

The results integrate the three types of data collected: translations of in-depth interviews, observations, and focus groups for each theme. The quotations shown below are taken directly from the transcripts and are presented in English. However it must be recognized that the quotes have been through two different translations: Fulfulde to French and French to English. Although great care was taken in the translations, some of the subtleties may be lost since some local concepts and vocabulary are difficult to translate.

The direct observations involved following infants and their caretakers for a six-hour period throughout the day (8-10 AM, 12-2 PM, 4-6 PM). However, a substantial amount of care is given to young children outside these hours, and breastfeeding continues throughout the night. The observations are presented here in the form of the number of minutes or the percentage of time the child or mother was observed in a specific activity. In this approach, each minute becomes a unit, and these values were entered into SPSS. Regression analyzes were carried out to test for statistical differences. It will be shown that virtually no differences were found in the type of feeding experienced by well-nourished and malnourished children. However, differences were found in terms of the care they received, in the type of surrogate caretakers employed, and in the social support available to their mothers.

6.1 HOUSEHOLD FOOD SECURITY

As described earlier, the study assumed that community and household food security was such that food availability would not be a problem. It became clear that in many cases, this assumption was false and abject poverty and food shortages were everyday realities for some families that influenced infant feeding practices.

I haven't given her anything other than water and gruel for the past 24 hours because I don't have the means to offer her anything else.

Mother of a well-nourished, 10-month-old girl, Boré (rural)

I have given her gruel and water (over the past 24 hours). They tell us at the health center to vary infants' complementary food, but we have neither the time nor the means to do so.

Mother of a malnourished 8-month-old girl, Boré (rural)

I come from Gao. We have enormous financial problems. We have nothing left, though he (my husband) sometimes works as a welder. We eat when he brings something back to the house; otherwise, we just stay like this. If I buy 200CFA (\$0.40) worth of fish and 100CFA (\$0.20) of manioc, I can resell it, sometimes with a little profit, sometimes with nothing.

Mother of a malnourished 12-month-old girl, Sevaré (urban)

6.2 VIEWS ON CHILD CARE

When asked about how best to bring up a child, mothers of both groups of children consistently mentioned the need to wash, clothe, and feed the child correctly.

To bring up a child correctly, you have to watch out for his cleanliness and his food and keep him from crying too much.

Mother of a well-nourished 6-month-old boy, Boré (rural)

To best bring up a child, you have to feed him, cure his illnesses, clothe him, and watch out for him a lot.

Mother of a malnourished 9-month-old boy, Mopti (urban)

The mothers of well-nourished children placed a much stronger emphasis on hygiene and cleanliness than those of malnourished children.

So that she is in good health, you have to really follow her feeding closely, giving her fish soup and infant formula, and really watch over her health closely by making sure the conditions are hygienic.

Mother of well-nourished 6-month-old girl, Sevaré (urban)

You have to look after him as well as possible, really make sure that his food is clean and avoid exposing his food to flies.

Mother of well-nourished 11-month-old boy, Synda (rural)

The best way to bring up a child is to make sure that her body is clean and to avoid dirt.

Mother of a well-nourished 8-month-old girl, Sevaré (urban)

The mothers of malnourished children placed a greater emphasis on the role of traditional medicines and benedictions in ensuring a child's good health.

In order to raise a child, you have to feed it, cure it, clothe it, and above all protect it. You have to also give it traditional medicines, which are very effective.

Mother of a malnourished 12-month-old boy, Mopti (urban)

To raise a child, you have to have the means to feed it correctly, cure it, clothe it, and watch over it. In addition, you can go to the marabout (religious cleric) to get the child blessed, or you can wash it with holy water.

Mother of a malnourished 6-month-old girl, Mopti (urban)

Importantly, one young mother of a malnourished child indicated that she did not have such strong views or expectations about child care but left the decisions to her mother-in-law. This theme recurred often during the research.

I can't say much about this because I am a young mother. In our family, my mother-in-law looks after these aspects. Nevertheless, I would say that you have to feed a child, wash him and his clothes, and watch over him a lot.

