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Authors

Hoeft, Kristin S
Guerra, Claudia
Gonzalez-Vargas, M Judy
[et al.](#)

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Rural Latino caregivers' beliefs and behaviors around their children's salt consumption

Kristin S. Hoefft^a, Claudia Guerra^b, M. Judy Gonzalez-Vargas^a, and Judith C. Barker^c

Kristin S. Hoefft: Kristin.Hoefft@ucsf.edu; Claudia Guerra: cguerra@cc.ucsf.edu; M. Judy Gonzalez-Vargas: gonzalezj@ucsf.edu; Judith C. Barker: barkerj@dahsm.ucsf.edu

^aDepartment of Preventive and Restorative Dental Sciences & Center to Address Disparities in Children's Oral Health (CAN DO), University of California, San Francisco, Box 0850, 3333 California Street, Suite 485, San Francisco, CA 94143, United States

^bDepartments of Anthropology, History & Social Medicine & Preventive and Restorative Dental Sciences & Center to Address Disparities in Children's Oral Health (CAN DO), University of California, San Francisco, Box 0128, 1450 3rd Street, Room HD556, San Francisco, CA 94158, United States

^cDepartments of Anthropology, History & Social Medicine and Preventive & Restorative Dental Sciences & Center to Address Children's Oral Health Disparities, University of California, San Francisco, 3333 California Street, Laurel Heights Suite 485, San Francisco, CA 94143-0850, United States, Tel: 415-476-7241, Fax: 415-476-6715

Abstract

Background—Prevalence of high blood pressure has been increasing in U.S. children, with implications for long term health consequences. Sodium consumption, a modifiable risk factor for high blood pressure, is above recommended limits and increasing. Very little is known about Latino caregiver beliefs and behaviors around their children's salt consumption.

Methods—In California's Central Valley, qualitative interviews in Spanish investigated low-income caregivers' views and understandings of their children's dietary salt consumption. Thirty individual interviews and 5 focus groups were conducted ($N=61$). Interview transcripts were translated and transcribed, coded and thematically analyzed.

Results—Seven primary topic areas around children's salt intake and its impact on health were identified: children's favorite foods, children's dietary salt sources, superiority of home-cooked foods, salty and sweet foods, managing salt for health, developing children's tastes, and adding salt added at the table. Parents recognize common sources of sodium such as "junk food" and processed food and made efforts to limit their children's consumption of these foods, but may

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Corresponding Author: Ms. Kristin S. Hoefft, University of California, San Francisco, Department of Preventive and Restorative Dental Sciences, Center to Address Disparities in Children's Oral Health (CAN DO), Box 0850, 3333 California Street, Suite 485, San Francisco, CA 94143, United States, Phone: + 4158906209, Kristin.Hoefft@ucsf.edu; kristin_hoefft@hotmail.com.

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overlook other significant sodium sources, particularly bread, cheese, prepared soups and sports drinks. Caregivers recognize excess salt as unhealthy for children, but don't believe health problems (like high blood pressure) can occur in young children. Nevertheless, they made efforts to limit how much salt their children consumed through a variety of strategies; school meals were a source of high sodium that they felt were outside of their control.

Conclusion—Latino caregivers are concerned about their children's salt intake and attempt to limit consumption, but some common sources of sodium are under-recognized.

Keywords

Latino; Child; Parenting; Salt/Sodium; Hypertension; Feeding practices

Background

Children's food preferences and eating behaviors are influenced by early childhood experiences, and relate very strongly to their adult eating choices and behaviors, making food preferences and habits important for both child health and the health of the next adult generation (Mennella, Turnbull, Ziegler & Martinez, 2005). A condition of concern to physicians and public health practitioners, one affecting both children and adults, is hypertension, a disorder associated with sodium intake. Prevalence of high blood pressure (combination of hypertension and prehypertension) in children has increased in recent years, from 15.8% to 19.2% in boys, and 8.2% to 12.6% in girls (Rosner, Cook, Daniels & Falkner, 2013). Having high blood pressure in childhood is associated with cardiovascular disease and continued high blood pressure in adulthood, though the influence of high blood pressure on mortality is controversial (Institute of Medicine [IOM], 2013; Raitakari et al., 2003; Shumei et al., 2007).

Overweight and obesity put children at increased risk for high blood pressure (Rosner, Cook, Daniels & Falkner, 2013) as well as further increasing the negative influence of sodium intake on high blood pressure (Yang et al., 2012). While Latino children have comparable rates of high blood pressure to non-Hispanic white children, they have significantly higher rates of overweight and obesity (Ogden, Carroll, Kit, & Flegal, 2014; Rosner, Cook, Daniels & Falkner, 2013). And sodium consumption in turn may influence obesity, as children who eat diets higher in sodium also drink more fluids, including sugar sweetened beverages, though a recent study found sodium influences adiposity independent of total energy intake and sugar-sweetened beverage consumption (Grimes, Wright, Liu, Nowson, & Loria, 2013; Zhu et al., 2014). The sodium sugar-sweetened beverage connection also has implications for tooth decay (dental caries). Both obesity and tooth decay are substantial public health problems facing today's children, and disproportionately affect Latino children (Ogden, Carroll, Kit, & Flegal, 2014; U.S. Department of Health and Human Services, 2000). At present, 38.2% of California's population is Latino (U.S. Census Bureau, 2013), and this ethnic group is the youngest of all the major racial/ethnic groups in the U.S., with 40% under age 21 years (U.S. Census Bureau, 2011).

