Maternal preferences for consistency of complementary foods in Guatemala

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Abstract

Increasing the nutrient density of complementary food mixtures is a common strategy for improving child nutrition in developing countries. Such modification, however, typically increases the viscosity of the mixtures, which may not appeal to caretakers or children. To assess maternal preference for complementary food consistency, 46 rural Guatemalan mothers, each of whom had a child between 6 and 14 months of age, were interviewed by trained data collectors and participated in focus group discussions. Strong opinions regarding consistencies of complementary foods were identified, which varied according to the child's age and health status. Mothers preferred thinner complementary foods for children less than one year old and thicker foods for children more than one year old. When the child had a cough or fever, most mothers preferred thin, liquid complementary foods. When the child had diarrhoea, about half of the mothers believed thinner complementary foods would replace the water the child lost with diarrhoea, whereas other mothers believed that thicker complementary foods would harden the stool or stop diarrhoea. This information will help guide efforts to develop improved complementary foods, particularly those for use during illness in underprivileged populations of developing countries.

Introduction

The World Health Organization (WHO) recommends that children begin complementary feeding in addition to breastmilk between four and six months of age in order to ensure adequate growth and nourishment [1]. In many developing countries, however, traditional complementary food gruels are based on starchy staple foods, such as wheat, rice, maize, or sorghum, that produce viscous porridges that are difficult for children to consume [2, 3]. As a result, mothers commonly dilute the porridge with water to reduce its viscosity [4, 5]. Such dilution, however, also reduces the energy density of the mixture [3]. Since young children have small gastric capacities, they are unable to consume enough of the diluted porridge to meet their energy requirements and consequently may become malnourished. This problem of high viscosity, low energy density, or both in complementary food is often referred to as "dietary bulk" [3]. Children consuming these foods grow poorly [6] and have higher mortality rates [7].

Increasing the nutrient density of complementary foods is a strategy commonly recommended for improving child nutrition [5, 8]. However, increasing the nutrient density of a complementary food may change its consistency from liquid or easily spoonable to thicker and dough-like. It is commonly suggested that foods of higher viscosity are less acceptable to the mother or to the child [9–12], although no published studies could be identified that specifically attempted to quantify this perception. The inadequacy of the information in this area is particularly striking, because a great deal of effort has already been invested in strategies to reduce the viscosity of complementary foods of high nutrient density, most commonly with the use of amylase-rich flours [5, 9, 13–16].

Qualitative research carried out in the same community where the current study was conducted found that indigenous Cakchiquel-speaking Guatemalan mothers displayed unexpectedly well-defined and detailed notions of food consistency (personal communication, E. Hurtado, 1992). Table 1 summarizes these classifications and provides examples of foods associated with various local terms for consistency. The objective of the current study was to measure more accurately, both qualitatively and quantitatively, the maternal preference for consistency of complementary foods in relation to the age and health status of the

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TABLE 1. Classification of foods according to consistency by mothers in Santa María de Jesús, Guatemala

Cakchiquel term	Literal meaning of Cakchiquel term	Spanish term	Foods reported as belonging to Cakchiquel category
Ya', pura ya'	Water or like water	*Liquida*	Coffee, broths, *topogigio, fresco,* incaparina (if it is thin)
Ma can ta ya' ya', Ya' yoj	Not like water, not thick	*Rala/liquida*	Thin gruels (*atol*) and sauces like *pepian, hilachas*
Co ru ya'	Has its water	*Rala*	Green leafy vegetables that are cooked in water, *caldo,* or broth
Cuor	Soft and can be mashed	*Media*	Avocadoes, bananas, squash
Tzapor, ja'roch	Thick foods	*Espesa*	Bread soaked in coffee, ground beans, pieces of tortilla soaked in bean broth, noodles, eggs, *puliques,* tomatoes, radishes, other vegetables and fruits, thick gruels, *atol* (incaparina and pap offered by INCAP)
Chak'ej, chie'	Dry or hard	*Duro, seco*	Tortillas, rice, beans, fish, meat, eggs, hard-boiled eggs, whole beans, cheese

Source: E. Hurtado. Qualitative research on infant and child feeding in Santa María de Jesús. Unpublished manuscript. Guatemala City: Institute of Nutrition of Central America and Panama (INCAP), 1992.

child, and the maternal preference for two improved gruels of different known viscosities.

