

Functions of social networks in maternal food choice for children in Mexico

Ligia I. Reyes^{1,2}  | Edward A. Frongillo¹  | Spencer Moore^{1,3} |
Christine E. Blake¹ | Wendy Gonzalez⁴  | Anabelle Bonvecchio⁵ 

¹Department of Health Promotion, Education, and Behavior, University of South Carolina, Columbia, South Carolina, USA

²Division of Nutritional Sciences, Cornell University, Ithaca, New York, USA

³Health & Society Group, Wageningen University and Research, Wageningen, Netherlands

⁴Knowledge Leadership, Global Alliance for Improved Nutrition, Geneva, Switzerland

⁵Research Center for Nutrition and Health, National Institute of Public Health, Mexico City, Mexico

Correspondence

Ligia I. Reyes, Division of Nutritional Sciences, Cornell University, Martha Van Rensselaer Hall, Room 3107A, 116 Reservoir Avenue, Ithaca, NY 14853, USA.
Email: ligia.reyes@cornell.edu

Funding information

University of South Carolina, SPARC Graduate Research Grant

Abstract

Food choice for children has important implications in establishing early-life dietary habits and preferences. Food choice for children has been studied as parent-child dyad dynamics, but little is known about the extended system of relationships in maternal food choice for children. The objective of this study was to understand the functions of mothers' social networks in the food choices that mothers make for their children ages 1 to 5 years old in rural Mexico. In-depth interviews were conducted with 46 participants in three rural communities. The interviews inquired about participants' child-feeding practices, personal and local beliefs about child feeding and the individuals with whom they had conversations about food and child feeding. All interviews were conducted in Spanish, audio-recorded, transcribed verbatim, verified for quality and analysed using the constant comparative method. Five interconnected networks emerged, consisting of household family, non-household family, community, children's initial school and health and nutritional programme personnel. Each network had functions in food choice that ranged from shared food decision-making in the household family network to imparting formal dietary guidance in the health and nutritional programme personnel network. Across the networks, professionals, participants' mothers and mothers-in-law, community senior women and other women with children emerged as prominent figures whom participants would turn to for child-feeding advice. These findings provide empirical evidence that social networks, as an organized system of interconnected relationships, have vital functions in establishing social norms for food choices made for children that can be leveraged to promote healthy food choices.

KEYWORDS

child feeding, feeding behaviour, food choice, social influence, social networks, social norms, social systems

[Corrections added on 21 September 2021 after first online publication: The labeling of Table 2 has been updated in this version. Correspondence and funding information details have also been updated for completeness. The updates in this version were provided to production prior to first online publication.]

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

© 2021 The Authors. *Maternal & Child Nutrition* published by John Wiley & Sons Ltd.

1 | INTRODUCTION

Childhood malnutrition—undernutrition and overweight and obesity—has lasting implications for children's health and overall wellbeing (Dewey, 2003; World Health Organization, 2016). Coexistence of these two forms of malnutrition has accelerated during the nutrition transition in many Latin American countries (Monteiro et al., 2004). Over the past 30 years, Mexico has had persistent undernutrition with increasing overweight and obesity among children under 5 years old (Gutiérrez et al., 2012; Kroker-Lobos et al., 2014).

Although adequate nutrition during early childhood is essential for optimal development, little is known about food choice for children as they transition into the family diet in contexts facing these two forms of malnutrition. Beyond specific nutritional needs during early childhood, children gain exposure to different tastes and textures that cue them to accept or reject certain foods (Birch et al., 1998). With this exposure, children learn dietary behaviours that form habits and preferences and imprint later-life individual behaviour (Dattilo et al., 2012).

Contento (2016) posits that food choice depends on several drivers consisting of biological predisposition and experiences with food from early life; intrapersonal and interpersonal conditions that pertain to knowledge, skills and norms and social and physical environments that impede or enhance food choices. The Food Choice Process model postulates that individuals' lived experiences are the foundation for how they view the world, the social and physical contexts in which they live and navigate can reinforce and challenge beliefs and the ability to make choice and personal systems are the cognitive processes by which individuals negotiate their values and call upon experiences to facilitate decisions (Furst et al., 1996; Sobal & Bisogni, 2009). This model theorizes that cultural ideals, personal factors, social factors, present contexts and resources are *influences*, or salient circumstances, that are considered and reconsidered in food decision-making (Furst et al., 1996; Sobal & Bisogni, 2009). These frameworks highlight that food choice is an intrapersonal process shaped by the interpersonal relationships intrinsic to an individual's integration in their social context (Blake & Bisogni, 2003).

Social networks are the connections that individuals have with others and the social structure that emerges from those connections, which can function to influence behaviour and health (Berkman et al., 2000; Heberlein et al., 2016; Valente, 2010). The structure of social networks consists of the patterns of ties between individuals, whereas the function of social networks involves the content and specific resources that flow through those ties, which can be supportive or detrimental to behaviour (Antonucci & Akiyama, 1987; Berkman et al., 2000; Israel & Antonucci, 1987; Steinbach, 1992). In social network theory, the structure and function of networks are important in shaping behaviour and attitudes through various social mechanisms, including the flow of resources, provisioning of social support, social influence and social engagement (Berkman et al., 2000). The social interactions that occur among network members are mechanisms by which information diffuses in society and norms are established (Edwards & Middleton, 1987; Nguyen

Key messages

- Social networks have vital functions in maternal food choice for young children.
- Mothers assign authority to members across their social networks who assist in decisions about child feeding but also raise tension between local beliefs and practices and formal nutritional guidance.
- The embeddedness of maternal food choice for children in social networks and the multiplicity of child-feeding authority figures suggest that programmes to improve child nutrition may benefit from integrating key network members to harmonize diffusion of messaging that promotes healthy diets for young children.

et al., 2019; Nonaka, 1994; Valente & Fosados, 2006). Social norms refer to the rules, often informal, that regulate behaviour (Bicchieri et al., 2018). Social norms can be characterized as *descriptive* (i.e., what a collective of people do), and *injunctive* (i.e., what a collective of people approve or disapprove) (Cialdini et al., 1991), which have recently been studied in relation to infant and young child feeding (Nguyen et al., 2019).

Social networks have been understudied in food choice research in low- and middle-income countries where dietary patterns are rapidly changing. The sparse evidence that exists from these settings, including Latin America, suggests that food choice for children involves social dynamics that extend beyond the mother-child dyad in which family systems, cultural systems and social hierarchies are prominent in diffusing information and shaping feeding behaviour (Aubel, 2012; McGadney-Douglass & Douglass, 2008; Nguyen et al., 2019; Romo et al., 2005). This evidence, however, has primarily focused on children under 2 years old. Understanding how social networks help establish social norms about food choice for children through age 5 may be particularly important and timely in the context of Mexico. The objective of this study was to understand the functions of mothers' social networks in the food choices that mothers make for their children by answering three research questions. First, what are mothers' social networks and their composition? Second, what child-feeding functions do mothers' social networks have? Third, who are the prominent authority figures across the networks in food choice for children?

