AN EVALUATION OF THE QUALITY OF THE DEMOGRAPHIC DATA COLLECTED BY ENUMERATORS IN A TEST OF SERVICE-BASED ENUMERATION PROCEDURES

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The Origins of Service-Based Enumeration

'Homelessness' emerged as a policy concern in America in the early 1980's. The perceived rise in the population of "visible homeless" led to a number of attempts to estimate the homeless population (Jencks 1994). The lack of resolution on questions about the size and characteristics of the homeless population from these studies led to increased requests of the Census Bureau by Federal agencies and local groups to collect data about the homeless population (Taeuber and Siegel 1991). In addition, many voiced their concern that the homeless population would be undercounted in the 1990 Census. The Census Bureau responded to these demands by making special attempts (the *S-Night* count) to get people living in shelters and on the street included in the 1990 Census.

Advocates for the homeless and internal Census Bureau studies criticized the S-Night method and argued that the procedure still resulted in an undercount of the portion of the homeless population that the S-Night method was supposed to capture. It was particularly argued that many of the homeless would not have been "visible" to the enumerators and would have had no opportunity to be counted. These criticisms led to research into other ways to enumerate the homeless population.

Many of the "invisible" homeless do make use of services such as soup kitchens and mobile food vans during the daytime and evening hours. The *S-Day* method was designed to make use of this fact by enumerating "... homeless persons at daytime centers where they receive services such as food, clothing, medical assistance, and so forth" (Salo and Campanelli 1991:130).

Service-Based Enumeration (SBE) is an offshoot of the S-Day procedure. SBE is not intended to produce a count of the homeless population, but provides the homeless an opportunity to be included in the general census count.[1] In SBE, agencies which provide services that are likely to attract homeless people are identified, contacted, and ask to prepare for enumeration on a specified date.[2] On the enumeration date, a team of enumerators hand out questionnaires to everyone who receives services at that site at that time. While handing out the questionnaires, the enumerators write down the client's name and note the client's race and sex. After the enumeration is completed and all responses are collected, the data are checked for internal and external duplication. Non-duplicated records are passed on for inclusion in the total census.

The Primary Research Topic: SBE Data Quality

Among the concerns about the SBE procedures is the issue of how accurate the collected data actually are. In many cases, the basic demographic data for a respondent (name, sex and race) are not provided directly by the respondent, but are rather taken from visual observations (for race and sex) and aural observations (name) made by the enumerator. How good a job do the enumerators do at collecting these data? What factors influence quality of these data? This paper explores these questions by analyzing the *match rates* of enumerator-provided data to respondent-provided data collected in a test of SBE procedures.

The Secondary Research Topic: Mobile Food Vans

There has been a great deal of interest in enumerating those serviced by mobile food vans which distribute meals at a fixed time throughout a wide area. Gerber and Wellens (1994) present a vivid account of the operations of a mobile food van in New York City and discuss the potential difficulties with enumerating such locations. For New York City, the biggest concern is whether a vehicle containing enumerators could keep up with the food van as it made its rounds through the city. The food van moves quickly through rush hour traffic in a winding manner often circling and taking unmarked streets. It would be easy for enumerators to lose track of the food

[1] Census 2000 *will not* classify people as homeless. Every effort will be made to ensure that people who do not have a usual place of residence are included in the count.

[2] In Census 2000, SBE procedures will be carried out at soup kitchens, food vans, and targeted non-sheltered outdoor locations.

van. Another concern is that the stops themselves are deliberately kept brief in order to avoid trouble with police, security guards or homeless persons. Lines are not formed at some of the van stops, thus identifying who has or has not been counted could be difficult. Finally, the service recipients often have nothing with which to carry the food they have been given and end up 'balancing' the items; getting them to fill out a questionnaire rapidly could be a problem.

