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Attachment E Ordering of LTC Reduction Groups Within Regional Offices
MEMORANDUM FOR Sherry L. Courtland
Chief, Demographic Surveys Division

From: Preston Jay Waite
Chief, Demographic Statistical Methods Division

Subject: Sampling Specifications for the 1994 Long-Term Care Survey: the Aged-In Component, the 95+ Supplement, and the Aged-In Portion of the Healthy Supplement

I. SUMMARY OF SAMPLE COMPONENTS AND SUPPLEMENTS FOR THE 1994 LONG-TERM CARE SURVEY (LTC)

The 1994 LTC sample consists of six components and two supplements. Five of the six components consist of persons eligible for the 1989 LTC. They comprise the longitudinal portion of the 1994 LTC. The longitudinal portion includes the following:

- 2,701 impaired persons with a community interview in 1989;
- 395 impaired persons with an institutional interview in 1989;
- a sample of 4,500 persons from persons unimpaired in the 1989 survey;
- all 2,528 persons unimpaired in 1989 who are 75 years and older on or before March 31, 1994; and
- 3,507 persons previously selected for the 1984 survey who were unimpaired in 1984 but were not selected for the 1989 survey.

The longitudinal portion of the 1994 LTC can be used for both cross-sectional and longitudinal estimates.

The sixth component can be used for cross-sectional estimates only. This component is usually referred to as the aged-in component. The aged-in component consists of the following:

- a sample of 5,000 Medicare persons who reached their 65th birthday between April 1, 1988 and March 31, 1994, inclusive. (In other words, people who turned 65 since the 1989 LTC.)

The sample for the two 1994 LTC supplements consist of the following:
• a sample of 540 persons who are 95 years of age and older (the 95+ supplement); and
• a sample of 1,762 persons selected from the six components described above. Twelve hundred of the persons designated for the healthy supplement are expected to screen unimpaired based on either their screener or detailed interview.

This memorandum gives instructions for selecting the aged-in component, for selecting the 95+ supplement, and for assigning persons from the aged-in component to be in the healthy supplement. We will administer an abbreviated community questionnaire to aged-in persons designated for the healthy supplement if they are determined to be healthy during the screening interview. A second memorandum specifies the selection of the longitudinal components and assignment of persons from the longitudinal components to be in the healthy supplement.

II. OVERVIEW OF SELECTING THE AGED-IN COMPONENT, THE 95+ SUPPLEMENT, AND THE AGED-IN PORTION OF THE HEALTHY SUPPLEMENT

Specifications for extracting the 1994 Medicare subfile are given in a memorandum, from Preston Jay Waite to Sherry L. Courtland, dated May 6, 1994, titled "Specifications to Extract the 1994 Medicare Subfile for the 1994 Long-Term Care Survey (LTC)." The DSD will divide the 1994 Medicare subfile into two files. The first file will consist of persons who become 65 years old between April 1, 1988 and March 31, 1994, inclusive. This file will be referred to as the "first 1994 universe subfile." The second file will consist of persons who become 95 years old before April 1, 1994 and will be referred to as the "second 1994 universe subfile."

DSD will use the first 1994 universe subfile for selecting the aged-in component and assigning the aged-in portion of the healthy supplement. First DSD will sort the file and obtain various counts. Using these counts, DSD will select the aged-in component from the first 1994 universe subfile. After selecting the aged-in component, DSD will systematically select a sample for the healthy supplement from the persons selected for the aged-in component. These persons will be designated with an H in their control number. They will be given the healthy interview provided they are determined to be healthy on the screener interview.

The 95+ supplement will be selected from part of the second 1994 universe subfile. First DSD will sort the file and obtain various counts. Then DSD will match the second 1994 universe subfile to the 1994 LTC longitudinal file to determine which persons aged 95 and over are already in the longitudinal sample. DSD will delete the longitudinal persons aged 95 and over. They will verify that unmatched persons on the longitudinal file are recently deceased or have moved out of LTC PSUs. The
remaining file will be referred to as the "95+ eligible subfile." DSD will obtain various counts for the 95+ eligible subfile. Using these counts, they will then select the sample for the 95+ supplement. After all the samples are selected, DSD will form a sample file with the items specified in Attachment B and the codes and parameters specified in section X. A diagram of these steps is given in Attachment D.

III. LTC PSU SELECTION

The LTC sample is a subsample of the 1970 current survey A-design sample. An A-design PSU consists of a county or a group of contiguous counties. All counties in the entire United States are grouped into 376 A-design strata. One hundred fifty-six of the strata consist of only one PSU; these are called self-representing (SR) PSUs. The remaining 220 strata are formed from counties with similar total 1970 census population and characteristics such as SMSA, percent of population urban, percent of population with race as nonwhite, number of farms, and per capita retail sales. A PSU is then selected from each A-design stratum with probability proportional to its 1970 population. These 220 sample PSUs are called nonself-representing (NSR) PSUs. More detailed sampling procedures for the A-design sample are given in "Technical Paper 40, The Current Population Survey—Design and Methodology."

For LTC, A-design strata are collapsed to form 173 LTC strata. Thirty-nine of the LTC strata consist of only one PSU. These PSUs are automatically included in the LTC sample and are called LTC self-representing (SR) PSUs. The remaining 134 LTC strata are formed by combining A-design strata with similar characteristics. The combining of A-design strata into LTC strata is based on the proportion of the population 65 years and older and enrolled in Medicare (referred to below as Medicare population) as estimated for the A-design sample PSU in each A-design stratum.

