Improving Survey Response in Spanish-speaking Households

James Dayton[1*], Michael W. Link[2], Robert Pels[1], and Kirsten Ivie[1]
[1] ORC-Macro International, [2] Centers for Disease Control and Prevention
*James.J.Dayton@orcmacro.com, 126 College Street, Burlington, VT 05401, 802-863-8974

Abstract
Growth of the Hispanic population in the United States, particularly among new immigrants, is requiring survey researchers to rethink how they encourage survey participation among those in potentially Spanish-speaking households. Typically, calls for telephone surveys are first made by English-speaking (only) interviewers, with subsequent calls made by bilingual interviewers if the households are thought to be Spanish speaking. We hypothesized that participation rates among Spanish speakers could be significantly increased if a bilingual interviewer made both the initial and subsequent attempts to these households. In 2005, a pilot was conducted in Arizona and Texas as part of the Behavioral Risk Factor Surveillance System (BRFSS), a random-digit–dialed survey. Sampled telephone numbers in exchanges where 50% or more of the population is Hispanic or that were matched to a Hispanic surname were randomly assigned to be called (1) using routine protocols with an English speaker making the initial calls or (2) using bilingual interviewers exclusively to make the contacts. We found that preassignment of likely Spanish-speaking households to bilingual interviewers significantly improved survey participation, particularly among those with lower levels of education and income. The approach worked best when Hispanic surnames were used to target households. The bilingual approach was, however, somewhat more costly in terms of interviewer labor than was the routine protocol.

Background

The U.S. Hispanic population has grown more than 3.5% per year since the 2000 Census, compared with less than one half of one percent for non-Hispanics (Pew Hispanic Center 2005). Since 1990, the U.S. Hispanic population has increased more than 80%, from fewer than 23 million to more than 40 million. In addition, a large part of this growth (44%) is the result of immigration from countries where Spanish is the dominant language. Most of these immigrants are generally young and in their prime child-bearing years, skewing the average age of this group lower than the U.S. average. Additionally, while making up 13% of the current U.S. labor force, Hispanics are expected to constitute more than 50% of labor market growth between now and 2020. Many of these new workers will likely be less educated and have less experience than other workers; as a result, they will be more likely to have low-skill/low-paying jobs with few or no health care benefits. These differences, in addition to many others, underscore the need for survey researchers to make every reasonable effort to ensure Hispanics, particularly those who speak only Spanish, are not underrepresented in behavioral research.

Spanish remains the dominant language among Hispanics, largely because of the influx of recent immigrants (Ramirez and Cruz 2003). Research has shown that the attitudes of Hispanics who speak Spanish (only) differ significantly from those of bilingual and English-speaking Hispanics (Pew Hispanic Center 2005). From a survey researcher perspective, ensuring adequate representation of Spanish-speaking sample members among Hispanic respondents in general is critical.

Continued growth of the Hispanic population in the United States, particularly newly immigrated groups, is requiring survey researchers to rethink how they encourage survey participation among those in potentially Spanish-speaking households. The initial calls for telephone surveys conducted in Spanish are usually made by English-speaking (only) interviewers. If the selected household member cannot complete the interview in English, subsequent attempts are made by a Spanish-speaking bilingual interviewer. Unfortunately, re-establishing contact after the first attempt, even with a bilingual interviewer, may be challenging if household members are difficult to reach or if they screen out subsequent call attempts. For this reason, we hypothesized that participation rates among Spanish-speaking sample members could be significantly improved if bilingual interviewers were used to make both the initial and subsequent attempts to these households. This would eliminate the need to break and later re-establish contact with the household. Moreover, beginning the interview, including the initial introduction, in Spanish could put Spanish speakers more at ease and willing to complete the interview.

Methods

In 2005, a pilot was initiated as part of the Behavioral Risk Factor Surveillance System (BRFSS). As one of the world's largest random-digit–dialed (RDD) health surveys, the BRFSS collects standardized, state-specific data on preventive health practices and risk behaviors linked to morbidity and mortality among adults. Further details on survey design, methodology, and the questionnaire are available elsewhere (Mokdad, Stroup, and Giles 2003) and at http://www.cdc.gov/brfss. The pilot was conducted in Texas and Arizona from May through December of 2005. These states were selected because of their high prevalence of Hispanics, specifically new immigrants. Also, both states use the same data collection agency, ORC Macro, to conduct their BRFSS surveys, thereby making the logistics of the pilot much easier.