Methods

Study site

The study was conducted in August 1995 in the community of Santa María de Jesús, which is located in the central highlands of Guatemala on the slope of Agua Volcano, 55 km south-west of Guatemala City and 10 km south of Antigua, in the department of Sacatepéquez. It is a traditional rural community with approximately 15,000 inhabitants, most of whom are descendants of the Mayan Indians and speak Cakchiquel, one of the 23 indigenous languages spoken in Guatemala. Many Santa Marienses, especially the men, also speak Spanish. The primary religion is Catholicism, but Evangelism is becoming increasingly present in the community. The male heads of households are predominantly (82%) subsistence farmers; the main crops are corn, black beans, peas, tomatoes, and coffee. Women are seldom formally employed, although many women sell food or crafts in the marketplace. The majority of adults, especially women, have had little schooling. The literacy levels among people over 10 years of age are 77% for males and 39% for females.

The socio-economic, health, sanitary, and nutritional characteristics of the community have been described in detail elsewhere [17–19]. Briefly, the housing quality is poor, as most homes have cornstalk walls, tin roofs, and dirt floors. Pit latrines are the most common means of human waste disposal. Most homes have electricity but no piped water; consequently, women must gather water daily from centrally located wells. The basic diet of adults and older children is composed largely of maize tortillas and black beans. Children typically are breastfed from birth up to the age of about two years. Complementary foods are commonly introduced at around six months of age. Foods most often used to complement breastmilk include locally produced cereal-based gruels and porridges (*atols*), coffee with sugar, tortillas and bread dipped in coffee, bananas, and broths. These foods are generally fed to children by cup or spoon. Between the ages of one and three years, the growth of these children is poor, and by the age of three, over 50% of the children are stunted (height-for-age % score < -2 relative to the WHO reference).

Data collection

The study employed a series of individual interviews and focus group discussions with the mothers of 46 children (aged 6–14 months) who were participating in a study on amylase-complemented foods [20]. Individual interviews and focus group discussions were conducted by bilingual (Cakchiquel–Spanish) women from the local community who visited the study participants at home and spoke with the participants in their native language, Cakchiquel.

The individual questionnaire addressed the maternal preference for consistency of complementary foods in relation to locally available foods that were commonly consumed by weaning-age children. For certain questions related to preferences, mothers were given a

choice of five answers: thick, like corn dough (Spanish: *espeso como masa de maiz;* Cakchiquel: *tzapor*); thin, like a liquid drink (Spanish: *ralo como atol;* Cakchiquel: *ya' yoj*); medium, semi-liquid consistency, thinner than corn dough but thicker than a liquid (Spanish: *medio;* Cakchiquel: *cuor*); no preference; or other. The foods associated with the terms "thick" and "thin" (*masa de maiz* and *atol*, respectively) were well known in the community, and there was minimal variation in their preparation. *Masa de maiz* is maize dough used to make tortillas and is similar in consistency to cookie or bread dough. *Atol* is a liquid drink made with water, cereal grains, and sugar and is similar in consistency to cream or thin gravy.

The first part of the individual questionnaire addressed maternal preference for the consistency of locally provided complementary foods according to the following categories: in general (without specifying age or health status); according to specific age categories (six months to one year [the early weaning period] and older than one year [mid to late weaning period]); and according to the health status of the child (healthy, cough or fever, diarrhoea). The second part of the interview questionnaire asked about the consistency of two experimental complementary food gruels of known viscosity that were being used in the larger intake study (table 2). The mothers were shown the two experimental gruels and instructed to stir them with a spoon, comment on their differences, judge their consistency, and select the preferred gruel, in response to specific questions.

