Menu labeling perception and health behaviors among immigrant and US born minority populations: Assessment in two Los Angeles public markets

Arturo Vargas-Bustamante, PhD, MA, MPP.[1]

Abstract

Objective. To analyze menu labeling perception and food choices/health behaviors in two Los Angeles public markets. Labels with food caloric content were displayed in the food court of one of these markets. **Materials and methods.** Bivarate means analyses compared the surveyed population by market and by nativity status. The main predictors of menu-labeling influence were identified in the sample from the market that displayed labels. A separate analysis investigated food choices/health behaviors among immigrant cohorts by time of US residence. **Results.** Reading labels when shopping was one of the main predictors associated with menu labeling influence. Longer-stayed immigrants were more likely to afford "balanced meals", but they were also more likely to eat in fast food restaurants and less likely to engage into moderate/intense physical activity. **Conclusions.** While nativity was not a significant predictor of menu labeling influence on food choices, our findings suggest food choices/behaviors convergence among immigrant and US-born populations.

Key words: nutrition policy; food habits; emigrants and immigrants; Hispanic Americans; acculturation

Resumen

Objetivo. Analizar la percepción del etiquetado de menús y la elección de alimentos/comportamientos de salud en dos mercados públicos de Los Ángeles. La información con el contenido calórico de los alimentos preparados estaba disponible en uno de los mercados. **Material y métodos.** El análisis bivarado compara la muestra por mercado y por lugar de nacimiento. Primero se identificaron predictores sobre la influencia del etiquetado de menús, y después se analizaron diferencias en la elección de alimentos/comportamientos de salud entre la población inmigrante y la nacida en EUA. **Resultados.** Leer las etiquetas cuando se compran víveres fue uno de los principales predictores asociados con la influencia del etiquetado de menús. Inmigrantes con más tiempo de residencia en EUA reportaron mayor capacidad de compra de "alimentos balanceados", pero también fueron más propensos a comer en restaurantes de comida rápida y menos propensos a participar en actividad física moderada/intensa. **Conclusiones.** Aunque el lugar de nacimiento no fue un predictor significativo del etiquetado de menús, nuestro análisis sugiere la convergencia entre la población inmigrante y la nacida en EUA en la elección de alimentos/comportamientos de salud.

Palabras clave: política nutricional; hábitos alimenticios; migrantes e inmigrantes; hispanoamericanos; aculturación

(1) University of California Los Angeles (UCLA). Fielding School of Public Health.

Increasing rates of overweight and obesity is an emergent public health problem in the United States (US). This condition affects people of all racial/ethnic groups and socioeconomic conditions; however, it is currently more widespread among minority and low-income populations.[1] Menu labeling is a recent policy response to address this problem. More than thirty US cities and states have introduced legislation to mandate menu labeling.[2-4] At the federal level, the Affordable Care Act (ACA) ruled the full disclosure of nutritional information in chain restaurants and vending machines.[5,6]

Recent studies in this area have found positive effects of menu labeling in different environments.[2,7] A study that compared the nutritional content of restaurants in Washington State before and after the introduction of menu labeling found that the nutritional content of food options improved. Moreover, approximately 20% of restaurant patrons shifted to healthier food options.[8] Two previous studies in New York City examined menu labeling at fast food restaurants.[9,10] In one of these studies customers who encountered caloric information consumed on average 52 fewer calories.[9] The second study found that almost 30% of survey respondents reported that labels changed their food choices.[10]

The evidence on the widespread effectiveness of menu labeling, however, is not conclusive. Previous research using random assignment of consumers in a non-restaurant environment found that menu labeling did not decrease the number of calories consumed, even among those who noticed the caloric information.[3] Another study found that menu labeling was effective only when the studied population was informed that 2 000 calories was the recommended daily caloric intake.[11] Additional studies have analyzed menu labeling in cafeterias or in hypothetical-choice experiments.[12,13] These studies found no effects of menu labeling or were able to identify very small effect sizes.

Although the association between accessibility to caloric content and improving the ability to make informed dietary decisions is backed by previous research, the different mechanisms that produce a behavioral change in food choices need to be better understood. Recent research has also provided convincing evidence that menu labeling has an effect on shifting food choices primarily among US-born populations; however, its effect among minority and foreign-born populations has not been investigated. Minority and foreign-born populations can have different levels of understanding about food caloric content due to differences in education, language barriers and cultural differences.[10,14] Their reactions to menu labeling can be motivated by different factors that need to be identified and analyzed.

