

Breastfeeding and mixed feeding practices in Malawi: Timing, reasons, decision makers, and child health consequences

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Abstract

Background. In order to effectively promote exclusive breastfeeding, it is important to first understand who makes child-care and child-feeding decisions, and why those decisions are made; as in most parts of the world, exclusive breastfeeding until 6 months of age is uncommon in Malawi.

Objective. To characterize early infant foods in rural northern Malawi, who the decision-makers are, their motivation, and the consequences for child growth, in order to design a more effective program for improved child health and nutrition.

Methods. In a rural area of northern Malawi, 160 caregivers of children 6 to 48 months of age were asked to recall the child's age at introduction of 19 common early infant foods, who decided to introduce the food, and why. The heights and weights of the 160 children were measured.

Results. Sixty-five percent of the children were given food in their first month, and only 4% of the children were exclusively breastfed for 6 months. Mzuwula and dawale (two herbal infusions), water, and porridge were common early foods. Grandmothers introduced mzuwula to protect the children from illness; other foods were usually introduced by mothers or grandmothers in response to perceived hunger. The early introduction of porridge and dawale, but not mzuwula, was associated with worse anthropometric status. Mzuwula, which is not associated with poor growth, is usually made with boiled

water and given in small amounts. Conversely, porridge, which is associated with poor child growth, is potentially contaminated and is served in larger amounts, which would displace breastmilk.

Conclusions. Promoters of exclusive breastfeeding should target their messages to appropriate decision makers and consider targeting foods that are most harmful to child growth.

Key words: Child growth, exclusive breastfeeding, Malawi, mixed feeding

Introduction

The quality of the diet in the first years of life is a key factor in children's health and survival [1]. Mild to moderate child malnutrition has been estimated to account for 53% of all child deaths in developing countries [2]. Appropriate breastfeeding and complementary feeding methods could potentially halve African infant mortality rates. Current nutrition policy encourages mothers to exclusively breastfeed their children for the first 6 months of life [3], providing the infant with a nutritionally sufficient, clean, and safe diet. Despite the recommendations and widespread promotion of exclusive breastfeeding, it is often not practiced, even in developing countries where it would be most beneficial. Most recent estimates suggest that one-third of all infants in sub-Saharan Africa are exclusively breastfed, an increase from 15% in 1990 [4].

Malawi is a landlocked country in southeastern Africa with a population of approximately 11 million, 80% of whom live in rural areas. The infant mortality rate is 114 per 1,000 live births, and the under-five mortality rate is 183 per 1,000 live births [5]. High levels of child malnutrition have been observed in Malawi for over two decades [6, 7]. Growth faltering begins soon after birth, with rapid worsening beginning at approximately 5 months, continuing through the second year, when stunting prevalence peaks at 60%, and remain-

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ing above 50% up to the age of five [7]. About 25% of Malawian under-five children are underweight; peak levels occur between 12 and 24 months of age [7]. Food insecurity is a major problem, with between 70% and 85% of households experiencing food shortages on an annual basis [8].

Exclusive breastfeeding appears to be uncommon in Malawi, despite very high rates of breastfeeding (nonexclusive + exclusive breastfeeding = 95% at 17 months of age [9]) and a national effort to increase exclusive breastfeeding [9-11]. A confounding factor and a perceived disincentive to exclusive breastfeeding is the high prevalence rate of HIV-positive Malawian pregnant women, estimated at 14% to 20% [12]. One recent study suggested that HIV-infected Malawian women were concerned that exclusive breastfeeding would compromise their health status if they did not have better access to nutritious foods [13].

The objective of the research presented in this paper is to characterize early infant-feeding practices in a rural Malawi setting, and specifically, to document the foods that are introduced early to the children, who the decision makers are for these practices, their motivation for doing so, and the consequences for child growth. With this characterization, a more effective program for the promotion of exclusive breastfeeding and healthy feeding practices might be designed.

Description of study site

The research was conducted in a rural area of northern Malawi near the town of Ekwendeni in Mzimba District. Approximately 80% of the population are small-holder farmers. Maize is the primary staple crop and is harvested in May and June after the single annual rainy season. Other important crops include beans, squash, groundnuts, and sweet potatoes, as well as tobacco as the major cash crop.

This research was carried out within a larger community-based research and development project, the Soils, Food and Healthy Communities Project (SFHC), based at Ekwendeni Hospital, that began in 2000. SFHC tries to improve the health of resource-poor households through participatory research that introduces relay cropping and intercrops of legumes to improve soil fertility, food security, and nutrition of poor households, in particular by increasing legume consumption by young children.

