

MINI-REVIEW

Embracing the Diversity of Latinx Communities to Promote Vaccinations

Alexander C. Ortiz^{a,*}, Kathleen M. Akgün^{b,c}, and Isabel S. Bazan^c

^aDepartment of Medicine, Yale School of Medicine, New Haven, CT, USA; ^bPulmonary, Critical Care and Sleep Medicine, VA Connecticut Healthcare System, West Haven, CT, USA; ^cSection of Pulmonary, Critical Care, & Sleep Medicine, Yale University School of Medicine, New Haven, CT, USA

While vaccine hesitancy is well documented in the literature among the Latinx community, little attention or effort is given to the nuances among the members of individual communities, such as country of origin, immigration status, generational status, primary language, race, age, sex, gender, or rural residence and how these complexities affect vaccine messaging and uptake. We have evidence that this heterogeneity causes differences in access to healthcare, attitudes towards vaccines, and degree of health disparities. In this review we will describe their impact on vaccination rates in the Latinx community, highlighting missed opportunities for public health outreach, and how targeted messaging could improve vaccine uptake.

INTRODUCTION

The COVID-19 pandemic has highlighted the challenges in overcoming vaccine hesitancy, with particular focus placed on marginalized minority groups [1-4]. As the largest ethnic minority group in the country, vaccine hesitancy is particularly relevant to the Latinx community [5-7]. The urgency of overcoming these challenges is especially glaring as COVID-19 death rates have increased among Latinx persons from 26.8% in May 2020 to 33.4% in January 2022; for comparison, deaths among non-Hispanic Whites during the same timeframe decreased from 41.4% to 40.6%, respectively [8].

The grouping of Hispanic/Latino, or “Latinx,” is flawed when considering the nuances surrounding vac-

cine hesitancy. Oversimplification and disregard of the vast diversity that exists among the 62.1 million Latinx persons in the US remains at the root of barriers to improving targeted vaccine campaigns. Ill-informed public policy makers, health officials, and clinicians may apply a one-size-fits-all approach to closing the vaccine gap, without addressing the diverse needs of Latinx people. Each Latinx subgroup represents diverse countries of origin with different immigration stories, acculturation experiences, and unique cultural beliefs.

We identify major sources of diversity among Latinx communities in the US, consider how this diversity contributes to vaccine gaps, and review existing evidence and opportunities to address disparities. The US Latinx community is one of the most diverse in the world and

*To whom all correspondence should be addressed: Alexander Ortiz, MD, MS, Department of Internal Medicine, Yale University School of Medicine; Email: Alexander.ortiz@yale.edu.

Abbreviations: COVID-19, Coronavirus disease-2019; ICE, US Immigration and Customs Enforcement; HPV, Human Papilloma Virus.

Keywords: Vaccine hesitancy, vaccine uptake, vaccine messaging, Hispanic/Latino, disparities, health inequity

Author Contributions: All authors made a substantial contribution to the concept of the manuscript. ACO drafted the manuscript, all authors edited and approved the final version of the manuscript.

