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COVERAGE IMPROVEMENT FROM EXPERIMENTAL RESIDENCE QUESTIONS

by

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1. Introduction

Survey undercoverage is often thought to be an intractable problem. The surveys conducted by the Bureau of the Census are widely believed to provide as good or better population coverage than those carried out by other survey organizations, but its surveys miss high percentages of people in certain groups. As a result, the Bureau is investigating various methods to improve the coverage of its household surveys.

Undercoverage occurs in two main forms -- 1) entire households are missed and 2) individuals are missed in households that are partially covered. Whole-household undercoverage occurs when a household eligible for interview is excluded from the survey, typically because the dwelling where the household resides has been omitted from the listing of addresses for the area. Within-household undercoverage occurs when one or more members of a sample household are omitted from the household roster.

This paper focuses on within-household undercoverage, which was the major topic of a study conducted on behalf of the Bureau of the Census by the National Opinion Research Center (NORC). Funding was provided primarily through the Survey of Income and Program Participation (SIPP) with additional support by the National Center for Health Statistics. In brief, the study used 3 questionnaire versions. One was a control version and the other two used an expanded set of experimental roster questions. One of these experimental versions

required full names and the other allowed "anonymous" responses. The most important findings are that the anonymous questionnaire resulted in a much higher average number of Black males listed as usual household residents (on the order of 33% higher). There was no evidence, however, that the expanded roster questions by themselves had any effect.

Brownrigg and Martin (1989), hypothesized the five main behavioral causes for undercoverage:

- mobility;
- illiteracy and other language problems;
- deliberate concealment;
- irregular household structure or living arrangements;
- resistance as a strategy for dealing with the government and other persons from outside the community.

Others consider behavioral as well as operational causes. As Hainer and his coworkers (Hainer, Hines, Martin, and Shapiro, 1988) put it:

> One reason people are missed is motivational. Black (and Hispanic) males are deliberately omitted from household rosters because of the potential loss of household income if the men were known to authorities ... A second cause of undercoverage is the lack of fit between the census definitions of household and residency, and people's actual living situations.

A number of variables are related to the degree of survey coverage. For example, coverage ratios are the survey's estimations of persons in age-sex-race or Hispanic origin categories over independent estimates based on the most recent census adjusted for births, deaths, immigration and emigration. It has been apparent since the Bureau began calculating coverage ratios that coverage of young Black males is worse than coverage of older Black males; similarly, young Black males are more likely to be missed than their non-Black

counterparts. Coverage of Black females is better than coverage of Black males, but is not as good as coverage of non-Black females (Shapiro, Diffendal, and Cantor, 1993).

In most surveys, a person is counted as a resident of a particular dwelling if he or she "usually" lives there. However, it may not be easy to obtain a household roster based on the criterion of usual residence. Under current Census Bureau definitions, a person's usual residence is the dwelling where he or she lives and sleeps most of the time. Some respondents may find it difficult to apply this standard; for example, it may be unclear whether to count a person staying in the respondent's home temporarily. In other cases, the respondent may be confused about persons in their household who sometimes stay at other places. People who float between several residences may be included or left off the roster at the respondent's discretion. Furthermore, Census Bureau procedures call for individuals with no usual place of residence who are currently staying in the respondent's residence to be included in the final roster in addition to "usual residents," but the household respondents themselves may often be unaware of this rule.

The Roster Research study carried out by NORC examines situations like this by experimenting with alternative methods of developing a roster. This study is a follow-up to two earlier studies. The results of these studies are reported in Shapiro, Diffendal, and Cantor (1993). In the next section we describe the methodology for this study and provide an overview of the analysis presented in Section 3 and 4.

2. Methodology

2.1 Sample Design

The sample for the experiment consisted of 644 occupied dwelling units spread across a total of 49 blocks in three sites--the Chicago and Washington, D.C., metropolitan areas and the City of Baltimore. The Field Division of the Census Bureau selected and listed blocks that were predominantly Black and low income. Entire blocks did not have to be listed as long as

the listing of each block included at least 40 housing units. (For example, we did not request a full listing of predominately Black and low income public housing or apartment buildings.) Twenty-five blocks were selected in the Chicago area, 18 of them located within the city limits and 7 of them from two nearby suburbs. Fifteen blocks were selected in the Washington metropolitan area, eight of them within the city limits and the remaining seven from nearby suburbs. All nine blocks in the Baltimore area were located within the City of Baltimore. Based on listings of each of the 49 blocks, NORC staff selected 15 housing units on each block using a systematic selection procedure; of the 735 dwellings selected in this way, 644 turned out to be occupied and thus eligible for interview.