Methods

The overall research approach was interdisciplinary and multimethod. The research team, composed of a sociologist, a nutritionist, hospital staff, and farmers, carried out a combination of qualitative and

quantitative research to understand early infant-feeding practices. Early introduction of non-breastmilk foods to infants was identified as an issue of interest on the basis of the qualitative research, and specific questions about these practices were included in the survey. Twenty-one semistructured interviews were conducted in 2001 in which key informants (mothers, older women, and traditional medicine practitioners) identified by community members were asked about pregnancy, breastfeeding, early infant feeding, and general care practices and beliefs. The questions were developed on the basis of initial test interviews with informants. Four focus groups were held with groups of men and women in the villages, using similar questions as the semistructured interviews. In addition, free lists of foods eaten by young children were obtained from 28 informants [14]. The team worked in pairs to carry out the interviews, with one person interviewing and the other person translating or taking notes. Informed consent was obtained prior to all interviews. All interviews were recorded, and the tapes were transcribed and translated into English.

Using the qualitative research as a basis for design, an extensive survey on agriculture and child-care and child-feeding practices was conducted in February 2002 (during the "hungry season") with 264 households. Questions were included about the timing of the introduction of 19 foods (identified as the most common early infant foods in the qualitative research), the reason or reasons that each of these foods was introduced, and the individual(s) who made the decision to introduce the food.

The subjects of this study were children 6 to 48 months of age and their primary caregivers (99% of respondents were the children's mothers; the remaining respondents were one father, one grandmother, and one stepmother) from two sets of households: those in intervention villages and those in control villages. The original survey design was intended to compare intervention households with nonintervention households in terms of food security, soil fertility, child nutritional status, and child-feeding practices. Intervention-village households were participating in the SFHC Project; control villages were selected on the basis of similar socioeconomic and environmental conditions. Households were recruited to the Project at village-level meetings organized by the hospital. Survey participants from intervention-village households were randomly selected from this group. In order to reduce selection bias, since other studies have indicated that more food-secure households join participatory agricultural projects [15], and to control for growth differences based on age, control households were matched with intervention households on the basis of two criteria: age of the child and food-security status (operationalized as the month when self-grown maize stores are exhausted). The majority of respond-

ents (87%) had a primary-level education, 6.5% had a secondary-level education, and 6% had no formal schooling. Most of the respondents (74%) were in monogamous marriages, 18% were in polygamous marriages, 6% were divorced, 1% were widowed, and 1% were single. Sixty-three percent of respondents had one under-five child in the household and 35% had two under-five children. The average number of people in the household was five.

In 160 households with a child under 4 years of age, the primary caregiver was interviewed in the home about the child's consumption of 19 specific early infant foods and was also asked if the child consumed other foods (**fig. 1**). In this sample, 112 households (57 control, 55 intervention) had children 6 to 24 months of age, and 48 (22 control, 26 intervention) had children 24 to 48 months of age. In the older group, 45 children were between 24 and 34 months of age and 3 were more than 34 months of age. For each of the 19 foods, the caregiver was asked if the food had been introduced to the child, and if so at what age (in months), the reasons for introducing the food (from a list of 10 choices, including "other"), and who was involved in deciding when the food should be introduced (a list was provided of 11 individuals, as well as "other," "don't know," and no answer). The surveys were pretested in a neighboring village and revised. In order to minimize biased responses due to extensive hospital education about exclusive breastfeeding, no direct questions were asked about how long the women had breastfed exclusively. The results suggest that asking women indirectly

minimized response bias about breastfeeding practices. Although the time period for caregivers to recall what foods were given to their children was long (up to 48 months), exact amounts were not assessed, and initial qualitative interviews indicated that caregivers were able to easily recall what foods were initially given to their children. Thus, measurement bias is anticipated to be low.

Anthropometric data were collected from 405 children in a central village location (e.g., primary school) by trained research assistants following standardized procedures and using calibrated equipment. Nude weights were measured by an electronic TANITA "Baby and Mommy Scale" (model 1582; lb/kg version) and recorded to the nearest 0.01 kg. A 100-cm length board (Perspective Enterprises) was used to record the length of children from sampled intervention and control households.

The research protocol was reviewed and approved by the Malawi National Research Council and by the Cornell University Committee on Human Subjects. Informed consent was obtained orally from each adult caregiver prior to the survey and collection of anthropometric data.

