

VITAL and HEALTH STATISTICS
DATA EVALUATION AND METHODS RESEARCH

comparability of

**Age on the Death Certificate
and Matching Census Record**

United States - May - August 1960

Comparisons of age as stated on the death certificate with age as stated on the matching census record by color, sex, geographic region, and specified causes of death. Based on a sample of death certificates for deaths occurring in the United States during May-August 1960 matched to 1960 census records.

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PREFACE

This report is one of a series of comparability studies on selected items from the death certificate and the matching census record for a sample of deaths which occurred in the United States during May-August 1960. The data are a byproduct of the study, Social and Economic Differentials in Mortality, United States, 1960, being carried out by Evelyn M. Kitagawa and Philip M. Hauser at the Population Research and Training Center, University of Chicago, in cooperation with the National Center for Health Statistics and the Bureau of the Census supported by PHS Grant RG-7134 (later changed to CH-00074). The items for which comparability is being studied are residence, age, marital status, race, nativity, and country of origin.

As a latecomer to this project, the author gratefully acknowledges the tremendous assistance provided by Lillian Guralnick, now of the Office of Research and Statistics in the Social Security Administration, and Evelyn M. Kitagawa who were both involved in this study from its inception.

SYMBOLS

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THIS REPORT discusses differences between age as stated on the death certificate and age as stated on the matching census record and the effect of these differences on the published age-specific death rates. The data presented in this report are based on a sample of deaths which occurred in the United States during May-August 1960.

Analysis of the data by means of two measures (net difference rates and percent agreement) involved examining age comparability by a number of characteristics of the decedent: age, sex, color, geographic region, and cause of death. Age comparability was relatively higher for white decedents than for nonwhite, especially for older nonwhite decedents, and slightly higher for male decedents than for female. There were some regional differences in levels of comparability: they were lower in the Northeast Region for white decedents and lower in the South for nonwhite decedents than in the other regions. Age comparability was higher among persons dying from accidents, poisonings, and violence than among persons dying from major cardiovascular-renal diseases.

The results of this study indicate that if the census record age is used as both the numerator and denominator of the age-specific death rate, the observed excess of mortality for the older white population compared with the older nonwhite population, if not reversed, is considerably diminished.

COMPARABILITY OF AGE ON THE DEATH CERTIFICATE AND MATCHING CENSUS RECORD

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INTRODUCTION

The major objectives of this report are (1) to evaluate the comparability of age as stated on the death certificate and as stated on the census record for the same individual, and (2) to evaluate the accuracy of the age-specific death rates in light of the age comparability results.

In the past most of the measures of health status have been provided by mortality statistics. The census record and the death certificate are the basic sources of data for these statistics, and the adequacy of these records in terms of completeness of coverage and accuracy of information is therefore important.

As far as death certificate coverage is concerned, "although there has never been a reliable evaluation made of death registration completeness, it has always been assumed that virtually all deaths are reported in the United States. It is unlikely that more than 1 or 2 percent of deaths go unrecorded."¹ On the other hand, considerable effort has been expended to determine the completeness of the census enumeration.²⁻⁵ Depending on the method used, undercoverage rates were estimated to be from 1.9 to 2.3 percent of the enumerated population in 1960.^{2,6} However, these figures represent coverage of the total population, and various portions of the total may seriously differ in their coverage rates. For example, the estimated number of individuals thought to have been missed was much higher for

nonwhite individuals and for certain age groups than for the population as a whole. An analysis of coverage errors for any subgroups of the population—such as age, sex, and color groups—necessarily involved consideration of content errors; that is, the number of persons reported in a given age, sex, or color group was affected not only by the degree to which they were missed but also by errors in age, sex, or color reporting and tabulation.²

Insofar as this report deals with the evaluation of age statements, the following discussion of the accuracy of the death certificate and census record relates primarily to considerations of accuracy of age statements.

The accuracy of age information on both records has been questioned repeatedly, particularly with regard to the subject of mortality among the nonwhite population. In contrast with the overall picture of large excesses in death rates for the nonwhite population compared with the white, death rates for the white group exceeded those for the nonwhite at ages 75 years and over. This reversal at older ages has existed as far back as 1900 and still existed as of 1965 to an even greater degree. It was suggested on the basis of 1963 age-specific death rates that the errors in age reported on the census record for the nonwhite population do not correspond to the errors on the death certificate. When a set of "corrected Negro populations" developed by Bogue⁷ was used, the difference noted at older ages was not eliminated.

Accuracy of Age Information

Is the reported age on either the census record or the death certificate inaccurate? If so, is the age statement on the census record more nearly accurate than that on the death certificate or vice versa?

From a two-way comparison of response, such a judgment is difficult unless some a priori reason existed for believing one record to be superior to the other. One acceptable criterion for superiority would be the extent to which one of the two records was more in agreement than the other record with age as derived from the matching birth certificate. However, the birth certificate is sometimes impossible to obtain, especially for older people, and this kind of check was not done. Another criterion would be how closely both of the records compared with a third, independent source. Although such information was available for the 1960 census on a nationwide basis (the CPS-Census Match⁴), nothing comparable was done for the death certificate.

On the other hand, while it would be important to know which record was more nearly accurate, the results would not permit correction of the death rates. That is, beyond the purpose of comparing information on the two records is the more pragmatic purpose of evaluating the accuracy of the death rates on the basis of this comparison. Even if it were known that the age on the death certificate is correct, it cannot be used to adjust the age of the total population which contains a large number of living persons of which only a small proportion die in a short period of time. However, the reverse is possible, and, in fact, is the procedure used here. The evaluation involves adjusting the death certificate information in the numerator of the death rate to the information contained in the census files for those decedents, thereby creating a rate in which the numerator and denominator of the death rate are based on census age reports.

Thus no statement is made or implied about which record is the more accurate but, rather, the differences between them and the effect of these differences in moving from the actual age on the death certificate to one which is consistent with what was reported on the census record are the subjects of this report.

MEASURING AGE COMPARABILITY

Correspondence or lack of correspondence between recorded ages on the census record and the death certificate represents the combined effect of the differences in circumstances between the two records surrounding the collection, response, and processing of data. For 1960 the 100-percent census enumeration (stage I) forms were generally filled out at home, where the subject, if not supplying the information himself, could be consulted. Age information was recorded as date of birth; returned forms were processed mechanically, and items not completed were assigned responses (1.7 percent of the 1960 census records had age estimated).

Personal items on the death certificate were usually filled out by a funeral director to whom information was generally provided by the next of kin; age was recorded in completed years as of the last birthday; completed forms were manually coded and punched; and items not filled out were left incomplete (.04 percent of 1960 death certificates had no age stated).

The data used here are a byproduct of the study, Social and Economic Differentials in Mortality, United States, 1960, in which a sample of all deaths that occurred in the United States during the 4 months of May-August 1960 was selected and manually searched in the 1960 census for matching records. Almost 80 percent of these decedents were found in the 100-percent census enumeration (stage I).

For the purposes of this study, two important changes were made in the usual census procedures. First, the census data used were unedited, manually coded responses with no assignments made for nonresponse. Second, the date of birth was converted to age at death, and a correction was made for those records in which a birthday occurred between the date of the census and the date of death. Thus the unmeasured error produced by coding and card punching may be expected to be about the same in both sets of records. The adjustment of age on the census record to age at date of death simplified the comparison of age information.

Two measures are used throughout this report to evaluate age comparability. The net difference rate measures the difference in the num-

ber of individuals in an age group between the death certificate classification and the census record classification relative to the number reported on the census record:

$\frac{d_i - c_i}{c_i} \times 100$, where d_i = Number of decedents in the study group classified as age i on the death certificate.

c_i = Number of decedents in the study group classified as age i on the census record.

The net difference rate here is algebraically equivalent to the "Index of Net Shift Relative to CPS Class" used by the U.S. Bureau of the Census in evaluating the 1960 census data in light of the results of the Current Population Survey.⁴ Theoretically, the range for this measure is from -100.0 percent to positive infinity. It is conceivable, but highly unlikely, that there would be no individuals in an age group. However, where age is analyzed by detailed characteristics or where characteristics other than age are analyzed, it is possible for the rate to become infinity. In this study no age category on one record contained more than twice the number of individuals than the other record, and thus, empirically, the rate never approached an absolute value of 100.0 percent. The comparison is made with respect to the marginal totals of the data according to each record, as shown below.

Census record	Death certificate		
	Total	Number in age group i	Number not in age group i
Total-----		d_i	
Number in age group i -----	c_i	s_i	$c_i - s_i$
Number not in age group i --		$d_i - s_i$	

A net difference rate of zero means that both records had the same number of individuals in that age group. However, no indication is given as to whether the same individuals are in that age group on both records.

This measure may be used to evaluate the accuracy of age-specific death rates with the condition that the data to be evaluated have the same age distribution as the data from which the net difference rate was derived. Under these circumstances, the net difference rate indicates the direction and the size of the difference between the actual age-specific death rate where numerator and denominator come from different sources and a rate that would result if both numerator and denominator came from the census record. For example, a negative net difference rate of -5.0 percent suggests that the actual age-specific death rate is too low. The number of deaths at that age on the death certificate is less than the number of deaths at that age according to the census records for those decedents. An age-specific death rate computed from age as reported in census records would be 5.0 percent greater than the actual age-specific death rate.

The second measure, percent agreement, is a more direct measure of the correspondence between records. It indicates the extent to which the same individuals are classified in the same age group on both records:

$\frac{s_i}{c_i} \times 100$, where s_i = Number of decedents in the study group classified by both the census record and the death certificate as age i

c_i = Number of decedents in the study group classified as age i on the census record.

In this case since only the agreements are considered (see the above diagram), there is no opportunity for differences between records to cancel each other as is possible in the net difference rate. The numerical value of one measure does not determine the numerical value of the other except when the value of the net difference rate is -100.0 percent; then the percent agreement must be zero.

The tables in the text of the report contain summary figures of percent agreement which were obtained by cumulating the number of records identically classified in the specified age intervals over a number of age categories and dividing by the total number of census records in these age intervals. For example, percent agreement for 5-year age intervals for decedents 45-64 years of age would be calculated as follows:

$$\frac{\sum_{i=45-49}^{i=60-64} s_i}{\sum_{i=45-49}^{i=60-64} c_i} \times 100.$$

Comparisons were made between death certificate and matching stage I unedited census record information for inflated sample data. (See Technical Appendix.)

AGE COMPARABILITY RESULTS

Sex, Color, and Age

Percent agreement.—Slightly more than two-thirds, 69 percent, of the total study group had the same single year of age on both the census record and the death certificate. Considerable variation around this overall figure existed for the component sex and color groups. Substantially less agreement was found for the nonwhite group for all ages (1-99 years) than for the white. Agreement levels were somewhat lower for females than for males although differences between males and females were not so pronounced as those between the white and nonwhite groups (table A). Three-fourths of the white males had the same single year of age reported on both records as compared with less than one-half of the nonwhite males; two-thirds of the white females had the same single year of age on both records as compared with a little more than one-third of the nonwhite females.

It should be established at this point that the designation of an individual as white or nonwhite is in accordance with the classification used by the Bureau of the Census. Although there were some differences in color assignments on the census record and the death certificate, they were very small: 0.2 percent of the decedents reported as white on the census record and 2.3 percent of

those reported as nonwhite were reported differently on the death certificate (preliminary estimates from another report in this series). Results on age comparability would not be affected by color discrepancies; for example, if there were lower age agreement among the 0.2 percent of decedents reported as nonwhite on the death certificate but white on the census record, it is unlikely that it would contribute to lowering the age agreement level of the total white group.

In addition to large differences in the amount of agreement in same single year of age between the color groups, there were at least three major differences in the patterns of disagreement. For the white group, agreement remained fairly constant with increasing age. For the nonwhite group, however, there was less likely to be agreement between the two records as age increased. While percent agreement was at the same level for both nonwhite and white decedents at age 1, it declined rapidly thereafter for nonwhite decedents and, consequently, the difference between the color groups was greater at the older ages (fig. 1). Second, age for the white group as reported on the death certificate was usually within 1 year of that reported on the census record when the two records did not agree. The difference was usually greater by more than 1 year for the nonwhite group, however, particularly for decedents aged 45 years and over. For example, in this older age group the age on the death certificate was within 1 year of that on the census record for 91 percent of white males but only for 61 percent of nonwhite males. And finally, where age statements between records did not agree, the age reported on the death certificate was more often older than the age given on the census record for white decedents of all ages as well as for nonwhite decedents under age 45. In contrast, the age given on the death certificate was more often younger than the age on the census record for nonwhite decedents over age 45.

Data for single years of age are subject to errors which may contribute to differences in correspondence between records. One such error is age heaping, or the tendency for reported ages to be concentrated at particular ages or at groups of ages ending in the same digit. Distributions of deaths by single years of age as reported on the census record and on the death certificate indicate that heaping is found in varying degrees in the four sex-color groups and that the extent and the

Table A. Percent distribution of matched census records, by age agreement with death certificates according to color, sex, and age: United States, May-August 1960

Death certificate age (relative to census age)	Total study group	White		Nonwhite	
		Male	Female	Male	Female
Percent distribution					
All ages, 1-99 years-----	100.0	100.0	100.0	100.0	100.0
Same single year of age-----	68.8	74.5	67.9	44.7	36.9
1 year younger-----	8.1	7.5	8.3	10.5	10.7
1 year older-----	9.7	9.1	10.5	10.3	9.5
Younger or older by more than 1 year-----	13.4	8.9	13.3	34.5	42.9
1-44 years-----	100.0	100.0	100.0	100.0	100.0
Same single year of age-----	74.8	79.0	76.8	61.3	57.4
1 year younger-----	6.7	5.6	6.5	9.5	10.6
1 year older-----	9.0	8.4	8.5	11.0	11.8
Younger or older by more than 1 year-----	9.5	7.0	8.2	18.2	20.2
45-99 years-----	100.0	100.0	100.0	100.0	100.0
Same single year of age-----	68.1	74.0	67.1	40.5	31.9
1 year younger-----	8.2	7.7	8.5	10.8	10.7
1 year older-----	9.8	9.2	10.7	10.1	9.0
Younger or older by more than 1 year-----	13.9	9.1	13.7	38.6	48.4

particular ages at which heaping occurs differ from one record to the other (figs. 2 and 3).

Generally speaking, although heaping existed on both records, it was less pronounced on the census record distribution than on the death certificate distribution. This can be partially explained by the fact that date of birth was used for the age item on the census record as opposed to completed years as of last birthday for this item on the death certificate. Another reason may be that when the informant on the death certificate was uncertain about the deceased's exact age, he would tend to report the age in round numbers. This tendency shows up as a preference for ages ending in 0 and 5 and is seen in both distributions although to a more marked degree in the death certificate distribution. In addition there appears to be specific preference for ages 59 and 60 on both records for all sex and color groups, which may reflect a preference for 1900 as the year of birth. On the whole, heaping is greater for fe-

males than males and greater for nonwhite individuals than for white.

Percent agreement figures for single years of age discussed above are affected by the extent to which heaping occurs on one record more than the other. While age heaping errors are part of the total difference in age information between records, they can be minimized by combining ages into intervals. Since ages are usually tabulated by 5- or 10-year intervals for most vital statistics purposes, the effects of age heaping and the lack of agreement in single years of age found here would probably not seriously distort the patterns in broader age groups.

When ages were combined into 5-year intervals, 86 percent of the total study group were classified in the same age groups on both records. A further but smaller improvement to 90 percent agreement occurred when ages were combined into 10-year intervals. This improvement in agreement occurred for each sex and color group

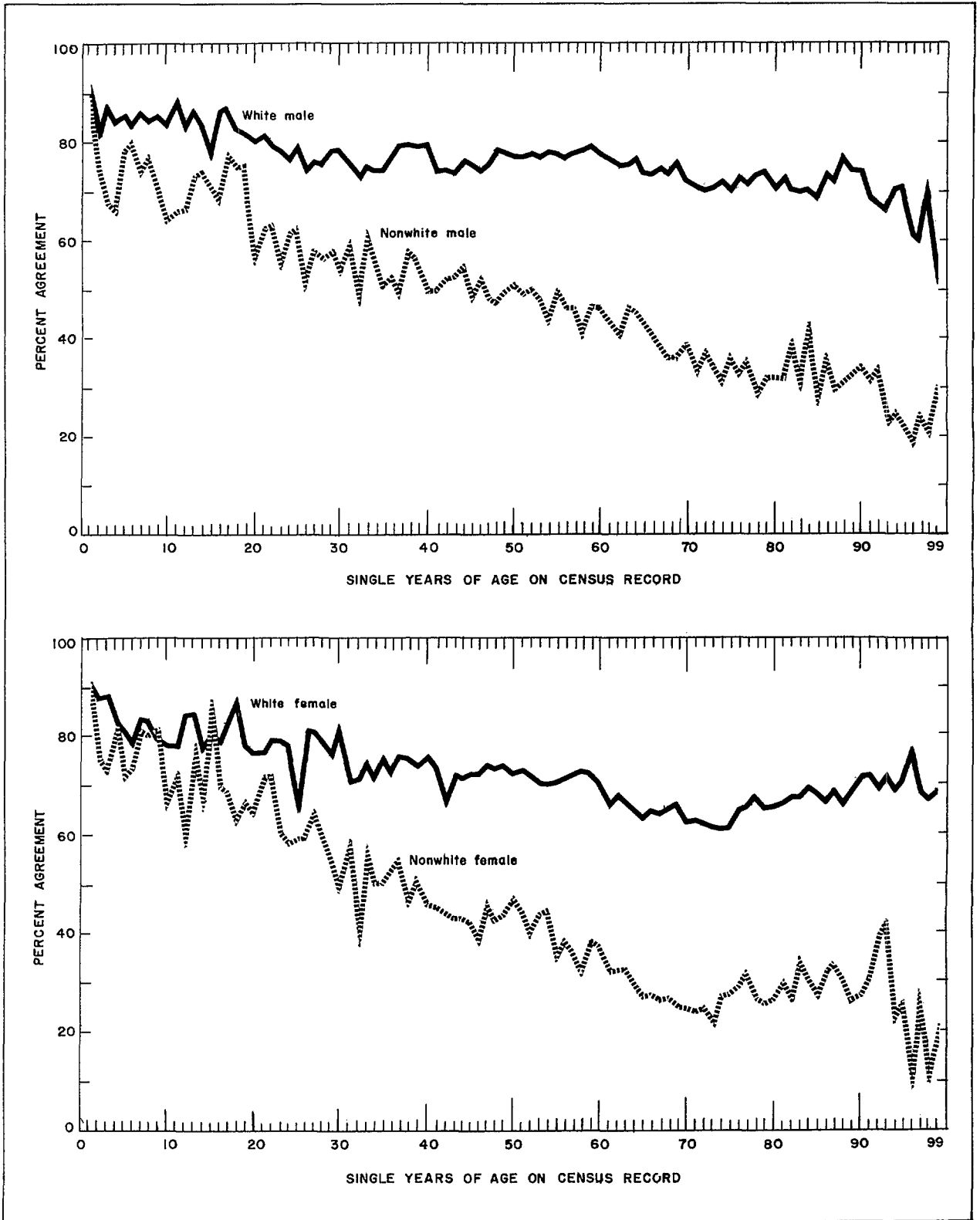


Figure 1. Percent agreement in age between the death certificate and the matching census record, by color and sex.

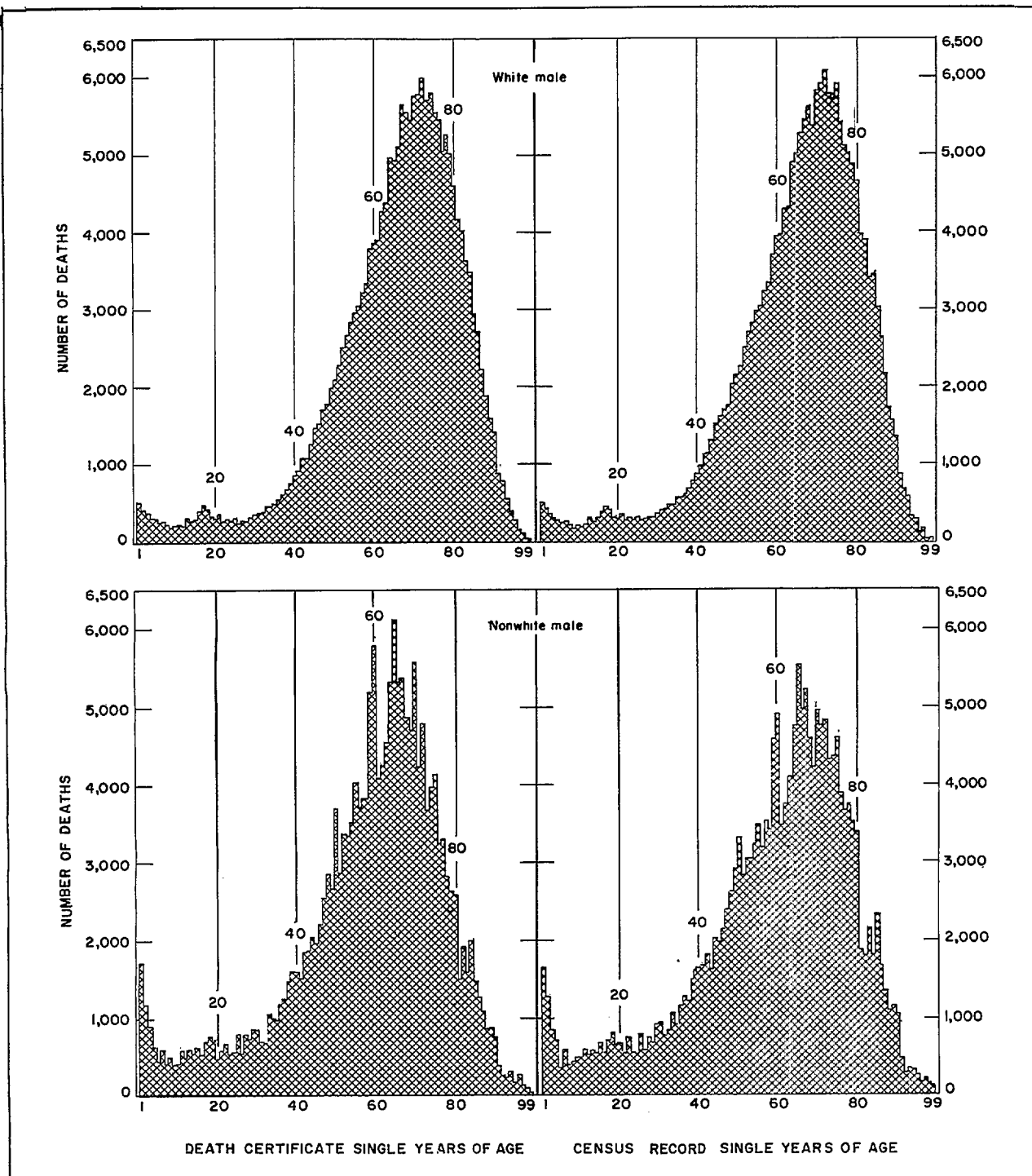


Figure 2. Distributions of deaths by age as stated on the death certificate and as stated on the matching census record for male decedents, by color.