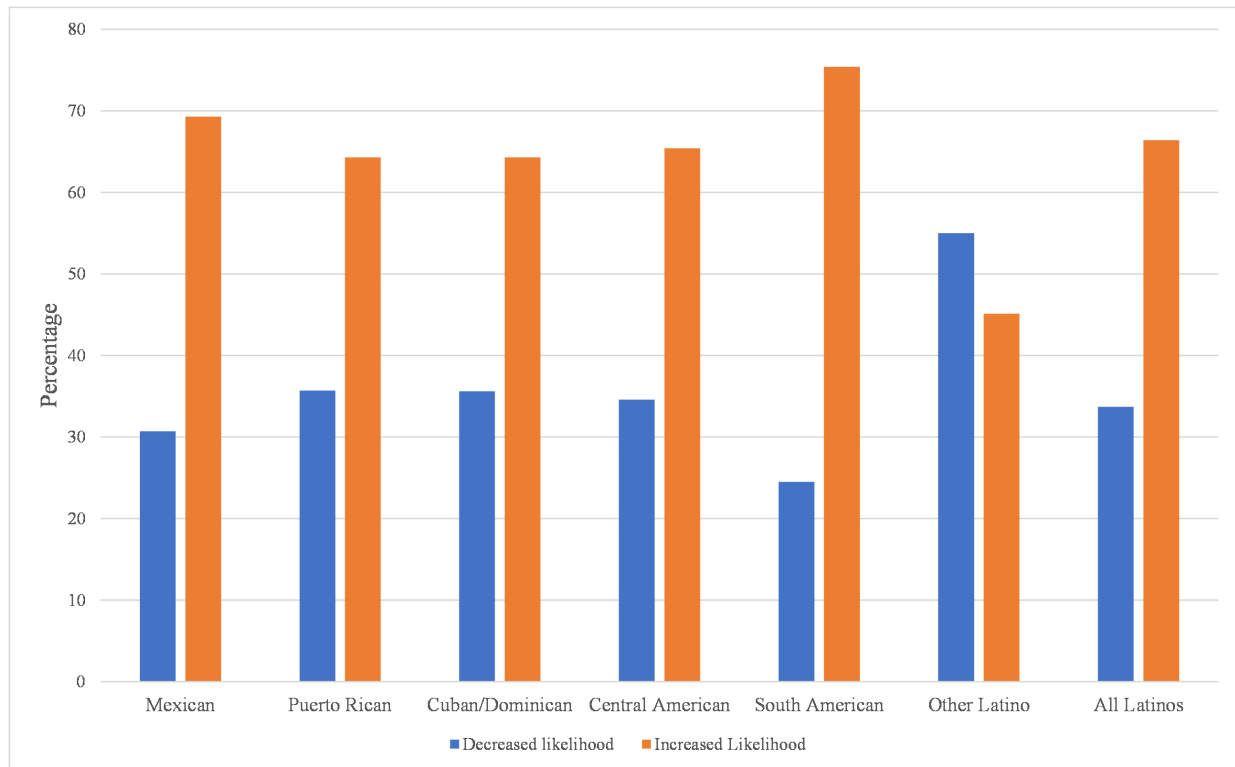


Figure 1. Intention to Vaccinate Among Latinx Subgroups. Figure adapted from data from Nápoles et al., 2021 [17]. The “increased likelihood grouping” is a combination of respondents who answered that they were moderately, very, or extremely likely to get the vaccine. The “decreased likelihood grouping” is a combination of respondents who answered that they were slightly or not at all likely to get the vaccine.

it is impossible to discuss the infinite nuances of this population. Even referring to Latinx persons as a singular community is conceptually flawed; however, without better alternatives, we will use this designation. We aim to focus on factors most related to vaccine disparities including country of origin, immigration status, generational status, primary language, race, age, sex, gender, and urban versus rural residence.

COUNTRY OF ORIGIN

In the 2020 US census, the Hispanic/Latino population grew 23%, to 62.1 million people, from 2010 [9]. This includes people with origins from approximately 20 distinct countries. Upon reaching the US, their cultural, ethnic, and racial diversity is demographically erased as they are relabeled with the generic term of “Hispanic” or “Latino,” a politically motivated designation from the Nixon administration of the 1970s [10]. This term was invented to group geographically-diverse, Spanish-speaking populations, with often-conflicting needs: Mexicans in the west, Puerto Ricans in the northeast, and Cubans in the southeast [11]. While this term has benefited government efforts in tracking immigration patterns and changing demographics, it serves as an enduring hindrance

when addressing health disparities.

Pre-COVID-19 pandemic, Latinx vaccine disparities studies were either too demographically broad, placing all Latinx persons into a single category, or narrow, focusing primarily on those from a single country [7,12,13]. This overlooks effective vaccine messaging to increase uptake, as differences in health risk factors vary across Latinx subgroups [14,15]. In a 2021 cross-sectional analysis of 472,521 Latin American adults from 20 countries, COVID-19 vaccine hesitancy was associated with female sex, non-binary gender identity, economic insecurity (self-reported worry about household finances in the coming month), and rural residence [16]. Notably, it found differences between countries regarding intention to vaccinate with highest rates among those from Mexico at 88.4% and lowest among those from Paraguay at 64.6%. Countries also responded differently to the source of vaccine messaging. Countries such as Uruguay and Costa Rica had increased probability of vaccine acceptance when messaging came from a local health worker. By contrast, respondents from Mexico, among others, were more likely to vaccinate if recommended by the World Health Organization. Participants also reported varying trust in government health officials as sources of vaccine messaging by country of origin, although low

trust in politicians was shared across countries [16]. The political climate of an immigrant's country of origin may also impact their political affiliation in the US, which may also impact vaccine hesitancy.

Domestically, a recent study looked at racial and ethnic disparities in intent to vaccinate against COVID-19, attempting to identify Latinx participants by national origin [17]. Lowest vaccination rates (self-reported slight or no intention) were reported among generic groupings of "Other Latino" (55.0%) and "Cuban/Dominican" (35.6%). Conversely, the generic term of "South American" had the highest intent to vaccinate with 60.8% (very or extremely likely to receive the vaccine). While far from ideal categorizations, these data illustrate significant differences between these subgroups in their intention to vaccinate (Figure 1). With Salvadorans now representing the third largest domestic Latinx group and Venezuelans the fastest growing, the use of these broad categories makes it difficult to determine true subgroup differences and what factors influence the decision to vaccinate [18]. It is vital that future vaccine disparities research, as well as vaccine messaging, utilize more specific national origin categorizations moving forward.