While there are multiple causes of high blood pressure, one well-established modifiable risk factor is sodium (salt) consumption, which is much higher than the recommended levels for

children in the U.S. and other developed countries (Butte et al., 2010; Grimes, Campbell, Riddell, & Newsom, 2011; IOM, 2013; U.S. Department of Agriculture, 2010). Over 80% of U.S. children aged 8–19 years exceed the Dietary Reference Intake (DRI) of 1,500 mg sodium (Rosner, Cook, Daniels & Falkner, 2013; U.S. Department of Agriculture, 2010). The average daily dietary sodium intake and dietary sodium sources of children in the U.S. and Australia at various ages is presented in Table 1. The 2010 Dietary Guidelines for Americans recommend a sodium limit of 2300mg/day for everyone over age 2, and 1500mg/day for people at high risk such as elderly individuals, people with high blood pressure, and African Americans (U.S. Department of Agriculture, 2010). The American Heart Association recommends aiming for consuming less than 1500mg sodium per day for all Americans, which corresponds with DRI for children 9–18 years, while DRI for children 1–3 years is 1,000 mg/day, for ages 4–8years it is 1,200 mg/day (American Heart Association, 2011; U.S. Department of Agriculture, 2010). For a representative sample of 6–11 year old children in the U.S., primary dietary sodium sources reported in 24-hour recalls are listed in Table 1 (Drewnowski & Rehm, 2013; Grimes, Campbell, Riddell, & Newsom, 2011; Grimes, Wright, Liu, Nowson, & Loria, 2013). This hierarchy is similar in Australian children as well (Grimes, Campbell, Riddell, & Newsom, 2011). Over the last 20 years, the two food categories with the highest increase of per person consumption in 2–6 year old U.S. children were savory (including salty) snacks and pizza, both high in sodium (Ford, Slining & Popkin, 2013). Children aged 6–11 years get the majority of their dietary sodium (61.4%) from food purchased in stores, 13.3% from quick service restaurants, and 10.4% from schools (Drewnowski & Rehm, 2013). While the data weren't reported for children, Mexican-Americans/other Hispanic adults consumed a statistically significant higher proportion of their sodium from stores than did non-Hispanic whites, 63.4% compared to 59.8% (Drewnowski & Rehm, 2013).

Children's dietary habits, including sodium intake, are multifactorial and are influenced by all levels of the social ecological framework, including structural/environmental and interpersonal factors (Stokols, 1996). One study found that how much a child eats is determined in this order: hunger, if they like the food, and then salt level, with saltier foods being preferred over plain (unsalted) or lower salt foods (Bouhhal, Chabanet, Issancou, & Nicklaus, 2013). Though child preferences exert some influence on what and how much food a child eats through self-feeding, refusal, and parents' tendencies to feed children preferred foods, environmental and family factors have strong influences on young children's food consumption and preferences since young children do not purchase or prepare the majority of their own food (Evans et al., 2011).

Parents influence their children's dietary intake and food preferences through their knowledge, modeling eating of particular foods, monitoring child food intake, and foods made available both through purchase and preparation (Schwartz, Scholtens, Lalanne, Weenen, & Nicklaus, 2011). Research on how parents manage and monitor their children's food intake has found varied successful strategies depending on the foods being managed (e.g., increasing fruit and vegetable intake versus reducing high fat and high sugar snack foods). To increase healthy food consumption, the preferred approach is to have healthy foods available, repeatedly offered, and parental modeling of eating them rather than pressuring children to eat healthy foods. To decrease consumption of unhealthy foods, it is

recommended to have unhealthy foods less available and less modeled in the home rather than restricting unhealthy items (such as forbidding the eating of candy or chips) which can increase attention and preference for the restricted foods (Schwartz, Scholtens, Lalanne, Weenen, & Nicklaus, 2011). Parental management of children's salt intake has been studied far less than has parental management of "healthy" versus "unhealthy" foods or fats and sugars in food.

Sodium intake at home is important, yet primary school age children consume 10.4% of their sodium through food eaten or available at school (Drewnowski & Rehm, 2013). In the U.S., school-provided meals have been identified as a wide-reaching venue to reduce sodium consumption in children and are subject to required reductions in sodium content in the food. School meals must meet sodium levels of 1,230mg for lunch and 540mg for breakfast in school year 2014–15 for elementary grades, and eventually reduce levels to 640mg for lunch and 430mg for breakfast by 2022–23 (U.S. Department of Agriculture, 2013). Childcare and daycare settings are another influence on children's diet, including on sodium intake. A study examining nutrient content of childcare center food in Georgia, U.S., found an average of 1210±192 mg sodium in daily menus for breakfast, lunch and a snack, leaving very little additional allowance for children to consume any sodium in meals outside of their part-time childcare and still stay within the guidelines (Maalouf, Evers, Griffin, & Lyn, 2013).