Interviews were completed at a total of 509 of these dwellings, for a response rate of 79.0%. NORC interviewers collected information on 1949 individuals in the 509 interviews.

The experiment compared three versions of the questionnaire. The interviewers arranged the questionnaires in a predetermined random sequence. The interviewers then administered the questionnaires at each cooperating household in this random order. The interviewing took place over a four-week period from November to December, 1992.

2.2 Questionnaires

Three versions of the questionnaires were developed, embodying different approaches to developing a household roster. The first, or standard version of the questionnaire begins with items drawn directly from the SIPP control card. In Version 1, an initial roster of residents is compiled based on responses to the *standard roster questions* ("What are the names of all persons living or staying here? Have I missed any babies or small children? ... Does (NAME) usually live here?") and demographic information is collected for each person on the roster. Next, we ask a series of experimental roster questions intended to identify residents omitted from the initial roster; these experimental roster questions ask:

- How many people besides those you've already listed stayed here last night?

- Is there anyone else who stayed at least one night during the past month?
- Is there anyone else who usually stays here but was not here during the last month?
- Is there anyone else who ate here at least once during the last week?
- Is there anyone else who usually eats here but who did not eat here during the last week?
- Is there anyone else who you consider to be a member of this household?
- Is there anyone else who considers himself or herself to be a member of this household?

New people identified by the experimental roster questions were then added to the roster. Once the roster was complete, Version 1 continued with a series of questions intended to clarify the relation of each person listed to the household. These questions concern a number of dimensions that respondents may consider in determining whether to count an individual as a usual resident (Gerber, 1990):

- How many nights did NAME stay here during the last month?
- On how many days did NAME eat here during the last week?
- Does NAME contribute money, food, or other help to this household?
- Do you consider NAME to be a member of this household?
- Was NAME here at all during the last day?
- Does NAME consider himself/herself a member of this household?
- Does NAME usually live here?
- Does NAME have other places where he/she frequently stays?

These *follow-up items* are then followed by a series of items on labor force participation.

The other two versions of the questionnaire contain essentially the same items as Version 1 but administer them in a different order. In Version 1, the standard roster questions come first, then the experimental roster question, and finally the follow-up items; in Versions 2 and 3, the experimental roster questions are administered first, then the follow-up items, and finally the standard roster questions. (Both the experimental roster questions and the standard items have been reworded slightly in Versions 2 and 3 to fit their new context.) Like Version 1, Versions 2 and 3 conclude with the labor force questions. Versions 2 and 3 differ from each other in only one respect: Version 3 requires respondents to identify household members by their full names, whereas Version 2 does not; Version 2 allows respondents to use initials, nicknames, or other means of identifying individuals instead.

2.3 Generalizability of Results and Standard Errors

We took a purposive sample of blocks from three arbitrarily chosen sites (though we did select equal probability samples of units within each sampled block). We chose to treat this as a universe equally distributed among the 49 blocks. Thus, the results cannot be properly generalized to any universe beyond that specified. We therefore computed standard errors assuming a simple random sample of housing units, which is actually a conservative approach for the defined universe since an equal number was of sample units selected in each of the 49 blocks ("strata"). If a reader wants to generalize these results to a larger universe, then under most reasonable models, the standard errors we used underestimate the variability in the estimates, and it’s possible that some results we claim as being significant would no longer be so.

2.4 Overview of the Analysis

We analyzed the data from this study to determine which method, on the average, produced more listed residents. In particular, the analysis considers two issues: 1) Did the experimental roster questions increase the number of persons rostered relative to the standard SIPP roster questions? and 2) Did anonymous interviewing (Version 2) increase the number of persons

rostered relative to full-name interviewing (Versions 1 and 3)? These issues are discussed with respect to the total number of people initially rostered (Section 3.1), the total number of respondents classified as "usual residents" (Section 3.2), and the total number of people on the final roster under an experimental roster definition (Section 3.3).

We also looked at the effect of experimental roster questions in Version 1 (see Section 3.4) and we tested models regarding the variables that predict whether a given person listed on the roster is counted as a usual resident (see Section 3.5).

Finally, we sought to determine which specific questions account for any gains produced by the experimental versions. For example, does asking about who eats in the household reveal new usual residents? This issue is discussed in Section 4.