Are the procedures appropriate for use on food vans? Factors that may have had an impact on the quality of data collected on van runs include: the quality of the available lighting, the amount of help available for the respondents, whether English was the primary language spoken at the site, and how crowded the site was. It is reasonable to assume that the quality of the data collected at the soup kitchen is superior to the data collected on the van runs. Therefore, the data collected at the soup kitchen enumerated in the test is used as a 'benchmark' for evaluating the data collected from the van runs.

Description of the Data

The data for this research are taken from a test of SBE procedures conducted in New York City on the 25th and 26th of September 1996. The test was conducted in one soup kitchen (on the 25th) and on two mobile food van runs with multiple stops (on the 26th).

A team of 10 people (1 team leader, 1 helper and 8 'listers') was assigned to enumerate the soup kitchen. Each lister was assigned a subset of the service-using population to enumerate and was instructed to enumerate everyone in that group -- including those who claimed to have been enumerated at a different time and those who claimed to "not usually use" soup kitchens. The lister was instructed to write down the name, sex, and race of each person enumerated (the *last resort data*) on a single line of a pre-numbered listing sheet. Sex and race were collected by visual inspection -- i.e., the enumerator's best guess of that person's sex and race. Sex was coded on the listing sheet as 'M' or 'F' and race was coded as 'W' (white), 'B' (black), 'A' (Asian), or 'O' (other). After writing down the information, the lister handed out a one-page questionnaire to the service user. The questionnaire was coded with the number corresponding to the filled-out line on the listing sheet (the listing number). At the end of the entire enumeration, the returned questionnaire was matched by the listing number to the enumerator and the line on the listing sheet. The data from each returned questionnaire was coded into a SAS data set by Census Bureau staff.

The team which conducted the soup kitchen enumeration was split into two teams for the enumeration of the mobile van runs. One team consisted of a team leader, a helper, and 3 listers. The other team consisted of a team leader and 4 listers. The listing and enumeration procedures for each van stop were essentially the same as for the soup kitchen. The primary differences were as follows: the team of enumerators needed to "stay with" the food van and were unable to wait for all questionnaires to be returned; the enumerators were faced with different food distribution scenarios among the van stops and had to use different ways to split up the listing chores; in addition to other concerns, the enumerators needed to focus on keeping the enumeration materials (questionnaires, listing sheets, etc.) separate for each van stop. At the end of the enumeration, questionnaires were matched to the van stop (by a unique site identification number called the Group Quarters Identification [GQID] number), the enumerator (by the listing number), and the listing sheet line (also by the listing number). The data from these questionnaires were also coded into a SAS data set by Census Bureau staff.

During the training session for the enumeration team, all team members filled out the same questionnaire that was passed out to the service users. Thus, the basic demographic information (age/race/sex) was collected for each of the listers. These data and the data taken off of the listing sheets were entered into SAS data sets by myself.

Observers not directly participating in the enumeration conducted 'headcounts' of the number of service users at each site (van stop or soup kitchen) and obtained estimates of the "number of meals served" at each site from the service providers.

Limitations of the Data

The quality of all data collected was highly dependent upon how well the respondents could read and understand the questions being asked. Studies have shown that a significant portion of the population using soup kitchens did not complete elementary school (Burt and Cohen 1990). Also, rounds of cognitive interviewing conducted prior to the test revealed that respondents have some difficulty understanding the "What is your race" question. Often they mark more than one box because they believe the categories coming after the space allotted for Indian tribe to be a new question. Thus, a respondent may mark the "Black, African-Am., or Negro" box *and* enter "Black" in the space provided by the "Some other race" box. As this paper 'assumes' that the respondent correctly entered his or her name, sex, and race, any data discrepancies between lister and respondent are attributed

to lister error. Thus, the enumerator "error rates" which I produce are inflated -- i.e., some of what is being called lister error is really "respondent error".

My study makes use of returned questionnaires to evaluate the accuracy of the last resort information. There is a possibility that the quality of the last resort information collected on those who returned questionnaires is better than the information collected on those who did not. There are only limited ways within this study to investigate that possible non-response bias.