It is well-established that Latino immigrants' diets, food preferences, and food habits change as a result of moving in the United States and acculturation thereafter (Ayala, Baquero, & Klinger, 2008; Batis, Hernandez-Barrera, Barquera, Rivera, & Popkin, 2011; Johnson, Sharkey, & Dean, 2001). This is partially due to changes in environment and availability of foods (for example, no longer having access to subsistence farming or fresh produce in rural Mexico, but having far greater access to convenience or grocery stores), and partially due to changes in lifestyle (busier schedules, purchasing versus growing food) (Ayala, Baquero, & Klinger, 2008; Batis, Hernandez-Barrera, Barquera, Rivera, & Popkin, 2011; Johnson, Sharkey, & Dean, 2001). More acculturated individuals generally consume less fruits, vegetables and beans, and more fast food, fats, sweets and soda (Ayala, Baquero, & Klinger, 2008). However, fat consumption and total energy intake are not associated with acculturation (Batis, Hernandez-Barrera, Barquera, Rivera, & Popkin, 2011). Within one generation, influence of the Mexican diet is almost lost among Mexican immigrants (Batis, Hernandez-Barrera, Barquera, Rivera, & Popkin, 2011). Moreover, food consumption in urban Mexico is not always close to the healthy guidelines. A study examining both child-brought and school-served lunches and snacks in Tijuana, Mexico found the overwhelming majority of foods to be unhealthy, containing foods with high fat, sugar and salt content and low in fruits and vegetables (Vargas, Jiménez-Cruz, & Bacardí-Gascón, 2013).

The previous work on acculturation and diet has predominately addressed adult food habits; far less is known about Latino parents' actions or food choices for children. There is some qualitative research on perceptions of healthy foods and beliefs of dietary influences on obesity (Flores, Moldonado & Duran, 2012), but little is known about Latino caregivers' beliefs and behaviors around providing or restricting salt in their children's diets. The purpose of this study was to examine the knowledge, beliefs and behaviors of rural Latino

caregivers about their children's salt consumption and related health implications. We were particularly interested in where caregivers believed salt was coming from in their child's diet, perceived health effects of salt consumption for children and how they attempted to manage their child's salt consumption, if at all.

Methods

We recruited a convenience sample of parents and caregivers from preschools, community organizations, and local events in Mendota, a rural agricultural town in California's Central Valley in the United States. Inclusion criteria included: self-identify as Latino, primary language Spanish, caregiver of child elementary school age or less, and low-income (at or below the federal poverty level, based on an annual income of \$23,550 U.S. for a family of four in 2013 (U.S. Department of Health and Human Services, 2013). Interested people received an explanation of study procedures, risks and benefits and could ask questions of the researchers. We conducted semi-structured one-on-one qualitative interviews lasting 1.5–2 hours in participants' homes following standard qualitative procedures (Bernard, 2006; Charmaz, 2006; Miles & Huberman, 1994). Interviews were audio-recorded, translated and transcribed. Transcripts were checked for accuracy by bilingual research staff and then initially independently coded for broad themes by 3 researchers using a social constructionist approach with QSR International's NVivo 10.0 Software (2012). Analysis used a social constructionist approach, which generates themes from the data without predetermined data codes through iterative reading of the transcript and discussion among authors (Charmaz, 2006; Miles & Huberman, 1994). A social constructionist approach is appropriate for research exploring complex topics for which little is currently understood, as is the case with Latino children's salt consumption. Qualitative approaches allow researchers to understand how participants conceptualize, think about, and talk about a particular topic without quantifying the distribution of these conceptualizations across populations. After preliminary analyses of themes, we returned to the field and conducted 2-hour focus groups in Spanish at a field office. The purpose of the focus groups was to confirm initial findings with a larger population, and to further explore less-developed topics from the individual interviews (Seale, Gobo, Gubrium, Silverman, 2004). Because the participants in the individual interviews all turned out to be women, we sought an all-male focus group to explore whether men had similar or different thoughts on the topic of children and salt. Typical questions posed during the interviews and focus groups were:

- What are the salty foods your child likes to eat?
- Do you think salt is necessary for health? Why?
- Is salt good for people? For all age groups? Why or why not?
- At what age would you let your child add salt to his/her own food? Why?
- Would you prefer to give your child a salty or sweet snack? Why?

This study was approved by the Institutional Review Board at [removed to preserve anonymity for review], a community advisory board, and conducted in accord with the Clinical Terms of Award and protocol approved by the funder as well as The Code of Ethics of the World Medical Association (Declaration of Helsinki). Informed consent was obtained

from all participants, and strict privacy measures were observed. The community advisory board guided researchers on potential key informants, appropriate incentives and study procedures. At the end of data collection, study participants each received a modest incentive, a grocery voucher worth \$30.

Study Site

The study site in California's Central Valley is reasonably representative of rural Latino communities generally. The community's permanent resident population of around 11,400 is 97% Hispanic, comprises mainly recent and a few second-generation immigrants from Mexico and other Latin American countries (Stoecklin-Marois, Hennessy-Burt, & Schenker, 2011; U.S. Census Bureau 2010, 2013). Non-livestock agriculture is the main economic enterprise, especially of cantaloupes, tomatoes and asparagus. Approximately 46% of the population are at or below the federal poverty level, partly due to high seasonal unemployment as well as the current drought.

Results

Thirty individual interviews were conducted, followed by five focus groups ($n=31$ new participants). Participants were predominantly female, foreign born, with low-education attainment, and cared for an average of two children (see Table 2). Most caregivers were parents, though about a quarter were grandparents or other caregivers of a child close to age five. Per inclusion criteria, all participants self-identified as Latino and as being in a low-income family.

Using a social constructionist approach, we identified in the transcripts 7 primary topic areas around children's salt intake and its impact on health: children's favorite foods, children's salt consumption/sources, superiority of home-cooked foods, salty and sweet, managing salt for health, developing children's tastes, and adding table salt. These topics consistently emerged from the data as distinct but related ways in which parents discussed their children's salt consumption. Below each topic area is discussed further and illustrated with typical quotations from study participants. The included quotes are representative of common themes expressed by many participants.