3. Analysis of Data on Rostered Persons

In this section, we compare the number of persons rostered under the three versions of the questionnaire. There are several ways of doing this. One is to compare the average number of total persons listed per housing unit across versions. Here we would certainly expect to get larger averages for the experimental versions since these would include people with casual connections to a unit, e.g., had a single meal at the household. Another method is to compare averages of usual residents across versions. That is, we only count persons for whom we get an affirmative answer to the question, "Does NAME usually live here?" (In Version 1, the persons listed with the standard roster question were asked the question, "Does NAME usually live here?" while persons listed with the experimental roster questions were asked, "Does NAME usually stay here?") This is a simple way of deciding who we want to count as belonging to the unit. This serves as a meaningful test of whether the experimental versions were helpful. A final approach is to compare averages for other more complex definitions of who belongs to the housing unit. For reasons we explain in section 3.3, we expect that reliance only on, "Does NAME usually live here?" will leave out a number of people who should be included with the sample housing units.

Section 3.1 discusses results for total persons, Section 3.2 discusses results for usual residents, and Section 3.3 for complex definitions. Some of the issues covered in these sections are explained in more detail in a preliminary report on the project (Tourangeau, 1993). In summary, as expected, the experimental versions did much better than Version 1 for total persons. For both the usual residents' definition and for the complex definitions, the anonymous version (#2) did better than the other 2 versions for Black males, but all other comparisons were not significant. Results for the complex definition are similar to the usual resident definition. But, since there are a number of people under the complex definition who weren't defined as clearly meeting the definition or clearly failing to meet it (unlike the usual resident definition), additional people may belong to the unit but have complex living arrangements.

The results in the Non-Black Male and Non-Black Female categories do not reveal noteworthy results. Although in some cases there were significant differences, the very small numbers make Non-Black Males and Non-Black Females in the sample the analysis very sensitive to race misclassification error. Therefore, it is very difficult to draw any conclusions for Non-Black persons.

3.1 Number of Total Persons Rostered

The household rosters under Versions 2 and 3 included more persons on average than those compiled using the standard items under Version 1. Overall, the average number of persons listed in the household rosters was 2.90 for Version 1, 3.94 for Version 2, and 3.87 for Version 3 (see Table 1). Thus, the two experimental versions of the roster questions added about a person compared to the standard items. This is a highly significant difference; a one-way analysis of variance yields an $F(2,506)$ of 8.04 ($p < .001$). (In using the F test here, we recognize that we are ignoring the lack of normality of the underlying distribution.) A contrast comparing the Versions 2 and 3 with Version 1 also yields a highly significant $t(506)$ of 3.99 ($p < .001$). However, there is no evidence of a difference between Versions 2 and 3. (In performing tests of individual contrasts, we made no adjustments to compensate for

making multiple comparisons. However, because the *p* value was so low for all the tests that were significant, undoubtedly the same conclusions would hold even if we made such adjustments.)

TABLE 1. Average Total Persons and Usual Residents Rostered by Version

	Version 1 (n=173)		Version 2 (n=177)		Version 3 (n=159)	
	Total Persons	Usual Residents	Total Persons	Usual Residents	Total Persons	Usual Residents
Total	2.90	2.83	3.94	3.13	3.87	2.99
Black Males	1.12	1.09	1.80	1.45	1.55	1.18
Black Females	1.48	1.45	1.93	1.60	1.98	1.60
Non-Black Males	0.16	0.16	0.04	0.02	0.12	0.06
Non-Black Females	0.13	0.13	0.04	0.02	0.06	0.05

Note: Because of missing data, row entries within a column may not sum to the column total. Figures for Version 1 reflect only persons listed using the standard rostering questions.

Both of the experimental versions of the roster questions begin with the question, "How many people stayed here last night?" This item differs in three obvious ways from the standard rostering item ("What are the names of all persons living or staying here?"). First, it leaves less room for confusion. Although difficulties may sometimes arise in determining who spent the night, on the whole this appears to be an easier standard to understand and apply than who lives or stays at the residence. For example, temporary residents may be easy to classify by the stayed-last-night test but difficult to classify by the lives-or-stays test. Second, the rostering items in the experimental versions may be seen as less threatening than those in the standard versions, because they do not begin by asking for names. Finally, the initial rostering items in the experimental versions invite respondents to cast a broad net; only later do questions become more stringent as they seek to determine which of the persons listed are usual residents of the dwelling. The standard questionnaire begins with a more stringent criteria. This approach appears to net fewer persons.