IMMIGRATION STATUS

The narrative around Latinx immigration is often watered down to a binary: documented and undocumented, with each designation carrying its own burden of cultural assumptions and implicit biases. The Latinx community includes persons whose immigration status ranges from citizens to residents to non-immigrants and undocumented people. Within this group are people on a variety of visas and special statuses; however, 79% of Latinx persons are US citizens [18].

Globally, migrants have higher rates of vaccine-preventable diseases and lower immunization rates [19]. In the US, studies have shown vaccination rates are lower among foreign-born vs US-born adults [20]. Data are sparse regarding the effect of the wide range of US immigration statuses on vaccination hesitancy and uptake; however, a review of immigrant attitudes towards the COVID-19 vaccine revealed increased intention to vaccinate among immigrant families [21].

Both an individual's immigration status, as well as that of their family members, play a role in the decision to vaccinate. Factors negatively influencing vaccination uptake among Latinx communities include fear of federal authorities such as ICE (US Immigration and Customs Enforcement), lack of access to information, and community disinformation [21,22]. These factors should be considered when discussing vaccine hesitancy and messaging in the Latinx community, as well as more nuanced exploration to explain greater and less vaccination hesi-

tancy in these communities.

GENERATIONAL STATUS

Assimilation or acculturation is a complex concept, and its impact on vaccine hesitancy is incompletely understood. The effect of acculturation may be influenced by local culture, political affiliation, socioeconomic status, or other factors. One study found that higher acculturation scores were associated with decreased likelihood of regular influenza vaccination [23].

There are wide cultural differences in the US Latinx community by generation. A recent immigrant may retain a large part of the culture from their native country after emigrating to the US, whereas a first or second generation Latinx person is often raised in two cultures, and each subsequent generation may identify less with their Latinx heritage. The Pew Research Center found that 97% of foreign-born Americans with Hispanic ancestry identify as Hispanic, whereas by the fourth generation or higher that number drops to only 50% [24]. Evidence also suggests that generational differences have clinically significant consequences on health behaviors and outcomes. For example, children of immigrant families experience fewer health problems such as accidents, ear infections, and asthma compared with children of US-born Latinx families [25]. First generation immigrant adolescents have lower rates of obesity, asthma, and fewer high-risk behaviors such as drug use, violence, and early sexual activity, though high-risk behaviors increase as time in the US increases [26]. Worsened health outcomes in subsequent generations suggests a protective effect of immigrant culture initially that may fade with assimilation into American culture, further impacted by low socioeconomic status, poverty, and effects of systemic racism. Additionally, assimilating to local political affiliations may have negative impacts on vaccine uptake as vaccinations are increasingly politicized [27,28]. Grouping immigrants with those who have been in the US for generations ignores cultural differences that evolve over time in the US and misses opportunities to improve vaccine messaging.

PRIMARY LANGUAGE

Language plays an essential role in effective vaccine messaging. Latinx people are often thought to be bilingual; however, a survey from the Pew Research Center reported that 38% are monolingual Spanish- and 25% are monolingual English-speaking [29]. Additionally, there is a substantial and increasing population of Latin American immigrants who primarily speak their Indigenous language, proficient in neither English nor Spanish. There is little tracking of the proportion of Indigenous-speaking Latinx people in the US; however, they are often isolat-

ed, with decreased access to health services compared to their Spanish-speaking neighbors [30].

The effect of primary language on vaccination uptake has been explored with the influenza, pneumococcal, and HPV vaccines in linguistically diverse communities [31-33]. Increased vaccination rates were associated with English as the primary language, increased English proficiency, and not requiring an interpreter in the healthcare setting. Interestingly, this trend has reversed with COVID-19. In a 2021 study, intent to obtain the COVID-19 vaccine was higher among Spanish-speaking than English-speaking Latinx participants [17]. Beyond vaccinations, data has shown that patient-provider language concordance results in improved healthcare access and patient-related health outcomes, thus highlighting the importance of training a diverse clinician workforce [34]. With misinformation playing a large role in the uptake of the COVID-19 vaccine, it is noteworthy that consumption of Spanish-language news media has been associated with increased trust in journalists and positive assessment of state and local officials, thus presenting additional opportunities to improve vaccine messaging [35].