The present study summarizes the main findings of a survey that investigated food choices among a population of primarily low-income Latinos/Hispanics in two Los Angeles (LA) public markets. The main difference between these two markets was that food caloric information of prepared foods was available at the food court of one of the markets, while this information was not disclosed in the food court of the second market. This study investigates differences across markets and between US born and native-born populations. It also characterizes changes in nutrition patterns and health behaviors across immigrant cohorts based on the number of years of US residence.

Materials and methods

Study population and setting

East and South LA have a predominantly low-income minority population, a cohort that is disproportionally affected by raising rates of overweight and obesity.[1] The survey was conducted in the food court areas that sell prepared foods in two LA public markets: i) Mercado La Paloma in South LA (MLP) and El Mercado de Los Angeles in East LA (ELA). A convenience sample size of 200 individuals was collected, 100 individuals from MLP and 100 individuals from ELA. Adults 18 years or older were invited to participate in the study. The University of California Los Angeles Institutional Review Board (IRB) office reviewed and approved the study (#10 -000201 -AM-00002).

Both markets were visited on randomly selected days and times during weekdays and on weekends in between June and July of 2010. Subjects were recruited and consented at each site until a sample size of N=100 was collected in each market for a total of N=200. Potential subjects were approached immediately after purchasing food at the food court in each market and offered the opportunity to participate in filling out a 15-20 minute questionnaire. They were offered a cash compensation of $2.50 for their time. Researchers completed their sampling after one month, ending up with similar recruitment success rates at each market, approximately 60%.

The questionnaire was administered mostly in Spanish (70%), although an English version was administered to native English speakers. Interviewers were bilingual and were trained to appropriately address ambiguous questions and avoid oversampling bias of any particular sub-population. Survey respondents were asked for socio-demographic characteristics, health related questions such as weight and perceived health status, and most importantly about their cur-

rent practices regarding nutritional labels on menus. The survey consisted of five sections: 1) Menu labeling awareness and understanding (in MLP only), 2) Diet and nutrition information 3) Health status and BMI 4) Socio-demographics.

Measures

Food choices, nutrition literacy and physical activity measures were collected to determine the comparability of the surveyed population across markets and by nativity status. In addition, these measures were useful to address the predisposition of health conscious individuals (e.g. people who exercise or who track calories) towards menu labeling utilization.[3,8] To characterize food choices the survey asked respondents whether they tracked calories regularly, if they performed moderate/intense physical activity, how many fruits and vegetables were consumed per day (excluding juices and fried potatoes, respectively), the number of sodas consumed per week, the number of times individuals ate in fast food restaurants, whether respondents afford "balanced" meals (interviewers were trained to define balanced meals as "Meals that provide you with enough amounts of nutrients, fats, protein and carbohydrates to ensure good health"), and whether respondents read nutrition labels while they shop for groceries as a proxy measure for food nutrition literacy.[3,14] In the MLP market, individuals were asked whether they noticed the food caloric information displayed in the food court. If the response was positive they were asked if menu labeling influenced their menu choices. In an affirmative case, they were asked if they "ordered something else with fewer calories", whether they chose to "order something to share" or "other".

Additional health status, BMI and socioeconomic information collected in previous studies were also gathered.[10,15] These measures captured survey respondents self-reported health status, BMI was estimated based on the reported weight and height from survey respondents. Subjects had the chance to report these measures using either the English system (i.e. feet/ inches and pounds) or the metric system (i.e. kilograms and meters/cm) since more recently arrived immigrants would be more familiar with the latter system. In addition, respondents were questioned about their weight at age 18 as a proxy measure of weight gain over the years. Individuals were also questioned on whether they were trying to lose weight, if they considered themselves overweight and if they have been diagnosed with diabetes. Gathered socioeconomic and demographic information was race (i.e. Latino of any race and other race/ethnicity), age, sex/gender, marital status, annual

income before taxes for the employed population, years of schooling, nativity (i.e. US-born or foreign-born) and years of US residence among the foreign-born. An ordinal variable was created with this information (i.e. US-born, one year or less, 2-4 years, 5-9 years, 10-14 years and 15 years or more).