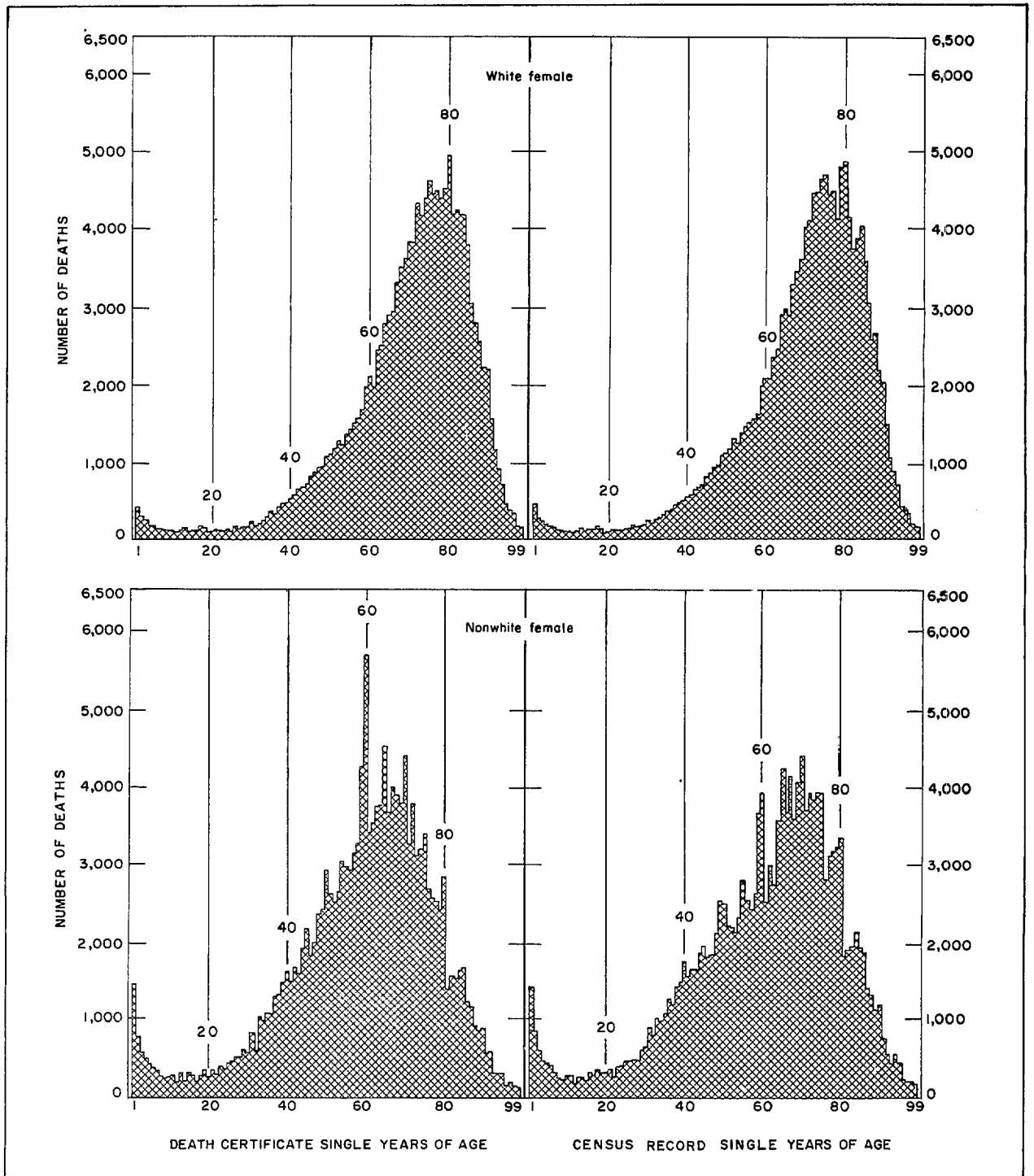


Figure 3. Distributions of deaths by age as stated on the death certificate and as stated on the matching census record for female decedents, by color.

along with some narrowing of the gap in color differences (table B).

The relationship between age and degree of agreement noted for single years of age was also seen in the 10-year age intervals. While the agreement between records was relatively high and fairly stable from one age interval to another for the white group, for the nonwhite, agreement declined with increasing age. For example, while about 95 percent of the nonwhite group in the census age interval 1-4 years were similarly reported on the death certificate, only 61 percent of those in the census age interval 85-99 years were reported in the same age group on the death certificate.

Net difference rate.—In addition to the fact that reported ages were often different between records for the nonwhite group, particularly at ages 45 and over, age as reported on the death certificate was frequently younger than that reported on the census record for the same individual at ages over 45. This finding is implied by the pattern of the net difference rates (fig. 4 and table 4), where the death certificate showed considerably more decedents aged 45-64 years than the census record and considerably fewer aged 75-99. The number of nonwhite decedents aged 65-74 years was almost the same on both records. This is because there were more decedents aged 65-69 years but fewer at ages 70-74 years on the death certificate than on the census record. Thus the differences between records for these two 5-year age intervals were cancelled when the ages were grouped into the 10-year interval 65-74. (See table 1 for data on 5-year age intervals.)

The implications of these findings are clear insofar as these data apply to all nonwhite decedents for 1960: the number of deaths for nonwhite individuals aged 75-99 years is substantially understated relative to the number of nonwhite decedents reported in this age range on the census record. Consequently, the published age-specific death rates for this group are lower than rates based on census ages. The pattern for the combined age group 65-99 years is the same as that for ages 75-99 years although the understatement on the death certificate relative to the census record (and hence, the net difference rate) is not as great. In a later section the effect of these

Table B. Percent agreement in age between the death certificate and the matching census record, by color, sex, and specified age intervals: United States, May-August 1960

Color and sex	Single years	5-year age intervals	10-year age intervals
	Percent agreement		
Total study group-----	68.8	85.9	90.3
White male-----	74.5	89.9	93.0
White female---	67.9	85.8	90.5
Nonwhite male--	44.7	68.3	77.1
Nonwhite female-----	36.9	60.4	71.5

findings on the age-specific death rates is further investigated.

No clear pattern was observed for the white group in the net difference rates which oscillated around 0.0 for most of the age intervals. Thus results in age comparability were rather different for the two color groups. The important differences were (1) the rapid decline in agreement with increasing age for nonwhite decedents in contrast with fairly constant agreement at each age for white decedents; and (2) the large negative net difference rates for older nonwhite decedents arising from the reporting of younger ages on the death certificate than on the census record for individuals over age 45. Because of these findings, statements about age comparability between records need to be made separately for the white and nonwhite groups.

Geographic Region

Even though the trend is toward diminishing geographic variation in age-specific death rates, differences still exist and are of interest.⁸ Some of the variation in age-specific death rates may not reflect geographic differences in mortality risks but rather geographic dissimilarities in the accuracy of age information. If the latter were the

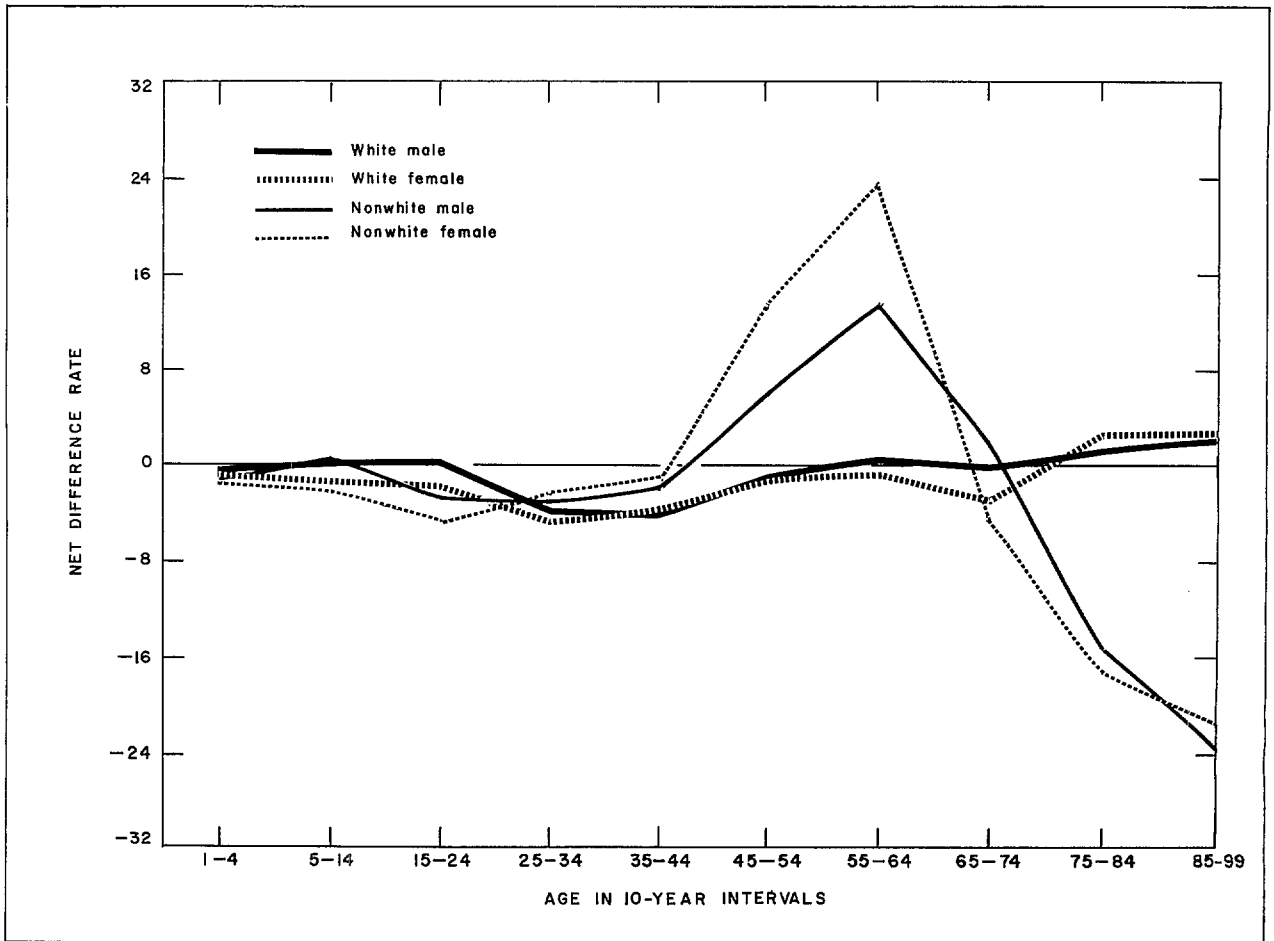


Figure 4. Net difference rates for 10-year age intervals between the death certificate and the matching census record, by color and sex.

case, then the measures of age consistency (the net difference rate and percent agreement) would be expected to vary among the geographic regions.

Net difference rate.—For the white group, net difference rates are very similar in both size and direction among regions (fig. 5 and table 2), and some of the regional differences could be expected on the basis of sampling error alone. The overall impression is that since lack of age correspondence between records was not concentrated in any one region then regional differences in mortality of the white population at specific ages are probably not a result of regional differences in the accuracy of age information on the records.

If age-specific death rates had been calculated for the nonwhite group by region, the accu-

racy of the rates for the South for ages 45 years and over would probably be more in question than those for the other three regions; net difference rates, although sizable for each region for older ages, were still larger for the South.

Percent agreement.—The amount of age agreement between the census record and the death certificate for the white decedents in this study did not differ much from one geographic region to another (tables C and 2). Differences consisted mainly of slightly lower agreement for the Northeast Region and slightly higher agreement for the North Central as compared with the rest of the country, regardless of the age of the decedent. On the other hand, agreement for the nonwhite group varied dramatically among the

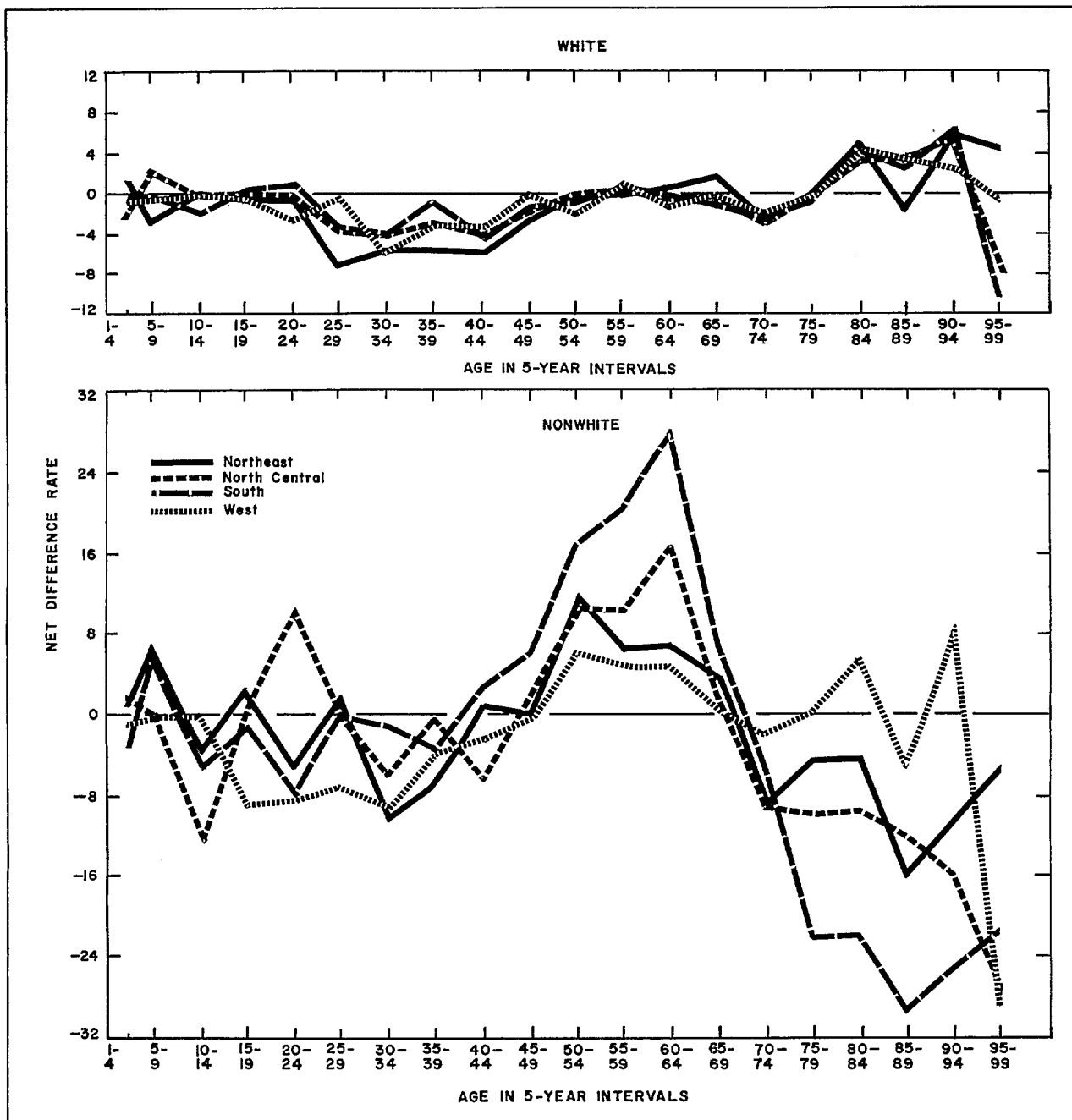


Figure 5. Net difference rates for 5-year age intervals between the death certificate and the matching census record, by geographic region and color.

regions; it was higher for the West and somewhat lower for the South than for the other regions.

It should be pointed out that regional differences found in age agreement may be related to differences in population composition. For example, the lowest agreement found among white decedents was for the Northeast Region, where the proportion of foreign born decedents is higher than for the rest of the country. Racial composition of the nonwhite group varied considerably among regions; in this study 99 percent of the nonwhite decedents in the South Region were Negro as compared with 52 percent in the West.

Cause of Death

Cause of death may affect the reporting of information on the death certificate. Procedures for completing the death certificate vary somewhat by State although the general practice is for the funeral director to complete the personal information on the death certificate from information provided by a relative of the deceased. There are, however, at least two kinds of circumstances surrounding death which could lead to variations in this procedure.

The first involves deaths which occur by accident, violence, or which were for one reason or another unattended by the individual's physician. In such cases, a medicolegal officer or coroner is usually required to certify the death. Although the certificate would then be sent to a funeral director, the medicolegal officer may take the responsibility for filling out the nonmedical part of the certificate. Under this general category are deaths from motor vehicle accidents, where the decedent may have carried some identification (such as a driver's license) that provided a statement of age.

The second case includes deaths occurring in the hospital. Hospital records containing personal information provided by the individual when he entered the hospital (assuming that the individual was able to provide such information when he entered) may be used for filling out the death certificate.

These cases can be only approximately distinguished on the basis of what is coded as cause of death. However, if age agreement, for example, between the death certificate and the census record varied by cause, this would support a hypothesis of different circumstances surround-

Table C. Percent agreement for 5-year age intervals between the death certificate and the matching census record, by geographic region, color, and age: United States, May-August 1960

Color and age	United States	Region			
		North-east	North Central	South	West
<u>White</u>		Percent agreement			
1-99 years-----	88.1	85.4	90.1	88.3	89.0
1-44 years-----	90.7	88.8	91.9	90.9	91.1
45-64 years-----	89.4	87.8	90.8	89.6	90.1
65-99 years-----	87.2	84.1	89.7	87.3	88.1
<u>Nonwhite</u>					
1-99 years-----	64.8	70.0	69.5	60.2	79.7
1-44 years-----	80.7	81.9	81.6	79.3	85.6
45-64 years-----	69.8	70.7	73.5	67.0	80.1
65-99 years-----	54.6	62.9	61.3	48.7	76.3

Table D. Percent agreement for 10-year age intervals between the death certificate and the matching census record, by cause of death, age, color, and sex: United States, May-August 1960

Age, color, and sex	Cause of death ¹				
	All causes	Cardiovascular diseases	Malignancies	Accidents, etc.	All other causes
<u>1-99 years²</u>					
	Percent agreement				
White male-----	93.0	93.0	93.1	93.9	92.8
White female-----	90.5	90.1	91.2	92.1	90.5
Nonwhite male-----	77.1	74.0	77.1	86.2	79.2
Nonwhite female-----	71.6	67.7	74.7	86.1	75.9
<u>1-34 years</u>					
White male-----	94.2	83.0	92.8	96.1	94.7
White female-----	93.4	84.1	90.8	95.7	95.6
Nonwhite male-----	89.1	74.4	88.0	92.2	88.8
Nonwhite female-----	89.2	78.8	82.4	95.0	91.4
<u>35-99 years²</u>					
White male-----	93.0	93.1	93.1	92.6	92.6
White female-----	90.4	90.2	91.3	90.6	90.0
Nonwhite male-----	75.4	74.0	76.6	79.2	77.3
Nonwhite female-----	69.6	67.4	74.2	77.2	71.6

¹Complete category titles and numbers of the Seventh Revision of the International Lists, 1955, are as follows:

Major cardiovascular-renal diseases (330-334, 400-468, 592-594)

Malignant neoplasms (140-205)

Accidents, poisonings, and violence (E800-E999)

All other causes (residual)

²Includes a total of 103 records with age reported as 100 years and over on the death certificate.

ing the death affecting the accuracy of information reported on the death certificate. The level of age agreement did in fact vary by cause of death. When deaths were divided into the four cause-of-death categories shown in tables D, 3, and 4, more agreement was found for decedents whose deaths were from accidents, poisonings, and violence (International List Numbers E800-E999) than from all causes combined.

Because age of the decedent is so closely related not only to cause of death but also to the degree of age agreement between records, especially for the nonwhite group, it should be taken into account in this analysis. Since patterns of both agreement and cause of death seemed to

differ primarily between ages under 35 and those 35 years and over, only these two age groups are considered here.

For decedents under age 35, the amount of age reporting agreement varied considerably among cause-of-death categories for each of the four sex and color groups. The amount of agreement was always substantially higher for accidents, poisonings, and violence and lower for major cardiovascular-renal diseases (330-334, 400-468, 592-594) than for all causes.

The lowest age agreement was found for deaths from major cardiovascular-renal diseases which are rather unlikely occurrences at these ages, suggesting that age on the census record

for some of these decedents was probably much younger than the true age. In fact, the major part of the disagreement was a result of age on the death certificate being from 10 to 30 years older than that on the census record. These cases of large discrepancies in age may reflect incorrectly matched records or processing errors in the coding and punching of age on the census record.

