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Using a Spanish Surname Match to Improve Identification of Hispanic Women in Medicare Administrative Data

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Objective. To assess the effectiveness of a Spanish surname match for improving the identification of Hispanic women in Medicare administrative data in which Hispanics are historically underrepresented.

Data Sources. We collected self-identified race/ethnicity data ($N = 2{,}997$) from a mailed survey sent to elderly Medicare beneficiaries who resided in 11 geographic areas consisting of eight metropolitan counties and three nonmetropolitan areas (171 counties) in the fall of 2004. The 1990 Census Spanish Surname list was used to identify Hispanics in the Medicare data. In addition, we used data published on the U.S. Census Bureau website to obtain estimates of elderly Hispanics.

Study Design. We used self-identified race/ethnicity as the gold standard to examine the agreement with Medicare race code alone, and with Medicare race code+Spanish surname match. Additionally, we estimated the proportions of Hispanic women and men, in each of the 11 geographic areas in our survey, using the Medicare race code alone and the Medicare race code+Spanish surname match, and compared those estimates with estimates derived from U.S. Census 2000 data.

Principal Findings. The Spanish surname match dramatically increased the accuracy of the Medicare race code for identifying both Hispanic and white women, producing improvements comparable with those seen for men.

Conclusions. We recommend the addition of a proxy race code in the Medicare data using the Spanish surname match to improve the accuracy of racial/ethnic representation.

Key Words. Women, minorities, Medicare race code, Spanish surname, sensitivity and specificity

As the largest health provider in the United States, the Centers for Medicare and Medicaid Services (CMS) maintains Medicare administrative/claims data that have been used extensively by researchers and federal/state governments

for assessing equity among Medicare beneficiaries (Eggers and Prihoda 1982; Gornick et al. 1996; Eggers and Greenberg 2000; Schneider, Zaslavsky, and Epstein 2004; Jha et al. 2005; Trivedi et al. 2005). However, prior works have documented that Hispanics are substantially underrepresented in Medicare data (Arday et al. 2000; Morgan, Wei, and Virnig 2004; Waldo 2004). In brief, the underrepresentation stemmed from the fact that the race code contained in the Medicare Enrollment Database is obtained from the Social Security Administration Master Beneficiary Record (SSA-MBR), which is collected from the SSA application form (SS-5) (Lauderdale and Goldberg 1996). Before 1980, the SS-5 form had only three race options: white, black, and other. In 1980, the race options were expanded to six: white, black, Hispanic, Asian/Asian American/Pacific Islander, North American Indian/Alaskan Native, and unknown. However, the SSA-MBR has continued to assign individuals into white, black, and other, with Hispanics and nonwhite/nonblack individuals (e.g., Asians) being forced into one of these three categories. Detailed descriptions on the SSA race codes are provided elsewhere (Lauderdale and Goldberg 1996; Arday et al. 2000). The Medicare race code has been reported to identify less than 40 percent of Hispanic Medicare beneficiaries (Arday et al. 2000).

Historically, the U.S. Bureau of the Census has used Spanish surnames to identify Hispanic population when self-identification is not attainable. The Spanish surname list was first constructed in 1950 using Hispanic surnames found in Arizona, California, Colorado, New Mexico, and Texas (Perkins 1993). Later, Passel and Word used the 1980 Decennial Census and the 1977 Federal Income Tax Returns to develop the Passel–Word Spanish surname list (i.e., the 1980 Census list of Spanish Surnames) (Perkins 1993). Word and Perkins then did additional refinement of the list by linking ethnicity and names directly using the 1990 Spanish Origin Research (SOR) data (Perkins 1993; Word and Perkins 1996). The SOR provided 1,868,781 householder (i.e., males or never married females) records that contain both surname and Hispanic origin. Based on the proportion of householders who are Hispanic,

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they classified distinct surnames into one of six classifications: heavily Hispanic (i.e., >75 percent of householders with a surname in this classification are Hispanics), generally Hispanic (50–75 percent), moderately Hispanic (25–50 percent), occasionally Hispanic (5–25 percent), rarely Hispanic (<5 percent), and indeterminate. This is referred to as the 1990 Census Spanish Surname list.