The quality and quantity of all data collected depended on the weather as both the van runs and the soup kitchen enumerations were only conducted on one night. There is no way to determine how much of an effect weather had on the responses. On the nights of the test, the temperature was in the 50's and there was no precipitation. In Census 2000, the SBE procedures will be carried out in early April when it is likely to be colder and rainier.[3] Had it rained on the night of the test, it is quite likely that the turnout would have been lower. People would have been less likely to wait for the van if it was raining. It is also likely that the data collected would be of much poorer quality in terms of accuracy and completeness. Had it been colder, it is likely that the turnout would be lower (people would not want to wait). It is less likely that colder weather would affect data quality. (These speculations about the impact of weather are based on discussions with the service provider and members of the Census Bureau's SBE team.)

The quantity of data collected is also impacted by the time of month -- people receiving checks from state or local government (such as AFDC, Social Security, Veterans', etc.) are more likely to use food services at the end of the month when the money from the checks is used up.

Finally, any inferences made from these data are severely limited by the fact that the 'sample' consists of one soup kitchen and two van runs within one city. For this study, a high level of cooperation was given by the service providers (holding up the food van to allow the enumeration to take place, introducing the enumerators to the clients, etc.). Conclusions drawn from the data may only be applicable to Manhattan.

[3] In Census 2000, a follow-up enumeration might be conducted at shelters and soup kitchens on a sample basis. Such an enumeration might allow for an improved enumeration of people without a usual residence.

Methodology

In order to study these data, a number of steps were taken. Univariate statistics for the dependent, independent, and study variables were generated. The data were checked for anomalies and compared to results from previous studies. The study variable and the independent variables were individually compared to the dependent variables in two-way cross tabulation tables. Statistical tests of significance (such as Chi-square) were generated to evaluate the strength of association between the variables. Finally, logistic regression models were then fit for each of the dependent variables.

Quality and Quantity of Test Data

Table 1 compares the number of people that the enumerators listed to the service providers' estimates of how many people were actually served. The 'percent listed' gives an indication of how successful the enumerators were at enumerating everyone who was using the services. The soup kitchen enumeration completely covered the population while the van runs missed about 1 out of every 4 clients.[4]

Table 1: SBE Test -- Estimated Number of People Served Compared to Number of People Listed

Location	Number Served	Number Listed	Percent Listed
Downtown Van Run	224	164	73.2
Uptown Van Run	230	178	77.4
Soup Kitchen	76	79	103.9
Total	530	421	79.4

A breakdown of questionnaire response by enumeration team is presented in Table 2. The table shows that a higher percentage of questionnaires were returned (71.3 percent) on the Uptown van run in comparison to the Downtown van run (57.9 percent) and the soup kitchen (63.3 percent). However, the difference between the Uptown van run and soup kitchen percentages is not statistically significant (the *p-value* of the Chi-square test is 0.20).

[4] It was possible to have more than 100% coverage (as is the case for the soup kitchen) because enumerators were instructed to relist any person they were not certain had been listed previously.

Table 2: SBE Test -- Questionnaire Return Rates

Location	Number Listed	Number Returned	Percent Returned
Downtown Van Run	164	95	57.9
Uptown Van Run	178	127	71.3
Soup Kitchen	79	50	63.3
Total	421	272	64.6

Table 3 shows that last resort information taken off listing sheets add substantially to the completeness of the data. When the last resort information is added to the information provided on the questionnaires, the overall item response rate for name climbs from 60.8 percent to 76.5 percent while for sex (51.5 percent to 98.1 percent) and race (53.7 percent to 98.1 percent) it nearly doubles.

Table 3: SBE Test -- Primary Source of Name, Sex and Race Data

	Percent of Data Obtained From:		Total Percent
Data Item	Listing Sheet	Questionnaire	Obtained
Name	15.7	60.8	76.5
Sex	46.6	51.5	98.1
Race	44.4	53.7	98.1

The Dependent Variables

The dependent variables used to study this data were the *match rates* for name, race, and sex.

