



# Special Studies

## PRELIMINARY NATIONAL CENSUS SURVIVAL RATES, BY RACE AND SEX, FOR 1960 TO 1970

This report presents a set of preliminary national census survival rates for use in estimating net migration during the decade, 1960 to 1970, for various subgroups of the United States population, particularly geographic subdivisions. Separate figures are given for the white population, the Negro-and-other-races population, and the Negro population, by sex.

In calculating national census survival rates, an attempt is made to eliminate all migration into and out of the United States for the intercensal period, that is, to derive a "closed" population. (Such a population can only be approximated for the United States but little error is believed to result from this approximation.) The present set of rates achieves this by excluding intercensal net civilian (alien and citizen) migration from the population including Armed Forces overseas in 1970. Specifically, these national census survival rates are based on the total resident population of the United States for 1960 and 1970, adjusted to include U.S. Armed Forces overseas and to exclude net civilian migration to the United States during the 1960-70 decade.

In general, national census survival rates are based on the population as enumerated by age in two successive censuses and represent the ratio of the population in a given age group at the second census to the population in the same cohort at the earlier census, adjusted to exclude net immigration during the intercensal period. The use of national census survival rates involves the following general assumptions:

1. National mortality rates for the decade represent mortality in each area of estimate adequately.

2. The relative change in the percent coverage for a particular age cohort between the two censuses for the country as a whole adequately reflects the situation in each geographic area for which net migration will be estimated.

3. For the national census survival rates by race, the relative change between the two censuses in classification by race for the country as a whole essentially characterizes each area of estimate separately.

In other words, in employing national census survival rates it is assumed that there are no significant differences from area to area, for a given sex-race group and age cohort, in mortality levels, completeness of coverage in the 1970 census relative to the 1960 census, and the degree of consistency of reporting race between 1960 and 1970. The assumption relating to mortality is essentially valid, but information on the assumptions relating to coverage and reporting of race is lacking at this time.

Since national census survival rates are affected not only by mortality during the intercensal period but also by changes in census coverage from one census to the next, the ratios may change irregularly from one age group to the next and may even have a value in excess of unity. The national census survival rates presented here exclude the effect of both net internal migration and net immigration since the national population is used and net immigration is removed from the population (at the second census). When they are applied to the population of some local area in 1960, the difference between the expected survivors in 1970 and the census population in 1970 represents essentially net migration (i.e., net internal migration and net immigration),

since mortality and changing census errors have been largely allowed for by the national census survival rates.

National census survival rates have been widely used for the purpose of estimating net migration for States and local areas between censuses because of the advantages they have in this application over reported death statistics by age or over life table survival rates. The use of death statistics for local areas is very laborious and often the age at death is not accurately reported, especially at the older ages. Estimates of net migration derived by use of life table survival rates suffer from the distorting effect of coverage errors at the two censuses. Estimates derived by use of national census survival rates are distorted mainly as a result of the coverage error at the second census, but rates of net migration computed with the population as enumerated in the second census as the base are "accurate," given the general assumptions of the method.

These survival rates are designed for developing estimates of net migration by age (sex and race) for geographic subdivisions of the United States consistent with the tabulations of population by age (sex and race) given in the PC(1)-B reports of the 1970 Census of Population. The rates for the Negro-and-other-races population are overstated to some extent because persons of "other races" appear to have been more completely reported in 1970 than in 1960 and because the count of "other races" in the 1970 census includes a number of persons who marked the "other races" category on the questionnaire and supplied a write-in entry indicating that they belonged in fact to the white category. Although, in general, the questionnaire entries were edited, the editing was not completely carried out. The applicability of the national census survival rates to the Negro-and-other-races population in local areas depends in part on the extent to which the racial composition (i.e., the percent of "other races") in the local area and the overstatement of "other races" in the local area differ from the national average.