Mother of malnourished 12-month-old boy, Mopti (urban)

6.3 VIEWS ON BREASTFEEDING

In general, women had extremely positive views on breastfeeding and saw it as a cheap, nutritious way of nourishing their children that encouraged health and growth.

Breastfeeding is a complete food for children here. It gives strength and health to a child.

Mother of a malnourished 8-month-old girl, Boré (rural)

For the moment, this (breastfeeding) is what is important in feeding this child. It is essential for his growth.

Mother of a well-nourished 6-month-old boy, Mopti (urban)

However, some mothers cited other aspects of breastfeeding in addition to those associated with nutrition. In particular, they noted that it quieted their infants and thus enabled them to get on with their household tasks.

There are a lot of benefits of breastfeeding in addition to it being "food." Because the breast has a calming effect, it is like a sleeping pill. In short, it is a medicine.

Mother of a well-nourished 11-month-old girl, Sevaré (urban)

Breastfeeding is really important. The child is well nourished, escapes illnesses, cries rarely, and above all sleeps a lot . . . Breastfeeding permits the child to have strength, stops him from crying, and enables me to get on with my work.

Mother of a well-nourished 10-month-old boy, Synda (rural)

The vast majority of the mothers talked about breastfeeding on demand, usually in response to the child's crying.

I give him the breast every morning when he wakes up and also when he cries because this means that he is hungry.

Mother of a well-nourished 6-month-old boy, Mopti (urban)

I breastfeed when she cries or when she pulls on my top.

Mother of a well-nourished 8-month-old girl, Sevaré (urban)

I breastfeed when he cries or when the last feed has been some time ago.

Mother of a well-nourished 7-month-old boy, Mopti (urban)

However, two mothers of malnourished children indicated that they did not always breastfeed on demand, because their work did not permit them to do so.

I breastfeed when he cries. But when I work, I force myself not to give him the breast, even if he cries for it because it slows me down.

Mother of malnourished 9-month-old boy, Boré (rural)

When I am busy, I just breastfeed when she cries, but if I have nothing to do, I breastfeed whenever I can or when she asks for it.

Mother of a malnourished 12-month-old girl, Sevaré (urban)

We had hypothesized (see section 4.1) that mothers of well-nourished children breastfeed more frequently in response to crying than mothers of malnourished children. Hypothesis 3 appears to have been supported, since the testimonies indicate that mothers of malnourished children may be unwilling to interrupt their work to breastfeed.

6.4 UNDERSTANDING OF MILK INSUFFICIENCY

Two mothers of malnourished children complained of severe milk deficiency and had started to give supplements to their children virtually from birth. One actually sought to decrease the reliance of her 11-month-old child on breast milk. Both women saw their lack of milk as being caused by personal problems. Even the women who did not personally experience milk insufficiency reiterated that worrying and anxiety were the leading causes of milk drying up.

Hunger and worrying (caused by the husband) can cause insufficient milk in a woman. I give gruel to my child so that he is not hungry and so that he breastfeeds less because I don't have enough milk.

Mother of a malnourished 11-month-old boy, Synda (rural)

My child is essentially nourished by gruel because there is no milk in my breasts. When a woman has problems like me, there will not be enough milk because I eat poorly. You can't even talk about the quality of the milk because there is really no milk at all.

Mother of a malnourished 11-month-old boy, Sevaré (urban)

In fact, these women may have been creating a vicious cycle of increased complementary feeding and milk insufficiency since milk production is governed by the frequency and intensity of infant suckling. Increased complementary feeding is likely to decrease stimulation of the breast by the infant and ironically decrease the quantity of maternal milk. This link was recognized by one woman in Sevaré, who, like others, was concerned about the varying quality as well as quantity of breast milk.

If a child consumes other liquids, he breastfeeds less, and this can reduce the quantity of breast milk. However, if the milk is not of good quality, we put a paste made out of millet husks on the breasts for several hours, and this remedies any problems with insufficiency or with the quality. Hunger is the principal factor (behind these problems).