The differences apparent for all persons listed are also apparent for both Black males and females. The rosters compiled under Versions 2 and 3 included more Black males than those compiled using the standard questions in Version 1. The mean number of Black males listed was 1.80 per household under Version 2, 1.55 under Version 3, and 1.12 under Version 1. Thus, Version 2 increased the number of Black males rostered per household by more than 60% relative to Version 1; the increase for Version 3 as compared to Version 1 was about 38%. The differences across versions are highly significant--$F(2,506)$ of 7.88 ($p < .001$). A contrast comparing Versions 2 and 3 with Version 1 also yields a highly significant t of 3.68 ($p < .001$), as does a contrast of Version 2 with Version 1 (t of 3.92, $p < .001$). A contrast between Version 3 and Version 1 is also significant with a t of 2.46 ($p < .01$). However, there is no evidence of differences between versions 2 and 3.

Similar differences are apparent for Black females, where the means are 1.93 for Version 2, 1.98 for Version 3, and 1.48 for Version 1. The overall differences in the average number of Black females listed per household are highly significant--$F(2,506)$ of 5.19 ($p < .01$)--and the contrast comparing Versions 2 and 3 with Version 1 is also highly significant (t=3.22, $p < .005$). However, there is no evidence of differences between Versions 2 and 3.

3.2 Number of Usual Residents Rostered

All three versions of the questionnaire contain an item to distinguish usual residents from others on the roster who are not household members. In each version, respondents were asked, "Does NAME usually live here?" about each person on the roster. Those for whom the answer was positive are considered usual residents. In Version 1, those who have no usual residence elsewhere also meet the standard SIPP criteria.

Overall, there is no evidence of differences among the three versions. However, if we examine the means for Black males--a group with a particularly high level of undercoverage--there are some significant differences that do emerge. Version 2 had the highest mean number of Black male usual residents, 1.45 per household; the corresponding figures for

Versions 1 and 3 are 1.09 and 1.18, respectively. Version 2 yields an increase of 33% in the number of Black males relative to Version 1. Across all three versions, the differences in the mean number of Black male usual residents is significant--$F(2,506)=3.93$ ($p < .05$). A contrast comparing Version 2 (which did not require full names to be used) with the other two versions (both of which did require full names) is also highly significant--$t(506)=2.72$ ($p < .001$). Thus, anonymous interviewing appears to substantially increase the number of Black males reported as usual residents. However, there is no evidence that the experimental roster questions had any effect.

The differences across versions in the number of usual residents reported did not extend to Black females. The means are 1.45, 1.60, and 1.60 for the three versions (see Table 1); an analysis of variance confirms that these are not significant differences--$F(2,506) < 1$.

The highly significant difference between Version 2 and the other two versions of the questionnaire in the number of Black males reported as usual residents strongly suggests that underreporting of Black males is the result of concealment rather than confusion; the only difference between Versions 2 and 3 is that Version 2 does not require full names.

3.3 Complex Definitions for Residences

This section explores other definitions for the usual residents of a housing unit. We do not expect the "usual resident" question to be the best way to determine which people belong to the household for several reasons: 1) We expected that our broad-based coverage questions may pull in people who we would regard as usual residents, but are not so considered by respondents; 2) we also expect that respondents may be unwilling to acknowledge some people as usual residents but will give us honest answers to other questions by which we can classify them as belonging to the unit, 3) and we also expect the experimental roster questions to net some people who have no usual place of residence and who therefore are not identified as usual residents by the respondent but should be included in the final roster because they are currently staying at the unit.

In this section, we conceptually develop one of many possible definitions for who should be included as a housing unit resident. The basic idea is that a person is a resident of the housing unit where he or she stays most often. More specifically, the definition encompasses three major classes of persons:

1) Persons identified by the household respondent as usual residents and who either

   • have no other place they frequently stay,

   • stayed at the housing unit in question at least as many nights in the past month as any other place,

   • moved into the housing unit within the past 30 days, or

   • has no single other place where they spent more time than here during each of the last 6 months.

2) Persons identified by the household respondents as not usual residents here and who either

   • have no other place they frequently stay and either:

     ◦ stayed at the housing unit in question the previous night, or

     ◦ stayed at the housing unit in question more nights than at any other place in the past month

   • stayed some other place frequently, but has no usual residence according to the respondent, and stayed here at least as many nights last month as stayed in any other place

   • have a usual residence elsewhere, but stayed at least 15 nights here during each of the past 6 months

3) College students (or other boarding student) living away from school who are regarded as members of the household by the household respondent. (Some surveys do not list college students living away at school at the sampled housing unit.)

The questionnaires did not include all the items needed to classify every person in the sample under this alternative definition. For example, none of the versions contain items asking when each person moved in; moreover, none of the versions attempted to gather information about the number of nights persons stayed at other households or if the other households were their usual residence. Therefore, it was impossible for us to classify some of the persons rostered as clearly meeting the definition or clearly failing to meet it. Results from the Living Situation Survey (Schwede, 1993) may help us determine whether or not people whose living arrangements we are currently uncertain about would meet the complex definition.

