

Do Ethnicity and Language Have Implications for Utility Service Delivery in Los Angeles?¹

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ABSTRACT

The interrelationship among race/ethnicity, language, income, and indicators of life quality in the United States is well documented. This is particularly the case for health outcomes, but the intersection of health and energy makes this an important topic for investigations into energy equity.

This paper reports on results of two studies examining the effects of race/ethnicity or language spoken at home on energy-related knowledge and attitudes and, in one study, program benefits, of residential customers. The first study assessed the comfort and health effects of income-qualified incentives for room air conditioners among respondents who reported speaking English or Spanish at home. Results indicate that the two groups got comparable benefits from program participation and that those who speak Spanish at home are well represented in the program population.

The second study assessed program awareness and energy-efficiency-related beliefs, attitudes, and perceived barriers, between survey respondents who identified as white only versus Hispanic/Latino and between Hispanic/Latino respondents who reported English versus Spanish at home. This study found several differences related to ethnicity, pointing to areas where more tailored program development and outreach may be beneficial. It also found that respondents who speak Spanish at home had much lower awareness of energy efficiency programs than those who speak English at home, despite having similar beliefs, attitudes, and perceived barriers, pointing to a need for greater Spanish-language and, perhaps, culturally specific, outreach for this group. Providing such assistance may help achieve energy-savings goals, improve energy equity, and have valuable health impacts.

Introduction

The interrelationship among race, income, and health outcomes in the United States is well documented. White Americans on average have higher incomes and greater wealth than people of color (Bhutta, Chang, Dettling, and Hsu 2020; Semega 2020; Kuhn 2018; Pew 2016). In addition to affecting current and generational wealth, this income disparity also effects health outcomes. Research has displayed disparities between White non-Hispanics and Hispanic and Latino Americans when it comes to healthcare quality (AHRQ 2020), access to health insurance (Berchick 2018), and a variety of morbidity concerns, such as heart disease, obesity, and diabetes (CDC fact sheet).

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Among Hispanic/Latino Americans, disparities in health outcomes relative to Whites appear to be exacerbated by low English proficiency. Nguyen and Reardon (2013) found that lower English proficiency was associated with lower health-related quality of life among Latino Americans. DuBard and Gizlice (2008) found Spanish-language preference to be associated with worse health status and less access to health care among Hispanics, concluding that “Spanish-language preference marks a particularly vulnerable subpopulation of US Hispanics....” More generally, Foiles Sifuentes et al. (2020) found limited English proficiency to be associated with a decreased likelihood of having health insurance, private insurance supplement to Medicare, or a usual care provider. Similarly, Jacobson, Hund, and Soto Mas (2016) found English proficiency to be the strongest predictor of health literacy among Hispanic immigrants.

Other differences beyond access to health care may contribute to the health disparities associated with English language proficiency. Salinas et al. (2014) found lower English proficiency related to lower physical activity, exercise self-efficacy, exercise social support, and perception of environmental support among Mexican-origin women living in the United States.

Greater English proficiency is associated with higher earnings among Hispanic/Latino immigrants (Cortina 2007; Sandford 2002; Bellante and Kogut 1998; McManus, Gould, and Welch 1983) as well as among other immigrant groups (Zhen 2013), which may help explain the relationship between English language proficiency and health.

One way in which income inequity, including that related to race and ethnicity, can result in health inequities is via disparities in home air quality. Inadequate home ventilation, air sealing, and duct sealing, as well as old or poorly maintained home heating equipment, all can create bad indoor air quality by increased infiltration of outdoor air, mold/mildew growth, or even unsafe gas levels (U.S. Environmental Protection Agency 2024; Holden, Lee, Hawcutt, and Sinha 2023; Tran, Park, and Lee, 2020). All of these conditions are more prevalent in lower-income homes than higher-income homes (National Center for Healthy Housing. 2022; Krieger and Higgins 2002). Adding to this is the fact that low-income customers are more likely than others to suffer poor health outcomes from homes that are too cold in winter or too hot in summer because adequately heating and cooling their living spaces takes a larger share of their income (Drehobl, Ross, and Ayala 2020; Tong, Ramaswami, Xu, Feiock, Schmitz, and Ohlsen 2021).

