



May 18, 1982

MEMORANDUM

From:

Subject: Specifications for Computing First Stage Ratio Estimate Factors for Weighting Data from the Long Term Care Survey

Weighting LTC data will require the application of a first stage ratio estimate factor to the weight of each person residing in a nonself-representing (NSR) LTC PSU. This factor adjusts weights to compensate for the fact that a sample NSR LTC PSU does not necessarily reflect the population distribution of the stratum from which it is selected.

First stage factors are normally computed from the 1970 census data. However, since LTC PSUs were selected based on their Medicare population, this population will be the basis for construction of the survey's first stage factors. This memorandum provides instructions for calculating LTC first stage factors using counts obtained from the December 1981 Medicare subfile which was used in selecting the LTC sample. This file is described in the February 16, 1982 memorandum from "Sampling Specifications for the Long Term Care Survey (LTC)." The instructions below frequently refer to the above memorandum.

Note that the factors computed per this memorandum may be revised, should any of them be unacceptably large or small.

I. BACKGROUND INFORMATION

A. Background

The first stage factor for a given subpopulation is equal to the known subpopulation size in NSR areas (both sample and nonsample LTC PSUs) divided by an estimate of that subpopulation obtained by dividing each NSR LTC PSU's subpopulation by the PSU's probability of selection. The subpopulation size is obtained for the time as close as possible to the time at which the LTC sample was selected. In this case, LTC PSU probabilities of selection were based on 1978 Medicare population. The December 1981 Medicare population was the sampling frame and this population will be used to compute first stage factors.

B. Definitions

1. A first stage ratio estimate factor will be computed for each of 32 cells defined by the following variables:

- a. Census region (Northeast, North Central, South, West)
- b. Residence (SMSA, non-SMSA)
- c. Age (65-74, 75-79, 80-84, 85+)

2. Y_{jkl} = total NSR Medicare population in the j^{th} region, k^{th} residence category, and l^{th} age group,

X_{ijkl} = Medicare population in the l^{th} age group in the i^{th} NSR sample LTC PSU in the j^{th} region and k^{th} residence category,

and

π_i = probability of selection of the i^{th} NSR sample LTC PSU, as given in the LTC sampling specifications.

Then the first stage ratio estimate factor for the r^{th} region, s^{th} residence category, and the t^{th} age group has the form

$$F_{rst} = \frac{Y_{rst}}{\sum_i \frac{X_{irst}}{\pi_i}}$$

Note that $\sum_i X_{ijkl} \neq Y_{jkl}$, because X_{ijkl} is defined only for NSR sample LTC PSUs whereas Y_{jkl} includes the appropriate population from all NSR LTC PSUs, including those not selected for sample.

II. COMPUTING FIRST STAGE FACTORS

A. Numerators

Use the December 1981 Medicare subfile (described in the LTC Sampling Specifications) to determine Y_{rst} , the numerator needed to compute F_{rst} , as follows:

- 1. Delete from the subfile all persons living in self-representing (SR) LTC PSUs. This can be done by deleting all persons with SSA state and county code matching a state and county code given for an SR LTC PSU in attachment A of the LTC sampling specifications. For convenience, these state and county codes are listed in attachment A of this memorandum.

2. For each record remaining on the subfile, convert the SSA state and county codes to 1980 census state and county codes. This can be done using a subroutine developed by Population Division. Retain the SSA state and county codes for later use.
3. DCD possesses a file which indicates the residence status (SMSA, non-SMSA) of each county in the U. S. This file contains 1980 census state and county codes. Use this file to attach a residence code, indicating SMSA or non-SMSA, to each record remaining on the Medicare subfile.
4. Each state is, of course, wholly contained by one census region. Attach a census region code (Northeast, North Central, South, West) to each remaining record on the Medicare subfile according to the 1980 census state code. Attachment B gives the 1980 census state code and census region for each state.
5. Assign an age code to each person eligible for inclusion in the LTC universe; delete all other persons:
 - a. Delete all persons born after December 31, 1916.
 - b. Assign an age code (65-74, 75-79, 80-84, 85+) to each person just as an age stratum code was assigned in II.E.2 of the LTC sampling specifications, except that the age of a person here should be his/her age on December 31, 1981. So codes should be assigned as follows:
 - (1) age 65-74 (birthdates January 1, 1907 through December 31, 1916),
 - (2) age 75-79 (birthdates January 1, 1902 through December 31, 1906),
 - (3) age 80-84 (birthdates January 1, 1897 through December 31, 1901),
 - (4) age 85+ (birthdates on or before December 31, 1896).
6. For each r , s , and t , obtain Y_{rst} by tallying persons in the r^{th} region, s^{th} residence category, and t^{th} age group.

