

# Comparative Ethnographic Evaluation of Enumeration Methods across Race/Ethnic Groups in the 2010 Census Nonresponse and Update Enumerate Operations

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## Abstract

Why do minority undercounts persist over censuses, despite efforts to reduce them? We use a 2010 Census ethnographic evaluation with a record check to identify possible differences among race/ethnic groups in factors affecting enumeration methods and inconsistencies across data sources. This controlled comparison evaluation was done in eight sites targeted to the major race/ethnic groups—American Indian, Alaska Native, Native Hawaiian/Other Pacific Islander, Asian, African American, non-Hispanic White, Hispanic, and a general site—in personal-visit 2010 Census Nonresponse Followup and Update Enumerate Operations. In the field sites, ethnographers observed and taped (when permitted) live census interviews, watched for cases of possible coverage error, and debriefed respondents to decide where to count persons. In the record check, we matched and compared rosters of ethnographer-observed housing units from 1) the observed standard interview and 2) the ethnographers' assessments to special 3) localized final 2010 Census unedited file datasets to identify inconsistencies across records in where to count persons. We present record check results and assess whether inconsistencies among rosters and characteristics of affected persons and households differ by race, Hispanic origin or household type. We identify qualitative themes crosscutting the ethnographic site reports as well as site-specific factors that contributed to inconsistencies. Some factors that affected enumeration methods and possibly coverage include: interviewer-respondent interactions, including question rewording; difficulty in gaining access to respondents; problems in canvassing and enumerating in rural areas without standard addresses; language issues, cultural variations, mobility, and the wider context. We also reference selected results from the "Behavior Coding of the 2010 Nonresponse (NRFU) Interview Report" (Childs and Jurgenson 2011) that was based primarily on analysis of audiotapes collected by the ethnographers in this evaluation. We suggest improvements for enumeration and coverage and new research.

**Key Words:** Census Coverage, Differential Undercount, 2010 Census, Nonresponse Followup, Update Enumerate, Ethnographic Studies

## 1. Introduction

The mission of the decennial census is to count everyone living in the United States once, only once, and in the right place. Counting everyone is important because census data are used to reapportion the House of Representatives, to redistrict, and to allocate more than \$400 billion in federal funds annually. Fulfilling this mission is daunting as the

country grows more diverse and complex. The decennial census is arguably the largest peacetime mobilization in the county.

However, the Census Bureau's own research has shown persistent differential counts by race and ethnicity. In 2010, despite continued efforts to reduce them, African Americans and Hispanics continued to be undercounted, while American Indians on reservations were undercounted in 2010, as they were in 1990, and non-Hispanic Whites were overcounted (U.S. Census Bureau 2012; Mule 2003; U.S. Census Bureau 2002 Table 1; National Research Council 2004). Prior decennial census ethnographic studies, conducted during census operations, but separate from the actual enumeration, identified a range of factors affecting coverage, but were limited in that they did not include systematic observations of live interviews in an actual census environment. (For a review of these studies, see Childs 2013.)

In 2010, we conducted a mixed-methods ethnographic evaluation to address this gap and to increase understanding of the types and sources of miscounts in the census. The goal of this evaluation was to explore types and sources of inconsistencies and possible census coverage errors and to identify the characteristics of households and persons affected by them through observation of live 2010 Census interviews. The overall evaluation was conducted in two 2010 Census operations as well as in one operation in the independent Census Coverage Measurement (CCM) Survey, which matches CCM households to census households and uses dual systems estimation to estimate coverage error in the census (Schwede and Terry 2013).

