sum was reduced to represent average number of daughters (instead of births) *per individual female*. The assumed sex ratio at birth was 1,058 males per 1,000 females.

throughout the oncoming generation, but a similar type of assumption with reference to mortality is conventionally made in the construction of life tables.

To some degree the lack of rigidity of socio-economic groups must be taken into account in any type of analysis of class differences in fertility. The factor possibly has special relevance to reproduction rates²² based on such attributes as occupational status, amount paid for rent,²³ or family income. Since such rates are derived by addition of age-specific fertility rates for all females in a given class, there is the postulate of stability of rank during the childbearing period. Actually, no such stability exists. On the other hand, the upward and downward shifts may be mutually compensatory, at least in part. Whatever the net result of shifts in economic status may be, the educational attainment of adults is a more stable attribute, and analyses based thereon should provide some check on those based upon family income.

The above conditions must be kept in mind in interpreting the reproduction rates. It must be emphasized that these rates are designed simply to give a more or less general portrayal of reproductivity in the various socio-economic groups *on the basis of existing age-specific fertility levels*. The age-specific fertilities of the surveyed urban white females in families reporting under \$1,000 income were such as to yield a gross reproduction rate of 1.17. This may be interpreted to mean that 1,000 females starting life together in this class would bear 1,170 daughters (or an average of 1.17 per woman) if existing age-specific fertilities continue, if all females survive the childbearing period and remain in the "under \$1,000" income class during the childbearing period. The corresponding rate for women

²² Changes of socio-economic status are also specially relevant to studies of differential fertility when the index of fertility pertains to past histories of births (such as total number of children ever born and to less extent to children under 5) instead of simply expressing average number of births during one year.

²³ For references to analyses of reproduction rates according to occupational status and rentals, see footnotes 13 and 24 respectively.

in the "\$3,000 and over" income group was 0.46, less than half as high as that for the "under \$1,000" group.

Since the basic materials for the gross reproduction rates and for standardized general fertility rates are identical (being age-specific birth rates during 1935 for females 15-44 regardless of marital status) it is natural that the pattern of class differences in gross reproductivity is of similar character to class differences in general fertility rates. In Table 1 (Column 5) there is complete accordance with the traditional inverse relation of fertility and socio-economic status. There were consistent and well-defined differences between the rates for successive income classes, and these extend into the higher income groups. The rate for females classed in the \$2,000-\$2,999 category was about 33 per cent higher than for females reporting family incomes of \$3,000 and over.

The gross reproduction rates of the population differentiated by educational classes (Table 1, Column 5) were computed as 1.18, 1.00, 0.77, and 0.57 for females reporting educational attainment under seventh grade, seventh-eighth grades, high school, and college, respectively. The fertility, thus expressed, of the females with less than seventh grade education was about 53 per cent higher than that for high school women, and was 107 per cent higher than the fertility of women with college education. The fertility of women with high school education exceeded that of women with college education by some 35 per cent. In the analysis confined to married women, the rate for high school wives was only about 6 per cent higher than that for college wives.

In Table 2 (top section), the gross reproduction rates according to income are presented for cities grouped according to size. A consistent decline of the rates with increasing income is uniformly found regardless of size of city. Attention is directed to the inverse relation between gross reproduction rates and size of city, no matter which income group is considered. This situation has been found in other studies and may perhaps be partially explained by a nearer

SIZE OF CITY	ANNUAL FAMILY INCOME							
	All In- comes	\$3,000 & Over	\$2,000- \$2,999	\$1,500- \$1,999	\$1,000- \$1,499	Under \$1,000		
						Total	On Relief	Non- relief
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>Gross Reproduction Rates</i>								
Cities with Populations:								
100,000 and Over	.73	.42	.53	.67	.81	1.03	1.27	.85
25,000-99,999	.88	.48	.66	.68	.85	1.23	1.55	.98
Under 25,000	.92	.52	.71	.78	.96	1.31	1.64	1.05
ALL CITIES	.81	.46	.61	.70	.86	1.17	1.43	.93
<i>Net Reproduction Rates²</i>								
Cities with Populations:								
100,000 and Over	.63	.38	.48	.59	.71	.85	1.02	.72
25,000-99,999	.75	.44	.60	.61	.74	1.01	1.25	.83
Under 25,000	.79	.47	.65	.70	.84	1.08	1.32	.89
ALL CITIES	.70	.42	.55	.63	.75	.96	1.15	.79

¹ The rates for groups of cities by size were adjusted to the distribution, by area of the 1930 Census populations in all cities of respective size.