During healthcare encounters, communication in the patient's primary language is crucial. The proper use of translators in the clinical setting remains vital, and specific consideration should be given to patients who primarily speak Indigenous languages – avoiding assumptions that a Hispanic surname indicates Spanish proficiency regarding topics like vaccination.

RACE

While colloquially the Latinx community is often discussed interchangeably as a racial group, it is important to understand that it is an ethnic designation. There are Latinx people of every race and racial admixture [36]. Deep racial disparities are not unique to US-based communities; people of primarily Indigenous and African descent are often socioeconomically and politically disenfranchised, with decreased access to healthcare throughout Latin America [37,38]. While the US census allows participants to select both an ethnicity and a race, for Latinx people, ethnicity most often supersedes race in health disparities literature, overlooking the interplay of race on vaccination and ethnicity. According to a 2016 review, health disparities are experienced by Afro-Latinx people in their mental and physical health compared to White-Latinx people [39]. However, the study designs of the majority of healthcare disparities research makes it difficult to measure more subtle disparities that may be affecting Afro-Latinx, Indigenous-Latinx, and Asian-Latinx people differentially. More data is needed on how race factors into the disparities in vaccination gaps within the Latinx community.

AGE

Young adults are historically a difficult group to reach for vaccination campaigns and uptake [40,41]. The Latinx community has the youngest median age of any racial or ethnic group in the US at 30-years-old [9]. Since Latinx persons make up 33.6% of COVID-19 deaths in patients under 49-years-old, despite only representing 22.6% of this age group, it is especially imperative to focus on the causes of low vaccine uptake among young Latinx adults [8]. A study among adult Mexican men identified 40-years and older age groups reported higher rates of vaccination within the previous year compared to those under 40. In this same study, men <40-years-old misunderstood the indications for vaccination and equated it more to an illness *treatment* than an illness *prevention* [12]. Lower insurance rates and lack of an established healthcare home further exacerbate lower vaccination rates in younger age groups [42]. Another 2021 study found 24% of young adults expressed COVID-19 vaccine hesitancy due to concerns over safety, side effects, and the belief that other people needed vaccination more than they did [43]. When messaging vaccines towards younger Latinx patients it is important to consider how age may factor into their decision to vaccinate and to tailor messages to address these concerns.

SEX AND GENDER

Barriers to vaccination are complex and tied to traditional gender roles, especially in the Latinx community. The effect of gender on vaccination uptake in the Latinx community is not well studied; however, males of all ethnicities are less likely than females to receive preventative health care [44,45]. Vaccination campaigns have traditionally targeted children and pregnant women and often exclude men from targeted messaging [46]. A 2020 study of adult Mexican men's attitudes towards vaccinations identified major barriers including insufficient knowledge of vaccine benefits and means of obtainment [12]. Latinx men are also more likely than Latinx women to be uninsured due to their type of employment [47]. Other possible barriers include the identities that adult men have as family providers and as such prioritize work over health [48]. Among Latinx women subgroups, confidence in vaccine safety, healthcare coverage, income, and religious participation were associated with increased likelihood of vaccination. Latinx men are less likely than women to receive the COVID-19 vaccine [46]. Among the contributing barriers, data suggests men are more vulnerable to online misinformation regarding vaccine indications, effectiveness, and safety [49].

Lastly, there is a gap in the literature regarding the health of Latinx sexual and gender minorities [50]. We

know that these subgroups face larger health disparities, are less likely to be insured, and this likely extends to vaccination uptake.

With the complex role that gender plays in vaccination, it must be considered when messaging vaccines to the Latinx community and identifying trusted messengers during public health outreach efforts.

URBAN VS RURAL COMMUNITIES

Historically, the narrative around disparities in the Latinx community centered on large cities. However, due to job opportunities in construction, farming, and meat-packing, the Latinx community has become increasingly rural [51]. The seasonality of many of these occupations leads to more frequent migratory lifestyles among these workers, where families may move every few months, further complicating demographic quantification of rural Latinx persons. The literature is yet to appropriately characterize rural Latinx communities; however, what is known is that Latinx persons make up approximately 8% of rural counties and are more likely to be impoverished, uninsured, and discriminated against in the healthcare setting compared to rural non-Hispanic Whites [52-55].

Rural communities have lower vaccination rates for preventable diseases such as influenza and pneumonia [56,57]. This has magnified during the COVID-19 pandemic where rural counties have lower vaccination rates and higher death rates [58,59]. There is little data comparing healthcare disparities between urban and rural Latinx populations, though they are likely distinct in their needs. For example, a study comparing Latinx persons in urban (Los Angeles and Houston) and rural (Lower Rio Grande and Yakima Valleys) areas revealed differences in HPV disease and vaccination awareness [60]. For COVID-19 vaccination, Hispanics in non-metropolitan areas are 13% less likely to be vaccinated compared with metropolitan Hispanics [61].