Telephone numbers were drawn according to standard BRFSS RDD sampling protocols. The sampled records were then matched to identify numbers that were either (1) in exchanges where 50% or more of the population was thought to be Hispanic based on Census estimates or (2) listed under a Hispanic surname. If either condition was met, the telephone number was flagged as a potentially Spanish-speaking household.

This subset of potentially Spanish-speaking households was randomly assigned to either a treatment or a control group. The treatment group was interviewed exclusively by Spanish/English bilingual interviewers, while the control group was assigned to the general interviewer pool. Contacting and interviewing for the treatment group was initiated in Spanish. If the respondent did not speak Spanish or preferred to conduct the interview in English, the interviewer switched immediately to English. Those in the control group were contacted in English, which is the normal protocol for BRFSS. If the respondent spoke only Spanish, or preferred Spanish, the number was called back by a bilingual interviewer. Interviewers followed standard BRFSS calling protocols—such as number of attempts, refusal conversion, and call scheduling— for each group.

Sample and survey data, including language of survey, were maintained for each state's records—regardless of whether an interview was actually conducted. After the close of pilot data collection, a dataset was prepared containing all Texas and Arizona records sampled from May through December 2005. Variables such as those used to determine pilot eligibility (e.g., surname match or more than 50% Hispanic in the telephone exchange), along with treatment/control group assignment, were included in the cumulative dataset for analysis.

Results are presented for all cases as well as for three subgroups: cases only on the Hispanic surname list; cases only in exchanges with high concentrations of Hispanics; and cases meeting both of these criteria. Comparing treatment and control cases, we assessed which, if any, was the optimal method for identifying Spanish-speaking households and ultimately, for generating the best response rate from Spanish speakers. Participation rates were calculated using standard definitions recommended by the American Association for Public Opinion Research (AAPOR), including contact rate #2, cooperation rate #2, refusal rate #2, and response rate #4 (AAPOR 2004). Two-way contingency tables were used to compare demographic characteristics and survey estimates across the four analysis groups. Finally, we estimated the costs of conducting such targeted interviewing, using interviewers' hourly wages (but not incorporating accessory costs such as benefits, company overhead, or other general and administrative fees). Analysis was largely performed using SPSS version 13, with Complex Samples Module (SPSS, 2004).

Results

A total of 63,480 records were drawn across the two states from May through December. Overall, 25.7% were eligible for the pilot based on a surname match or an exchange having more than 50% Hispanics. This eligibility proportion differed slightly by state: 23.9% for Arizona and 26.7% for Texas. Approximately half from each state's eligible pool were selected for the treatment group, where interviews commenced in Spanish.

Of the 16,340 numbers eligible for the pilot, most (69.1%) were in an exchange where 50% or more of the households were thought to be Hispanic, but the number was not matched to a Hispanic surname; 17.9% of the cases had both a Hispanic surname match and were in an area with a high concentration of Hispanics; and, 13.0% were eligible based upon having a Hispanic surname alone.

The following sections contrast the treatment and control groups in terms of (1) participation rates (2) selected survey estimates, including respondent demographics, prevalence estimates for key health conditions and risk behaviors, and missing data, and (3) effort and costs associated with interviews.

Participation Rates

All participation rates, including cooperation, contact, and response, were higher when bilingual interviewers worked the cases from the outset. Statistical differences were noted between the treatment and control groups in terms of cooperation rates (73.0% versus 66.8%) and response rates (41.4% versus 36.4%) for the portion of the sample that had a Spanish surname (Table 1). In other words, when residents with a Spanish surname received an initial call in Spanish, they responded more favorably than when called in English first. Final refusal rates also tended to be higher in the bilingual group; however, these differences were not statistically different.

Respondent Demographics

Significantly more interviews were conducted in Spanish when the interviewer started the interview in Spanish (Table 2). The differences were highest among the surname-match-only group (55.1% versus 40.4%); however, the differences were statistically significant across all four analysis groups.

Regarding other demographic characteristics, the treatment group yielded significantly more people with a lower household income, fewer people with college education, and more single adult households. There were no significant differences with regard to age, sex, or the number of children in the household between routine protocol and bilingual groups.