B. Denominators

Determine \hat{Y}_{rst} , the denominator needed to determine F_{rst} , as described below:

1. From the subfile in its condition after instruction A.5 above has been executed, delete all records whose SSA state and county codes do not match the SSA state and county codes for a group A

or group B LTC PSU in attachment A of the LTC sampling specifications. Note that the subfile should contain no records from SR LTC PSUs since these were deleted in A.1.

2. With one exception, each NSR LTC PSU is either an entire SMSA or a group of SMSAs, or contains no part of an SMSA. Attachment C indicates the residence status of each NSR LTC PSU.

With two exceptions, each NSR LTC PSU lies entirely in one census region. The exceptions are:

With one exception, each NSR LTC PSU consists of one or more counties in their entirety.

- a. With the above special cases in mind, consider the NSR LTC PSUs as being numbered consecutively within census regions. LTC PSUs 324 and 325 should be included in both census regions covered, and, in a given region, the LTC PSU's number within the region should only refer to that part of the LTC PSU which lies in that region.

- b. Determine X_{irst} , the number of persons in the t^{th} age group, s^{th} residence category, r^{th} census region, and i^{th} LTC PSU, as follows:

- (1) For all NSR LTC PSUs except 125 and 152, tally all persons in the t^{th} age group, r^{th} census region, and i^{th} LTC PSU. Then,

$$X_{irst} = \begin{cases} \text{the above tally, if the } i^{\text{th}} \text{ LTC PSU has} \\ \text{residence status } s \\ 0, \text{ otherwise} \end{cases}$$

- (2) For LTC PSU 125, tally all persons in an age group t as in (1) above. Define $.5763$ times the age group total, rounded to the nearest integer, to be x_{irst} for $s = \text{SMSA}$. Define the remainder to be X_{irst} for $s = \text{non-SMSA}$.

2. For each record remaining on the subfile, convert the SSA state and county codes to 1980 census state and county codes. This can be done using a subroutine developed by Population Division. Retain the SSA state and county codes for later use.
3. DCD possesses a file which indicates the residence status (SMSA, non-SMSA) of each county in the U. S. This file contains 1980 census state and county codes. Use this file to attach a residence code, indicating SMSA or non-SMSA, to each record remaining on the Medicare subfile.
4. Each state is, of course, wholly contained by one census region. Attach a census region code (Northeast, North Central, South, West) to each remaining record on the Medicare subfile according to the 1980 census state code. Attachment B gives the 1980 census state code and census region for each state.
5. Assign an age code to each person eligible for inclusion in the LTC universe; delete all other persons:
 - a. Delete all persons born after December 31, 1916.
 - b. Assign an age code (65-74, 75-79, 80-84, 85+) to each person just as an age stratum code was assigned in II.E.2 of the LTC sampling specifications, except that the age of a person here should be his/her age on December 31, 1981. So codes should be assigned as follows:
 - (1) age 65-74 (birthdates January 1, 1907 through December 31, 1916),
 - (2) age 75-79 (birthdates January 1, 1902 through December 31, 1906),
 - (3) age 80-84 (birthdates January 1, 1897 through December 31, 1901),
 - (4) age 85+ (birthdates on or before December 31, 1896).
6. For each r , s , and t , obtain Y_{rst} by tallying persons in the r^{th} region, s^{th} residence category, and t^{th} age group.

B. Denominators

Determine \hat{Y}_{rst} , the denominator needed to determine F_{rst} , as described below:

1. From the subfile in its condition after instruction A.5 above has been executed, delete all records whose SSA state and county codes do not match the SSA state and county codes for a group A

or group B LTC PSU in attachment A of the LTC sampling specifications. Note that the subfile should contain no records from SR LTC PSUs since these were deleted in A.1.

2. With one exception, each NSR LTC PSU is either an entire SMSA or a group of SMSAs, or contains no part of an SMSA. Attachment C indicates the residence status of each NSR LTC PSU.

With two exceptions, each NSR LTC PSU lies entirely in one census region. The exceptions are:

With one exception, each NSR LTC PSU consists of one or more counties in their entirety.