With demographic shifts in rural America, it is crucial that vaccine messaging and outreach in these communities considers special circumstances that surround rural Latinx people including socioeconomic factors, access to healthcare, and discrimination. It is also important that vaccine messaging targeting urban Latinx communities is not directly ported over to rural ones as their needs, concerns, and barriers are distinct from urban settings.

CONCLUSION AND OUTLOOKS

With the health disparities facing the Latinx community and projections that this community will grow to >100 million people by 2050, it is imperative that we improve vaccine uptake in the community. The only way to increase vaccine uptake moving forward is to recognize

the vast diversity within the Latinx community and focus more targeted messaging to subgroups with the widest vaccination gaps. It is crucial that research into racial and ethnic health disparities account for Latinx subgroups and develop more representative and nuanced constructs than the current, overly simplistic federal census categorizations. With improved data on Latinx subgroups we can begin to improve messaging and close the Latinx vaccination gap through vaccine campaigns that address the root causes of vaccine hesitancy and access.

REFERENCES

1. Sanchez GR, Peña JM. Online: Brookings. 2021. (cited 2021). Available from: <https://www.brookings.edu/blog/how-we-rise/2021/01/25/skepticism-and-mistrust-challenge-covid-vaccine-uptake-for-latinos/>
2. Sesin C. Mistrust, disinformation among Latinos on Covid vaccine worries Hispanic doctors Online: NBC News; 2020 (cited 2021 November 17). Available from: <https://www.nbcnews.com/news/latino/mistrust-disinformation-among-latinos-covid-vaccine-worries-hispanic-doctors-n1251636>
3. Webb Hooper M, Nápoles AM, Pérez-Stable EJ. No Populations Left Behind: Vaccine Hesitancy and Equitable Diffusion of Effective COVID-19 Vaccines. *J Gen Intern Med.* 2021 Jul;36(7):2130–3.
4. Dottle R, Tartar A, Kessler A. Texas Now Only U.S. State Where White People Aren't Largest Vaccinated Group. *Covid-19 Tracker Online: Bloomberg*; 2021 (cited 2021 November 17). Available from: <https://www.bloomberg.com/graphics/covid-vaccine-tracker-global-distribution/us-vaccine-demographics.html>
5. Chavez N. Latinos still scrambling due to Covid-19 in New Jersey are on high alert over Omicron Online: CNN; 2021 (cited 2022 January 3rd). Available from: <https://www.cnn.com/2021/12/24/us/new-jersey-omicron-coronavirus-latinos/index.html>
6. Merschel M. For many Hispanic people, vaccination worries are a matter of trust Online: American Heart Association News; 2021 (cited 2021 December 23). Available from: <https://www.heart.org/en/news/2021/09/15/for-many-hispanic-people-vaccination-worries-are-a-matter-of-trust>
7. Cassidy D, Castaneda X, Ruelas MR, Vostrejs MM, Andrews T, Osorio L. Pandemics and vaccines: perceptions, reactions, and lessons learned from hard-to-reach Latinos and the H1N1 campaign. *J Health Care Poor Underserved.* 2012 Aug;23(3):1106–22.
8. National Center for Health Statistics. Provisional Death Counts for Coronavirus Disease 2019 (COVID-19) Online. Centers for Disease Control and Prevention; 2022. (cited 2022 Jan 28).
9. Jones N, Marks R, Ramirez R, Rios-Vargas M. 2020 Census Illuminates Racial and Ethnic Composition of the Country Online: United States Census Bureau; 2021 (cited 2021 December 21). Available from: <https://www.census.gov/library/stories/2021/08/improved-race-ethnicity-measures-reveal-united-states-population-much-more-multiracial.html>