In the usual application of national census survival rates in the estimation of net migration for a local area, the following computations are made:

1. The population by age as enumerated in the earlier census ( $P_0$ ) or births during the decade (B) are multiplied by the national census survival rates ( $r$ ), to obtain the expected population by age at the date of the later census on the assumption that there had been no migration ( $P_0r$  or  $Br$ ).

2. The expected population ( $P_0r$  or  $Br$ ) by age is subtracted from the population by age as enumerated at the later census ( $P_1$ ), to obtain the estimates of net migration ( $M$ ) for the particular age cohort.

The formulas for this variation of the national census survival rate method (forward procedure) are as follows, therefore:

$$M = P_1 - P_0r, \text{ or } M = P_1 - Br$$

Such calculations are carried out separately for each age cohort. A positive result indicates net in-migration and a negative result indicates net out-migration.

In the special case of cohorts under 5 years and 5 to 9 years of age in 1970, births for 1965 to 1970 and births for 1960 to 1965 are multiplied by the national census survival rates based on birth statistics. Two variations of survival rates for births, one based on registered births and the other based on births adjusted for underregistration, are given in the present report. They would be applied to the different types of birth statistics which define the particular survival rates--that is, the first type of rate would be applied to registered births, the second type to births adjusted for underregistration.

An example of the application of national census survival rates for the decade 1950-1960 may be found in Census publication, Current Population Reports, Series P-23, No. 15, "National Census Survival Rates, by Color and Sex, for 1950 to 1960." This report also contains a discussion of various methodological issues involved in the use of such rates.

National census survival rates can appropriately be based also on other types of populations: for example, the total population of the United States including Armed Forces overseas, the population of Puerto Rico and other outlying areas of the United States, and certain other groups of civilian citizens overseas, and excluding intercensal net immigration of aliens; the native population of the United States including the overseas population as above; and the native resident population including Armed Forces overseas and excluding intercensal net migration of U.S. civilian natives. The essential data for deriving survival rates on the basis of the native population, tabulations of the native population of the United States by age, sex, and race for 1970, will not become available until later this year. Survival rates calculated on the basis of these alternative populations will then be prepared for publication in a detailed report. This report will include an expanded exposition of the assumptions, derivation, and application of the rates.

**Table 1. NATIONAL CENSUS SURVIVAL RATES, BY RACE AND SEX, FOR 1960 TO 1970**

(Based on the total resident population, plus Armed Forces overseas, adjusted to exclude net civilian (alien and citizen) immigration during the decade)