For each respondent, the last name from the questionnaire was compared to the last name on the listing sheet. If the last names matched *exactly*, then the names were considered a match and the *name match indicator* variable was coded as a '1'. If the names did not match, the *name match indicator* variable was coded as a '0'. Overall, there are 230 respondents who have an entry for name on both the questionnaire and the listing sheet. Among these respondents, the last names on the listing sheets and the questionnaires matches *exactly* 52.6 percent of the time.

The *race match indicator* variable was constructed in a similar manner. After recoding the responses to the race item on the returned questionnaires into one of the four race categories used on the listing sheets, the responses from the listing sheets and the questionnaires were compared. Matching responses were coded as '1' and non-matching responses were coded as '0'. Overall, there are 214 respondents who have an entry for race on both the questionnaire and the listing sheet. Among these respondents, the race entry on the listing sheets and the questionnaires matches 79.9 percent of the time.

The *sex match indicator* variable was also constructed by comparing the responses to the sex item on the questionnaires to those on the listing sheet. Overall, there were 208 respondents who have an entry for sex on both the questionnaire and the listing sheet. Among these respondents, the sex entry on the listing sheets and the questionnaires matches 99.5 percent of the time. Since the match rate is so high (only one non-match), there is no need to explore this variable further.

Distribution of Match Rates for Selected Variables

Table 4 shows the distribution of the *name match indicator* within the categories of selected independent variables. Comparing the distributions of the name match indicator among the location categories suggests that there may be a difference between the percentages of names matched on the van run stops and at the soup kitchen. When the results of the van runs are combined, the van run names are found to match 50 percent of the time. As seen in Table 4, the soup kitchen names match 63 percent of the time. The *p-value* of Chi-square test for the comparison of these proportions is 0.12. On a *relative* basis, however, this difference may not be 'significant', as each of these proportions could be interpreted as being 'low'.

Table 5 shows the distribution of the *race match indicator* within the categories of selected independent variables. Comparing the distributions of the race match indicator among the location categories suggests that there is not a large difference between the percentages of races matched on the van run stops and at the soup kitchen. When the results of the van runs are combined, the van run races are found to match 79.4 percent of the time. As seen in Table 5, the soup kitchen names match 84.1 percent of the time. The *p-value* of Chi-square test for the comparison of these proportions is 0.44 (no significance).

Table 4: SBE Test -- Distribution of Name Match Rates by Selected Variable Attributes

Variable	Percent Matched
Respondent's Race:	
Asian	37.5
Black	58.7
Other	62.9
White	41.6
Respondent's Sex:	
Female	56.8
Male	51.8
Enumerator's and Respondent's Race:	
Same	59.0
Different	49.0
Location:	
Soup Kitchen	63.0
Downtown Van Run	51.4
Uptown Van Run	49.1

Table 5 SBE Test -- Distribution of Race Match Rates by Selected Variable Attributes

Variable	Percent Matched
Respondent's Race:	
Asian	50.0
Black	93.1
Other	55.6
White	75.0
Respondent's Sex:	
Female	71.8
Male	81.7
Enumerator's and Respondent's Race:	
Same	85.1
Different	77.1
Location:	
Soup Kitchen	84.1
Downtown Van Run	78.9
Uptown Van Run	78.7

Overall, the race match rate (almost eighty percent) was much higher than the name match rate (just over fifty percent). Whereas the race match rate is probably acceptable for demographic purposes, the name match rate might not be.

Detailed Analysis of the Match Rates on Van Runs

Table 6 presents the coefficients from logistic regression models which use the name match indicator and race match indicators as dependent variables. For both models, the independent variables include: the study variable *Van Run* (whether the data was collected at the soup kitchen or at a van run stop); the site headcount; the rough time of enumeration; the number of items on the questionnaire that the respondent filled out; indicator variables for whether the respondent was or was not black, Asian, other race; an indicator variable for whether the respondent was or was not male; indicator variables for whether the enumerator was or was not black, other race; an indicator variable for whether the enumerator was or was not male; and an interaction term (ERACEMAT) which indicates whether the race of the enumerator matches the race of the respondent.

