Rural Latino Immigrant Caregivers' Conceptions of Their Children's Oral Disease

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Abstract

Objective: *The aim of this study was to examine Latino immigrant caregivers' explanatory models of the causes of early childhood caries (ECC).* ***Methods:*** *In a rural area, we conducted 71 open-ended qualitative interviews with 26 Mexican immigrant and 12 Salvadoran immigrant caregivers of children under 6 about the causes of ECC. Two researchers independently read each interview and classified each interviewee's response.* ***Results:*** *Caregivers mentioned three biomedical causes of oral disease (sweets, poor oral hygiene, and bottle-feeding) and two lay or popular causes (lack of milk consumption and "bad" genes). Although caregivers were aware that the consumption of sweet foods causes decay, they expressed particular confusion about how bottle-feeding causes decay. Nineteen caregivers attributed decay specifically to bottle-feeding, yet 14 believed the cause of decay was the bottle's nipple. Seven Mexican immigrant caregivers attributed their children's decay specifically to a lack of calcium, and six immigrant caregivers to "bad teeth genes."* ***Conclusions:*** *Conceptions of oral disease derived from the caregivers' own dental experiences, their conceptions of the body, and interactions with dental professionals. The fact that biomedical explanations dominate the list of causes of caries for both groups indicates that the caregivers' explanatory models of oral disease are powerfully shaped by interactions with health professionals. Immigrant caregivers' mistaking of the baby bottle's nipple as the source of decay indicates the need for more effective oral health promotion. Yet the Mexican immigrants' conceptions of a lack of calcium as a major factor in their children's decay may illustrate a strong cultural link between teeth and milk.*

Key Words: Latino/Hispanic children, rural immigrants, early childhood caries, parental beliefs and behaviors, ethnography, low income, oral health education

Introduction

Studies have long documented the disproportionate rates of early childhood caries (ECC) among Latino children (1). Research shows that Mexican-American children have higher rates of decay than US schoolchildren (2-5), and that the US-born children of Mexican immigrants experience more decayed primary teeth than Mexican-American children in general (6). Much research into the reasons why children of Mexican immigrants bear a disproportionate burden of oral disease has pointed to barriers to access and dental utilization (7,8). Some research suggests that immigrant parents may have poor knowledge of effective preventive measures (9,10), may not understand the relationship between diet and oral disease (10), and may accord low value to primary teeth (11). This "low dental IQ" may, in turn, be exacerbated by their lack of access to dental professionals (12). Yet little research to date has examined Latino immigrant caregivers' beliefs about the cause of their children's oral disease, and whence such conceptions derive. It is important to understand different populations' beliefs about the causes of oral disease because they affect oral health practices (Butani et al., unpublished observations), dental utilization (13), and communication with oral health professionals (14,15).

The concept of "explanatory models" (15) has long been used to show that different cultural beliefs about the origins and nature of a particular disease lead to different methods of managing and preventing it. This concept suggests that caregivers of different cultural origins may interpret the causes of oral disease differently than dental professionals, and consequently may adopt different oral health-related behaviors. Explanatory models of disease are shaped by the illness experiences of the members of a group, their interactions with health professionals, and their conceptualization of the body and how it works. They often contain elements of both biomedical and lay or "folk" knowledge (15). Explanatory models of oral disease that differ from biomedical models are not exclusive to minority groups, but may exist among low-income populations with little access to oral health education (12-14). An understanding of the different explanatory models of oral disease among groups with a high incidence of oral disease – such as low-income Latinos – is crucial to the design of effective oral health education programs. It can also help facilitate dentist–patient communication (14,15), as the dentist can then address misconceptions of oral disease in the patients' own terms.

This paper examines Latino immigrants' conceptions of their children's oral disease through interviews with

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26 Mexican immigrant and 12 Salvadoran immigrant rural caregivers of US-born Latino children. Analysis of the explanatory models of disease among immigrant parents will help explain puzzling aspects of parental behavior – for example, why parents may allow children to bottle-feed at night despite health professionals' conflicting advice. Explanatory models should not be viewed as "incorrect beliefs," but rather as logically consistent with the caregivers' cultural background, experiences, social context, and interactions with health professionals (15). A better understanding of Mexican and Salvadoran immigrant parents' models of oral disease will thus help inform the design of effective oral health education messages and improve the delivery of dental care.