2 | METHODS

2.1 | Study design and sampling

In-depth interviews were conducted with 46 participants in three rural communities in Mexico. Data collection was supported by

Un Kilo de Ayuda, a national non-governmental organization dedicated to healthy growth among children under 5 years old in rural communities through an integrated nutritional programme that includes a basic food basket. The study communities were selected based on community municipality, community size using Un Kilo de Ayuda enrollment as a proxy and interviewer mobility to the communities. Criteria for inclusion were that participants be the mother, or the primary caregiver in the absence of the mother, of a child between the ages of 12 and 59 months, be able to communicate in Spanish and be 15 years or older. Un Kilo de Ayuda personnel introduced the interviewer at health and community centres and provided a list of programme participants who met child-age criteria. Women were invited to participate by approaching them in waiting areas at health and community centres, asking women with whom contact was made if they knew other women with children of similar age range, using the list provided by Un Kilo de Ayuda and canvassing the communities. All interviews were conducted by the first author in Spanish, audio-recorded, primarily done in women's homes and averaged 75 min in duration. Oral consent was obtained before each interview, and no incentives were provided. Ethical approval was obtained from the Institutional Review Boards for Human Participants at the University of South Carolina.

2.2 | Assessment

The interview guide adapted modules developed by the Cornell Food Choice Research Group for the Food Choice Process model (Furst et al., 1996; Sobal & Bisogni, 2009) and incorporated new modules created by the research team. This semi-structured interview guide was pretested in a comparable rural community in Mexico. The modules included knowledge and food meanings, beliefs and social norms, and social channels and networks. The module on knowledge and food meanings inquired about participants' child-feeding knowledge, their thoughts about good and not-so-good foods for children and how and where they gained that knowledge. Questions on beliefs and social norms inquired about broader beliefs in the community regarding child feeding and what participants made of those beliefs. The section on social channels and networks included a name generator and name interpreter instrument (Campbell & Lee, 1991) to inquire specifically about individuals with whom participants had conversations about food and child feeding.

2.3 | Text analysis

Interviews were transcribed verbatim in Spanish and verified for quality. All verified transcriptions were coded using NVivo Version 12. Data were analysed using the constant comparative method in grounded theory in which new data are constantly compared to existing categories to develop the scope of that category or create new categories for salient themes (Glaser, 1965). Ten steps were

systematically conducted for this analysis: (1) simultaneous open coding and codebook development by the first author using research questions as guide; open coding is an interpretative process of comparing raw data line by line for similarities and differences to assign conceptual labels (Corbin & Strauss, 1990); (2) peer consultation of codebook and coding technique after initial coding of 9 transcriptions, about 20% of all interviews; (3) gradual categorization during coding to designate specific network functions as distinct networks emerged; (4) post-hoc higher-level categorization of functions across networks specific to the findings, which was informed by the thinking in existing literature on social network functions, social capital and social support (Berkman et al., 2000; Coleman, 1988; Israel & Antonucci, 1987; Thoits, 2011); (5) gradual categorization during coding to designate emergent hierarchies based on participant descriptions of network members identified as trusted sources of child-feeding advice; (6) application of iterative techniques through completion that compared newly coded text to existing coded text to determine whether content fit within the scope of a code or whether a new code was needed, with two additional peer consultations; (7) review of all coded text for thematic categorization addressing research questions with ongoing peer consultation; (8) visual examination of coded categories using hierarchy charts in NVivo; (9) final examination of selected text for thematic representation and (10) translation of selected text from Spanish to English, also conducted to facilitate peer consultation.

2.4 | Participant characteristics

Forty-six participants were recruited (Table 1). All were the children's mothers, except for one grandmother who was the child's primary caregiver. About half (54%) of children were female. For children's age, 28% were between 12 and 23 months old, 33% were between 24 and 35 months old and 39% were between 36 and 59 months old. In the oldest age group, one child was 66 months once age was verified. The average participant age was 31 years old. For education, 49% of the participants had completed secondary school, 38% had completed primary school and 13% did not complete primary school. Most mothers were married or living in common-law arrangements (98%). Most participants reported their occupation as homemakers (78%), and the remaining (22%) reported at least part-time employment outside of the home. About half (52%) of children's fathers had temporary jobs, mostly in construction and day labour, that required them to relocate near to their job locations and return home only on weekends and, in a few cases, every few months. The average household size was five members. Most participants were beneficiaries of at least one government or non-government programme that consisted of nutritional guidance and/or a provision of a basic food basket. Most participants were beneficiaries of Un Kilo de Ayuda (96%), the national government social development programme PROSPERA (48%), a state basic food basket programme named CAVIN (39%) and other small-scale government basic food basket programmes (33%).

TABLE 1 Participant characteristics

Characteristic	Sample <i>n</i> = 46 Percentage (proportion)
Child sex	
Female	54% (25)
Male	46% (21)
Child age	
12 to 23 months old	28% (13)
24 to 35 months old	33% (16)
36 to 59 months old	39% (17)
Maternal age (average)	31 years old
Maternal education	
Secondary school complete	49% (22)
Primary school complete	38% (17)
Primary school incomplete	13% (6)
Maternal marital status	
Married/common-law arrangement	98% (45)
Single	2% (1)
Maternal occupation	
Homemaker	78% (36)
At least part-time outside of home	22% (10)
Paternal employment location	
Temporary relocation	52% (23)
Non-relocation	48% (21)
Household size	5 members
Social programme participation	
Un Kilo de Ayuda ^a	96% (44)
PROSPERA ^b	48% (22)
CAVIN ^c	39% (18)
Other	33% (15)

^aUn Kilo de Ayuda: Non-governmental programme that operated in rural communities to improve nutrition and development of children under 5 years old and integrated anthropometric monitoring, nutritional guidance and an optional basic food basket.

^bPROSPERA: Federal social development programme that provided financial assistance to low-income families who were adherent to conditionalities that included well-child visits for children under 5 years old with targeted nutritional guidance.

^cCAVIN: State programme, fairly new in the communities, that provided a basic food basket to caregivers of children under 5 years old who were either underweight, or at risk of underweight.

