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Generation status as a determinant of influenza vaccination among Mexican-identified adults in California, 2011–12

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ABSTRACT

First generation Latinos often have better health behaviors and outcomes than second and third generation Latinos. This study examined the correlates of seasonal influenza vaccinations among Mexican-identified (Mexican) adults, who make up the largest Latino subgroup in California. A sample of Mexican adults (N = 7493) from the 2011–12 California Interview Health Survey was used to compare the odds of first, second, and third generation Mexicans receiving influenza vaccinations in the past year. We performed a logistic regression taking into account socio-demographic characteristics, health status, and access to care. We repeated the analysis after stratifying for nativity, and then age. Being a second (odds ratio (OR) = 0.74, confidence interval (CI): 0.59, 0.92) and third generation or higher (OR = 0.66, CI: 0.51, 0.86) Mexican was associated with lower odds of getting an influenza vaccination compared to first generation Mexicans. Having a chronic disease, and access to care was associated with higher odds of vaccination, while lower age was associated with lower odds of vaccination among both US-, and foreign-born Mexicans. Given that the majority of Mexicans in California are US-born, the fact that being second- and third-generation Mexicans was associated with lower influenza vaccination rates is of significant concern.

Seasonal influenza (the flu) has a substantial economic impact due to lost productivity and absence from work (Klepser, 2014). Routine annual flu vaccinations are recommended by the CDC for all persons 6 months or older, and who do not have contraindications (Jefferson et al., 2014). Despite the CDC's recommendations, the general US population has low vaccination rates, with Latinos having lower vaccination rates than non-Hispanic (NH) Whites (Lu et al., 2014). Latinos are the fastest growing ethnic group in the US and CA (Livingston et al., 2008; U.S. Census Bureau, 2015), so understanding the correlates of vaccination is important for increasing vaccine uptake in this group.

Research suggests that younger and low SES individuals are less likely to be vaccinated (Gu and Sood, 2011; Takayama et al., 2012). Second generation Latinos tend to be younger, but also tend to be more educated, and primarily English speaking when compared to first generation Latinos (Hugo Lopez, 2009; Pew Hispanic Center, 2009; Taylor et al., 2012). Because correlates vary by generation (Gu and Sood, 2011; Takayama et al., 2012; Nagata et al., 2013), flu vaccination may also vary by generation status among Latinos. Patterns of health behaviors among Latinos suggest an immigrants' paradox, where low acculturated, low SES, first generation individuals engage in higher rates of protective behaviors than more highly acculturated, higher SES, second generation individuals (Aguirre-Molina and Molina, 2011). This pattern may extend to vaccination. On the other hand, prior research also suggests that insurance coverage is the strongest predictor of flu vaccination in the US (Takayama et al., 2012), and first generation Latinos are more likely to be uninsured than second generation Latinos (Rodriguez et al., 2009).

While understanding if flu vaccination varies by generational status among Latinos is important, most literature on preventive care utilization treats Latinos as a homogenous group even though Mexicans and Central Americans are less likely to utilize preventive care than other Latino subgroups (Vargas Bustamante et al., 2010). This ethnic subgroup difference in preventive care utilization has significant implications for the US health-care system, as Mexicans are the largest Latino subgroup in the US, and made up 30.7% of CA's population in 2010 (CA is the state with the largest number of Latinos in the US) (U.S. Census Bureau, 2015).

This study examines whether or not flu vaccination is correlated with generational status among Mexicans in CA. Additionally, this study examines other potential demographic, health status, and healthcare access correlates of flu vaccination among Mexican adults

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in CA. By examining the vaccination behaviors by generation among Mexicans in California, we may identify trends to be studied in other states with significant Mexican populations, and important groups for whom targeted interventions may be needed to increase vaccination rates.