In each of the remaining 134 LTC strata of approximately equal Medicare population, one A-design stratum is selected with probability proportional to its estimated 1978 Medicare population. The A-design sample PSU from that stratum is then selected as an LTC sample PSU. These sample PSUs are called LTC nonself-representing (NSR) PSUs. A list of LTC PSUs (both SR and NSR) appears in Attachment A.

IV. PRELIMINARY OPERATIONS FOR SELECTING THE SAMPLES

A. The Creation of the 1994 Universe Subfiles From the 1994 Medicare Subfile

Prior to sampling, it will be necessary to form strata for the aged-in sample, to assign an LTC PSU number to each record, to assign a current surveys (CS)
PSU number to each record, to divide the Medicare subfile into two universe subfiles, and to sort each universe subfile. The final products will be referred to as the first and second 1994 universe subfiles.

1. Form strata.

   a. For the aged-in sample, form strata based on each person’s original reason for entitlement (first occurrence) of BENE_ENTLMT_RSN_CD

      (i) Stratum 1 - BENE_ENTLMT_RSN_CD = 0

      This stratum contains all persons originally entitled due to age.

      (ii) Stratum 2 - BENE_ENTLMT_RSN_CD = 1, 2, 3

      This stratum contains all persons originally entitled by disability.

      (iii) If the original reason for entitlement is blank, then delete these records. They are not part of the Medicare universe

   b. For the 95+ supplement, the universe will not be stratified. There were only 12 persons in stratum 2—not enough persons to stratify on original reason for entitlement.

      If the original reason for entitlement code is blank, include these records in the universe. Persons 95 and over may not have entered the Medicare system because the system was started in the 1970’s after these persons were already 65.

2. Assign the appropriate LTC PSU number to each record. Also assign the appropriate CS PSU number to each record in each subfile. In most cases an LTC PSU consists of only one CS PSU. For those LTC PSU’s containing more than one CS PSU, a CS PSU number is listed in Attachment C for each county in each LTC PSU. For counties lying in more than one CS PSU, the lowest CS PSU number of the LTC PSU is listed.

3. Divide the 1994 Medicare subfile into two files:

   Refer to the first file as the “first 1994 universe subfile.” It will consist of persons who turned 65 between April 1, 1988 and March 31, 1994, inclusive and are alive on March 31, 1994.
Refer to the second file as the "second 1994 universe subfile." It will consist of persons who turned 95 on or before March 31, 1994 and are alive on March 31, 1994.

4. Sort each file in the following manner:
   a. By stratum number (j = 1 or 2)
   b. By LTC PSU number within stratum (i = 1-173)
   c. By race (white, black, other, unknown) within LTC PSUs within stratum
   d. By age within races within LTC PSUs within stratum

B. The Creation of the 95+ Eligible Subfile from the Second 1994 Universe Subfile


2. Delete the persons aged 95 and over who match to the 1994 LTC longitudinal file.

3. Verify with the Health Care Financing Administration that nonmatched persons on the longitudinal file are recently deceased or have moved out of an LTC PSU.
   
   All persons aged 95 and over on the longitudinal file should be on the second 1994 universe subfile. A discrepancy could occur one of two ways. First, the longitudinal file was updated as of mid-March 1994. The second 1994 universe was updated as of March 31, 1994. Nonmatched longitudinal sample could occur if persons on the longitudinal file have died between mid-March 1994 and March 31, 1994, inclusive. Second, nonmatched cases could occur if longitudinal persons moved out of an LTC PSU.

4. Refer to the remaining second 1994 universe file as the "95+ eligible subfile" (i.e., these persons are on the second 1994 universe subfile and not on the 1994 LTC longitudinal file).

C. Obtaining Counts of the 1994 Universe Subfiles and the 95+ Eligible Subfile

   Obtain the following counts of persons:
\[ N_{ij} = \text{the total number of persons in the } i^{th} \text{ LTC PSU and } j^{th} \text{ stratum from the first 1994 universe subfile.} \]

\[ N_{i,1} = \text{the total number of persons in the } i^{th} \text{ LTC PSU from the first 1994 universe subfile.} \]

Note that \( N_{ij} \) for Group A PSUs (non-asterisked in Attachment A) represent 10 percent and \( N_{ij} \) for Group B PSUs (asterisked in Attachment A because they are smaller PSUs) represent 50 percent of all persons on the 1994 Health Insurance Skeleton Eligibility Write-Off file who become 65 years old on or after April 1, 1988 and are alive as of March 31, 1994 in the \( i^{th} \) LTC PSU and \( j^{th} \) stratum. The same is true for \( N_{i,1} \) except that \( N_{i,1} \) includes all stratum in the \( i^{th} \) PSU.

\[ N_{i,2} = \text{the total number of persons in the } i^{th} \text{ LTC PSU from the second 1994 universe subfile.} \]

\[ E_{i,2} = \text{the total number of persons 95 years of age or older on April 1, 1994 in the } i^{th} \text{ LTC PSU from the } 95+ \text{ eligible subfile.} \]

V. PRELIMINARY OPERATIONS FOR SELECTING THE AGED-IN COMPONENT

A. Sample Size and Sampling Intervals

The national sampling interval (si) for the 1994 LTC aged-in component should be calculated using \( N_{ij} \) and \( \pi_i \). \( \pi_i \) is the probability of selection which remains the same as the 1982 LTC design. (The \( \pi_i \)'s are listed in Attachment A.) The si should result in a designated sample of approximately 5,000 persons or 4,949 nondeceased persons.