Comparison of Health and Risk Indicators

The treatment and control groups were compared for 15 health conditions and risk behaviors, including asthma, diabetes, high blood pressure, obesity, angina, and arthritis or joint pain; having had a stroke or heart attack; having health care coverage; getting cholesterol tests and influenza shots; smoking and binge drinking; being limited in daily life activities; and ever being tested for HIV or engaging in activities linked to the spread of HIV. Statistically significant differences between the control and treatment groups were found for 5 of the 15 questions examined when all cases were included in the analysis. Respondents who were called by bilingual interviewers at the outset were more likely to be obese (29.4% versus 25.4%, $p < .05$), but less likely to report:

- Having health care coverage (64.1% versus 68.1%; $p < .05$);
- Having cholesterol checked (58.7% versus 64.3%, $p < .01$);
- Having joint pain (29.2% versus 34.1%, $p < .05$); and,
- Being a current smoker (14.7% versus 18.1%, $p < .05$).

Item Missing Data

Regarding the level of missing data, we hypothesized that the treatment group might have fewer instances of missing data. We thought comprehension might be improved when the survey was initiated and subsequently completed in a language that was compatible with the respondent, rather than started in English and "forcing" the respondent to complete in a language that may not be the primary one spoken at home. Upon analysis, however, there were no statistically significant differences in the amount of missing data, with the exception of the HIV risk-related behavior question. Fewer respondents from the treatment group had data missing in this section (0.9% versus 2.0%, $p < .05$).

Level of Effort

The level of effort necessary to conduct telephone interviews can be quantified in many ways, including interviewer time, the amount of sample needed to accomplish the interviewing goal, or the financial cost to implement the project.

On average, the bilingual group required 1.49 hours per interview, compared with 1.14 hours for the controls. This represents just over a 30% increase in interviewer time when calling targeted records with a bilingual interviewer. The greater time required is largely because interviews are conducted in Spanish more often in this group and the Spanish-language interviews typically took longer to conduct than did those conducted in English.

Although the treatment group required more interviewer hours, sample was used more efficiently than in the control group. On average, one completed interview required 7.38 records for the treatment group and 7.75 records for the control group. Although the difference is not statistically significant, it could potentially be important in terms of survey operations. Additional sample consumes more interviewer time and is more costly. Sample efficiency rates are used to determine future sample needs and when they increase—even by a fraction—costs can quickly escalate when ordering large batches of sample records.

The final assessment of effort is the monetary cost to use bilingual interviewers with targeted sample. Since bilingual interviewers were used exclusively for the treatment-group interviews, the interviewer-related costs were higher because they were paid more. Bilingual interviewers were used in the control

group as well, but only after a household was determined to be non-English speaking. As a result, both treatment and control groups cost more on a per-interview basis than the overall statewide interviews. The actual cost of interviewing in both states—that is, calling all records including the pilot-eligible records—was $9.03 per interview. Only interviewer wages were considered in this cost, and it does not include sample purchases, telephone charges, benefits, overhead, or other administrative fees. When isolating the control group, costs rose to $10.75 per interview. The treatment group was the most expensive, at $15.02 per interview.

The overall interviewing cost cited above ($9.03 per interview) reflects the fact that half of the eligible sample was called in Spanish first (treatment), and the other half was called in English first (control). Remember, most of the sample was not eligible for the pilot, which reduces the overall cost. To better understand how much it would cost to fully implement the treatment, we calculated costs for two scenarios: 1) all eligible records were called in Spanish first, and 2) all eligible records were called in English first (the BRFSS standard). This allows us to compare the cost of the treatment against the current practice of interviewing all records in English initially.

If we were to call all records with a Hispanic surname or an exchange in a Hispanic-dense area in Spanish initially, 485.2 (14.1%) more interviewer hours would be expended. However, this targeted approach would also yield 58 (1.5%) more interviews overall because of better sample efficiency in the treatment group. Given the increased interviewer hours and relative wages of bilingual interviewers, the cost per interview is elevated when the treatment is applied to all eligible records (Table 4). Overall, the cost per interview for both states would have been 15.3% higher if the treatment had been applied to all eligible records. When looking at each state separately, the per-interview cost would be higher, but the difference would not be the same for both states. In Arizona, the bilingual approach would have cost 12% more than the standard BRFSS approach, and in Texas, the increase would have been 17.5%.