Methods

Research Design. We used an in-depth qualitative approach to gain an understanding of rural Latino immigrant parents' conceptions of their children's oral disease (Barker and Horton, unpublished observations). Our approach consisted of a) in-depth interviews of caregivers about their beliefs regarding the causes of their children's oral disease, supplemented by b) an ethnographic observation of their oral health-related behaviors. These observations helped us understand how the caregivers' different conceptions of their children's oral disease led them to different forms of preventive dental care and dietary behaviors.

Sample Recruitment. We conducted this study in a rural community in California's Central Valley, which had a high proportion of immigrant caregivers. Eligible participants were: a) primary caregivers of at least one child under the age of 6; and b) immigrants from Latin America (both Mexico and El Salvador). Participants were drawn from two sources: a) two-thirds from a randomized list of household addresses generated by a partner study on farmworker occupational health; and b) one-third from two local Head Start programs with high Latino enrollment. We did not screen specifically for children who had dental caries.

Data Collection: Interviews. Interested participants were screened for eligibility and recruited into the study by bilingual interview staff, who obtained informed consent. All interviews relied on an open-ended interview guide approved by the institutional review board of the University of California, San Francisco. Interview questions were developed based on previous studies of Latino immigrant and low-income populations' conceptions of oral disease and experiences with the oral health care system (1,5,6,8-14; Butani et al., unpublished observations), and in consultation with a team of specialists in Latino children's oral health. Interviews examined the caregivers' conceptions of their children's oral health and disease and oral health-related behaviors based on these conceptions.

Data Collection: Ethnography. Ethnography helped explore how the caregivers' explanatory models of oral disease led them to different oral health-related behaviors. It included observations of oral health-related behaviors during snack time or mealtime and during visits to the dentist. Observations helped complement the data provided by the interviews and were conducted with the expressed consent of the families observed.

Data Analysis. Each interview was audio taped, translated, and transcribed, and all observations recorded as typed field notes. Data analysis included preparing and coding the transcripts and field notes and performing qualitative analysis on the textual data. Following standard procedures, we developed a short list of codes related to conceptions of oral disease and added new codes when they emerged while reading the transcripts and field notes (16,17). Two researchers independently read through the 38 caregivers' responses, categorized the causes of children's oral disease, and through discussion reached consensus on discrepant categorizations. Five major categories of the causes of oral disease were developed. Interviewers then analyzed the caregiver responses by country of origin to discern the possible differences in conceptions of oral disease between Mexican and Salvadoran immigrants.

Results

Between September 2005 and May 2006, we conducted a total of 71 in-depth interviews with 38 immigrant caregivers about the causes of their children's oral disease. Twenty-six caregivers (85 percent of the sample) were from Mexico, and 12 caregivers were from El Salvador (see Table 1). All participants were the mother of the focal child. This was a primarily low-income and recently arrived immigrant population: The median annual household income was $17,000, and the median length of residence of caregivers in the United States was 9 years. Just over one-third of the children (36 of 95, or 38 percent) of these caregivers were under age 6, the prime age at which ECC strikes. As a group, the caregivers had had significant experience with the children's oral disease. Most caregivers (23 of 38, or 60 percent) reported that their focal child under age 6 had had experience with caries, eight reported their child had no dental visit yet, and seven reported their child had had a visit but no caries as yet.

Caregivers mentioned three biomedical causes of oral disease and two lay or popular causes. The three biomedical explanations cited were consumption of sweets (24 responses), bottle-feeding of infants and toddlers (23 responses), and lack of proper oral hygiene (17 responses). Caregivers provided two popular explanations for the Latino children's oral disease – inadequate intake of milk or dietary calcium (7 responses) and "bad genes" (6 responses). Only the Mexican immigrant caregivers attributed caries to insufficient milk or calcium intake. While consumption of sweets and bottle-feeding resulted in considerable discussion, oral hygiene – "brushing" – was rarely elaborated beyond that simple term.