1. The national sampling interval for selecting the aged-in component,

\[ si = \frac{\sum \sum f_i N_{ij}/\pi_i}{5000} \]

\( f_i = 10 \) for each Group A PSU (non-asterisked PSUs in Attachment A).

\( f_i = 2 \) for each Group B PSU (asterisked PSUs in Attachment A).
2. For each LTC PSU within each stratum within the first 1994 universe subfile, compute

\[ \hat{n}_{ij} = \text{the expected sample size for the } i^{th} \text{ LTC PSU in the } j^{th} \text{ stratum for the first 1994 universe subfile} \]

\[ = \frac{10N_{ij}}{\pi_{isi}} \text{ rounded to 4 decimal places, for Group A PSUs} \]

\[ = \frac{2N_{ij}}{\pi_{isi}} \text{ rounded to 4 decimal places, for Group B PSUs.} \]

For several LTC PSUs \( \hat{n}_{ij} \) may be greater than \( N_{ij} \). If this occurs do the following:

1. Assign \( w_{ij} = \hat{n}_{ij} \)

2. Let \( \hat{n}_{ij} = N_{ij} \).

3. For each stratum within the first 1994 universe subfile, compute

\[ \hat{n}_{j} = \sum_{i}^{173} \hat{n}_{ij} \]

4. For each LTC PSU within the first 1994 universe subfile, compute

\[ \hat{n}_{i,1} = \sum_{j}^{2} \hat{n}_{ij} \]

5. Also compute

\[ \hat{n} = \sum_{j}^{2} \hat{n}_{j} = \sum_{i}^{173} \hat{n}_{i,1} \]

(perform the calculation both ways as a check).
B. Computing Take Everys and Random Starts for the Aged-in Component

A take every (TE_{e,1}) is required for each LTC PSU and a random start (RS_{j,1}) is required for each LTC PSU and stratum. These parameters are used in the sample selection procedure outlined below.

Note that the aged-in component will only be selected from the first 1994 universe subfile and the take every does not vary by stratum.

Perform the following operations on the first 1994 universe subfile for each LTC PSU:

1. Compute the take every:

\[ TE_{e,1} = \frac{x_{i,s}i}{10} \text{, rounded to 4 decimal places, for Group A PSUs.} \]

\[ TE_{e,1} = \frac{x_{i,s}i}{2} \text{, rounded to 4 decimal places, for Group B PSUs.} \]

If TE_{e,1} < 1.0000 for any LTC PSU, print out the LTC PSU number and the value of TE_{e,1}, then let TE_{e,1} = 1.

2. For each stratum, determine the random start associated with the j\textsuperscript{th} stratum and first LTC PSU,

\[ RS_{j,1} = 1 \text{ if } TE_{e,1} = 1, \text{ otherwise} \]

\[ RS_{j,1} = \alpha_j TE_{e,1}, \text{ rounded to 4 decimal places,} \]

where \( \alpha_j \) is a 4 decimal place random number such that 0 < \( \alpha_j \) \leq 1.0000. Thus, it should be true that 0 < RS_{j,1} \leq TE_{e,1}. The \( \alpha_j \)'s can be generated by the computer using a random number generator. RS_{j,1} is only needed here for the first LTC PSU in each stratum; all other random starts will be generated by an algorithm using parameters from the sampling of the previous LTC PSU and stratum. All TE_{e,1}'s and RS_{j,1}'s should be saved for output later.
VI. SELECTING THE AGED-IN COMPONENT OF MEDICARE ENROLLEES

A. Sample Selection

Select the aged-in component of 1994 Medicare enrollees from the first 1994 universe subfile from each LTC PSU within each stratum in the order in which it is sorted as specified below.

1. Sampling the First 1994 Universe Subfile for the Aged-in Component

Sample the first 1994 universe subfile in the sort order described in Section IV.A.5. Sample the first LTC PSU in stratum 1 using TE_{1,1}, followed by the second LTC PSU in stratum 1 using TE_{2,1}, etc., until the stratum has been entirely sampled. Sample stratum 2 in the same way as stratum 1.

Each LTC PSU has one take every TE_{i,1} which is to be used in sampling both strata for that LTC PSU. However, within a stratum, determine the random start RS_{q,i} used in sampling a LTC PSU from parameters associated with sampling the previous LTC PSU, continuing in this fashion until the stratum is entirely sampled. Generate the first RS for each stratum as described in Section V.B.2.

a. Applying RS_{q,i} and TE_{i,1}

Select the sample of persons from the i^{th} LTC PSU, and j^{th} stratum, in the following manner:

Determine the sequence of numbers

RS_{q,i}, RS_{q,i} + TE_{i,1}, RS_{q,i} + 2TE_{i,1},

until the absolute difference between N_{q,i} and the last member of the sequence is less than TE_{i,1}.

Next, round each member of the sequence up to the next integer (e.g., 6.0487 is rounded to 7). Note that a number such as 5.0000 is rounded to 5.

Consider the persons in the i^{th} LTC PSU, and the j^{th} stratum as numbered consecutively from 1 to N_{q,i}. Then those persons with numbers corresponding to those in the above rounded sequence are the sample persons from that stratum and LTC PSU.
Note: if $TE_{k,1} = 1$ then the sequence of numbers for the $i^{th}$ PSU and the $j^{th}$ stratum will be 1, 2, 3...$N_{ji}$.

b. Verifying the Sample Selection

Within a stratum the accuracy of the sample selection in one LTC PSU should be checked before proceeding to the next LTC PSU. Sampling should not continue if in some case (i) and (ii.) below do not hold.