An earlier study by Howard et al. (1983) used the 1980 Census list of Spanish Surnames and the Generally Useful Ethnic Search System (GUESS) to compare the surname-based identification with Hispanic self-identification obtained from a 1980 mailed survey examining the prevalence of respiratory diseases in Albuquerque, New Mexico. Their study found sensitivities of 85 and 87 percent from male respondents for the census list and GUESS methods, respectively, and slightly lower sensitivities of 79 and 82 percent from female respondents. A more recent publication reported the results of two studies assessing the accuracy of surname matching using the 1990 Census Spanish Surname list for identifying elderly Hispanic males in both regional and national Medicare data (Morgan, Wei, and Virnig 2004). Comparing with self-identified race/ethnicity collected from 1,530 male veterans aged 65 or older, the Spanish surname match augmented Medicare race code substantially improved the identification of Hispanic males. Sensitivity increased from 43 to 87 percent, while the overall κ statistic improved from 0.54 (95 percent CI: 0.46–0.62) to 0.86 (0.82–0.91). Corresponding improvements were seen among whites, where specificity improved from 61 to 87 percent and the overall κ improved from 0.69 (0.64–0.75) to 0.87 (0.83–0.90). Additionally, using surname augmented Medicare race code brought the estimated proportions of elderly Hispanic males in 16 counties from California, Colorado, Florida, Illinois, New York, and Texas (Spring 2002) into close correspondence with the county-level proportions shown in the U.S. Census 2000. The mean difference ($\pm$ standard deviation) in proportion of Hispanics was reduced to 0.7 percent ($\pm$2.0 percent) from a difference of 11.0 percent ($\pm$9.8 percent) obtained when the Medicare race code alone was used. In parallel, the estimates of whites improved from an average difference of 9.3 percent ($\pm$9.1 percent) to 0.9 percent ($\pm$2.1 percent).

This prior work was limited by its exclusive focus on male Medicare beneficiaries. Other investigators have reported that a Spanish surname match appears to work better among men and never-married women, who typically retain their parental surname, than among women who have been married and who may have adopted their husband's surname (Howard et al. 1983; Perkins 1993). However, most of the reported differences in accuracy between

men and women have been restricted to the geographic locations of the studies. For example, differences in sensitivity for men and women range from small (0.99 versus 0.95) in San Antonio, TX (Hazuda et al. 1986) to sizeable (0.88 versus 0.70) in the San Francisco Bay Area (Perez-Stable et al. 1995). Thus, further work is necessary to determine to what extent a Spanish surname match would improve the identification of Hispanic women in Medicare data. In this paper, we report the results of a study using a combination of survey data, Medicare administrative files, and data from the U.S. Census 2000, to compare the effectiveness of a Spanish surname match among elderly women and men in geographically diverse metropolitan and nonmetropolitan areas.

METHODS

We examined the agreement of race/ethnicity from self-identification, with Medicare race code alone (Medicare race), and with Medicare race code+ Spanish surname match (Medicare race+surname). We used data from a National Institute on Aging funded mailed survey conducted in the fall of 2004, "Medicare+Choice and Minority Elderly" (R01/AG019284-01A2), which was approved by the Baylor College of Medicine Institutional Review Board.