² See Table 1, footnote 3.

Table 2. Gross and net reproduction rates of the surveyed white urban populations in the United States by income and size of city, 1935.¹

approach to the rural way of life in smaller cities. It is possible, too, that a selective process of migration from rural areas to smaller cities is directly involved.

Net Reproduction Rates. As stated above, the net reproduction rates are derived by reducing the specific fertility rates according to the prevailing age-specific mortality rates for the group considered. Thus a net reproduction rate of 1.5 means that at existing age-specific fertility and mortality²⁴ rates, a cohort of 1,000 females start-

²⁴ The differential mortality rates, used in computing the net reproduction rates for various classes, were adapted from Hauser's data for Chicago Census tracts, grouped according to median rentals. See Hauser, P. M.: *Differential Fertility, Mortality, and Net Reproduction in Chicago, 1930*. Table 20. (Unpublished doctoral dissertation, University of Chicago, 1938.)

Note: The above is a careful study which has the advantage of being based on birth registration for an entire large city. It should be realized, however, that as in other studies based upon official data, the unit of classification was not rent paid by the individual family but the median rental for the Census tract in which the individual lived.

ing life together would bear a total of 1,500 daughters (or an average of 1.5 per woman). With such a rate, the ratio of the present generation to the following one would be 1.0: 1.5. A net reproduction rate of 1.0 signifies that the rate is just sufficient to keep the population from ultimate decline. A rate of 0.75 means a potentially decreasing population, the ratio of the present to the next generation being 1.0:0.75. The net reproduction consequently indicates, in the above sense, the potential rate of increase or decrease per generation.

The net reproduction rate for the entire urban white surveyed females, regardless of income status, was found to be 0.70. The rate by size of community was 0.63 in cities of over 100,000 population, 0.75 in cities of 25,000-100,000 population, and 0.79 in cities with fewer than 25,000 inhabitants (Table 2). These rates are significantly lower²⁵ than those derived from official data for 1930. This is doubtless accounted for in part by declines in urban fertility during the period 1930-1935, but it should also be emphasized as indicated above, that there was possibly some underenumeration of births by the *Survey* in certain areas.²⁶ Some caution should therefore be used in the interpretation of absolute heights of the various rates. For instance, it is likely that the average net reproduction rate for the "under \$1,000" group should be somewhat above instead of just under the requirements for population replacement. (Figure 2; Table 1, Column 6.) The same is probably true in regard to the net reproduction rate for the "under seventh grade" group. It seems improbable, however, that underenumeration of births was great

²⁵ By way of comparison it may be stated that analyses based upon official data for 1930 indicated a net reproduction rate of 0.84 for the total white urban population; 0.76 for cities of 100,000 or more population; 0.86 for cities of 25,000-100,000 persons; and a rate of 0.94 for cities with fewer than 25,000 inhabitants. See Karpinos, Bernard D.: *The Differential True Rates of Growth of the White Population in the United States and Their Probable Effects on the General Growth of the Population*. *The American Journal of Sociology*, September, 1938, xliv, pp. 251-273.

²⁶ Another factor which should be mentioned is that the *Survey* was somewhat overloaded with large cities. The procedure of weighting rates according to distribution of the urban population by size of city may not have wholly eliminated the influence of this factor because the size groups are broad.