Statistical analysis

The analysis first compares the survey population across markets and a descriptive analysis summarizes the perception of those who were exposed to menu labeling in MLP. A logit model is used to identify the main predictors of reported menu labeling influence on food choices. The second comparison investigates differences between US-born and foreign-born populations to identify how nativity status can be linked to dietary/nutrition/physical activity factors. To further investigate this difference taking confounding factors into consideration, an ordered logit regression analyses (i.e. used when the dependent variable is ordinal rather than binary or multinomial) is implemented to do a cross-cohort analysis across immigrant populations based on the number of years they have lived in the US. In this regression model the US-born population is the reference category. The regression model clusters standard errors by market to minimize within group variation (i.e. ELA or MLP differences) and to maximize between-group variation (i.e. US-born vs. foreign-born). Sensitivity tests using non-robust standard errors and an ordinal probit specification were also implemented.

Results

The breakdown of the overall sample included 56% female, 91% self-reporting as Latino and 70% of survey Spanish-respondents. The average age of participants was 41 years, ranging from 18 to 78 years old. The average number of years of schooling was 10 years, and it ranged from 0 to 22 years. Overall, only 45% of the surveyed population had health insurance coverage. The overall study reported earning on average $20 000 in annual income, which is about 100% of the 2012 Federal Poverty Level in the US for a family of three.

Table I shows the first mean analysis by market (i.e. MLP – had menu labels and ELA – did not have food caloric information). Survey respondents in ELA had a mean age of approximately 40 years, an annual income of $18 096, and nine years of schooling. Fifty-two percent were female, 41% had health insurance coverage and 33% of the sampled population responded to the survey in English. The mean number of years in the US

Table I
Means comparison across Los Angeles markets

Variable	East LA	South LA	95% Conf. Interval		p-value	
English response	0.33	0.26	-0.06	0.20	0.28	
Tracks calories	0.10	0.16	0.08	0.18	0.23	
Moderate/Intense physical activity	0.65	0.62	-0.11	0.16	0.70	
Fruits per day	1.50	1.61	1.40	1.71	0.48	
Vegetables per day	1.10	1.47	1.15	1.42	**0.01**	
Sodas per week	6.76	5.50	-0.86	3.38	0.24	
Times of fast food intake per week	1.65	1.33	1.28	1.70	0.14	
Affords "balanced" meals	0.87	0.84	0.81	0.90	0.55	
Looks for labels when shopping	0.53	0.63	0.51	0.65	0.15	
Latino	0.93	0.89	0.87	0.95	0.33	
Age	39.77	42.37	39.15	42.99	0.18	
Female	0.52	0.60	0.49	0.63	0.26	
Married	0.50	0.46	0.41	0.55	0.57	
US born	0.18	0.19	0.13	0.24	0.86	
Years in the US	15.25	17.34	14.29	18.02	0.27	
Annual income	18096.4	20049.9	16755.4	21490.2	0.42	
Years of schooling	8.99	11.77	9.75	11.02	**0.01**	
BMI	28.84	27.63	27.49	28.95	0.10	
Weight in pounds	170.3	163.9	162.0	172.1	0.21	
Weight at age 18	129.5	126.9	122.6	133.7	0.64	
Trying to lose weight	0.68	0.72	0.64	0.76	0.54	
Considers him/herself overweight	0.67	0.70	0.62	0.75	0.62	
Diabetes diagnosed	0.09	0.09	0.05	0.13	0.98	
Health Status						
Excellent	0.01	0.02	0.00	0.03	0.58	
Very good	0.13	0.13	0.08	0.18	0.93	
Good	0.31	0.48	0.33	0.46	**0.0**	
Fair	0.46	0.31	0.32	0.45	**0.03**	
Poor	0.08	0.06	0.03	0.11	0.54	
Has health insurance	0.41	0.48	0.38	0.51	0.32	
N	100	100				

Source: Survey administered in South LA (market with menu labels in prepared food available at the food court) and East LA (market without menu labels in prepared food options available at the food court), Los Angeles, CA in the summer of 2010
Note: Statistically significant *p*-values are highlighted in bold

among the foreign born was 15.25 years. By contrast, participants from MLP had a mean age of 42 years, an annual income of $20 050, and 12 years of schooling. Sixty percent were female, 48% of the surveyed population had health insurance coverage and 26% responded to the survey in English. The mean number of years in the US among the foreign-born was 17.34 years.