The survey included two mailings of questionnaires that asked about health status and race/ethnicity. A $2 incentive was included with the first mailing. Survey recipients were a stratified random sample of 5,697 white, black, and Hispanic community-residing Medicare beneficiaries, aged 65 or older. We drew 65 percent of our sample from eight metropolitan counties in six states including Arizona, California, Florida, Illinois, New York, and Texas (Table 1). In addition, we identified three geographic areas (Arizona/California/Nevada, Florida, and Louisiana/Texas) and drew the remainder of our sample (35 percent) from the 171 nonmetropolitan counties in these three areas. Men and women were equally represented. The objectives of the parent study focused on comparisons of enrollment in Medicare managed care plans (i.e., Medicare+Choice) across three racial/ethnic groups (white, black, Hispanic). Thus, our sampling areas were selected because they had both a significant presence of whites, blacks, and Hispanics, and available Medicare managed care plans.

We conducted a Spanish surname match, using the 1990 Spanish Surname list, on all elderly Medicare beneficiaries in the 179 counties in our survey areas before drawing our race/ethnicity-specific sample. Specifically, we matched the 12,215 "heavily Hispanic" surnames identified on that list to

Table 1: Number of Persons Aged 65 or Older in U.S. Census 2000 and in Medicare 2004 by Sex

		No. Elderly Men		*No. Elderly Women*	
State	*Statistical Areas*	*Census 2000*	*Medicare 2004*	*Census 2000*	*Medicare 2004*
	Metropolitan counties				
Arizona (AZ)	Maricopa	151,306	140,111	200,141	186,049
California (CA)	Los Angeles	323,854	372,393	464,423	511,413
Florida (FL)	Hillsborough	49,487	47,725	68,329	65,358
Illinois (IL)	Cook	238,372	220,972	367,051	332,268
New York (NY)	Bronx	47,949	43,562	84,226	76,289
	Kings	100,073	95,260	166,175	154,816
	Queens	95,394	95,487	154,566	150,257
Texas (TX)	Harris	98,426	102,445	142,248	142,850
	Nonmetropolitan counties				
Arizona/California/Nevada (AZ/CA/NV)	9 AZ, 21 CA, and 12 NV counties	105,411	106,738	119,499	120,876
Florida (FL)	25 FL counties	87,173	73,680	99,815	85,047
Louisiana/Texas (LA/TX)	22 LA and 82 TX counties	172,203	163,897	175,845	219,774

the surnames in our study datasets obtained from the CMS. Individuals coded as Hispanic by the original Medicare race code or individuals matched to one of the 12,215 "heavily Hispanic" surnames were identified as Hispanic by our combined Medicare race code+surname match. Individuals who had a matching Hispanic surname but who were coded either as Asian or as North American Native by the original Medicare race code were not reclassified as Hispanic because these individuals were considered highly likely to be of Filipino or American Indian ancestry (Perez-Stable et al. 1995); therefore, these individuals were excluded from our sampling dataset. Members of our Hispanic sample received questionnaires in both English and Spanish.

Our survey questionnaire adapted the combined format of race/ethnicity question set forth by the U.S. Office of Management and Budget (1997). Specifically, we asked "Which of the following best describes you?" and allowed respondents to choose from "White," "African American or Black," "Hispanic, Spanish or Latino," "American Indian or Alaska Native," "Asian, Asian American or Pacific Islander," and "Other." If the respondents chose the "Other" category, they could write in a preferred identification. If the respondents chose the "Asian, Asian American, or Pacific Islander" category, we also asked the respondents a follow-up question "Are you Filipino?" which allowed a dichotomous answer of "Yes" or "No." The overall response rate

was 52.6 percent (2,997 of 5,697) with 52.0 percent among men and 53.3 percent among women.

Using these survey data, we compared respondents' race/ethnicity self-identification with their race in the Medicare race code alone, and in the Medicare race+surname code. We computed the sensitivity, specificity, positive predictive value, negative predictive value, and κ statistics for whites, blacks, and Hispanics.

Further, we estimated the overall proportion of Hispanics among elderly men or women in each of the 11 geographic areas in our study using both the Medicare race and Medicare race+surname codes. We then compared these two sets of estimates with Census 2000-based estimates of Hispanics, ages ≥ 65 years, in each of the 11 geographic areas (Table 1). The Census data came from table P12H (sex by age—Hispanic or Latino) published on the Census Bureau website which used the Census 2000 Summary File 1 (SF-1) 100 percent data.