Table 2 shows the mean number of persons per household who met the definition above. The "conservative" column includes persons who definitely met the criteria; the "liberal" column includes persons who met the definition under the conservative criterion and all persons who either were not usual residents of the sample unit and had no other place where they frequently stayed or were usual residents of the sample unit but had another place where they frequently stayed. The "usual residents" column includes persons with an affirmative answer to the question, "Does NAME usually live here?"

Version 1 could not be classified under the complex definitions because we do not have enough information on the persons rostered with the standard roster question (What are the names of all persons living or staying here?). That is, for some cases in the complex definition we need to know if a person stayed in the unit last night. In Versions 2 and 3, we get this information from the first roster question, "How many people stayed here last night?", by recording the roster-question number with their names. In Version 1, however, this question isn’t asked until after the standard roster question, so we can’t determine if any of the people from the standard question stayed last night.

TABLE 2. Average Number of Residents on the Final Roster by Version and Definition

	Version 2 (n=177)			Version 3 (n=159)		
	Liberal Criterion	Conservative Criterion	Usual Residents	Liberal Criterion	Conservative Criterion	Usual Residents
Total	3.18	3.12	3.13	3.06	2.97	2.99
Black Males	1.47	1.45	1.45	1.23	1.16	1.18
Black Females	1.62	1.59	1.60	1.62	1.60	1.60
Non-Black Males	0.02	0.02	0.02	0.06	0.06	0.06
Non-Black Females	0.02	0.02	0.02	0.05	0.05	0.05

Note: Because of missing data, row entries within a column may not sum to the column total.

We expected the complex definitions to classify a larger number of people as belonging to the household than does the "usual resident" definition. However, Table 2 averages differ little from each other. This may indicate that there are few transient-type people in these households who would be missed by the standard definition. But, after looking at the number of people whose residency we are uncertain about, it is not clear. For example, of the 318 Black males rostered in Version 2, 260 met the liberal criterion and 58 did not. Of the 58 who did not meet the criterion, though, there are 31 Black males whose residency could not be determined under the complex definition. This does not necessarily imply that the undefined people would be transient-type people who would meet the criterion for residency, but since some may, the averages in Table 2 under the complex definitions may be underestimates even for the liberal criterion.

3.4 Version 1 Including Follow-up Questions

All of the preceding comparisons among questionnaire versions have been with the Version 1 rosters determined from only the initial roster questions, excluding persons added by the

follow-up questions. Thus, we compared the broader experimental roster questions (Versions 2 and 3) to the standard questions (Version 1). Version 1 included the same questions as Version 3, only the ordering of questions differed. Table 3 compares data for Black males for these two versions, both for total persons and for usual residents. For neither group is there a statistically significant difference. Since the numerical difference and the standard errors are rather large for total persons, it is of course possible that the question ordering in Version 1 results in fewer reported persons.

TABLE 3. Average Total Persons and Usual Residents
"FULL" Version 1 vs Version 3

	"FULL" Version 1 (n=173)		Version 3 (n=159)	
	Total Persons	Usual Residents	Total Persons	Usual Residents
Black Males	1.36	1.11	1.55	1.18

3.5 Models for Predicting Usual Residents

Altogether, the household rosters listed 1,939 persons for whom it was possible to determine if they were usual residents. 1,526 of these people were identified by the household informant as usually living at the dwelling. (For another 10 persons, the usual residence variable was missing.) This section explores criteria that household respondents may have used in making this judgment; it examines answers to the question, "Does NAME usually live here" as a function of responses to the six follow-up items (i.e., How many nights did NAME stay here during the last month?, On how many days did NAME eat here during the last week?, Does NAME consider himself/herself a member of this household?, Does NAME have other places where he/she frequently stays?, Does NAME contribute money, food, or other help to this household?, and Was NAME here at all during the last day?). We fit

logistic regression models to the data to determine which of the follow-up items were significantly related to responses to the usual residency item.

We tested an additive model that included all six follow-up items as predictors, as well as main effect terms for the sex and age of the person. (Analyses of the data separately by version yielded results similar to those given in the combined analysis; as a result, we present only the latter here. This analysis includes *all* persons rostered under Version 1, including those first reported in response to the special probes administered after the standard roster questions.)