3 | RESULTS

3.1 | Maternal social networks

The social networks that participants described in relation to child feeding were largely interconnected and embedded within the social space of their communities. The set of participants' networks consisted of household family, non-household family, community, children's initial school and health and nutritional programme personnel

(Table 2). The household family network was composed of participants' spouses, mothers, sisters, in-laws and older children who lived in the same dwelling and ate from the same pot. The non-household family network was composed of participants' mothers, in-laws, siblings, cousins, aunts and uncles and nieces and nephews who lived in a separate dwelling and did not eat from the same pot. The community network was composed of distant relatives, friends and neighbours who lived within participants' vicinity. The initial school network was composed of teachers, other mothers and children who were connected through participants whose children attended initial school about 4 h per weekday (*n* = 11). The health and nutritional programme personnel network was composed of doctors, nurses and PROSPERA and Un Kilo de Ayuda personnel who operated out of community health centres.

3.2 | Functions of social networks for mothers and food choice

Participants described the functions that each network had for the feeding of their children. Building on theoretical underpinnings (Antonucci & Akiyama, 1987; Israel & Antonucci, 1987), we define functions as the actions of networks, as described by participants, that facilitated, or hindered, child-feeding behaviour. These functions ranged from directly intervening on feeding behaviour in the most proximal network (i.e., household family) to providing formal feeding and nutritional guidance in the most peripheral network (i.e., health and nutritional programme personnel). Some networks had functions that no other network had, but some functions emerged across the networks (e.g., share child-feeding knowledge).

3.2.1 | Household family

Participants expressed that receiving *encouragement to provide variety in children's diets* was a function of the household family social network. This occurred through conversations, often when planning and preparing meals, but also by bringing home foods, or providing money for foods, considered to be nutritious for the child but infrequently consumed, such as meats and fish. Another function was *shared and engaged decision-making about child feeding* through collective meal preparation with other household women and fathers' engagement. For father's engagement, some participants cited that their spouses were preoccupied with children having monotonous diets and would often ask what children ate, suggested preparing foods children enjoyed and procured pricier foods children infrequently consumed. Members *fostered meal modifications for children*, such as reducing spiciness of family meal. Participants discussed functions that *interfered with feeding* by undermining participants' requests against certain foods, *modelled unhealthy eating behaviours* that participants considered increased child request for foods that they did not want children to have and *destabilized feeding* by disrupting feeding routines that they established for their children. For example, some

TABLE 2 Characterization of social networks

Characterization of social networks and their specific functions in food choice for children
<p>Household family</p> <p><u>Network members:</u> Spouses, mothers, sisters, in-laws, and older children of participants</p> <p><u>Mode of connection:</u> Members lived in the same dwelling and ate from the same pot</p> <p><u>Functions of network:</u> Accustom child to family diet; adapt diet to family health; destabilize child feeding; encourage variety in diet; foster meal modification; interfere with child feeding; model unhealthy eating; share and engage in food decision-making; and, value togetherness during meals</p> <p><i>'When [my son's] dad is here, his dad is very much into buying soda, not me, I am more into making lemon water, or watermelon, or guava, I like to make a water out of whatever fruit I have, but if [children] see soda, yes, he does ask for soda'.</i> (Model unhealthy eating, B105)</p>
<p>Non-household family</p> <p><u>Network members:</u> Mothers, in-laws, siblings, cousins, aunts and uncles, and nieces and nephews of participants</p> <p><u>Mode of connection:</u> Members lived in a separate dwelling and did not eat from the same pot</p> <p><u>Functions of network:</u> Encourage variety in diet; facilitate food access; foster meal modification; provide food directly to child; share child-feeding knowledge; and, share ideas to spark food acceptance</p> <p><i>'We talked about foods, [my aunt] told me that I could also prepare for them oatmeal patties with tuna, she says 'give them!', because oatmeal like that in milk, they don't eat it well, they don't like it because of its thickness. She told me to prepare them like that in foods with rice in a patty, and 'give them!', and I did and they ate them'.</i> (Share ideas to spark food acceptance, B107)</p>
<p>Community</p> <p><u>Network members:</u> Distant relatives, friends, and neighbours of participants</p> <p><u>Mode of connection:</u> Members lived within participants' vicinity</p> <p><u>Functions of network:</u> Judgement of child behaviour and appearance; propagate local beliefs and practices; share child-feeding knowledge; stigma of child underweight appearance; and, stigma of parenting practice</p> <p><i>'There are times when other children, it's not so good, I mean they don't eat well and they're sleepy or don't have energy to go from one place to another. And I see that [my daughter] does, I mean that she eats and does what she wants and is like 'let's go to this mom, let's play, let's go to the other one now', and like that, she goes from one place to another, and there are children who don't. There are children who are just, there'.</i> (Judgement of child behaviour and appearance, CA205)</p>
<p>Initial school</p> <p><u>Network members:</u> Teachers, other mothers, and school children</p> <p><u>Mode of connection:</u> Members were connected through participants whose children attended initial school about 4 hours per weekday</p> <p><u>Functions of network:</u> Monitor adherence to lunch requirements; provide food directly to child; and, share child feeding knowledge</p> <p><i>'Yes, [the school] has rules. Things that are junk, they can't take anything like that ... they can't take juices, forget about candies. Everything else should be that, made at home, vegetables, fruit'.</i> (Monitor adherence to lunch requirements, B108)</p>
<p>Health and nutritional programme personnel</p> <p><u>Network members:</u> Doctors, nurses, and PROSPERA and Un Kilo de Ayuda personnel</p> <p><u>Mode of connection:</u> Members operated out of community health centres</p> <p><u>Functions of network:</u> Impart dietary guidance; maternal confidence about feeding; monitor nutritional status; and, socialization around food</p> <p><i>'It makes me feel, when I take her to the health center, I weigh her and they say that she's very good with her weight or with her height. So I see her that she, well, she has strength. In other words, she's very active. That's what I feel, it makes me feel that everything that I am feeding her is a healthy nutrition for her'.</i> (Maternal confidence about feeding and monitor nutritional status, CA206)</p>

participants cited that the consumption of sugar-sweetened beverages, such as soda, by children's fathers during family meals increased children's request for these beverages. When fathers returned from relocated employment, some participants experienced a destabilization of feeding routines because fathers tended to 'satisfy whims' of children by providing candy treats and were overall more permissive with children's requests. Other functions were related to family dynamics that channelled values relevant to feeding. These functions included *adapting family meals to accommodate the health needs* (e.g., diabetes) of other household members, while simultaneously working to *accustom children to family diets* within the context of reinforcing relevant family values such *eating together as a family*.

