

CENSUS-NOVS STUDY OF DEATH CERTIFICATES MATCHED TO CENSUS RECORDS

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THE Bureau of the Census and the National Office of Vital Statistics have jointly conducted a small study in Memphis, Tennessee, to test the feasibility of a reliable larger-scale study of socio-economic differences in mortality.

The need for this study arose, specifically, out of efforts to find a way of obtaining more reliable data than we have had heretofore on mortality rates according to occupation. In the past, such data have been derived from the occupation reported on the death certificates filed during the census year and the population by occupation enumerated in the census. Differences in definitions of occupation on the death certificate and for the census, in reporting practices, and in coding have caused some doubt as to the accuracy of such rates. It has been suggested that the amount of variation produced by the three factors could be reduced by using the characteristics of the decedents given in the census schedules in place of those given on the death certificate. This might be accomplished by locating the census record for each individual who dies after the date of enumeration through the use of the name and address given on the death certificate.

Past attempts at matching death and census records have resulted in locating about 80 per cent of the decedents on the schedules. Analyses based on matched records alone thus might lead to biased results. The present study was planned to obtain information about the deceased persons who could not be located in the census records so that the causes for failure to match could be determined and better rates of matching achieved; in addition, the bias could be assessed by comparing the characteristics of the unmatched persons with those of the matched persons.

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An alternate suggestion for providing additional information about the deceased was developed in the second part of the study. A questionnaire which included items, related to possible mortality studies, that appeared in the census schedules was designed. It was planned to mail the questionnaire to the persons who had provided the information for the death certificate. If replies to the questionnaires were satisfactory, that is, corresponding to census entries, this might provide a more practical method of obtaining detailed information about the decedent. There was also the possibility that the queries would be returned with greater frequency than the known matching rate.

PROCEDURE

A special census of the City of Memphis had been taken as of January 31, 1958. One of its chief purposes was to test self-enumeration as a method of collecting census data. A week prior to the census date, a listing operation was carried out in which the address of each household and the name of the household head were recorded. At that time, the schedules were distributed to each dwelling unit with instructions requesting that the completed schedules be mailed to the census field office in Memphis. Entries on the schedules were made by a member of the household for the entire household, or if necessary, by a more competent person. Follow-up on 10 per cent of the sample households was made by the field office to obtain schedules from households that had not mailed them in. Special surveys were later conducted to check on the coverage of households and persons within households.

Death certificates for events occurring in Shelby County (in which the city of Memphis is located) are filed with the Shelby County Health Department and then forwarded to the State office. The Tennessee State Department of Health sent the National Office of Vital Statistics reproduced copies of all certificates of deaths occurring in Shelby County during the months of February and March 1958. Odd numbered certifi-

cates for February and even numbered for March constituted the study sample. Death certificates for illegitimate babies, for infants who were born after the date of the census, and for persons whose usual residence was outside the city limits of Memphis were eliminated, leaving 349 cases in the sample.

A questionnaire was sent out for each remaining death certificate. It was addressed to the person given as the informant. In cases for which the informant's name was not specified or the address was not clear, a letter was sent first to the funeral director or the State office of vital statistics requesting the name of a close friend or relative of the deceased, or a better address, where this was the problem.

The questionnaires were sent out from two to three months after the date of death. If no reply was received in two weeks, a follow-up letter and questionnaire was sent to the same informant. For deaths in February, the follow-up letters were sent by first class mail but for March the follow-up letters were sent by certified mail. The results of the mail inquiry are shown in Table 1.

All death certificates and the completed questionnaires were then forwarded to the Bureau of the Census, where location of the enumeration district which included the address of usual residence given on the death certificate, and of any other pertinent address given in the questionnaire, was determined. The appropriate folder of census schedules was then searched for the address and name of the decedent. If the individual could not be found at the usual place of residence, a search was made for the enumeration record at the other addresses given on the questionnaire. Of course, for the persons for whom the questionnaire had not been returned, only the address on the death certificate was available.