- a. With the above special cases in mind, consider the NSR LTC PSUs as being numbered consecutively within census regions. LTC PSUs 324 and 325 should be included in both census regions covered, and, in a given region, the LTC PSU's number within the region should only refer to that part of the LTC PSU which lies in that region.

- b. Determine X_{irst} , the number of persons in the t^{th} age group, s^{th} residence category, r^{th} census region, and i^{th} LTC PSU, as follows:

- (1) For all NSR LTC PSUs except 125 and 152, tally all persons in the t^{th} age group, r^{th} census region, and i^{th} LTC PSU. Then,

$$X_{irst} = \begin{cases} \text{the above tally, if the } i^{\text{th}} \text{ LTC PSU has} \\ \text{residence status } s \\ 0, \text{ otherwise} \end{cases}$$

- (2) For LTC PSU 125, tally all persons in an age group t as in (1) above. Define $.5763$ times the age group total, rounded to the nearest integer, to be x_{irst} for $s = \text{SMSA}$. Define the remainder to be X_{irst} for $s = \text{non-SMSA}$.

- (3) For LTC PSU 152, tally all persons in an age group t as in (1) above. x_{irst} is defined to be .7619 times the age group total, rounded to the nearest integer, for $s = \text{SMSA}$ and zero for $s = \text{non-SMSA}$.
3. Define the sample estimate of the number of persons in NSR areas in the r^{th} census region, s^{th} residence category, and t^{th} age group to be

$$\hat{Y}_{rst} = \sum_i \frac{x_{irst}}{\pi_i}$$

where π_i is defined in I.B.2.

C. First Stage Factors

Compute the value of each of the 32 first stage ratio estimate factors using the formula

$$F_{jkl} = \frac{Y_{jkl}}{x_{jkl}}$$

These factors should be saved for use in weighting LTC data. Note that some factors may be changed through cell collapsing by SMD.

III. OUTPUT

Provide the following printed output.

A. PSU Output

For each NSR LTC PSU, output π_i .

B. PSU by First Stage Cell Output

For each first stage cell (defined by j , k , and l), and NSR LTC PSU (i) output x_{ijkl} . For LTC PSUs 125 and 152, also print out the x_{ijkl} 's before multiplication by .5763 and .7619, respectively.

C. First Stage Cell Output

For each first stage cell, output Y_{jkl} , \hat{Y}_{jkl} , and F_{jkl} .

Attachments

ATTACHMENT B: 1980 State Code and Census Region for Each State

<u>1980 State Code</u>	<u>State</u>	<u>Census Region</u>	<u>1980 State Code</u>	<u>State</u>	<u>Census Region</u>
01	AL	S	41	OR	W
02	AK	W	42	PA	NE
04	AZ	W	44	RI	NE
05	AR	S	45	SC	S
06	CA	W	46	SD	NC
08	CO	W	47	TN	S
09	CT	NE	48	TX	S
			49	UT	W
10	DE	S		VT	NE
11	DC	S	50	VA	S
12	FL	S	51	WA	W
13	GA	S	53	WA	S
15	HI	W	54	WV	S
16	ID	W	55	WI	NC
17	IL	NC	56	WY	W
18	IN	NC			
19	IA	NC			
20	KS	NC			
21	KY	S			
22	LA	S			
23	ME	NE			
24	MD	S			
25	MA	NE			
26	MI	NC			
27	MN	NC			
28	MS	S			
29	MO	NC			
30	MT	W			
31	NE	NC			
32	NV	W			
33	NH	NE			
34	NJ	NE			
35	NM	W			
36	NY	NE			
37	NC	S			
38	ND	NC			
39	OH	NC			
40	OK	S			

ATTACHMENT C: Residence Status of NSR LTC PSUs

SMSA NSR LTC PSUs:

121	122	123	124	126	127	129
152	153					
221	222	223	224	225	226	227
228	229	230	251	164		
321	322	323	324	325	326	327
328	329	330	331	332	333	334
335	336	372	376	379	385	
421	422	423	424	425		

Non-SMSA NSR LTC PSUs:

128	130	131	151	154	155	156	157
252	253	254	255	256	257	258	259
260	261	262	263	265	266	267	268
269	270	271	272	273	274	275	276
277	278	279	280				
351	352	353	354	355	356	357	358
359	360	361	362	363	364	365	366
367	358	369	370	371	373	374	375
377	378	380	381	382	383	384	386
387	388	389	390	391	392		
451	452	453	454	455	456	457	458
459	460	461	462	463			

Mixed SMSA/non-SMSA NSR LTC PSU:

125