Perhaps even more noteworthy is the negligible difference in the amount of age agreement between the white and the nonwhite individuals who died from accidents, poisonings, and violence. Several factors could play a part in explaining this finding. Accidents, poisonings, and violence are the most frequent cause of death at younger ages. A large number of these deaths resulted from motor vehicle accidents, and some evidence of age would probably have been available for those decedents. The bulk of deaths in this general category were probably certified by a medicolegal officer or a coroner. Any one or a combination of these factors or ones in addition to these could be involved, but their contribution cannot be determined directly from these data.

Curiously, however, the results for ages 35 or over did not show the same strong relationship between cause of death and degree of agreement as that found for younger ages. For older ages, there were only small differences in age agreement by cause. Since agreement for the white group was at approximately the same level, regardless of age or cause with the exception of major cardiovascular-renal diseases at the younger ages, the small differences at older ages are not remarkable. For the nonwhite group the generally lower age agreement that existed for older decedents was reflected to practically the same extent in each cause category although agreement was somewhat higher for accidents, poisonings, and violence.

The effect of these differences in age correspondence among causes on the age-specific death rates by cause will be examined in a later section.

RESULTS OF RELATED STUDIES

There have been a number of other studies comparing responses on vital and census records. Procedures and target populations differ among

these studies so that results are not quite comparable. However, they are of value as indicators of the variation in the circumstances of these studies that may account for the differences among the results.

The study most analogous in scope and design to the one discussed in this report was that done by the General Register Office of the United Kingdom to evaluate the results of the 1951 Census of England and Wales.⁹ For this British study, all death certificates filed during the week of May 1-7, 1951, were selected and searched for matching census records for April 8, 1951. Their match rate was 87 percent—7 percent higher than the rate for the present study.

In addition to higher match rates, agreement in single years of age for matched records was also higher for the British study: 80 percent were in complete agreement, with only 4 percent of cases differing by more than 1 year; whereas 69 percent of the present study were in complete agreement, with almost 14 percent differing by more than 1 year (table E). The similarities in results between the two studies are interesting. Generally speaking, there was more agreement in age among males than among females in both countries. Agreement tended to decline with increasing age and, where there was disagreement, the age on the death certificate was more often older than the age on the census record for the same individual. For the British study this last pattern was partly a result of the natural aging process between date of the census and date of death, which was not corrected as it was in the present study. The conclusion of the British study⁹ was that:

Since population estimates are based initially on the census enumeration these discrepancies tend to distort death rates in the direction of exaggerating longevity, but, . . . it is clear that any exaggeration is of trivial magnitude for normal vital statistics purposes. On the whole it is fair to say that age statements at death registration have a high order of reliability.

This conclusion agrees with the findings for the white group in the present study—that, although differences in age between records existed, they would probably not appreciably affect the actual age-specific death rates.

However, if results for the white group were compared with those for the group in the British study, agreement would still be higher for the British study (table E).

Recently, data from an evaluation of the 1961 Census of England and Wales were made available.¹⁰ There were some procedural differences between the earlier study and the later one, but the two sets of results were very similar: for 1961, 79 percent of matched records were in agreement in single years of age, and 4 percent of the records differed by more than 1 year of age. Reproduction of almost identical results, separated in time by a decade, supports the reliability of the figures in the 1951 British study and suggests that the differences found between their

results and those of the present study are probably real. This raises the question as to whether either the death-registration system or the enumeration process or both in England and Wales produce more accurate data than those in the United States. Or, on the other hand, is the population in England and Wales different on the average from that in the United States with respect to those characteristics which contribute to lower age agreement between records?

Another study, "The Comparability of Reports on Occupation From Vital Records and the 1950 Census,"¹¹ was done in the United States in 1950 to compare occupation information on vital and census records. Part of the study involved comparing age information on the death certificate

Table E. Percent distribution of matched census records, by age agreement with death certificate according to sex and age: 1951 British Study and 1960 United States Census-Death Certificate Matched Record Study

Sex and death certificate age (relative to census age)	1951 British Study ¹					1960 U.S. Census-Death Certificate Matched Record Study					
	All ages	0-14 years	15-34 years	35-64 years	65 years and over	Total					White, 1-99 years
						1-99 years	1-14 years	15-34 years	35-64 years	65-99 years	
Percent distribution											
Male-----	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Same single year of age-----	81.7	92.2	82.4	80.8	81.6	71.8	83.3	75.6	73.9	69.8	74.5
1 year younger---	4.6	-	4.4	5.2	4.6	7.7	5.1	6.7	7.3	8.2	7.5
1 year older----	10.4	6.9	9.9	10.5	10.5	9.2	8.1	8.9	8.8	9.5	9.1
Younger or older by more than 1 year-----	3.3	0.9	3.3	3.5	3.3	11.3	3.5	8.8	10.0	12.5	8.9
Female-----	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Same single year of age-----	78.9	98.8	83.3	76.7	78.9	64.8	82.9	72.9	66.3	63.3	67.9
1 year younger---	5.1	-	1.0	5.4	5.4	8.6	5.2	7.8	8.5	8.7	8.3
1 year older----	11.3	1.2	14.6	11.9	11.3	10.4	8.3	8.8	9.9	10.7	10.5
Younger or older by more than 1 year-----	4.7	-	1.0	6.1	4.5	16.2	3.6	10.5	15.3	17.3	13.3

¹Gt. Brit. General Register Office, 1951 Census of England and Wales, General Report, H.M. Stationery Office, London, 1958.

with that on the matching census record. For this comparison, the sample was confined to death certificates for white males aged 45-64 years who died during May-August 1950. These death certificates were selected in such a way as to include a certain number of each of the major occupation categories. Of this sample, 79 percent were found in the 1950 census compared with a match rate of 81 percent for the white male decedents aged 45-64 in the present study.

Age agreement between the two records for ages classified into 5-year groups was consistently lower for each age group in the occupation study (table F). The differences between the results of the two studies are probably due to differences in procedures rather than to improvements in information on records from 1950 to 1960 although some difference may be attributed to the use of self-enumeration in the 1960 census and the use of year of birth in 1960 instead of age as was used in 1950. One procedural difference was that ages on the census record were not corrected for the time that elapsed between

Table F. Percent agreement for 5-year age intervals between the death certificate and the matching census record for white male decedents aged 45-64 years: United States, 1950 Occupation Study and 1960 Census-Death Certificate Matched Record Study

Death certificate age ¹	1950 Occupation Study ²	1960 Census-Death Certificate Matched Record Study
	Percent agreement	
45-49 years----	88.1	92.7
50-54 years----	87.5	91.5
55-59 years----	84.3	91.2
60-64 years----	85.8	90.1

¹Death certificate used as base for percent agreement.

²National Office of Vital Statistics: The comparability of reports on occupation from vital records and the 1950 census, by D.L. Kaplan, E. Parkhurst, and P. K. Whelpton, Vital Statistics—Special Reports, Vol. 53, No. 1. Public Health Service, Washington, D.C., June 1961.

enumeration and date of death in the occupation study. It was estimated that 4 or 5 percent of the decedents should be reported in different 5-year age groups. This correction would certainly raise the levels of agreement to ones approaching those in the present study.

A second factor that might explain some of the differences between studies was the sampling procedure used in the occupation study. Since the sample for the occupation study was drawn to represent the distributions of major occupation groups in 1950, the sample in the present study from 1960 deaths might be slightly different in occupation distribution. To the extent that occupation is related to age agreement, differences in the sample composition of occupations would affect the results.

A third study, "Matched Record Comparison of Birth Certificate and Census Information,"¹² was done as part of the 1950 Birth Registration Test in the United States. The relevant data concern age of mother as reported on the birth certificate and the matching infant card for infants born during the month of March 1950. The infant cards were filled out by enumerators during the 1950 census for infants born during January-March of that year. Both for single years of age (fig. 6) and for ages grouped into 5-year intervals, there was higher agreement in age for mothers in the birth study than for all female decedents aged 15-44 years in the present study (table G). In both studies agreement was higher for the white group than for the nonwhite, but an interesting difference appeared in the relative positions of the color groups when single years of age were combined into 5-year intervals. That is, agreement in single years of age was almost always higher for white female decedents than for nonwhite mothers. However, for 5-year age groups, agreement was higher for nonwhite mothers than for white female decedents up to age 35. The apparent reason for this is that 22 percent of the differences for nonwhite mothers were within 1 year of the same single year of age compared with 16 percent for the white female decedents.

This relatively high agreement in the birth study existed even though no corrections were made for a possible birthday between the date the birth occurred and the date of the census. One explanation for the higher age agreement in the

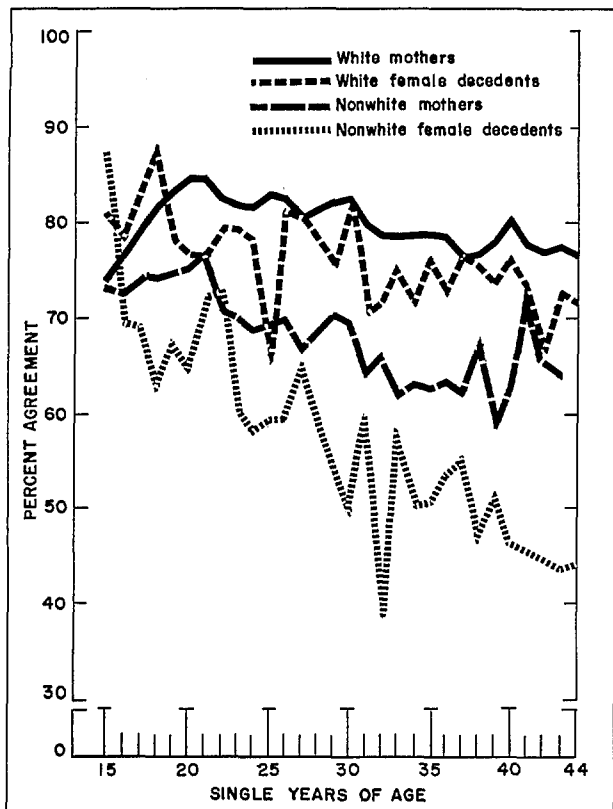


Figure 6. Percent agreement in age between the vital record and the matching census record for mothers (1950 Birth Study) and for female decedents (1960 Census-Death Certificate Matched Record Study) aged 15-44 years, by color.

birth study is the great likelihood that the respondent was the same (i.e., the mother herself) for both the infant card and the birth certificate. Another reason could be that if the mother's age were reported far outside the range of child-bearing ages, 15-44 years, it probably would have been detected. On the other hand, the age reported on the census record or the death certificate would not fall into any such narrow range of possibilities.

Finally, there are other studies carried out by the Bureau of the Census to evaluate census results. The Post-Enumeration Survey (PES)⁵ in 1950 was an intensive reinterview program carried out for a sample of persons to evaluate the coverage of the censuses and the accuracy of the responses obtained. The agreement in response

for ages classified into 5-year groups between the census and PES was quite high—94 percent for the total group compared with 89 percent for the present study. In the CPS-Census⁴ match study done in 1960 to evaluate the accuracy of the data in the 1960 census, slightly higher age agreement was found than for the PES—95 percent agreement for the total group classified into 5-year age groups by the census and the CPS. This may reflect improved techniques in the CPS over the PES or improvements in the 1960 census, including the use of self-enumeration and year of birth. The same sex, color, and age patterns of age agreement observed in the present study were found in both of these studies, although the percent agreements were much higher in the census studies. Agreement was higher for males than females, higher for white individuals than for nonwhite, and higher for younger ages than for older ages among nonwhite individuals in all three studies (table H). In view of the basic similarities in the collection and processing of data for the census, PES, and CPS, and the likelihood that the respondent was the same for both records being compared, it is not surprising that age agreement was higher for these studies than for the present study. Moreover, the census studies refer to samples of the living population while the present study refers to a sample of deaths.

As an independent investigation of the 1950 census, several record check studies were done. One of these involved a sample of census records matched to birth certificates.¹³ Of those matched, 96 percent were in the same 5-year age group according to the census record and the birth certificate. Unfortunately these results are based largely on findings for younger individuals since birth certificates were found for less than one-third of persons aged 45 years and over. In the 1951 British study discussed above, a similar record check was done, and 99 percent of the sample were in the same 5-year age group on both the 1951 census and the birth certificate. Birth certificates were found in the British study for more than 85 percent of individuals 65 years and over in the sample.

The following hypotheses are suggested by the results of these diverse studies:

1. Age reported in the registration system and the enumeration process in the United States is somewhat less consistent than

Table G. Percent agreement for 5-year age intervals between the vital record and the matching census record for mothers and for female decedents aged 15-44 years, by color: United States, 1950 Birth Study and 1960 Census-Death Certificate Matched Record Study

Age ¹	1950 Birth Study ² (mothers)			1960 Census-Death Certificate Matched Record Study (female decedents)		
	Total	White	Non- white	Total	White	Non- white
	Percent agreement					
15-19 years-----	93.3	93.4	93.0	92.2	92.4	91.6
20-24 years-----	95.1	95.6	92.1	88.8	90.6	82.4
25-29 years-----	95.3	95.9	90.1	87.5	89.3	81.9
30-34 years-----	94.7	95.4	88.6	84.2	87.1	75.1
35-39 years-----	92.9	93.7	87.3	86.3	89.5	75.5
40-44 years-----	92.8	93.7	85.6	83.7	86.9	71.0

¹Age in the Birth Study refers to age on the birth record which was used as base for percent agreement; age on census record is base for 1960 Census-Death Certificate Matched Record Study.

²National Vital Statistics Division: Matched record comparison of birth certificate and census information: United States, 1950, Vital Statistics—Special Reports, Vol. 47, No. 12, Public Health Service, Washington, D.C., Mar. 1962.

similar information reported in England and Wales.

2. Age information is less reliable for certain portions of the population than others no matter which record is being considered. These are generally females, non-white individuals, and persons of older ages.
3. Age information is more likely to be consistent from one record to another if the same individual is the respondent on these records.

EVALUATION OF ACCURACY OF AGE-SPECIFIC DEATH RATE

The age-specific death rate as an estimate of the probability of dying at a given age has had worldwide significance as a measure of the health status of the Nation and as an identifier of sub-groups within the population that are at high risk of death. Its importance cannot be overestimated, and for this reason its accuracy is of considerable interest.

For the purposes of this report accuracy is taken to imply consistency: the age reported on one record is consistent with that on the other record for the same individual. Specifically, the question posed is "If the figures for the numerator and the denominator of the age-specific death rate come from the same source (the census record) how would such an age-specific death rate (herewith called the adjusted age-specific death rate) compare with the published (herewith called the actual) figures?"

To answer this question figures from census records for all decedents in a given year should be used. For the year in which the data for this study were collected, 1960, considerably less than all such records are available so that only an approximation to an adjusted rate is possible. The net difference rate, used in the previous sections of this report, can provide an estimate of the percentage difference between the actual and the adjusted age-specific death rates. However, the net difference rates used in this section are based on different figures from those used in the previous sections. They represent the compari-

Table H. Percent agreement for 5-year age intervals between matching records: United States, three census studies and 1960 Census-Death Certificate Matched Record Study

[Census record was used as base for percent agreement; 5-year age intervals were used through age 74; ages 75 years and over were treated as one interval]

Color, sex, and age on census record	1950 census and Birth Certificate Record Check ¹	1950 census and Post-Enumeration Survey ²	1960 census and Current Population Survey ³	1960 Census-Death Certificate Matched Record Study ⁴
<u>Total</u>	Percent agreement			
All ages-----	96.3	94.0	94.8	89.3
Under 45 years-----	96.8	95.1	95.9	88.9
45 years and over-----	91.9	91.3	92.1	89.4
<u>White</u>				
All ages-----	---	94.7	95.4	91.4
Under 45 years-----	---	95.7	96.5	90.7
45 years and over-----	---	92.4	92.8	91.5
<u>Nonwhite</u>				
All ages-----	---	88.3	89.8	69.4
Under 45 years-----	---	90.8	91.5	80.7
45 years and over-----	---	79.3	84.7	66.6
<u>Male</u>				
All ages-----	---	94.3	94.9	90.3
Under 45 years-----	---	95.5	95.7	89.5
45 years and over-----	---	91.3	92.9	90.4
<u>Female</u>				
All ages-----	---	93.8	94.7	88.0
Under 45 years-----	---	94.7	96.1	87.8
45 years and over-----	---	91.4	91.5	88.0

¹U.S. Bureau of the Census Post-Enumeration Survey, 1950, Results Memorandum No. 24, Age Statistics-"Record Check" Studies, Jan. 1954. (unpublished)

²U.S. Bureau of the Census: The Post-Enumeration Survey: 1950, Bureau of the Census, Technical Paper No. 4, Washington, D.C., 1960.

³U.S. Bureau of the Census: Evaluation and research program of the U.S. Censuses of Population and Housing, 1960: accuracy of data on population characteristics as measured by CPS-Census Match, Series ER60, No. 5, Washington, U.S. Government Printing Office, 1964.

⁴Refers to ages 1-99 years.

sons found between the age information reported on the death certificate and that reported for the same individual in the edited 25-percent sample of the 1960 census (stage II) (table 5) as opposed to the unedited 100-percent census enumeration (stage I) used in the previous sections. There are several advantages in using stage II data rather than stage I for evaluating age-specific death rates. The most important one is that stage II data were processed by FOSDIC (Film Optical Sensing Device for Input to Computer), whereas stage I data were manually coded for this study, and errors resulting from the manual process necessitated the exclusion of certain groups of records. A more detailed discussion of the differences between stage I and stage II and the reasons for preferring one to the other for the different sections of this report are contained in the Technical Appendix.

This analysis is confined to death rates rather than numbers of deaths to facilitate comparisons of results between the various subgroups. Estimations were made of adjusted numbers of deaths which are presented in table 8 but which will not be discussed here. The death rates considered are specific for sex, color, and 10-year age intervals and for sex, color, cause of death, and 10-year age intervals. The adjusted rate was calculated in the following way:

$$\text{Adjusted} = \text{Actual} \div (1 + \text{Net Difference Rate})$$

This method is one of several possible procedures for correcting age-specific death rates from the data. Another method has been suggested by Dr. Kitagawa which would yield slightly different results. See the Technical Appendix for an outline of this method. The net difference rates used to calculate adjusted rates are shown in table 6.

Figure 7 and table 7 show that the adjusted rates for white males and females at every age are remarkably close to the actual rates. For nonwhite males and females, the adjusted rate is sometimes quite different from the actual. The adjusted rates for the nonwhite group are lower at ages 45-74 (except for females 65-74) and higher at ages 75 and over than the actual. Both of these changes and the small decrease in the adjusted rate for the white group at ages 75 and over contribute to slightly smaller differences

between white and nonwhite individuals in adjusted rates for ages 45 and over.

The most interesting finding relates to the oldest ages 75 and over: actual rates for the white population are higher than those for the nonwhite at ages 75 and over, but at all other ages rates are higher for the nonwhite population. This reversal is diminished but not eliminated in the adjusted rates. The adjusted rates for the nonwhite group are as high as those for the white at ages 75-84 years. The "crossing of the curve" occurs only at ages 85 and over, where although the adjusted rates for the nonwhite population are still lower than those for the white group, the gap is smaller than was the case for the actual rates. For the combined age group 65 years and over, the adjusted death rate is higher for the nonwhite group than for the white, reversing the color differentials found in the actual death rates (table 7). There is some reason to believe that the net difference rates used to calculate these adjusted rates are a conservative estimate of the "true" difference in age statements since these rates are based on records only for decedents who were matched with the census. In any event, the results lend support to the hypothesis that the excess in mortality for the white population over the nonwhite at ages 75 and over, in contrast with the overall pattern of excesses for the nonwhite population, is an artifact of the data rather than a real phenomenon.

The adjusted rates for three major cause-of-death categories (figs. 8-10) were similar to the pattern for all causes. The adjusted rates for the white group in each cause category showed smaller changes from the actual rates than those for the nonwhite group in the same category. The adjusted rates for the nonwhite group at ages 75 and over were higher than the actual, tending to approach the rate for white individuals. (For accidents, poisoning, and violence little or nothing can be said about the rates for nonwhite persons 85 years and over because the study group had frequencies of less than 10 nonwhite individuals.) The largest differences between the actual and adjusted rates were found for major cardiovascular-renal diseases and the smallest for accidents, poisonings, and violence, corresponding to the findings in the earlier section of lower and higher than average age agreement for these two categories, respectively.