Mother of a well-nourished 7-month-old boy, Sevaré (urban)

Nearly every woman in the study ensured that she had adequate milk by regularly eating *cobal*.

Here, old women advise us to drink a lot of cobal, which increases the quantity of milk in the breasts.

Mother of a malnourished 7-month-old boy, Boré (rural)

I drink cobal and I swallow butter to have more milk in my breasts.

Mother of a malnourished 3-month-old boy, Synda (rural)

In order to have a lot of milk, you must eat a lot of to and drink a lot of cobal afterwards.

Mother of a well-nourished 10-month-old boy, Synda (rural)

The risk of milk insufficiency was a constant preoccupation of every woman interviewed and a subject about which they had strong ideas. However, no woman was sufficiently malnourished to have a genuine possibility of reduced milk output. It may be, as found elsewhere, that fears of milk insufficiency reflect more general perceptions of scarcity and shortage in these marginal environments (Obermeyer and Castle, 1996).

6.5 VIEWS ON THE AGE FOR INTRODUCING FOODS

Nearly all mothers acknowledged the practice of giving water to their infants from the first week of life.

I give water to the child from birth, even before the baptism.⁶

Mother of a well-nourished 6-month-old girl, Boré (rural)

In my opinion, you give water once a day until he is two months old and then from time to time as he grows up.

Mother of a well-nourished 6-month-old girl, Sevaré (urban)

Water was seen as crucial to life and of particular importance to young infants.

⁶Baptisms usually occur on the seventh day of a child's life.

During the past 24 hours, she has only taken water because water is indispensable to survival.

Mother of a well-nourished 3-month-old girl, Sevaré (urban)

During the last 24 hours, I gave water because all human beings need water to survive.

Mother of a well-nourished 4-month-old infant, Sevaré (urban)

Giving complementary foods was seen as a sequential process beginning with *cobal*. Most mothers advocated giving *cobal* at about 6-7 months, with a small minority saying that it should be given earlier or later.

I know that at around 5 months you can get her to taste cobal little by little.

Mother of a well-nourished 8-month-old girl, Sevaré (urban)

At 6 months, you can give cobal and all liquids that are not salty.

Mother of a well-nourished 7-month-old boy, Sevaré (urban)

Some mothers looked for physical signs of development in their children as a signal for giving them complementary food.

I give him breast milk and the traditional medicines. I would not want him to have additional foods before he starts crawling.

Mother of a well-nourished 6-month-old boy, Boré (rural)

The main reason for giving *cobal* was that breast milk alone would no longer satiate the child and that the child was asking for additional food or crying after being breastfed. Again and again, the overriding idea was expressed that a child should be stopped from crying because it impedes women's work and agricultural activities.

Now the quantity of milk is not sufficient, and I noticed that after each period of breastfeeding, he was crying and I had to fill him up with cobal. Then he was calm.

Mother of a well-nourished 10-month-old boy, Mopti (urban)

I gave him cobal in addition to breast milk so that he could be at ease.

Mother of a well-nourished 10-month-old girl, Boré (rural)

Foods such as soured milk and *cobal* were described as being “sweet” (even though they may contain no sugar) and appropriate for young children. Regarding giving “heavier” foods such as *to* or rice, it was thought better to postpone these until the child had started to walk or had been completely weaned (whichever came first) because otherwise the child's legs would become “heavy” and he would have difficulty walking. This view seemed more widespread among the mothers of malnourished children.

Before weaning, if you give food to the child (besides cobal), he will walk with difficulty and his legs will become heavy.

Mother of a malnourished 7-month-old boy, Boré (rural)

I think that if you give food before weaning, he will risk having a lot of illnesses. Very often he will become heavy and not walk on time.