Children's Favorite Foods

Interviews started with inviting participants to discuss their families', and especially their children's, usual and favorite foods. When asked "what does your child like to eat the most?" caregivers most often mentioned homemade foods. The majority commented that chicken (either fried, with rice or as a soup) was popular, with other child favorites being spaghetti, soup, rice, pizza and hamburgers. About a third also mentioned traditional foods like *tamales*, *enchiladas* and *pupusas*. Only a few mentioned specific fruits or vegetables. In later sections in the interview, there was general discussion of children liking candy and other food participants' described as "junk" food. These comments weren't always about the interviewee's own child; rather, it was their perception of children generally.

By age 1, and definitely by age 2, children usually ate the same food as the rest of the family, except for the avoidance of spicy food if they didn't like it. There was also more

frequent consumption of their favorite foods, like chicken soup and pasta, than older family members.

Children's Salt Consumption

Perceived high-salt foods were called “junk food,” (including processed snack food, e.g., chips), and “fast food” (such as pizza, hamburgers and French fries). When discussing processed snack foods, caregivers most often mentioned various kinds of chips; Hot Cheetos in particular were specifically mentioned by over a fifth of the participants. One caregiver explained: “there are chips that have too much salt and unfortunately they [the children] really like Cheetos.” French fries were discussed with particular concern because the salt is visible, as well as tasting salty.

School meals were considered substantial contributors to salt consumption because they often contained foods with titles similar to junk food: hamburgers, pizza, hot dogs and so forth, as discussed by these caregivers in a focus group:

<respondent2> ... at school they talk about nutrition, but at the same time they give them a lot of food, let's say, with a lot of salt or...

<interviewer1> For lunch?

<respondent2> Yes. Like junk food, they give that, as we call it. Because when we get the list for the month of what they are going to be given to eat, I see there are [chips] with cheese, hamburgers, hot dogs, pizza...

School meals were also perceived as high in salt because they were considered pre-prepared, not freshly made, as described here: “Yes, I think that at school kids consume more sodium than at the house because everything that they give them at the school are preheated things. They are not cooked like the ones we have at home.”

Superiority of Home-Cooked Foods

A widespread and strongly held belief among participants was that by cooking food themselves, home-cooked foods were lower in sodium and generally healthier. Participants felt they had more knowledge of, and control over, how much salt went into food. In particular, sight and taste were used to manage the salt level of food, as explained by participants in one of the focus groups:

<interviewer1> So, food made at home is healthier?

<respondent3> Of course.

<respondent2> Yes.

<respondent3> Of course.

<respondent2> Obviously, you use less of everything.

<respondent3> And you see how you're making it.

<respondent2> You're making it yourself.

<respondent3> You never put too much [salt] because you can see it.

And another caregiver explains “it depends on the taste, and I know what I’m adding because I’m the one making the food.”

For this reason, some caregivers preferred to make the same “fast food” dishes that their children liked, such as hamburgers or Chinese food, but at home. As this mother explains, “My youngest tells me ‘I want Chinese food.’ [I tell him] ‘No, I’ll make it.’ And he does eat it, and I like it because it has vegetables and he eats it.”

When asked specifically about at-home sources of dietary salt, caregivers mentioned packaged or “junk food” (usually chips) and items where salt was added at the table, such as fresh fruit or vegetables (e.g., mango, jicama, cucumber) prepared with salt, lemon and chili (Guerra, Hoefl, Barker, & Gonzalez-Vargas). Cheese, prepared soups, and sports drinks were reported to be commonly consumed items (multiple times a week) yet participants did *not* voluntarily mention these as sodium sources. When prompted to report on use of specific types of food, individual interviewee participants provided information about how often they ate particular foods (Table 3).

Sweet and Salty Taste

Salt and sweet were highly intertwined topics—caregivers often brought up sugar or sweets when talking about salty and unhealthy foods for their children. When we asked caregivers whether they would prefer to give their child a salty or a sweet snack, caregiver responses were split equally. Nearly all caregivers justified their preference by saying that they chose the healthier (or less harmful) of the two options. Other factors discussed in relation to their choice were: size of snack, presence of fat in snack, child’s preference, impact on child’s behavior, and ability of snack to satiate hunger.

Caregivers who preferred to give their child a sweet snack chose it because they believed salty foods (and the fat that often came with them) were generally worse for health than sweet foods. As one caregiver explained:

<interviewer> And you’d prefer to give them sweets instead of potato chips?

<respondent> Yes, sometimes, yes, I’d prefer to give them a sweet.

<interviewer> Why?

<respondent> Because I know the “Sabritas” [chips] have more salt, that they are more... well, I imagine, that they are worse than a sweet, I would think, because a sweet is smaller, but I don’t know.

Some caregivers also mentioned their child would prefer or ask for a sweet snack. Others too mentioned sweet snacks being smaller so there would be less consumption of junk food overall.

Sweet snacks were generally perceived as unhealthy by this group of rural Latino participants because of an association with diabetes and tooth decay. This caregiver explained, “... the candy can be bad for them... can give them diabetes because of the sweet, and the [chips] don’t.” Another downside of sweet snacks caregivers discussed is that children would continue to ask for them, even after being given one.