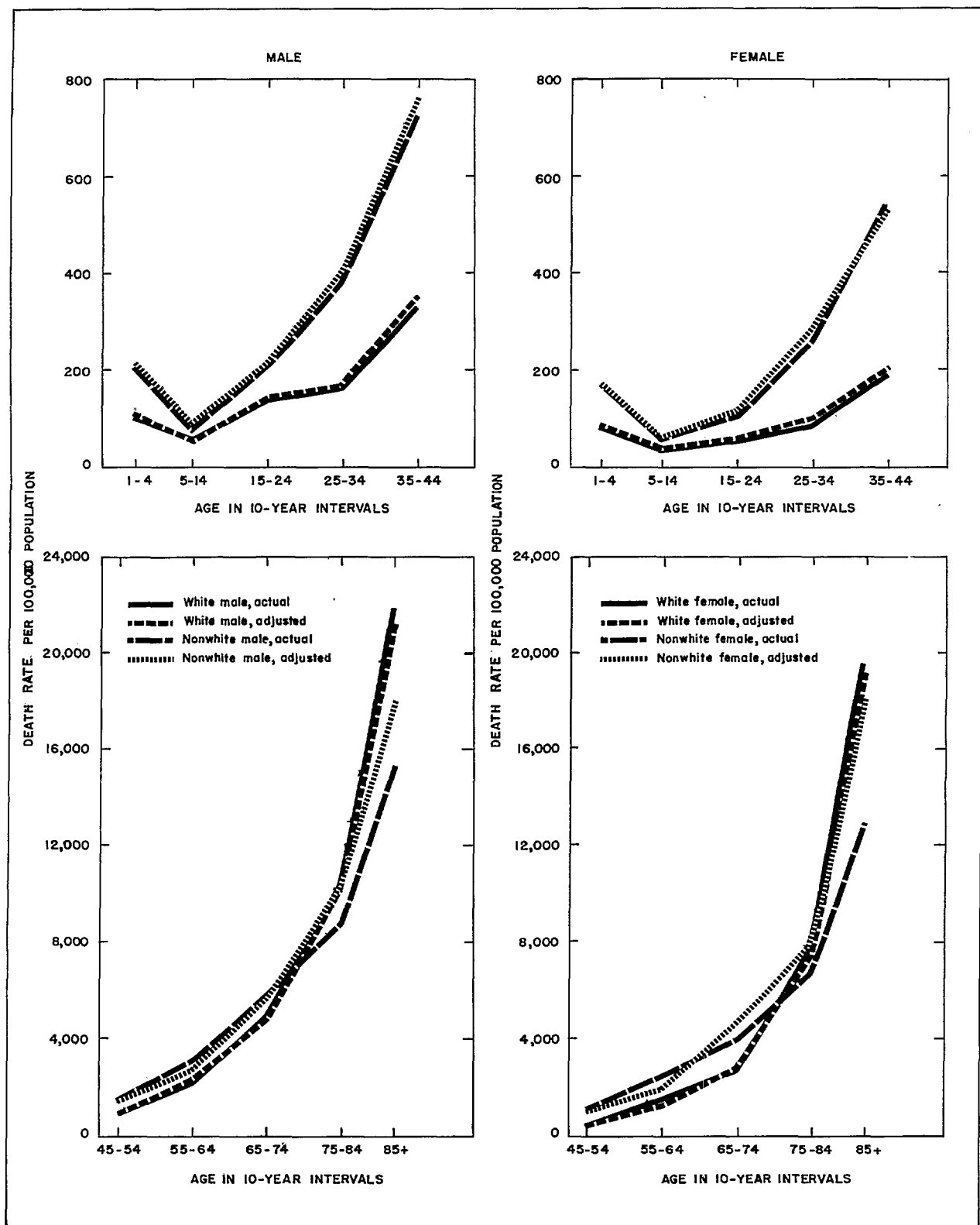


Figure 7. Actual and adjusted age-specific death rates for 10-year age intervals, by color and sex.

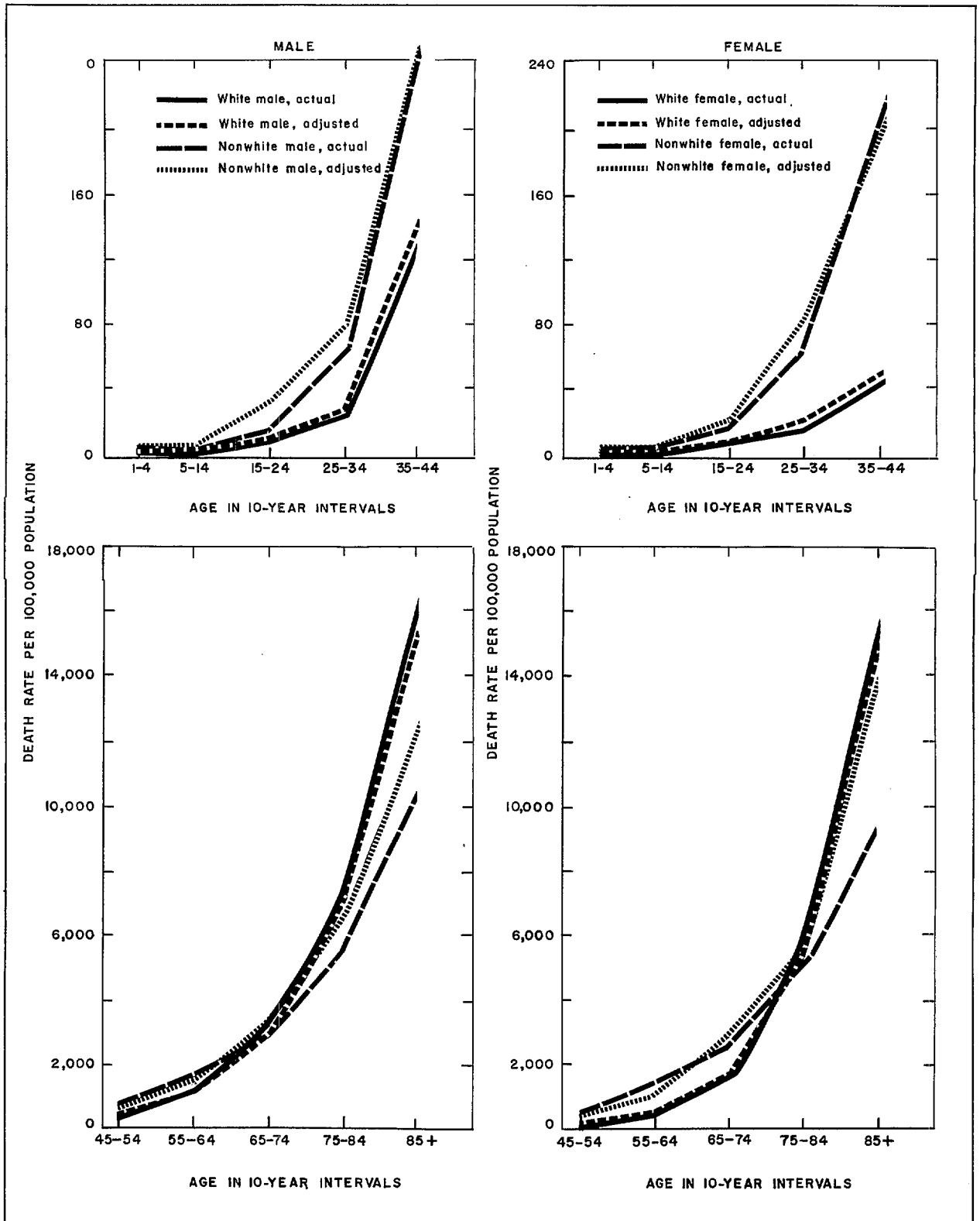


Figure 8. Actual and adjusted age-specific death rates for Major Cardiovascular-Renal Diseases for 10-year age intervals, by color and sex.

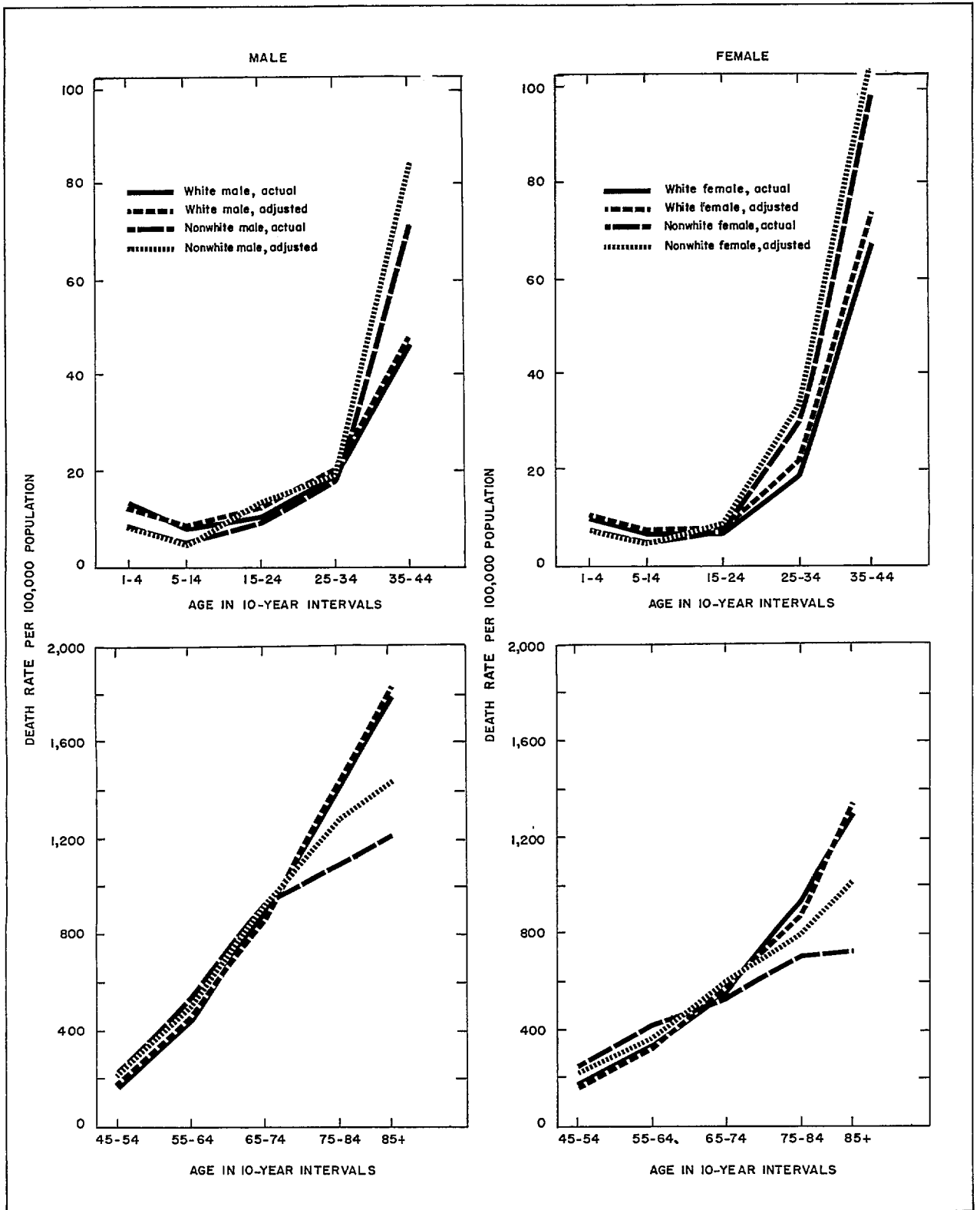


Figure 9. Actual and adjusted age-specific death rates for Malignant Neoplasms for 10-year age intervals, by color and sex.

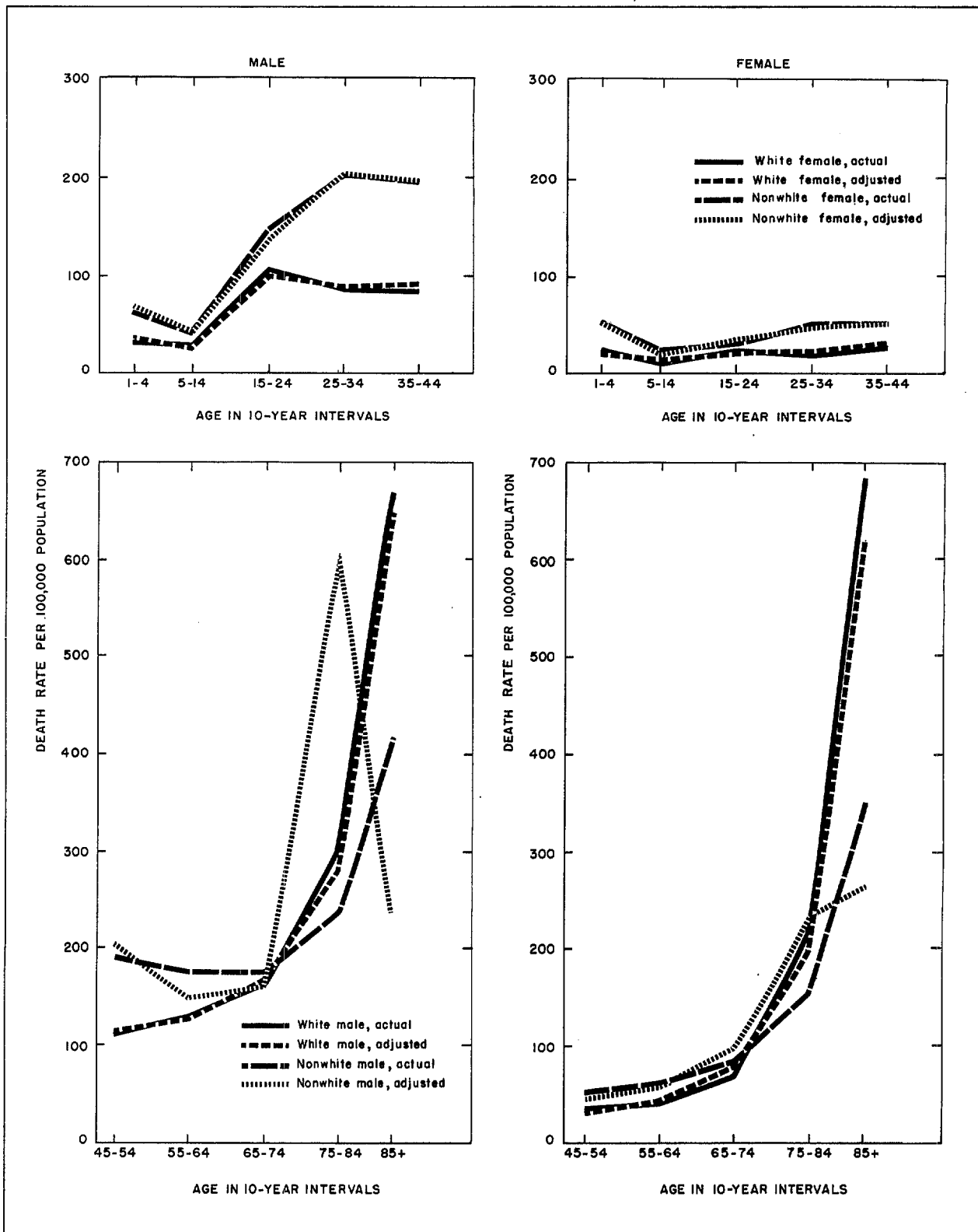


Figure 10. Actual and adjusted age-specific death rates for Accidents, Poisonings, and Violence, by color and sex.

Adjusted rates are not intended to be closer representations of reality than the published rates but rather to reflect the change in rates brought about by removing some of the age statement differences between the census record and the death certificate. Also these adjustments do not allow for estimates of undercoverage in the census record. The analysis is limited to only those age-specific death rates published for the year 1960, and no attempt is made to generalize these results to other years. It is further restricted in generality because of the number of limitations inherent in the data which are discussed in the Technical Appendix. These limitations include the fact that the adjusted rates are based on data that refer only to deaths sampled during May-August and matched with the 25-percent sample (stage II) census records. Moreover, this evaluation is specific for the characteristics considered here: sex, color, age, and cause of death. Insofar as the value of the net difference rates between ages on the census record and those on the death certificate is related to other characteristics, age-specific death rates by such characteristics should be evaluated on the basis of net difference rates for each characteristic. For example, an age-specific death rate for white males by marital status should be evaluated from net difference rates calculated for white males by age and marital status. In spite of the specificity of this evaluation, some indication of the general quality of the actual age-specific death rates for various portions of the population in 1960 is provided.

DISCUSSION

The results of this report confirm the frequently stated argument that there are inconsistencies in the age information between the census record and the death certificate. Moreover, it has been shown that these inconsistencies can affect the level of the age-specific death rates. The question arises at this point as to what can be expected in the future in terms of improved age information. It is difficult to identify the factor or factors responsible for differences in age statements. Measures of age correspondence between records reflect the combined effect of the various differences between records, including the questions designed to elicit age response, the respondent providing the information, the care

taken by the person completing the forms, and the processing of the responses.

Because of these differing circumstances, a certain amount of difference in age information between the records might be expected. However, since an average of 93 percent of the white male decedents were classified in the same 10-year age interval on both records, it is clear in view of the results for white males in this study that at least this level of agreement should be possible for all subgroups of the study population. That subgroups vary radically from this average for white males is evidence that more is involved than differences in procedures between records.

While the entire amount of disagreement between records cannot be attributed to any one factor, the disagreements in excess of what was found for white males can probably be ascribed to differences in characteristics of the subgroups. Then the question becomes what reasons can account for those portions of the population providing unreliable information and what possibilities exist for future improvements.

It seems reasonable to suppose that consistent age reporting on records implies the existence of two prerequisites on the part of the respondent: (1) That he knows either his age or the age of the individual for whom he is responding, and (2) that he is willing to provide this information accurately. The existence of these prerequisites is related to the individual's social and economic environment. The low age agreement in the older nonwhite group probably reflects the fact that they do not have birth certificates and do not know their age. For the majority of white males the environment is largely urban and industrial where records of age—including birth certificates, social security enrollment forms, and insurance policies—are widely used. To the extent that the trend has been for nonwhite individuals to move from rural farm areas to urban industrial ones, differences in age information as a result of differences in the environment should diminish. The relatively greater age consistency for younger than older nonwhite decedents, which approached the levels found for the white group, may be taken as evidence of this movement. At any given moment in time, individuals within the two color groups may be quite similar with respect to age agreement. For example, if age comparability had been analyzed by socioeconomic

status, age agreement might have been the same for white and nonwhite individuals within each status group. In any event, as more and more use is made of records and as record keeping becomes increasingly accurate, knowledge of one's age should increase.

Although sex differences were not as great as color differences, the lower agreement for females than males deserves some attention. The emphasis here, particularly for white females, should probably be on willingness to report their accurate age rather than on knowledge of it. Where disagreement existed between records, it was often a result of the age on the death certificate being reported as older than that on the census record for white females. If it is assumed that women are quite likely to respond for themselves on the census record, then the finding would support the contention that women tend to give a younger age. There is some hope for improvements in this area with the more widespread use of self-enumeration in the census. On the other hand, some of the age inconsistency for females might arise from a difference in respondents on the two records. That is, information for males might be more likely to come from the wife or other household member on both the census record and the death certificate, whereas information for females might be more likely to come from themselves on the census record and hence from a different respondent on the death certificate.

Much could be gained from further research into this subject of comparison of age statements in an effort to isolate the causes of disagreement and thus to provide a basis for making improvements. There are many characteristics of individuals that need to be studied which, separately or in combination, might affect age agreement—e.g., education, urban-rural residence, marital status, nativity, and the relationship of the deceased to the informant on the death certificate. In addition to such studies, one involving a three-way comparison of age on the census record, death certificate, and social security form or the birth certificate would be of considerable importance.

SUMMARY

The outstanding finding in this evaluation of age response comparability on the death certifi-

cate and the census record for the same individual is that age agreement is generally quite high for the white group and relatively low for the nonwhite.

Agreement levels appeared to be closely related to age for nonwhite decedents: age agreement although somewhat lower for nonwhite individuals than for white under age 45 was substantially lower at ages 45 and over. Large discrepancies for nonwhite individuals between the ages reported on the death certificate and those on the census record have their impact on adjusted age-specific death rates based on age of decedent as reported on the census record. The adjusted rates differed from the actual rates for ages 45 and over, casting some doubt on the accuracy of the actual rate as a measure of nonwhite mortality risks at these ages.

Other characteristics of the decedent examined for their bearing on the problem were related to the amount of age agreement but to a lesser degree than color and age. Sex differences were small although there was usually less age agreement for females than for males. Geographic region of residence and the factors which vary concomitantly with geographic area—race and nativity—seemed to be related to amount of age agreement. White decedents of the Northeast Region and nonwhite decedents of the South Region had lower agreement than did decedents of other regions. Cause of death appeared to affect age agreement: higher than average agreement was found for decedents whose deaths were from accidents, poisonings, and violence while lower than average agreement was found for decedents whose deaths were from the major cardiovascular-renal diseases. The extent of these differences is indicated approximately in the comparison between actual and adjusted rates. Actual rates were different from adjusted rates to a slightly larger degree for females than males. For accidents, poisonings, and violence the actual rates did not noticeably differ from the adjusted rates although they did for major cardiovascular-renal diseases.

The results from related studies indicated similar patterns of age, sex, and color differences in age agreement between two sources although the size of the differences varied from study to study.