In this paper, we present findings from our partial validation record check of ethnographer-observed interviews in the 2010 Census and from our ethnographic studies in terms of where persons were or should have been counted.<sup>1</sup> We start with a description of our methodology, then present results on inconsistencies across four data sources from the record check of ethnographer-observed households. The record check study and data from the 2010 Census provide quantitative evidence of race/ethnic groups that are miscounted and suggestions of why. They qualitative insights from the ethnographers who actually observed the enumeration of these groups shed light on why some groups may be consistently undercounted and miscounted. We summarize crosscutting themes from the eight census sites from the ethnographer reports and interview summaries on reasons for inconsistencies. We identify types and sources of inconsistencies across records, the characteristics of persons and households that may be affected by them and how they may be related to race/ethnic groups and research sites. We offer recommendations for research to try to reduce miscounts in the 2020 Census.

## 2. Mixed Methods

This was a multi-stage, mixed-methods evaluation using qualitative methods as well as a partial validation record check followup.

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<sup>1</sup> Results from the CCM Survey are presented in Schwede and Terry, 2013 and Schwede, Terry, and Childs, 2012 and forthcoming.

## 2.1 The Ethnographic Component

The ethnographic component of this study involved sending ethnographers to accompany interviewers<sup>2</sup> and observe live 2010 Census interviews over nine consecutive days during the early to mid-operation periods. To our knowledge, this was the first census in which researchers were able to systematically observe live census interviews across multiple sites within the decennial census environment.

Our ethnographers observed in two personal-visit 2010 Census Operations. One ethnographer observed during the Update Enumerate (UE) Operation on an Indian reservation right around Census Day. In that operation, interviewers conducted personal visit or phone interviews with respondents at all households; mailout census forms were not used. Seven other ethnographers observed during the later, much larger Nonresponse Followup Operation (NRFU) in May, 2010 that was targeted to the approximately 26 percent of all households that did not return a form in the mail by the cutoff date.

The same paper questionnaire (“Enumerator Questionnaire”) and observation methods were used in these two census operations. The ethnographers accompanied different interviewers as much as possible. They observed and audiotaped interviews, listening for cues of possible coverage ambiguity and omissions. If they heard any, they conducted short, casual debriefings with respondents to try to resolve where each person should be counted. They were to observe interviews quietly and unobtrusively, to record what happened. Each was to try to get 35 completed interviews, at least half of them with the designated target race/ethnic group in his/her site. The ethnographers transcribed the observed interview tapes verbatim and specified where each person should be counted according to the 2010 Census residence rules (Lamas 2009). They wrote site reports that addressed our research questions and identified possible reasons for errors.

Table 1 shows the race and ethnic groups targeted for special attention and the corresponding research sites. These categories include the major race groups identified by the Office of Management and Budget (OMB) for inclusion in federal surveys (American Indian and Alaska Native are combined in the OMB categories but were studied separately in this research). They also include the Hispanic origin (OMB ethnicity) category and a general site not targeted to a specific group as a type of quasi-control site.

**Table 1:** Target Race/ethnic Groups and Sites

<i>Target Race/ethnic Group</i>	<i>Research Site Location</i>
African American	Chicago, Illinois
Asian	San Francisco Chinatown
Alaska Native	Kodiak Island, Alaska
American Indian	Southwest Reservation
Native Hawaiian/Other Pacific Islander	Hawaii County, Hawaii (Big Island)
Non-Hispanic White	Kansas City area, Missouri
Hispanic	Dallas/Fort Worth, Texas
Generalized	Broward County, Florida

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<sup>2</sup> Temporary census interviewers are called “interviewers.” In this article, we use the more generic term, “interviewer,” because the same behaviors may also be found among survey interviewers.

The eight sites shown in Table 1 were specially selected by our research team on the basis of providing: 1) enough CCM sample housing units for the later CCM observations; 2) a relatively high count of the target race/ethnic group for each race/ethnic site as recorded in Census 2000 ten years earlier (the only breakdowns available by Census Tract at the time of selection); 3) a relatively high hard-to-count score from Census 2000 data in the Census Bureau's Planning Database (Bruce, Robinson, and Devine 2012; Bates and Mulry 2011) to increase the probability the ethnographers would observe possible coverage errors; 4) an area for which regional field administrators approved our fieldwork; and 5) geographical dispersion of sites around the U.S.