There were 60 persons who could not be located in the census records. Two census enumerators, working regularly in Memphis, were assigned the task of finding out if these persons were thought to have been enumerated and at what address. The purpose of the study was described to the enumerators and

COLOR AND SEX OF DECEDENTS	NUMBER					PER CENT DISTRIBUTIONS				
	Total	Under 45 Years	45-64 Years	65-74 Years	75 and Over	Total	Under 45 Years	45-64 Years	65-74 Years	75 and Over
A. All Certificates in Sample	349	46	112	95	96	100.0	13.2	32.1	27.2	27.5
White Male	109	15	30	35	29	100.0	13.8	27.5	32.1	26.6
White Female	86	12	12	19	43	100.0	14.0	14.0	22.1	50.0
Nonwhite Male	83	8	38	24	13	100.0	9.6	45.8	28.9	15.7
Nonwhite Female	71	11	32	17	11	100.0	15.5	45.1	23.9	15.5
B. No Response to Questionnaire	53	9	21	12	11	B/A 15.2	19.6	18.8	12.6	11.5
White Male	7	2	1	1	3	6.4	13.3	3.3	2.9	10.3
White Female	8	1	2	2	3	9.3	8.3	16.7	10.5	7.0
Nonwhite Male	15	1	7	5	2	18.1	12.5	18.4	20.8	15.4
Nonwhite Female	23	5	11	4	3	32.4	45.5	34.4	23.5	27.3
C. Not Located in Census Record	60	12	27	14	7	C/A 17.2	26.1	24.1	14.7	7.3
White Male	10	1	3	4	2	9.2	6.7	10.0	11.4	6.9
White Female	8	1	3	1	3	9.3	8.3	25.0	5.3	7.0
Nonwhite Male	21	3	13	3	2	25.3	37.5	34.2	12.5	15.4
Nonwhite Female	21	7	8	6	0	29.6	63.6	25.0	35.3	—
D. Not Located in Census Record but Responded to Query	39	7	19	9	4	D/A 11.2	15.2	17.0	9.5	4.2
E. Not Located in Census Record and No Response to Query	21	5	8	5	3	E/A 6.0	10.9	7.1	5.3	3.1
F. Located in Census Record but No Response to Query	32	4	13	7	8	F/A 9.2	8.7	11.6	7.4	8.3

Table 1. Distribution by age, color, and sex of a sample of decedents, by extent of matched records, Memphis, February-March, 1958.

they were provided with instructions and asked to complete special forms for each decedent. Some information was obtained about every case. In addition, for all persons not located in the census records who had died in a hospital, the date of admission to the hospital was obtained by the State Department of Health. This date served to determine if the deceased was actually in the hospital or institution on the date of enumeration.

RESULTS

A. Matching Procedure. It was possible to locate in the census records 289 or 83 per cent of the deaths included in the sample, 80 per cent of the deaths in February and 86 per cent of the deaths in March. Of the remaining 60 cases, information from the respondents permitted us to classify them as to whether the respondents (a) believed the deceased had been enumerated, (b) believed the deceased had not been enumerated, or (c) did not know if the deceased had been enumerated or not. The results show, roughly, that one-third of the cases fell into each category.

Among the 17 per cent which could not be matched, no single reason could account for a majority of the failures to match. At the outset of the study, it was thought that failure to match in many, if not most, of the cases was due to the omission at the usual home residence of persons who had been in general hospitals at the time of the census; yet, less than one-fourth of the unmatched cases in Memphis fitted this category. In some cases, specific reasons for persons probably having been missed in the census were suggested by respondents' replies. Each of the following reasons accounted for a few cases. The first four are a function of the self-enumeration procedure used. The last four relate to problems associated with old age or illness, that is, of persons near death. However, these reasons account for only about one-third of unmatched cases, mostly those where the respondent knew that the decedent had not been enumerated.