Many, if not most, energy utilities and other program administrators have developed programs to help low-income customers address the conditions identified above. Specifically, many programs provide low- or no-cost air and duct sealing, furnace tune-ups, installation of new heating and cooling equipment, as well as energy bill reduction or other forms of payment assistance. The impact of such efforts is a function of the degree to which they can reach low-income customers. While many such programs have been successful (e.g., Khursheed 2022), low awareness or other barriers may continue to prevent low-income customers from participating in them.

This paper reports on results of two studies examining the effects of race/ethnicity or language spoken at home on energy-related knowledge and attitudes and, in one study, program benefits, of residential customers. The first assessed the comfort and health effects of income-qualified incentives for room air conditioners among respondents who reported speaking English or Spanish at home. The second assessed awareness of and attitudes toward energy efficiency among residential general population survey respondents who identified as White-Not Hispanic/Latino or Hispanic/Latino and, among the latter, between those who reported speaking English or Spanish at home. We recognize that language spoken at home does not necessarily denote language preference or proficiency. According to U.S. Census data, 40% of Los Angeles

County residents who speak Spanish at home speak English less than “very well,” meaning that 60% speak it very well.² However, absent a more direct indicator of English proficiency, language spoken at home is at least an indirect, if imperfect, indicator of some level of difference in English proficiency.

Study 1: Program Awareness and Reported Benefits of Room Air Conditioners by Language Spoken at Home

Methods

ADM conducted an online survey of 380 Los Angeles Department of Water and Power (LADWP) customers who used enhanced incentives, available to income-qualified customers, to buy energy efficient room air conditioners. LADWP offered the enhanced incentives to help these customers better manage the impacts of extreme heat caused by climate change.

ADM implemented the survey in two rounds. The first round included all 759 income-qualified participants that bought residential cooling equipment with LADWP enhanced incentives from the beginning of September through October 15, 2022. The second round included a random sample of the 2,753 income-qualified participants that bought residential cooling equipment with LADWP enhanced incentives from the beginning of April through August 18, 2023.

In each survey round, ADM sent up to three email survey recruitments to each participant in the sample. A total of 400 participants responded to the survey, with 380 passing screening questions and/or proceeding past the first questions. Round 1 and Round 2 respondents and responses were similar and were analyzed together.

The survey instrument assessed respondent’s use of the room air conditioners purchased through the program, how they would have cooled their homes absent the new room air conditioners, indices of health and comfort experience before and after purchase of the new room air conditioners, non-comfort benefits of the new room air conditioners, source of awareness of the enhanced incentives, and demographic characteristics.

Both instruments asked respondents about their and their household’s health and comfort before and after buying the new equipment through the program but defined the pre- and post-purchase periods differently. In Round 1, the pre and post periods were immediately before and after purchase. In Round 2, the pre and post periods covered the same time frame for each respondent but in separate years: specifically, the post period was the period immediately after purchase and the pre period covered the same time interval in the previous. This allowed for a comparison of health and comfort during directly comparable periods of time.

The demographic section did not ask the respondent’s race or ethnicity but asked what languages other than English were spoken at home. Of the 380 respondents, 338 reported their home language, of whom 189 reported speaking Spanish and 92 reported only English. (The other 67 reported a variety of other languages.)

The current study compared the 189 who reported speaking Spanish at home and the 92 who reported speaking English at home on source of program awareness, reported indices of comfort and other benefits of having the new room air conditioners, and satisfaction with the room air conditioners.

² American Community Survey 2022, Table DP02.

Those who speak Spanish at home and those who speak English at home did not differ on most demographic indices (Table 1). The one exception is that those reporting Spanish at home tended to report larger household sizes.

Table 1. Demographic characteristics

Characteristic	Language Spoken at Home	
	Spanish	English
Dwelling type		
Single-family, detached	32%	28%
Attached or apartment, up to 3 units	22%	16%
Apartment, 4 or more units	37%	51%
Manufactured, other	5%	2%
Don't know/no response	4%	2%
Household size (number of household members) ¹		
One person (lives alone)	10%	33%
Two	21%	28%
Three or four	32%	24%
Five or six	23%	8%
Seven or more	9%	2%
Don't know/no response	4%	5%
Annual Household Income		
Less than \$25,000	30%	40%
\$25,000 to \$49,999	46%	36%
\$50,000 or more	14%	11%
Don't know/no response	11%	13%
Ownership		
Own	26%	20%
Rent	74%	80%
Geography		
Central/Northeast	46%	43%
Southwest	25%	33%
Northwest	30%	24%
¹ Those who speak Spanish at home tended to report larger household sizes, $z = -5.67$, $p < .00001$.		