Mother of a malnourished 9-month-old boy, Mopti (urban)

In addition, among mothers in both groups, the idea that introducing solid foods would increase the amount the child defecates was extremely common. Given their heavy workloads, mothers attempted to control their child's defecation (often by giving enemas as described above). Some women expressed the view that solid food should be delayed to prevent excessive defecation, which would then have to be cleaned up.

It can lead to poor nutrition and even malnutrition among such children because the child will make too much feces. It tires out the mother.

Mother of a well-nourished 6-month-old girl, Sevaré (urban)

Giving additional foods to a child who is breastfeeding will result in a lot of feces so it is better to wait until he has grown.

Mother of a well-nourished 5-month-old boy, Sevaré (urban)

The idea that the child had to indicate that he or she required complementary food was extremely prevalent among the mothers of malnourished children. Only one mother of a well-nourished child expressed this view.

As soon as he starts to want to eat of his own volition, you have to give him food. The only criterion is when he starts to pull himself towards food.

Mother of a malnourished 12-month-old boy, Sevaré (urban)

One day the child wanted to eat rice and I gave him some. Since then, I have given him everything.

Mother of a malnourished 12-month-old girl, Mopti (urban)

First the breast milk becomes insufficient, and then the child seeks food other than breast milk.

Mother of a malnourished 11-month-old boy, Sevaré (urban)

Although these statements about how and when to give an infant food are instructive and fairly consistent, they do not reflect what mothers actually do. As can be seen below, both mothers' reports about how they care for their child and observations of the interaction between mother and child show a pattern of complementary feeding somewhat different from what mothers gave as

rules for action. The discrepancies involve both what was given and the time (age) it was given. For instance, although mothers stated that children should not be given *to* or rice until they can walk or until they are weaned, very few followed that “rule.”

Indeed, both the reported consumption data and the observations suggest that malnourished children in particular actually consume these foods considerably earlier than their mothers claim. Some mothers knew what they “ought” to do but admitted that they had acted differently by giving foods earlier than would have been expected. Giving food earlier than what women have been told is good may be a response to the child’s own behavior, in particular, in an attempt to quiet crying so that they could get on with their work.

Some people give food at 5 or 6 months. I give them food at 4 months.

Mother of a malnourished 9-month-old boy, Boré (rural)

Nine months is the best age, but for reasons that are related to the living conditions of the mother, some give at 3 months; I give at 6 months.

Mother of a well-nourished 3-month-old boy, Mopti (urban)

There also seems to be some flexibility in the definition of “food.” Women who were adamant that giving *to* or rice to children before weaning would delay development were happy to give *cobal*. *Cobal* is considered both an appropriate bridging substance before the introduction of “real” solids such as rice and *to* and a “top-up” food in cases of perceived milk insufficiency. It should be noted, however, that unless soured milk is added to it, *cobal* is of extremely low calorific value.

Furthermore, as shown above, traditional medicines were given virtually universally and even though these may contain shea or animal butter, they are not considered food. Thus, surveys of infant feeding may not be capturing the true extent of complementary feeding, given the differences in the criteria for what constitutes “food” for mothers compared with what constitutes “food” for researchers.

7.1 BREASTFEEDING

During the observation period, all the children were observed breastfeeding. As earlier indicated, observations were noted each minute for a total of 360 minutes (6 hours) per child. Table 7 indicates that among the well-nourished and malnourished children, there were differences in the time spent breastfeeding although they were not statistically significant. In a linear regression for each age group, it was found that among those age 3-4 months, well-nourished children breastfed on average for 19 minutes more than their malnourished counterparts. This result has borderline significance ($p=0.181$) but may be significant with a larger sample size. Among those age 5-6 months, well-nourished children breastfed for on average 11 minutes more than those who were malnourished. However, among those age 7 months or more, those who were well-nourished breastfeed for on average 10 minutes less than their malnourished counterparts.