Upon completion of the individual questionnaire interviews, four focus group discussions were conducted, with the objective of soliciting additional qualitative information on preferences. All 46 mothers who were interviewed were invited to participate in the focus group discussions; 39 (85%) of the mothers participated. They were randomly assigned to focus groups in accordance with their work schedules. The questions asked by the moderator mirrored those asked during the individual interviews. The focus group discussions were tape-recorded and translated into Spanish by the moderator.

Results

The participant mothers ranged in age from 16 to 39 years (mean, 28.8 years), had had a mean number of 5.1 pregnancies (range, 1–12), and had completed a mean of 1.3 grades (range, 0–6) in primary school. Thirty-three (72%) of the mothers spoke Spanish fluently. The children ranged in age from 6 to 14 months (mean, 9.1 months). The questionnaire results revealed that most mothers (77%) preferred to spoon-feed their children, 15% preferred to use a cup or bottle, and 8% preferred to feed by hand.

Age of the child

Table 3 shows the results of the individual questionnaires on maternal preference of complementary food consistency based on the age of the child. In general, mothers preferred to feed younger children thinner foods and older children thicker foods. A majority of the mothers (63%) stated that they preferred to feed an easily spoonable, semi-liquid gruel when the child was less than one year old. When the child was one or more years of age, however, more mothers preferred to feed the child thicker complementary food gruels, ranging from an easily spoonable, semi-liquid consistency (33%) to a thick, dough-like consistency (48%).

The focus group discussions confirmed these results and provided qualitative insight into them. Nearly all women participating in the focus groups felt that the consistency of the complementary food should change according to the age of the child. Many commented that children one or more years of age needed a thicker complementary food that would "fill their stomachs"

TABLE 2. Characteristics of experimental complementary foods

Food	Energy density (kcal/ 100 g)	Viscosity (cps)[a]	Consistency
Traditional (control)	100	14,500	Semi-solid, spoonable, like pudding or mayonnaise
Low-viscosity[b]	100	4,200	Semi-liquid, easily spoonable, like cream or thick gravy

a. Viscosity measurements were made with a Brookfield viscosimeter, spindle no. 6 (50.0 rpm), at 30°C.
b. Maize malt was added (0.2 g/100 g gruel) to reduce the viscosity.

TABLE 3. Number (percent) of mothers preferring different consistencies of improved, energy-dense complementary food gruels, according to age of child ($n = 46$)

Preferred consistency of food	Age of child	
	< 1 yr	≥ 1 yr
Thick, like corn dough *(espeso como masa de maiz)*	8 (17)	22 (48)
Medium (semi-liquid, easily spoonable, thinner than corn dough and thicker than a liquid)	29 (63)	15 (33)
Thin like a liquid drink *(ralo como atol)*	7 (15)	6 (13)
No preference	2 (4)	3 (7)

because their "stomachs are large and they normally eat very little." Notably, in Cakchiquel the same expression, *ni nim rupan*, means "large stomach" and "big appetite." Other mothers reasoned that "older children could take hold of the complementary food and eat it if it was thick." The following are examples of responses to the question "Do you believe that the consistency of a complementary food mix should change according to the age of the child?":

» Yes. Depending on the age of the child, the consistency of the food will change. As the child grows, he wants very thick complementary food so that it will sustain him. If it is thin, it is the same as breastfeeding or nursing, and that is not going to fill him.

» Yes. The consistency of complementary food should change, because large children are not the same as small children. When children are small, I give them complementary food that is a little thin so that they can eat it, but when they are large, I give them complementary food that is thick so that it sustains the stomach, because the stomach is already large.

Health status of the child

The results of the individual questionnaires and the maternal preferences for complementary food consistency, based on the child's health status and age, are presented in table 4. Mothers exhibited no overwhelming preferences for particular complementary food consistencies for healthy children. Rather, when the children were well, the mothers would feed them foods of all types of consistencies, but felt that the food should be "smooth" so that the child could "swallow it quickly" and so that it would "fill the stomach."