Table 1
Sociodemographic Characteristics of Caregivers

	Mexican ($n = 26$)*	Salvadoran ($n = 12$)*	Total of both groups ($n = 38$)*
Gender	$n = 26$	$n = 12$	$n = 38$
Female	26	12	38
Age (years)	$n = 25$	$n = 11$	$n = 36$
Mean ± SD	30.4 ± 6.2	32.0 ± 7.4	31.1 ± 6.9
Median	29	28	29
Range	19-47	24-45	19-47
<20	1	0	1
21-30	15	6	21
31+	9	5	14
Years of education completed	$n = 25$	$n = 12$	$n = 37$
Mean ± SD	7.1 ± 3.7	3.9 ± 2.8	5.8 ± 3.5
Median	9	3.5	6
Range	0-14	0-10	0-14
0-3	6	6	12
4-6	5	5	10
7-9	10	0	10
10-12	2	1	3
13+	2	0	2
Annual household income†	$n = 24$	$n = 12$	$n = 36$
Mean ± SD	$17,000 ± 5,700	$18,200 ± 7,400	$17,500 ± 6,400
Median	17,500	14,000	16,000
Range	$8,000-$28,000	$8,000-$36,000	$8,000-$36,000
<$10,000	4	1	5
$11,000-$15,000	6	5	11
$16,000-$20,000	9	2	11
$21,000+	5	4	9
Marital/partner status	$n = 25$	$n = 12$	$n = 37$
Mother has partner	24	12	36
Mother is single	1	0	1
Years of residence in the United States	$n = 25$	$n = 12$	$n = 37$
Mean ± SD	8.5 ± 5.6	9.8 ± 2.9	9.0 ± 4.0
Median	7	10	9
Range	3-22	5-16	3-22
<10	18	7	25
10+	7	5	12
Legal status	$n = 25$	$n = 12$	$n = 37$
Undocumented	17	3	20
Temporary permanent status	0	5	5
Asylum	0	1	1
Legal permanent resident	7	3	10
Citizen	1	0	1
Occupation	$n = 24$	$n = 11$	$n = 35$
Farmwork	13	11	25
Full-time caregiver	10	0	10
Other	1	0	1
Rural or urban origin‡	$n = 26$	$n = 12$	$n = 38$
Rural origin	21	10	31
Urban origin	5	2	7
Children per household	$n = 26$	$n = 12$	$n = 38$
Mean ± SD	2.7 ± 1.2	2.3 ± 1.1	2.6 ± 1.2
Median	3	2	2
Range	1-5	1-5	1-5
1	4	3	7
2	7	5	12
3	10	3	13
4	2	0	2
5	3	1	4

Table 1
Continued

	Mexican ($n = 26$)*	Salvadoran ($n = 12$)*	Total of both groups ($n = 38$)*
Age of youngest child (years)	$n = 25$	$n = 11$	$n = 36$
Mean ± SD	2.3 ± 1.4	2.6 ± 1.9	2.4 ± 1.5
Median	2	2.5	2
Range	2 weeks-4 years	6 months-6 years	2 weeks-6 years
<1	6	2	8
1-2	8	4	12
3-4+	11	4	15
5+	0	1	1
Age of oldest child¶ (years)	$n = 23$	$n = 9$	$n = 32$
Mean ± SD	10.2 ± 5.7	9.2 ± 5.2	10.0 ± 5.0
Median	10	8.5	9
Range	2-24	3-19	2-24
<5	6	3	9
6-10	9	3	12
11+	8	3	11

* Numbers in individual cells vary slightly as not all participants supplied data to every question.
† In 2006, $US.
‡ A rural town was defined as having a population of 15,000 or less. An urban area was defined as having a population larger than 15,001.
¶ When more than one child lives in a household.
SD, standard deviation.