Four variables emerged from this analysis as significant predictors of whether the household respondent classified a person as a usual resident--the number of nights the person had stayed in the last month (the logistic regression coefficient for this variable was 0.21, with a standard error of 0.03), whether the person contributed money or other help to the household (logistic regression coefficient of 2.70, with a standard error of 0.69), whether the person had other places where he or she stayed frequently (logistic regression coefficient of -2.37, with a standard error of 0.59), and whether the person considered himself or herself a member of the household (logistic regression coefficient of 6.68, with a standard error of 1.23).

Across all three versions of the questionnaire, people who spend the night at the dwelling more often, who had no other place they frequently stayed, who contributed money or other support to the household, and who considered themselves household members were more likely to be labelled as usually living at the sample dwelling than their counterparts who slept there less often, frequently stayed elsewhere, did not contribute money, or did not consider themselves household members. Table 4 shows the percentage of persons identified as usual residents by version and by each of the significant predictors in the logistic regression model. Note in particular the very high correlation for "considers self a member."

TABLE 4. Percentage of Persons Rostered Labelled Usual Residents, by Selected Characteristics

Variable	Values	% Usual Residents	n
	Total	83.8	1939
Version	Version 1	79.2	629
	Versions 2 and 3	78.6	1310
Contributes Money?	Yes	98.0	1008
	No	61.5	905
Considers Self a Member?	Yes	94.7	1605
	No	1.8	331
Stays Often at Other Places?	Yes	13.3	437
	No	97.8	1475
Nights Stayed in Last Month	6 nights or fewer	6.8	368
	7-29	79.2	109
	30 or more	99.5	1400

Note: Because of missing data, row entries sum to different totals.

4. Performance of the Roster Questions

This section evaluates the performance of the experimental roster questions in Versions 2 and 3. Table 5 examines the consistency between the household respondents' answers to the roster questions and their answers to the quantitative follow-up questions. A major purpose for this analysis is to determine if there are a substantial number of individuals who are added

to the initial roster by the later rostering questions. We are particularly interested in the people added by later roster items who should have been brought in earlier, (e.g. the household respondent mentions a person for the first time on the "eating" question, but later states that this person stayed at the unit 13 nights during the last month). We also discuss which roster questions are most effective for future roster research in terms of bringing in individuals who are retained on the final roster.

4.1 Examination of the On-diagonal and Off-diagonal Entries

In Table 5, the rows represent the roster questions and the columns represent the quantitative-follow-up questions. The questions in the first four columns correspond to those in the first four rows. See Section 2.2. The row questions appear in the first set of bullets, and the column questions appear in the second set of bullets.

Note that the first two roster questions (How many people stayed here last night? How many other people stayed here at least one night during the last month?) have been combined in the first row because they correspond to a positive number answer to the Column 1 question (How many nights did NAME stay here during the last month?). The questions listed in Rows 5 and 6 of the table do not correspond to any column question. Consequently, the questions in Section 2.2 have been reordered in the table to put these two questions last. Rows 7 and 8 are for records with roster-question numbers that are meaningless or missing, respectively.

Each individual is tabulated in the row corresponding to the question that brought him/her into the roster. The column corresponds to the first quantitative-information question for which the answer was a positive number or yes. For example, if the answers to the Column 1 and 2 questions were 0 and 5, respectively, for an individual, that individual would be tallied in Column 2, irrespective of their answers to the Column 3 and 4 questions. An individual is listed in Column 5 if the answers to the Column 1-4 questions were all either zero or no. The last column lists all individuals who could not be classified in a preceding

column due to missing information. For example, missing information on the number of nights in the household would make it impossible to place the record in a following column since it's unclear if the person actually spent any nights in the residence.

The top number in each cell is the number of people who met the criteria of that cell. The number below it in parenthesis is the number of people who both met the criteria and are considered usual residents by the respondent.

We first discuss here the top numbers in the cells formed by Rows 1-4 and Columns 1-5. When there is consistency between the roster question and the quantitative information, the entry falls on the diagonal. Inconsistencies fall off the diagonal. Column 5 entries are inconsistent and considered above the diagonal.

For example, if a person comes onto the roster with the member question (Row 3) then, for consistency, their first attachment to the household should be "Considered a Member" (Column 3).