Discussion

As the percentage of Hispanics continues to increase in the United States, it is critical that survey researchers identify and test more effective means of ensuring adequate representation of this group—particularly those who speak only Spanish—in surveys. The approach tested here of identifying likely Spanish-speaking households at the sampling stage, preassigning those cases to bilingual interviewers, and starting the contacting and interviewing process in Spanish appears to be effective for this purpose. This approach significantly improved response rates among this subgroup, increasing the percentage of Spanish speakers among the respondents. Moreover, it was effective in reaching those with lower levels of education and with lower family incomes, groups often under-represented in RDD telephone surveys. These respondents also differed significantly from those in the control group on 5 of the 15 health conditions and risk factors examined. Nonresponse bias is a product of the level of nonresponse and differences between respondents and nonrespondents on measures of importance in a survey. It would appear that the preassignment of cases helped to reduce both the level of nonresponse and differences between respondents and nonrespondents in terms of survey measures. In this respect, the approach seems likely to reduce potential nonresponse bias among this important subset of respondents.

The approach was most effective among the subgroup of respondents identified through Hispanic surname listings. This makes sense because there is a much higher likelihood that a listed telephone number matched to a Hispanic surname will (1) reach a household (as opposed to a business or unassigned number) and (2) reach people likely to speak Spanish (be they bilingual or Spanish speaking only). In contrast, telephone numbers identified through estimates of the percentage of Hispanics within an exchange are more likely to contain a mix of Spanish-speaking and non-Spanish-speaking households, as well as other potential non-household telephone numbers. An optimal approach, however, needs to contain a mix of telephone numbers from both sources. Households with listed telephone numbers vary significantly from unlisted households in terms of demographic characteristics and survey responses (Link and Mokdad 2005). If cases are identified only through the Hispanic surname list, there is a chance that the approach could actually increase bias in the survey estimates among Hispanics by increasing response among a particular subset of the Hispanic community. Including cases based on the estimated percentage of Hispanics in an area would allow for the inclusion of unlisted telephone numbers along with the listed. Based on the results presented here, however, it would appear that 50% may not be an effective cut-point for inclusion. Subsequent retesting of the approach using a combination of Hispanic surname match along with cases from exchanges with a higher cut-point may optimize this approach.

This pilot had some limitations. It was conducted in just two states, so the results may not be replicated in other states with high concentrations of Hispanics. It is also not clear how this pilot would perform in areas where there is a substantial Hispanic population that is not composed primarily of new immigrants, who tend to speak Spanish at home. Next, the pilot was conducted with only Spanish speakers in mind. As such, the results may differ if a similar approach were used to reach sample members in other languages or cultures. Furthermore, the telephone may not be the best way to target other linguistically or culturally isolated groups in an RDD survey, particularly those that occur infrequently in the general population. Finally, while the purpose of the pilot was to increase response, we cannot forget the importance of cellular phones in this growing population. Cell phones were ineligible for BRFSS interviewing during the pilot. There is some evidence to suggest that cell phones—including cell-phone-only households—are more prevalent among Hispanics (Blumberg et al., 2006) than non-Hispanics. Although these may not represent the majority of Hispanic households, cell phones may have some impact on the ability to increase response in these isolated groups.

Reduction of nonresponse bias is often considered by researchers only at the global or overall survey level. Less often is nonresponse bias examined at the subgroup level. With the growing percentage of Spanish-speaking peoples in the United States and the corresponding decline in overall response rates in surveys, the onus is on researchers to examine nonresponse bias at the subgroup level and identify effective means of addressing this problem. The procedure detailed here is one such approach—an approach that appears to be effective for reaching an increasingly important and growing subgroup in the United States.