If a child was sick, however, strong beliefs about complementary food consistencies emerged. Almost all mothers (78%) preferred to feed children thin complementary foods when they had a fever or cough (table 4). Focus group discussions provided insight into the beliefs behind these results. An overriding concern expressed in the focus groups was that "children don't want to eat at all when they are sick." For most women, this concern about illness-induced anorexia was more important than the consistency of the complementary food during illness. If a feverish child did eat anything, however, most women thought that the food should be of a thin, liquid, or semi-liquid consistency, so that the child "can swallow it" and so that it "can go down the throat easily." One woman said, "When my child is sick, he is thirsty," and stated that if she gave him thick complementary food he would not eat it. If it was too thick, she said, "It sticks in the child's mouth and he doesn't swallow it." The following are other representative responses to the question "What consistency of complementary food do you prefer to feed your child when she/he has cough or fever?":

» The complementary food should be very thin so that the child will eat it and so that it will go down the throat easily.

» When my child has cough or fever, I give him thin food because it helps with his thirst and nausea.

For a child with diarrhoea, two opposing opinions emerged in both the individual interviews and the focus groups, particularly for younger children (six months old). In the interviews, about half of the mothers preferred to feed younger children thinner, liquid-like foods, whereas about one-third preferred to give foods of a thick consistency (table 4). In the focus groups, qualitative insights into these two opposing schools of thought regarding the optimal consistency of the complementary food were obtained. Mothers who preferred to give thinner foods to children with diarrhoea did so in order to replace the water that the child lost. For example, they said:

» When they have diarrhoea, they are thirsty, and because of this they will take a little food if it is thin. With diarrhoea you should only give liquid food to help soothe the thirst and replace the liquid that is lost.

» I prefer to feed liquid complementary food because it helps to replace the liquid that is lost in diarrhoea. On the other hand, mothers who preferred to give

TABLE 4. Number (percent) of mothers preferring different consistencies of complementary foods, according to age and health status of child ($n = 46$)

Preferred consistency of food	Age and health status of child					
	6 mo			12 mo		
	Healthy	Cough or fever	Diarrhoea	Healthy	Cough or fever	Diarrhoea
Thick	13 (28)	2 (4)	16 (35)	16 (35)	3 (7)	12 (26)
Medium	6 (13)	3 (7)	4 (9)	11 (24)	2 (4)	10 (22)
Thin/liquid	14 (31)	36 (78)	22 (48)	3 (7)	36 (78)	19 (41)
No preference	13 (28)	0 (0)	2 (4)	16 (35)	0 (0)	2 (4)
Child won't eat or mother doesn't feed child	0 (0)	5 (11)	2 (4)	0 (0)	5 (11)	3 (7)

children with diarrhoea thicker complementary foods did so because they felt it hardened the stool and stopped the diarrhoea:

» I give him thick food because it helps to plug up the child and stop the diarrhoea. If I give liquid food it makes the child worse. I also give thick food during diarrhoea because it helps to calm him and alleviate the diarrhoea.

» I prefer to feed my child thick food because it hardens the stomach. If I give him liquid food I think that it could make him worse because it loosens the stomach.

Finally, when the mothers were shown the two semi-liquid complementary gruels used in the energy-intake study (table 2), 22 (48%) reported they would prefer to feed their well children the thicker of the two gruels, 17 (37%) said they would prefer the thinner, and 7 (15%) had no preference. Unfortunately, the mothers were not asked which of the foods they would prefer to give their sick children.

Discussion

This study was conducted to better understand maternal preferences for consistency of complementary foods and to determine if and how maternal preference varied according to the age and health status of the child. The results suggested that indigenous mothers in this rural Guatemalan community made clear distinctions among food consistencies and had strong preferences for different consistencies according to the age and health status of their children. The mothers preferred to feed older children thicker foods because they felt that these foods better filled the stomachs of larger, older children. When a child was well, food consistency was not a major concern. When a child was ill, however, the mothers had strong opinions regarding food consistency according to the type of illness. When a child had cough or fever, the mothers consistently preferred to give thinner foods. When a child had diarrhoea, some mothers preferred to give thin foods to replace the water lost, whereas others preferred to feed thicker foods to harden the stool or "stop up the child." The lack of apparent preference for either of the two experimental foods may be due to the similarity in their consistency: both were semi-liquid, differing in viscosity by only 10,000 cps.

