

Queso fresco knowledge, attitudes, and practices among Hispanic women in Southern California



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ABSTRACT

Industry manufactured fresh, unripened cheeses, including queso fresco, are required to comply with national food safety regulations. Conversely, artisanal queso fresco, a common food in traditional Latin American and other cultures, may not follow safety regulations and can be contaminated with bacteria that cause foodborne illnesses. This survey explored knowledge, attitudes, and practices (KAP) around queso fresco through KAP surveys and focus group discussions with Hispanic women in Southern California. Thirty percent had eaten queso fresco from Mexico in the past year. Over half of respondents believed queso fresco was unsafe for pregnant women, yet 61% reported eating queso fresco during pregnancy. Public health messaging may better influence Hispanic pregnant women by adapting culturally appropriate tones that are educational or fear-based, depending on women's level of acculturation, country of origin, language preference, and awareness about the risks of queso fresco.

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Key words: Queso fresco, Hispanics, knowledge, practice

INTRODUCTION

Fresh, unripened cheeses are eaten in many cultures in the Mediterranean, the Middle East, Southeast Asia, Latin America, and other regions. These fresh or soft cheeses are made in many varieties (1); some varieties have the same name but varied taste, texture, and form; others have different names but are the same kind of cheese (2). Across Mexico and Central America, the most common fresh cheeses are typically known as “queso fresco.” Other varieties of soft cheeses include queso panela, queso de canasta, queso blanco, requeson, and queso crema. Common semi-hard or semi-ripened fresh cheeses include queso Oaxaca, asadero, and Menonita or Chihuahua. In the United States, these cheeses are frequently referred to as Mexican-style, or Hispanic-style, cheeses. Cheese names in Spanish are not standardized, so varieties are named inconsistently by both generic and trademarked brands (3).

The popularity of queso fresco and other Hispanic-style cheeses has increased across the United States, particularly among the growing Hispanic population. In 2012, over 224 million pounds of Hispanic-style cheese was estimated to be produced in the United States, with more people consuming queso fresco than any other type of Hispanic-style cheese (4). Commercial production of fresh cheeses, such as queso fresco, in the United States and other countries follows national food safety regulations that usually include the use of pasteurized milk (5,6). However, queso fresco and other traditional fresh cheeses are also produced in many countries by artisanal cheesemakers in small farms, ranches, and homes using raw, unpasteurized milk. These products have distinctive textures, smells, and tastes, which are often more desirable than manufactured cheese to many cultural groups (1). These artisanal cheeses and their means of production are strongly linked to their places of origin and part of the history and culture of the communities that produce them.

In addition, artisanal fresh cheeses may be produced, transported, or sold in unsanitary and unregulated conditions (5). Large quantities of queso fresco and other fresh cheeses, frequently unlabeled and without proper refrigeration, are brought into the United States across the southern land border by individuals declaring the products for personal consumption; subsequently, these products are often sold in the United States without a license (7).

Because of their relatively high moisture content (up to 67%), fresh cheeses can support growth of bacteria and thus have a short shelf life, particularly if not properly refrigerated. Hispanic-style fresh cheeses have frequently been associated with sporadic and outbreak-related foodborne illnesses, and Hispanic people have been disproportionately affected (8,9,10). Individuals with compromised immune systems, pregnant women, young children, and older adults are especially vulnerable to severe outcomes (11).

To effectively address the public health risks associated with consumption of fresh cheeses, it is necessary to understand the public’s awareness of and practices related to buying and eating queso fresco and other Hispanic-style fresh cheeses. We explored the knowledge, attitudes, and practices (KAP) around queso fresco consumption among Hispanic women in San Diego and Los Angeles, California who were pregnant or mothers of young children and thus at elevated risk of illness. Given their proximity to the US-Mexico border and large Hispanic populations, the study sites of San Diego and Los Angeles counties are areas where such cheeses are likely to be distributed. The goals were to understand prevailing ideas about queso fresco and its consumption among Hispanic women, and messaging that may be effective in raising awareness about health risks.

METHODS

For this assessment, we defined queso fresco as traditional Mexican cheeses such as panela, asadero, blanco, rancho, doble crema, canasto, Oaxaca, and requesón. We collected quantitative and qualitative data by conducting KAP surveys and focus group discussions on queso fresco purchases and consumption with Hispanic women in Los Angeles and San Diego counties in July 2014. Descriptive statistical analyses were conducted using *SAS Version 9.4* (SAS Institute, Cary, NC). This assessment received a nonresearch determination from the National Center for Emerging and Zoonotic Infectious Diseases at the U.S. Centers for Disease Control and Prevention (CDC).