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Table 1. Participation rates by surname match and percent Hispanic in county, by type of interviewer assigned

Participation rate	Either surname or county > 50% Hispanic		Surname match		County > 50% Hispanic		Both surname and county > 50% Hispanic	
	Control %	Treatment %	Control %	Treatment %	Control %	Treatment %	Control %	Treatment %
Disposition (all sampled cases):								
--- Percent interviewed	12.4	13.1	20.4	23.4**	11.7	11.9	23.0	25.1
--- Percent Known eligibility, non-interview	12.2	11.9	21.3	19.4	11.0	11.1	21.9	20.5
--- Percent Unknown eligibility	19.0	19.1	25.6	24.3	17.8	18.1	24.7	23.3
--- Percent Ineligible	56.4	55.9	32.7	32.9	59.5	58.9	30.3	31.0
Contact rate (AAPOR #2)	57.8	58.2	54.4	56.7	58.8	58.5	56.3	58.0
Refusal rate (AAPOR #2)	12.3	14.0	11.5	13.6	12.2	14.0	11.1	13.7
Cooperation rate (AAPOR #2)	70.6	72.8	66.8	73.0**	72.2	72.7	68.5	72.8
Response rate (AAPOR #4)	40.8	42.4	36.4	41.4**	42.4	42.5	38.5	42.2

Significance: †= p < .10 * = p < .05, ** = p < .01, *** = p < .001

Table 2. Demographic characteristics by surname match and percent Hispanic, by interviewer assigned

	Either surname or county > 50% Hispanic		Surname match		County > 50% Hispanic		Both surname and county > 50% Hispanic	
Characteristic	Routine %	Bilingual %	Routine %	Bilingual %	Routine %	Bilingual %	Routine %	Bilingual %
Questionnaire language:								
Spanish	30.8	43.2***	40.4	55.1***	30.9	41.6***	45.7	58.7***
English	69.2	56.8***	59.6	44.9***	69.1	58.4***	54.3	41.3***
Ethnicity:								
Hispanic	69.5	74.0***	89.0	92.5*	68.1	70.5	95.8	95.6
Non-Hispanic	30.5	26.0***	11.0	7.5*	31.9	29.5	4.2	4.4
Sex:								
Male	37.7	36.6	40.0	36.4	37.1	36.7	39.5	36.3
Female	62.3	63.4	60.0	63.6	62.9	63.3	60.5	63.7
Age:								
18-34	25.4	27.5	28.3	30.0	24.5	25.7	27.6	27.1
35-49	32.7	31.2	33.4	35.2	32.0	28.8	32.0	31.9
50-64	22.3	23.1	23.8	21.0	22.4	25.2	24.9	24.7
65+	19.6	18.1	14.5	13.8	21.1	20.4	15.4	16.3
Education:								
< High school	30.0	31.5	36.1	38.4	29.5	29.9	38.1	38.6
High school	27.7	30.7	28.1	33.9*	27.7	29.5	28.3	33.2
College	42.2	37.8*	35.7	27.7**	42.8	40.6	33.6	28.2
Income:								
<$25,000	47.1	52.4*	53.6	59.9*	48.1	51.8	59.2	63.1
<$25,000-$49,999	31.2	26.4*	30.7	25.1*	29.8	26.7	27.1	24.8
$50,000+	21.7	21.1	15.7	15.0	22.1	21.5	13.7	12.1
Adults in household:								
One	30.5	37.0**	26.8	34.4**	31.1	38.0**	26.1	35.0*
Two	51.8	44.3***	53.0	44.0**	51.3	44.6**	52.5	44.5*
Three or more	17.7	18.7	20.2	21.6	17.6	17.5	21.4	20.5
Children in household:								
None	51.6	50.1	44.7	41.6	52.6	53.7	43.6	44.7
One or more	48.4	49.9	55.3	58.4	47.4	46.3	56.4	55.3
(n)	(1,012)	(1,070)	(515)	(588)	(834)	(848)	(337)	(366)

Significance: * = p < .05, ** = p < .01, *** = p < .001

Table 3. Expected costs and interview outcomes with and without the targeted sample, by state

Group	Interviewer Hours - Expected	Total Cost	# of Interviews - Expected	Cost per Interview
Both states:				
Routine only	3927.2	$36,335.04	3817	$9.52
Bilingual only	3442.0	$31,050.07	3759	$8.26
Arizona:				
Routine only	1475.5	$13,596.05	1515	$8.97
Bilingual only	1303.3	$11,757.45	1467	$8.01
Texas:				
Routine only	2452.7	$22,748.87	2302	$9.88
Bilingual only	2137.9	$19,285.84	2292	$8.41