Table 5. Roster Questions By Quantitative Follow-Up Questions

for Version 2 and Version 3

Roster Questions	Total	Quantitative Follow-Up Questions					
		Nights Stayed > 0	Days Ate > 0	Considered a Member	Considers Self Member	All Entries Zero or No	Problem with Blanks
Total	1314 (1030)	1134 (1013)	96 (1)	29 (3)	3 (1)	24 (0)	28 (12)
Stayed Last Night/Month	1051 (957)	1027 (946)	5 (1)	3 (1)	1 (1)	3 (0)	12 (8)
Ate This Week	127 (5)	32 (5)	68 (0)	4 (0)	0	13 (0)	10 (0)
Member Who May Be Away	28 (5)	9 (4)	7 (0)	10 (1)	1 (0)	1 (0)	0
Considers Self Member	1 (0)	0	0	1 (0)	0	0	0
Usually Stays But Away	11 (5)	3 (2)	0	3 (1)	1 (0)	1 (0)	3 (2)
Usually Eats, Not This Week	34 (1)	6 (1)	16 (0)	7 (0)	0	5 (0)	0
Other	8 (7)	8 (8)	0	0	0	0	0
Missing	54 (50)	49 (48)	0	1 (0)	0	1 (0)	3 (2)

Note: The top number in each cell is the number of people who met the criteria of that cell. The number below it in parenthesis is the number of people who met the criteria and are considered usual residents.

This is because the interviewer already asked the household respondent to list all the people who stayed in the house during the month, and list everyone else who ate in the house during the week. So, when we ask the quantitative questions, "How many nights did NAME stay here during the last month?" and "How many days did NAME eat here at least once during the last week?", we expect the answers to be zero. And we expect the answer to, "Do you consider NAME to be a member of this household?" to be yes.

Overall, 93 percent (1105/1185) of the entries are on the diagonal. The people rostered with the staying questions are 98 percent on the diagonal. The people rostered with the eating and member questions are 54 and 36 percent on the diagonal, respectively.

Few entries (31) fall above the diagonal. The phrasing of the roster questions is slightly different from the phrasing of the quantitative information questions, and may have prompted different answers from the respondent, resulting in some of the above-diagonal entries (and also some of the below-diagonal entries). For example, the roster question, "Is there anyone else who has eaten here at least once during the last week?" corresponds to the quantitative question, "How many days did NAME eat here at least once during the last week?"

Above the diagonal entries could also be the result of a household respondent who initially admitted the attachment of a person to the household by adding them to the roster and then minimized the attachment as the interview progressed into the quantitative questions. A possible example of this situation is the 13 people rostered with the eating question who did not fit any quantitative category (Row 2, Column 5). Ten of the 13 come from only two households. None of the 13 people are usual residents of the households in which they are listed, and 12 have another place where they frequently stay. The other attachments these people have to the household are minimal. Since the interviewing period included the Thanksgiving holiday for a few sample units, many of these people may have only been visiting for the holiday or were only dinner guests. As the interviewing progressed, the respondents in these households may have concluded that either further information was not wanted or should not be provided for these people.

There were 49 below-diagonal entries. Of these 49 people, 41 stayed at least one night in the residence. Thus, the eating and household membership questions may have reminded respondents, in some cases, of other people who had also stayed there. In other cases, these questions may have brought in people that the respondent purposely avoided mentioning when asked who stayed in the house. Then, as the roster-building questions focused on eating or household membership questions, they were willing to add other people to the roster. Later, the respondent admitted greater attachments by revealing quantitative information about people on the roster who they avoided in the early roster-building questions. Whether the respondent inadvertently or purposely did not initially list these people as staying in the house, this makes asking the later roster questions especially useful. That is, the additional experimental-roster questions served as probes, and were used both to roster people with the attachment stated in the question and to roster people who were missed by an earlier roster question(s), particularly the staying questions which should be most closely related to inclusion in the final household roster.

The roster questions in Rows 5 and 6, regarding staying and eating in the household, cannot be on the diagonal. This is because the quantitative questions regarding staying and eating in the household refer to the last month and week, respectively, while the roster questions refer to prior time periods. Because of the difference in reference period, the people rostered with these questions should have an answer of zero to the quantitative questions. Since not every entry was zero, some entries could be considered below the diagonal in the sense that they should have been added to the roster by an earlier roster question. Of the 45 people rostered with these questions, 25 can be considered below the diagonal. Nine of the 25 stayed one or more nights in the house.

4.2 Usual Residents

The key purpose in asking a set of questions to build an initial roster is to obtain as complete a final roster as possible. In this subsection, we consider the impact of each of the rostering questions on the final roster. For purposes of this discussion, a person is defined to be on the final roster if and only if the person is considered by the respondent to be a usual resident. The discussion on usual residents in this section focuses on the row-total cells in all eight rows of

Table 5, and the results are at least partially dependent on the order in which the rostering questions were asked.