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Table 1. Cross classification of 5-year age intervals as stated on the death certificate and on the matching 100-percent enumeration census record (stage I), by color and sex: United States, May-August 1960

Color, sex, and age on census record		Age on death certificate									
		Total, 1-99 years	1-4 years	5-9 years	10-14 years	15-19 years	20-24 years	25-29 years	30-34 years	35-39 years	40-44 years
1	<u>White male</u> Total, 1-99 years-----	199,642	1,697	1,243	1,255	1,951	1,540	1,482	2,082	3,177	5,261
2	1-4 years-----	1,708	<u>1,649</u>	36	1	-	1	1	-	-	1
3	5-9 years-----	1,243	33	<u>1,179</u>	22	1	1	-	1	-	-
4	10-14 years-----	1,251	4	10	<u>1,177</u>	41	4	-	1	-	2
5	15-19 years-----	1,938	-	3	28	<u>1,837</u>	40	4	-	2	4
6	20-24 years-----	1,546	3	-	2	28	<u>1,416</u>	51	14	5	4
7	25-29 years-----	1,536	-	2	1	4	46	<u>1,365</u>	45	10	4
8	30-34 years-----	2,178	3	4	1	2	3	40	<u>1,931</u>	84	13
9	35-39 years-----	3,280	4	3	6	3	2	8	63	<u>2,977</u>	108
10	40-44 years-----	5,516	-	-	8	11	4	-	10	65	<u>4,868</u>
11	45-49 years-----	8,733	-	1	1	13	7	4	3	9	182
12	50-54 years-----	12,626	-	-	1	4	5	3	4	3	37
13	55-59 years-----	16,503	-	-	1	4	4	2	3	8	8
14	60-64 years-----	21,688	-	1	-	-	1	1	1	6	6
15	65-69 years-----	27,097	-	-	1	1	6	1	4	4	9
16	70-74 years-----	29,843	-	1	4	1	-	1	-	2	10
17	75-79 years-----	26,917	-	2	1	-	-	-	-	1	1
18	80-84 years-----	19,817	-	1	-	-	-	1	2	1	3
19	85-89 years-----	11,487	1	-	-	1	-	-	-	-	-
20	90-94 years-----	3,946	-	-	-	-	-	-	-	-	1
21	95-99 years-----	789	-	-	-	-	-	-	-	-	-
22	Not stated or not valid-----	2,091	8	4	4	8	10	16	19	43	51
23	<u>White female</u> Total, 1-99 years-----	149,902	1,274	768	634	730	649	767	1,265	2,160	3,220
24	1-4 years-----	1,285	<u>1,249</u>	27	2	1	-	-	1	-	-
25	5-9 years-----	773	17	<u>726</u>	10	2	1	-	-	1	1
26	10-14 years-----	651	4	7	<u>604</u>	18	1	1	-	-	2
27	15-19 years-----	747	-	2	13	<u>690</u>	17	1	2	-	5
28	20-24 years-----	657	1	1	-	12	<u>595</u>	15	8	5	2
29	25-29 years-----	801	1	-	1	2	23	<u>715</u>	33	10	2
30	30-34 years-----	1,336	1	-	1	-	2	23	<u>1,164</u>	79	14
31	35-39 years-----	2,226	-	-	2	-	2	8	45	<u>1,992</u>	99
32	40-44 years-----	3,376	-	1	1	-	1	-	3	49	<u>2,935</u>
33	45-49 years-----	4,786	-	-	-	5	2	1	1	12	122
34	50-54 years-----	6,411	-	1	-	-	2	-	1	2	21
35	55-59 years-----	8,393	-	1	-	-	1	-	2	5	7
36	60-64 years-----	12,150	1	-	-	-	1	-	-	1	4
37	65-69 years-----	16,617	-	1	-	-	-	1	1	-	2
38	70-74 years-----	22,199	-	-	-	-	-	-	-	1	3
39	75-79 years-----	23,238	-	-	-	-	-	-	1	1	1
40	80-84 years-----	21,372	-	-	-	-	-	-	2	1	-
41	85-89 years-----	14,699	-	-	-	-	1	2	1	1	-
42	90-94 years-----	6,516	-	1	-	-	-	-	-	-	-
43	95-99 years-----	1,669	-	-	-	-	-	-	-	-	-
44	Not stated or not valid-----	1,842	5	3	2	5	6	7	11	19	24

Table 1. Cross classification of 5-year age intervals as stated on the death certificate and on the matching 100-percent enumeration census record (stage I), by color and sex: United States, May-August 1960—Con.

Age on death certificate												
45-49 years	50-54 years	55-59 years	60-64 years	65-69 years	70-74 years	75-79 years	80-84 years	85-89 years	90-94 years	95-99 years	Not stated, not valid, or 100+ years	
8,560	12,551	16,602	21,647	27,109	29,650	26,871	20,431	11,661	4,144	728	37	1
-	-	3	1	4	6	-	-	5	-	-	-	2
-	2	3	1	-	-	-	-	-	-	-	-	3
5	1	2	1	-	2	-	1	-	-	-	-	4
1	4	1	-	2	2	-	5	5	-	-	-	5
6	8	3	2	4	-	-	-	-	-	-	-	6
7	9	18	9	6	-	10	-	-	-	-	-	7
7	17	14	15	16	18	10	-	-	-	-	-	8
30	13	15	11	20	12	-	5	-	-	-	-	9
263	147	20	24	26	24	5	25	11	5	-	-	10
<u>7,938</u>	317	118	26	26	22	20	35	6	5	-	-	11
223	<u>11,479</u>	586	129	51	26	30	25	15	5	-	1	12
62	446	<u>15,142</u>	557	131	44	46	20	20	-	5	2	13
7	73	488	<u>19,512</u>	865	426	91	150	35	20	5	10	14
3	18	145	955	<u>24,490</u>	955	370	50	75	10	-	2	15
2	6	26	333	1,041	<u>26,338</u>	1,356	546	151	25	-	1	16
4	6	8	30	360	1,454	<u>23,868</u>	935	217	30	-	1	17
2	4	4	27	33	244	838	<u>17,818</u>	703	136	-	3	18
-	1	4	6	22	55	192	735	<u>10,195</u>	265	10	1	19
-	-	1	6	8	22	20	76	198	<u>3,558</u>	56	1	20
-	-	1	2	4	-	15	5	25	85	<u>652</u>	15	21
98	148	206	264	312	292	225	206	112	60	5	5	22
4,731	6,325	8,378	12,046	16,657	21,074	23,118	22,585	14,987	6,886	1,648	50	23
-	1	3	1	-	-	-	-	-	-	-	6	24
-	2	2	-	6	-	-	-	5	-	-	-	25
5	1	-	1	2	-	-	5	-	-	-	-	26
1	1	3	1	2	4	-	5	-	-	-	-	27
3	6	2	3	2	2	-	-	-	-	-	-	28
3	2	4	1	4	-	-	-	-	-	-	-	29
10	7	8	2	4	6	5	5	-	5	-	-	30
21	10	12	6	6	3	5	5	5	-	5	-	31
215	71	17	17	15	16	20	15	-	-	-	1	32
<u>4,251</u>	223	87	22	24	16	15	5	-	-	-	-	33
148	<u>5,627</u>	393	102	18	26	25	20	25	-	-	-	34
59	293	<u>7,345</u>	419	159	42	20	15	20	5	-	1	35
3	55	338	<u>10,358</u>	813	351	90	80	25	30	-	1	36
4	13	137	799	<u>14,155</u>	893	370	96	105	30	10	1	37
1	4	16	246	1,006	<u>17,973</u>	1,741	840	208	150	10	5	38
4	4	7	36	351	1,315	<u>19,495</u>	1,533	425	35	30	10	39
2	4	3	22	50	317	1,002	<u>18,783</u>	1,015	151	20	-	40
1	1	1	5	20	85	295	1,023	<u>12,731</u>	496	36	5	41
-	-	-	4	6	23	25	120	373	<u>5,819</u>	145	10	42
-	-	-	1	14	2	10	35	50	165	<u>1,392</u>	10	43
52	93	124	136	206	262	320	257	185	115	10	5	44

Table 1. Cross classification of 5-year age intervals as stated on the death certificate and on the matching 100-percent enumeration census record (stage 1), by color and sex: United States, May-August 1960—Con.

Color, sex, and age on census record		Age on death certificate									
		Total, 1-99 years	1-4 years	5-9 years	10-14 years	15-19 years	20-24 years	25-29 years	30-34 years	35-39 years	40-44 years
<u>Nonwhite male</u>											
1	Total, 1-99 years-----	20,142	470	244	271	343	296	378	443	662	900
2	1-4 years-----	476	<u>450</u>	20	1	-	-	-	-	-	-
3	5-9 years-----	233	7	<u>214</u>	5	1	-	3	-	-	-
4	10-14 years-----	280	4	5	<u>252</u>	9	1	2	-	1	1
5	15-19 years-----	343	1	1	10	<u>312</u>	8	1	-	1	2
6	20-24 years-----	315	1	-	1	14	<u>256</u>	22	3	1	4
7	25-29 years-----	384	2	1	-	3	21	<u>306</u>	24	4	4
8	30-34 years-----	464	-	1	-	-	1	31	<u>347</u>	51	12
9	35-39 years-----	695	1	1	-	-	2	6	56	<u>532</u>	54
10	40-44 years-----	897	2	-	-	2	3	2	6	45	<u>663</u>
11	45-49 years-----	1,220	1	-	-	2	-	1	1	12	124
12	50-54 years-----	1,578	1	1	2	-	1	2	4	5	19
13	55-59 years-----	1,878	-	-	-	-	-	1	1	5	6
14	60-64 years-----	2,155	-	-	-	-	2	-	-	4	7
15	65-69 years-----	2,525	-	-	-	-	1	-	-	1	2
16	70-74 years-----	2,389	-	-	-	-	-	-	1	-	-
17	75-79 years-----	1,999	-	-	-	-	-	1	-	-	2
18	80-84 years-----	1,150	-	-	-	-	-	-	-	-	-
19	85-89 years-----	790	-	-	-	-	-	-	-	-	-
20	90-94 years-----	266	-	-	-	-	-	-	-	-	-
21	95-99 years-----	105	-	-	-	-	-	-	-	-	-
22	Not stated or not valid-----	391	3	1	1	2	3	2	13	25	20
<u>Nonwhite female</u>											
23	Total, 1-99 years-----	16,752	350	176	121	146	174	264	413	643	854
24	1-4 years-----	356	<u>343</u>	9	-	-	-	-	-	1	-
25	5-9 years-----	170	6	<u>159</u>	2	-	-	1	-	-	-
26	10-14 years-----	134	1	5	<u>117</u>	3	2	1	1	-	-
27	15-19 years-----	154	-	1	2	<u>141</u>	6	-	1	-	-
28	20-24 years-----	182	-	-	-	1	<u>150</u>	13	4	3	2
29	25-29 years-----	260	-	-	-	-	12	<u>213</u>	17	10	1
30	30-34 years-----	434	-	-	-	-	3	29	<u>326</u>	51	10
31	35-39 years-----	657	-	1	-	-	1	4	46	<u>496</u>	63
32	40-44 years-----	856	-	-	-	-	-	2	11	59	<u>608</u>
33	45-49 years-----	1,044	-	-	-	-	-	-	2	15	112
34	50-54 years-----	1,174	-	-	-	-	-	-	2	3	29
35	55-59 years-----	1,454	-	-	-	-	-	-	2	4	17
36	60-64 years-----	1,610	-	1	-	-	-	-	-	1	4
37	65-69 years-----	2,035	-	-	-	-	-	-	-	-	2
38	70-74 years-----	2,043	-	-	-	-	-	-	-	-	3
39	75-79 years-----	1,700	-	-	-	1	-	-	-	-	1
40	80-84 years-----	1,182	-	-	-	-	-	1	-	-	-
41	85-89 years-----	803	-	-	-	-	-	-	1	-	1
42	90-94 years-----	364	-	-	-	-	-	-	-	-	-
43	95-99 years-----	140	-	-	-	-	-	-	-	-	1
44	Not stated or not valid-----	349	3	1	-	-	1	6	7	13	13

Table 1. Cross classification of 5-year age intervals as stated on the death certificate and on the matching 100-percent enumeration census record (stage I), by color and sex: United States, May-August 1960--Con.

Age on death certificate												
45-49 years	50-54 years	55-59 years	60-64 years	65-69 years	70-74 years	75-79 years	80-84 years	85-89 years	90-94 years	95-99 years	Not stated, not valid, or 100+ years	
1,251	1,721	2,125	2,456	2,727	2,291	1,662	1,012	592	215	83	45	1
1	2	1	1	-	-	-	-	-	-	-	1	2
-	1	-	-	-	2	-	-	-	-	-	-	3
1	-	-	-	3	1	-	-	-	-	-	-	4
-	2	1	2	-	1	-	1	-	-	-	1	5
1	6	2	1	-	2	1	-	-	-	-	-	6
5	5	2	3	3	-	1	-	-	-	-	-	7
5	6	3	1	-	1	1	3	-	-	1	-	8
15	7	9	1	5	1	2	2	1	-	-	1	9
99	32	15	9	7	6	2	2	-	2	-	-	10
<u>923</u>	89	37	10	8	3	6	1	2	-	-	2	11
139	<u>1,191</u>	150	34	17	10	2	-	-	-	-	3	12
39	256	<u>1,376</u>	124	45	14	7	2	2	-	-	1	13
13	68	281	<u>1,494</u>	187	60	16	18	4	1	-	1	14
8	34	126	410	<u>1,718</u>	156	48	10	7	4	-	3	15
1	12	66	198	386	<u>1,418</u>	203	72	25	5	2	7	16
-	3	37	104	224	<u>364</u>	<u>1,100</u>	117	40	3	4	4	17
1	4	10	42	66	147	166	<u>635</u>	65	11	3	10	18
-	1	8	17	39	73	78	124	<u>400</u>	40	10	4	19
-	2	-	2	14	27	24	15	37	<u>130</u>	15	3	20
-	-	1	3	5	5	5	10	9	19	<u>48</u>	4	21
30	39	56	52	34	37	29	19	15	7	3	2	22
<u>1,097</u>	<u>1,417</u>	<u>1,703</u>	<u>2,085</u>	<u>2,053</u>	<u>1,843</u>	<u>1,425</u>	962	631	286	109	48	23
-	-	2	-	1	-	-	-	-	-	-	3	24
-	1	1	-	-	-	-	-	-	-	-	-	25
1	1	-	-	1	1	-	-	-	-	-	-	26
1	2	-	-	-	-	-	-	-	-	-	-	27
2	2	-	5	-	-	-	-	-	-	-	-	28
1	1	2	2	-	1	-	-	-	-	-	-	29
5	2	2	1	1	3	1	-	-	-	-	-	30
16	5	10	6	3	2	2	1	1	-	-	-	31
94	38	17	12	6	3	4	2	-	-	-	2	32
<u>751</u>	92	33	19	5	8	6	-	1	-	-	-	33
135	<u>834</u>	116	32	9	3	5	4	-	-	-	-	34
58	262	<u>916</u>	123	39	18	7	7	-	1	-	1	35
18	84	295	<u>971</u>	143	55	22	10	4	2	-	1	36
13	48	181	446	<u>1,057</u>	190	66	19	8	4	1	5	37
1	27	61	267	404	<u>998</u>	169	74	30	8	1	2	38
1	12	38	108	228	301	<u>835</u>	120	40	12	3	7	39
-	3	20	57	93	158	159	<u>577</u>	93	12	9	4	40
-	2	5	26	43	83	103	101	<u>390</u>	44	4	6	41
-	-	2	5	12	17	33	31	53	<u>182</u>	29	5	42
-	1	2	5	8	2	13	16	11	21	<u>60</u>	12	43
25	40	36	42	44	31	39	27	11	8	2	1	44

Table 2. Net difference rates and percent agreement for 5-year age intervals between the death certificate and the matching 100-percent enumeration census record (stage I), by geographic region, color, and age: United States, May-August 1960

Color and age	United States	Region				United States	Region			
		North-east	North Central	South	West		North-east	North Central	South	West
<u>White</u>		Net difference rate				Percent agreement				
Total, 1-99 years-	...	...	...	...	...	88.1	85.4	90.1	88.3	89.0
1-4 years-----	-0.7	1.2	-2.2	-0.5	-0.7	96.8	97.5	96.1	96.9	97.2
5-9 years-----	-0.2	-3.1	2.0	-0.2	-0.6	94.5	91.6	96.7	94.2	94.8
10-14 years-----	-0.7	-	-0.3	-1.9	-	93.6	93.6	94.8	92.3	93.9
15-19 years-----	-0.1	-0.3	-0.1	0.3	-0.6	94.1	93.6	95.1	93.4	94.3
20-24 years-----	-0.6	-0.6	-0.6	0.7	-2.6	91.3	89.2	92.6	91.5	91.4
25-29 years-----	-3.8	-6.9	-3.8	-3.2	-0.2	89.0	85.9	89.7	89.6	91.2
30-34 years-----	-4.8	-5.7	-4.1	-3.8	-6.0	88.1	85.4	89.9	88.1	88.5
35-39 years-----	-3.1	-5.7	-2.9	-0.6	-3.1	90.2	87.9	91.2	91.6	90.3
40-44 years-----	-4.6	-5.9	-4.2	-4.4	-3.4	87.8	86.3	89.0	88.0	87.8
45-49 years-----	-1.7	-3.0	-1.9	-1.0	-	90.2	88.4	91.4	90.3	91.0
50-54 years-----	-0.8	-0.5	-0.3	-1.1	-2.1	89.9	88.7	91.2	89.7	89.7
55-59 years-----	0.3	-0.2	0.4	0.7	0.9	90.3	88.4	91.5	90.4	92.0
60-64 years-----	-0.4	0.3	-0.9	-0.2	-1.4	88.3	86.6	89.8	88.5	88.5
65-69 years-----	0.1	1.7	-0.2	-1.2	-0.6	88.4	86.1	90.3	88.4	89.6
70-74 years-----	-2.5	-2.7	-2.9	-2.2	-1.9	85.1	82.3	87.2	85.4	86.5
75-79 years-----	-0.3	-0.2	-0.1	-0.8	-0.4	86.5	82.8	89.4	86.3	87.7
80-84 years-----	4.4	5.1	3.4	4.8	4.8	88.9	85.6	91.2	89.4	89.1
85-89 years-----	1.8	-1.6	3.5	2.4	3.5	87.6	83.0	91.3	87.6	87.6
90-94 years-----	5.4	6.1	5.4	6.6	2.3	89.6	87.9	91.5	89.7	88.9
95-99 years-----	-3.3	4.5	-6.8	-9.9	-0.5	83.2	79.6	85.3	79.8	88.3
<u>Nonwhite</u>										
Total, 1-99 years-	...	...	...	...	...	64.8	70.0	69.5	60.2	79.7
1-4 years-----	-1.4	0.8	1.4	-3.1	-1.1	95.3	96.2	95.9	94.8	95.7
5-9 years-----	4.2	6.6	-	5.8	-	92.6	95.1	93.2	92.4	88.9
10-14 years-----	-5.3	-3.6	-12.2	-5.1	-	89.1	87.5	87.8	88.7	97.1
15-19 years-----	-1.6	2.3	-	-1.4	-9.1	91.1	93.0	90.5	91.4	88.6
20-24 years-----	-5.4	-5.4	10.0	-7.9	-8.6	81.7	85.1	88.3	78.4	87.9
25-29 years-----	-0.3	1.6	-	-	-7.3	80.6	84.4	82.6	77.9	85.5
30-34 years-----	-4.7	-10.6	-6.0	-1.3	-9.4	74.9	73.3	79.3	73.4	78.1
35-39 years-----	-3.5	-6.8	-0.4	-3.3	-4.1	76.0	80.0	78.3	72.9	82.0
40-44 years-----	0.1	0.7	-6.5	2.5	-2.5	72.5	74.3	72.6	70.7	80.4
45-49 years-----	3.7	-	2.1	5.9	-0.6	73.9	72.7	77.1	72.4	79.5
50-54 years-----	14.0	11.4	10.4	16.9	6.0	73.6	74.1	77.0	71.4	81.5
55-59 years-----	14.9	6.4	10.3	20.6	4.8	68.8	70.4	72.3	65.6	79.2
60-64 years-----	20.6	6.8	16.3	28.1	4.7	65.5	67.4	69.9	61.7	80.4
65-69 years-----	4.8	3.4	1.8	6.5	-	60.9	67.3	64.6	56.9	76.4
70-74 years-----	-6.7	-9.2	-9.1	-6.0	-2.2	54.5	61.1	60.2	49.2	74.4
75-79 years-----	-16.5	-4.8	-10.0	-22.3	-	52.3	61.3	60.0	45.8	77.5
80-84 years-----	-15.4	-4.4	-9.5	-21.9	5.3	52.0	56.6	63.7	44.0	80.3
85-89 years-----	-23.2	-15.9	-12.4	-29.7	-5.1	49.6	64.1	59.8	40.8	75.2
90-94 years-----	-20.5	-10.7	-16.0	-25.0	8.3	49.5	67.9	47.9	45.5	75.0
95-99 years-----	-21.6	-5.6	-26.8	-21.5	-28.6	44.1	72.2	51.2	39.5	42.9

Table 3. Number of matching 100-percent enumeration census records (stage I) for 10-year age intervals, by cause of death, color, sex, and age: United States, May-August 1960

Color, sex, and age ¹	Cause of death ²				
	All causes	Cardio-vascular diseases	Malignancies	Accidents, etc.	All other causes
<u>White male</u>					
Total, 1-99 years-----	199,667	118,044	34,147	17,084	30,392
1-4 years-----	1,708	53	247	661	747
5-14 years-----	2,494	110	361	1,425	598
15-24 years-----	3,484	210	285	2,528	461
25-34 years-----	3,714	677	474	1,912	651
35-44 years-----	8,796	3,675	1,369	2,162	1,590
45-54 years-----	21,359	11,403	3,998	2,426	3,532
55-64 years-----	38,201	22,045	8,195	2,216	5,745
65-74 years-----	56,940	35,556	10,858	1,925	8,601
75-84 years-----	46,734	32,096	6,823	1,382	6,433
85-99 years-----	16,237	12,219	1,537	447	2,034
<u>White female</u>					
Total, 1-99 years-----	149,942	90,164	30,030	7,363	22,385
1-4 years-----	1,290	41	178	437	634
5-14 years-----	1,424	88	267	527	542
15-24 years-----	1,404	178	178	609	439
25-34 years-----	2,137	408	489	542	698
35-44 years-----	5,602	1,362	2,045	751	1,444
45-54 years-----	11,197	3,726	4,478	817	2,176
55-64 years-----	20,543	9,959	6,453	850	3,281
65-74 years-----	38,821	24,098	8,279	961	5,483
75-84 years-----	44,615	32,424	5,963	1,120	5,108
85-99 years-----	22,909	17,880	1,700	749	2,580
<u>Nonwhite male</u>					
Total, 1-99 years-----	20,157	10,289	3,031	2,583	4,254
1-4 years-----	477	22	31	153	271
5-14 years-----	513	32	30	319	132
15-24 years-----	658	52	28	477	101
25-34 years-----	848	160	44	435	209
35-44 years-----	1,592	626	190	396	380
45-54 years-----	2,798	1,361	460	339	638
55-64 years-----	4,033	2,151	801	231	850
65-74 years-----	4,915	3,028	856	135	896
75-84 years-----	3,154	2,040	486	72	556
85-99 years-----	1,169	817	105	26	221
<u>Nonwhite female</u>					
Total, 1-99 years-----	16,775	9,604	2,734	872	3,565
1-4 years-----	358	17	18	116	207
5-14 years-----	304	33	31	122	118
15-24 years-----	336	64	28	89	155
25-34 years-----	694	198	82	111	303
35-44 years-----	1,513	581	326	117	489
45-54 years-----	2,218	1,094	557	94	473
55-64 years-----	3,064	1,837	622	72	533
65-74 years-----	4,079	2,723	649	65	642
75-84 years-----	2,884	2,068	323	61	432
85-99 years-----	1,325	989	98	25	213

¹Includes 103 records with age reported as 100 years and over on the death certificate.