In terms of the covariates, there were no statistically significant differences between the markets on age, gender, income, US-born individuals, number of years in the US and number of individuals with health insurance coverage. However, participants from MLP market reported, on average, a higher number of years of schooling compared to participants from ELA. This difference was statistically significant at α=0.05, (*p*-value=0.00). Likewise, a statistically significant difference was identified across market in the number of individuals reporting "Good" and "Fair" health status. In terms of outcomes of interest, there was no difference between markets on the number of fruits, sodas or fast food consumed. However, participants from MLP reported consuming more vegetables, 1.47 per day, compared to those from ELA, 1.09 per day. This difference was statistically significant α=0.05, (*p*-value=0.005).

Table II summarizes the survey results for the battery of questions about menu labeling among patrons of MLP. Of the overall surveyed population, approximately 56% of food court attendees noticed the menu labels and 38% claimed that it influenced their food choices. Within this sub-population of respondents that used food caloric information to guide their food decisions 89% of survey respondents argued that they ordered something in the menu with fewer calories, 3% decided to order something to share, and 8% of respondents had other reactions. According to these results of the logit regression model in table II to identify the main predictors of menu labeling influence on food choices, reading labels when respondents shop (OR: 18.6, *p*=0.00), and having a higher weight differential between their current weight and their weight at age 18 (OR: 1.03, *p*=0.05) were the statistically-significant predictors of reported influence on food choice in MLP.

Table III provides the means comparison between the native and foreign-born surveyed populations. U.S.-born respondents had a mean age of approximately 31 years, an annual income of $20 420, and 14 years of schooling. Fifty-four percent were female, 78% had health insurance coverage and 73% of the sampled population responded to the survey in English. By contrast, foreign-born participants had a mean age of 43 years of age, an annual income of $18 847, and 10 years of schooling. Fifty six percent were female, 37% of the surveyed population had health insurance coverage and 20% responded to the survey in English.

In terms of covariates, statistically significant differences were identified between native and foreign-born populations in terms of English response, age, marital status, years of schooling, weight at age 18, individuals reporting excellent health status, and population with

Table II
PREDICTORS OF MENU LABELING INFLUENCE ON FOOD CHOICES IN THE SOUTH LOS ANGELES PUBLIC MARKET

Descriptive analysis	Observations	Mean
Total N	100	
Noticed menu labels	56	0.56
Influenced menu choices	38	0.38
Ordered something >calories	33	0.89
Ordered something to share	1	0.03
Other responses	4	0.08

Logit analysis: Predictors of "Influenced Menu Choices"

	Odds Ratio	Robust standard error
Tracks calories	0.221	-0.405
Moderate/Intense physical activity	5.902	-6.699
Fruits per day	1.206	-0.46
Vegetables per day	1.03	-0.407
Sodas per week	0.936	-0.0857
Times of fast food intake per week	1.494	-0.423
Affords "balanced" meals	0.105	-0.185
Looks for labels when shopping	18.59*	-23.3
Latino	1.02	-0.0366
Age	1.743	-2.168
Female	0.585	-0.649
Married	0.26	-0.261
Annual income	1	-2.76E-05
Years of schooling	1.009	-0.133
BMI	1.186	-0.164
Current-Weight Age 18	1.031‡	-0.0188
Trying to lose weight	2.27	-2.172
Considers him/herself overweight	0.161	-0.327
Diabetes diagnosed	1.092	-1.271
Worse health status	0.447	-0.338
US-born	0.985	-1.278
Years in the US	0.94	-0.0475
Has health insurance	0.662	-0.484
Constant	1.499	-7.328

Source: Survey administered in South and East, Los Angeles, CA in the summer of 2010
Note: Model with observations from South LA (market with menu labels in prepared food available at the food court) only
* *p*<0.05
‡ *p*<0.1