The eight ethnographers accompanied 69 interviewers and observed 363 interviews. About two-thirds of these were audiotaped.

## **2.2 The Record Check Component**

After the ethnographers' data collection was complete, we conducted a partial validation record check, triangulating rosters and assessments of where to count each person across four sources of data for the observed census households. These include analysis of:

1. Data from the transcribed or summarized observed standard NRFU/UE interviews;
2. The ethnographers' assessments of where each person should be counted;
3. The final rosters from the census unedited dataset, pulled into local datasets consisting of our site blocks and two rings around them;
4. The coder/matcher team summary assessment of all sources to try to determine the correct location of where each person should be counted and to document who we did not find in all datasets.

## **3. Limitations**

We mention three imitations to our research on the 2010 Census Update Enumerate and Nonresponse Followup operations. First, the final proportions of all ethnographer-observed interviews in each site that were with persons from the designated target race/ethnic groups varied considerably, from 22 percent in the Alaska Native site to 92 percent in the American Indian site. The low proportion in most of the Alaska Native research site was because Alaska Natives constitute a hard-to-count minority and live dispersed in a mixed race community, rather than in a condensed ethnic enclave. They fall into the hard-to-sample and hard-to-find-and contact groups (Tourangeau 2013). The site results presented here are for ALL ethnographer-observed interviews in that site, and do not necessarily reflect results for the targeted race/ethnic group alone.

Second, the Enumerator Questionnaire (EQ) used in both the Update Enumerate and Nonresponse Followup Operations is limited in its usefulness for coverage studies. It records where most persons should be counted, but does not collect enough information to determine where persons who live or stay in more than one place should be counted and whether those persons identified in omission probes should be counted in the household or not. Those generic overcount and undercount questions are flags for potential future telephone followup in the Coverage Followup (CFU) Operation some months later. Due to these questionnaire limitations, we tabulate inconsistencies in where

persons should be counted during our census record check, rather than specify which we think might or might not be possible coverage errors.

Third, among our four datasets, each has its own limitations. We do not claim any one dataset as “Truth.”

## **4. Results**

### **4.1 Analysis Sample Record Check Results**

A total of 257 ethnographer-observed interviews in occupied housing units had sufficient verbatim interview transcription and/or detailed summaries and rosters to compare to the localized 2010 Census unedited dataset in our record check analysis. We refer to these 257 observed occupied housing units with 786 persons as our analysis sample to distinguish it from the overall ethnographic sample. Households with no population on Census Day were excluded, as were persons who moved in after Census Day who should have been counted at their April 1, 2010 (i.e., former) residences.

We found that 87 percent of persons were consistent across all four data sources in where they should be counted, indicating they were most likely correctly counted in the census. Conversely, 13 percent of persons were inconsistent across records; it is not clear if they were counted correctly or not. These persons were in 44 (17 percent) of the 257 occupied housing units.

To test for associations of inconsistencies with race/ethnic group, we conducted individual chi-square tests of independence. These compared the proportion of people in a race/ethnic group with record check inconsistencies with all other persons.

Both African Americans and American Indians were significantly more likely to have record check inconsistencies than the overall sample. We note that there is nothing inherent in being in either of these racial groups and in being miscounted. The African American and American Indian sites were also significantly more likely to have inconsistencies than other sites.

Housing units with inconsistencies tended to be larger and the households were more complex, but the results were not significant at the  $p = .05$  level.

Team members coded up to three sources of record check inconsistency per person. As shown in Table 2, seven sources of inconsistency were identified by the coder/matchers. The most frequently mentioned source of inconsistencies in the observed operations was interviewer error, which mentioned in 29 percent of the cases. This included question rewording, reordering, omission and other errors by interviewers.

Mobility/tenuousness was the second highest source mentioned, at 12 percent. This covered persons with unstable living situations, such as college students, people cycling from place to place for work, children under shared custody, and persons with tenuous attachments to households.