(i) $n_{qi}$, the actual sample size obtained from sampling the $i^{th}$ LTC PSU, and $j^{th}$ stratum should be within one of the expected sample size $A_{qi}$. That is, it should be true that $| n_{qi} - A_{qi} | \leq 1.0000$ unless this is a PSU where $A_{qi} > N_{qi}$. If $TE_{k,1} = 1.0000$ then $n_{qi}$ should equal $N_{qi}$. Notify DSMD if there is a discrepancy between the actual and expected sample sizes unless this is a PSU where $TE_{k,1}$ was originally less than 1.

(ii) If $N_{qi} > RS_{qi}$, then define $LO_{qi}$, the leftover from sampling the $i^{th}$ LTC PSU, and $j^{th}$ stratum, as $N_{qi}$ minus the last member of the unrounded sequence determined above. The expected leftover from sampling the $i^{th}$ LTC PSU, and $j^{th}$ stratum, is defined as:

$$EXPLO_{qi} = N_{qi} - [RS_{qi} + (n_{qi} - 1) TE_{k,1}]$$

It should always be true that $LO_{qi} = EXPLO_{qi}$. Notify DSMD in the case that $LO_{qi} < EXPLO_{qi}$.

If $N_{qi} < RS_{qi}$, then $LO_{qi} = N_{qi}$.

c. Determine $RS_{qi}$ for successive LTC PSUs within a stratum

(i) After sampling the $i^{th}$ LTC PSU in the $j^{th}$ stratum, determine the next random start as follows (assuming the $i^{th}$ LTC PSU is not the last to be sampled in the stratum):
If the \( i^{th} \) LTC PSU is not the last to be sampled in the \( j^{th} \) stratum, then

\[
RS_{d+1|j} = \left( \frac{TE_{d+1} - LO_{d+1}}{TE_{d+1}} \right) TE_{d+1|1},
\]

rounded to 4 decimal places.

(ii) If the \( i^{th} \) LTC PSU is the last to be sampled in stratum 1, then it is not necessary to save \( LO_{i1} \) and \( RS_{i1} \).

d. Example:

Suppose the first LTC PSU in stratum \( j \) for the first 1994 universe subfile is a Group A LTC PSU and has \( \pi_1 = 0.051123 \)

and \( N_{ij1} = 20 \) and \( s_i = 730.590873 \), \( \pi_{1si} = \frac{10N_{ij1}}{\pi_1 s_i} = 5.3548 \)

\[
TE_{11} = \frac{\pi_1 s_i}{10} = 3.7350
\]

Let \( \alpha_j = 0.3476 \), then \( RS_{i1} = \alpha_j TE_{11} = 1.2983 \).

The sequence of numbers is calculated as 1.2983, 5.0333, 8.7683, 12.5033, 16.2383, 19.9733 and the rounded sequence is 2, 6, 9, 13, 17, 20 thus the 2nd, 6th, 9th, 13th, 17th, and 20th persons in the first LTC PSU in stratum \( j \) on the sorted universe subfile are sample persons.

It can be seen that \( n_{i1} = 6 \) is within one of \( \pi_{1si} = 5.3548 \).

The expected leftover is

\[
EXPLO_{i1} = N_{ij1} - [RS_{i1} + (n_{i1} - 1) TE_{i1}]
\]

\[
= 20 - [1.2983 + (5)(3.7350)]
\]

\[
= 20 - 19.9733
\]

\[
= 0.0267
\]

and the actual leftover is
\[ LO_{ij} = 20 - 19.9733 = 0.0267. \]

So \( LO_{ij} = EXPLO_{ij} \). It can be seen that \( LO_{ij} < TE_{1,1} \). The take every for sampling the second LTC PSU, \( j^{th} \) stratum is \( TE_{2,1} = \pi_{2,i} \), and the random start is

\[
RS_{2j} = \left( \frac{TE_{1,1} - LO_{ij}}{TE_{1,1}} \right) TE_{2,1} \\
= \left( \frac{3.7350 - 0.0267}{3.7350} \right) TE_{2,1} \\
= (0.9929) TE_{2,1}, \text{ rounded to 4 decimal places}
\]

e. Sample Counts

After sampling the first 1994 universe subfile, determine

\[ n_{ij} = \text{number of persons sampled from the } i^{th} \text{ LTC PSU and } j^{th} \text{ stratum} \]

\[ n_{i,1} = \text{number of persons sampled from the } i^{th} \text{ LTC PSU} \]

\[ = \sum n_{ij} \]

B. Sample File

Following the sample selection, create a sample file consisting of the entire compressed record (see Attachment B), plus the LTC PSU number and all sample identifiers and parameters listed in section X for each person selected for the aged-in component from the first 1994 universe subfile. Sort the records of this file by LTC PSU in the order specified in Attachment A and then by control number within LTC PSU.

VII. DESIGNATING WHICH AGED-IN PERSONS ARE ELIGIBLE FOR THE HEALTHY SUPPLEMENT

A. Overview

A sample of persons from the aged-in component need to be selected for the healthy supplement. If these persons screen in as healthy, they will be interviewed with the LTC-3, Community Questionnaire, at the time of their LTC interview. This section describes the systematic selection of sample persons from the aged-in component. Section X describes how an H will be
assigned to the control number for persons designated for the healthy supplement.