3.2.2 | Non-household family

Participants described receiving *encouragement to provide variety in children's diets* through conversations with non-household family members. When participants and children visited relatives' homes, some relatives *modified meal preparation* for young children. Participants also expressed that non-household relatives *shared knowledge about child feeding* with them, such as benefits of certain food for children, and *ideas to spark children's food acceptance* (e.g., creative meal preparations and presentations). Members of this network *facilitated access to certain foods* by offering foods to participants that were sometimes difficult to find locally. These members *directly provided*

foods to children, both acceptable foods and foods that participants did not want their children to have.

3.2.3 | Community

Participants indicated that their community social network engaged in *knowledge sharing about child feeding*, including benefits and harms of certain foods for children. This knowledge sharing *propagated local beliefs and practices* about foods and was most prominent in this network. Participants described common beliefs in the community, such as avoiding 'cold' or 'heavy' foods, benefits of traditional food-related remedies and a common belief and practice to feed young children broths instead of more solid textures. Participants described functions that involved comparing their children against social standards. Participants explained that they and community members perceived and made *judgements of child behaviour and child appearance*. These judgements were about how children behaved around food with others present and whether children appeared healthy, especially if children had been underweight. *Stigmatization of child underweight appearance* was described as signifying weakness. Judgement of a child as underweight was related to *stigmatization of parenting practice* responsible for the child being underweight or future undesirable outcomes, including obesity but primarily diet-related noncommunicable diseases.

3.2.4 | Initial school

Participants relayed that schools had existing lunch requirements that discouraged ultra-processed and packaged foods such as candies, chips and sliced white bread among others and promoted homemade lunches that included vegetables and fruits. Teachers and a healthy-eating committee formed of volunteer children's mothers *monitored adherence to school lunch requirement* by checking children's lunches when children entered school premises or during recess; monitoring could occur daily or biweekly. The healthy-eating committee *shared knowledge* with other mothers about unhealthfulness of 'junk' foods, sometimes citing gaining knowledge from talks provided through nutritional programme and PROSPERA personnel. Participants described *direct food provision to children* through school-sponsored meal and snack programming and through exchanges among children of foods brought from home.

3.2.5 | Health and nutritional programme personnel

One function of this network was to *impart dietary guidance*. Dietary guidance consisted of information about specific food benefits, food acceptability and food-related health risks among other topics. Dietary guidance was provided in groups through periodical nutritional programme talks and workshops, as well as one-on-one guidance through well-child visits and clinical referrals. *Children's*

nutritional status was monitored by health personnel and by Un Kilo de Ayuda personnel as a component of programme eligibility. Participants discussed children's nutritional status results (e.g., weight and haemoglobin levels) as indicative of how they, as mothers, performed in feeding their children. This monitoring showed links to *maternal confidence about feeding* through signs of pride when children had normal nutritional status results, which reinforced their feeding practices, but also insecurity when results were abnormal (e.g., underweight or anaemia), which urged them to seek guidance. This network enabled *socializing around food*, which reinforced content formally imparted by professional personnel, and offered opportunities to taste different recipes given that mothers often organized to bring prepared foods to programme events.

Across the networks, functions were distinguishable in how these facilitated, or hindered, child-feeding behaviour: behavioural acceptance, behavioural apprehension, detrimental and supportive (Figure 1). Behavioural acceptance functions were about the meaning of participants' existing feeding behaviours in relation to their networks. For example, eating together as a family, especially during *la comida* or late afternoon meal, was a meaningful practice that reinforced bonding during family meals. In contrast, behavioural apprehension functions were about judgement and stigma, or social sanctions, when feeding behaviour deviated from socially acceptable beliefs and practices. Supportive functions were actions that facilitated participants' decisions and feeding behaviour. In contrast, detrimental functions were those that hindered participants' preferred practices in feeding their children.

3.3 | Network authority figures in maternal food choice

Social hierarchies emerged in the authority about child feeding that participants assigned to some network members. Participants identified attributes about these authority figures that designated them the status of trusted sources for child-feeding advice.

Health and nutritional programme personnel were widely viewed by participants as trusted and reliable sources for child-feeding advice. Participants referred to them as experts and cited their formal education as an attribute to trust. Although participants broadly assigned this expert status to health and nutritional programme personnel, they tended to cite advice received from doctors especially if it contrasted with practices propagated by other network members.

... To my baby, I didn't give him anything that a doctor wouldn't tell me was okay, precisely because they know, I mean, no one is going to come and tell me that the neighbor knows more than the doctor, I mean, if the doctor tells me 'this isn't good for him' then it isn't good for him. B105

Participants' mothers were widely cited as respected and trusted figures in child-feeding advice. Participants cited age, experience