RESULTS

Table 2 presents the racial/ethnic distribution of the survey respondents. Approximately equal numbers of additional men and women were identified as Hispanic based on surname but not by the original Medicare race code (353 and 349, respectively). The Medicare race code originally classified a majority of these beneficiaries as white (318 or 90 percent in men and 328 or 94 percent in women). Ninety-five percent of men self-identifying as white were labeled as white by the Medicare race code (i.e., sensitivity; Table 2). Similarly, of men self-identifying as black, 99.5 percent were labeled as black by the Medicare race code. Conversely, among those men identifying themselves as Hispanic, only 31.2 percent had a Hispanic race code in the Medicare data. Augmenting the Medicare race code with the surname match did not alter the agreement in blacks (99.3 percent who self-identified as black were considered black by Medicare race+surname). In contrast, the addition of surname resulted in a large increase in agreement in Hispanics (97.7 percent of those self-identified as Hispanic were classified as Hispanic by Medicare race+surname compared to 31.2 percent by Medicare race alone). The agreement between self-identification and surname match for men identifying themselves as white decreased slightly to 86.4 percent. A strikingly similar pattern was seen for women: adding a surname match improved agreement from 34.1 to 95.2 percent for women self-identifying as Hispanic. Agreement for women who

Table 2: Comparison of Medicare Race Code and Spanish Surname Match to Self-Identification among Survey Respondents by Sex

	*Medicare Only**				*Medicare+Surname Match*		
	White (n = 813)	*Black (n = 467)*	*Hispanic (n = 154)*	*Other (n = 32)*	*White (n = 495)*	*Black (n = 464)*	*Hispanic (n = 507)*
Self-Identification							
Men (N = 1,466)							
White (n = 559)	531	12	14	2	483	12	64
Black (n = 431)	2	429	0	0	2	428	1
Hispanic (n = 442)	274	7	138	23	5	5	432
American Indian (n = 13)	1	11	1	0	0	11	2
Asian (Filipino), (n = 21[15])	5 (5)	8 (3)	1	7 (7)	5 (5)	8 (3)	8 (7)
Sensitivity	0.950	0.995	0.312	NA	0.864	0.993	0.977
Specificity	0.689	0.963	0.984	NA	0.987	0.965	0.927
Positive predictive value	0.653	0.919	0.896	NA	0.976	0.922	0.852
Negative predictive value	0.957	0.998	0.768	NA	0.922	0.997	0.990
κ	0.59 (0.55–0.63)	0.94 (0.92–0.96)	0.36 (0.31–0.41)	NA	0.87 (0.84–0.90)	0.94 (0.92–0.96)	0.87 (0.84–0.90)
	*Medicare Only**				*Medicare+ Surname Match*		
	White (n = 788)	*Black (n = 483)*	*Hispanic (n = 153)*	*Other (n = 17)*	*White (n = 460)*	*Black (n = 479)*	*Hispanic (n = 502)*
Self-Identification							
Women (N = 1,441)							
White (n = 551)	531	12	7	1	449	12	90
Black (n = 448)	1	445	2	0	1	443	4
Hispanic (n = 419)	251	13	143	12	9	11	399
American Indian (n = 10)	2	7	1	0	0	7	3
Asian (Filipino), (n = 13[7])	3 (2)	6 (1)	0	4 (4)	1 (1)	6 (1)	6 (5)
Sensitivity	0.964	0.993	0.341	NA	0.815	0.989	0.952
Specificity	0.711	0.962	0.990	NA	0.988	0.964	0.899
Positive predictive value	0.674	0.921	0.935	NA	0.976	0.925	0.795
Negative predictive value	0.969	0.997	0.786	NA	0.896	0.995	0.979
κ	0.62 (0.59–0.66)	0.94 (0.92–0.95)	0.41 (0.36–0.46)	NA	0.83 (0.80–0.86)	0.93 (0.92–0.95)	0.80 (0.77–0.84)