Few published studies specifically report maternal preferences for complementary food consistency. A few studies have some anecdotal information on maternal preferences [10, 11, 13] but it is difficult to draw conclusions about maternal preferences on the basis of these studies. For example, the terms used to describe various consistencies of complementary foods (e.g., thick, thin, or smooth) are often ambiguous and poorly defined, and often no measurements of viscosity are given. Additionally, the classification of consistency and viscosity is not standardized across studies; for example, gruels of similar viscosity are described as "thick" in one study and "thin" in another. In one of the few quantitative studies identified [9], the mothers of 78 severely malnourished children five to eight months of age recovering from diarrhoea in a nutrition rehabilitation unit in Bangladesh were asked whether complementary foods should be "liquid" or "semi-solid." Approximately 60% of the mothers said that the consistency should be "liquid," but no viscosity measurements were reported, nor were mothers asked to explain the reasons for their preferences. In Peru, Creed de Kanashiro et al. [10] found that "mothers had very definite ideas about the required thickness for each type of complementary food preparation," and during recipe trials "mothers were reluctant to prepare complementary food mixes with a thicker consistency than customary." These mothers gave their children mostly soft, smooth complementary foods, such as soups or puddings, because they were easy to swallow. Bentley et al. [11] reported that Nigerian mothers who commonly "hand feed" preferred thin, liquid foods for children up to 35 months of age because they felt that a child "could not swallow foods of a solid or semi-solid consistency." In India, Gopaldas et al. [13] reported that mothers preferred gruel (830 cps) thinned with amylase-rich flour, a malted flour, because it was "smooth and fairly free-flowing," whereas the gruel without amylase-rich flour (2,800 cps) was perceived by mothers to be "lumpy."

The age effects seen in the current study are consistent with reports by Gopaldas et al. [12, 21] who reported that Indian mothers preferred to give older children (10 months of age or older) thicker porridges of spoonable consistency (2,000–6,000 cps) rather than thin, free-flowing gruels (1,000 cps) like those fed to younger children.

The effect of a child's health status on maternal preference for complementary food consistency found in the current study is also consistent with other reports. In Peru, mothers preferred to give children with diarrhoea mashed rather than fried potatoes, toasted or roasted cereals and legumes rather than the coarser fresh, dried, or whole-grain forms, and hard foods that had been peeled or ground [10]. In Nigeria, Bentley et al. [11] found that maternal encouragement as well as child acceptance increased when children with diarrhoea were given "liquid or semi-solid food" rather than "solid food."

The significance of the current study relates to ongoing efforts to improve the dietary quality of complementary foods in developing countries [22]. A great deal of effort has been invested in trying to increase the nutrient density of such foods without increasing their consistency to a point that is unacceptable to mothers or children [5, 9, 14–16]. The potential importance of such organoleptic characteristics of foods has been noted [23], but few studies have been done

on maternal or child preferences for such characteristics. The current study suggests that these preferences are strong and vary according to the age and health status of the child. To permit comparisons across studies to be made, future studies of the consistency of complementary foods should try to standardize terms and laboratory methods, since measured viscosity depends on temperature, spindle reading, speed, and other factors.

Our results are specific to one rural Mayan community in Guatemala, and preferences will be different in other settings. Moreover, the results are based on the mothers' reported preferences, and more studies are needed to confirm these reports by observation.

In conclusion, the results of this study will increase the likelihood that efforts to develop improved complementary foods will not be contradictory to the mothers' preferences. They are particularly relevant for ongoing efforts to improve feeding during illness [24–26]. Improved effectiveness of such efforts will contribute to better growth and health status of children in developing countries.

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