Table 2
Number of Perceived Causes of Early Childhood Caries Recognized by Participants in Each Population Group

Number of perceived causes	Total ($n = 38$)	Mexican ($n = 26$)	Salvadoran ($n = 12$)
0	2	2	0
1	11	6	5
2	14	9	5
3	7	5	2
4	3	3	0
5	1	1	0

Table 3
Perceived Causes of Children's Oral Disease (Total Number of Responses by Population Group)

Perceived cause	Total ($n = 77$)	Mexican ($n = 58$)	Salvadoran ($n = 19$)
Biomedical	64	47	17
Sweets	24	18	6
Bottle drinking	23	16	7
(Nipple of bottle)*	(14)	(9)	(5)
Poor oral hygiene	17	13	4
Lay or popular	13	11	2
Lack of calcium	7	7	0
Bad genes	6	4	2

* Notes a misunderstanding or confusion within the category "bottle drinking," rather than a separate category of response.

Most women (66 percent) discussed one or two categories of cause (see Table 2). Two (Mexican immigrant) caregivers did not proffer a cause for dental caries, and only one (Mexican immigrant) caregiver mentioned all five categories of cause. Not only did Mexican immigrant caregivers, in general, display a wider range of beliefs about the cause of dental caries compared with Salvadoran caregivers, but they also discussed more lay causes (see Table 3). Despite their higher level of formal education, more Mexican immigrant caregivers (33 percent of 26) than Salvadoran immigrants (17 percent of 12) discussed a mix of biomedical and lay or popular perceptions of cause (see Table 4).

The fact that biomedically based perceptions dominate the list of causes of caries for both groups indicates that the caregivers' explanatory models of oral disease are not merely culturally based but are powerfully shaped by their interactions with health professionals. Yet, the health education efforts by educators at the federal Women, Infants, and Children (WIC) nutritional program or by dentists have only been partially successful. Although both Mexican and Salvadoran immigrant caregivers subscribed to biomedical understandings of the cause of oral disease, the women in both groups expressed particular confusion about how bottle-feeding causes decay. An understanding of the immigrant caregivers' explanatory models of oral disease illuminates the caregivers' different understandings of the causes of oral disease, as well as the

Table 4
Perceived Causes of Children's Oral Disease (by Numbers of Individual Participants from Each Population Group)

Category	Total ($n = 36$)	Mexican ($n = 24$)	Salvadoran ($n = 12$)
Biomedical causes only	25	15	10
1 biomedical	10	5	5
2 biomedical	11	8	3
3 biomedical	4	2	2
Popular causes only (1 cause)	1	1	0
Mixed biomedical and lay causes	10	8	2
1 biomedical + 1 lay	3	1	2
1 biomedical + 2 lay	1	1	0
2 biomedical + 1 lay	2	2	0
2 biomedical + 2 lay	0	0	0
3 biomedical + 1 lay	3	3	0
3 biomedical + 2 lay	1	1	0

solutions they devised based upon these perceived causes. Moreover, they indicate important areas for intervention by oral health education programs and dental professionals.

Biomedical Explanations of Decay

Consumption of Sweet Substances. Consumption of candies was the single most common cause mentioned by caregivers, with a total of 19 responses. Six caregivers expressed awareness of sugar as the operative agent causing caries, and two specifically mentioned adhesion to teeth as an important factor. One Mexican immigrant respondent, for example, said "it's from eating candy or things with a lot of sugar that will stay on their teeth," while another explained "because they eat candy and they do not get their teeth brushed." A Salvadoran immigrant mother agreed: "The sugar is what causes the cavities – candies and soda." Caregivers less commonly mentioned juice or soda as sugary agents that also cause decay, with only three mentions each.

Bottle-feeding. Nineteen caregivers mentioned bottle-feeding as a possible cause of oral disease, many repeating an explanation given to them by health professionals. Nine caregivers said that they had learned that bottle-feeding can lead to oral disease from health educators at the federal WIC nutritional program for low-income families, and seven caregivers (including three of the nine WIC attendees) had also heard this from their physician in the United States. Two had learned this from doctors in Mexico when they were raising Mexico-born children, two had heard this from friends, and one from her mother. Two caregivers – one who was bottle-feeding a 7-month-old infant and one who had exclusively breast-fed her children – said that they had never heard that bottle-feeding could cause decay.