Caregivers of both sweet and salty taste preferences acknowledged that sweet foods “wind children up” but this was not a strong factor influencing their decision. Caregivers who preferred to give salty snacks always gave health as their reason, except for two caregivers who felt salty snacks would satiate hunger better, as explained here:

<respondent> I’d prefer chips.

<interviewer> Why?

<respondent> Because the chips would help them a little.

<interviewer> How?

<respondent> Because if they eat a lollipop, it’s small. It’s... how can I explain this? Because it’d be a craving and that’s it, but it wouldn’t fill them up or anything. It wouldn’t help their hunger. And chips would get rid of a little bit of hunger, when they are hungry.

While salty snacks were generally viewed as unhealthy, they were initially perceived to be without specific (poor) health outcomes for children. When asked whether they believed sweet or salty/savory snacks to be more harmful for children, about half of caregivers said both were bad. When pressed to make a decision, they were nearly evenly split, with a few more caregivers thinking sweet snacks were more harmful. This was largely due to the impression that sweet foods cause diabetes, that children are susceptible to diabetes (as opposed to high blood pressure which is perceived as affecting only adults), and that diabetes is a serious illness. Tooth decay was also commonly acknowledged as a negative consequence of consuming sweet foods, but the benefits of tooth brushing and dental care led to a perception that tooth decay was less serious and “curable” compared to diabetes which was perceived as a more serious and permanent condition (Hoefl, Barker & Masterson, 2010).

Managing Salt for Health

Some salt consumption was considered necessary for health. Many caregivers mentioned oral rehydration solution as an example of this, as illustrated through this focus group exchange:

<Respondent 9> No, I think the salt is good for them [children]. Because ... since their body is little and they’re...developing.

<Respondent 2> Aha, not in excess...

<Respondent 6> And they are more active than us.

<Respondent 9> Aha, yes. Salt is good for the kids.

<Respondent 6> In moderation, not in excess. If they get dehydrated, they say to eat a little salt is good.

<Respondent 1> It’s like the *suero* (rehydration solution).

<Respondent 6> It’s like *suero* (rehydration solution).

<Respondent 1> *Suero* (rehydration solution) tastes a lot like salt.

Caregivers did believe children's excessive salt consumption was harmful to health but not until middle to late adulthood when salt intake has become a long-standing habit. This caregiver explains, "If they [children] eat the salt with moderation because they need it, then I don't think is harmful. Until a certain age, when they begin to grow, if they continue to eat too much salt, then it starts to affect them..." High blood pressure and kidney disease were recognized ill-effects of consuming too much sodium, but they were mainly perceived as health issues in late adulthood rather than something that could affect children. A very small number of caregivers mentioned without detail that excess salt consumption could cause stomach ache, nausea or vomiting, and mouth blisters.

This parent answered questions about what happens when you give your child a salty snack like chips:

<Respondent> Well, their blood pressure would go up. ...

<Interviewer> But do you think that by giving them chips, they are going to have it [high blood pressure] when they're older, or can they get it now when they are little?

<Respondent> No, when they're grownups.

Here a parent expresses how adults and elderly are more vulnerable to risks of eating salt:

"Yes because I start to look at the differences between my kids, I have a six year old, he's almost seven and I look at the differences between my mom who is going to be fifty, to me, I'm thirty-five, to my mother-in-law who is, I mean I look, my mother-in-law, seventy something, I look at the differences between my mother-in-law, she can't eat salt at all because ... high blood pressure. So she can't eat salt at all, because she holds a lot of fluids and her feet swell up. And that's why I told you that I look at the difference between the different ages, I say they [doctors] didn't take the salt away from my kids but they did take it away from my mother-in-law, they even give her pills for her to release some of those fluids, if it's like that, that's why I tell you, the older the person gets, it affects them a lot. But not the kids, because they have a lot of defenses and their body doesn't respond badly to salt, but yes, in excess it is bad."

Caregivers perceived children as both resilient and fragile due to their age, as illustrated by this discussion in a focus group:

<Interviewer 1> Okay and in what way do you think the salt affects the kids, adults and the seniors? ...Or does it affect them [children, adults, elderly] in a different way? the amount of salt they're eating in their food?

<Respondent 7> The kids, no? I think... Because they are smaller.

<Interviewer 1> It affects them [children], does it affect them more [than older people]?

<Respondent 7> Yes because they are growing, the grandfather is already sick perhaps...

<Respondent 2> Going to die... He's going to die faster.

<Respondent 7> But you have to take care of the younger one, the grandfather already lived.

<Respondent 9> I think it affects all three of them. But it's going to affect the grandfather more... Because he's already old... And his organs are tired... They can't filter as well as a child. ...

<Respondent 1> And the kids too I think because they are smaller.

Despite salt consumption not being perceived as an immediate or major child health issue, caregivers actively tried to limit how much salt their children consumed. This was seen as a way to instill good health habits and develop healthy food and flavor preferences, rather than as an action to evade immediate or longer-term health risks.

<Interviewer> At what age do you think that we should start to worry about how much salt we eat?

<Respondent> I think as a parent, since your kids are small.

<Interviewer> Since they're small?

<Respondent> Since they begin to eat food.

<Interviewer> So, since babies?

<Respondent> Aha, because even as babies you don't add seasonings or anything to their foods when they're small.

<Interviewer> And they eat it.

<Respondent> Aha, like the [jarred baby food] vegetables which taste horrible and they eat it.