B. Sorting the Aged-in Component

Before selecting the healthy supplement from the aged-in component, sort the records for the aged-in component in the following order:

1. By stratum number
2. By LTC PSU number within stratum number
3. By race (white, black, other, unknown) within LTC PSUs within stratum
4. By age within races within LTC PSUs within stratum

C. Random Start and Sampling Interval

1. The sampling interval (SI) for selecting the healthy supplement is 10.3605.
2. The random start (RS) is (.1762 * 10.3605) = 1.8255

D. Applying the Random Start and Sampling Interval

Select the sample of persons for the healthy supplement as follows:

1. First determine the sequence of numbers
   
   RS, RS + SI, RS + 2*SI, RS + 3*SI, ………,until the absolute difference between the number of persons selected for the aged-in component (n) and the last member of the sequence is less than SI.

2. Next round each number of the sequence up to the next integer (eg. 6.0487 is rounded to 7). Note a number such as 5 is rounded to 5.

3. Consider the aged-in component as numbered consecutively from 1 to n. Those persons with numbers corresponding to those in the above rounded sequence are the persons from the aged-in component that are in the healthy supplement.
E. Designating Persons From the Aged-in Component to Receive the Healthy Supplement if They Screen In as Healthy

The records of persons selected for the aged-in component and the healthy supplement will be designated with an H in their control numbers according to the specifications given in section X.

VIII. PRELIMINARY OPERATIONS FOR SELECTING THE 95+ SUPPLEMENT

A. Sample Size and Sampling Intervals

Using the 95+ eligible subfile, the national sampling interval \( ri \) for the 1994 LTC 95+ supplement should be calculated using \( E_{i2} \) and \( \pi_i \). \( \pi_i \) is the probability of selection which remains the same as the 1982 LTC design. (The \( \pi_i \)'s are listed in Attachment A.) This \( ri \) should result in a designated sample of approximately 540 persons 95 years of age or older.

1. The national sampling interval for selecting the 95+ supplement,

\[
ri = \sum \sum \frac{E_{i2}/\pi_i}{540}
\]

2. For each LTC PSU within the 95+ eligible subfile, compute

\[
\hat{E}_{i2} = \text{the expected sample size for the } i^{th} \text{ LTC PSU}
\]

\[
= \frac{E_{i2}}{\pi_i ri} \text{ rounded to 4 decimal places.}
\]

For several LTC PSUs \( \hat{E}_{i2} \) may be greater than \( E_{i2} \). If this occurs do the following:

1. Assign \( w_{i2} = \hat{E}_{i2} \)

2. Let \( \tilde{E}_{i2} = E_{i2} \).
3. Compute

\[ \hat{e}_{12} = \sum_{i} \hat{e}_{12} \]

B. Computing Take Everys and Random Starts for the 95+ Supplemental Sample

A take every (TE\(_{i,2}\)) and a random start (RS\(_{i,2}\)) are required for each LTC PSU. These parameters are used in the sample selection procedure outlined below.

Perform the following operations on the 95+ eligible subfile for each LTC PSU:

1. Compute the take every:

\[ \text{TE}_{i,2} = \pi_{i,1}, \text{ rounded to 4 decimal places.} \]

If TE\(_{i,2}\) < 1.0000 for any LTC PSU, print out the LTC PSU number and the value of TE\(_{i,2}\), then let TE\(_{i,2}\) = 1.

2. Determine the random start associated with the first LTC PSU,

\[ \text{RS}_{i,2} = 1 \text{ if } \text{TE}_{i,2} = 1, \text{ otherwise} \]

\[ \text{RS}_{i,2} = \alpha_{i} \text{TE}_{i,2}, \text{ rounded to 4 decimal places,} \]

where \( \alpha_{i} \) is a 4 decimal place random number such that 0 < \( \alpha_{i} \) ≤ 1.0000. Thus it should be true that 0 < RS\(_{i,2}\) ≤ TE\(_{i,2}\). The \( \alpha_{i} \)'s can be generated by the computer using a random number generator. RS\(_{i,2}\) is only needed here for the first LTC PSU; all other random starts will be generated by an algorithm using parameters from the sampling of the previous LTC PSU. All TE\(_{i,2}\)'s and RS\(_{i,2}\)'s should be saved for output later.

IX. SELECTING THE 95+ SUPPLEMENT OF MEDICARE ENROLLEES

A. Sample Selection

Select the 95+ supplemental sample of 1994 Medicare enrollees from each LTC PSU in the order in which it is sorted as specified below.
1. Sampling the 95+ Eligible Subfile for the 95+ Supplement

Sample the 95+ eligible subfile in the sort order described in Section IV.A.5. The first LTC PSU in the 95+ eligible subfile will be sampled using $TE_{1,2}$, followed by the second LTC PSU using $TE_{2,2}$, etc.

The random start $RS_{1,2}$ used in sampling a LTC PSU is determined from parameters associated with sampling the previous LTC PSU. The random start is generated as described in Section V.B.2.

a. Applying $RS_{1,2}$ and $TE_{i,2}$

Select the sample of persons from the $i^{th}$ LTC PSU in the following manner:

Determine the sequence of numbers

$RS_{1,2}, RS_{1,2} + TE_{i,2}, RS_{1,2} + 2TE_{i,2}, \ldots,$

until the absolute difference between $E_{i,2}$ and the last member of the sequence is less than $TE_{i,2}$.

Next, round each member of the sequence up to the next integer (e.g., 6.0487 is rounded to 7). Note that a number such as 5.0000 is rounded to 5.