Age of cohort		All classes			White			Negro and other races <sup>1</sup>		
Age in 1960 (or birth date)	Age in 1970	Total	Male	Female	Total	Male	Female	Total	Male	Female
Born Apr. 1, 1965 to 1970: Based on registered births Based on total births <sup>2</sup> ....	Under 5 years:									
	.....	.95297	.94824	.95794	.96446	.95982	.96936	.89660	.89050	.90284
	.....	.94590	.94123	.95081	.95931	.95470	.96419	.88091	.87491	.88703
Born Apr. 1, 1960 to 1965: Based on registered births Based on total births <sup>2</sup> ....	5 to 9 years:									
	.....	.94808	.94320	.95321	.95417	.94978	.95879	.91595	.90799	.92412
	.....	.94004	.93523	.94509	.94876	.94440	.95335	.89481	.88705	.90279
Under 5 years.....	10 to 14 years.....	1.00271	1.00504	1.00029	.99753	.99990	.99506	1.03306	1.03577	1.03035
5 to 9 years.....	15 to 19 years.....	1.00668	1.00538	1.00803	1.00362	1.00242	1.00486	1.02562	1.02402	1.02722
10 to 14 years.....	20 to 24 years.....	.98959	.98144	.99802	.98956	.98371	.99563	.98982	.96560	1.01405
15 to 19 years.....	25 to 29 years.....	.98081	.96850	.99341	.97820	.97022	.98642	.99967	.95580	1.04295
20 to 24 years.....	30 to 34 years.....	.99473	.98608	1.00339	.98802	.98175	.99438	1.04313	1.01898	1.06525
25 to 29 years.....	35 to 39 years.....	.98728	.97867	.99575	.98434	.97727	.99140	1.00872	.98951	1.02572
30 to 34 years.....	40 to 44 years.....	.97809	.96894	.98697	.97799	.96917	.98667	.97891	.96700	.98920
35 to 39 years.....	45 to 49 years.....	.95304	.94297	.96270	.95612	.94591	.96597	.92746	.91755	.93639
40 to 44 years.....	50 to 54 years.....	.94422	.92824	.95964	.94691	.93058	.96276	.92042	.90677	.93281
45 to 49 years.....	55 to 59 years.....	.90696	.87995	.93324	.91101	.88342	.93796	.87071	.84833	.89174
50 to 54 years.....	60 to 64 years.....	.88843	.84299	.93262	.88939	.84355	.93401	.87922	.83766	.91946
55 to 59 years.....	65 to 69 years.....	.82298	.75093	.89211	.81982	.74776	.88877	.85296	.78058	.92420
60 to 64 years.....	70 to 74 years.....	.75728	.67482	.83259	.75590	.67117	.83304	.77251	.71440	.82748
65 to 69 years.....	75 to 79 years.....	.60729	.52831	.67687	.61381	.53181	.68584	.53514	.49018	.57600
70 years and over.....	80 years and over...	.36841	.31014	.41490	.36558	.30600	.41269	.40512	.36034	.44522
65 years and over.....	75 years and over...	.45868	.39537	.51113	.45867	.39374	.51209	.45883	.41422	.49901

<sup>1</sup>The survival rates for this category are affected by an overstatement of "other races." See text.<sup>2</sup>Births adjusted for underregistration.**Table 2. NATIONAL CENSUS SURVIVAL RATES FOR THE NEGRO POPULATION, BY SEX, FOR 1960 TO 1970**

(Based on the total resident population, plus Armed Forces overseas, adjusted to exclude net civilian (alien and citizen) immigration during the decade)

Age of cohort		Total	Male	Female
Age in 1960 (or birth date)	Age in 1970			
Born Apr. 1, 1965 to 1970: Based on registered births Based on total births <sup>1</sup> ....	Under 5 years:			
	.....	.88284	.87506	.89081
	.....	.85904	.85147	.86680
Born Apr. 1, 1960 to 1965: Based on registered births Based on total births <sup>1</sup> ....	5 to 9 years:			
	.....	.91354	.90602	.92122
	.....	.88325	.87598	.89067
Under 5 years.....	10 to 14 years.....	1.01740	1.02036	1.01446
5 to 9 years.....	15 to 19 years.....	1.00076	.99810	1.00340
10 to 14 years.....	20 to 24 years.....	.94082	.91142	.97014
15 to 19 years.....	25 to 29 years.....	.94440	.89374	.99404
20 to 24 years.....	30 to 34 years.....	.99514	.95877	1.02803
25 to 29 years.....	35 to 39 years.....	.98389	.95597	1.00850
30 to 34 years.....	40 to 44 years.....	.95538	.93935	.96919
35 to 39 years.....	45 to 49 years.....	.90346	.89159	.91400
40 to 44 years.....	50 to 54 years.....	.89719	.88375	.90916
45 to 49 years.....	55 to 59 years.....	.85036	.82839	.87036
50 to 54 years.....	60 to 64 years.....	.86090	.81787	.90071
55 to 59 years.....	65 to 69 years.....	.85139	.77470	.92391
60 to 64 years.....	70 to 74 years.....	.75349	.69579	.80615
65 to 69 years.....	75 to 79 years.....	.51755	.47489	.55549
70 years and over.....	80 years and over...	.38012	.33006	.42296
65 years and over.....	75 years and over...	.43717	.39091	.47739

<sup>1</sup>Births adjusted for underregistration.

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