While many of these mothers had heard that bottle-feeding can lead to oral disease, they expressed confusion about how exactly bottle-feeding harms children's teeth. Only three of 38 caregivers (two Mexican immigrants and one Salvadoran immigrant) identified the prolonged bathing of teeth in the sugary contents of the bottle as the primary cause of ECC. Instead, caregivers typically expressed two different explanatory models for how bottle-feeding leads to oral disease – one model implicated the structure of the bottle as the cause, whereas the other model implicated prolonged exposure to the bottle itself. Each explanatory model of how bottle-feeding leads to oral disease led the caregivers to adopt different feeding practices to prevent it.

When asked how bottle-feeding causes decay, 14 caregivers (nine Mexican immigrants and five Salvadoran) specifically cited the bottle's nipple as the cause of decay: "Because of the rubber. The rubber was what the bad part is. It causes teeth to get decayed. And ugly," said one Salvadoran immigrant mother. Four other caregivers specifically cited the plastic of the nipple as the harmful agent. As one Salvadoran mother put it: "Well, because the plastic that the nipple has, it's bad for the children's teeth. That has been my understanding. That is the reason I take them off the bottle at an early age."

Caregivers' conceptions of the nipple as the causative agent in ECC seemed to derive from misunderstanding the health professionals' messages. Two caregivers explicitly identified their dentist as the source of this information, and two others cited health educators at WIC. Another two caregivers appeared to confuse the association of the nipple with crooked teeth with its role in causing cavities. One caregiver explained thus: "Because in Mexico [at the clinic] they told us not to give them so much [nipple] because their teeth don't stay straight."

Five caregivers subscribed to an explanatory model that instead emphasized prolonged exposure as a way that bottle-feeding can lead to oral disease. A Salvadoran immigrant caregiver explained: "[M]y mom would always tell me that we should not let children carry the bottle in their mouth for a long time." Said a Mexican mother: "[B]ecause they sleep with it and they finish the milk and they are still sucking and all they're doing is sucking the nipple, they are not drinking anything and that's bad." Three of these five caregivers emphasized prolonged exposure to the bottle at nighttime as the primary factor. As one Salvadoran immigrant noted: "They [WIC] said that when they fall asleep with the bottle, their teeth get stained and when they don't brush their teeth."

These two different explanatory models of oral disease led the caregivers to adopt different child-feeding practices. Seven caregivers who

conceived of the bottle as the cause of their children's decay had chosen to switch their children to a cup with a hard spout instead. One Mexican immigrant caregiver explained: "Yes, because the nipple from the bottle will ruin his teeth and the cup mouthpiece will not." Yet three of these caregivers said they continued to allow their child to drink from the cup during the night. One Mexican immigrant caregiver who gave her child chocolate milk in his cup said: "He'll get up at 2 to 3 in the morning, crying, and he'll tell me he wants his little cup with milk and I feel bad and get up and get him his cup."

Meanwhile, 10 caregivers who wished to avoid their children's prolonged exposure to the bottle or cup adopted a practice of removing it from their child after the child was asleep. These caregivers said they followed this routine without brushing their children's teeth. As a Salvadoran immigrant caregiver explained: "[I]t's easier for a child to go to sleep with their bottle and if it has sweet drinks, it could affect the teeth. I don't – I just let her fall asleep and I take it out and when she wakes up she gets it again." By not understanding that the substance inside the bottle and the context in which the bottle was consumed (at naptime or bedtime) were both more important than the bottle itself, these caregivers unknowingly adopted unhealthy feeding practices.