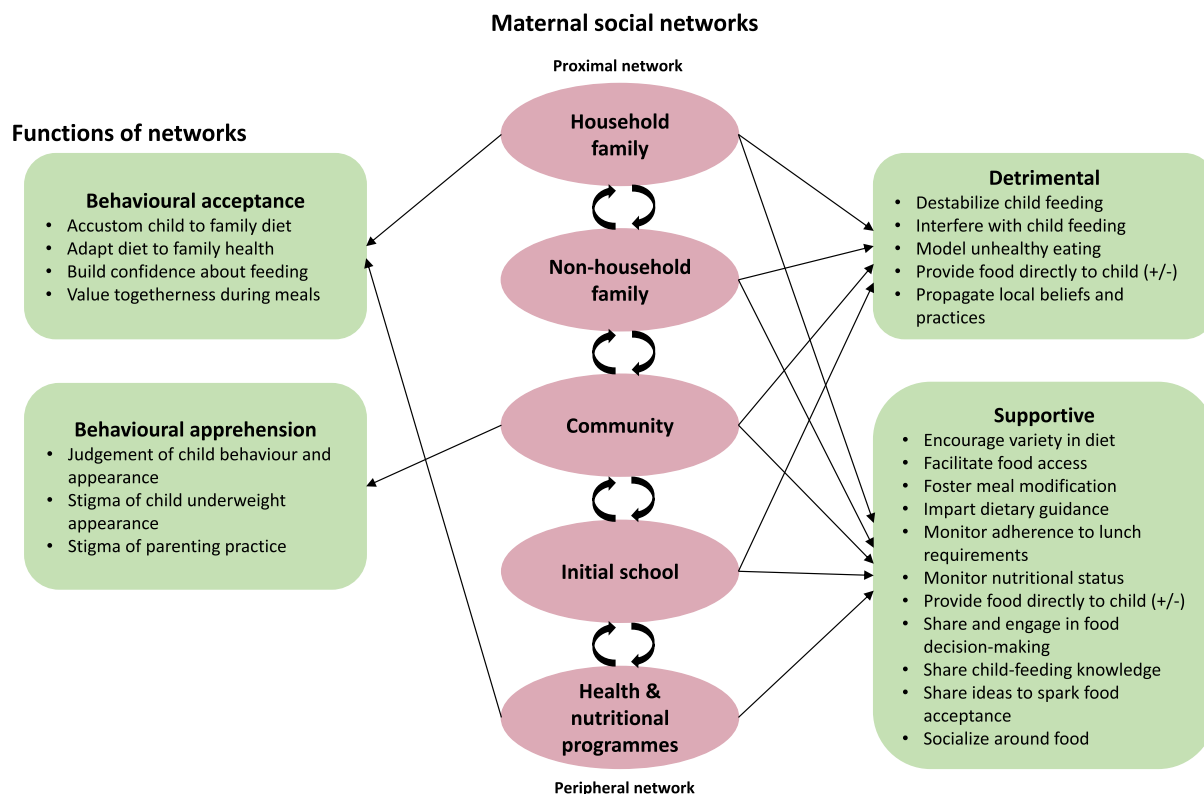


FIGURE 1 Functions of social networks

raising children and their own upbringing experiences with their mothers. Participants valued the care their mothers demonstrated for their children, and participants often linked this behaviour to their own childhood experiences with their mothers, sometimes highlighting various struggles that their mothers overcame.

My mother always took care of me, she would feed me in the morning, she would put let's say one or two tacos or a sandwich so I could eat it when I got hungry. But yes, when I would return home she would already have made something to eat. She was always always like that, they say that what is instilled is learned and to this date, it's the same with my children. CA204

Mothers-in-law were another child-feeding authority figure for some participants. Participants cited a familial relationship in which respect was extended to mothers-in-law as senior women. Participants who had fewer of their own family members around or felt inexperienced tended to accept mothers-in-law as authority figures in child feeding and adhered to their advice and observed behaviour.

When he was younger, my mother-in-law started giving him food when he was about one month and a half, she started giving him tastes of bean broth ... and as

she went on teaching me, I did the same, from the moment I saw that she fed him, same, he started asking to be fed, what I mean is that he drank milk, but he also wanted to eat. CA210

The position of mothers-in-law tended to be different among participants who felt more confident about child feeding or had more of their own family within closer proximity. These participants were less likely to seek input from mothers-in-law and more likely to push back against input that did not align with their beliefs about how to feed their children.

My mother-in-law gets very upset, she says '... when you want me to give him candies, I won't give him any', 'don't give him any', yes, she does get upset, but the reality is that I try to take care of my children, how I feel is best, then they tell me 'well when we raised you', yes, but we were different, like ... we were raised so abruptly we got used to it, but now times are different, now give children candies and in a little while they will have that diabetes and things like that. B105

Participants expressed that senior community women and other women with children were figures whose input they respected and attributed this to their long-standing experience and relatability as

mothers. Some senior community women also served as *vocales*, or liaisons, for programmes like PROSPERA and Un Kilo de Ayuda. There were also attributes that participants dismissed. Some participants dismissed input from younger people and those considered to be inexperienced or uninformed.

There are people that [I pay more attention to than others], that I say, maybe those women have experience, meaning people who are older, because someone who is younger than I am and tells me something, well I don't think so because, I mean, I think maybe not, I mean no. B111

Participants appraised attributes of these authority figures and expressed strong views about them. All these individuals were part of an interconnected system of networks and rarely did participants only rely on one or another. Instead, participants expressed striking a balance with all the input they receive and what they make of it, eventually weighing their children's responses, resources available and situations in which interactions occur and food choice is made.

[I learned what I know] from my mother, yes. She's the one who taught me since, like I'm telling you, since I was little. Like I was the oldest, I was the one who went on noticing how she fed my siblings, or what she did, and all of that. And when I worked, when I worked housework, well I used to see it with the older ladies, or what was what they said that they gave to their children and what sat well with them. And the talks that they used to give to us ... with the nurses that sometimes they come to give us talks, that is how I went on learning more. Or my aunts who are older are the ones that, where I went on noticing her with her children. B107

The interconnectedness of the networks created tension for participants that arose when authority figures conflicted in the views expressed about feeding and when people whose input participants rarely considered, usually community members, tried to dismiss or challenge the views of those participants viewed as authority figures. This tension caused uncertainty but also helped participants assert the advice they accepted about feeding.

... It's like we learn from our mothers, they teach us to eat a little bit of everything, and well that everything has a benefit, and well, practically, the Kilo has helped me, it would be in different forms ... to take advantage of foods, because before when we were little, [people] would say that the broth of beans was what was the benefit and it turns out that it isn't, it's just pure salt. Now here at the Kilo, what helps is the bean itself, not the broth. What I mean is that it's a lot of differences in what you learn and what you bring ... before that's

what my mom sometimes told us 'no, the bean broth is good for children' or 'I used to give it to you'. But after that, I entered the Kilo ... and that's the thing, that also in bits, in bits you know something, but we complete that also with the same talks, those from the Kilo. B112

4 | DISCUSSION

Social networks are the interpersonal connections that individuals have with others (Berkman et al., 2000; Israel & Antonucci, 1987; Steinbach, 1992). These interpersonal connections have structural characteristics and functions that can influence health-related behaviour (Berkman et al., 2000; de Leon et al., 2001; Israel & Antonucci, 1987; Lynch, 1998; Steinbach, 1992), including food choices that individuals make for themselves and their children (Furst et al., 1996; Pachucki et al., 2011). This study provides evidence on the composition of maternal social networks, functions of these networks in child feeding and authority figures in child feeding.

The five networks were interconnected and had functions that facilitated, and in some cases hindered, child-feeding behaviour. These functions were categorized as behavioural acceptance, behavioural apprehension, detrimental and supportive and revealed *how* networks assisted in establishing normative child-feeding behaviour. For example, in the household family network, behavioural acceptance functions demonstrated that participants' feeding behaviour was adherent to deeply held family values where bonding and inclusion of family members' needs were common within the family unit. In the health and nutritional personnel network, behavioural acceptance functions tapped into maternal confidence based on the meaning that participants assigned to the monitoring of their children's nutritional status, where normal weight and anaemia-free results were understood as reflecting adequate feeding behaviour, but underweight or anaemia precipitated feeding behaviour modifications to revert to acceptable outcomes. The precipitation of modifying feeding behaviour was also related to avoidance of behavioural apprehension functions that judged and stigmatized not only parenting but also children. Behavioural acceptance and behavioural apprehension were functions of participants' socialization within their networks, which provided rubrics, or social norms, about what was, and should be, acceptable or deviant. These functions align with what is known as social influence in social networks theory. Social influence postulates that individuals obtain normative and behavioural guidance through comparisons with their network(s), where individuals assess the appropriateness of their beliefs and behaviours, which become reinforced when adherent with those of the group and altered when deviant (Berkman et al., 2000; Marsden & Friedkin, 1994; Thoits, 2011). Supportive and detrimental functions have been largely studied as social support, with some bias towards their supportive nature. Social support functions are usually performed for individuals by networks members to facilitate certain outcomes (Antonucci & Akiyama, 1987; Berkman et al., 2000; Israel & Antonucci, 1987; Thoits, 2011).