1. Household never received census schedule.
2. Respondent did not have enough space on schedule to include all household members.
3. Respondent listed person but schedule was never mailed.
4. Respondent did not list person because schedule was filled and mailed after the death.
5. Deceased had been living alone and was incapable of filling schedule.
6. Deceased had been moved from one relative to another,

QUESTIONS	NUMBER OF REPLIES POSSIBLE	NUMBER OF REPLIES COMPLETED	PER CENT COMPLETED
What was the last regular address of the decedent?	296	293	99.0
Where was he staying on January 31, 1958?	295	291	98.6
Where was he staying at time of death?	296	291	98.3
Where was the decedent born?	296	285	96.3
Where was his father born?	296	243	82.1
Where was his mother born?	296	240	81.1
What was the highest grade of regular school that the deceased ever attended?	288	233	80.9
When did he last work? (males only)	164	141	86.0
What kind of work did he do in his last job?	162	143	88.3
What kind of business or industry was this work in?	162	147	90.7
What was his usual occupation?	162	128	79.0
What kind of business or industry was this work in?	162	134	82.7
How many children did he (she) ever have?			
Males:	164	152	92.7
Females:	123	107	87.0
Who was head of the household in which the deceased last lived?	296	285	96.3
Where the deceased was <i>not</i> head of household:			
What is the usual occupation of the head?	100	83	83.0
What is the usual industry of the head?	100	77	77.0

Table 2. Per cent of responses completed on each item of returned questionnaires for sample of decedents, Memphis, February-March, 1958.

prior to death, and was not regarded as usual resident of any place.

7. Deceased had planned to move and was, therefore, omitted.

8. Usual address given to hospital was fictitious, so the deceased was not counted either at hospital or outside.

B. Questionnaire. Replies were received on 83 per cent of the mail queries sent out for February deaths and 88 per cent for March. The difference arose chiefly through the apparently greater effectiveness of the certified mail follow-up of deaths in March.³

The distribution by age, color, and sex of the decedents whose death certificates were used in this study is shown in Table 1, along with the percentage responding in each group. There

³Other mail surveys to supplement the information available from the death certificate made by the National Office of Vital Statistics, have shown that the response rate and completion rate can be improved by further specific mail, telephone or direct interview follow-up.

were fewer responses proportionately for nonwhite decedents than for white.

While 85 per cent of the questionnaires sent out were returned, not all the questions were answered. The extent of completed responses is shown in Table 2. The proportion varied from nearly 100 per cent for the question on residence to about 80 per cent for questions on education and occupation.

The questionnaire would be valuable only if it produced the same information that had been obtained in the census enumeration. Replies to the questionnaire were compared with the replies to the census questions, and where the same information was requested, also with the entries on the death certificates.

There was one question that was exactly the same on the three records. This was number 3 on the questionnaire, "Where

Table 3. Correspondence of items reported on different records for sample of decedents, Memphis, February-March, 1958.

ITEM APPEARING ON TWO RECORDS: DEATH CERTIFICATE (dc) QUESTIONNAIRE (q) CENSUS ENUMERATION (c)	NUMBER OF TIMES ITEMS COMPLETED ON BOTH RECORDS	NUMBER OF TIMES REPLIES AGREED	PER CENT CORRE- SPONDENCE
Age in same 5 year age groups (q & c)	250	196	78.4
Birthplace of decedent (dc & q)	295	274	92.9
Birthplace of decedent (dc & c)	194	166	85.6
Last regular address (dc & q)	293	268	91.5
Address as of January 31 (q & c)	237	219	92.4
*Place of death (dc & q)	291	171	58.8
Father's birthplace (c & q)	158	155	98.1
Mother's birthplace (c & q)	147	145	98.6
Highest grade of school completed (c & q)	130	60	67.7
Response differed by one year		28	
Year last worked (males) (c & q)	78	56	71.8
Last occupation (males) (c & q)	53	45	84.9
Last industry (males) (c & q)	63	53	84.1
Usual occupation (males) (q & dc)	115	79	68.7
Usual industry (males) (q & dc)	109	73	67.0
Usual occupation (dc)—last occupation (q) (males)	129	99	76.7
Usual industry (dc)—last industry (q) (males)	124	98	79.0
Number of children ever born (c & q) (females)	46	37	80.4
Head of household (c & q)	243	206	84.8
Occupation of head of household (<i>not</i> decedent) (c & q)	52	43	82.7
Industry of head of household (<i>not</i> decedent) (c & q)	47	42	89.4

* Apparently, the wording of this item on the questionnaire was unsatisfactory and was frequently misunderstood.