Respondent concealment/refusal accounted for nine percent of the mentions. In this category were respondents who refused to answer questions or otherwise indicated they were being untruthful when answering coverage-related questions.

**Table 2:** Frequencies of Sources of Inconsistency (multiple answers)

<i>Source of Record Check Inconsistency</i>	<i>Number</i>	<i>Percent</i>
Interviewer Error	47	29.2
Mobility/Tenuousness	20	12.4
Respondent Concealment/Refusal	15	9.3
Address Missed during the Census	15	9.3
Not in Census – Unknown Reason	13	8.1
Respondent Confusion	8	5.0
Language Barrier	3	1.9
Other	40	24.8
Total	161	100

The “address missed during the census” category was also identified as a source of inconsistency in nine percent of the mentions. This referred to the inability of the coders to find an official address or adequate description of the ethnographer-observed housing unit in the census dataset for the observed housing unit. This occurred primarily in the American Indian site. It may also have happened if there were multiple housing structures on the property and one or more of them may not have been listed separately.

Respondent confusion was coded as a source of inconsistency in five percent of the cases. Respondents provided inconsistent responses or were observed answering a different question from the one that was asked. Language barriers were mentioned a few times when the fact that the interviewer did not speak the respondent’s language resulted in an inconsistency and/or possible coverage error. Finally, a variety of factors were included in the “Other” category. This includes such sources of possible error as incomplete interviews, unknowledgeable proxies, and duplicate records due to multiple census operations. In a number of these cases, the persons were included in the final localized unedited census dataset who were not identified during the ethnographer-observed interviews. We have no data from our evaluation to determine whether those persons were correctly counted at the observed housing unit during a different 2010 Census operation.

#### **4.2 Cross-cutting Issues Affecting Enumeration across Sites (Ethnographic)**

We identified six cross-cutting themes across the ethnographers’ reports and cases. These include: 1) interviewer error, 2) access to respondents, 3) language issues, 4) cultural issues, 5) mobility, especially around Census Day, and 6) the wider context.

##### *4.2.1 Interviewer Error, including Question Rewording*

Frequent major interviewer rewording and omission of key coverage questions was an enumeration factor mentioned by all ethnographers. It was a factor in record check inconsistencies in the African American, non-Hispanic White, Native Hawaiian/Other Pacific Islander, Alaska Native, and General sites. The Childs-Jurgenson behavior coding evaluation (2011), which used our ethnographer tapes as 95 percent of their cases, showed that overall, questions were read exactly or with only slight changes just 37 percent of the time.

Some rewording is situational, in trying to secure interviews with reluctant, resistant or impatient respondents. In situations where a respondent did not speak English well or a person was hard of hearing, interviewers sometimes simplified questions as much as possible, sometimes changing the meaning. Other interviewers reworded the questionnaire to make it more conversational to avoid breakoffs, not understanding that even subtle changes in wording may change the meaning. And there was a small number of interviewers who reworded questions to finish interviews faster, to complete more interviews per day. In a census, there is pressure on interviewers to meet quotas on completed interviews and quantity is a major marker of success; some appear to be taking short-cuts.

#### *4.2.2 Access to Respondents*

Difficulty in gaining access to respondents was seen in different forms in urban and rural areas. In the urban African American and Asian sites, it took the form of locked buildings with buzzer systems that restricted entry and some persons who refused to open doors. In the Chinatown site, some lived in single-room only units, called *san fong*, with vague building numbers and unit numbers, and complex living situations.

In the American Indian, Native Hawaiian, and the Alaska Native sites, difficulty in access was due to the lack of street names and numbers and the use of descriptive phrases only, like “white trailer with grey trim” or “near telephone pole 8.” On the American Indian reservation and in the Hawaiian site, census maps for remote areas sometimes lacked landforms and any identifying characteristics; it was hard to locate and verify scattered housing units, and later describe their locations for any followup operations. These factors affected respondents’ descriptions of alternate addresses for themselves and other mobile persons in the household and some inconsistencies appeared to be due to this factor.