Tests of difference were carried out using Mann-Whitney U for scaled items and chi-square for nominal-level categorical items. In all cases where a statistically significant result was found, we show the associated z score or χ^2 value, along with the p value calculated to the nearest significant digit for p values greater than 0.0001; $p < .0001$ otherwise. Typically, a p -value of 0.05 or less is interpreted as meaning a finding is “statistically significant,” or not likely to have occurred by chance.

Results

Survey results were highly similar for the two survey rounds and so the data from the two survey rounds were combined for the comparison by language.

Language spoken at home was not related to source of program awareness.

Respondents reported the degree to which their household experienced heat-related discomfort during the periods before and after purchase of the room air conditioner with the enhanced incentives, by indicating how frequently each of these three situations occurred:

- It was uncomfortably warm inside your home.
- It was too hot to cook inside your home.
- Someone felt sick or unwell because of the heat.

All three of the above indices showed less discomfort after purchase than before (Table 2). Respondents who said they speak English at home reported more frequent pre-purchase discomfort compared to those who reported speaking Spanish at home, on the first index: “It was uncomfortably warm inside your home” ($z = -2.12, p = .03$). No other comparisons showed statistically significant differences based on language spoken at home.

Table 2. Comfort indices before and after air conditioning purchase

Timing	Language Spoken at Home	Percentage of Respondents Scale: 1 (Never) to 5 (All or Nearly All the Time)					
		1	2	3	4	5	Don't know
It was uncomfortably warm inside your home							
Before purchase ¹	Spanish	5%	7%	17%	21%	46%	5%
	English	4%	1%	13%	20%	58%	4%
After purchase	Spanish	26%	18%	17%	14%	22%	3%
	English	12%	29%	18%	12%	27%	1%
It was too hot to cook inside your home							
Before purchase	Spanish	4%	12%	15%	24%	42%	3%
	English	5%	4%	15%	25%	46%	4%
After purchase	Spanish	25%	20%	16%	14%	23%	2%
	English	17%	25%	18%	11%	26%	2%
Someone felt sick or unwell because of the heat							
Before purchase	Spanish	29%	17%	16%	19%	16%	3%
	English	23%	15%	14%	14%	28%	5%
After purchase	Spanish	52%	16%	8%	12%	8%	4%
	English	47%	12%	12%	9%	17%	3%

¹ Respondents who said they speak English at home reported more frequent pre-purchase discomfort compared to those who reported speaking Spanish at home, $z = -2.12, p = .03$.

Those who said they speak Spanish at home reported higher overall satisfaction with the room air conditioners than did those who said they speak English at home ($z = -3.27, p = .001$; Table 3).

Table 3. Satisfaction with room air conditioner

Language Spoken at Home	Percentage of Respondents Scale: 1 (Not at All) to 5 (Extremely)					
	1	2	3	4	5	Don't know
Spanish	1%	2%	5%	13%	78%	1%
English	2%	2%	10%	25%	59%	2%
Satisfaction was higher for those who speak Spanish at home, $z = -3.27, p = .001$.						

Study 2: Awareness and Attitudes by Ethnicity and Language Spoken at Home

Methods

ADM completed a survey of 440 LADWP residential customers who identified as either Hispanic/Latino or white only. The survey was conducted with a representative sample of all LADWP residential customers plus an over-sample of customers from zip codes with a relatively high prevalence of Hispanic or Latino residents. The over-sample was done to offset an under-representation of such customers in the response to the representative sample. ADM sent up to three email survey recruitments to each sampled customer. To further encourage Hispanic/Latino respondents, the recruitment emails to the over-sample had both English and Spanish text and offered the option of taking the survey in Spanish as well as English.

The survey covered program awareness, perceptions and concerns about energy and water use, barriers to saving energy and water, energy saving behaviors and purchases, and perceptions and interest relating to home electrification.

The demographic section asked the respondent's race or ethnicity as well as what languages other than English were spoken at home. A total of 573 customers responded to the survey and responded to the question about race/ethnicity. Of those, 158 reported a race/ethnicity other than Hispanic/Latino or white. Of the remaining 440 respondents, 263 (60%) either identified as Hispanic/Latino ($n = 238$) or took the survey in Spanish ($n = 25$) and 177 (40%) identified as white only. Of the 263 who identified as Hispanic/Latino, 127 (48%) either reported speaking Spanish at home or took the survey in Spanish, while the remaining 136 (52%) reported speaking English at home and took the survey in English.