Partly because of such confusions about how exactly bottle-feeding leads to children's oral disease, three caregivers openly expressed skepticism about the health educators' message. One Salvadoran immigrant mother, for example, explained that WIC had told her that "their teeth get ruined quickly from the rubber on the bottle." She said this explanation did not make sense to her: "I think that sometimes it's the rubber, but not so much, but because of the sugars in the bottle." Yet her uncertainty of the exact mechanism by which the bottle causes decay deepened because of her own experience with her children. "I don't think it's the bottle because my older son didn't drink from the bottle and he still has cavities," she noted. For this reason, she continued to bottle-feed her youngest daughter. Similarly, a Mexican immigrant mother reported: "Well, I did not like him to drink out of the bottle because the dentist said that the nipple would rot his teeth. I think that's not true, though, because [her granddaughter] had a lot of cavities [and] she never drank out of a bottle." Caregivers thus tested their explanatory models of the causes of their children's oral disease by assessing the reasonableness of the health educators' models and by comparing those models with their personal experiences. As a result of the miscommunication or misunderstanding that distorted the health educators' message, these caregivers sometimes dismissed the explanatory models of their children's oral disease offered by health professionals.

Popular Explanations of Decay

Lack of Milk or Calcium. Seven caregivers, all Mexican immigrants, explicitly mentioned a link between low calcium intake and oral disease. Two caregivers specifically attributed their own children's ECC to a possibly inadequate intake of milk. One, for example, said: "I did not breastfeed. Sometimes I think that's why they have teeth problems – maybe not enough calcium but I don't know." Similarly, another caregiver said of her son's experience: "Hmm, well, the truth – I don't know why he has so many dental problems because since he's small he got cavities, but rarely did he eat candy. I think it was because he did not have enough calcium."

Two mothers attributed their children's ECC to their own lack of consumption of sufficient milk while pregnant. Both perceived calcium intake as important as oral hygiene and that consumption of sugary foods caused caries. For example, one mother of a girl who drank two to three bottles of juice each night and subsequently developed severe ECC at the age of $1\frac{1}{2}$ explained her daughter's oral disease this way: "I think it's from lack of calcium. Yes, like the [multivitamins] that they gave me [at the clinic] I really did not take them. That's why I think that this happened to her." This mother had heard from friends that bottle-feeding also caused decay, yet maintained that her lack of sufficient calcium intake while pregnant was the main cause of her child's ECC.

This linkage between milk and children's teeth may be culturally based, as illustrated by the word for "baby teeth" in Spanish: "*dientes de leche*," or literally, "milk teeth." In the interviews, we asked the caregivers to explain why they thought primary teeth are called "milk teeth." Twenty of the 26 Mexican immigrant caregivers confirmed a perceived link between milk, or calcium, and the physical health of "baby" teeth. One caregiver explained: "They are formed from the mother's milk. That's why teeth have a lot to do with milk." Meanwhile, another Mexican caregiver said that baby teeth were formed from milk, the child's staple food, whereas adult teeth are formed "from food." Another caregiver reasoned that the consumption of milk is linked to the "strength" of teeth, saying that teeth may break not because they are "decayed" but rather because they are "weak" because of a lack of sufficient calcium.

Because caregivers perceived inadequate calcium intake as an important cause of oral disease, some adopted feeding practices to encourage milk consumption. Three caregivers explicitly said they encouraged their children to consume large quantities of milk to avoid oral disease. One caregiver, for example, commented: "Well, like when they eat something sweet, I tell them to go and brush their teeth and also to drink a lot of milk." These perceptions highlight an important area for oral health education.

"Bad Genes" and the Futility of Prevention. Six caregivers specifically attributed their children's decay to "bad teeth" that may be inherited genetically. These caregivers dismissed other biomedical factors that might lead to decay in favor of heredity. Reflecting on why one of her three daughters had developed oral disease while the

other two had not, one Mexican immigrant mother declared: "Well, I do not know – maybe they already have that in them because they eat candy, but they really do not eat a lot of candy." Similarly, a Salvadoran immigrant mother who was puzzled by her daughters' pronounced ECC attributed it to her husband's family: "I don't know whether it's because of my husband's family, because a lot of them have had dental problems, they have a lot of cavities." While susceptibility to dental caries may indeed have a genetic component, these caregivers instead posit genetics as the overriding factor in determining decay. One Mexican immigrant mother put this bluntly. Stating that there was no single environmental factor "to blame" for her children's cavities, she attributed their caries purely to heredity: "I think that it's something genetic, that that's whose teeth are going to get bad no matter what."