Across the networks, hierarchies emerged in which authority regarding child feeding was explicitly assigned to some network members. Participants assigned authority to health and nutritional programme personnel, their own mothers, mothers-in-law, senior community women and other women who were also mothers, all who could have membership in any of the five networks. The assignment of authority to health personnel for formal child-feeding guidance is well established and has been used in strategies to improve child nutrition across different settings (Bhutta et al., 2013; McLorg & Bryant, 1989; Pelto et al., 2004; Penny et al., 2005). The prominent role of senior women in infant and young child feeding has also been studied (Aubel, 2012; Bezner Kerr et al., 2008; Bryant, 1982). An early study of social networks and infant feeding practices found that participants of Latin descent relied heavily on relatives as child-feeding advisors, especially their mothers and mothers-in-law, but were sceptical of feeding advice from neighbours and friends (Bryant, 1982). The role of these child-feeding advisors in food choice as part of a system of networks in which one advisor might offer advice that conflicts with that of another or can reinforce aligning advice has been rarely examined. In discussing advice received about child feeding, participants highlighted tensions between local beliefs and practices in their communities passed by older female generations, which included mothers and mothers-in-law, and what professionals advised as best feeding practices for children. Although tension between local and professional advice was commonly discussed, participants also described their mothers and mothers-in-law as strong advocates who facilitated adherence to professional advice. The multiplicity of child-feeding advisors calls for research to expand focus beyond singular networks, such as only the household family or only professional personnel, or specific members, such as only grandmothers or only doctors, and instead explore across networks. These hierarchies were emergent, and future research could explore the specific circumstances in which deference is adjudicated to different network members and how this deference is translated from guidance to feeding behaviour.

The interconnectedness of the networks offers important insights about how information diffuses to establish social norms, which could be leveraged to promote healthy food choices for children. Although each network had unique functions, all networks relied on interpersonal communication through which child-feeding knowledge was transferred across the networks. Interpersonal communication, or conversation, is a powerful mechanism that diffuses information, helps verify one's beliefs and can reinforce and modify social norms (Southwell & Yzer, 2009; Suls & Wheeler, 2000). Innovation diffusion theory postulates that new information spreads largely as a function of network structures (Valente, 1995; Valente & Fosados, 2006). A recent study found that mothers with more connected networks engaged in more information diffusion about infant and young child feeding and that this diffusion reinforced the messages that were promoted and contributed to improved feeding practices (Nguyen et al., 2019). In addition to how information diffuses within and across networks, the integration of feeding advisors into strategies that aim to promote healthy eating is a

promising avenue to synchronize messaging that can modify existing beliefs and social norms beyond the specific networks.

This study used a rigorous design with in-depth exploration of individuals who directly and indirectly, individually and collectively, participated in the food choices made for children. It integrated a social networks instrument (i.e., name interpreter) which is commonly used in quantitative formats. This instrument was crafted into an open-ended format that, combined with other qualitative techniques, facilitated an organic emergence of rich descriptions about individuals, experiences and spaces that were relevant to the food choices that mothers made for their children. Most participants were beneficiaries of Un Kilo de Ayuda. This programme had biweekly presence in the communities and periodically offered dietary guidance and anthropometric monitoring. The regularity of this programme may be related to the extent that participants expressed deference to network members. Although we acknowledge this potential, about 42% of the rural population in Mexico participated in at least one programme that included a nutritional component (Gutiérrez et al., 2012), and maternal deference to health professionals has been previously documented (McLorg & Bryant, 1989; Monterrosa et al., 2012; Pelto et al., 2004). To conduct rich in-depth interviews, we required a community-trusted partnership to successfully navigate and foster trust in the communities. The study findings therefore reflect the experiences of women who were the primary caregivers of young children from three different rural communities in Mexico and who participated in at least one nutritional programme.

Social networks, as part of an organized system of relationships, have vital functions in the food choices that are made for children ages 1 to 5 years old. Each network had functions in establishing social norms that mothers considered in the food choices made for children. Across the networks, mothers assigned authority to individuals that established hierarchies for child-feeding advice. Although the advice mothers received was sometimes reinforced across advisors, tensions existed between local beliefs and practices and formal guidance about child feeding. The findings point to a potential lapse in harmonization of messaging in current programming even in well-integrated and evidence-based programmes. For example, the present study was conducted within the context of high participation in the social development programme PROSPERA, which had a scaled-up, evidence-based Integrated Strategy for Attention to Nutrition (EslAN) designed to strengthen the health and nutrition components of the programme against the backdrop of the nutrition transition (Bonvecchio Arenas et al., 2019). The strategy incorporated health providers, local community health workers and primary caregivers. Nevertheless, tensions between local beliefs and practices and formal guidance persisted as evidenced in this study. For programmes, future research that examines the feasibility of integrating multiple network members, such as authority figures across networks, in diffusing formal dietary guidance could be particularly important to reduce tensions between local beliefs and practices and formal dietary guidance. For example, the integration of authority figures in mass communication campaigns could be particularly useful in synchronizing dietary

messaging, and by virtue of their embeddedness in the social space of the communities, support shifting social norms around child feeding. Furthermore, more research is needed to examine network functions and how these functions contribute to feeding behaviour that is normative within and across networks to better leverage the promotion of healthy diets and food choices for young children.

ACKNOWLEDGEMENT

This work was partially supported by a SPARC Graduate Research Grant from the Office of the Vice President for Research at the University of South Carolina.

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

CONTRIBUTIONS

LR designed the study protocol, conducted in-depth interviews, analysed the data, interpreted results and wrote the manuscript. EF contributed to the design of study protocol and guided data collection, data analysis, results interpretation and writing of the manuscript. SM contributed to the design of study protocol, guided results interpretation and revisions of the manuscript. CB contributed to the design of study protocol, guided analysis and revisions of the manuscript. WG contributed to the design of study protocol and revisions of the manuscript. AB contributed to the implementation of the study protocol and revisions of the manuscript. LR, EF, SM, CB, WG and AB have read and approved the final manuscript for submission.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available upon justified request from the corresponding author. The data are not publicly available due to privacy and ethical restrictions.