Consider the persons in the $i^{th}$ LTC PSU as numbered consecutively from 1 to $E_{i,2}$. Then those persons with numbers corresponding to those in the above rounded sequence are the sample persons from that LTC PSU.

Note: If $TE_{i,2} = 1$ then the sequence of numbers for the $i^{th}$ PSU will be 1, 2, 3…$E_{i,2}$.

b. Verifying the Sample Selection

The accuracy of the sample selection in one LTC PSU should be checked before proceeding to the next LTC PSU. Sampling should not continue if in some case (i) and (ii) below do not hold.

(i) $e_{i,2}$, the actual sample size obtained from sampling the $i^{th}$ LTC PSU in the 95+ eligible subfile should be within
one of the expected sample size $\epsilon_{12}$. That is, it should
be true that $|e_{12} - \epsilon_{12}| \leq 1.0000$ unless this is a
PSU where $\epsilon_{12} > E_{12}$. If $TE_{12} = 1.0000$ then $e_{12}$ should
equal $E_{12}$.

Notify DSMD if there is a discrepancy between the actual
and expected sample sizes, unless this is a PSU where
$TE_{12}$ was originally less than 1.

(ii) Define $LO_{i,2}$, the leftover from sampling the $i^{th}$ LTC PSU
as $E_{12}$ minus the last member of the unrounded sequence
determined above. The expected leftover from sampling
the $i^{th}$ LTC PSU is defined as:

$$EXPLO_{12} = R_{12} - [RS_{12} + (e_{12} - 1) \cdot TE_{12}]$$

It should always be true that $LO_{i,2} = EXPLO_{12}$. Notify
DSMD in the case that $LO_{i,2} \neq EXPLO_{12}$.

c. Determine $RS_{i,2}$ for successive LTC PSUs

(i) After sampling the $i^{th}$ LTC PSU, determine the next
random start as follows (assuming the $i^{th}$ LTC PSU is not
the last to be sampled):

If the $i^{th}$ LTC PSU is not the last to be sampled, then

$$RS_{i+1,2} = \left( \frac{TE_{12} - LO_{12}}{TE_{12}} \right) TE_{i+1,2}$$

rounded to 4 decimal places

(ii) If the $i^{th}$ LTC PSU is the last to be sampled, then it is not
necessary to save $LO_{i,2}$ and $RS_{i,2}$. 
d. Example:

Suppose the first LTC PSU for the 95+ eligible subfile has $\pi_1 = .051123$, $E_{1.2} = 12$, and $ri = 60.129$,

$$e_{1.2} = \frac{E_{1.2}}{\pi_1 ri} = 3.9037 \quad TE_{1.2} = \pi_1 ri = 3.0740$$

Let $\alpha_i = .4221$, then $RS_{1.2} = \alpha_i TE_{1.2} = 1.2975$.

The sequence of numbers is calculated as 1.2975, 4.3715, 7.4455, 10.5915 and the rounded sequence is 2, 5, 8, and 11. Thus the 2nd, 5th, 8th, and 11th persons in the first LTC PSU on the sorted 95+ eligible subfile are sample persons.

It can be seen that $e_{1.2} = 4$ is within one of $e_{1.2} = 3.9037$.

The expected leftover is

$$\text{EXPLO}_{1.2} = E_{1.2} - [RS_{1.2} + (e_{1.2} - 1)TE_{1.2}]$$

$$= 12 - [1.2975 + (3)(3.0740)]$$

$$= 12 - 10.5195$$

$$= 1.4805$$

and the actual leftover is

$$LO_{1.2} = 12 - 10.5195 = 1.4805.$$  

So $LO_{1.2} = \text{EXPLO}_{1.2}$. It can be seen that $LO_{1.2} < TE_{1.2}$. The take every for sampling the second LTC PSU is $TE_{2.2} = \pi_2 ri$ and the random start is

$$RS_{2.2} = \left(\frac{TE_{2.2} - LO_{1.2}}{TE_{1.2}}\right)TE_{2.2}$$

$$= \left(\frac{3.0740 - 1.4805}{3.0740}\right)TE_{2.2}$$

$$= (.5184) TE_{2.2}$$

rounded to 4 decimal places

---

e. Sample Counts

After sampling the 95+ eligible subfile, determine
\( \epsilon_{i,2} \) = number of persons 95 years of age and older
sampled from the \( i^{th} \) LTC PSU in the 95+ eligible subfile.

B. Sample File

Following the sample selection, create a sample file for the 95+ supplement consisting of the entire compressed record (see Attachment B), plus the LTC PSU number and all sample identifiers and parameters listed in section X for each person selected for the 95+ supplement from the 95+ eligible subfile. Sort the records for this file by LTC PSU in the order specified in Attachment A and then by control number within LTC PSU.

X. SAMPLE IDENTIFICATION CODES AND PARAMETERS

Several codes and parameter values are to be assigned to each person on the sample file. Some codes are to be applied in a systematic fashion. It is important that these codes are applied to sample persons in the prescribed order. Such ordering is specified below.

Assign the following codes and parameter values to the sample persons.