10. Gershon L. Where Did the Term “Hispanic” Come From? Online: JSTOR Daily; 2020 (cited 2022 January 29). Available from: <https://daily.jstor.org/where-did-the-term-hispanic-come-from/>
11. Meraji SM. Who Put The ‘Hispanic’ In Hispanic Heritage Month? Online: National Public Radio; 2017 (cited 2022 January 29). Available from: <https://www.npr.org/sections/codeswitch/2017/09/23/552036578/who-put-the-hispanic-in-hispanic-heritage-month>
12. Snyder VN, Garcia D, Pineda R, Calderon J, Diaz D, Morales A, et al. Exploring Why Adult Mexican Males Do Not Get Vaccinated: Implications for COVID-19 Preventive Actions. *Hisp J Behav Sci.* 2020;42(4):515–27.
13. Phippard AE, Kimura AC, Lopez K, Kriner P. Understanding knowledge, attitudes, and behaviors related to influenza and the influenza vaccine in US-Mexico border communities. *J Immigr Minor Health.* 2013 Aug;15(4):741–6.
14. Daviglius ML, Talavera GA, Avilés-Santa ML, Allison M, Cai J, Criqui MH, et al. Prevalence of major cardiovascular risk factors and cardiovascular diseases among Hispanic/Latino individuals of diverse backgrounds in the United States. *JAMA.* 2012 Nov;308(17):1775–84.
15. Cokkinides VE, Bandi P, Siegel RL, Jemal A. Cancer-related risk factors and preventive measures in US Hispanics/Latinos. *CA Cancer J Clin.* 2012;62(6):353–63. Epub 20120917. <https://doi.org/10.3322/caac.21155>.
16. Urrunaga-Pastor D, Bendezu-Quispe G, Herrera-Añazco P, Uyen-Cateriano A, Toro-Huamanchumo CJ, Rodriguez-Morales AJ, et al. Cross-sectional analysis of COVID-19 vaccine intention, perceptions and hesitancy across Latin America and the Caribbean. *Travel Med Infect Dis.* 2021;41:102059. Epub 20210416. <https://doi.org/10.1016/j.tmaid.2021.102059>.
17. Nápoles MA, Stewart AL, Strassle PD, Quintero S, Bonilla J, Alhomsí A, et al. Racial/ethnic disparities in intent to obtain a COVID-19 vaccine: A nationally representative United States survey. *Prev Med Rep.* 2021;24:101653. Epub 20211127. <https://doi.org/10.1016/j.pmedr.2021.101653>.
18. Noe-Bustamante L. Key facts about U.S. Hispanics and their diverse heritage Online: Pew Research Center; 2019 (cited 2022 January 27). Available from: <https://www.pewresearch.org/fact-tank/2019/09/16/key-facts-about-u-s-hispanics/>
19. Charania NA, Gaze N, Kung JY, Brooks S. Vaccine-preventable diseases and immunisation coverage among migrants and non-migrants worldwide: A scoping review of published literature, 2006 to 2016. *Vaccine.* 2019;37(20):2661–9. Epub 20190406. <https://doi.org/10.1016/j.vaccine.2019.04.001>.
20. Lu PJ, Rodriguez-Lainz A, O’Halloran A, Greby S, Williams WW. Adult vaccination disparities among foreign-born populations in the U.S. *Am J Prev Med.* 2014;47(6):722–33. Epub. 2012;20141007: <https://doi.org/10.1016/j.amepre.2014.08.009>.
21. Mcfadden SM, Demeke J, Dada D, Wilton L, Wang M, Vlahov D, et al. Confidence and Hesitancy During the Early Roll-out of COVID-19 Vaccines Among Black, Hispanic, and Undocumented Immigrant Communities: a Review. *J Urban Health.* 2021: <https://doi.org/10.1007/s11524-021-00588-1>.