NOTE: The comparisons of occupation and industry are based on agreement for the 2 digit code used in the current Population Survey of the Bureau of the Census.

was he (she) born?" Out of 194 times that the question on place of birth was answered on all 3 records, the answer agreed in 162 cases. A question on occupation and industry appeared on all 3 records, but the variations in the nature of the question made it possible to compare the records only in pairs.

All comparisons of like responses were made for the group of records on which the question was answered on both. Since not all questions were completed on the census record, the number of comparisons possible were reduced so greatly that the study is not particularly valuable in this respect. The results of the comparisons of questions appearing on different records are shown in Table 3.

DISCUSSION

A. Matched Death-Census Records. The success of locating an individual in the census records depends obviously on knowing the address at which he was enumerated. In accordance with census practice, each person is enumerated at his usual residence, that is, the place where he lives and sleeps most of the time. The concept of "Usual residence" is also used in completing the death certificate, except for persons dying in resident institutions. For these individuals, the person completing the death record is asked to enter the usual place of residence of the deceased before he entered the institution. Since this address does not serve to locate the census record, separate identification of deaths occurring in resident institutions is needed. It is not possible to know from the death certificate how long the deceased was in the institution, or if he had already been admitted on the day of the enumeration. Thus, it may be necessary to search the enumeration schedule for both the previous residence and the institution in some cases.

There were slightly more cases, proportionately, matched for March than for February, suggesting the existence of an optimum interval after the census date for maximum success in matching death records. Owing to the fact that the census enumeration takes place over a period of time rather than on one day, persons who died during the interval between the

census date and the enumerators' visit may often be omitted from the schedules.

The characteristics of the unmatched cases as shown on the death certificate, when compared with those of matched cases, indicated that there was some selection. A higher proportion of nonwhites, particularly females, were not located in the census record. There was no clear evidence of bias for age or marital status. Apparently, hospitalization at death, or at the time of enumeration, did not affect the chances of matching. The field investigation did not suggest any changes in enumeration procedure that would have improved the rate of matching.

The rate of matched records reached in this study may present a maximum possible because the deaths used in this sample were for urban persons, that is, residents of Memphis who had died in Shelby County. Also, additional information on addresses was obtained from the questionnaire. This is an ideal set of circumstances compared to locating persons who have died in counties or States other than that of their usual place of residence, or who reside in rural areas.

B. Questionnaire. The response rate for the questionnaires compared quite well with the experience of other mail surveys. The rate was improved by the use of certified mail.⁴

There is some evidence of bias in the nonresponse group. A higher proportion of nonrespondents was found for nonwhite decedents, with females exceeding males. The completeness of response varied with the type of question. The correspondence of replies to questions on the census schedules and the questionnaire was relatively high for birthplace of the decedent or his parents. It was lower for education and occupation; but these comparisons are scarcely conclusive because they have been made only when replies on both records were completed.

PROSPECTS FOR LARGE-SCALE STUDY

The chief problem in a study of characteristics of decedents

⁴ This has been observed previously. See Sirken, M. G.: Development of Survey Procedures for Collecting Medical and Social Data for Samples of Recently Deceased Populations. Unpublished paper given at a meeting of the Biometric Society, March 9, 1957.

as described in census records is the number of persons not located in the initial matching process. The pilot study showed that these persons may have been residents of an institution rather than of the address indicated on the death certificate; and that for other persons not located in the census record, it was possible to obtain information about their characteristics in a field follow-up. Thus, a large-scale study of mortality according to characteristics of the decedent as given in the census enumeration record is feasible, if special provision is made to locate persons dying in resident institutions and field or mail follow-up is provided to estimate the characteristics of the unmatched.

A comparable study through questionnaires alone would also require special provisions to obtain complete and accurate responses. In addition, there would still be the problem of having characteristics for the decedent and the base population from different sources.

Prospects for conducting a large-scale study of differential mortality, in conjunction with the 1960 Census, will depend on the creation of a satisfactory research design and on obtaining adequate funds to meet the costs of the study.