*Medicare beneficiaries coded as Asian or North American Native by the original Medicare race code were not included in the survey sample.

self-identified as black shifted slightly from 99.3 to 98.9 percent, and declined from 96.4 to 81.5 percent for women self-identifying as white. Likewise, the sensitivity of the Medicare race+surname was greatly improved regardless of whether the women self-identifying as Hispanic are married/widowed or not (from 33.5 to 94.7 percent and from 35.9 to 97.4 percent, respectively), while the specificities stayed about 90 percent or higher.

We found similar improvement in the sensitivity of the Medicare race+surname across levels of income and education. Among respondents reporting $\leq$\$20,000 versus those reporting >\$20,000 annual family income, the sensitivity improved from 38.8 to 95.7 percent and from 16.9 to 95.5 percent, respectively, for women and from 34.8 to 97.8 percent and from 23.7 to 98.0 percent, respectively, for men. All specificities remained $\geq$88 percent. Similarly, among respondents with less than a high school education versus those with a high school education or greater, the sensitivity improved from 42.6 to 98.1 percent and from 21.1 to 91.1 percent, respectively, for women and from 37.3 to 99.6 percent and from 23.0 to 95.8 percent, respectively, for men. All specificities were $\geq$90 percent.

Although our survey respondents were not asked directly of their preferred language, we found a consistent pattern of improved sensitivities in using the Medicare race+surname among both men and women who self-identifying as Hispanic. For example, among all English language respondents (N= 2,603), the sensitivity improved from 32.1 to 92.6 percent for women and from 28.0 to 96.6 percent for men, with specificities $\geq$90 percent. Among all Spanish language respondents (N= 304), the sensitivity improved from 37.8 to 100.0 percent for women and from 37.9 to 100.0 percent for men. Only eight men (5 percent) and three women (2 percent) Spanish language respondents self-identified as non-Hispanic.

Sixty-four men and 90 women respondents who were classified by the surname match as Hispanics subsequently self-identified as whites. We compared these "false positives" with the 432 men and 399 women respondents who were classified as Hispanic by both self-identification and the surname match (i.e., "true positives"). Among our false-positive Hispanics, 87.5 percent of men and 96.7 percent of women chose to respond using the English language questionnaire compared to 66.4 percent men and 62.9 percent women in the true-positive Hispanic group ($p \leq .001$ for both men and women). The false-positive Hispanic group also reported higher education (high school or greater: 65.6 versus 44.1 percent among men and 75 versus 44.4 percent among women, $p \leq .002$ for both men and women) and higher income (>\$20,000 annual income: 63.8 versus 36.3 percent among

men and 50.6 versus 22.9 percent among women, $p \leq .0001$ for both men and women).

Finally, 57 respondents (2 percent) self-identified as having a race/ethnicity other than white, black, or Hispanic. All of these respondents had been coded as white, black, Hispanic, other, or unknown by the original Medicare race code. Of these, 23 self-identified as American Indian or Alaskan Native and 34 self-identified as Asian, Asian American, or Pacific Islander (22 as Filipino). Twelve of the 22 self-identified Filipinos (55 percent) matched to the Spanish surname list. These 57 respondents were included in our analyses as race/ethnicity misidentifications.

Compared with the 2000 Census, the original Medicare race code underestimated elderly Hispanic population by two- to threefold for both men and women (Figures 1 and 2). In contrast, the Medicare race+surname estimates closely approximated the Census 2000-derived estimates. For example, in Los Angeles the Medicare race+surname code identified 24.3 percent Hispanic men and 23.7 percent Hispanic women compared to Census 2000 estimates of 23.1 and 24.2 percent, respectively. The Medicare race code alone yielded estimates of 8.8 and 9.8 percent, respectively. Similar increases in agreement between Medicare and Census-derived estimates were observed for all geographic or metropolitan and nonmetropolitan areas included in our study.