Caregivers had a variety of strategies for limiting the amount of salt in their children's food. These strategies, along with examples of each, are listed in Table 4. The topic of adding table salt is explored further in a later section of this article. A few mothers specifically mentioned the negative influence of fathers on children's nutrition—either through negative modeling, or going against the mother's limitations on junk food consumption. Fathers were sometimes said to be too indulgent of their children, giving children whatever they asked for. Mothers resolved this tension in several ways: through discussion with fathers to better align their parental goals, through limiting the quantity of undesired foodstuffs in the house, or by encouraging fathers to consume such items only after the children had gone to bed or when away from the house.

Adding vegetables to pre-prepared soups is definitely a way of increasing a child's access to and consumption of healthy foods and of diluting to some degree the quantity of salt consumed per serving. This strategy however is unlikely to greatly reduce overall sodium intake given the extremely high quantities of sodium typically present in many processed products.

Developing Children's Tastes

Caregivers believed it is part of their role and responsibility to teach their children to “develop their tastes”—they spent energy to expose their children to a variety of flavors while taking care to introduce children to healthy foods and flavors. As this caregiver explains, “because if I get them used to eating salty, it will become a habit and they won't be able to stop it, so most of the time I don't have the salt shaker available to my children.” And this caregiver explains how she prepares her children's food, “With a little salt, very little. Because if it tastes of salt... the thing is that if a child gets used to it from the beginning... because if the mother is used to adding a stream of salt, then the child will too, but it should be with less salt.”

As children got older, there is a tone of explicitly teaching children to develop tastes and make healthy decisions as explained by these caregivers, “as kids you don't know. But now it's better to teach them that it [salt] is harmful so that they never get to eat too much.” And “right now mine [my child] is eight and just now [I let him add salt], but I tell him how much to add, so that it doesn't taste too salty but not plain either. So I tell him ‘Add this much, son.’”

Child Adding Salt at The Table

While adding salt to food at the table increases by only a small proportion the amount of total salt consumed (estimates suggest less than 10%), caregivers discussed monitoring how and when they allowed their children to add salt at the table (Mattes & Donnelly, 1991). Caregivers had very consistent thoughts on the development of skills and knowledge required for children to independently add salt to their own food. Caregivers outlined three main capacities that children must have in order to properly yet independently add salt to their food at the table: 1) the ability to recognize when food tasted too plain or too salty, 2) to have the dexterity to be able to add just a small quantity of salt, and 3) to understand that excess salt was bad for them. Generally, caregivers thought children could distinguish when food tasted too salty around age 5 years. But felt children could not be trusted to correctly add salt on their own until around age 12 years (10–14 was most common range mentioned). Once children reached 10–14 years old, they were recognized as being able to master the three necessary abilities. Prior to that age, caregivers felt children would “add the whole thing [container of salt]”, so caregivers were required to check food flavor and add (or pretend to add) salt for the child. A few caregivers permitted their children to independently add salt as young as four years old, though in such cases caregivers perceived their children to have met at least the first two capacities.

This discussion with a caregiver explains the three capacities:

<interviewer> At what age do you think it's okay to allow children, if they want to, to add salt to their food once it's on the table, at what age can they start to do that?

<respondent> When they are six years old.

<interviewer> And why at that age?

<respondent> Because they start to feel the taste of food.

<interviewer> So, at that age they more or less know?

<respondent> Yes. I think.

<interviewer> So would you allow her [daughter] to add salt? Or would you add it?

<respondent> No. I would add it.

<interviewer> You'd put it?

<respondent> If I let her she'll put it all on.

<interviewer> So, at what age would you allow her to do it?

<respondent> At twelve years.

<interviewer> Like twelve? And why until that age?

<respondent> Because she'd see she should put a little and she'll put that.

Another caregiver comments,

“To mine, from the food I used to give them, whatever amount of salt I add to it, that's how they would eat it, but now, since they were ten, if they ate a watermelon, they would add salt to their taste, since they were ten, to a jicama, they go and sprinkle salt. But now it's their decision.”

Four caregivers said children were never old enough to add their own salt, saying that the food didn't need more salt and children needed to get used to the flavors. As explained here,

<Interviewer> At what age would you let them?

<Respondent> No, we shouldn't let them add salt.

<Interviewer> At any age?

<Respondent> No, at any age because if they grab it, then they want to add a lot.

<Interviewer> Not even when they are older?

<Respondent> No, no, we have to get them used to everything, to a normal thing and you don't have to add salt to the salad.

Discussion

Similar to previous research, we found the Latino caregivers in our study are very oriented to their children, concerned about ensuring their children's health and motivated to provide them food they like to eat that is high quality and nourishing. Caregivers recognized excess salt as unhealthy for children, but didn't believe health problems (like high blood pressure) could occur in young children. Nevertheless, through a variety of strategies they made efforts to limit how much salt (sodium) their children consumed.

Caregivers recognize common sources of sodium such as “junk” or processed food such as chips and fast food (hamburgers, pizza, French fries), some of which match with primary dietary sources of sodium identified for a representative sample of 6–11 year old children in the U.S.: namely, pizza (see also Table 1)(Drewnowski & Rehm, 2013). But caregivers

overlooked other significant sodium sources in the foods that their children commonly consumed, particularly cheese, prepared soups and sports drinks.