ORCID

Ligia I. Reyes  <https://orcid.org/0000-0001-5492-3562>

Edward A. Frongillo  <https://orcid.org/0000-0002-8265-9815>

Wendy Gonzalez  <https://orcid.org/0000-0002-2682-0918>

Anabelle Bonvecchio  <https://orcid.org/0000-0002-2765-0818>

REFERENCES

- Antonucci, T. C., & Akiyama, H. (1987). Social networks in adult life and a preliminary examination of the convoy model. *Journal of Gerontology*, 42(5), 519–527. <https://doi.org/10.1093/geronj/42.5.519>
- Aubel, J. (2012). The role and influence of grandmothers on child nutrition: Culturally designated advisors and caregivers. *Maternal & Child Nutrition*, 8(1), 19–35. <https://doi.org/10.1111/j.1740-8709.2011.00333.x>
- Berkman, L. F., Glass, T., Brissette, I., & Seeman, T. E. (2000). From social integration to health: Durkheim in the new millennium. *Social Science & Medicine*, 51(6), 843–857. [https://doi.org/10.1016/S0277-9536\(00\)00065-4](https://doi.org/10.1016/S0277-9536(00)00065-4)
- Bezner Kerr, R., Dakishoni, L., Shumba, L., Msachi, R., & Chirwa, M. (2008). “We grandmothers know plenty”: Breastfeeding, complementary feeding and the multifaceted role of grandmothers in Malawi. *Social Science & Medicine*, 66(5), 1095–1105. <https://doi.org/10.1016/j.socscimed.2007.11.019>
- Bhutta, Z. A., Das, J. K., Rizvi, A., Gaffey, M. F., Walker, N., Horton, S., Webb, P., Lartey, A., Black, R. E., Lancet Nutrition Intervention Review Group and Maternal and Child Nutrition Study Group (2013). Evidence-based interventions for improvement of maternal and child nutrition: What can be done and at what cost? *The Lancet*, 382(9890), 452–477. [https://doi.org/10.1016/S0140-6736\(13\)60996-4](https://doi.org/10.1016/S0140-6736(13)60996-4)
- Bicchieri, C., Muldoon, R., & Sontuoso, A. (2018). Social norms. In E. N. Zalta (Ed.), *The Stanford encyclopedia of philosophy (winter 2018)*. Metaphysics Research Lab: Stanford University. <https://plato.stanford.edu/archives/win2018/entries/social-norms/>
- Birch, L. L., Gunder, L., Grimm-Thomas, K., & Laing, D. G. (1998). Infants' consumption of a new food enhances acceptance of similar foods. *Appetite*, 30(3), 283–295. <https://doi.org/10.1006/appe.1997.0146>
- Blake, C. E., & Bisogni, C. A. (2003). Personal and family food choice schemas of rural women in upstate New York. *Journal of Nutrition Education and Behavior*, 35(6), 282–293. [https://doi.org/10.1016/S1499-4046\(06\)60342-4](https://doi.org/10.1016/S1499-4046(06)60342-4)
- Bonvecchio Arenas, A., González, W., Théodore, F. L., Lozada-Tequeanes, A. L., García-Guerra, A., Alvarado, R., Fernández-Gaxiola, A. C., Rawlinson, C. J., de la Vega, A. V., & Neufeld, L. M. (2019). Translating evidence-based program recommendations into action: The design, testing, and scaling up of the behavior change strategy EsLAN in Mexico. *The Journal of Nutrition*, 149(Supplement_1), 2310S–2322S. <https://doi.org/10.1093/jn/nxz229>
- Bryant, C. A. (1982). The impact of kin, friend and neighbor networks on infant feeding, practices. *Social Science & Medicine*, 16(20), 1757–1765. [https://doi.org/10.1016/0277-9536\(82\)90269-6](https://doi.org/10.1016/0277-9536(82)90269-6)
- Campbell, K. E., & Lee, B. A. (1991). Name generators in surveys of personal networks. *Social Networks*, 13(3), 203–221. [https://doi.org/10.1016/0378-8733\(91\)90006-F](https://doi.org/10.1016/0378-8733(91)90006-F)
- Cialdini, R. B., Kallgren, C. A., & Reno, R. R. (1991). A focus theory of normative conduct: A theoretical refinement and reevaluation of the role of norms in human behavior. In *Advances in experimental social psychology* (Vol. 24) (pp. 201–234). Elsevier. [https://doi.org/10.1016/S0065-2601\(08\)60330-5](https://doi.org/10.1016/S0065-2601(08)60330-5)
- Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, 94, S95–S120. <https://doi.org/10.1086/228943>
- Contento, I. R. (2016). Determinants of food choice and dietary change: Implications for nutrition education. In *Nutrition education: Linking research, theory, and practice* (third ed.). Jones & Bartlett Learning.
- Corbin, J. M., & Strauss, A. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. *Qualitative Sociology*, 13(1), 3–21. <https://doi.org/10.1007/BF00988593>
- Dattilo, A. M., Birch, L. L., Krebs, N. F., Lake, A., Taveras, E. M., & Saavedra, J. M. (2012). Need for early interventions in the prevention of pediatric overweight: A review and upcoming directions. *Journal of Obesity*, 2012, 1–18. <https://doi.org/10.1155/2012/123023>
- de Leon, C. F. M., Gold, D. T., Glass, T. A., Kaplan, L., & George, L. K. (2001). Disability as a function of social networks and support in elderly African Americans and Whites. *The Journals of Gerontology: Series B*, 56(3), S179–S190. <https://doi.org/10.1093/geronb/56.3.S179>
- Dewey, K. (2003). Guiding principles for complementary feeding of the breastfed child. Retrieved from Pan American Health Organization website: https://www.who.int/nutrition/publications/guiding_principles_compfeeding_breastfed.pdf
- Edwards, D., & Middleton, D. (1987). Conversation and remembering: Bartlett revisited. *Applied Cognitive Psychology*, 1(2), 77–92. <https://doi.org/10.1002/acp.2350010202>
- Furst, T., Connors, M., Bisogni, C. A., Sobal, J., & Falk, L. W. (1996). Food choice: A conceptual model of the process. *Appetite*, 26(3), 247–266. <https://doi.org/10.1006/appe.1996.0019>