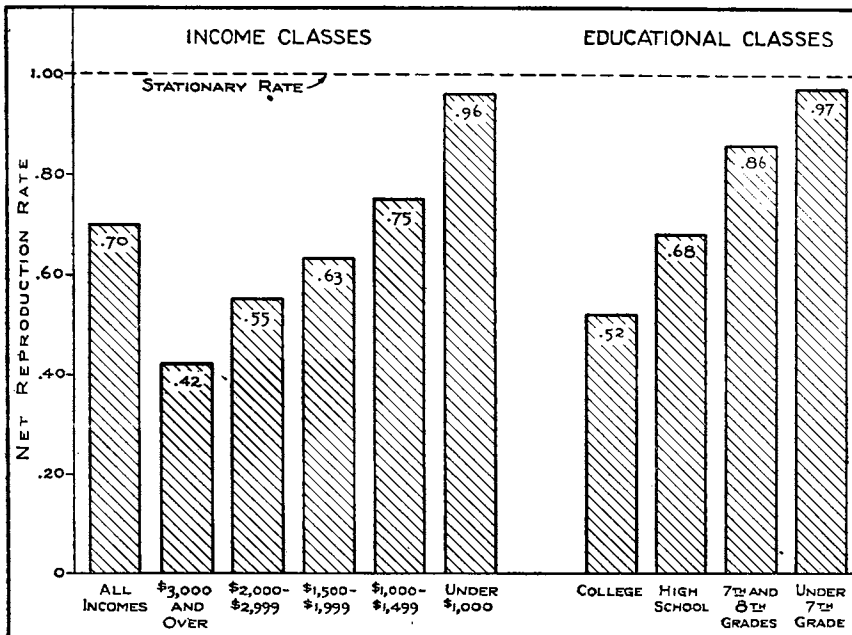


Fig. 2. Net reproduction rates of the white urban populations in the National Health Survey, by family income and educational status, 1935. (From Table 1, Column 6.)

enough to move any of the remaining rates from below to above unity. In other words, urban white women in families with incomes as high as \$1,000 and those with as much as seventh or eighth grade schooling, were characterized by average net reproduction rates too low for permanent renewals of their population.

The net reproduction rates exhibit a consistent inverse relationship between fertility and socio-economic status. The inter-class divergencies of the net rates are not so sharp as those of the gross rates, due to the relatively lower mortality rates assumed for the upper income groups. Nevertheless, the range extended from 0.42 in the income group of "\$3,000 and over" to 0.96 for the "under \$1,000" group. The rate for females in the "\$2,000-\$2,999" group was about 31 per cent higher than that observed for women in families reporting family incomes of \$3,000 and more.

As classified by educational status, the net reproduction rates ex-

tended from 0.52 for college women to 0.97 for women reporting less than seventh grade schooling. The rate for high school women (0.68) surpassed that for college women by about 31 per cent.

It is therefore apparent that when indices of fertility are related to the total female population, there is consistency in the pattern of inverse association between fertility and socio-economic status. Not only is this true, but the relative spread of the rates is wider between extreme and successive income or educational groups than is found when the factor of marriage frequencies is held constant. This fact is explicitly demonstrated in Table 3 and Figure 3 where rates for each income and educational group are expressed as percentages of the corresponding type of rate for the total populations involved.²⁷

Table 3. Relative ratios of the various indices of fertility for specific socio-economic classes to the corresponding rate for all socio-economic classes of respective urban white populations involved.¹ Rate for all classes expressed as 100.

SOCIO-ECONOMIC CLASS	CRUDE BIRTH RATES	STANDARDIZED FERTILITY RATES		REPRODUCTION RATES	
		Nuptial	General	Gross	Net
(1)	(2)	(3)	(4)	(5)	(6)
<i>Annual Family Income</i>					
\$3,000 and Over	54	79	55	57	60
\$2,000-\$2,999	72	79	73	75	79
\$1,500-\$1,999	89	87	85	86	90
\$1,000-\$1,499	110	95	107	106	107
Under \$1,000 (Relief and Non-relief)	120	124	145	144	137
Under \$1,000 (Nonrelief)	108	102	116	115	113
On Relief	136	155	175	177	164
<i>Educational Attainment</i>					
College	—	90	69	70	74
High School	—	95	95	95	97
7th or 8th Grade	—	109	125	123	123
Under 7th Grade	—	121	146	146	139
TOTAL POPULATION	100	100	100	100	100

¹ Derived from Table 1; see also footnote 27.

²⁷ For the above purpose, however, the crude and nuptial fertility rates for the base populations were adjusted according to the distribution of females 15-44 years of age, by income and by education. This was done in order to prevent unequal influence of class composition on the various base rates. The adjusted crude birth rate was 14.4; the adjusted nuptial rate for analysis by income was 107.4; and for analysis by educational status, 108.0.