#### *4.2.3 Language Issues*

The language issue was cited a few times in our record check study. But language barriers also prevented other interviews from even starting when interviewers could not speak the respondents’ languages. This was documented in the Native Hawaiian/Other Pacific Islander, Hispanic, and Asian sites. In the Asian site, language barriers were observed when an interviewer who spoke only Mandarin encountered a Cantonese-only speaker (Lee Tu, forthcoming). In these cases, the interviewers had to call the census office to either have a bilingual interviewer accompany them on a later visit or have the case reassigned, requiring another, later visit. In Asian sites with Chinese, then, it should be determined whether both Cantonese and Mandarin speaking interviewers are needed.

#### *4.2.4 Cultural Issues*

While efforts were made to have local interviewers conduct interviews, sometimes interviewers were not sensitive to cultural customs of other groups. In the Native Hawaiian and Chinese sites, some interviewers were impatient and somewhat overbearing, violating norms of politeness and respect. In other cases such as on the Indian reservation, ceremonies were being held which meant that enumeration had to be halted.

#### *4.2.5 Mobility, especially around April 1, 2010*

On the topic of mobility, the ethnographers described many variations of moves. A number of these were permanent moves from one residence to another. There were some

cases of persons moving on or right around April 1 who appeared to be at higher risk of being counted more than once, at the wrong place, or missed.

Another type of mobility situation was that in which one or more persons in the household lived elsewhere most of the time for work. This included some in the Alaska site who were away for long periods in the Coast Guard or the Merchant marines and those who worked on the North Slope oil fields seasonally and came home every four to six weeks for a week or two and then went back. It was not so clear where these should be counted (Bunten, forthcoming).

We had a number of cases across the sites of children cycling among two or more relatives' homes and respondents found it very hard to answer questions about where the children stayed most of the time and where they were on April 1. Some were cycling for college or for work, while others were tenuously attached.<sup>3</sup>

#### *4.2.6 Wider Context*

The wider context was important as well. The 2010 Census was conducted during the economic crisis, with high levels of unemployment, foreclosures and abandonment posing challenges to enumeration. Another factor was that just before the NRFU operation started, a very strong anti-immigration law was debated and passed in Arizona and new anti-immigrant actions were taken in some Texas communities. The new law provoked heightened tensions around the country, particularly in our Hispanic site in the Dallas/Fort Worth area (Garcia forthcoming). Also, census boycotts by the Native Hawaiian Sovereignty movement in the Native Hawaiian site (McMillen-Wolfe, forthcoming) and Arabs and other Middle Easterners protesting the lack of a specific race category for them may have affected participation.

### **4.3 Site-specific Factors Associated with Inconsistencies (Ethnographic)**

The qualitative data from actual inconsistent cases within each ethnographic site illustrate the sources of inconsistency identified in the statistical analysis and also raise issues for consideration. In the Alaska Native site, mobility for long-distance work on land and sea in the Coast guard, Merchant Marines, and on the North Slope oil field raised issues of potential overlap in housing unit and group quarters operations. Other factors in inconsistencies and possible miscounting included multiple types of interviewer error, local and inter-state cycling among households, and a man's attempts to avoid the 2010 Census.

In the American Indian site, vague descriptive addresses given due to the lack of street names and addresses contributing to inconsistencies and possible coverage errors were linked to 2010 Census maps for remote areas. These maps had few or no features, land forms, or topographic details and were not uniform in scale. Inconsistency was also linked to mobility and a local interviewer who knew the respondent's family appeared to miss the significance of the respondent's statement that one child was living elsewhere with her father to attend school. That child was included on the roster as a member of the observed housing unit but should have instead been listed on the father's roster elsewhere.