Methods

We used persons who selected "Mexican" as their ethnicity (N = 7493) in the 2011–2012 adult public use file of the California Health Interview Survey (CHIS) (California Health Interview Survey, 2014). The primary outcome was whether or not the respondent had received an influenza vaccine in the last 12 months. Independent variables were drawn from prior literature (Gu and Sood, 2011; Nagata et al., 2013), and included demographic categories, income to federal poverty level (FPL) ratio (household income divided by FPL) divided into poor (0–0.99), near poor (1–1.99), or above poor (2.00 or above), employment status (employed or not employed), family type includes children, self-rated health is good (self-rated health is described as excellent, very good, or good), diagnosis with one of 8 chronic diseases (asthma, diabetes or prediabetes, heart disease, stroke, arthritis, gout, or lupus), and respondent is a monolingual English-speaker (speaks primarily English at home). We controlled for healthcare utilization via number of doctor visits in the previous year, and for insurance status, both of which have been shown to be correlates of flu vaccination (Nagata et al., 2013). Generational status was measured using the individuals' and their parents' place of birth (either in the US or in a foreign country). Foreign-born Mexicans were classified as first generation, second generation was defined as US-born with one foreign-born parent, and third or above generation (referred to as third) was defined as US-born with two US-born parents.

We used multivariable binary logistic regressions, weighted according to CHIS directions (UCLA), to test the association between

generational status and receiving an influenza vaccine among all Mexican-identified adults (N = 7466, Model 1). We then ran two analyses examining the determinants of receiving an influenza vaccine, stratifying by nativity. First we examined US-born Mexican-identified adults in California (N = 3142, Model 2), then foreign-born Mexican-identified adults in California (N = 4324, Model 3). Because vaccination behavior is likely to vary by age we stratified our sample by age (18 to 39, 40–64, and 65 or older). Calculations were done in Stata/MP 13 for Windows. Variance inflation factors for all models were under 2.

Results

The seasonal influenza vaccination rate among all Californians was 36% (online appendix Table A). Among NH Whites it was 41%, but among all Mexicans it was 30%, (online appendix Table A). Vaccination rates were 26% (95% CI: 25, 28) among US-born Mexicans and 33% (95% CI: 30, 35) among foreign-born Mexicans (Table 1). Vaccination rates increased across age groups consistently both among all Californians and among all Mexicans. US-born Mexicans were on average more than 7 years younger than foreign-born Mexicans (mean age being 35.7 (95% CI: 35, 36.4)), for US-born and 43.4 (95% CI: 43, 43.9) for foreign-born. 67% of US-born Mexicans were ages 18–39, while 59% of foreign-born Mexicans were older than 40. SES varied as well, as 58% of foreign-born Mexicans had less than a high school education, while the mean income to FPL ratio was 1.78 (the mean for US-born individuals was 3.16). When looking at language status, more US-born individuals were English monolinguals (37%) compared to foreign-born individuals (2%)

When examining all Mexican-identified adults (Table 2, model 1), we found being a second (OR = 0.74, CI: 0.59, 0.92) and third generation (OR = 0.66, CI: 0.51, 0.86) Mexican was associated with lower odds of receiving an influenza vaccination compared to first generation individuals. Being 18 to 39 (OR = 0.20, CI: 0.15, 0.26), 40 to 64 (OR =

Table 1
Demographic characteristics of Mexican-identified persons in the California Health Interview Survey 2011–12, stratified by nativity.