Figure 1: Estimated Percentages of Elderly Hispanic Men

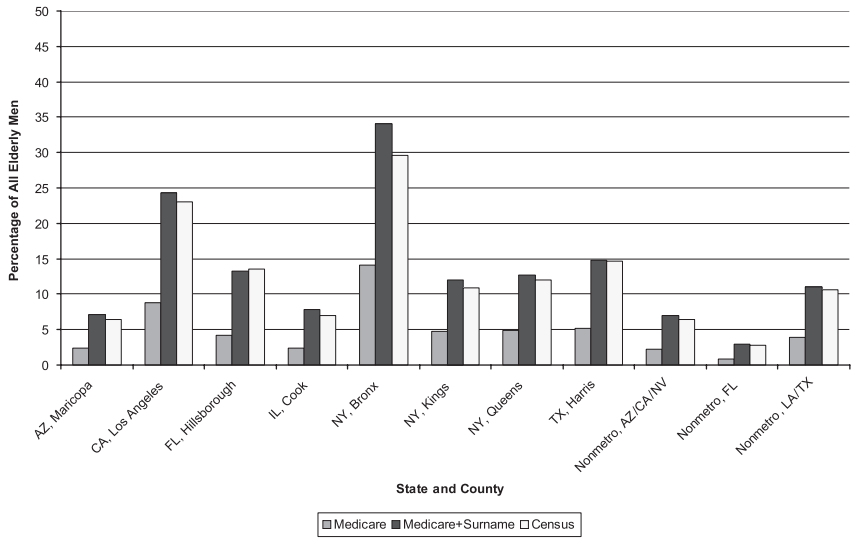
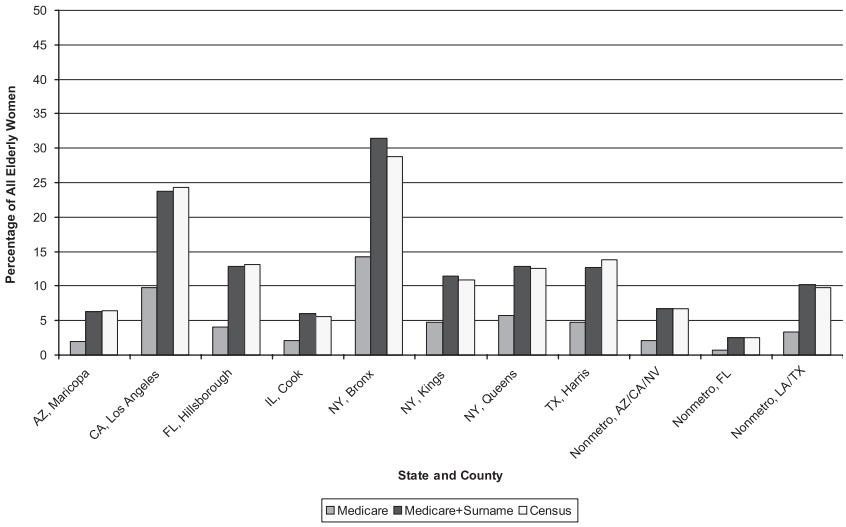


Figure 2: Estimated Percentages of Elderly Hispanic Women



DISCUSSION

This national study of both metropolitan and nonmetropolitan areas confirms prior works showing that the use of a Spanish surname match improves the accuracy of Medicare race code in identifying elderly Hispanic men (Howard et al. 1983; Hazuda et al. 1986; Perkins 1993; Perez-Stable et al. 1995; Word and Perkins 1996; Morgan, Wei, and Virnig 2004). More importantly, our finding clearly demonstrates the effectiveness of a Spanish surname match for identifying Hispanic women regardless of marital status, education, income, or language. We illustrate increased accuracy in two ways: first, we directly compared self-identification with Medicare race code alone and with Medicare race code+Spanish surname match; second, we show geographic-level estimates of population distribution that closely approximate those obtained from the 2000 census. Although the sensitivity for whites and the specificity for Hispanics decline somewhat for both men and women, they remain quite high; and in both cases the overall accuracy, as indicated by the κ statistics, improves dramatically. The accuracy for the augmented race code for blacks remains virtually unchanged for both men and women.

