

Drinking Water Practices Among Latino Families in North Carolina: A qualitative study

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Abstract

Purpose: The purpose of this study was to understand the beliefs, experiences and practices regarding drinking water among the North Carolina (NC) Latino community, and to gather information on what would make effective messages to promote fluoridated community water (CW) consumption among Latino families.

Methods: Phone interviews were conducted with Latino stakeholders, consisting of parents of young children and key community informants (n=15). The interviews were audio-recorded, and transcripts were analyzed qualitatively using Atlas.ti.8 software.

Results: Major themes emerging from the interviews included: poor characteristics of CW misconceptions and lack of knowledge about CW fluoridation and safety, ingrained culture/upbringing that devalued CW consumption, and reasons for consuming CW. Participants suggested that effective efforts to promote fluoridated CW consumption among the NC Latino community should be implemented in a variety of formats and involve a collaborative approach between Spanish-speaking health professionals and community workers.

Conclusion: Successful promotion of fluoridated CW consumption among NC Latino communities requires engagement of both health professionals and community stakeholders. Effective interventions aimed to promote fluoridated CW consumption need to be widespread, informative, persuasive, credible, culturally sensitive, and interactive.

Keywords: community water fluoridation, cultural competency, dental caries, fluoride, health promotion, public health

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Introduction

The introduction of community water (CW) fluoridation, one of the ten great public health achievements of the last century, has contributed to large decrements in dental caries burden among both children and adults since the 1960s.¹⁻⁴ Despite the well-known benefits of fluoridated CW, the consumption of bottled water (BW) has more than doubled over the last fifteen years.⁵ Of note, Mexico was the leading country worldwide in per capita consumption of BW in 2016, consuming approximately 71% more BW than individuals in the U.S.⁶

Multiple studies have shown BW consumption and tap water avoidance are prevalent practices among Latino communities.⁷⁻¹⁰ It has been reported that these practices may stem from pervasive beliefs that CW is unsafe to drink due to

its perceived poor aesthetic qualities, such as cloudy appearance, salty taste, or smell of chlorine.^{7,8} Others have reported not drinking CW due to fear of getting sick.⁹ Such perceptions and beliefs are thought to originate from personal experiences with natural disasters, such as hurricanes and earthquakes, and historical events, such as cholera outbreaks, which actually rendered the tap water in certain regions of Latin America unsafe to drink for extended periods of time.¹⁰⁻¹⁵

While BW consumption may be viewed by many as a harmless, or even a healthy practice, relying on BW as one's primary source of drinking water can have negative oral health implications. Most BWs do not contain the optimal 0.7ppm level of fluoride recommended by the United States

(U.S.) Public Health Service for dental caries prevention.¹⁶ Some BWs have also been shown to be slightly acidic, nearly reaching the critical pH for dentin (6.5) and enamel (5.5), which can have implications for dental erosion.^{17,18}

According to data from the 2015-2016 National Health and Nutrition Examination Survey (NHANES), Hispanic children experience the highest rate of dental caries among youth aged 2-19 years in the U.S.^{2,19} The disproportionate burden of dental disease among Hispanic children, combined with the popularity of BW among Latino communities, suggests that fluoridated CW is underutilized among the Latino population segment, and that the youth who are at greatest risk for dental caries are among those least likely to reap the oral health benefits of CW fluoridation.

In the state of North Carolina (NC), 9% of its residents are Hispanic or Latino, with 25% of Latino residents living in the state's two most urban counties: Mecklenburg and Wake.²⁰ It is noteworthy that 88% of NC residents on CW systems received optimal levels of fluoride in their CW in 2014, indicating its relatively easy accessibility.²¹ While studies have reported on various barriers preventing families from consuming CW, no study to date has reported attempts to design an intervention to promote switching from BW to CW consumption among Latino families.

There is ample motivation to advocate for fluoridated CW among Latino communities in NC. The purpose of this study was to better understand Latino community members' and stakeholders' experiences and views on fluoridated CW versus BW consumption in NC, and gain insight into their perspectives on what they consider are effective messages and strategies for promoting fluoridated CW consumption among Latino communities.

Methods

Qualitative data collected for this study relied on phone interviews with Latino stakeholders in NC using semi-structured interview guides. Institutional Review Board (IRB) approval was obtained (#16-2716) from the University of North Carolina (UNC), Chapel Hill. Participants were recruited from two broad stakeholder categories, "community members" or "key informants." Community members (CM) were defined as parents of elementary school-aged Latino children. Inclusion criteria for this group included fluency in the English language, self-identification as Hispanic/Latino(a), and parental status of at least one elementary school-aged child. Key informants (KI) were defined as professionals who worked, to a considerable degree, with Latino families and children in NC. Inclusion criteria included fluency in the

English language and professional status involving frequent interactions with Latino families and children.