	All Mexicans	US-born Mexicans	Foreign-born Mexicans
	N = 7493	N = 3162	N = 4331
	% or M (95% CI)	% or M (95% CI)	% or M (95% CI)
Flu vaccination in last 12 months	30% (28, 31)	**26% (25, 28)**	**33% (30, 35)**
Generation			
First generation	55% (53, 56)		
Second generation	29% (28, 31)	64% (62, 67)	Not applicable
Third generation	16% (15, 17)	36% (33, 38)	Not applicable
English monolingual (only English spoken at home)	18% (17, 19)	**37% (35, 40)**	**2% (2, 3)**
Age (continuous)	39.9 (39.5, 40.3)	**35.7 (35, 36.4)**	**43.4 (43, 43.9)**
18 to 39	53% (52, 54)	67% (65, 69)	41% (39, 43)
40 to 64	40% (38, 41]	26% (24, 28)	52% (50, 54)
65 or older	7% (7, 8)	7% (6, 9)	7% (6, 8)
Female	51% (50, 52)	51% (49, 53)	51% (49, 53)
Married	49% (47, 50)	**34% (32, 37)**	**60% (58, 63)**
Employed	59% (58, 61)	60% (57, 62)	59% (57, 61)
Family type includes children	46% (45, 48)	**34% (31, 37)**	**56% (54, 59)**
Education			
Below high school	37% (36, 38)	**12% (11, 14)**	**58% (56, 60)**
High school	29% (27, 30)	**37% (35, 39)**	**2% (20, 23)**
Some college	22% (21, 23)	**33% (31, 36)**	**13% (11, 15)**
College plus	12% (11, 13)	**17% (16, 20)**	**7% (6, 8)**
Income to federal poverty level ratio (continuous)		**3.16 (3.00, 3.32)**	**1.78 (1.69, 1.88)**
0 to 99 (poor)	30% (29, 32)	22% (20, 24)	37% (35, 40)
1.00 to 1.99 (near poor)	29% (28, 31)	23% (20, 25)	35% (33, 37)
2.00 or above* (above poor)	40% (39, 42)	56% (53, 59)	28% (25, 30)
Insured	70% (68, 71)	**77% (74, 79)**	**64% (62, 67)**
Number of doctor visits in the last 12 months		**2.66 (2.53, 2.79)**	**2.41 (2.28, 2.53)**
Self-rated health is good	72% (70, 73)	**81% (79, 83)**	**64% (62, 66)**
Diagnosed with chronic disease	26% (25, 28)	25% (23, 28)	27% (25, 29)

Notes: We report the unweighted N, and weighted proportions and means in this table. Data has been weighted per CHIS directions.
Bolded entries are significantly different at the p ≤ 0.05 level. We tested whether or not US- and foreign-born Mexicans varied on the various characteristics presented above. Due to the weighted nature of the data testing OLS and logistic regressions were used to test for differences. While age and income to federal poverty threshold level was categorized in our analysis, we tested whether or not the means of these variables varied between the two groups. Education was not available as a continuous variable.

Table 2
Analysis of the correlates of receiving a flu vaccination among (a) all, (b) US-born, and (c) foreign-born Mexican identified persons in California 2011–12 using a binary logistic regression (Source: California Health Interview Survey, 2011–12).

	Model 1 All Mexicans	Model 2 US-born	Model 3 Foreign-born
	OR (95% CI)	OR (95% CI)	OR (95% CI)
Generation			
First generation	1		
Second generation	**0.74 (0.59, 0.92)**	1	
Third generation*	**0.66 (0.51, 0.86)**	0.88 (0.67, 1.16)	
English monolingual (only English spoken at home)			
Yes	0.94 (0.74, 1.19)	0.9 (0.70, 1.17)	1.09 (0.63, 1.90)
No	1	1	1
Age			
18 to 39	**0.20 (0.15, 0.26)**	**0.15 (0.10, 0.22)**	**0.25 (0.16, 0.37)**
40 to 64	**0.25 (0.19, 0.32)**	**0.23 (0.15, 0.34)**	**0.27 (0.18, 0.4)**
65 or older*	1	1	1
Sex			
Female	**1.19 (1.04, 1.37)**	1.13 (0.89, 1.43)	1.23 (1.00, 1.52)
Male	1	1	1
Married			
Yes	**1.27 (1.07, 1.51)**	1.14 (0.91, 1.43)	**1.35 (1.07, 1.71)**
No	1	1	1
Employed			
Yes	1.03 (0.86, 1.23)	1.05 (0.79, 1.4)	1.05 (0.81, 1.36)
No	1	1	1
Family type includes children			
Yes	**0.85 (0.72, 1.00)**	0.92 (0.70, 1.22)	**0.78 (0.62, 0.97)**
No	1	1	1
Education			
Below high school	0.95 (0.71, 1.25)	0.8 (0.50, 1.30)	1.12 (0.77, 1.62)
High school	0.99 (0.76, 1.28)	0.89 (0.64, 1.24)	1.16 (0.79, 1.70)
Some college	0.87 (0.69, 1.11)	0.86 (0.62, 1.19)	0.92 (0.61, 1.39)
College plus*	1	1	1
Income to federal poverty level ratio			
0 to 99 (poor)	0.98 (0.79, 1.21)	0.81 (0.56, 1.16)	1.10 (0.80, 1.50)
1.00 to 1.99 (near poor)	1.12 (0.91, 1.37)	1.23 (0.91, 1.68)	1.11 (0.84, 1.47)
2.00 or above* (above poor)	1	1	1
Diagnosed with chronic disease			
Yes	**1.35 (1.14, 1.59)**	**1.38 (1.08, 1.76)**	**1.31 (1.05, 1.64)**
No	1	1	1
Self - rated health is good to excellent			
Yes	1.11 (0.92, 1.34)	1.13 (0.84, 1.52)	1.10 (0.87, 1.40)
No	1	1	1
Number of doctor visits in the last 12 months	**1.14 (1.10, 1.18)**	**1.12 (1.07, 1.18)**	**1.16 (1.10, 1.21)**
Insured			
Yes	**1.86 (1.53, 2.26)**	**1.87 (1.36, 2.58)**	**1.87 (1.47, 2.38)**
No	1	1	1
Constant	0.66 (0.39, 1.11)	0.68 (0.36, 1.27)	0.46 (0.22, 0.96)
N	7466	3142	4324