Table 7: Mean number of minutes child spent breastfeeding during the six-hour observation period, by nutritional status and age

Age of child (months)	Well-nourished children (N=16)		Malnourished children (N=15)	
	No. mins	% time	No. mins	% time
3-4	61.3	17	42.3	12
5-6	41.8	12	30.3	8
7+	37.2	11	47.2	13

These data indicate that younger children of better nutritional status spend more of the early months breastfeeding but then appear to reduce breast milk consumption to take in additional liquids and solids by at least six months of age. Those who are malnourished seem to breastfeed less in the early months but more during the later months, compared with their well-nourished peers. It is impossible to say whether the shorter amount of breastfeeding in early life is a cause or consequence of their nutritional status without knowing the full medical and nutritional history of the children in question.

Factors leading to difficulties with feeding may include problems associated with congenital disorders or low birth weight about which we have no information. However, it may be that such conditions lead to problems with suckling and/or breast milk intake and later to a reluctance to take solid food at six months when their well-nourished counterparts are able to do so.

In summary, the general patterns indicate that at younger ages, those with better nutritional outcomes breastfed for a longer duration during the observation period. In contrast, at the older ages, those with poorer nutritional outcomes breastfed slightly longer during the period they were observed.

Further analysis indicated that the mean duration of each period of breastfeeding did not vary between the well-nourished and malnourished children observed. Among those age 3-4 and 5-6 months, each period of breastfeeding lasted approximately 6 minutes, while those age 7 months or more fed for approximately 7 minutes at a time. Thus, the hypothesis that well-nourished children would breastfeed longer than malnourished children (hypothesis 4, section 4.1) was not supported.

7.2 MOTHERS' REPORTS OF LIQUIDS AND SOLIDS CONSUMED

Mothers were asked to name everything that their infant had consumed since birth and to state when the child began to take it. The categories of interest were the following: water, *cobal*, animal milk, formula, and traditional medicines for the liquids; meat or fish for the solid proteins; *to* and rice for the starch staple; and fruit. All the infants 6 months old or younger had been given water early on, and most had often been given traditional medicines in the weeks after birth.

All children received breast milk except one child in Mopti whose mother had died. Nearly all children received water and traditional medicines from early ages. Indeed, not one infant was truly exclusively breastfed, although many of the younger infants did not receive "food" until they were 6 months old. Children were, in general, receiving *cobal* at about 6 months, and *to* or rice was introduced at about 9-10 months. However, a few children in the rural areas were receiving only *cobal*, breast milk, and traditional medicines at 11-12 months of age.⁷

7.3 OBSERVATIONS OF LIQUIDS AND SOLIDS CONSUMED

The observations over a total of six hours in a day showed that the children spent very little time consuming any kind of liquid. As seen in Table 8, 16 well-nourished and 15 malnourished children were observed. However, in general, the older children spent more time consuming both water and other liquids than the younger children. It is noteworthy that of the three children exhibiting good nutritional status at 3-4 months, only one consumed water during the observations, compared with two out of the three others of the same age. Of the five children in good health at age 4-5 months, only one consumed water during the observations, compared with one out of the three who were malnourished. Nevertheless, none of the differences in the consumption of water at the different ages by nutritional outcomes were statistically significant.

Even children age 7 months or older, who needed complementary feeding for optimal growth and development, only spent about 2 percent of their time consuming liquids other than breast milk and water. Further analysis indicated that on average those age 7 months or older spent approximately six minutes more than the youngest children consuming liquids. Those who were better nourished spent an extra minute per observation period consuming liquids, compared with their malnourished counterparts. Among those age 5-6 months and 7 months or more, there was no difference by nutritional status in their consumption of other liquids.

⁷It should be noted that the traditional medicines are usually given with butter from the shea nut, which may have some calorific value.