KAP surveys

We partnered with Project Concern International (PCI), a community-based organization in San Diego County, using convenience sampling to conduct the KAP surveys. Women 18 years of age and older who were pregnant or mothers of an infant or newborn baby were recruited from existing PCI women's health education groups. Bilingual (English and Spanish) case managers conducted the surveys by telephone; surveys were conducted in Spanish or in English based on participant's choice. Questions focused on how often women and their family members ate queso fresco, where women bought queso fresco in the United States, if they ever consumed queso brought from Mexico, and if it was important to them that the queso they ate was labeled and refrigerated. Other questions explored awareness about the safety of eating queso fresco during pregnancy, the safety of feeding queso fresco to children under one year of age, whether they had heard about risks associated with eating queso fresco, and if so, the information source.

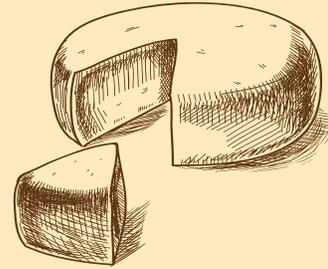
Focus groups

We also conducted four focus groups in San Diego and one in Los Angeles. Three community-based organizations that serve pregnant women and mothers of young children (PCI, Women Infants and Children (WIC)/Healthy Start, and San Ysidro Health Center) recruited participants using convenience sampling during regularly scheduled activities with these groups. Hispanic women were eligible to participate if they were ≥ 18 years of age and spoke Spanish fluently. The discussions lasted 45–60 minutes. We obtained verbal informed consent from participants before starting data collection and used a standard guide to facilitate each focus group discussion. Discussions, all conducted in Spanish, began with questions regarding knowledge about queso fresco and pasteurization, and then participants reviewed four types of messaging styles and tones (informative, emotional and fear-based, empowering, and shocking) in one-page sample educational materials that contained images related to the messages (Figure 1). Participants also had the opportunity to ask questions about queso fresco. We analyzed themes using detailed notes and audio recordings to identify emergent trends across groups. Because of the similarity of responses from the focus groups in Los Angeles and San Diego, data were combined.

Figure 1. Guide for focus group discussion topics

Queso fresco knowledge and consumption practices

- What do you know about queso fresco?
- What have you heard about how these cheeses can affect health?
- How can you tell if queso fresco is good or bad?
- What have you heard about “pasteurization”?



Queso fresco educational materials: messages and content for each style/tone

Informative

- Diseases caused by bacteria found in cheese (listeriosis, *M. bovis* tuberculosis, salmonellosis)
- Symptoms and health outcomes: miscarriage, vomiting, diarrhea, stomach problems, fever, death
- Populations at highest risk: children, fetus/neonate, pregnant women, elderly
- Prevention by consuming queso fresco made with pasteurized milk, make in a clean environment, keep refrigerated

Emotional/fear-based

- Story and photograph of a young child who became severely ill and a woman who had a miscarriage after consuming unsafe queso fresco
- Headline: “The risks of eating unsafe queso fresco are severe!”

Empowering

- Encourage people to buy labeled queso fresco from grocery stores and discourage consumers from buying queso fresco from street vendors
- Available on CDC’s website: <http://www.cdc.gov/usmexicohealth/resources-public-health.html>

Shocking

- Photographs of unsanitary conditions such as queso being made in a coffin and queso with flies on/in it
- Headline: “Do you know how your queso fresco is made?”

Awareness and motivating factors

- From where or whom would you like to receive this information?
- What messages would make a pregnant woman or mother reconsider eating queso fresco or feeding it to a young child?

RESULTS

Sixty-four women, ranging from 19 to 47 years of age (average: 31 years), participated in the KAP survey. Most (90%) of the respondents were born in Mexico; 6% were born in the United States, and one woman was born in Honduras. All of them lived in the United States at the time of the project. The majority (84%) of respondents reported speaking Spanish primarily at home. One-third (33%) of the respondents had completed only an elementary school education, and the same proportion had completed a high school education or had obtained a GED equivalent. Ninety-four percent of the surveys were conducted in Spanish based on respondents' language preference.

A total of 41 women participated in the focus groups, with a total of 27 women in the four San Diego focus groups and 14 women in the Los Angeles focus group. Most participants (75%) in both locations were born in Mexico. In the Los Angeles group, three participants were born in Guatemala and two in El Salvador. In the San Diego group, one woman was from Argentina and four were of unknown origin. All the women lived in the United States.