Interview guides were created for each stakeholder group; the guide for community members included probing and open-ended questions about their child/children's water-drinking practices, determinants, and influences. The guide for key informants included questions about their observations of Latino children's water-drinking practices and their insights on what would make effective messages and strategies for promoting fluoridated CW consumption among Latino families. Pilot interviews were conducted with one community member and one key informant, and the interview guides were further iteratively revised during the course of the study.

In collaboration with faculty members and students from the University of North Carolina (UNC) Adams School of Dentistry, the investigators utilized purposive sampling to recruit an initial group of Latino community members from various municipalities and key informants from different professions in order to gain a diverse representation of perspectives. Snowball sampling was used thereafter to recruit additional participants via word of mouth; initial participants recommended and provided contacts of additional individuals who could provide valuable information as potential study participants. This process was continued until theoretical saturation was reached.

Interviews were conducted during daytime and evening according to the participant's availability and convenience. Verbal consent was obtained from each stakeholder prior to beginning the interview session and study participants were informed they would be mailed a \$20 gift card following their interview as compensation for their time. At the end of each session, uninformed or misinformed participants were presented facts about fluoridated CW and BW, and any fluoridated CW myths revealed were dispelled by the interviewer. All interviews were conducted by the same investigator (YO) between September and November of 2017, audio-recorded, transcribed verbatim, coded in vivo based on frequently used words, categorized into broad domains, and analyzed using Sandelowski's qualitative description framework²² with Atlas.ti 8 (Scientific Software Development GmbH) software.

Results

A total of 15 participants (10 community members and 5 key informants) were interviewed between September and November 2017. Interviews lasted between 20-45 minutes, with key informant interviews generally lasting longer than community member interviews. A majority of the community

members interviewed were first-generation immigrant parents of young children from Mexico or El Salvador. One member self-identified as Puerto Rican. Key informants included an English as a Second Language (ESL) elementary school teacher, Latino social advocates, a Spanish-speaking nurse from a local health center, and a Latino oral health sciences student. Recurring themes emerging from the interviews were organized into the following five domains: 1) poor characteristics of CW, 2) misconceptions and lack of knowledge about CW, 3) ingrained culture/upbringing that devalued CW consumption, 4) reasons for drinking CW, and 5) ideas for an intervention to effectively promote fluoridated CW consumption among Latino communities.

Poor characteristics of CW

While several Latino parents of elementary school-aged children believed that water was the best beverage option for their children's overall and dental health, most parents relied on sugar-sweetened beverages (e.g., juices and sodas) and BW as their primary beverage choice and did not allow their children to consume CW. A common influence of these practices was the belief that CW was unclean and unsafe to drink due to its aesthetic qualities related to discolored appearance, taste of chlorine, and unpleasant smell:

[CM #8]: *"The water wasn't clear in the cup, and in the clear cup you would see it kind of yellowish-orange. It wasn't clear."*

[CM #6]: *"My kids, my son does not like the flavor in it, the chlorine flavor, and so he would spit it back out and I'd have to give him the bottled."*

[CM #5]: *"To brush our teeth, you could sometimes smell, the water smelled weird, when you turned on the water."*

Misconceptions and lack of knowledge about CW fluoridation and safety

Other common reasons for parents discouraging their children from drinking CW were their mistrust or lack of knowledge regarding the sanitation process of public water, lack of awareness of the fluoridation of most CW systems, and lack of knowledge on the dental health benefits of fluoridated CW. Participants were forthright in voicing their uncertainties and concerns:

[CM #1]: *"Well, one of my questions about the water... They clean out the water and they make to run again to the community's house.... I would like to know more about that. I don't know how they clean, how they... if it's good to drink again or not because I don't understand [how] people do that."*

Interviewer: *"Community water fluoridation is when they add a little bit of fluoride to the water. And do you know what the purpose of that might be?"*

[CM #8]: *"Not really, I guess to clean it? I'm not sure."*

[CM #4]: *"We use reverse osmosis water because the fluoride is... Yeah I know for science, fluoride is good for your teeth. That's what they say. But the fluoride that came from earth is good for your teeth. Not the fluoride they add as a chemical... it is not good for your brain."*

Ingrained culture/upbringing that devalued CW consumption

In addition to the previously cited reasons for the underutilization of CW by the NC Latino community, a recurring theme linked to the growing popularity of BW over CW was the heavily ingrained habit of avoiding CW throughout the childhood of the interview participants, both in their native countries and in the U.S. In countries such as Mexico where the local tap water may be unpotable in some areas, a heavy emphasis was placed on avoiding tap water, and positive reinforcement was given to consuming beverages other than tap water, including BW, juices, and sodas. Fluoridated CW is considered to be the most advantageous beverage one can drink from a dental health standpoint in the U.S., however it may also be the most avoided beverage within parts of the NC Hispanic/Latino community:

[CM #6]: *"Well, just in our community in general, I think that the Hispanic community tends to think that... We come from a place where water, tap water, is not good, and you're told you shouldn't drink it. I think some of those beliefs come with people when they move here and then they still think that tap water is bad so they have to drink bottled water or buy gallon water. I think it's just a cultural thing."*

[KI #3]: *"Like I will say, honestly, it was shock for me. I mean, I was a child, but I remember that it was like odd that I could drink from the tap [here]. I mean that just seemed so revolutionary because it was very clear to me, it was like very ingrained when I was growing up that of course you can't drink the water from the tap, and so you just know that. And it takes a while to realize that it is okay."*

[KI #2]: *"...you go to somebody's house in a rural area, what they will offer you, which is like a treat, is a soda instead of water. Like who would want to drink water when you have access to something that's fancier? And I feel like that has stuck around a little bit, it's like a sign of celebration, it's something positive, it's a reward."*

Reasons for consuming CW

While the majority of interview participants reported drinking primarily or exclusively BW, a few supported consuming CW. Reasons included the affordability of CW, fewer adverse environmental impacts, trust in their local water company, and alternative options available to purifying CW, such as using a commercial water filter or boiling tap water:

[CM #2]: *“For me, tap water is better for the reasons I gave. You don’t have to pay for it. You avoid polluting with plastic bottles... I know that there is a risk, that there are probably things that we don’t know about the water from the tap. But I trust the [water sanitation] company...”*

[CM #2]: *“We use the... the container that has the filter inside it. We have the Brita... During the summer, I do the water from the fridge. And I think that there’s a filter there.”*

[CM #10]: *“We use tap water because in my mind, [when] you boil the water, you’re purifying it. So I just feel like it’s getting the chemicals out when you’re boiling hot water.”*

Ideas for an effective intervention promoting fluoridated CW

When participants were asked to offer their insight into what they believed may be effective ways to promote fluoridated CW consumption (where available) specifically among Latino families in NC, many voiced the importance of educating the public on the presence of fluoride in their CW and its dental health benefits. Some also suggested discussing the cost-saving benefits of switching from BW to fluoridated CW. Others stressed the importance of making messaging appealing to both parents and children when promoting fluoridated CW via use of visuals, as well as having the information delivered in their native language (i.e., Spanish) by expert community and health professionals in interactive settings (e.g., festivals, doctor’s and dental visits, radio shows, etc.) where they can be engaged and ask questions. They also preferred these interactions to take place in settings where transportation is not a barrier. Specific suggestions for interventions were categorized according to messages, deliverers, mode of delivery, and location of delivery.

Messages

[KI #5]: *“Look, it’s safe. It’s clean. It’s fluoride. It prevents cavities.”*

[KI #2]: *“Perhaps showing specific savings. Like, ‘so there’s a family of four and this is how much they spend a week on bottled water. If they only switched, this is how much they would save, and this is the impact that it would have on the kids’ teeth because of the fluoride.’”*

[CM #5]: *“...more pictures. More slides... so they can actually see what the differences of teeth of somebody that just drinks bottled water and then somebody that drinks tap water over their life.”*

Deliverers

[CM #10]: *“A Spanish-speaking dentist, assistant, just somebody that maybe... The ideal person would probably be the person working in that field. They’re studying it.”*

[KI #4]: *“Nonprofits that have a strong family base.”*

Mode of Delivery

[KI #1]: *“...if you somehow can get a professional on the radio station and you promote this space, 30-minute space or whatever, and ask the audience to call in with some questions... I think you will dissipate a lot of misunderstandings, misinformation, or whatever.”*

[KI #1]: *“...you grab a newspaper and it’s free... On those newspapers, they’re advertising for dentists and doctors and whatnot and lawyers, but also have topics about immigration and things like that... so I think people, parents with young children, or all kinds of children, are more likely to be receptive from newspaper than from the radio.”*

[CM #7]: *“Definitely the Internet, but I would look like in an organization [for] anything with like a factual website that I can actually get the correct information...”*

Location of Delivery

[KI #3]: *“It seems more beneficial doing like a community outreach type approach. Like meeting the families, like if there’s a gathering in their neighborhood, or the common area, or a church, or a community center, something like that, where transportation is not a barrier. And also making it known and well-advertised that it will be delivered, the information will be given, in their native language.”*

[KI #2]: *“...having folks at festivals... having an opportunity where people can talk to somebody [who] can explain why [drinking tap water is] important and share information and provide goodies.”*