²Complete category titles and numbers of the Seventh Revision of the International Lists, 1955, are as follows:

- Major cardiovascular-renal diseases (330-334, 400-468, 592-594)
- Malignant neoplasms (140-205)
- Accidents, poisonings, and violence (E800-E999)
- All other causes (residual)

Table 4. Net difference rates and percent agreement for 10-year age intervals between the death certificate and the matching 100-percent enumeration census record (stage I), by cause of death, color, sex, and age: United States, May-August 1960

Color, sex, and age ¹	Cause of death ²					Cause of death ²									
	All causes	Cardiovascular diseases	Malignancies	Accidents, etc.	All other causes	All causes	Cardiovascular diseases	Malignancies	Accidents, etc.	All other causes					
<u>White male</u>						<u>Net difference rate</u>					<u>Percent agreement</u>				
Total, 1-99 years-	...	...	...	...	...	93.0	93.0	93.1	93.9	92.8
1-4 years-----	-0.6	-22.6	-2.4	0.6	0.4	96.5	75.5	96.0	96.2	98.5					
5-14 years-----	0.2	-6.4	-0.3	0.1	1.7	95.7	88.2	96.1	95.9	96.5					
15-24 years-----	0.2	-13.3	-3.2	2.0	-1.5	95.3	81.9	91.9	97.0	94.1					
25-34 years-----	-4.0	-11.2	-6.3	0.1	-7.1	91.0	83.2	89.2	95.0	88.9					
35-44 years-----	-4.1	-5.7	-5.8	-2.0	-1.6	91.2	90.1	89.4	93.4	91.9					
45-54 years-----	-1.2	-1.4	-0.9	-0.3	-1.2	93.4	93.4	93.8	93.7	93.0					
55-64 years-----	0.2	0.1	0.1	-0.1	0.5	93.5	93.3	93.9	93.9	93.3					
65-74 years-----	-0.3	-0.4	0.8	-2.5	-1.1	92.8	92.8	93.5	90.2	92.1					
75-84 years-----	1.2	1.1	1.1	2.1	1.5	93.0	93.3	92.2	90.9	92.6					
85-99 years-----	1.9	2.0	-1.0	3.1	3.9	92.7	93.1	90.2	91.9	92.5					
<u>White female</u>						<u>Net difference rate</u>					<u>Percent agreement</u>				
Total, 1-99 years-	...	...	...	...	...	90.5	90.1	91.2	92.1	90.5
1-4 years-----	-0.9	-17.1	-1.1	-2.5	0.6	97.2	82.9	94.9	96.6	98.4					
5-14 years-----	-1.5	-10.2	-7.1	1.9	-0.7	94.6	84.1	90.6	97.0	95.9					
15-24 years-----	-1.8	-12.4	-6.2	1.8	-0.7	93.6	83.1	88.8	96.9	95.2					
25-34 years-----	-4.9	-10.8	-5.7	-3.0	-2.4	90.5	84.6	90.2	92.4	92.8					
35-44 years-----	-4.0	-5.3	-4.4	-1.1	-3.7	90.6	88.4	90.9	92.8	91.1					
45-54 years-----	-1.3	-3.2	-0.5	-1.3	0.6	91.5	89.4	92.9	92.0	92.3					
55-64 years-----	-0.6	-1.7	1.5	-0.6	-1.1	89.9	88.2	92.3	92.0	89.4					
65-74 years-----	-2.8	-2.8	-2.6	-6.5	-2.6	87.7	87.4	89.5	84.0	86.7					
75-84 years-----	2.5	1.7	4.1	7.2	4.1	91.5	91.4	92.0	92.5	91.0					
85-99 years-----	2.8	3.2	2.8	1.5	1.2	92.7	93.0	89.5	90.8	92.8					
<u>Nonwhite male</u>						<u>Net difference rate</u>					<u>Percent agreement</u>				
Total, 1-99 years-	...	...	...	...	...	77.1	74.0	77.1	86.2	79.2
1-4 years-----	-1.3	-18.2	-	-4.6	1.5	94.5	81.8	96.8	92.8	95.9					
5-14 years-----	0.4	-18.8	3.3	1.9	0.8	92.8	71.9	100.0	94.4	92.4					
15-24 years-----	-2.9	-23.1	-21.4	1.5	-7.9	89.7	69.2	75.0	93.9	84.2					
25-34 years-----	-3.2	-11.3	-4.5	2.5	-8.6	83.5	75.6	81.8	88.5	79.4					
35-44 years-----	-1.9	-0.8	-10.5	-0.5	-0.8	81.3	79.7	79.5	83.8	82.1					
45-54 years-----	6.2	7.1	7.6	2.9	5.2	83.7	82.4	84.3	83.8	85.9					
55-64 years-----	13.6	18.0	9.1	5.6	8.8	81.2	80.8	81.5	79.2	82.6					
65-74 years-----	2.1	2.6	3.6	-15.6	1.7	74.8	74.8	77.1	65.2	74.1					
75-84 years-----	-15.1	-15.9	-17.3	-27.8	-9.4	64.1	63.3	64.0	56.9	67.4					
85-99 years-----	-23.3	-23.5	-26.7	11.5	-21.3	61.0	61.4	54.3	84.6	61.1					
<u>Nonwhite female</u>						<u>Net difference rate</u>					<u>Percent agreement</u>				
Total, 1-99 years-	...	...	...	...	...	71.6	67.7	74.7	86.1	75.9
1-4 years-----	-1.7	-23.5	-11.1	-2.6	0.5	96.3	76.5	88.9	95.7	98.1					
5-14 years-----	-2.3	-9.1	3.2	1.6	-5.9	93.1	87.9	93.5	96.7	90.7					
15-24 years-----	-4.8	-18.8	-14.3	4.5	-2.6	88.7	75.0	75.0	96.6	92.3					
25-34 years-----	-2.4	-10.6	3.7	-2.7	1.3	84.3	78.8	79.3	91.0	86.8					
35-44 years-----	-1.1	-0.7	-1.8	-3.4	-0.4	81.0	77.8	81.9	86.3	83.0					
45-54 years-----	13.3	16.7	12.2	11.7	7.2	81.7	80.8	85.6	85.1	78.4					
55-64 years-----	23.6	26.6	15.3	13.9	24.6	75.2	74.0	77.5	70.8	77.5					
65-74 years-----	-4.5	-1.5	-13.7	-7.7	-7.3	65.0	65.2	65.3	64.6	63.6					
75-84 years-----	-17.2	-18.0	-13.0	-19.7	-16.4	58.7	57.5	63.5	67.2	59.0					
85-99 years-----	-21.5	-21.5	-24.5	-	-18.3	60.7	60.6	56.1	80.0	64.8					

¹Includes 103 records with age reported as 100 years and over on the death certificate.

²Complete category titles and numbers of the Seventh Revision of the International Lists, 1955, are as follows:

- Major cardiovascular-renal diseases (330-334, 400-468, 592-594)
- Malignant neoplasms (140-205)
- Accidents, poisonings, and violence (E800-E999)
- All other causes (residual)

Table 5. Cross classification of 5-year age intervals as stated on the death certificate and on the matching 25-per-cent sample census record (stage II), by color and sex: United States, May-August 1960

[Numbers include allocations of ages not reported on the census record; number of allocations is in superscript]

	Color, sex, and age on census record	Age on death certificate										
		Total, 1 year and over	1-4 years	5-9 years	10-14 years	15-19 years	20-24 years	25-29 years	30-34 years	35-39 years	40-44 years	45-49 years
1	<u>White male</u> Total, 1 year and over--	47,972 ⁴⁴³	402 ²	309 ¹	330 ⁴	447	379 ⁴	390 ¹	528 ⁵	814 ⁵	1,370 ¹¹	2,078 ¹⁸
2	1-4 years-----	406 ⁴	<u>387</u> ²	12 ¹	1 ¹	-	1	1	2	-	-	-
3	5-9 years-----	301 ¹	9	<u>281</u>	9 ¹	1	-	-	1	-	-	-
4	10-14 years-----	329	3	4	<u>302</u>	16	1	-	1	-	-	1
5	15-19 years-----	431 ¹	-	2	5	<u>408</u>	5	1	-	1	1	2
6	20-24 years-----	404 ²⁴	-	-	1 ¹	4	<u>349</u>	14	5 ²	4	-	1
7	25-29 years-----	407 ⁷	1	3	-	2	13 ²	<u>356</u>	7 ¹	6	1	1
8	30-34 years-----	542 ¹⁷	-	1	1	1	1 ¹	4	<u>483</u> ¹	18 ¹	9 ¹	3 ²
9	35-39 years-----	875 ⁹	-	1	3	1	1 ¹	3	20	<u>762</u>	27 ²	12 ²
10	40-44 years-----	1,449 ²⁹	2	1	3	3	1	-	3	11	<u>1,254</u>	67 ⁶
11	45-49 years-----	2,119 ¹⁷	-	2	1	5	-	4 ¹	-	2	<u>49</u> ²	<u>1,886</u>
12	50-54 years-----	3,100 ⁴⁴	-	1	2	3	2	1	2	3 ²	17 ¹	53
13	55-59 years-----	4,094 ⁹⁸	-	-	-	1	2	4	1	3	2 ¹	32
14	60-64 years-----	5,344 ⁸⁰	-	-	-	-	1	-	1	1	2	6 ²
15	65-69 years-----	6,542 ⁸¹	-	-	-	1	1	1	-	2 ¹	2 ¹	5 ³
16	70-74 years-----	7,022 ⁴⁹	-	1	1	1	1	1	-	1 ¹	4 ¹	5 ¹
17	75-79 years-----	6,349 ²⁷	-	-	-	-	-	-	1	-	-	3 ¹
18	80-84 years-----	4,499 ¹²	-	-	1 ¹	-	-	-	1 ¹	-	1 ¹	-
19	85-89 years-----	2,668 ²⁰	-	-	-	-	-	-	-	-	1 ¹	-
20	90-94 years-----	885 ²	-	-	-	-	-	-	-	-	-	-
21	95-99 years-----	165 ¹	-	-	-	-	-	-	-	-	-	1 ¹
22	100 years and over-----	41	-	-	-	-	-	-	-	-	-	-
23	<u>White female</u> Total, 1 year and over--	35,624 ⁵⁸⁷	324 ²	181 ¹	161 ³	195	143 ¹	186	305 ⁴	555 ⁵	807 ⁸	1,152 ¹⁴
24	1-4 years-----	333 ⁴	<u>316</u> ¹	5 ¹	1	-	-	1	1	-	2	-
25	5-9 years-----	186 ¹	5	<u>174</u>	4 ¹	-	-	-	-	-	-	1
26	10-14 years-----	170 ¹	-	2	<u>151</u> ¹	5	2	-	-	1	2	-
27	15-19 years-----	199 ⁶	2 ¹	-	1	<u>183</u>	-	-	-	2 ¹	1	-
28	20-24 years-----	154 ¹	-	-	-	5	<u>132</u>	-	7 ¹	-	-	1
29	25-29 years-----	225 ²⁶	-	-	-	-	8 ¹	<u>175</u>	9	3	2 ²	-
30	30-34 years-----	352 ²⁵	1	-	1	-	-	8	<u>280</u> ³	21 ²	6 ³	5 ¹
31	35-39 years-----	583 ¹³	-	-	1 ¹	-	-	-	6	<u>501</u>	24 ¹	7 ¹
32	40-44 years-----	882 ²⁴	-	-	2	2	-	-	1	18	<u>719</u> ¹	46 ⁶
33	45-49 years-----	1,163 ²²	-	-	-	-	1	2	-	5 ²	33	<u>1,008</u> ¹
34	50-54 years-----	1,589 ³⁶	-	-	-	-	-	-	-	-	13 ¹	45 ²
35	55-59 years-----	2,082 ³⁰	-	-	-	-	-	-	-	3	2	28 ¹
36	60-64 years-----	3,047 ⁸⁸	-	-	-	-	-	-	-	-	2	3
37	65-69 years-----	4,003 ⁸⁸	-	-	-	-	-	-	-	-	1	4 ²
38	70-74 years-----	5,294 ¹⁰¹	-	-	-	-	-	-	1	1	-	1
39	75-79 years-----	5,449 ⁴²	-	-	-	-	-	-	-	-	-	2
40	80-84 years-----	4,749 ³⁹	-	-	-	-	-	-	-	-	-	-
41	85-89 years-----	3,289 ³⁵	-	-	-	-	-	-	-	-	-	-
42	90-94 years-----	1,433 ¹	-	-	-	-	-	-	-	-	-	-
43	95-99 years-----	354 ⁴	-	-	-	-	-	-	-	-	-	-
44	100 years and over-----	88 ²	-	-	-	-	-	-	-	-	-	1

Table 5. Cross classification of 5-year age intervals as stated on the death certificate and on the matching 25-percent sample census record (stage II), by color and sex: United States, May-August 1960—Con.

[Numbers include allocations of ages not reported on the census record; number of allocations is in superscript]

Age on death certificate												
50-54 years	55-59 years	60-64 years	65-69 years	70-74 years	75-79 years	80-84 years	85-89 years	90-94 years	95-99 years	100 years and over	Not stated or not valid	
3,088 ⁸⁶	4,067 ²⁷	5,271 ⁵⁵	6,535 ⁷⁶	7,180 ⁷⁸	6,317 ⁷⁰	4,596 ¹⁰	2,686 ²⁵	1,000 ¹⁰	155	30 ⁵	8	1
-	-	2	-	-	-	-	-	-	-	-	-	2
-	-	-	-	-	-	-	-	-	-	-	-	3
1	-	-	-	-	-	-	-	-	-	-	-	4
-	2	4 ¹	-	-	-	-	-	-	-	-	-	5
1	2	2	4 ⁴	2 ²	15 ¹⁵	-	-	-	-	-	-	6
-	4	6 ²	2 ²	-	5	-	-	-	-	-	-	7
3 ²	4 ¹	3 ¹	2 ²	4	5 ⁵	-	-	-	-	-	-	8
4	11 ¹	8 ¹	6 ²	6	5	-	-	5	-	-	-	9
59 ⁵	11 ¹	9 ⁴	6 ⁴	14 ⁴	-	-	-	-	-	5 ⁵	-	10
73 ⁵	57	7 ²	10 ²	8	15 ⁵	-	-	-	-	-	-	11
2,757 ⁹	138 ⁸	73 ¹⁴	12 ⁴	16 ⁸	-	10	10	-	-	-	-	12
131 ⁴	3,656 ⁸	115 ⁸	88 ⁸	24 ⁶	10	10	10 ⁵	-	5	-	-	13
45 ⁵	140 ⁵	4,691 ⁴	247 ²⁶	155 ¹⁸	25 ¹⁵	10	5 ⁵	10	-	5	-	14
7 ⁴	33 ⁴	238 ⁸	5,805 ⁸	232 ⁸	175 ²⁰	30 ¹⁰	10	-	-	-	-	15
1 ¹	3 ¹	87 ⁵	253 ¹²	6,247 ¹²	251 ¹⁰	145	15 ⁵	5	-	-	-	16
3	3 ¹	13 ⁸	83 ⁴	365 ⁸	5,596	202	55	20 ¹⁰	5	-	-	17
2	1 ¹	11 ⁴	9	79 ⁴	185	4,019	150	40	-	-	-	18
1 ¹	1	1	4	24 ⁸	20	155	2,366 ¹⁰	90	5	-	-	19
-	-	1	-	4 ²	-	5	60	810	5	-	-	20
-	-	-	4	-	-	5	5	10	135	-	-	21
-	1	-	-	-	5	5	-	10	-	20	-	22
1,574 ⁹²	2,055 ⁸¹	2,971 ⁴⁰	4,073 ⁸⁸	5,059 ⁸⁴	5,433 ⁸¹	5,161 ⁸⁵	3,199 ⁸⁰	1,620 ⁴⁵	400 ²⁵	70	-	23
1	1	3	2 ²	-	-	-	-	-	-	-	-	24
-	-	-	2	-	-	-	-	-	-	-	-	25
-	2	-	-	-	-	5	-	-	-	-	-	26
-	-	1	2 ²	2 ²	-	-	-	-	5	-	-	27
-	1	1	-	2	-	5	-	-	-	-	-	28
4 ⁸	3 ¹	-	4 ²	2 ²	-	5 ⁵	5 ⁵	-	5 ⁵	-	-	29
4 ⁸	2	-	4 ⁴	10 ⁴	-	10 ⁵	-	-	-	-	-	30
7 ²	3 ¹	1	4	4 ²	15 ⁵	10	10	-	-	-	-	31
40 ⁴	5 ²	4	10 ⁴	10 ²	5	15 ⁵	5	-	-	-	-	32
51 ⁴	19 ²	6 ¹	4	4 ²	25 ⁵	-	5 ⁵	-	-	-	-	33
1,335 ²	92 ⁸	54 ⁶	14 ⁸	16 ⁸	5	5	-	5 ⁵	5	-	-	34
79 ⁸	1,774 ⁴	106 ⁷	60 ²	10	15 ¹⁰	-	-	-	5	-	-	35
39 ⁸	101 ⁷	2,496 ¹⁰	209 ¹⁶	122 ²⁰	15 ⁵	45 ¹⁵	5	5 ⁵	5 ⁵	-	-	36
6 ²	38 ²	203 ²	3,364 ⁸	222 ¹²	90 ¹⁵	50 ¹⁰	10 ⁵	10 ⁵	5 ⁵	-	-	37
4 ¹	7 ²	67 ⁷	280 ¹⁰	4,172 ¹⁶	425 ²⁵	260 ²⁵	31	40 ¹⁰	5 ⁵	-	-	38
3 ²	4 ¹	17 ⁴	82 ²	358 ⁸	4,522 ¹⁰	311 ⁵	120	20 ¹⁰	10	-	-	39
1	2	8 ¹	19 ⁸	94 ¹²	225	4,130	190 ¹⁵	60	20 ⁵	-	-	40
-	-	3 ¹	10 ²	24 ²	85 ⁵	275 ¹⁵	2,726	156 ¹⁰	10	-	-	41
-	-	1 ¹	3	3	-	40	82	1,279	25	-	-	42
-	1 ¹	-	-	2 ²	6 ¹	-	10	40	295	-	-	43
-	-	-	-	2 ²	-	5	-	5	5	70	-	44

Table 5. Cross classification of 5-year age intervals as stated on the death certificate and on the matching 25-percent sample census record (stage II), by color and sex: United States, May-August 1960—Con.

[Numbers include allocations of ages not reported on the census record; number of allocations is in superscript]

Color, sex, and age on census record		Age on death certificate										
		Total, 1 year and over	1-4 years	5-9 years	10-14 years	15-19 years	20-24 years	25-29 years	30-34 years	35-39 years	40-44 years	45-49 years
<u>Nonwhite male</u>												
1	Total, 1 year and over--	4,900 ⁷²	120	65	70	98 ¹	69 ³	84 ³	117 ²	154 ¹	212 ⁵	309 ⁴
2	1-4 years-----	123	<u>117</u>	5	-	-	-	-	-	1	-	-
3	5-9 years-----	64 ¹	1	<u>59</u>	-	-	1	1 ¹	-	-	-	-
4	10-14 years-----	75 ¹	-	-	<u>66</u>	4	2 ¹	-	-	-	-	2
5	15-19 years-----	96 ²	-	-	4	<u>88¹</u>	1	1	-	-	-	1
6	20-24 years-----	73 ²	-	-	-	2	<u>56</u>	5	2 ¹	-	2 ¹	1
7	25-29 years-----	93 ²	-	1	-	3	5	<u>68</u>	5	1	1	2
8	30-34 years-----	120 ³	1	-	-	-	1	<u>6¹</u>	<u>91</u>	9	4	-
9	35-39 years-----	169 ²	-	-	-	1	1	2 ¹	<u>14</u>	<u>127</u>	<u>11¹</u>	4
10	40-44 years-----	215 ⁷	-	-	-	-	-	-	2 ¹	8	<u>160¹</u>	19 ²
11	45-49 years-----	292 ³	-	-	-	-	-	-	1	2	27	<u>222¹</u>
12	50-54 years-----	399 ⁷	-	-	-	-	-	-	1	1	3	36 ¹
13	55-59 years-----	456 ⁵	-	-	-	-	1 ¹	-	-	2	3 ¹	14
14	60-64 years-----	497 ³	-	-	-	-	-	-	1	-	-	6
15	65-69 years-----	617 ³	-	-	-	-	-	-	-	2	-	2
16	70-74 years-----	585 ¹⁵	-	-	-	-	1 ¹	-	-	-	-	-
17	75-79 years-----	464 ⁴	-	-	-	-	-	1	-	-	1 ¹	-
18	80-84 years-----	281 ⁵	-	-	-	-	-	-	-	1 ¹	-	-
19	85-89 years-----	184	-	-	-	-	-	-	-	-	-	-
20	90-94 years-----	62	-	-	-	-	-	-	-	-	-	-
21	95-99 years-----	21 ¹	-	-	-	-	-	-	-	-	-	-
22	100 years and over-----	14	-	-	-	-	-	-	-	-	-	-
<u>Nonwhite female</u>												
23	Total, 1 year and over--	4,098 ³³	80 ¹	41	30	43	30	51 ¹	105	175 ⁵	211 ⁴	306 ³
24	1-4 years-----	80 ¹	<u>78¹</u>	1	-	-	-	-	-	-	-	-
25	5-9 years-----	42 ¹	-	<u>38</u>	1	-	-	1	-	1 ¹	-	1
26	10-14 years-----	32	1	1	<u>29</u>	-	1	-	-	-	-	-
27	15-19 years-----	47 ³	-	1	-	<u>40</u>	1	-	2	-	-	-
28	20-24 years-----	35 ¹	-	-	-	-	<u>27</u>	2	1	-	1	2
29	25-29 years-----	51 ⁴	1	-	-	-	1	<u>37</u>	4	3 ¹	1	1
30	30-34 years-----	119 ⁵	-	-	-	-	-	7	<u>82</u>	19	2 ²	2
31	35-39 years-----	169 ³	-	-	-	1	-	1	<u>11</u>	<u>131¹</u>	18	1
32	40-44 years-----	208 ³	-	-	-	-	-	-	4	<u>12¹</u>	<u>142</u>	28 ¹
33	45-49 years-----	279 ³	-	-	-	1	-	-	1	6	<u>28¹</u>	<u>202</u>
34	50-54 years-----	283 ⁵	-	-	-	-	-	-	-	1 ¹	12 ¹	38
35	55-59 years-----	332 ³	-	-	-	-	-	1	-	1	3	18 ¹
36	60-64 years-----	419 ³	-	-	-	-	-	-	-	1	3	8
37	65-69 years-----	483 ³	-	-	-	-	-	1 ¹	-	-	-	3
38	70-74 years-----	494 ⁷	-	-	-	-	-	-	-	-	-	-
39	75-79 years-----	425 ⁵	-	-	-	1	-	-	-	-	-	-
40	80-84 years-----	277 ⁴	-	-	-	-	-	-	-	-	-	-
41	85-89 years-----	189 ¹	-	-	-	-	-	1	-	-	1	1
42	90-94 years-----	79 ¹	-	-	-	-	-	-	-	-	-	1 ¹
43	95-99 years-----	39 ¹	-	-	-	-	-	-	-	-	-	-
44	100 years and over-----	16	-	-	-	-	-	-	-	-	-	-

Table 5. Cross classification of 5-year age intervals as stated on the death certificate and on the matching 25-per-cent sample census record (stage II), by color and sex: United States, May-August 1960—Con.