The current study carried out two sets of analyses on responses to questions on program awareness, perceptions and concerns about energy use, and barriers to saving energy. Both sets compared the 136 respondents who identified as Hispanic/Latino, reported speaking English at home, and took the survey in English with another group: one set compared them with the 177 respondents who identified as white only, while the second set compared them with the 127 respondents who identified as Hispanic/Latino and reported speaking Spanish at home or took the survey in Spanish.

The first set compared groups by ethnicity while controlling (to the extent possible) for language spoken at home. The second set compared groups by language spoken at home while controlling (to the extent possible) for ethnicity.

The three groups (white only, Hispanic/Latino speaking English at home, and Hispanic/Latino speaking Spanish at home) differed demographically to some degree. Consistent

with the previous research, Hispanic/Latino respondents who speak English at home tended to report lower incomes than white only respondents but higher incomes than those who speak Spanish at home (Table 4). Hispanic/Latino respondents who speak English at home also were less likely to report owning their home than white only respondents, but they did not differ in reported home ownership from those who speak Spanish at home. Also, not shown in the table, Hispanic/Latino respondents tended to be younger and to have less formal education and they were somewhat more likely to be female, compared to white only respondents.

Table 4. Demographic characteristics

Category	White Only	Hispanic/Latino – English at Home	Hispanic/Latino – Spanish at Home
Annual Household Income ^{1,2}			
Less than \$25,000	10%	21%	35%
\$25,000 to \$49,999	11%	33%	37%
\$50,000 or more	57%	36%	19%
Don't know/no response	22%	0%	9%
Ownership ³			
Own	73%	54%	50%
Rent or other	25%	46%	50%
Dwelling type			
Single-family, detached	72%	68%	59%
Single-family, attached	5%	7%	14%
Multifamily	23%	26%	27%
Manufactured or mobile	1%	0%	0%
Household size (number of household members) ⁴			
One person (lives alone)	29%	9%	1%
Two	36%	13%	18%
Three or four	25%	42%	46%
Five or six	6%	29%	28%
Seven or more	3%	6%	7%
Don't know/no response	1%	0%	0%
¹ Hispanic/Latino-Spanish at home vs. white only: $z = -5.12, p \leq 0.0001$. ² Hispanic/Latino-Spanish at home vs. Hispanic/Latino-English at home: $z = 3.75, p = 0.0002$. ³ Hispanic/Latino-Spanish at home vs. white only: $\chi^2 = -13.92, p \leq 0.0001$. ⁴ Hispanic/Latino-Spanish at home vs. white only: $z = -6.93, p \leq 0.0001$.			

Tests of difference were carried out using Mann-Whitney U for scaled items and chi-square for nominal-level categorical items. In all cases where a statistically significant result was found, we show the associated z score or χ^2 value, along with the p value calculated to the nearest significant digit for p values greater than 0.0001; $p \leq 0.0001$ otherwise.

Presumably, the observed demographic differences among groups, particularly income and home ownership, would at least partly explain any differences seen in motives and barriers. To assess whether this is the case, we carried out the above analyses on both unweighted responses and on responses weighted by income and home ownership. When both unweighted

and weighted analyses are both statistically significant or nonsignificant, we show the unweighted results; otherwise, we show both sets of values.

Results

Hispanic/Latino, speak English at home, compared to white only.

No statistically significant differences existed between Hispanic/Latino respondents and white only respondents with respect to beliefs about energy efficiency (Table 5).

Table 5. Beliefs about energy efficiency

Ethnicity	Agreement				
	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Buying EE equipment will lower your utility costs					
Hispanic/Latino	3%	0%	10%	23%	65%
White only	1%	2%	7%	32%	58%
Buying EE equipment will help combat climate change					
Hispanic/Latino	6%	5%	12%	21%	56%
White only	6%	3%	14%	29%	49%
Buying EE equipment will help make the grid more reliable					
Hispanic/Latino	3%	4%	13%	28%	52%
White only	2%	1%	19%	28%	50%

However, differences existed between Hispanic/Latino and white only respondents across many of the assessed indices of concerns, motives, and barriers.