A. LTC Control Number

Each sample person is to be assigned a 14 digit LTC control number. The control number has the following form:

Digit 1: screener or nonscreener code

Digit 2: zero-filled pad

Digit 3: sample identification code 1 (based on status in 1982, also referred to as the 1984 sample component)

Digit 4: sample identification code 2 (based on status in 1984, also referred to as the 1989 sample component)

Digit 5: sample identification code 3 (based on status in 1989 for longitudinal components and identifies the aged-in and supplemental components for 1994)

Digits 6-8: CS PSU number (given in Attachment A)
Digits 9-12: sequential numbers within CS PSUs

Digit 13: healthy supplement code (identifies persons selected to receive the healthy supplement if they are determined to be healthy)

Digit 14: check digit

The control number differs from the control number for the 1989 LTC survey by the addition and deletion of the following digits: the addition of the zero-filled pad (digit 2), the addition of the sample identification code 3 (digit 5), the addition of the healthy supplement code (digit 13), and the deletion of the caregiver code.

Below are instructions for determining each component of the control number.

1. Screener or Nonscreener Code (Digit 1)

The first digit of a person's control number indicates whether the person receives a full or partial screener interview. The letter S indicates a full screener interview, and the letter N indicates a partial screener interview.

Assign all persons selected from the 1994 universe subfile the letter S for digit 1.

2. Zero-filled pad (Digit 2)

The zero-filled pad is 0 filled for all persons. The zero-filled pad makes the control number an even number of digits, which is a requirement for barcoding.

3. Sample Identification Code 1 (Digit 3)

The third digit of a person's control number will designate the sample group the person was from for the 1984 LTC survey. It is actually based on their status in 1982.

Assign all persons selected from the 1994 universe subfile a 0 for digit 3.
4. Sample Identification Code 2 (Digit 4)

The fourth digit of a person's control number will designate the sample group the person was from for the 1989 LTC survey. It is actually based on their status in 1984.

Assign all persons selected from the 1994 universe subfile a 0 for digit 4.

5. Sample Identification Code 3 (Digit 5)

The fifth digit of a persons control number will designate the sample group the person is from for the 1994 LTC survey. For the longitudinal portion of the LTC sample it is actually based on a person's 1989 status. Persons selected by the instructions in this memorandum were not in the 1989 LTC survey.

Assign all persons selected for the aged-in component a 6 for this code. And assign all persons selected for the 95+ supplemental component a 9 for this code.

6. CS PSU Number (Digits 6-8)

Fill the sixth, seventh, and eighth digits of a person's control number with the CS PSU number of the LTC PSU the person was selected from. Note that the CS PSU numbers are given in Attachment A and are based on the 1970 design (the current survey design when LTC began). In LTC PSUs consisting of more than one CS PSU, use the CS PSU number given in Attachment C for the person's county, which is listed under his/her LTC PSU.

7. Sequential Numbers within CS PSUs (Digits 9-12)

Within each CS PSU, assign 4 digit numbers sequentially to each sample person in order of selection, starting with 0001 for each CS PSU.

8. Healthy Supplement Code (Digit 13)

Assign all persons selected for the healthy supplement the letter H for digit 13 of their control number. Assign all other persons the letter O for digit 13 of their control number.
9. Check Digit (Digit 14)

The check digit is calculated from the first 11 digits (digits 2-12) after the screener/nonscreener code of the control number.

   a. Write the first 11 digits after the screener/nonscreener code of the control number, A, as
      \[ A = C_2 \ C_3 \ C_4 \ C_5 \ C_6 \ C_7 \ C_8 \ C_9 \ C_{10} \ C_{11} \ C_{12} \]

   b. Compute the products
      \[
      \begin{align*}
      B_2 &= 1 \times C_2 \\
      B_3 &= 2 \times C_3 \\
      B_4 &= 7 \times C_4 \\
      B_5 &= 8 \times C_5 \\
      B_6 &= 1 \times C_6 \\
      B_7 &= 2 \times C_7 \\
      B_8 &= 7 \times C_8 \\
      B_9 &= 8 \times C_9 \\
      B_{10} &= 1 \times C_{10} \\
      B_{11} &= 2 \times C_{11} \\
      B_{12} &= 7 \times C_{12} \\
      \end{align*}
      \]

   c. Let \( D \) = sum of the digits of \( B_2, B_3, B_4, B_5, B_6, B_7, B_8, B_9, B_{10}, B_{11}, \) and \( B_{12} \).

   d. The check digit is the units digit of \( D \).

10. Always write the control number with dashes after the sample identification code 3, after the CS PSU number, and before the healthy supplement code and check digit, i.e.,

\[
- - - - - - - - - -
\]

11. Example

Suppose that in LTC PSU 102, from CS PSU 105 there are ten sample persons selected for the aged-in component. The tenth sample person in order of selection is designated for the healthy supplement, has CS PSU number 105, and has sequential number 0010. So the first 11 digits after the screener/nonscreener code of this person's control number are 00061050010. The check digit is computed as follows:
A = C_2 C_3 C_4 C_5 C_6 C_7 C_8 C_9 C_{10} C_{11} C_{12}

B_2 = 1 \times 0 = 0
B_3 = 2 \times 0 = 0
B_4 = 7 \times 0 = 0
B_5 = 8 \times 6 = 48
B_6 = 1 \times 1 = 1
B_7 = 2 \times 0 = 0
B_8 = 7 \times 5 = 35
B_9 = 8 \times 0 = 0
B_{10} = 1 \times 0 = 0
B_{11} = 2 \times 1 = 1
B_{12} = 7 \times 0 = 0

D = 0 + 0 + 0 + 4 + 8 + 1 + 0 + 3 + 5 + 0 + 0 + 1 + 0 = 22

Check digit = 2

The control number is S0006-105-0010-H2.