Discussion

The findings of this study support the perception that a considerable proportion of Latino community members in NC may avoid drinking CW due to its unpleasant aesthetic qualities, misconceptions about its safety, lack of awareness about fluoridation (where applicable) and its dental health benefits, and ingrained habits and reinforcements on drinking any beverage rather than plain CW. These results

are consistent with an earlier report of a study conducted in rural California, in which Latina mothers of young children did not drink municipal water due to its colored appearance and salty or chlorine taste and smell.⁸ Similar findings were reported at a university in Mexico, wherein approximately 75% of the university staff and student participants reported drinking exclusively BW, primarily due to the poor aesthetic features of CW, and secondarily due to health concerns.¹⁰ In another study of primarily low-income Latino parents, about 30% of parents reported avoiding drinking CW while approximately 40% stated they never gave it to their children for fear that it may cause illnesses.⁹

A recurring theme in this body of literature is the concept that unpleasant qualitative features of CW (e.g., cloudy appearance and taste/scent of chlorine) are signs of unpotable water that should be avoided. While this may be an instinctive assumption, it is fallacious. First, according to the U.S. Environmental Protection Agency (EPA), when CW is treated, chlorine is added as an oxidizing and disinfecting agent to control microbial growth and to eliminate various harmful contaminants and poor qualitative factors, such as color, taste and odors. Ironically, the EPA has also reported that while increasing chlorine dosages raises its disinfecting and oxidizing power, it could potentially create a less-than-favorable taste and odor.²³ As a result, the taste and smell of chlorine are frequently misinterpreted as dangerous, when they are actually indicators of greater safety. This misinterpretation can negatively direct individuals to alternative sources of hydration, such as BW, sugar-sweetened beverages, resulting in inadequate fluoride exposure, increased sugar intake, or xerostomia due to dehydration; all ultimately making individuals more susceptible to dental caries.

In addition to experiences relating to the poor aesthetic features of CW, experiences growing up in geographically vulnerable areas of Latin America with compromised CW safety, may likely have reinforced reliance on BWs. Examples of such experiences include Hurricane Maria in 2017, the 1985 and 2017 earthquakes in Mexico City, or the 1991 cholera epidemic.¹⁰⁻¹⁵

Results of this study support that Latino cultures, life experiences, and upbringing largely impact beverage consumption practices, and that these conditioned practices may be difficult to modify. Based on these findings, more intentional efforts should be made in dental clinical settings to assess patients' beverage consumption practices, including focused dental history questionnaires, patient interviews, or dietary assessments. Dental professionals should actively initiate regular discussions particularly with Latino patients

identifying as BW drinkers to provide information on the multiple benefits of CW. Dental professionals should also be aware that culturally ingrained beliefs that CW is harmful may not change overnight. Initiatives promoting CW consumption are crucial in community settings as well. According to participants' responses, educational interventions should highlight the specific benefits of CW including caries prevention, optimal oral and systemic health, cost-savings, and low environmental impact. Messages should be delivered in Spanish in a variety of formats (e.g., visual, audio, written and interactive) for maximum effectiveness. Dental hygienists can play a key role in all of these education efforts.

This study had limitations. First, the major emerging themes from this qualitative study cannot be generalized to the entire heterogeneous Latino population, including more recent immigrants, due to the limited ethnic backgrounds represented in the sample and due to inclusion criteria of fluency in the English language. Second, because the interviews were conducted by phone, this mode of data collection automatically excluded community members who either could not afford or did not have access to a phone due to financial constraints. This aspect of the study protocol may have excluded stakeholders unable to afford to buy BW and relied solely on CW due to finances. In spite of these limitations, findings from this study provide some clarity on Latino families' rationales and motivations for their drinking water choices and provides insights into possible future steps for educational interventions and research.

Conclusion

The participants of this qualitative study provided valuable insights into the phenomenon of BW preference among Latino communities and offered ideas for promoting the change to consuming fluoridated CW. Various strategies and messages were suggested on how to best educate NC Latino families on the benefits of fluoridated CW. Results indicate that a multifaceted approach involving expert opinion (e.g., medical, dental, allied health and water treatment professionals) using various forms of delivery (e.g., one-on-one interactions, flyers, news/radio segments) in multiple settings (e.g., Latino health fairs, dental visits, school functions) in a language that Latino families can understand (i.e., Spanish), is key to promoting successful behavioral change. Effective interventions aimed to promote fluoridated CW consumption need to be informative, persuasive, credible, culturally sensitive, and interactive. Efforts must be collaborative and inter-professional, involving not only that of health professionals, but also of other community stakeholders (e.g., school teachers and non-profit agencies).

Further research will be needed to test the effectiveness of these strategies on behavioral change among this population segment.

Disclosure

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