Food provided at schools was a particular issue for caregivers who perceived the menu to often contain many foods they considered unhealthy, like hot dogs and pizza. School meals have been recognized and criticized for high levels of sodium, and have been the target of stricter guidelines in the upcoming years (U.S. Department of Agriculture, 2013). However, Drewnowski and colleagues assessed that U. S. children receive only about 10% of their sodium intake from school, suggesting that while their school sodium intake is indeed high, their salt intake from home, restaurant or quick service food is even higher. Caregivers were particularly conflicted about this because they believed school meals should be healthy and serve to teach their children about ideal nutrition. But they felt powerless to influence the content of school meals. Given the very low incomes of this population (97% of the school district qualifies for the federally supported free or reduced school lunch program (California Department of Education, 2013)), parents relied on school-provided meals as an important nutrition source for their children and were unable to send separate, additional meals from home. This population will likely benefit from the upcoming policy changes restricting sodium levels in school meals.

Caregivers strongly felt that home-prepared foods were healthier for children because they would be lower in sodium. This is consistent with reports showing that the vast majority of sodium consumed in the U.S. is through processed food (Bibbins-Domingo et al., 2010; Mattes & Donnelly, 1991). However, many of the under-recognized sources of sodium for this group were processed foods regularly used in cooking and consumed in the home. Things like prepared bouillon cubes or powders, soups, cheese, processed meats, bread, canned foods, and so forth: All these frequently end up as part of a home provided or cooked meal – and fall squarely between items clearly recognized as completely packaged or outside foods (like chips, French fries) and home-cooked foods made entirely from scratch in which the only added sodium is through direct cook-controlled seasoning. As rural Latino populations become busier, and more acculturated, this “gray area” of in-between foods is likely to expand, contributing further to unrecognized sodium consumption, and thus will be of more concern around the health of this population.

Caregivers were, aware and concerned about of the risk of obesity and diabetes for the children in their community, consistent with the increasing burden of those conditions in children. But they did not believe that high blood pressure could occur in children nor that it was a concern for their community. Yet high blood pressure in children is a rapidly growing public health problem generally affecting about 19% of boys and 13% of girls, and occurring in even higher proportions in obese/overweight populations (Rosner, Cook, Daniels & Falkner, 2013). Caregivers’ underestimation of the risk may be shaped by the current under-diagnosis and low screening rate for high blood pressure in children (Shapiro, Hersh, Cabana, Sutherland, & Patel, 2012).

Salty and sweet food preferences were heavily intertwined topics for caregivers. The literature has noted children who eat diets higher in sodium drink more fluids, including sugar-sweetened beverages (Grimes CA, Wright JD, Liu K, Nowson CA, & Loria CM,

2013). Sugar sweetened beverage consumption is linked with obesity, Type 2 diabetes and dental decay (de Ruyter, Olthof, Seidell & Katan 2012; Evans, Hayes, Palmer, Bermudez, Cohen, & Must, 2013; Xi et al., 2014). Caregivers were about evenly split, however, on whether salty or sweet snacks were more harmful for children's health: Sweet foods were perceived as deleterious for their influence on diabetes and tooth decay, while salt was considered generally unhealthy because of its association with other ingredients, such as fats, in 'junk food.'

Despite their children's salt consumption not being perceived as an immediate health risk, caregivers were interested and active in managing and controlling the amount of salt in their children's diet in order to develop lifelong healthy habits and "develop their tastes". Caregivers in our study understood the influence early flavor experiences have in shaping future food preferences, and strive to mold the flavor preferences of their children towards healthy foods. This perception is corroborated by the literature which demonstrates that home environment, modeling, and early flavor exposures can predict food preferences and habits later in life (Hetherington, Cecil, Jackson, & Schwartz, 2011; Schwartz, Scholtens, Lalanne, Weenen & Nicklaus, 2011). Preference for salty foods is not innate, though some studies suggest that early exposure to salt in infancy increases subsequent preference for salty foods (Hetherington, Cecil, Jackson, & Schwartz, 2011). The literature also notes that food preferences generally, and sodium preferences in particular, are quite malleable. People can adjust over time to new norms of preferred saltiness (Blais et al., 1986), as seen in countries that have adjusted their sodium limits for processed foods (He & MacGregor, 2009). This palate adaptability was under-recognized by the Latino caregivers in our study, and perhaps should be emphasized to groups needing to change their dietary norms.

Caregivers had a variety of strategies for managing and limiting the amount of salt in their children's food (see Table 4). These strategies are mostly in line with the recommendations in the literature to increase access to and modeling of consumption of healthy foods, while limiting access to or modeling of eating unhealthy foods (Schwartz C, Scholtens PA, Lalanne A, Weenen H, & Nicklaus S, 2011).

This study has some limitations in that data were from a small, convenience sample in a single rural town, making generalization of these results to other populations fraught with difficulty and best undertaken cautiously. Additional limitations are that we did not measure actual sodium (salt) consumption or take clinical measurements, such as blood pressure, in our sample. But that was not the intent of this study that instead aimed to understand caregivers' self-reported perceptions of (children's) sodium intake and health. Additionally, both food habits and blood pressure vary greatly with child's age and developmental stage; although we included caregivers who cared for children primary school-aged and younger, we did not examine in detail any of these developmental/age nuances. Issues such as time constraints, food costs and availability (Campbell et al., 2013), working in the field versus being a stay-at-home mother are likely important determinants of cooking and child feeding practices, but were not a focus of this study or analysis. These topics, however, warrant further investigation.