[Numbers include allocations of ages not reported on the census record; number of allocations is in superscript]

Age on death certificate												
50-54 years	55-59 years	60-64 years	65-69 years	70-74 years	75-79 years	80-84 years	85-89 years	90-94 years	95-99 years	100 years and over	Not stated or not valid	
432 ⁵	504 ⁷	586 ⁸	671 ¹²	538 ⁶	401 ⁶	231 ⁴	144 ²	54 ²	24	17 ¹	6	1
-	-	-	-	-	-	-	-	-	-	-	-	2
1	-	1	-	-	-	-	-	-	-	-	-	3
-	-	-	-	-	-	-	-	-	-	-	-	4
-	-	-	-	-	-	-	1 ¹	-	-	-	-	5
2	1	1	1	-	-	-	-	-	-	-	-	6
2	1	-	3 ¹	-	-	-	-	1 ¹	-	-	-	7
3	1 ¹	1	1 ¹	2	-	-	-	-	-	-	-	8
3	1	1	2	-	2	-	-	-	-	-	-	9
14 ²	3	4	2	1	1	1 ¹	-	-	-	-	-	10
18	12 ¹	4	2	1	2 ¹	-	-	1	-	-	-	11
295 ¹	39 ¹	15 ³	4	4	1 ¹	-	-	-	-	-	-	12
54	320 ¹	32 ¹	19	7 ¹	3	1	-	-	-	-	-	13
23	64	344 ¹	42 ²	9 ²	4	2 ¹	2	-	-	-	-	14
11 ²	35	104 ¹	405 ²	37 ¹	15	-	5	1	-	-	-	15
3	17 ³	39	106 ²	341 ²	51 ⁴	19 ²	5 ¹	1	-	-	-	16
-	7	24	44 ²	85	256	29	10	4 ¹	2	1	1	17
2	2	11 ²	24 ²	34	41	142	17	4	1	2	1	18
1	1	4	9	10	19	33	97	8	2	-	1	19
-	-	1	4	7	4	3	5	32	5	1	-	20
-	-	-	1	-	2	-	1	1	13	3 ¹	-	21
-	-	-	-	-	-	1	1	1	1	10	-	22
358 ⁵	395 ³	538 ¹³	489 ⁸	415 ⁶	366 ⁷	233 ²	126 ¹	62 ²	28 ¹	16 ¹	5	23
-	-	-	-	-	-	-	1	-	-	-	-	24
-	-	-	-	-	-	-	-	-	-	-	-	25
-	-	-	-	-	-	-	-	-	-	-	-	26
-	-	-	-	-	1 ¹	2 ²	-	-	-	-	-	27
1 ¹	-	1	-	-	-	-	-	-	-	-	-	28
1 ¹	-	1 ¹	1 ¹	-	-	-	-	-	-	-	-	29
-	1	2 ¹	-	1	1	-	-	1 ¹	-	1 ¹	-	30
1 ¹	2 ¹	-	1	-	-	1	-	-	-	-	-	31
12 ¹	5	3	1	-	1	-	-	-	-	-	1	32
26	6	7 ²	-	1	1	-	-	-	-	-	-	33
190	26	6 ¹	6 ¹	2	2 ¹	-	-	-	-	-	-	34
72	190 ¹	29	9 ¹	5 ¹	3 ²	-	-	-	1	-	-	35
33	81	242 ²	27	15 ¹	4	-	-	1	-	-	-	36
9 ¹	47	119 ¹	247	35 ²	17 ¹	3	2	-	-	-	-	37
7	15	79 ²	104 ¹	220	35 ²	20	9	4 ¹	1 ¹	-	-	38
3	10	26 ²	57 ²	76 ¹	214	30	5	1	1	1	2	39
2	7 ¹	11 ¹	17 ²	37	46	135	20	2	-	-	1	40
1	1	10	11	19	30	26	75 ¹	8	1	4	1	41
-	1	2	4	1	7	7	10	37	7	2	-	42
-	1	-	3	2 ¹	2	5	2	6	15	3	-	43
-	2	-	1	1	2	-	1	2	2	5	-	44

Table 6. Number of matching 25-percent sample census records (stage II) and net difference rates for 10-year age intervals, by cause of death, color, sex, and age: United States, May-August 1960

Color, sex, and age	Cause of death ¹					Cause of death ¹				
	All causes	Cardio-vascular diseases	Malignancies	Accidents, etc.	All other causes	All causes	Cardio-vascular diseases	Malignancies	Accidents, etc.	All other causes
<u>White male</u>	Number of matching census records					Net difference rate				
Total, 1 year and over-----	47,972	28,273	8,275	4,203	7,221	...	...	...	...	...
1-4 years-----	406	11	51	142	202	-1.0	-18.2	2.0	-2.1	-
5-14 years-----	630	31	87	361	151	1.4	-3.2	-2.3	2.5	2.0
15-24 years-----	835	59	75	591	110	-1.1	-23.7	-20.0	3.9	-2.7
25-34 years-----	949	176	129	490	154	-3.3	-9.7	-8.5	-1.0	1.3
35-44 years-----	2,324	1,031	315	553	425	-6.0	-9.7	-7.0	-2.0	-1.6
45-54 years-----	5,219	2,821	950	614	834	-1.0	-0.2	-0.7	-3.4	-2.4
55-64 years-----	9,438	5,526	1,943	544	1,425	-1.1	-1.8	-0.4	0.6	0.1
65-74 years-----	13,564	8,458	2,531	481	2,094	1.1	1.7	3.1	-4.0	-2.6
75-84 years-----	10,848	7,355	1,780	315	1,398	0.6	-0.1	-0.4	6.7	3.9
85 years and over----	3,759	2,805	414	112	428	3.0	3.4	-2.2	2.7	5.1
<u>White female</u>										
Total, 1 year and over-----	35,624	21,336	7,074	1,729	5,485	...	...	...	...	...
1-4 years-----	333	15	43	114	161	-2.7	-26.7	-7.0	1.8	-2.5
5-14 years-----	356	26	77	124	129	-3.9	-26.9	-1.3	-5.6	0.8
15-24 years-----	353	62	43	130	118	-4.2	-25.8	-7.0	4.6	-1.7
25-34 years-----	577	135	128	135	179	-14.9	-31.9	-13.3	-6.7	-9.5
35-44 years-----	1,465	376	536	195	358	-7.0	-12.2	-9.5	-0.5	-1.4
45-54 years-----	2,752	961	1,069	208	514	-0.9	-7.4	1.6	1.4	4.9
55-64 years-----	5,129	2,493	1,594	220	822	-2.0	-3.4	1.4	-2.3	-4.4
65-74 years-----	9,297	5,731	1,964	227	1,375	-1.8	-1.0	-2.6	-10.1	-2.3
75-84 years-----	10,198	7,484	1,275	250	1,189	3.9	2.8	7.5	8.0	6.2
85 years and over----	5,164	4,053	345	126	640	2.4	3.1	-2.6	11.1	-0.6
<u>Nonwhite male</u>										
Total, 1 year and over-----	4,900	2,490	719	627	1,064	...	...	...	...	...
1-4 years-----	123	2	9	40	72	-2.4	-	-	-7.5	-
5-14 years-----	139	4	8	84	43	-2.9	-25.0	12.5	-3.6	-2.3
15-24 years-----	169	10	12	126	21	-1.2	-50.0	-33.3	7.1	-9.5
25-34 years-----	213	45	12	108	48	-5.6	-17.8	-	-0.9	-6.3
35-44 years-----	384	158	47	84	95	-4.7	-4.4	-14.9	-	-4.2
45-54 years-----	691	328	111	87	165	7.2	10.1	9.0	-5.7	7.3
55-64 years-----	953	522	196	47	188	14.4	13.2	9.7	19.1	21.3
65-74 years-----	1,202	737	200	29	236	0.6	3.8	-	6.9	-9.7
75-84 years-----	745	475	105	18	147	-15.2	-15.6	-15.2	-61.1	-8.2
85 years and over----	281	209	19	4	49	-14.9	-16.7	-15.8	75.0	-14.3
<u>Nonwhite female</u>										
Total, 1 year and over-----	4,098	2,369	661	218	850	...	...	...	...	...
1-4 years-----	80	5	3	31	41	-	-20.0	-	-	2.4
5-14 years-----	74	10	4	29	31	-4.1	-	-	6.9	-16.1
15-24 years-----	82	19	6	24	33	-11.0	-21.1	-16.7	-4.2	-9.1
25-34 years-----	170	54	19	27	70	-8.2	-22.2	-10.5	3.7	-1.4
35-44 years-----	377	143	79	31	124	2.4	2.8	-5.1	-	7.3
45-54 years-----	562	281	138	27	116	18.1	26.0	11.6	7.4	9.5
55-64 years-----	751	468	147	14	122	24.2	25.4	17.0	7.1	30.3
65-74 years-----	977	656	158	14	149	-7.5	-5.5	-10.8	-14.3	-12.1
75-84 years-----	702	491	83	15	113	-14.7	-13.6	-12.0	-33.3	-18.6
85 years and over----	323	242	24	6	51	-28.2	-31.4	-29.2	33.3	-19.6

¹Complete category titles and numbers of the Seventh Revision of the International Lists, 1955, are as follows:

- Major cardiovascular-renal diseases (330-334, 400-468, 592-594)
- Malignant neoplasms (140-205)
- Accidents, poisonings, and violence (E800-E999)
- All other causes (residual)

Table 7. Actual and adjusted age-specific death rates for 10-year age intervals, by specified causes of death, color, sex, and age: United States, 1960

Color, sex, and age	All causes		Cause of death ²					
	Actual	Ad-justed ¹	Cardiovascular diseases		Malignancies		Accidents, etc.	
			Actual	Ad-justed ¹	Actual	Ad-justed ¹	Actual	Ad-justed ¹
<u>White male</u>								
Rate per 100,000 population								
1-4 years-----	104.9	106.0	2.2	2.7	13.1	12.8	32.4	33.1
5-14 years-----	52.7	52.0	2.5	2.6	8.0	8.2	25.7	25.1
15-24 years-----	143.7	145.3	8.0	10.5	10.3	12.9	105.2	101.3
25-34 years-----	163.2	168.8	25.9	28.7	18.8	20.5	88.8	89.7
35-44 years-----	332.6	353.8	128.4	142.2	46.3	49.8	88.2	90.0
45-54 years-----	932.2	941.6	478.5	479.5	164.1	165.3	111.0	114.9
55-64 years-----	2,225.2	2,249.9	1,263.5	1,286.7	450.9	452.7	128.7	127.9
65-74 years-----	4,848.4	4,795.6	2,998.0	2,947.9	887.3	860.6	163.1	169.9
75-84 years-----	10,299.6	10,238.2	7,029.2	7,036.2	1,413.7	1,419.4	297.1	278.4
85 years and over-----	21,750.0	21,116.5	15,977.8	15,452.4	1,791.4	1,831.7	664.5	647.0
65 years and over-----	7,137.3	7,052.7	4,713.7	4,653.2	1,073.4	1,059.6	223.5	222.2
<u>White female</u>								
1-4 years-----	85.2	87.6	1.6	2.2	9.7	10.4	23.5	23.1
5-14 years-----	34.7	36.1	2.1	2.9	6.2	6.3	10.8	11.4
15-24 years-----	54.9	57.3	6.5	8.8	6.5	7.0	23.5	22.5
25-34 years-----	85.0	99.9	15.3	22.5	18.8	21.7	21.8	23.4
35-44 years-----	191.1	205.5	45.3	51.6	66.6	73.6	26.0	26.1
45-54 years-----	458.8	463.0	150.9	163.0	175.7	172.9	34.2	33.7
55-64 years-----	1,078.9	1,100.9	520.4	538.7	329.0	324.5	42.0	43.0
65-74 years-----	2,779.3	2,830.2	1,728.9	1,746.4	562.1	577.1	69.2	77.0
75-84 years-----	7,696.6	7,407.7	5,556.3	5,405.0	939.3	873.8	211.4	195.7
85 years and over-----	19,477.7	19,021.2	14,998.9	14,547.9	1,304.9	1,339.7	683.5	615.2
65 years and over-----	5,256.7	5,184.1	3,674.4	3,616.5	718.4	711.3	149.1	146.5
<u>Nonwhite male</u>								
1-4 years-----	207.3	212.4	6.8	6.8	8.2	8.2	61.6	66.6
5-14 years-----	75.2	77.4	4.9	6.5	4.9	4.4	40.1	41.6
15-24 years-----	213.8	216.4	16.6	33.2	9.2	13.8	147.8	138.0
25-34 years-----	386.4	409.3	65.8	80.0	18.2	18.2	203.7	205.5
35-44 years-----	729.2	765.2	248.2	259.6	71.7	84.3	196.2	196.2
45-54 years-----	1,551.0	1,446.8	719.1	653.1	233.6	214.3	192.1	203.7
55-64 years-----	3,151.5	2,754.8	1,738.5	1,535.8	549.8	501.2	175.1	147.0
65-74 years-----	5,664.0	5,630.2	3,400.7	3,276.2	927.5	927.5	174.0	162.8
75-84 years-----	8,662.6	10,215.3	5,571.1	6,600.8	1,086.1	1,280.8	234.8	603.6
85 years and over-----	15,238.7	17,906.8	10,356.8	12,433.1	1,211.7	1,439.1	414.5	236.9
65 years and over-----	6,923.9	7,413.2	4,314.0	4,574.8	982.4	1,044.0	202.0	229.0
<u>Nonwhite female</u>								
1-4 years-----	174.4	174.4	4.9	6.1	7.0	7.0	53.2	53.2
5-14 years-----	53.4	55.7	5.2	5.2	4.8	4.8	20.9	19.6
15-24 years-----	106.1	119.2	17.4	22.1	6.7	8.0	32.4	33.8
25-34 years-----	260.0	283.2	65.2	83.8	29.6	33.1	49.5	47.7
35-44 years-----	547.3	534.5	209.3	203.6	98.3	103.6	52.6	52.6
45-54 years-----	1,144.9	969.4	572.4	454.3	249.3	223.4	50.3	46.8
55-64 years-----	2,409.7	1,940.2	1,460.5	1,164.7	427.8	365.6	61.0	57.0
65-74 years-----	3,981.4	4,304.7	2,681.1	2,837.1	537.6	602.7	82.7	96.5
75-84 years-----	6,708.4	7,864.5	4,756.5	5,505.2	702.3	798.1	153.4	230.0
85 years and over-----	12,871.2	17,926.5	9,330.6	13,601.5	727.5	1,027.5	347.7	260.8
65 years and over-----	5,215.2	6,015.2	3,613.0	4,148.1	591.0	677.8	116.7	136.2

¹Adjusted age-specific death rate = actual age-specific death rate ÷ (1 + net difference rate). The net difference rates come from stage II data.

²Complete category titles and numbers of the Seventh Revision of the International Lists, 1955, are as follows:

- Major cardiovascular-renal diseases (330-334, 400-468, 592-594)
- Malignant neoplasms (140-205)
- Accidents, poisonings, and violence (E800-E999)
- All other causes (residual)

Table 8. Estimated corrected number of deaths for 5-year age intervals, by color, sex, and age: United States, 1960

Age	White		Nonwhite	
	Male	Female	Male	Female
	Number of deaths ¹			
Total, 1 year and over-----	812,527	609,892	98,748	79,222
1-4 years-----	7,486	5,957	2,486	2,027
5-9 years-----	4,294	3,106	924	806
10-14 years-----	3,837	2,340	898	499
15-19 years-----	7,050	2,963	1,289	709
20-24 years-----	8,270	3,142	1,815	1,103
25-29 years-----	7,499	4,187	2,314	1,462
30-34 years-----	9,283	6,028	2,751	2,531
35-39 years-----	14,847	8,828	4,146	3,031
40-44 years-----	22,585	13,807	4,949	3,990
45-49 years-----	34,922	18,451	6,193	4,686
50-54 years-----	50,937	24,944	7,912	5,152
55-59 years-----	67,032	32,797	8,987	6,578
60-64 years-----	87,139	47,953	9,854	7,082
65-69 years-----	108,871	64,794	11,542	9,238
70-74 years-----	116,627	89,014	11,734	10,120
75-79 years-----	109,779	96,512	9,161	7,715
80-84 years-----	82,107	84,505	6,110	5,339
85-89 years-----	49,174	66,875	3,835	4,218
90-94 years-----	16,158	26,048	1,346	1,818
95-99 years-----	4,016	6,286	344	796
100 years and over-----	614	1,355	158	322

¹Estimated corrected number of deaths in age group *i* =

$$\frac{\text{published number of deaths in age group } i}{(1 + \text{net difference rate for age group } i)} \times \frac{\text{total number of published deaths all ages}}{\text{total number of estimated deaths all ages}}$$

where the net difference rates were derived from a comparison of age statements between the death certificate and the matching 25-percent sample census record (stage II) including the allocations for ages not reported on the census record, and the published number of deaths came from Vital Statistics of the United States, 1960, Vol. II, Part A, page 5-182, table 5-11.

TECHNICAL APPENDIX

Design of the Study

The data used in this report are a byproduct of the study, Social and Economic Differentials in Mortality, United States, 1960, which has as its primary objective the provision of nationwide statistics on mortality differentials by various social and economic characteristics collected in the 1960 census. To this end, for those death certificates selected for the 4-month period May-August 1960, a manual search was made for matching census records in the 1960 files.

Of the approximately 535,000 deaths which occurred during the 4-month period, about 340,000 were selected for the search. All nonwhite decedents were selected as well as all white decedents under age 65, one-half of the white decedents 65-74 years old, and one-fifth of the white decedents 75 years and older. Thus the data presented in this report have been inflated by the following factors:

- 1 x Sample number of all nonwhite decedents and white decedents under 65 years of age
- 2 x Sample number of white decedents 65-74 years of age
- 5 x Sample number of white decedents 75 years of age and over

If the decedent was found in the 100-percent census enumeration (stage I) and it was indicated there that a 25-percent census sample record (stage II) existed for him, his stage II record was searched since most social and economic characteristics in the 1960 census were collected in stage II.

Definitions

The demographic characteristics of the decedent—sex, color, and geographic region of residence—used in this report are census rather

than death certificate designations. Cause of death was taken from the death certificate and grouped into the four following major cause categories:

Major cause-of-death category	International Lists Numbers
Major cardiovascular-renal diseases-----	330-334,400-468,592-594
Malignant neoplasms-----	140-205
Accidents, poisonings, and violence-----	E800-E999
All other causes-----	Residual codes

Unmatched Deaths

Approximately 23 percent of the total sampled death certificates were not matched with the 1960 stage I records. This rate is slightly reduced to 21 percent when decedents under 1 year of age on the death certificate are eliminated—about 35,000 such records. Many of the infant decedents were born after the April 1960 enumeration, and their death certificates were matched with the mother's census record. Although over 65 percent of the death certificates for infants were matched with the census record, many of these records would be for the mother only, prior to birth of the infant, so that exclusion from this analysis of all decedents under 1 year of age on the death certificate seemed justified.

There was considerable variation in the non-match rate for subgroups of the total sample. For example, rates of about 35 percent existed for white decedents aged 15-34 years as compared with 20 percent or less for those aged 55 years or over (table I). Other subgroups with

Table I. Percent of death certificates matched with census records, by color, sex, and age on death certificate: United States, May-August 1960

Age	White		Nonwhite	
	Male	Female	Male	Female
Total, 1+ years--	80.7	81.3	69.6	72.7
1-4 years---	76.4	75.4	66.9	66.1
5-14 years--	80.8	81.7	71.9	76.6
15-24 years--	64.8	69.6	59.7	60.1
25-34 years--	66.1	74.9	52.0	60.6
35-44 years--	75.0	80.3	56.9	69.0
45-54 years--	79.4	82.7	66.7	71.7
55-64 years--	81.3	83.2	73.0	75.0
65-74 years--	82.9	82.8	75.4	74.5
75+ years---	81.9	80.5	75.5	75.2

higher than average nonmatch rates were the nonwhite decedents, decedents of the South and West Regions, and decedents whose deaths were from accidents, poisonings, and violence and from other causes of death (table II).