B. Reduction Group Code

Reduction group codes are assigned in case a sample needs to be reduced in the future. A sample may need to be reduced because of budgetary problems. The reduction group code should be assigned separately to the aged-in component and the 95+ supplement.

Assign a three digit code to each sample person selected for the aged-in component. Consider each aged-in component person as a string of persons in order of selection. Assign a reduction group code to each person, beginning with 003 for the first sample person, increasing by one until a person is assigned reduction group code 101, then continuing with 001 through 101 as often as necessary.

Assign a three digit code to each sample person selected for the 95+ supplement. Consider each person in the 95+ supplement as a string of persons in order of selection. Assign a reduction group code to each person, beginning with 121 for the first sample person, increasing by one until a person is assigned reduction group code 202, then continuing with 102 through 202 as often as necessary.

C. Stratum Code

Retain each person's stratum code, assigned in IV.A.1.
D. Quantities to be Used in Weighting the Sample

Assign the appropriate values of the quantities below to each sample person. The value of each varies by LTC PSU and/or stratum.

1. $T_{E_{i,1}}$ for the aged-in component
   $T_{E_{i,2}}$ for the 95+ supplement

2. $\pi_i$

3. $F_{ij} = \text{inflation factor for } i^{th} \text{ LTC PSU and } j^{th} \text{ stratum}$

For the aged-in component,

If $w_{i1} > N_{i1}$, then

$$F_{ij} = \frac{w_{i1}}{N_{i1}},$$

Else $F_{ij} = 10$, for Group A PSUs
   $= 2$, for Group B PSUs.

For the 95+ supplement,

If $w_{i2} > E_{i,2}$, then

$$F_i = \frac{w_{i2}}{E_{i,2}},$$

Else $F_i = 1$.

E. Variance Codes: Pseudostratum Numbers and Half-Sample Codes for Half-Sample Replication

Codes for variance estimation using the balanced half-sample replication method may be assigned to each sample person at a later date. Fields at the end of the sample file should be reserved for this purpose.

XI. OUTPUT

Certain printed output and tape files are needed upon completion of sample selection. Also, some tape files are needed prior to sample selection.
A. Universe Subfiles and the 95+ Eligible Subfile

Universe subfiles and the 95+ eligible subfile should be saved for possible use after sampling.

B. Sample Files

1. After selecting the aged-in component, create a sample file as specified in VI.B. Provide this file in the order that it was selected. For each sample person, this file should contain all items listed in Attachment B, in addition to the following:
   
a. LTC PSU number
b. LTC control number
c. Reduction group code
d. Stratum code
e. $TE_{i,1}$ and $\pi_i$ and $F_i$

2. After selecting the 95+ supplemental sample, create a sample file as specified in IX.B. For each sample person, this file should contain all items listed in Attachment B, in addition to the following:
   
a. LTC PSU number
b. LTC control number
c. Reduction group code
d. Stratum code
e. $TE_{i,2}$ and $\pi_i$ and $F_i$

C. Sampling Data

1. To verify the sort, print the following records: 1,000 records starting at $i=172$. Include in the printout the following variables: stratum number, LTC PSU number, race, and age.

2. Provide the following data to DSMD so that the sample selection can be verified:
   
a. $N_{i,2}$

b. $N_{L2}$, $E_{L2}$ across strata

c. sampling intervals: si (aged-in) and ri (95+ supplement)
3. Provide the following data from the sample selection of the aged-in component from the first 1994 universe subfile. Data should appear in the order in which the sample was selected. Include in one file the following variables:

- $\pi_i$, $TE_{i_1}$, $N_{i_1}$, $N_{i_2}$, $N_{i_3}$, and $N_{i_4}$ for each LTC PSU.
- $\text{RS}_{i_1}$, $\text{LO}_{i_1}$, $\text{EXPLO}_{i_1}$, $\alpha$, and the first and last control numbers assigned, for each LTC PSU and stratum
- $\bar{a}_{i_1}$, $n_{i_1}$, $\bar{A}_{i_1}$, $n_{i_1}$, $\bar{a}_{i_1}$, $n_{i_1}$

4. Provide a count of the number of persons designated for the healthy supplement (the number of persons who have an H in their control number).

5. Provide the following data from the sample selection of the 95+ supplement from the 95+ eligible subfile. Data should appear in the order in which the sample was selected. Include in one file the following variables:

- $\pi_i$, $TE_{i_2}$, $E_{i_2}$, and $E_{i_2}$ for each LTC PSU.
- $\text{RS}_{i_2}$, $\text{LO}_{i_2}$, $\text{EXPLO}_{i_2}$, $\alpha_i$, and the first and last control numbers assigned, for each LTC PSU
- $\bar{e}_{i_2}$, $c_{i_2}$, $\bar{e}_{i_2}$, $c_{i_2}$

D. Current Surveys PSU Summary Data

Provide DSMD with the following data by CS PSU within each LTC PSU:

1. Parent LTC PSU number
2. CS PSU number
3. Count of persons selected for 1994 LTC in the CS PSU

E. County Summary Data

Provide DSMD with the following data by county within each LTC PSU:

1. Parent LTC PSU number
2. Social Security Administration (SSA) state and county codes
3. Count of persons selected for the 1994 LTC survey in the county

F. LTC Field Control Listing

Provide DSMD with one copy of a computer listing containing the following: the LTC control number, CAN, BIC, reduction group code, and name and address of each sample person selected in the 1994 LTC. Sort the listings by reduction group code in the order specified in Attachment E, and by CS PSU within reduction group code.