Table III
MEANS COMPARISON BETWEEN US AND FOREIGN-BORN INDIVIDUALS

Variable	US-born	Foreign-born	95% Conf. Interval		p-value
English response	0.73	0.20	0.23	0.36	0.00
Tracks calories	0.16	0.12	0.08	0.18	0.54
Moderate/Intense physical activity	0.73	0.61	0.57	0.70	0.18
Fruits per day	1.36	1.60	1.40	1.71	0.24
Vegetables per day	1.13	1.32	1.15	1.42	0.28
Sodas per week	7.69	5.79	5.08	7.20	0.17
Times of fast food intake per week	1.34	2.14	1.28	1.70	0.00
Affords "balanced" meals	0.92	0.84	0.81	0.90	0.22
Looks for labels when shopping	0.70	0.55	0.51	0.65	0.09
Latino	0.86	0.92	0.87	0.95	0.29
Age	31.05	43.34	39.15	42.99	0.00
Female	0.54	0.56	0.49	0.63	0.79
Married	0.14	0.56	0.41	0.55	0.00
Annual income	20419.35	18847.53	16755.40	21490.24	0.62
Years of schooling	13.76	9.62	9.75	11.02	0.00
BMI	27.18	28.46	27.49	28.95	0.18
Weight in pounds	168.08	166.81	162.00	172.08	0.85
Weight at age 18	151.89	122.58	122.58	133.74	0.00
Trying to lose weight	0.76	0.69	0.64	0.76	0.41
Considers him/herself overweight	0.64	0.69	0.62	0.75	0.53
Diabetes diagnosed	0.03	0.10	0.05	0.13	0.14
Health status					
Excellent	0.06	0.01	0.00	0.03	0.03
Very good	0.22	0.11	0.08	0.18	0.08
Good	0.42	0.39	0.33	0.46	0.78
Fair	0.25	0.42	0.32	0.45	0.06
Poor	0.06	0.07	0.03	0.11	0.69
Has health insurance	0.78	0.37	0.38	0.51	0.00

Source: Survey administered in South and East, Los Angeles, CA in the summer of 2010
Note: Statistically significant p-values are highlighted in bold.

health insurance. These difference were statistically significant at α=0.05, (*p*-value=0.00). In terms of outcomes of interest, statistically significant means difference between native and foreign-born populations existed for times of fast food intake per week. This difference was statistically significant α=0.05, (*p*-value=0.005). No statistically significant differences were identified in the amount of fruits, vegetables or sodas consumed.

Table IV shows the results of the ordered logit regression model. This regression pictures the changes on dietary and physical activity behaviors among native and foreign-born populations based on the number of years of US residence. According to these results, immi-

Table IV
Ordered logit regression analysis: Years of US residence and changes in nutrition behavior (reference group: US-born population)

	Odds Ratio	Robust standard errors
Tracks calories	1.778	-0.863
Moderate/Intense physical activity	0.757*	-0.00778
Fruits per day	0.810‡	-0.0758
Vegetables per day	0.935	-0.21
Sodas per week	0.925*	-5.57E-06
Times of fast food intake per week	1.131*	-0.0529
Affords "balanced" meals	3.309*	-1.354
Looks for labels when shopping	1.403	-0.303
Latino	2.500‡	-1.013
Age	0.998	-0.0223
Female	0.598‡	-0.157
Married	1.34	-1.298
Annual income	1.000*	-3.26E-06
Years of schooling	0.880*	-0.0211
BMI	0.998	-0.0379
Current-weight age 18	1.010*	-0.00231
Trying to lose weight	0.642*	-0.0724
Considers him/herself overweight	1.382‡	-0.255
Diabetes diagnosed	0.444*	-0.00564
Worse health status	2.213*	-0.253
Has health insurance	0.253*	-0.119
Constant	22.84*	-9.092

Note: Model with observations from South LA (market with menu labels in prepared food available at the food court) and East LA (market without menu labels in prepared food options available at the food court). Standard errors were clustered by market
* $p<0.01$
‡ $p<0.05$

grant cohorts with more time of US residence were more likely to consume fast food (OR: 1.13, p-value=0.00), to afford balanced meals (OR: 3.31, p-value=0.00), to have a higher weight differential between their current weight and their weight at age 18 (OR: 1.01, p=0.00) and to consider him/herself overweight (OR: 1.382, p-value=0.05). By contrast, immigrant cohorts with more time of US residence are less likely to engage in moderate/intense physical activity (OR: 0.757, p-value=0.00), to consume fruits (OR: 0.810, p-value=0.05), to drink sodas (0.925, p-value=0.01) and to try losing weight (OR: 0.642, p=0.00).