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<sup>3</sup> For an extended discussion of types of mobility that were identified as part of the Living Situation Survey, see Bates and Gerber (1998).



In the Native Hawaiian site, the same issues of lack of street names and addresses were linked with 2010 Census maps that were difficult to follow. In addition, at least one “hidden household” (not identified in the census) on a large rural property was discovered and enumerated in the field, but appeared not to have been included in the localized dataset. Question rewording that dropped reference to April 1, 2010 was also an important factor, as was a respondent’s interpretation of the question as being about who was included in his family, rather than who lived or stayed there on Census Day.

The Asian site demonstrated the issue of vague addresses and inconsistencies in a very different setting: urban multi-unit buildings. Here, irregular housing arrangements were found with two unrelated families sharing one housing unit but not functioning as a social household. Conversely, one family used three contiguous single-room-only rooms as one housing unit. These cases raise the factor of mismatches between respondent conceptions of who “belongs” in their “households” and residences and the 2010 Census definitions of the “household” as all who share one physical housing unit on Census Day, whether related or not. Other factors in inconsistencies included language and spelling barriers, and bilocality (Lee Tu, forthcoming). This site also demonstrated the range of Chinese languages and dialects and the critical need for bilingual interviewers from the local community to do on-the-fly translations when standardized translated Enumerator Questionnaire forms are not available.

The same need for bilingual interviewers to do on-the-fly translations due to a lack of a Spanish version of the form was an important factor in the Hispanic site. Question rewording and household complexity were two other factors associated with inconsistencies. A fourth factor was respondents who were not knowledgeable (proxy respondents) or who provided inaccurate or incomplete data to comply with the interview but also offered resistance for other reasons. A high initial refusal rate in this site also suggested concerns about confidentiality and fears of deportation for some during the highly charged debate about strong anti-immigration laws at that time (Garcia forthcoming).

As in the Hispanic site, respondent concealment and distrust of the government were found in some inconsistent cases in the African American site. Other major factors in inconsistencies were major question rewording by interviewers, mobility, and some housing units and persons that appeared to be missed in “Smith/Jones” type situations: situations in which completely different sets of persons were found for the same housing unit in the ethnographer-observed households in NRFU or UE than were identified in the final census dataset. Two of these cases appeared to be separate basement housing units that were enumerated in the field but appeared not to have been in the localized final 2010 Census unedited dataset, raising the suggestion of possible issues in processing more than one form for the same physical address that may have more than one housing unit. In some of the inconsistencies found in this study that were linked to major interviewer error, the persons were still counted in the final 2010 Census dataset, despite the lack of adequate substantiation in the interviews themselves. As stated earlier, inconsistencies in this analysis do not necessarily imply possible coverage error in the 2010 Census.

In the non-Hispanic White site, a “Smith/Jones” situation of completely different households recorded by the ethnographers and in the 2010 Census post-processed localized dataset raises questions about the quality and accuracy of proxy reporting. During a blitz enumeration in a low-income housing project, the ethnographer reported

that one man who answered the door and claimed he was just visiting the housing unit complied with the interviewer's request to do the interview but provided incomplete and likely inaccurate information about two males living with several children of indeterminate ages (Albee forthcoming). The final census dataset showed a completely different household—a single mother and her four children—which seemed to be a more likely configuration. The ethnographer said that the results of the interview with the non-resident male were not accepted because proxy respondents were not permitted in first interviews.

In the General site, the important issue identified was interviewer failure to follow up with in-movers to make sure they were included in the 2010 Census at their prior April 1, 2010 places (Blumberg 2011). Cultural insensitivity appeared to be a factor in one housing unit in which it was not clear whether some persons were residents or just visitors.

#### **4. Implications and Recommendations**

In this research, we found inconsistencies across four data sources in the 2010 Census for 13 percent of persons in our analysis sample of ethnographer-observed housing units in the Update Enumerate and Nonresponse Followup operations. They were found in 44 (17 percent) of the 257 occupied housing units with enough data for the comparisons. Due to the limitations of the Enumerator Questionnaire in not definitively ascertaining where all persons should be counted, we cannot determine how many of those in the ethnographer-observed housing units with inconsistencies were correctly counted and how many had possible coverage errors.