22. Soto-Vásquez AD, Gonzalez AA, Shi W, Garcia N, Hernandez J. COVID-19: Contextualizing Misinformation Flows in a US Latinx Border Community (Media and Communication During COVID-19). *Howard J Commun.* 2021;32(5):421–39.
23. Moran MB, Chatterjee JS, Frank LB, Murphy ST, Zhao N, Chen N, et al. Individual, Cultural and Structural Predictors of Vaccine Safety Confidence and Influenza Vaccination Among Hispanic Female Subgroups. *J Immigr Minor Health.* 2017 Aug;19(4):790–800.
24. Lopez MH, Krostad JM, Passel JS. Who is Hispanic? Online: Pew Research Center; 2021 (cited 2021 December 21). Available from: <https://www.pewresearch.org/fact-tank/2021/09/23/who-is-hispanic/>
25. National Research Council Institute of Medicine. From Generation to Generation: The Health and Well-Being of Children in Immigrant Families. Washington (DC). US: National Academies Press; 1998. 314 pp.
26. Brindis C, Wolfe AL, McCarter V, Ball S, Starbuck-Morales S. The associations between immigrant status and risk-behavior patterns in Latino adolescents. *J Adolesc Health.* 1995 Aug;17(2):99–105.
27. Fridman A, Gershon R, Gneezy A. COVID-19 and vaccine hesitancy: A longitudinal study. *PLoS One.* 2021;16(4):e0250123. Epub 20210416. <https://doi.org/10.1371/journal.pone.0250123>.
28. Suryadevara M, Bonville CA, Cibula DA, Domachowske JB, Suryadevara AC. Associations between population based voting trends during the 2016 US presidential election and adolescent vaccination rates. *Vaccine.* 2019;37(9):1160–7. Epub 20190126. <https://doi.org/10.1016/j.vaccine.2019.01.036>.
29. Krogstad JM, Gonzalez-Barrera A. A majority of English-speaking Hispanics in the U.S. are bilingual Online: Pew Research Center; 2015 (cited 2022 January 15). Available from: <https://www.pewresearch.org/fact-tank/2015/03/24/a-majority-of-english-speaking-hispanics-in-the-u-s-are-bilingual/>
30. Semple K. Immigrants Who Speak Indigenous Languages Encounter Isolation Online: The New York Times; 2014 (cited 2022 January 5). Available from: <https://www.nytimes.com/2014/07/11/nyregion/immigrants-who-speak-indigenous-mexican-languages-encounter-isolation.html>
31. Mendoza De la Garza M, Quigg SM, De Lorenzo SB, Schroeder DR, Takahashi PY. Vaccination Rates Among Patients Age 65 Years and Older Who Require Interpreter Services in the State of Minnesota. *J Community Health.* 2021 Aug;46(4):703–10.
32. Farmer GC, Papachristou T, Gotz C, Yu F, Tong D. Does primary language influence the receipt of influenza and pneumococcal immunizations among community-dwelling older adults? *J Aging Health.* 2010 Dec;22(8):1158–83.
33. Yi JK, Anderson KO, Le YC, Escobar-Chaves SL, Reyes-Gibby CC. English proficiency, knowledge, and receipt of HPV vaccine in Vietnamese-American women. *J Community Health.* 2013 Oct;38(5):805–11.
34. Lor M, Martinez GA. Scoping review: Definitions and outcomes of patient-provider language concordance in healthcare. *Patient Educ Couns.* 2020;103(10):1883–901. Epub 20200524. <https://doi.org/10.1016/j.pec.2020.05.025>.