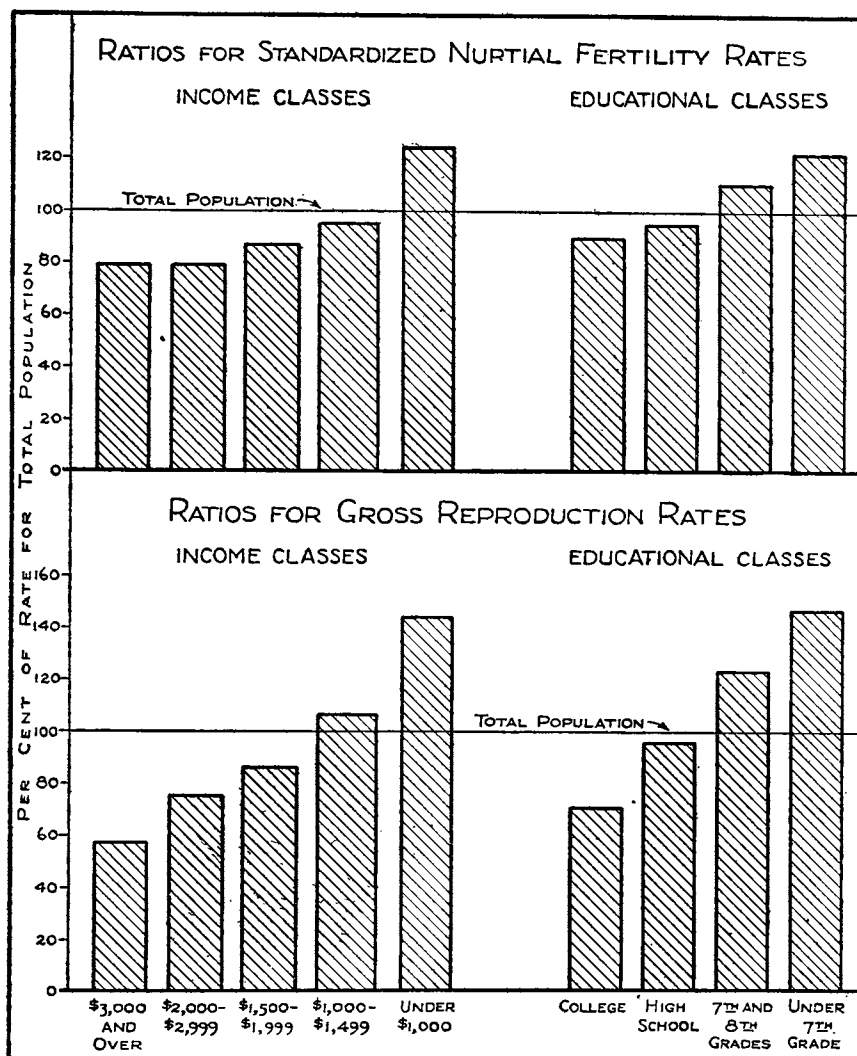


Fig. 3. Chart showing inter-class divergence of fertility rates restricted to married women 15-44 (top section of chart) in comparison with the inter-class spread of gross reproduction rates (based upon total females 15-44, lower section of chart). In each case the rate for all classes is expressed as 100. (From Table 3, Columns 3 and 5.)

It is seen, for instance, that when the analysis is restricted to married women (nuptial fertility rates), the rate for the "under \$1,000" group is 24 per cent higher than the corresponding rate for all incomes. Comparable excesses were 44 per cent and 37 per cent for

SOCIO-ECONOMIC CLASS	AGE OF WOMEN AT ENUMERATION					
	15-19	20-24	25-29	30-34	35-39	40-44
(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Annual Family Income</i> ¹						
\$3,000 and Over	1.7	15.3	42.9	63.4	74.2	77.0
\$2,000-\$2,999	2.4	25.4	60.1	75.9	80.5	82.8
\$1,500-\$1,999	3.6	35.0	68.2	79.6	83.0	82.8
\$1,000-\$1,499	5.9	48.0	73.6	80.7	82.1	80.1
Under \$1,000 (Relief and Non-relief)	9.6	48.8	70.9	75.9	74.6	72.6
Under \$1,000 (Nonrelief)	11.5	49.6	69.1	73.8	72.5	70.1
On Relief	7.8	47.5	73.8	78.9	77.5	76.2
<i>Educational Attainment</i> ²						
College	2.0	22.7	55.8	60.0	80.6	79.0
High School	5.9	41.9	65.1	81.5	79.3	82.6
7th or 8th Grade	12.2	50.1	76.9	74.2	75.0	76.7
Under 7th Grade	15.6	50.6	72.6	90.7	80.9	72.3

¹ Proportions married by income status, based on the *Survey* for a group of cities described in footnote 28. Includes all in the household, regardless of relationship to household head.

² Proportions married by educational status, based on data for all cities included in the *Survey*.

Table 4. Proportions married among surveyed urban white females, by age, family income, and educational attainment.

gross and net reproduction rates, respectively. Similarly, the nuptial fertility rate for the "\$3,000 and over" income group was 21 per cent lower than the average corresponding rate for all incomes, but the gross reproduction and net reproduction rates for this income group were, respectively, 43 and 40 per cent lower than such rates for the total incomes. Essentially the same situation is found in comparing the spread of the rates according to educational status when the analysis is and is not restricted to married women. Differentials in fertility are strikingly magnified by introduction of the influence of variations in proportions married.