We offer four general sets of recommendations that may improve enumeration and coverage in the 2020 Census. These recommendations are in the areas of: 1) reducing interviewer errors and increasing cultural awareness of interviewers; 2) improving access to hard-to-find and hard-to-reach respondents; 3) reducing language barriers to data collection among those whose first language is not English and who have little or no fluency in English; and 4) designing and conducting more research on the interaction of mobility and coverage and on the linkages among household structure, race/ethnicity, and coverage.

The first general category of recommendations centers on reducing interviewer errors and increasing cultural awareness of interviewers. We offer six specific suggestions under this first general category.

The first and second suggestions on reducing interviewer error and improving cultural awareness are to develop new training modules. One module would explain how questions are developed and tested and why it is important for interviewers to read questions as worded. The second would focus on providing cultural awareness and sensitivity training appropriate for the race/ethnic groups in the local census office field area.

The third suggestion would be to incorporate role playing of difficult interviews into training, such as where a respondent is resistant or impatient, or does not speak English well. Case studies from this evaluation could be used to develop role-playing situations.

The fourth suggestion is to review an incentive structure that emphasizes quantity of completed interviews/per day or per trip somewhat more than quality. A few of the most “productive” interviewers specially selected by the local field staff for our researchers to accompany appeared to be deliberately cutting corners and shortening interviews to get more interviews completed, sometimes leading to possible coverage problems.

The fifth suggestion is to do more analysis of the dynamic reactions of the interviewer to respondent behavior over the course of the interview, as demonstrated in a presentation on the Census Coverage Measurement component of this evaluation (Sando 2012, 2013, Terry, Schwede....2013). This is a promising line of research that can supplement and go beyond behavior coding. We suggest more research in this area.

The sixth suggestion to reduce interviewer errors and issues with cultural awareness and sensitivity is to monitor interviewers more frequently as they conduct interviews. This could be done in two ways. Crew leaders could more frequently observe interviewers conducting live interviews. A newer option may be the use of CARI (computer audio recorded interviewing) to record random interviews for later monitoring. Interviewers might be more careful to read questions as worded if they knew that some of their completed interviews might be reviewed at a later time and that the way they conducted the interviews could affect their jobs.

We turn now to the second of our four general recommendations: to improve access to hard-to-find and hard-to-reach respondents. We suggest improving maps to include more features, such as topographic changes and land forms. We also suggest the possibility of renting four-wheel drive vehicles to cover remote areas when interviewers do not have personal access to these types of vehicles. We also suggest giving interviewers Bureau-supplied smart phones, rather than having them use their own phones and possibly incurring large bills.

The third general recommendation concerns language barriers that make some foreign language speakers hard to interview. We recommend translating materials into more languages and trying to hire more bilingual interviewers. We suggest exploring the use of ACASI (audio-computer-assisted self-interviewing) with foreign language scripts so that those not speaking English well might take the device and listen and respond to the interview in their own language. If this works, it could reduce the number of bilingual interviewers needed.

The fourth general recommendation is to suggest the need for more research. We suggest more research on the interaction of mobility and possible coverage error. We also suggest more research on the interactions of race/ethnicity and coverage over time. We know from past research that minorities are at higher risk of coverage error and their growth rates are higher than those of non-Hispanic Whites (Humes, Jones, and Ramirez 2011) and population projections indicate that this will culminate in a majority-minority U.S. population sometime in the early 2040s (U.S. Census Bureau 2013). These trends suggest that coverage error could increase over time and become more costly to mitigate at the same time that the Census Bureau is trying to reduce the costs of conducting the census. It would be well to find cost-effective means to address the issue of persistent differential miscounts of some groups.

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