Compared to white only respondents, the Hispanic/Latino group placed greater importance on lowering utility costs (Table 6). This difference was seen in both the weighted and unweighted data. No other differences were statistically significant in unweighted data, but when using weights to control for income and home ownership, Hispanic/Latino respondents were seen to be more concerned about combating climate change and making the grid more reliable.

Hispanic/Latino respondents also indicated greater motivation to save energy than did white respondents by the desire to increase home comfort, save money, increase their home's value, avoid waste, and improve the health and safety of their household (Table 7). When using weights to control for income and home ownership, the difference relating to improving household health and safety was no longer statistically significant, suggesting this difference (and only this difference) may have been an artifact of the demographic differences.

Finally, despite indicating higher levels of some energy-related concern and greater motivation to save energy, the Hispanic/Latino group perceived greater barriers to saving energy than did white only respondents (Table 8). All of these differences remained statistically significant when demographic differences were controlled.

The majority of both groups reported being aware that LADWP offers programs to help customers save energy. Awareness was somewhat greater among the white only than among the Hispanic/Latino respondents, but the difference was not statistically significant (74% vs. 67%, unweighted data, $\chi^2 = 1.88, p = 0.17$; results for the weighted were data were similar).

Table 6. Energy-related concerns

Importance of...					
Ethnicity	Not at all	Somewhat	Moderately	Very	Extremely
Lowering your utility costs ¹					
Hispanic/Latino	0%	4%	7%	20%	69%
White only	1%	8%	16%	26%	49%
Combating climate change - unweighted					
Hispanic/Latino	4%	8%	9%	24%	54%
White only	5%	8%	7%	22%	58%
Combating climate change – weighted ²					
Hispanic/Latino	5%	12%	9%	23%	51%
White only	4%	9%	7%	18%	39%
Helping make the grid more reliable – unweighted					
Hispanic/Latino	0%	7%	13%	31%	49%
White only	2%	2%	10%	36%	50%
Helping make the grid more reliable – weighted ³					
Hispanic/Latino	0%	9%	16%	29%	46%
White only	0%	7%	12%	23%	35%
How concerned about...					
Ethnicity	Not at all	Somewhat	Moderately	Very	Extremely
Household electricity consumption					
Hispanic/Latino	4%	7%	15%	30%	43%
White only	4%	12%	29%	23%	32%
Household natural gas consumption					
Hispanic/Latino	7%	13%	24%	22%	34%
White only	13%	14%	34%	16%	23%
¹ $z = -3.21, p = 0.0007$. ² $z = -2.46, p = 0.007$. ³ $z = -2.20, p = 0.01$.					

Table 7. Motives to save energy

Ethnicity	How much this motivates saving energy				
	Not at all	A little	A moderate amount	A lot	A great deal
Increasing home comfort ¹					
Hispanic/Latino	3%	3%	20%	24%	50%
White only	3%	8%	26%	34%	28%
Improving the environment					
Hispanic/Latino	1%	2%	17%	34%	46%
White only	4%	5%	21%	27%	44%
Saving money ²					
Hispanic/Latino	0%	0%	6%	24%	71%
White only	0%	6%	16%	32%	46%
Increasing your home's value ³					
Hispanic/Latino	7%	5%	18%	19%	51%
White only	16%	8%	24%	25%	26%
Avoiding waste ⁴					
Hispanic/Latino	1%	1%	10%	24%	64%
White only	2%	3%	17%	32%	46%
Improving the health and safety of your household - unweighted ⁵					
Hispanic/Latino	1%	0%	14%	19%	66%
White only	1%	3%	18%	28%	51%
Improving the health and safety of your household – weighted ⁶					
Hispanic/Latino	0%	0%	15%	22%	62%
White only	0%	0%	12%	17%	48%
¹ $z = -3.33, p = 0.0004$. ² $z = -4.11, p \leq 0.0001$. ³ $z = -3.36, p = 0.0004$. ⁴ $z = -2.90, p = 0.002$. ⁵ $z = -1.99, p = 0.02$. ⁶ $z = -1.38, p > 0.05$.					