- Glaser, B. G. (1965). The constant comparative method of qualitative analysis. In *Social problems* (Vol. 12, pp. 436–445). Oxford University Press. <http://www.jstor.org/stable/798843>
- Gutiérrez, J. P., Rivera-Dommarco, J., Shamah-Levy, T., Villalpando-Hernández, S., Franco, A., Cuevas-Nasu, L., Romero-Martinez, M., & Hernández-Ávila, M. (2012). Encuesta Nacional de Salud y Nutrición 2012: Resultados nacionales. Retrieved from Instituto Nacional de Salud Pública website: <https://ensanut.insp.mx/encuestas/ensanut2012/doctos/informes/ENSANUT2012ResultadosNacionales.pdf>
- Heberlein, E. C., Picklesimer, A. H., Billings, D. L., Covington-Kolb, S., Farber, N., & Frongillo, E. A. (2016). Qualitative comparison of women's perspectives on the functions and benefits of group and individual prenatal care. *Journal of Midwifery & Women's Health*, 61(2), 224–234. <https://doi.org/10.1111/jmwh.12379>
- Israel, B. A., & Antonucci, T. C. (1987). Social network characteristics and psychological well-being: A replication and extension. *Health Education Quarterly*, 14(4), 461–481. <https://doi.org/10.1177/109019818701400406>
- Kroker-Lobos, M. F., Pedroza-Tobías, A., Pedraza, L. S., & Rivera, J. A. (2014). The double burden of undernutrition and excess body weight in Mexico. *The American Journal of Clinical Nutrition*, 100(6), 1652S–1658S. <https://doi.org/10.3945/ajcn.114.083832>
- Lynch, S. A. (1998). Who supports whom? How age and gender affect the perceived quality of support from family and friends. *The Gerontologist*, 38(2), 231–238. <https://doi.org/10.1093/geront/38.2.231>
- Marsden, P., & Friedkin, N. (1994). Network studies of social influence. In S. Wasserman & J. Galaskiewicz (Eds.), *Advances in social network analysis: Research in the social and behavioral sciences* (pp. 3–25). SAGE Publications, Inc. <https://doi.org/10.4135/9781452243528.n1>
- McGadney-Douglass, B. F., & Douglass, R. L. (2008). Collective familial decision-making in times of trouble: Intergenerational solidarity in Ghana. *Journal of Cross-Cultural Gerontology*, 23(2), 147–160. <https://doi.org/10.1007/s10823-008-9064-8>
- McLorg, P. A., & Bryant, C. A. (1989). Influence of social network members and health care professionals on infant feeding practices of economically disadvantaged mothers. *Medical Anthropology*, 10(4), 265–278. <https://doi.org/10.1080/01459740.1989.9965973>
- Monteiro, C. A., Conde, W. L., & Popkin, B. M. (2004). The burden of disease from undernutrition and overnutrition in countries undergoing rapid nutrition transition: A view from Brazil. *American Journal of Public Health*, 94(3), 433–434. <https://doi.org/10.2105/AJPH.94.3.433>
- Monterrosa, E. C., Pelto, G. H., Frongillo, E. A., & Rasmussen, K. M. (2012). Constructing maternal knowledge frameworks. How mothers conceptualize complementary feeding. *Appetite*, 59(2), 377–384. <https://doi.org/10.1016/j.appet.2012.05.032>
- Nguyen, P. H., Frongillo, E. A., Kim, S. S., Zongrone, A. A., Jilani, A., Tran, L. M., Sanghvi, T., & Menon, P. (2019). Information diffusion and social norms are associated with infant and young child feeding practices in Bangladesh. *The Journal of Nutrition*, 149(11), 2034–2045. <https://doi.org/10.1093/jn/nxz167>
- Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science*, 5(1), 14–37. <https://doi.org/10.1287/orsc.5.1.14>
- Pachucki, M. A., Jacques, P. F., & Christakis, N. A. (2011). Social network concordance in food choice among spouses, friends, and siblings. *American Journal of Public Health*, 101(11), 2170–2177. <https://doi.org/10.2105/AJPH.2011.300282>
- Pelto, G. H., Santos, I., Gonçalves, H., Victora, C., Martines, J., & Habicht, J. P. (2004). Nutrition counseling training changes physician behavior and improves caregiver knowledge acquisition. *The Journal of Nutrition*, 134(2), 357–362. <https://doi.org/10.1093/jn/134.2.357>
- Penny, M. E., Creed-Kanashiro, H. M., Robert, R. C., Narro, M. R., Caulfield, L. E., & Black, R. E. (2005). Effectiveness of an educational intervention delivered through the health services to improve nutrition in young children: A cluster-randomised controlled trial. *The Lancet*, 365(9474), 1863–1872. [https://doi.org/10.1016/S0140-6736\(05\)66426-4](https://doi.org/10.1016/S0140-6736(05)66426-4)
- Romo, M. E., López, D., López, I., Morales, C., & Alonso, K. (2005). En la búsqueda de creencias alimentarias a inicios del siglo XXI. *Revista Chilena de Nutrición*, 32(1). <https://doi.org/10.4067/S0717-75182005000100007>
- Sobal, J., & Bisogni, C. A. (2009). Constructing food choice decisions. *Annals of Behavioral Medicine*, 38(S1), 37–46. <https://doi.org/10.1007/s12160-009-9124-5>
- Southwell, B. G., & Yzer, M. C. (2009). When (and why) interpersonal talk matters for campaigns. *Communication Theory*, 19(1), 1–8. <https://doi.org/10.1111/j.1468-2885.2008.01329.x>
- Steinbach, U. (1992). Social networks, institutionalization, and mortality among elderly people in the United States. *Journal of Gerontology*, 47(4), S183–S190. <https://doi.org/10.1093/geronj/47.4.S183>
- Suls, J. M., & Wheeler, L. (Eds.) (2000). *Handbook of social comparison: Theory and research*. New York: Kluwer Academic/Plenum Publishers.
- Thoits, P. A. (2011). Mechanisms linking social ties and support to physical and mental health. *Journal of Health and Social Behavior*, 52(2), 145–161. <https://doi.org/10.1177/0022146510395592>
- Valente, T. W. (1995). *Network models of the diffusion of innovations*. Cresskill, NJ: Hampton Press.
- Valente, T. W. (2010). *Social networks and health: Models, methods, and applications*. Oxford University Press. 10.1093/acprof:oso/9780195301014.001.0001
- Valente, T. W., & Fosados, R. (2006). Diffusion of innovations and network segmentation: The part played by people in promoting health. *Sexually Transmitted Diseases*, 33(Supplement), S23–S31. <https://doi.org/10.1097/01.olq.0000221018.32533.6d>
- World Health Organization. (2016). What is malnutrition? Retrieved from <https://www.who.int/features/qa/malnutrition/en/>

How to cite this article: Reyes, L. I., Frongillo, E. A., Moore, S., Blake, C. E., Gonzalez, W., & Bonvecchio, A. (2022). Functions of social networks in maternal food choice for children in Mexico. *Maternal & Child Nutrition*, 18:e13263. <https://doi.org/10.1111/mcn.13263>