Ideally, race and Hispanic ethnicity information should be represented by separate variables, consistent with current federal policy. The traditional

Medicare race code is limited by not separating race (e.g., white, black) with ethnicity (i.e., Hispanic). Although our Spanish surname match procedure will allow us to identify white and black Medicare beneficiaries who are likely to be Hispanic, we have no mechanism for identifying the racial identification (e.g., white, black) of Medicare beneficiaries who are already identified as Hispanic by the Medicare race code. Thus, for the purpose of these analyses, we have focused on improving the accuracy of the single Medicare race variable.

While black and white differences in health care access, use, and outcomes are well documented, Hispanics remain understudied. Largely this is due to an overwhelming inability to identify Hispanic elders (Eggers and Greenberg 2000). As we and others document, less than 40 percent of Hispanic elders are identified as Hispanic by the current Medicare race code. This underidentification raises concerns that the individuals Medicare identifies as Hispanic might be different from Hispanics not identified by the Medicare race code (Waldo 2004). With a surname indicator, concerns about bias and underrepresentation would be largely ameliorated. It is possible and feasible for CMS to provide Spanish surname augmented race information to researchers without requiring direct release of beneficiary names. If CMS were to add a Spanish surname indicator to the current Medicare denominator file, or if they were to make such an indicator available for researchers who wish to study Hispanic elders, then researchers would benefit from the precision afforded by the surname indicator without needing the actual names of the Medicare beneficiaries. Further, the improved identification of Hispanics will benefit health policy makers, as well as quality improvement, clinical, and administrative leaders within health care organizations who are working on addressing disparities in their own organizations.

Our study, like all studies, has weaknesses that must be acknowledged. First, we do not have information about our survey nonrespondents. Second, our survey included areas of the United States that had black, Hispanic, and white populations, and had Medicare managed care plans available. It is possible that these areas are different than areas without substantial black and Hispanic populations or with no managed care. Perkins (1993) suggests that a Spanish surname match is less efficient in areas with low concentrations of Hispanics. However, in this study we found consistent improvement of accuracy in identifying Hispanics using the combined Medicare race code and Spanish surname indicator across areas that vary widely in the concentration of Hispanics for both men and women (Figures 1 and 2), as also shown previously among men (Morgan, Wei, and Virnig 2004). Nevertheless, it is undetermined if our results can be generalized to areas outside of our sampling

frame, particularly those areas with extremely low concentrations of Hispanics.

One additional limitation pertains to the broader issue of race and ethnicity classification in the United States. While the identification of Medicare beneficiaries as "Hispanic" or "non-Hispanic" is of importance to policy makers and other health care leaders in the United States, these terms may be confusing for new immigrants, particularly those coming from countries with different combinations of race and ethnicity, when they are asked to respond to questions about their race and ethnicity. Further, Hispanics often choose to identify with a country of personal or ancestral origin rather than the general classification of "Hispanic." For example, in our studies, when Hispanics have chosen a response of "other" for their race/ethnicity, it has not been unusual for them to write in a designation such as "Venezuelan" or "white Cuban American" (Morgan, Wei, and Virnig 2004).

In conclusion, we show consistent patterns in the performance of a combined Medicare race code and Spanish surname indicator for identifying elderly Medicare beneficiaries who are Hispanic. We recommend that CMS seriously consider providing such an indicator for researchers wishing to examine racial/ethnic disparity among black, Hispanic, and white elders.

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