The actual variations in proportions married in the different socio-economic classes are of interest in themselves. These data are presented in Table 4 by family income for a group of cities²⁸ com-

²⁸ The restriction to partial areas for the above analysis by income was made in order to show proportions married by five-year age intervals throughout the entire childbearing span. Only for the cities represented did the Health Survey tabulate the general female population 15-44 by quinquennial age groups classified by family income. The areas included above are mainly large cities in the Eastern, Central, and Southern regions.

prising 76 per cent of all surveyed urban white females 15-44 years of age, and by educational status for urban white women of child-bearing age in the total *Survey*. The tendency for proportions married to vary inversely with income and educational status is manifested fairly consistently for ages under 35.²⁹ At ages 15-19, approximately 10 per cent of females reporting family incomes of under \$1,000 were married as compared with less than 2 per cent of those reporting family incomes of \$3,000 and over. Corresponding percentages were 49 and 15 at ages 20-24; and 71 and 43 at ages 25-29. Similarly, about 16 per cent of the females 15-19 reporting under seventh grade schooling were married as compared with 2 per cent of those of the same ages reporting some college attendance. Corresponding percentages were 51 and 23 at ages 20-24, and 73 and 56 at ages 25-29. Special attention is called to the striking differences between the two groups ranking highest with respect to income and educational status. For instance, at ages 20-24, 25 per cent of the females reporting family incomes of \$2,000-\$2,999 were married as compared with only 15 per cent of those in the "\$3,000 and over" group. The proportion married among females 20-24 reporting high school training was almost twice as great as that for college women of identical ages. The latter situations, of course, are basic to the wider discrepancy in fertility of these groups when the index is based upon total female populations instead of married women. The effect of variations in proportions married on the pattern of differential fertility is not confined, of course, to socio-economic groupings. It is found in considering fertility differentials by rural-urban residence, and also in comparing separate states, especially northern states with southern states.³⁰

²⁹ The failure of this association in the age groups 35-39 and 40-44 may be due in part to the fact that widows, divorcees, and women permanently separated from former husbands are not included as "married." The analysis pertains not to proportions "ever married" but to those "married" on the day of the enumeration.

³⁰ This problem is discussed by B. D. Karpinos in a forthcoming paper "The Concept of Fertility and its Implications."

CONCLUSIONS

The broad implications of this paper may be summarized as follows:

1. Although recent studies have provided suggestive evidence of a diminishing importance of class differences in the fertility of urban white *married women*, the traditional inverse relation between fertility and socio-economic status is found still to be consistently and sharply manifested when the analysis embraces *all* urban white women of childbearing age.

2. The above situation is due to the fact that there is a sharp inverse association between *proportions married* and socio-economic status, especially when younger ages are considered.

3. The average net reproduction rate for the surveyed urban white females was 0.70, the range extending from 0.42 for females reporting family incomes of \$3,000 and over to 0.96 for all in the "under \$1,000" income group; and from 0.52 for women reporting college attendance to 0.97 for those who attained less than seventh grade status. Although the absolute height of these figures cannot be interpreted too closely, they afford indications of the very low reproductivity of the groups ranking highest in socio-economic status. The average net reproduction rates for urban white groups, least privileged with reference to income and educational ranking, were, on the other hand, at or above the levels required for permanent population replacement.

4. One cannot state, of course, that the restriction or non-restriction to married women is universally the preferable procedure in studies of differential fertility. Both approaches are important and, although they serve different purposes, both are needed for proper interpretation of trends in group differences in fertility. The confining of such analyses to married women serves to hold constant the factor of variation in proportions married and permits a better understanding of what is taking place in group differentials in the

fertility of married women. On the other hand, the computation of reproduction rates requires the inclusion of unmarried women, for the potential rate of growth of a population depends upon frequency of marriage at different ages as well as marital fertility. Thus, if there is undue neglect of the rôle of differences in proportions married, there is danger that results based exclusively upon married women will be misinterpreted. The data presented in this report clearly show that approximate equality of the fertility rates for *married* women in the two upper income groups and in the two upper educational groups must not be interpreted as indicative of equality in potential rates of growth. The reproductivity of females reporting family incomes of \$3,000 and over was a good deal lower than that for comparable women reporting \$2,000-\$2,999; and that of college women was significantly lower than that of women of high school status.