Across all roster questions, 78 percent (1030/1314) of the people listed are usual residents. The roster questions about people who stayed last month at the dwelling (Row 1) or usually stay (Row 5) in the household bring in 93 percent (962/1030) of the usual residents. The roster questions about people who ate last week (Row 2) or usually eat (Row 6) in the household added only 1 percent (6/1030) of the usual residents, and the household membership questions (Rows 3 and 4) bring in fewer than 1 percent (5/1030).

Five percent (50/1030) of the usual residents cannot be tied to a specific roster question because of missing information (Row 8). Forty-eight of these 50 people stayed in the households every night of the month. The household respondents consider all of them members of the household (with one exception for whom that information is missing). All 50 have no other place where they frequently stay. Probably all 50 fit into the "Stayed Last Night/Month" category, a reallocation which would raise the percentage of usual residents who are in Rows 1 and 5, from 93 percent to 98 percent.

We also note that while 91 percent (962/1062) of the people rostered by the staying questions (Rows 1 and 5) were considered to be usual residents by the respondents, only 6 percent (11/190) rostered by the eating or membership questions (Rows 2, 3, 4, and 6) were considered usual residents. Furthermore, of the 11 usual residents in the latter group, 10 were listed as staying at least one night last month in the quantitative information section. Thus, respondents clearly equate usual residence with at least some period of staying in the residence.

4.3 Roster Questions that Worked and Didn't Work

This section addresses the question: which roster-questions work the best? The staying questions clearly worked. Of the 1051 people listed with these questions, 91 percent were usual residents, who account for as many as 98 percent of all usual residents listed. This is not to ignore that the

first question asked would probably list the majority of usual residents anyway or the possibility that another question asked first may have worked even better.

The eating questions, asked after the staying questions, rostered 161 extra people, but only 6 of these were usual residents. The member question, asked after the eating questions, rostered 28 extra people and 5 of these were usual residents. We expected the eating question to bring in more people overall than the member question because it's broader and it's asked sooner. The eating question didn't, however, bring in many usual residents. If we pursue the eating question further, we will probably ask about only those people who ate in the house more than two days. This approach may eliminate those people with very little attachment to the house, such as dinner guests.

The eating questions may improve coverage for another reason. These questions may capture those people who stayed some nights in the residence (Row 2, Column 1), but are not considered usual residents, though they have no other place where they frequently stay. When these conditions are met, we may want to roster them at this house because we wouldn't capture them in any other. Homeless people who spend some time with a relative are an example of this.

The roster question, "Is there anyone else who considers himself or herself a member of this household?" added only one person overall, and this person wasn't a usual resident. Most likely this roster question won't be used in follow-up studies.

5. Conclusions

Comparisons between questionnaire Version 2 and Version 1 showed about a 33% increase in average number of Black males per housing unit for Version 2 in the respondent-classified usual resident definitions of household belonging. This indicates considerable promise for improved coverage of Black males by permitting anonymity in survey interviews. There was no evidence, however, that the broader set of roster questions increased the average number of usual residents reported, though it did increase the total number of people reported with at least casual household

associations. Since Version 2 had the broad set of questions as well as the anonymity feature, we cannot be sure that anonymity by itself would achieve significant coverage gains.

There were a number of people in the sample who may have complex living arrangements. This is indicated by a substantial group who did not unequivocally belong to the unit nor obviously not belong. It is possible that many people of this type who were added through the broad set of roster questions met the criteria of our complex definition of belonging to the unit, but unfortunately we did not ask for sufficient information to classify them. For example, it may be that many of the people who frequently stay elsewhere spend more nights at this unit than at other units, but we could not ascertain if this was true. Or, perhaps people of this type have a usual residence elsewhere, and therefore don't belong to the household. Results from the Living Situation Survey may help determine whether there are a substantial number of people who meet this or other complex definitions of household belonging but are not considered usual residents by the household respondent. This research survey is now being conducted by Research Triangle Institute for the Census Bureau (Schwede, 1993).

Another finding in this paper is that answers to several questions are good predictors for usual resident: persons who contribute money, consider themselves a member, do not stay often at other places, and stayed many nights in the last month. Of the experimental roster questions we asked, the eating question seemed to be least effective - a fairly large number of people were added to the roster by this question, but very few of them appeared to really belong to the unit. If we ask this question in future research, it would only be with some threshold on the minimum number of days of eating in the residence.

We are planning additional testing for some type of anonymity in Census Bureau surveys. There are of course, difficulties when full name is not collected, especially in longitudinal surveys like Survey of Income and Program Participation which follows movers. We will have to weigh these difficulties against the potential gains of improved coverage. At this point, the potential is high. We would also like to conduct more testing of expanded roster questions. We will focus on

asking questions that can classify people with complex living arrangements under complex definitions of household belonging.

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