Table 8. Perceived barriers to saving energy

Ethnicity	How much of a barrier				
	Not at all a barrier	Somewhat of a barrier	A moderate barrier	A great barrier	An extremely significant barrier
Cost of efficient equipment or improvements					
Hispanic/Latino	4%	7%	29%	24%	36%
White only	8%	7%	34%	27%	24%
Other cost priorities					
Hispanic/Latino	1%	10%	30%	25%	34%
White only	9%	8%	33%	29%	21%
Amount of time involved ¹					
Hispanic/Latino	11%	10%	37%	20%	23%
White only	15%	20%	38%	16%	11%
Lack of knowledge about how to save energy ²					
Hispanic/Latino	10%	10%	29%	26%	26%
White only	23%	19%	32%	16%	11%
Home is already efficient ³					
Hispanic/Latino	17%	15%	35%	13%	19%
White only	27%	21%	33%	12%	7%
Not convinced about potential money savings ⁴					
Hispanic/Latino	15%	13%	34%	19%	19%
White only	37%	16%	29%	10%	7%
¹ $z = -2.75, p = 0.003$. ² $z = -4.15, p \leq 0.0001$. ³ $z = -3.29, p = 0.0005$. ⁴ $z = -4.54, p \leq 0.0001$.					

Hispanic/Latino: speak English at home compared to speak Spanish at home.

With respect to language spoken at home, none of the differences relating to beliefs, concerns, motives, or perceived barriers was statistically significant in unweighted data (Tables 9-12). However, both saving money and avoiding waste provided greater motivation to save energy to those who spoke Spanish at home than those who spoke English at home, when weighted data were used to control for differences in income and home ownership. It is not clear why language spoken at home should be associated with these motives. Given that they were the only two statistically significant differences seen in the weighted data, out of 20 comparisons made, it may be well to interpret them cautiously.

However, despite the lack of a relationship between language spoken at home and beliefs, concerns, motives, and perceived barriers, awareness of LADWP energy efficiency programs may be greater among those who speak English at home than among those who speak Spanish at home (67% vs. 54%, $\chi^2 = 3.55, p = 0.06$; results for the weighted data were similar).

Table 9. Beliefs about energy efficiency

Language Spoken at Home	Agreement				
	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Buying EE equipment will lower your utility costs					
Spanish	1%	1%	11%	25%	62%
English	3%	0%	10%	23%	65%
Buying EE equipment will help combat climate change					
Spanish	3%	1%	10%	25%	61%
English	6%	5%	12%	21%	56%
Buying EE equipment will help make the grid more reliable					
Spanish	2%	1%	9%	32%	57%
English	3%	4%	13%	28%	52%

Table 10. Energy-related concerns

Language Spoken at Home	Importance				
	Not at all	Somewhat	Moderately	Very	Extremely
Lowering your utility costs					
Spanish	2%	2%	2%	38%	56%
English	0%	4%	7%	20%	69%
Combating climate change					
Spanish	5%	3%	3%	38%	51%
English	4%	8%	9%	24%	54%
Helping make the grid more reliable					
Spanish	2%	3%	8%	47%	40%
English	0%	7%	13%	31%	49%
Language Spoken at Home	How concerned				
	Not at all	Somewhat	Moderately	Very	Extremely
Household electricity consumption					
Spanish	3%	8%	16%	35%	37%
English	4%	7%	15%	30%	43%
Household natural gas consumption					
Spanish	4%	7%	19%	44%	26%
English	7%	13%	24%	22%	34%

Table 11. Motives to save energy

Language Spoken at Home	How much this motivates saving energy				
	Not at all	A little	A moderate amount	A lot	A great deal
Increasing home comfort					
Spanish	0%	3%	18%	33%	46%
English	3%	3%	20%	24%	50%
Improving the environment					
Spanish	1%	3%	10%	37%	50%
English	1%	2%	17%	34%	46%
Saving money – unweighted					
Spanish	1%	0%	4%	32%	63%
English	0%	0%	6%	24%	71%
Saving money – weighted¹					
Spanish	1%	0%	4%	32%	63%
English	0%	0%	3%	26%	51%
Increasing your home's value					
Spanish	10%	5%	13%	27%	45%
English	7%	5%	18%	19%	51%
Avoiding waste - unweighted					
Spanish	1%	2%	9%	35%	54%
English	1%	1%	10%	24%	64%
Avoiding waste – weighted²					
Spanish	1%	1%	9%	37%	52%
English	1%	1%	7%	29%	42%
Improving the health and safety of your household					
Spanish	0%	3%	4%	32%	61%
English	1%	0%	14%	19%	66%
¹ $z = -2.16, p = 0.02.$ ² $z = -2.39, p = 0.008.$					