Table 6 SBE Test -- Logistic Regression Results

	Regression Coefficients and Significance Levels	
Variables	***Name Match***	***Race Match***
Intercept	-0.437	2.303 *
Van Run	-1.210 **	-1.247 *
Headcount	0.003	-0.002
Time of Enumeration	0.187	0.199
Number of Items Marked	-0.043	-0.069
Black Respondent	1.124 ***	1.829 ***
Asian Respondent	0.558	-0.830
Other Race Respondent	1.296 ***	-0.476
Male Respondent	-0.039	0.025
Black Enumerator	0.112	-0.309
Other Race Enumerator	0.591	-0.044
Male Enumerator	0.540	-0.163
ERACEMAT: Races of Respondent and Enumerator Match	0.738 **	0.466

Note: * indicates coefficient significant at .10 level
** indicates coefficient significant at .05 level
*** indicates coefficient significant at .01 level

Analysis of Name Match Logistic Regression Model

The first column of data in Table 6 suggest that four variables (Van Run, Black, Other, and ERACEMAT) are statistically significant in the name match model. The coefficients can be made more interpretable through the use of the exponential function. For example: the coefficient for Black in the model is equal to 1.124. The exponential function transforms the coefficient to 3.057. This new coefficient implies that, after controlling for the other variables included in the model, the odds of having the last names on the questionnaire and listing sheet match is 3.057 times greater for the black respondents than the white

respondents. Likewise, the Other coefficient indicates that the odds of having the names match exactly is over 3 times greater for the other respondents than the white respondents. The coefficient of the ERACEMAT variable indicates that a respondent whose race matches the enumerator's race has over twice the odds of having the names on the listing sheet and questionnaire match.

When the exponential function is applied to the coefficient of Van Run the resulting value (.298) is less than one. This implies that: taking all variables into account, the odds of the last names on the questionnaire and listing sheet matching for the van run respondents is about 70% less than the odds of the names matching for the soup kitchen respondents. Thus, it can be concluded that the name data collected on the van runs were not as good as the name data collected at the soup kitchen.

Analysis of Race Match Logistic Regression Model

The second column of data in Table 6 suggest that only two variables (Van Run and Black) are significant and only one variable (Black) is strongly significant. For the Black variable: after controlling for the other variables included in the model, the odds of having the race variable on the questionnaire and listing sheet match is 6.228 times greater for the black respondents than the white respondents.

For Van Run: the odds of the race variable on the questionnaire and listing sheet matching for the van run respondents is about 70% less than the odds of the race variable matching for the soup kitchen respondents. This indicates that the race data collected on the van runs was not as good as the race data collected at the soup kitchen. This difference may not be directly observable in the bivariate analysis due to poorer quality of van run data being offset by the higher proportions of the better-matching black respondents on the van runs. The weak significance of the coefficient also suggests that the difference may not exist at all. If it does exist, the difference is small on a *relative* basis.

Conclusion

In summary, the data do show that for this test the enumerators did a better job of collecting the respondent's last name at the soup kitchen than they did on the van runs, although the difference may not be important. The data only weakly suggest that the enumerators did a better job of collecting race at the soup kitchen than they did on the van runs and for practical purposes there is no difference between the sites.

Overall, the name data being collected may not be of sufficient quality for unduplication purposes. The race data, however, is probably of sufficient quality for demographic purposes. The sex data is definitely of sufficient quality for demographic purposes. These results have implications about the future direction of SBE. In the Census 2000 Dress Rehearsal, the questionnaire will be interviewer-administered rather than self-administered. The results suggest that this shift to an interviewer-administered questionnaire should be accompanied by increased attention on capturing the correct name. The results also suggest that increasing the likelihood that the respondents and enumerators are of the same race would help in correctly capturing the respondents name.

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** This paper reports the general results of research undertaken by Census Bureau staff. The views expressed are attributable to the author and do not necessarily reflect those of the Census Bureau.*