Four caregivers whose children had developed ECC expressed a sense of powerlessness over their children's dental decay. One Salvadoran mother, for example, ventured that perhaps her daughters' caries resulted from "bad luck." This sense of futility derived from the caregivers' lack of understanding of the mechanisms of dental decay, an incomprehension that was bolstered by the health educators' unsuccessful explanations of the cause of cavities. For example, one Mexican immigrant mother said that she still did not understand what led her son to develop severe decay at age 1.5, although her dentist had told her it was caused by his consuming several bottles of milk each night. Unclear how bottle drinking relates to ECC, this mother said: "The truth is I don't know [what caused it] because when he was smaller he hardly ate candy. . . . If we knew what caused it we would prevent it." The caregivers' sense of powerlessness over their children's ECC suggests communication gaps between caregivers and health professionals that sustained health education could address.

Discussion

This paper has contributed to an understanding of Mexican and Salvadoran immigrants' explanatory models of children's oral disease. Because qualitative interviews allow the caregivers to express their understandings of the relationship between specific behaviors and oral disease in their own language, they are valuable in identifying unknown oral health beliefs and gauging the groups' oral health knowledge. They allow for a complex understanding of the explanatory models of illness causation and treatment, which may contain elements of both biomedical and lay knowledge.

The most commonly cited explanation for the children's oral disease was the consumption of sweet foods, with 19 caregivers defining sweet foods specifically as "candy." The caregivers were less aware of soda and juice as contributors to oral disease. While caregivers did commonly cite biomedical explanations for children's decay, they expressed particular confusion about how bottle-feeding leads to decay. Fourteen of the 19 caregivers who mentioned bottle-feeding as a cause of decay attributed it to the bottle's nipple, whereas five attributed decay to prolonged exposure to the bottle. To our knowledge, the association between decay and the bottle's nipple has not yet been reported. Each different explanatory model of oral disease led the caregivers to adopt specific feeding practices to avoid the perceived cause of decay, such as switching from a bottle to a cup with a hard spout or removing the child's bottle when the child fell asleep. These misunderstandings of how bottle-feeding causes oral disease thus led the caregivers to adopt further unhealthy practices. Meanwhile, seven caregivers – all Mexican immigrants – mentioned the consumption of milk as a strong protective factor in avoiding oral disease.

While some differences existed between the Mexican and Salvadoran immigrant caregivers' explanatory models of oral disease and oral health-related practices, the explanations offered by both groups of mothers are remarkably similar. Yet the similarity in both groups' explanations does not necessarily derive from a shared "Latino culture." Similarities between the two groups of participants could also reflect the restricted access to a limited pool of health educators or dental professionals, a high degree of social interaction among residents, or a relative lack of socioeconomic differentiation in this low-income immigrant community. Generalizations to all Latinos should be undertaken cautiously. Urban Latino populations, those in other socioeconomic strata, or those in other geographic regions of the country could well express quite different views.

Nonetheless, these findings point to distinct areas in which continued health education is not only necessary but could be more effectively delivered and reinforced. Eighteen caregivers mentioned health professionals as the source of their knowledge of how bottle-feeding causes decay, while only three mentioned peers. The caregivers' confusion of the nipple as the source of decay may derive from health educators' distillation of a complex health prevention message into a simple and memorable slogan – that, for example, the nipple "is bad for teeth." Yet because they misunderstand the precise mechanism of decay, many caregivers adopt unhealthy feeding practices based upon these messages. Others dismiss the harm that bottle-feeding can cause because of the message's apparent lack of sense. This confusion illustrates the need for more effective oral health education programs and for a better understanding of the caregivers' explanatory models of oral disease, so as to better guide oral health education programs to redress such misconceptions.

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