Consumption patterns and sources

Most (80%) KAP survey respondents reported eating queso fresco either weekly (50%) or monthly (30%). Respondents reported buying queso fresco in the United States from large grocery stores (90%, n=58); 5% reported buying queso fresco from smaller neighborhood markets in the United States, and the rest did not shop for queso fresco. Women in the focus groups similarly said that they bought queso from U.S. grocery chains and neighborhood stores.

In addition, about one-third (30%) of KAP survey respondents reported having eaten queso fresco brought from Mexico to the United States; of those, 44% said that they ate queso fresco from Mexico several times a year. Similarly, many of the women of Mexican origin who participated in the focus groups said that they always bring queso fresco from Mexico or that relatives bring queso fresco from Mexico several times per year. One woman mentioned that people will sometimes sell queso fresco out of their homes in small amounts, including queso brought from Mexican cities close to the border.

When asked about how they identify whether queso fresco is safe, women in the focus groups said they trusted particular brands. Most women knew the importance of buying queso fresco with labels, mostly for the expiration dates to know when the product will go bad. As one participant said, "The label can be a sign that you're buying a cheese that won't do you harm."

Knowledge of pasteurization

Almost three-quarters of KAP survey respondents (73%) reported having heard the term "pasteurized," yet less than half (48%) responded that they knew what it meant. Knowledge about pasteurization varied among the women in the focus groups. Several said that pasteurization is a process whereby milk is heated to high temperatures to kill bacteria, while others were confused about the difference between whole and raw milk. One woman said that a doctor had told her it was important to choose pasteurized cheeses, so she looks for "pasteurized" on labels. Others said they had heard the word but were not sure what it meant.

Perspectives on the health risks

Awareness and opinions about queso fresco as a health risk varied among women in the focus groups. Participants frequently mentioned that they were confused about why eating queso fresco could be dangerous when dairy products provide calcium to promote healthy growth in children and prevent osteoporosis in older adults. Over two-thirds (69%) of KAP survey respondents had heard that queso fresco can make a person sick. Of those, 59% knew it could cause diarrhea or stomach problems. One woman said she knew it was an important concern because queso fresco can contain bacteria; despite knowing the risks, she still bought cheese from vendors who brought it from Mexico. Several women talked about how they had learned from television about the dangers of queso fresco. One woman said she heard on television to avoid eating homemade cheeses because they are “made at bad temperatures.” Another woman said she grew up on a ranch in Mexico eating queso fresco and drinking fresh, raw milk in the mornings, but had never heard that those products could be harmful. Many also said that they had consumed fresh milk products in Mexico without getting sick. Almost all (98%) survey respondents knew it was very important to refrigerate queso fresco.

Perspectives on the health risks during pregnancy

Women in the focus groups had varying levels of knowledge about the risks of consuming queso fresco during pregnancy. More than half (63%) of the KAP respondents believed it was unsafe for pregnant women, but most (61%) also reported eating queso fresco during pregnancy. KAP respondents reported hearing about the health risks mainly from clinics (41%) and services (30%), such as Women, Infants, and Children (WIC) and Healthy Start.

One woman recounted that when she was pregnant, her doctor had advised against eating queso fresco. This prompted her to tell her mom to stop bringing and “tempting her” with cheeses from Mexico. However, she had many friends who ate queso fresco during their pregnancies. Another participant added that she was told by her doctor not to eat queso fresco during her pregnancy but was not told why. Another said that during her first pregnancy, she loved eating “the queso fresco with chili and jalapeño sold in Mexico”; she ate it often and stated she did not experience any problems.

During several focus groups, women asked whether the quantity of cheese eaten makes a difference, if it was safe to eat a small amount, or if it was better they avoid queso fresco altogether; they said they did not know that even a small piece of cheese could be contaminated with harmful bacteria.

Effective messaging

Focus group participants reviewed words and images of informative, emotional and fear-based, empowering, and shocking messaging (Figure 1). When focus group participants were asked what types of educational material they preferred, most participants who had less baseline knowledge about the risks of queso fresco preferred informational messages, while those with more awareness preferred the shocking or fear-based messages. Women who preferred the informative messaging preferred learning about the types of bacteria found in queso fresco and felt empowered with knowledge they could then share with their families to help them stay safe and healthy. The general reaction to the empowering messaging was that it provided a clear message telling people to buy refrigerated, labeled queso fresco from a store. Those who preferred material with fear-based tones felt it was more effective in demonstrating the severe consequences of eating unsafe

cheese. One participant said it made her want to know more about the precautions to take when buying and eating queso fresco. Upon viewing the messaging with fear-based tones, women in the focus groups were surprised to learn that eating unsafe queso fresco could lead to miscarriage and death of young children.