Table 12. Perceived barriers to saving energy

Language Spoken at Home	How much of a barrier				
	Not at all a barrier	Somewhat of a barrier	A moderate barrier	A great barrier	An extremely significant barrier
Cost of efficient equipment or improvements					
Spanish	8%	3%	23%	40%	25%
English	4%	7%	29%	24%	36%
Other cost priorities					
Spanish	3%	8%	22%	43%	23%
English	1%	10%	30%	25%	34%
Amount of time involved					
Spanish	8%	11%	30%	33%	17%
English	11%	10%	37%	20%	23%
Lack of knowledge about how to save energy					
Spanish	10%	11%	16%	43%	20%
English	10%	10%	29%	26%	26%
Home is already efficient					
Spanish	12%	15%	33%	30%	10%
English	17%	15%	35%	13%	19%
Not convinced about potential money savings					
Spanish	12%	14%	31%	30%	13%
English	15%	13%	34%	19%	19%

Summary and Discussion

The results of the first study found few differences based on language spoken at home, indicating that the two respondent groups got comparable benefits from program participation. This finding itself does not address the question of whether Spanish-speaking customers participated in the program to the same degree as English-speaking customers. Respondents who speak Spanish at home made up 22% of all 567 survey respondents who reported both their race/ethnicity and their home language. By contrast, we estimate that somewhere from 39% to 44% of all income-qualified households in Los Angeles County speak Spanish at home.³ This could mean that those who speak Spanish at home are underrepresented in the participant population. On the other hand, it may just mean they are underrepresented among survey respondents. Unfortunately, the survey recruitment emails were only in English and this survey, unlike the general population survey (Study 2) did not have a Spanish language option. Therefore, it may have excluded the segment of the population with the least English skills.

Results of the second study point to several differences in concerns, motives, and perceived barriers between residential customers who identify as Hispanic/Latino versus white

³ Residents who speak Spanish at home residents make up 39% of all Los Angeles County residents (2022 American Community Survey, Table S1601) and 44% of all those below the poverty line (2022 American Community Survey, Table S1603). For the program discussed here, “income-qualified” does not exclude households above the poverty line, and so the percentage of qualified customers who speak Spanish at likely lies somewhere between those two percentages.

only. Generally, the former were more concerned about utility costs and were more motivated to save energy by those concerns as well as increasing their home's comfort and value, avoiding waste, and improving the household's health and safety. Presumably, such increased levels of concern and motivation should encourage these customers to take advantage of the program offerings, with which they appear to be as familiar as were white, non-Hispanic/Latino customers.

However, Hispanic/Latino customers also perceived greater barriers to saving energy. These barriers were related to the amount of time required, lack of knowledge about how to save energy, the perception that their home is already sufficiently energy efficient, and skepticism about the potential money savings, point to areas where more tailored program development and outreach may be beneficial.

The second study found no statistically significant differences relating to concerns, motives, and perceived barriers between Hispanic/Latino customers who reported speaking English or Spanish at home. Despite this, however, those who speak Spanish at home may have lower awareness of energy efficiency programs than those who speak English at home. This would be consistent with the idea of lower participation in the air conditioning incentive program (Study 1) among those who speak Spanish at home, although it does not rule out the idea, suggested above, of greater survey nonresponse among program participants who speak Spanish at home. In any case, the finding of lower program awareness among those who speak Spanish at home may point to a need for greater Spanish-language and, perhaps, culturally specific, outreach for this group, particularly as they tend to have markedly lower incomes and so are particularly in need of such assistance. Providing such assistance not only would help achieve energy-savings goals and improve energy equity but it may have valuable health impacts as well.

References

Bellante, D. and C. Kogut. 1998. "Language Ability, US Labor Market Experience and the Earnings of Immigrants." *International Journal of Manpower* 19 (5): 319-330.

www.semanticscholar.org/paper/Language-ability%2C-US-labor-market-experience-and-of-Bellante-Kogut/b771ac733fd5d398d8d7462cb67a7e84fe77089b.

Bhutta, N., A. Chang, and L. Dettling. 2020. "Disparities in Wealth by Race and Ethnicity in the 2019 Survey of Consumer Finances." *FEDS Notes*. Board of Governors of the Federal Reserve System, September 28, 2020. www.federalreserve.gov/econres/notes/feds-notes/disparities-in-wealth-by-race-and-ethnicity-in-the-2019-survey-of-consumer-finances-20200928.htm.