35. Gomez-Aguinaga B, Oaxaca AL, Barreto MA, Sanchez GR. Spanish-Language News Consumption and Latino Reactions to COVID-19. *Int J Environ Res Public Health*. 2021 Sep;18(18):9629.
36. Gonzalez JB. Breakdown of Latin American Ethnic Groups Online: Latino Stories; 2020 (cited 2022 January 27). Available from: [https://latinostories.com/latin-american-ethnic-groups/#:~:text=Ethnic%20Groups%20\(%25\)&text=European%20\(mostly%20Spanish%20and%20Italian,0.4%25%20\(2010%20est.\)&text=mestizo%2052.9%25%2C%20Creole%2025.9%25,0.3%25%20\(2010%20est.\)](https://latinostories.com/latin-american-ethnic-groups/#:~:text=Ethnic%20Groups%20(%25)&text=European%20(mostly%20Spanish%20and%20Italian,0.4%25%20(2010%20est.)&text=mestizo%2052.9%25%2C%20Creole%2025.9%25,0.3%25%20(2010%20est.))
37. Rodriguez Mega E. How the mixed-race mestizo myth warped science in Latin America Online: *Nature*; 2021 (cited 2022 January 29).
38. Giuffrida A. Racial and ethnic disparities in Latin America and the Caribbean: a literature review. *Divers Equal Health Care*. 2010; Epub 2010 Apr 1.
39. Cuevas AG, Dawson BA, Williams DR. Race and Skin Color in Latino Health: An Analytic Review. *Am J Public Health*. 2016 Dec;106(12):2131–6.
40. Bednarczyk RA, Chu SL, Sickler H, Shaw J, Nadeau JA, McNutt LA. Low uptake of influenza vaccine among university students: evaluating predictors beyond cost and safety concerns. *Vaccine*. 2015;33(14):1659–63. Epub 20150226. <https://doi.org/10.1016/j.vaccine.2015.02.033>.
41. Ahmed F, Singleton JA, Franks AL. Clinical practice. Influenza vaccination for healthy young adults. *N Engl J Med*. 2001 Nov;345(21):1543–7.
42. Adams SH, Newacheck PW, Park MJ, Brindis CD, Irwin CE Jr. Health insurance across vulnerable ages: patterns and disparities from adolescence to the early 30s. *Pediatrics*. 2007 May;119(5):e1033–9.
43. Adams SH, Schaub JP, Nagata JM, Park MJ, Brindis CD, Irwin CE Jr. Young Adult Perspectives on COVID-19 Vaccinations. *J Adolesc Health*. 2021 Sep;69(3):511–4.
44. Baker P. Who self-cares wins: an updated perspective on men and self-care. *Trends Urol Men's Health*. 2019;10(3):19–22.
45. Mitchell JA, Perry R. Disparities in patient-centered communication for Black and Latino men in the U.S.: cross-sectional results from the 2010 health and retirement study. *PLoS One*. 2020 Sep;15(9):e0238356.
46. Reyes-Velarde A. Many Latino men haven't gotten vaccinated. Misinformation, fear and busy lives are factors Online: *Los Angeles Times*; 2021 (cited 2022 January 26). Available from: <https://www.latimes.com/california/story/2021-05-19/why-many-latino-men-havent-gotten-vaccinated-yet>
47. Monheit AC, Vistnes JP. Race/ethnicity and health insurance status: 1987 and 1996. *Med Care Res Rev*. 2000;57(Suppl 1):11–35.
48. Daniel-Ulloa J, Sun C, Rhodes SD. The intersection between masculinity and health among rural immigrant Latino men. *Int J Mens Health*. 2017;16(1):84–95.
49. Saling LL, Mallal D, Scholer F, Skelton R, Spina D. No one is immune to misinformation: an investigation of misinformation sharing by subscribers to a fact-checking newsletter. *PLoS One*. 2021 Aug;16(8):e0255702.
50. Rhodes SD, Mann-Jackson L, Alonzo J, Bell JC, Tanner A, Martinez O, et al. The Health and Well-Being of Latinx Sexual and Gender Minorities in the USA: A Call to Action. In: Martinez AD, Rhodes SD, editors. *New and Emerging Issues in Latinx Health*. Online: Springer; 2020. p. 217–36. https://doi.org/10.1007/978-3-030-24043-1_10.
51. Rowlands D, Love H. Mapping rural America's diversity and demographic change Online: The Brookings Institution; 2021 (cited 2022 January 23). Available from: <https://www.brookings.edu/blog/the-avenue/2021/09/28/mapping-rural-americas-diversity-and-demographic-change/>
52. Parker K, Menasce Horowitz J, Brown A, Fry R, Cohn Dv, Igielnik R. Demographic and economic trends in urban, suburban, and rural communities Online: Pew Research Center; 2018 (cited 2022 January 28). Available from: <https://www.pewresearch.org/social-trends/2018/05/22/demographic-and-economic-trends-in-urban-suburban-and-rural-communities/>
53. Wiltz T. Hispanic Poverty in Rural Areas Challenges States Online: The Pew Charitable Trusts; 2015 (cited 2022 January 6). Available from: <https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2015/08/14/hispanic-poverty-in-rural-areas-challenges-states>
54. Figueroa CM, Medvin A, Phrathep BD, Thomas CW, Ortiz J, Bushy A. Healthcare Needs of U.S. Rural Latinos: A Growing, Multicultural Population. *Online J Rural Nurs Health Care*. 2021;21(1):24–48.
55. López-Cevallos DF, Harvey SM. Foreign-Born Latinos Living in Rural Areas are more likely to Experience Health Care Discrimination: Results from Proyecto de Salud para Latinos. *J Immigr Minor Health*. 2016 Aug;18(4):928–34.
56. Zhai Y, Santibanez TA, Kahn KE, Srivastav A, Walker TY, Singleton JA. Rural, urban, and suburban differences in influenza vaccination coverage among children. *Vaccine*. 2020;38(48):7596–602. Epub 20201015. <https://doi.org/10.1016/j.vaccine.2020.10.030>.
57. Bennett KJ, Bellinger JD, Probst JC. Receipt of influenza and pneumonia vaccinations: the dual disparity of rural minorities. *J Am Geriatr Soc*. 2010 Oct;58(10):1896–902.
58. Bernstein E, DeRycke E, Akgün K. Racial and Rural Disparities in COVID-19 Vaccination Uptake in a National Sample of Veterans. *Annual Meeting of the American Thoracic Society*; San Francisco, California, USA, 2022.
59. Sun Y, Monnat SM. Rural-urban and within-rural differences in COVID-19 vaccination rates. *J Rural Health*. 2021 Sep;jrhl.12625.
60. Glenn BA, Tsui J, Coronado GD, Fernandez ME, Savas LS, Taylor VM, et al. Understanding HPV vaccination among Latino adolescent girls in three U.S. regions. *J Immigr Minor Health*. 2015 Feb;17(1):96–103.
61. Sanders A, McGranahan D. COVID-19 Vaccinations in Rural America Online: United States Department of Agriculture; 2022 (cited 2022 January 23). Available from: <https://www.ers.usda.gov/covid-19/rural-america/covid-19-vaccinations-in-rural-america/>