After viewing the emotional or fear-based materials, several women discussed how strange it was to learn how serious the risks could be, considering they had never heard this information before despite attending prenatal education classes. Those same participants expressed skepticism toward the importance of the issue. Almost all participants agreed that doctors would best be able to deliver messages about queso fresco effectively. When asked who would be most likely to promote behavior change with this information, several participants suggested educating children at school, who could then bring information home to their families.

DISCUSSION

It was encouraging that almost all (>90%) of the KAP participants bought queso fresco from large grocery stores, because those products are likely to be regulated, labeled, and from safer sources. However, our findings also suggest that many Hispanic women in Southern California obtain and consume potentially unsafe queso fresco from other sources; these products are more likely to be made from unpasteurized milk, subject to pathogen contamination after processing, and transported without proper refrigeration (5).

Pasteurization, the process of heating milk to a specific temperature for a set amount of time, can effectively kill pathogens that can contaminate milk and dairy products, such as *Salmonella* spp., *Brucella* spp., *Listeria monocytogenes*, and *Mycobacterium bovis*.^{*} Exposure to these pathogens can lead to acute gastrointestinal illnesses (diarrhea, vomiting), infectious diseases that cause systemic illness (brucellosis, tuberculosis), and pregnancy complications including miscarriage, neonatal sepsis or meningitis, and death (7,12).

Hispanics have been shown to be at higher risk of certain foodborne illnesses. For example, 73% of human brucellosis cases reported in California from 1973 to 1992 occurred among Hispanic people. Cases of brucellosis and human tuberculosis disease due to *M. bovis* are concentrated in Southern California counties with large Hispanic populations (13,14). The rate of listeriosis during 2009–2011 was approximately 24 times higher for pregnant Hispanic women than for the U.S. population as a whole (15). Between 2009 and 2011, four (33%) of 12 listeriosis outbreaks in the United States were connected to consumption of queso fresco made from pasteurized milk, indicating that even pasteurized cheeses carries a risk (15,16).

Non-U.S.-born Hispanic persons in the United States (77%) and U.S.-born Hispanics (55%) frequently say they like or love queso fresco (17), but each group might be exposed to different risks based on access to unsafe queso fresco and information regarding risks. Less acculturated Hispanics may have stronger ties to their home country and culture; thus, they also are more likely to have ties to traditional sources of queso when they travel home or when others send or bring quesos from Mexico. Thus, if health information is not culturally appropriate, including messages provided during pregnancy, it may be less effective for preventing exposure to unsafe queso fresco in this higher risk population.

^{*} **Note:** Current regulations in the United States allow for the sale of cheeses made from unpasteurized milk if the cheese is aged for typically 60 days or more at a temperature greater than 35°F (2°C). (18)

The range of knowledge and understanding of the term “pasteurization” among participants presents an important health education opportunity. Further discussions with target populations are required to determine the most effective approach for education about pasteurization, dispelling confusion, and communicating the health consequences of consuming unpasteurized dairy products. Although participants knew to look for an expiration date on a label, they were less familiar with the word “pasteurization.” It is important that public health professionals work with the target communities to increase understanding of factors in safe cheese production and consumption and encourage people to buy cheeses labeled as pasteurized.

Additionally, it is necessary to more effectively communicate the risks of consuming queso fresco during pregnancy to promote safe choices. Women reported having received information on this topic as part of their prenatal care; 63% of KAP respondents believed queso fresco was unsafe for pregnant women. However, 31% of KAP participants were unaware that queso fresco can cause illness and 61% reported eating the product during pregnancy. This discrepancy between knowledge and practice demonstrates the need for more effective messaging tailored to women’s awareness of the issue. Health education using informative content may be important for women with little or no awareness, whereas messaging with emotional tones may be effective for women who have more awareness.

Large quantities of cheese are brought, frequently without proper storage temperature, into the United States by individuals crossing the U.S.–Mexico ports of entry. In 2009, the U.S. Food and Drug Administration, in collaboration with CDC, documented more than 65,000 pounds of cheese in quantities over 5 pounds brought by individuals crossing at two land ports of entry in San Diego County during a 4-week period (19). A 2004 study assessing cheese brought from Mexico to the United States through non-commercial crossing lanes found that 93% of the cheeses were unlabeled and estimated that approximately 94% of cheese brought across the border is unpasteurized (20). Although regulations exist for importation of cheese for commercial use, none exist for bringing cheese across the border for “personal use” (21). Thus, improving education and awareness about safe cheese buying and consumption practices remains a key strategy in reducing associated health risks with these popular products.