Finally, we did not explicitly look at acculturation or its influence, nor was the topic raised directly by participants even though for immigrant populations generally, acculturation is an established influence on dietary practices. It may not have been a salient issue for this study population because the town is so dominantly Latino, and even though the average length of time in the U.S. was 17 years, acculturation to more general population norms is still very low because of its remote rural location and homogeneously Hispanic residents (Matias et al., 2013). Other literature shows that Mexican immigrants experience a tension between their food experiences growing up in Mexico, where they perceive food to be healthy, and food that is available within the context of their current environment and time availability (Handley et al., 2013). All of these issues warrant further exploration with respect to sodium intake in future studies.

Despite these limitations, this study provides important initial information about rural Latino caregivers' knowledge, beliefs and practices around sodium in their children's diet and children's snacking behaviors, an issue that is growing and linked to the increasing concern of high blood pressure in children. The study also revealed that, contrary to some suggestions, these populations are regularly exposed to and do use processed and pre-packaged food in their diet, even though home-cooked meals are dominant in the daily life and foodscape in these low-income rural households.

We conclude that even though these low-income, rural, Latino caregivers did not recognize high blood pressure as a health risk to their children, they actively tried to manage and control their children's salt intakes in order to instill healthy flavor preferences and food habits. They recognized (and tried to limit) access to what they called "junk food", "fast food", and salty snack foods, such as chips. Participants often under-appreciated the sources as well as the amounts of sodium from prepared products used in home-cooked meals, from, for example, cheese, sports drinks, packaged soups, and bouillon cubes—foods their children eat frequently.

The findings from this study make a narrative contribution to the more clinical literature around salt (sodium) and children's nutrition. Our study is one of the first to discuss caregivers' beliefs and perceptions around the effect of salt on children's health and the methods they use to influence salt intake. To our knowledge, it is also the only such study in a rural Latino population. Similar to Flores' previous work looking at Latina mothers' perceptions of food on obesity, caregivers recognized excess salt as unhealthy for children (Flores, Maldonado, & Duran, 2012), but our study shows that recognition of the role of (excess) dietary salt and health is more nuanced and complex than nutrient counts or statistical correlations alone would imply.

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Highlights

- We studied caregivers' *beliefs and habits for managing children's salt consumption*
- Caregivers viewed "junk food" like chips and fast food as common sources of sodium
- Other sodium sources (prepared soups, sports drinks, cheese) were often overlooked
- Despite current U.S. trends, children not seen at-risk for sodium-based health issues
- Caregivers used multiple strategies to limit their children's salt (sodium) intake

Table 1

Average Sodium Intake and Main Sources of Sodium for U.S. and Australian children at various ages

	All U.S. children (2–18 years)	Young U.S. children (2–5 years)	Primary School-aged U.S. children (6–11 years)	Australian Children (4–8 years) ^c
Average daily sodium (Na) consumption (mg)^a	3,056 ± 48	2,246 ± 30	2,997 ± 53	
Primary dietary sodium source by food type^b			pizza (8.3%) bread (7.9%) pasta dishes (6.9%) chicken dishes (6.9%) sausages/franks/bacon/ribs (6.2%) cheese (4%)	pizza (2.1%) bread (15.0%) pasta dishes (1.8%) chicken dishes (2.8%) sausages/franks/bacon/ribs (6.0%) cheese (5.3%)

^aGrimes, Wright, Liu, Nowson, & Loria, 2013, using data from National Health and Nutrition Examination Survey (NHANES) 2005–2008

^bDrewnowski & Rehm, 2013, using data from NHANES 2003–2008

^cGrimes, Campbell, Riddell, & Newsom, 2011, using data from Australian National Children’s Nutrition and Physical Activity Survey 2007

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Table 2

Demographic information for 61 caregiver participants and the child under their care who is closest in age to 5 years

Characteristic	% or mean \pm SD
Caregiver Gender (female)	87%
Caregiver Born in U.S	8%
Caregiver Age in years	41 \pm 12
Caregiver Highest Grade Completed	6 \pm 4
Number of Children in Family	2 \pm 1.1
Years Caregiver has lived in U.S. (if foreign born)	17 \pm 9
Child Born in U.S	77%
Child Age in years \pm SD	8 \pm 5

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Table 3

Frequency of Children's Consumption of Major Salty Foods

Salty Food	Never/almost never	Less than 1 a month	1-3 times a Month	1-2 times a Week	3-6 per week	Daily	Total n
Bacon	19	4	3	4	0	0	30
Canned Foods	16	0	3	5	1	0	25
Cheese	0	0	0	4	13	11	28
Chips	2	1	5	10	4	5	27
Chorizo	9	6	5	7	1	0	28
Sports Drinks	4	2	6	0	5	11	28
Instant soups (dehydrated)	4	1	5	11	4	4	29
Crackers	8	3	9	4	0	2	26
Hot Dogs	2	9	6	8	1	4	30

Table 4

Strategies used by parents to limit child’s salt consumption

Strategy	Common Examples
Serving a variety/balance of foods	<ul style="list-style-type: none"> • Serving fresh fruit with chips • Adding fresh vegetables to pre-prepared soups
Limiting frequency of salty food consumption	<ul style="list-style-type: none"> • Buying chips only once a week • Eating fast food only once a month
Limiting volume of salty food consumption	<ul style="list-style-type: none"> • Letting a child eat a only few chips for a serving
Limiting the amount of salt in food preparation	<ul style="list-style-type: none"> • Cooking and eating food at home
Parental limitation of salt added at table	<ul style="list-style-type: none"> • Parent not allowing child to add salt • Parent supervising or instructing child in adding salt • Parent only pretending to add salt

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