Many factors may be responsible for the large number of unmatched records. One may be residential mobility between the time of enumeration and the date of the individual's death. Other factors may be census underenumeration of various subgroups of the population, processing and/or coding errors on either set of records, and reporting errors on either set of records on crucial, identifying pieces of information.

Potentially "match bias" (i.e., the bias introduced into the data as a result of using only matched records to analyze age comparability) could be a serious problem, and it is one which cannot be easily quantified. From the compari-

Table II. Percent distribution of total, matched, and unmatched decedents, by selected death certificate characteristics: United States, May-August 1960

Death certificate characteristic	Total	Matched	Unmatched	Death certificate characteristic	Total	Matched	Unmatched
<u>Color</u>				<u>Region</u>			
Total-----	100.0	100.0	100.0	Total-----	100.0	100.0	100.0
White-----	89.0	90.3	84.2	Northeast-----	28.0	28.9	24.2
Nonwhite-----	11.0	9.7	15.8	North Central----	29.7	30.6	26.2
<u>Sex</u>				South-----	28.2	26.7	34.1
Total-----	100.0	100.0	100.0	West-----	14.1	13.8	15.4
Male-----	56.8	56.6	57.9	<u>Cause of death¹</u>			
Female-----	43.2	43.4	42.1	Total-----	100.0	100.0	100.0
<u>Age</u>				Major cardiovascu-			
Total-----	100.0	100.0	100.0	lar-renal dis-			
1-4 years-----	1.1	1.0	1.4	eases----330-334,	57.8	58.9	53.1
5-14 years-----	1.2	1.2	1.2	400-468, 592-594			
15-24 years-----	1.9	1.5	3.2	Malignant neo-	17.8	18.1	16.7
25-34 years-----	2.2	1.8	3.8	plasms----140-205			
35-44 years-----	4.7	4.4	6.2	Accidents, poison-	8.2	7.2	11.8
45-54 years-----	9.9	9.7	10.6	ings, and vio-			
55-64 years-----	17.1	17.3	16.3	lence---E800-E999	16.2	15.7	18.3
65-74 years-----	25.9	26.6	23.0	All other			
75 years and over---	35.9	36.3	34.2	causes---residual			
Not reported-----	0.0	0.0	0.1				

¹Numbers after causes of death are category numbers of the Seventh Revision of the International Lists, 1955.

sons made between the distributions of the matched and unmatched decedents by their respective death certificate characteristics, it is not possible to infer whether the age correspondence for the unmatched decedents, had their census records been found, would have been worse, the same, or better than that for the matched. On the other hand, there are several reasons for assuming that the findings of this study based on matched records probably indicate more age agreement than is actually the case for all records.

One major reason for this assumption comes from the match process itself. Age may have been used in the match operation in order to determine if a census record with similar but not identical spellings of name and/or street constituted a match. Also it is conceivable that two records would be classified as not matched because of large age discrepancies.

Moreover, results from an independent follow-back survey indicated some relationship between levels of education and income and the proportion of decedents not found in the census. As part of the study, *Social and Economic Differentials in Mortality, United States, 1960*, a sample of about 10,000 death certificates was selected from the original 340,000 certificates, and questionnaires similar in content to the stage II census forms were mailed to the informants on the death certificates. One purpose of this follow-back survey was to provide survey information for decedents not found in the census.¹⁴ According to survey responses for white decedents, a somewhat larger proportion of white females (but not white males) with low education and white males (but not white females) with low income levels were not found in the census than the proportion not found with high education and high income.¹⁵ If these characteristics of education and income are positively related to age agreement between records, this is a further indication that the unmatched record would probably have less age agreement than the matched.

A rough indication of how different results would have been had census records been found for the unmatched decedents can be arrived at by assuming that these records would have had either perfect or no age agreement with the death certificate. The measures calculated under

these assumptions suggest that if there were no agreement, the results presented here are extreme overstatements of the level of age agreement that actually exists, whereas if there were perfect agreement, these results only slightly understate the amount of agreement. Since the data used to make these two assertions are hypothetical and might confuse the issue, they are not shown.

Sources and Limitations of Data

Two series of comparisons of age information are available: (1) death certificate age information cross classified by census age information from the 100-percent enumeration (stage I), and (2) death certificate age information cross classified by census age information from the 25-percent sample (stage II).

Series 1—Death Certificate and Stage I Census Record Comparisons of Age Information

Stage I data were selected for evaluating age comparability for two reasons: (1) they represent to a greater extent than stage II data the actual, unedited age information reported on the census record, (2) the estimates derived from them are subject to less sampling error than those from stage II—e.g., the number of records available for detailed subcategories such as age, sex, color, and cause of death become so small in stage II that sometimes fewer than 10 records are involved.

For this study stage I data were manually coded, not processed by FOSDIC as was the procedure for the official census publications. The date of birth reported on the stage I census was coded into quarter of year, century, decade, and year and later converted to an "updated age" based on the month of death and the quarter of year of birth to correct for a birthday that might have occurred in the interval between the date of the census and the date of death. A combined code was used for quarter of year and century of birth which resulted in some obvious errors when converted to age because of the confusing construction of the code: a number of records turned up with negative ages or ages implausibly over 100 years. Ultimately, all records with negative ages

calculated from the stage I census and all records with ages of 100 and over on either the census or the death record were eliminated from the comparison of response analysis—835 such records were omitted.

In addition to these, other records were excluded—3,033 records where age was not stated on one or the other source since these are essentially out of the realm of measuring comparability in age statement (the great bulk of them had no age information on the census record); 34 records with processing errors resulting in impossible age codes ("not valid" ages); and an estimated 2,687 records where sex and/or color were not stated on the census record (table III). More record losses were incurred in the data by single years of age where a couple of thousand records did not have year but did have century and decade of birth (e.g., 194-) on the census record. These records were allocated to year 5 and were included with the reported ages in the data by 5- and 10-year age intervals.

Measures of age comparability based on these data are of somewhat limited generality. The smallest contribution to the limitations comes from the sampling error. For most statistics shown in this report, the sampling error is either zero or of negligible size. Except for statistics based on the stage II census match, the sampling error is zero for all measures for nonwhite decedents and for all white decedents under age 65. Many of the measures for white decedents over 65 have sampling errors of less than 2 percent of the measure itself.

A rough approximation to the sampling error of a proportion or rate, P , shown in the report may be computed from the formula:

$$\sigma_p = \sqrt{\frac{PQ}{n}} \text{ where } n \text{ is the sample size and } Q = 1 - P$$

Stage I—White persons 65 years and over

- (1) Ages 65-74: Divide the recorded estimate in table 1 by 2.
- (2) Ages 75 and over: Divide the recorded estimate in table 1 by 5.

However, more serious limitations in these measures of age comparability do arise from other sources. The largest is probably the potential "match bias" discussed previously. Another,

Table III. Actual and inflated number of records ultimately used in Census-Death Certificate Matched Record Study and enumeration of excluded records: United States, May-August 1960

Status of records	Actual count of records	Inflated number of records
Searched in stage I census-	340,033	533,743
Ultimately used in study-----	232,752	386,438
Excluded ¹ -----	107,281	147,305
Not found in stage I census-----	77,067	112,656
Rejected—impossible codes-----	483	798
Decedents under 1 year on death certificate-----	23,176	23,176
Sex and/or color not stated on census-----	12,687	4,371
Ages negative or 100 years and over-	835	1,557
Ages not reported or "not valid"-----	3,033	4,747

¹By subtraction from total searched.

but perhaps not as serious, source would be the potential "seasonal bias" introduced by the selection of deaths occurring only in the summer months May-August.

Series 2—Death Certificate and Stage II Census Record Comparisons of Age Response

The denominator of an actual or published age-specific death rate is based on edited census data. One part of the editing process involves allocation of an age to persons with no age reported on the census record, taking into account other related information for those persons such as sex, color or race, marital status, and relationship to head of household. To evaluate the accuracy of the death rate by the method discussed in the text, estimates of the percentage error in the age-specific death rate come from the stage II data which were treated in the usual census

manner just described, as opposed to the rather unusual process that stage I data were subject to in this study. Stage II data, therefore, do not contain the kind of record losses as stage I data. Records of ages under 1 were omitted but ages 100 and over are included, and there were no cases of not stated age, sex, or color since they were allocated. Of the 64,675 records which were designated on the stage I census as being included in the stage II sample, 62,487 were found. Beyond the initial loss of records not found in stage I, a further loss of less than 4 percent of the records was incurred in the stage II match operation.

As an interesting consequence of examining stage II data, it was found that the census allocation of not stated ages agreed only 20 percent of the time with the 10-year age group containing the age stated on the death certificate. It may be that the allocation procedure is more satisfactory on a group than on an individual basis. Or it may be satisfactory for the population as a whole but not suitable for the population of decedents in this study, particularly for the age groups 25-34 and 35-44 years. On the other hand, it may be that individuals with nonresponses constitute a special group and that information on either record for them is subject to question. Table IV contains figures for the two measures used (percent agreement and net difference rates) based on the three types of data available—stage I unedited data, stage II data with allocations, and stage II data excluding allocations. Although the source of data does affect the degree of age comparability within each age, sex, and color category, the relative differences among age, sex, and color groups are not disturbed to any appreciable extent.

When net difference rates based on stage II data without allocations were used to adjust age-specific death rates, these adjusted rates were not seriously different from those based on the data with allocations. For purposes of comparison, adjusted age-specific death rates based on the three types of data are presented in table V. For almost all categories of age, sex, and color the choice of data makes little difference in the adjusted rates. The exception to this occurs in the age group 85 and over for nonwhite males and females where adjusted rates differ consid-

erably. But while the data from stage II with allocations give the lowest adjusted rate for the nonwhite males, the same data give a higher adjusted rate for nonwhite females so that the choice of data does not appear to affect the results in any one direction.

The data for Series 2 comparisons are subject to the same limitations in generality described in stage I with the additional disadvantage of being subject to larger sampling errors. That is, beyond the sampling done to select decedents to match with census records, the stage II information was collected for only 25 percent of the population.

The sampling errors of estimates based on stage II census reports may be quite large for certain groups where proportions and frequencies are small. This is true for both white and nonwhite decedents and particularly for the younger ages.

For stage II estimates most of the required sample sizes may be obtained directly from table 8, except for white persons 65 and over. For estimates of white persons 65 and over based on stage II and for estimates not based on stage II census records, the appropriate sample sizes may be obtained as follows:

Stage II—White persons 65 years and over

- (1) Ages 65-74—Divide the recorded estimate in table 8 by 2.
- (2) Ages 75 and over—Divide the recorded estimate in table 8 by 5.

Alternative Method for Adjusting Death Rates Using Comparison of Response Results

In the text of this report estimates were provided of adjusted age-specific death rates where the net difference rates calculated from the comparison of age response data were applied directly to the published age-specific death rates. In addition, table 8 presented the estimated corrected number of deaths in 1960 where the same net difference rates were applied to the published number of deaths. One consequence of using these net difference rates is that the total number of corrected deaths over all ages differed from the total number of deaths reported in official publications and, therefore, the individual figures had to

Table IV. Comparison of net difference rates and percent agreements based on three types of data, by color, sex, and 10-year age intervals: United States, May-August 1960

Sex and age	White			Nonwhite		
	Stage I census ages not reported: excluded	Stage II census ages not reported:		Stage I census ages not reported: excluded	Stage II census ages not reported:	
		Allocated	Excluded		Allocated	Excluded
<u>Male</u>						
Net difference rate						
1-4 years-----	-0.6	-1.0	-0.5	-1.3	-2.4	-2.4
5-14 years-----	0.2	1.4	0.8	0.4	-2.9	-1.5
15-24 years-----	0.2	-1.1	1.5	-2.9	-1.2	-1.2
25-34 years-----	-4.0	-3.3	-1.4	-3.2	-5.6	-5.8
35-44 years-----	-4.1	-6.0	-5.2	-1.9	-4.7	-4.0
45-54 years-----	-1.2	-1.0	-0.9	6.2	7.2	7.5
55-64 years-----	0.2	-1.1	-0.7	13.6	14.4	14.1
65-74 years-----	-0.3	1.1	0.8	2.1	0.6	0.8
75-84 years-----	1.2	0.6	0.2	-15.1	-15.2	-15.5
85 years and over-----	¹ 1.9	3.0	2.5	¹ -23.3	-14.9	-16.4
<u>Female</u>						
1-4 years-----	-0.9	-2.7	-2.1	-1.7	-	-
5-14 years-----	-1.5	-3.9	-4.5	-2.3	-4.1	-2.7
15-24 years-----	-1.8	-4.2	-2.6	-4.8	-11.0	-6.4
25-34 years-----	-4.9	-14.9	-7.4	-2.4	-8.2	-3.7
35-44 years-----	-4.0	-7.0	-5.5	-1.1	2.4	1.6
45-54 years-----	-1.3	-0.9	-0.5	13.3	18.1	18.4
55-64 years-----	-0.6	-2.0	-1.2	23.6	24.2	23.6
65-74 years-----	-2.8	-1.8	-1.7	-4.5	-7.5	-7.7
75-84 years-----	2.5	3.9	3.1	-17.2	-14.7	-14.9
85 years and over-----	¹ 2.8	2.4	1.3	¹ -21.5	-28.2	-29.1
<u>Male</u>						
Percent agreement						
1-4 years-----	96.5	95.3	95.8	94.5	95.1	95.1
5-14 years-----	95.7	94.6	94.6	92.8	89.9	91.2
15-24 years-----	95.3	91.7	94.6	89.7	87.0	88.5
25-34 years-----	91.0	89.6	91.7	83.5	79.8	81.3
35-44 years-----	91.2	88.4	89.8	81.3	79.7	81.1
45-54 years-----	93.4	91.4	92.2	83.7	82.6	83.4
55-64 years-----	93.5	91.1	92.0	81.2	79.7	80.4
65-74 years-----	92.8	92.4	92.9	74.8	74.1	74.9
75-84 years-----	93.0	92.2	92.5	64.1	62.8	63.6
85 years and over-----	¹ 92.7	93.5	93.8	¹ 61.0	64.4	64.3
<u>Female</u>						
1-4 years-----	97.2	94.9	95.7	96.3	97.5	97.5
5-14 years-----	94.6	93.0	92.9	93.1	93.2	94.5
15-24 years-----	93.6	90.7	92.5	88.7	82.9	87.2
25-34 years-----	90.5	81.8	89.2	84.3	76.5	80.7
35-44 years-----	90.6	86.1	88.2	81.0	80.4	81.1
45-54 years-----	91.5	88.6	90.2	81.7	81.1	82.3
55-64 years-----	89.9	87.3	88.7	75.2	72.2	72.6
65-74 years-----	87.7	86.5	87.6	65.0	62.0	62.6
75-84 years-----	91.5	90.1	90.7	58.7	60.5	61.3
85 years and over-----	¹ 92.7	91.1	91.6	¹ 60.7	55.7	55.9

¹Refers to ages 85-99 years.

Table V. Comparison of adjusted age-specific death rates for 10-year age intervals based on three types of data used for adjustments, by color, sex, and age: United States, May-August 1960

Sex and age	White				Nonwhite			
	Actual age-specific death rate ¹	Adjusted age-specific death rate			Actual age-specific death rate ¹	Adjusted age-specific death rate		
		Stage I census ages not reported: excluded	Stage II census ages not reported			Stage I census ages not reported: excluded	Stage II census ages not reported	
			Allocated	Excluded			Allocated	Excluded
Rate per 1,000 population								
<u>Male</u>								
1-4 years-----	1.0	1.0	1.0	1.0	2.1	2.1	2.2	2.2
5-14 years-----	0.5	0.5	0.5	0.5	0.8	0.8	0.8	0.8
15-24 years-----	1.4	1.4	1.4	1.4	2.1	2.2	2.1	2.1
25-34 years-----	1.6	1.7	1.7	1.6	3.9	4.0	4.1	4.1
35-44 years-----	3.3	3.4	3.5	3.5	7.3	7.4	7.7	7.6
45-54 years-----	9.3	9.4	9.4	9.4	15.5	14.6	14.5	14.4
55-64 years-----	22.3	22.3	22.5	22.5	31.5	27.7	27.5	27.6
65-74 years-----	48.5	48.6	48.0	48.1	56.6	55.4	56.3	56.2
75-84 years-----	103.0	² 101.8	102.4	102.8	86.6	102.0	102.1	102.5
85+ years-----	217.5	² 213.4	211.2	212.2	152.4	² 198.7	179.1	182.3
<u>Female</u>								
1-4 years-----	0.9	0.9	0.9	0.9	1.7	1.7	1.7	1.7
5-14 years-----	0.3	0.3	0.3	0.3	0.5	0.5	0.5	0.5
15-24 years-----	0.5	0.5	0.5	0.5	1.1	1.2	1.2	1.2
25-34 years-----	0.9	0.9	1.1	1.0	2.6	2.7	2.8	2.7
35-44 years-----	1.9	2.0	2.0	2.0	5.5	5.6	5.4	5.4
45-54 years-----	4.6	4.7	4.6	4.6	11.4	10.1	9.7	9.6
55-64 years-----	10.8	10.9	11.0	10.9	24.1	19.5	19.4	19.5
65-74 years-----	27.8	28.6	28.3	28.3	39.8	41.7	43.0	43.1
75-84 years-----	77.0	75.1	74.1	74.7	67.1	81.0	78.7	78.8
85+ years-----	194.8	² 189.5	190.2	192.3	128.7	² 163.9	179.2	181.5

¹National Center for Health Statistics: Vital Statistics of the United States, 1960, Vol. II, Part A, Public Health Service, Washington, U.S. Government Printing Office, 1963.

²Refers to ages 85-99 years.

be adjusted to add to the total. It was mentioned in the text that the adjustment procedure described is highly specific: if deaths to be corrected are by sex, color, age, and cause of death or marital status or some other variable, the net difference rates used to correct these deaths should come from comparison of age response data by age, sex, color, and cause of death or marital status. Since such comparisons of age response are not available by detailed cause of death or by marital status, some provision should be made to adjust those deaths with the data available. Insofar as the deaths to be corrected are similar in age distribution to the deaths in this study group, although age reporting may differ within detailed cause of death or within marital status categories, it is possible to use the method described in the text for approximate adjustment purposes. How-

ever, when the age distribution of the deaths to be corrected is very different from that for the deaths in this study group, an alternative method for adjustment may be preferred.

One alternative procedure proposed by Dr. Kitagawa¹⁶ has the additional advantage (besides being applicable regardless of age distributions) of forcing the total estimated corrected number of deaths to be the same as the official totals. The primary methodological difference in the two adjustment procedures is that whereas the one used in this report relies on the marginal distributions of the comparison of age response results, the alternative procedure uses the entire cross classification of age response data.

In both cases the analysis is specific for age, color, and sex. The basic data involved are shown below.

Comparison of Response Results

Census record age	Death certificate age						
	Total	1-4	5-9	...	k	...	n
Total-----	$\sum_j x_{1j}$	$\sum_i x_{i1} = d_1$	$\sum_i x_{i2} = d_2$	...	$\sum_i x_{ik} = d_k$	...	$\sum_i x_{in} = d_n$
1-4 years-----	$\sum_j x_{1j} = c_1$	x_{11}	x_{12}	...	x_{1k}	...	x_{1n}
5-9 years-----	$\sum_j x_{2j} = c_2$	x_{21}	x_{22}	...	x_{2k}	...	x_{2n}
.
.
k years-----	$\sum_j x_{kj} = c_k$	x_{k1}	x_{k2}	...	x_{kk}	...	x_{kn}
.
.
n years-----	$\sum_j x_{nj} = c_n$	x_{n1}	x_{n2}	...	x_{nk}	...	x_{nn}

Actual Deaths, United States, 1960

$$D = (D_1 \ D_2 \ \dots \ D_k \ \dots \ D_n)$$

Estimated Corrected Number of Deaths, United States, 1960

$$\hat{D} = (\hat{D}_1 \ \hat{D}_2 \ \dots \ \hat{D}_k \ \dots \ \hat{D}_n)$$

By the method used in this study

$$\begin{aligned} \hat{D}_k &= D_k \div \left[1 + \left(\frac{d_k - c_k}{c_k} \right) \right] \cdot \frac{D}{\hat{D}} \\ &= D_k \left(\frac{c_k}{d_k} \right) \cdot \frac{D}{\hat{D}} \end{aligned}$$

where $\frac{D}{\hat{D}}$ is the adjustment factor needed to make the adjusted age-specific deaths add to the published total number of deaths

By the alternative method

$$\hat{D}_k = \sum_j^n \left[x_{kj} \cdot \frac{D_j}{d_j} \right]$$

As an example, consider the comparison of age response results shown in table 8 for non-white males presented here in broad age categories.

Comparison of Response Results

Census record age	Death certificate age				
	Total	1-14 years	15-44 years	45-64 years	65+ years
Total----	4,900	255	734	1,831	2,080
1-14 years----	262	249	9	4	-
15-44 years--	766	6	677	65	18
45-64 years--	1,644	-	42	1,498	104
65+ years----	2,228	-	6	264	1,958

Actual Deaths, United States, 1960

Age	Total	1-14 years	15-44 years	45-64 years	65+ years
Number---	98,748	4,218	16,521	36,806	41,203

Estimated Corrected Number of Deaths, United States, 1960

Age	Method used in this report		Alternative method
	Not corrected to total	Corrected to total	
Total-----	98,756	98,748	98,748
1-14 years-----	4,332	¹ 4,332	² 4,402
15-44 years-----	17,248	17,247	17,000
45-64 years-----	33,048	33,045	33,118
65+ years-----	44,128	44,124	44,228

¹Method used in this report:

$$4,332 = 4,218 \times \frac{262}{255} \times \frac{98,748}{98,756}$$

²Alternative method:

$$4,402 = 249 \times \frac{4,218}{255} + 9 \times \frac{16,521}{734} + 4 \times \frac{36,806}{1,832} + 0 \times \frac{41,203}{2,080}$$

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