Notes: * Reference group. Bolded items are significant at the p ≤ 0.05 level.

0.25, CI: 0.19, 0.32) female (OR = 1.19, CI: 1.04, 1.37), married (OR = 1.27, CI: 1.07, 1.51), and having a family with children (OR = .85, CI: .72, 1.00) were associated with lower odds of receiving a vaccination. Having more doctor visits in the past year (OR = 1.14, CI: 1.10, 1.18), being currently insured (OR = 1.86, CI: 1.53, 2.26), and having chronic diseases (OR = 1.35, CI: 1.14, 1.59) was associated with higher odds of receiving a vaccination.

When we stratified our analysis by nativity (Table 1, models 2 and 3), we found that being 18–39 (OR = 0.15, CI: 0.10, 0.22) or 40 to 64 (OR = 0.23, CI: 0.15, 0.34) was associated with lower odds of receiving a flu vaccination among US-born Mexicans. Having more doctor visits (OR = 1.12, CI: 1.07, 1.18), being currently insured (OR = 1.87, CI: 1.36, 2.58), and having a chronic diseases (OR = 1.38, CI: 1.08, 1.76) was associated with higher odds of receiving a vaccination. Among foreign-born Mexicans, being 18–39 (OR = 0.25, CI: 0.16, 0.37) or 40

to 64 (OR = 0.27, CI: 0.18, 0.40) was associated with lower odds of receiving a flu vaccination. Being married (OR = 1.35, CI: 1.07, 1.71), having a family with children (OR = .78, CI: 62, .97) having more doctor visits (OR = 1.16, CI: 1.10, 1.21), being currently insured (OR = 1.87, CI: 1.47, 2.38) and having chronic diseases (OR = 1.31, CI: 1.05, 1.64) was associated with higher odds of receiving a vaccination.

We found that the impact of generational status and correlates of vaccination varied when we stratified our sample by age (see Table B online appendix). Among 18–39-year-olds, being second generation (OR: 0.70, CI: 0.53, 0.94) was associated with lower odds of receiving the vaccine, while the number of doctor visits (OR: 1.17, CI: 1.11, 1.23) being currently insured (access to care) (OR: 1.56, CI: 1.20, 2.03) was associated with higher odds of vaccination. Among 40–64 year-olds being third generation (OR: 0.67, CI: 0.48, 0.94) and in a family with children (OR: 0.66, CI: 0.53, 0.84) was associated with lower

odds of being vaccinated, while being female (OR: 1.31, CI: 1.06, 1.62) and having a chronic disease (OR: 1.55, CI: 1.21, 1.99), being insured, (OR: 2.23, CI: 1.64, 3.03), and number of doctor visits (OR: 1.11, CI: 1.06, 1.16) was associated with higher odds of vaccination. Among those 65 or older, generational status was not significant, but having some college education (OR: 0.30, CI: 0.13, 0.71) was associated with lower odds of being vaccinated. Having good self-rated health (OR: 1.65, CI: 1.05, 2.60), being insured (OR: 6.09, CI 1.74, 21.33), and number of doctor visits (OR: 1.11, CI: 1.02, 1.20) was associated with higher odds of vaccination.