The main limitation of this evaluation is the small number of participants from a single geographic location. Most of the participants were Non-U.S.-born and Mexican; U.S.-born Hispanics and people from other Latin American countries were not represented. Because participants were part of a convenience sample of women in a location near the U.S.–Mexico border, the subjects might not be representative of the broader populations of Hispanic women. Our assessment might also be limited by selection bias. Because women who participated in this study were already enrolled in health programs through community organizations, they could have been more proactive about health issues and could have been previously aware of the topics covered. Recall bias and social desirability bias could also impact the results due to the time frame of KAP questions and the setting in which activities took place.

The lack of a single definition of queso fresco and the use of different names for and varieties of fresh Mexican cheese can cause confusion. Imprecision may have been created by the difficulty of gaining an accurate measure of consumption of queso fresco sourced from artisanal cheeses made with unpasteurized milk and participants’ unfamiliarity with pasteurization. Similarly, many participants were not aware of the origin or quality of the queso fresco they consumed that was not bought in a large U.S. supermarket.

Considering the present findings and those of other investigations, queso fresco safety and health promotion efforts could be focused on educating Non-U.S.–born Hispanic people and their families in the United States. Educational outreach can be more challenging for binational and border communities with ties to Mexico, given the strong cultural influences and fluidity of cross-border movement in the region. To reach this highly mobile community, concise messages appealing to the linguistic and cultural preferences of Non-U.S.–born Hispanic audiences may have the greatest impact. Partnering with Mexican health authorities and physicians to develop and deliver public health messages would likely be advantageous but could require strategic planning to sustain communication and health promotion efforts amid competing priorities.

In addition, educational efforts should focus on simple, informative messaging for at-risk populations, with easy ways to identify safe cheeses: 1) Buy cheese from well-known, trusted grocery stores, not from unofficial vendors; 2) Look for products with labels that say “pasteurized”; and 3) Keep cheese refrigerated—from the moment you bring it home from the store until you eat it. Most participants had heard the term “pasteurization” but could not accurately describe the reason for its importance or details of the process; either public education should explain the basic process, or simpler ways to describe pasteurization should be explored.

As Hispanic pregnant women are one of the higher risk groups for adverse health effects associated with queso fresco, the discrepancy found between their awareness of risks and their actual behavior of eating queso fresco during pregnancy should be addressed. It is important to ensure that existing or new prenatal educational materials are culturally relevant for this audience and adapted for Hispanic women of diverse national origins and differing levels of acculturation and literacy.

Public health messages are most effective when they are delivered to the right people, by the right people, and in the right formats. An effective approach would be to prioritize health education for the populations at highest risk for the most severe consequences. These include pregnant Hispanic women (and their fetuses or newborn infants), young children, older adults, and patients with certain comorbidities or compromised immune systems.

Almost all focus group participants agreed that education on this topic would be well received from their physicians. Public health practitioners should consider partnering with medical care providers to promote safe queso fresco consumption, because pediatricians frequently interact with patients who are at a higher risk and with parents of young children. Because some members of the Hispanic community are not aware of the risks of queso fresco consumption, these individuals may be more likely to listen to and believe the information if it comes from a trusted source, such as a medical care provider.

Given the time constraints of medical visits, however, it is important to explore alternate communication strategies and partners to help in reinforcing the messages. Teaching about safe queso fresco and the importance of pasteurization and food handling during health education at schools could be a good way for children to bring home this messaging and promote changes in their families’ consumption practices. Community health educators and workers, such as promotoras (i.e., community health workers), could also raise awareness on this topic and promote behavioral and cultural changes in purchasing and consumption practices. Several educational resources exist online for use by promotoras, such as CDC *Listeria*-related information (<https://www.cdc.gov/spanish/listeria/education.html>) and FDA’s “Preventing Listeriosis In Pregnant Hispanic Women in the U.S. toolkit” (<https://www.fda.gov/food/health-educators/preventing-listeriosis-pregnant-hispanic-women-us>).

Along with interpersonal education, it is important to consider other population-based strategies for sustained efforts to create more widespread awareness. These include partnering with popular information sources, such as media sites and news stations. Incorporating messages into soap operas, or “telenovelas,” disseminating them through social media channels, and getting Latina celebrities to endorse them could raise widespread awareness and trust more broadly.

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