Table 8: Mean number of minutes child spent consuming water and other liquids during the six-hour observation period, by nutritional status and age

Age of child in months	Well-nourished children (N=16)		Malnourished children (N=15)	
	No. mins	% time	No. mins	% time
CONSUMED WATER				
3-4	1.0	0.3	2.3	0.6
5-6	2.6	0.7	2.7	0.8
7+	3.8	1.0	3.4	0.9
CONSUMED OTHER LIQUIDS				
3-4	0	0	1.6	0.4
5-6	4.2	1.2	1.3	0.4
7+	7.2	2.0	7.2	2.0

Overall, the results point to some compensation by the mothers of very young malnourished children who tend to give greater quantities of water and other liquids. This may be to counteract perceived inadequacies of their breast milk or to facilitate surrogate caretaking by leaving a child with a sibling or other babysitter. However, by 7 months, these differences seem to have disappeared and the children follow more or less the same additional liquid regime whatever their nutritional status. Nevertheless, the children who are malnourished at this age appear to be breastfed significantly more, whilst those who are well nourished consume greater quantities of solid mushy food (see below).

Although there may not be significant differences in the quantity of liquids consumed by well-nourished and malnourished children, important variations exist in the quality of their intake. The only liquid consumed by well-nourished children age 3-4 months was water (N=3). In contrast, those of the same age who were malnourished were consuming traditional medicines and *quinqueliba* (a local infusion with anti-pyretic and other healing properties). Giving traditional medicines and *quinqueliba* suggests that mothers or caretakers were aware of the weakened state of their child and were attempting to rectify it by administering local therapies.⁸

The small number of children age 5-6 months make generalization and comparison difficult: three were malnourished, and five were well nourished. For the 7- to 12-month-olds, gruel made up one-half of the liquid intake during the period they were observed. Unlike their malnourished counterparts, older children who were better nourished were also consuming cows' milk. It should be noted, however, that the gruel also sometimes contained soured milk. Malnourished children were thus likely to occasionally consume animal milk even though it was in a diluted form.

The amount of time spent consuming solid food by the 16 well-nourished and the 15 malnourished children was extremely minimal. Those in the youngest age groups did not consume any solids at all. However, even the older children who were capable of chewing and digesting solid food spent minimal time actually doing so. The observations found that a surprisingly high

⁸ Some traditional medicines are routinely given to healthy children to prevent illnesses such as diarrhea and to enhance growth (Castle, 1992). However, in this case, it was noted that the medicine was given for curative rather than preventive purposes.

proportion of the time spent consuming solids included the consumption of clay, earth, and/or sand. If these are added to the true solids (which can be classified as “food” and have a nutritive value), then the number of minutes spent consuming solids doubles to 5.7 for the malnourished children age 5-6 months. These figures indicate the malnourished children age 5-6 months spent twice as long eating clay or sand and actual food. In contrast, none of the well-nourished children of the same age were consuming such non-foods.

Geophagia (or the consumption of dirt or earth) among children has been reported in Africa and elsewhere. In Guinea, it was found that more than half of all children under age five routinely consumed dirt. The practice was strongly associated with subsequent parasitic infections (Glickman et al., 1999). In South Africa, geophagia was found to affect children from the age of 8 months onward (Taylor et al., 1999) and in Holland, it was noted to be linked to zinc and other mineral deficiencies (Van Wouve, 1995). In Mali, pregnant women have been observed deliberately eating dirt (which is also sold for this purpose in local markets). It is likely that in this group and among the infants, the practice is a biological response to anemia or other mineral deficiencies.

In addition, malnourished children were observed consuming millet husks, which have little nutritive value and are probably a source of contamination. The better nourished children consumed foods of a comparatively higher nutritional value such as rice and sauce, fish, or fresh fruits and vegetables.

A comparison of rural and urban children observed showed only slight differences in the type of food consumed. Interestingly the rural children age 4-5 months appeared to consume a greater variety of foods, but these foods were not always of high nutritional value. In contrast, the urban children of the same age appeared principally to consume fish and rice with sauce. By 7 months, both sets of children were consuming more or less the same items. It is important to note that both the 5- to 6-month-olds and the 7- to 12-month-olds in rural and urban areas were consuming both gruel and rice with sauce. This represents a contrast with both what was considered normative and what was reported by mothers. That is, the observations found far more complementary feeding at these ages than were found with other methods of data collection.