Discussion

Flu vaccine uptake among the general Mexican population in California was low (30%, appendix Table A), and uptake was even lower among US-born Mexicans (26%, Table 1). Age and generational status were significant correlates of vaccination, as was insurance status and care utilization. Correlates varied by nativity, as marital status and being in a family with children were associated with vaccination among foreign-born Mexicans only.

Our study found that being second and third generation Mexican was associated with 30% lower odds of being vaccinated after controlling for other socio-demographic, insurance, and health care utilization factors. As a result, we found an immigrants' paradox exists among Mexicans in CA. A possible explanation for this generational gap could be that public health campaigns often target Latinos through the use of Spanish media campaigns (Gombeski et al., 1982; Hu et al., 1989; Ramirez, 2013). Policies encouraging English-language media campaigns to use themes that appeal to Mexicans (71% of US-born, Mexican respondents consume English-only language media (California Health Interview Survey, 2014)) may increase vaccination among second and third generation Mexicans.

Age was a significant correlate of vaccination, as being under 65 was associated with over 70% lower odds of being vaccinated among both US-, and foreign-born Mexicans. Because individuals ages 18–39 made up 67% of US-born Mexicans in CA, the fact that higher generational status and lower age are correlates of lower odds of vaccination means that younger, second generation individuals should be particular targets of policies to increase flu vaccine uptake.

Our study confirms that having a chronic condition, being insured, and higher care utilization are correlated with vaccine uptake among both US-, and foreign-born Mexicans, and not just the general US population (Takayama et al., 2012). Being insured or having a higher number of doctor visits was also associated with increased odds of receiving an influenza vaccination across all age groups. In our sample, 64% of foreign-born and 77% of US born Mexicans reported being insured. Research shows a significant number of Latinos with insurance do not have a usual source of care (Livingston et al., 2008). While the Affordable Care Act has increased insurance coverage, low rates of having a usual source of care, coupled with low utilization rates of preventive medicine (Vargas Bustamante et al., 2010), suggests that expanding insurance coverage may not be enough to increase vaccination among Mexicans in CA. Our finding that increased utilization of care was correlated with vaccination across nativity and age suggest increased insurance coverage may need to be coupled with policies promoting education campaigns around healthcare utilization and preventive care to promote flu vaccination.

Limitations of this study include a cross-sectional, self-report design that might have influenced ability to recall vaccination status, particularly since Latinos have been found to have higher odds of over-reporting vaccinations (Rolnick et al., 2013). The CHIS collected a limited amount of health information on respondents, so only information on eight chronic conditions was available. Results reflect patterns for Mexicans living in California and are not generalizable to other Latino subgroups or other states; however, analysis of other Latino groups or Mexican populations living in other states may reveal similar patterns.

Due to the limitations of the data, we could not control for health risk beliefs and cultural values (Nagata et al., 2013).

Conclusion

When targeting Mexican populations in California, failure to account for generational differences among Mexicans may hamper flu vaccination. Given that the majority of Mexicans in California are younger, US-born individuals, English language campaigns that specifically target second generation individuals could increase Mexican vaccination coverage rates. Campaigns to increase care utilization may also increase vaccine uptake among Mexicans. While California has well-established Mexican communities and Latino health support services, our findings suggest that we may find similar gaps between first and second/third generation individuals in other states with significant Mexican populations.

Authors contribution

VDR designed the initial analyses; MG expanded the analyses. All authors approved these analyses, and contributed to the design of subsequent analyses. MG coded the data and ran the final analyses. JM interpreted the analysis and JM wrote the first draft of the manuscript under MG's supervision. All authors approved the interpretation of the analysis, helped to revise the manuscript, and gave final approval of the version to be published.

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Conflict of interest statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

Transparency document

The Transparency document associated with this article can be found, in the online version.

Appendix A. Supplementary data

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.pmedr.2015.11.006.

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