The regression model in table IV accounts for different socio-economic and demographic covariates. According to these results, sampled immigrants with more time of US residence are more likely to be Latino (OR: 2.5, p=0.05), and to report worse health status (OR: 2.21, p-value=0.00). Conversely, survey respondents with more time of US residence are less likely to be female (OR: 0.598, p=0.05), to have been diagnosed with diabetes (OR: 0.444, p-value=0.00) and to have health insurance coverage (OR: 0.253, p=0.00). Sensitivity tests using non-robust standard errors and ordered probit regression models were omitted for brevity since all statistical terms are identical to those in table IV, but they are available upon request.

Discussion

The first objective of this study was to investigate the self-reported influence of menu labeling on food choices among MLP patrons. This comparison showed that while a majority of individuals noticed the food caloric information, only 38% of the surveyed population claimed that this information changed their food choices. Two possible explanations for this outcome can be either the use of multiple criteria, besides good nutrition, when it comes to ordering food in restaurants, and menu labeling understanding. In the first case, individuals may not always be interested in minimizing the number of calories they consume when eating out, particularly if they are rewarding themselves by eating in a restaurant. Other criteria such as taste and cost may be more important for individuals when it comes to ordering food out. In the second case, not all individuals may have the complete understanding of how many calories they need to consume and how they can use menu labeling to their advantage.

Among those individuals who reported using food caloric information to guide their food choices, the majority of them decided to order something with fewer calories. Interestingly, one of the main predictors of reported influence of menu labeling on food choices was reading labels while shopping. This finding would suggest that previous exposure to nutritional information could be associated with an increased probability that individuals will take advantage of menu labeling information in chain restaurants and vending machines. This finding would support the argument that nutrition literacy may increase the effectiveness of menu labeling at reducing caloric consumption.[15] Future research should focus on how increased nutrition literacy can interplay with other factors that are important for individuals when they eat out such as taste, costs, stress, peer effects, among others. It also raises questions on whether displaying the number of calories is the most effective information to disclose in menu labels.

The second comparison that was implemented in this study focused on dietary differences between US-

born and immigrant individuals. The study findings support the hypothesis of gradual convergence in health outcomes and behaviors between native and foreign-born individuals, even after income, age and other important factors are being taken into consideration.[16] Particularly worrisome was the finding that immigrant populations were statistically more likely to eat food in fast food restaurants. This type of food vendors is commonly identified as one of the main triggers of obesity and overweight due to its high caloric content and poor nutritional value.[17]

In addition, immigrants from cohorts with longer US residence are less likely to practice moderate/intense physical activity and eat less fruits per day compared to more recently arrived immigrants, even though they declared a higher probability of affording balanced meals. On a positive note, immigrants who have resided in the US more years are more likely to afford "balanced" meals and less likely to drink soda compared to more recently arrived immigrants. These findings suggest that an increased income effect not necessarily translates into nutrition/health behaviors that are conducive to preventing obesity and overweight.

New research in this area is needed to estimate the cost-effectiveness of food caloric labeling among different types of providers, especially those who cater to populations that are increasingly at risk of obesity and overweight.[6] This information could also be useful to design interventions that increase menu-labeling literacy and awareness among minority and immigrant population. Future research should also focus on ways of linking menu labeling literacy with programs and interventions that aim at promoting lifestyles changes by supporting prevention and better management of chronic disease conditions such as heart disease, diabetes and obesity.

Study limitations

The cross-sectional nature of the study limits comparisons across time. Measures are self-reported, which is subject to measurement error. While this study was adequately powered for statistical inference, its convenience sample design and its sample characteristics constraints the generalizability of the results.

Conclusions

Minority and foreign-born individuals use food caloric information in restaurants and other environments differently due to education, language barriers and cultural factors. These differences can influence the effectiveness of the mandate to disclose food caloric information that is part of the ACA implementation. The present study compared two samples of immigrant and minority populations with different exposure to food caloric information in two LA public markets. Our findings suggest that familiarity with labels while shopping for groceries is a statistically significant predictor of reported influence of menu labeling at the food court of the public market where caloric information for prepared food options was available. We also investigated whether nativity was associated with menu labeling influence on food choices and health behaviors. Our findings show that even though nativity was not a significant predictor of menu labeling influence on food choices, we identify nutrition and health behavior convergence between immigrant and US-born populations the longer immigrants reside in the United States.

Acknowledgments

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