Cortina, J., R. de la Garza, and P. Pinto. 2007. "No Entiendo: The Effects of Bilingualism on Hispanic Earnings." ISERP Working Papers, 08-06. Institute for Social and Economic Research and Policy, Columbia University. academiccommons.columbia.edu/doi/10.7916/D84Q81TQ.

DuBard, A., and Z. Gizlice. 2008. "Language Spoken and Differences in Health Status, Access to Care, and Receipt of Preventative Services Among US Hispanics." *American Journal of Public Health* 98 (11): 2021-2028.

Foiles Sifuentes, A., M. Cornejo, N. Li, M. Castaneda-Avila, J. Tjia, and K. Lapane. 2020. "The Role of Limited English Proficiency and Access to Health Insurance and Health Care in the Affordable Care Act Era." *Health Equity* 4 (1): 509-517.

Fox, S., and G. Livingston. 2007. "Hispanics with Lower Levels of Education and English Proficiency Remain Largely Disconnected from the Internet." *Latinos Online*. Washington, DC: Pew Hispanic Center. eric.ed.gov/?id=ED495954.

Holden, K., A. Lee, D. Hawcutt, and I. Sinha. 2023. "The impact of poor housing and indoor air quality on respiratory health in children." *Breathe* (19) 2. www.ncbi.nlm.nih.gov/pmc/articles/PMC10461733/.

Jacobson, H., L. Hund, and F. Soto Mas. 2016. "Predictors of English Health Literacy among U.S. Hispanic Immigrants: The importance of language, bilingualism and sociolinguistic environment." *Literacy and Numeracy Studies* 24 (1): 43-64. pubmed.ncbi.nlm.nih.gov/27127416/.

Khursheed, A. 2022. "Save Energy, Breathe Better: Quantifying the Societal Health Benefits of Improving Air Quality Through Energy Efficiency." *Energy Optimization: Evaluation for a Clean and Equitable Future*. International Energy Program Evaluation Conference. San Diego, CA. November 1-4, 2022.

Krieger, J. and D. Higgins. 2002. "Housing and Health: Time Again for Public Health Action." *American Journal of Public Health* 92 (4): 758-768. ajph.aphapublications.org/doi/full/10.2105/AJPH.92.5.758?role=tab.

McManus, W., W. Gould, F. Welch. 1983. "Earnings of Hispanic Men: The Role of English Language Proficiency." *Journal of Labor Economics* 1 (2): 101-130. www.jstor.org/stable/2534901.

National Center for Healthy Housing. 2022. "Studying the Optimal Ventilation for Environmental Indoor Air Quality. Columbia, MD: Enterprise Community Partners." April 2022. nchh.org/resource-library/report_studying-the-optimal-ventilation-for-environmental-indoor-air-quality.pdf.

Nguyen, D., and L. Reardon. 2013. "The Role of Race and English Proficiency on the Health of Older Immigrants." *Social Work in Health Care* 52 (6): 599-617.

Salinas, Jennifer J., DeAnne K. Hilfinger Messias, Daisy Morales-Campos, and Deborah Parra-Medina. 2014. "English Language Proficiency and Physical Activity among Mexican-Origin Women in South Texas and South Carolina." *Journal of health care for the poor and underserved* 25 (1): 357-375.

Sandford, J. 2002. "English Language Proficiency and the Earnings of Mexican Immigrants." *Honors Projects. Illinois Wesleyan University*. digitalcommons.iwu.edu/cgi/viewcontent.cgi?article=1033&context=econ_honproj.

Semega, Jessica, Melissa Kollar, Emily A. Shrider, and John Creamer. 2020. "Income and Poverty in the United States: 2019." *Report Number P60-270: United States Census Bureau*. September. 2020. www.census.gov/data/tables/2020/demo/income-poverty/p60-270.html.

Tran, V., D. Park, and Y. Lee. 2020. "Indoor Air Pollution, Related Human Diseases, and Recent Trends in the Control and Improvement of Indoor Air Quality." *International Journal of Environmental Research and Public Health* 17 (8): 2927. www.ncbi.nlm.nih.gov/pmc/articles/PMC7215772/.

U.S. Environmental Protection Agency 2024. *Introduction to Indoor Air Quality*. www.epa.gov/indoor-air-quality-iaq/introduction-indoor-air-quality.

Zhen, Ying. 2013. "The Effects of English Proficiency on Earnings of US Foreign-Born Immigrants: Does Gender Matter." *Journal of Finance and Economics* 1 (1): 27-41.