Data management and analysis

Qualitative data were analyzed for trends, key concepts, and practices by data analysis techniques described by Miles and Huberman [16] and Patton [17]. A coding scheme was developed using different themes based

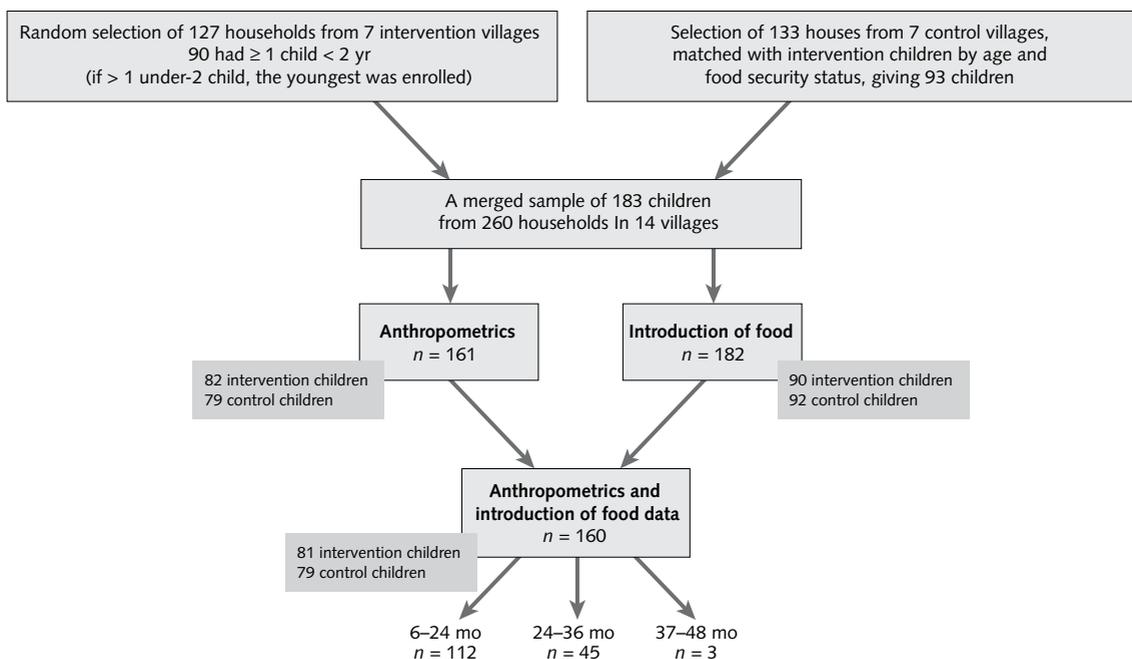


FIG. 1. Flow chart of sampling methods and number of participants, February 2002 survey

on the interview schedules. This code list was modified during the data analysis process as new themes emerged. A set of definitions for each code was also developed and modified throughout the analytical process. After coding, the data were read over and examined for emerging themes and trends. Inductive analysis was used to identify indigenous food concepts, feeding practices, and key social roles in child feeding. Follow-up interviews and focus group discussions were conducted to better understand these concepts, practices, and roles. Identification of sensitive topics in the qualitative research allowed the team to carefully word survey questions to avoid biased answers.

The quantitative data, i.e., the anthropometric data and the data from the survey regarding age at introduction of the food, reasons for introducing the food, and the decision makers, were entered in Excel and analyzed using SAS (version 8). For each month of age, the percentage of children given a food for the first time was calculated as (number of children first given the food at age X or younger) ÷ (number of children whose age was X or younger). The effect of household food security and socioeconomic status (SES) on age at introduction of each food was tested by multinomial logistic regression (age at introduction vs. month household ran out of or expected to run out of maize, where ages at introduction are classified as < 1 month, 1-4 months, 4-6 months, and > 6 months or never [i.e., the child was > 6 months of age but had not been given the food]). The reasons for the introduction and the decision makers were tabulated, and cross-tabulations between “reasons” and “decision makers” were also generated.

The effect of early introduction of individual foods was tested by comparing growth status with age at introduction of the three key early infant foods. The children’s heights and weights were converted to height-for-age, weight-for-age, and weight-for-height z-scores (HAZ, WAZ, and WHZ, respectively) by calculating the difference between the child’s measure and the age-matched mean measure of a reference population, and then dividing by the standard deviation of a reference population [18]. In SAS, a general linear model was used where the dependent variable was HAZ, WAZ, or WHZ and the independent variable was age at introduction of a food (categorized as described above). The model included children from 6 to 48 months of age for whom we had both anthropometric data and data on the timing of introduction of early infant food. “Porridge” includes the earliest introduction of any type of porridge: porridge with unrefined maize flour (*mgaiwa*) and porridge with milk and maize flour (*chintuwe*) (table 1). “*Dawale*” includes dawale, “dawale water,” and “dawale porridge,” and the earliest age of introduction of any of the three types of dawale was used. The model tested for effects of the child’s sex and age, the month at which the household

TABLE 1. Definitions of local food terms based on qualitative interviews

Term	Definition
Mzuwula	Herbal infusion made from the leaves of specific tree species found in the area. The infusion is made from crushed leaves mixed with boiled or cold water
Dawale	Herbal infusion made from the roots of a specific tree species found in the area. Sometimes other leaves are crushed and added to the infusion. Sometimes fed to infant as an infusion, sometimes added to porridge to make a very thin porridge.
Chinthipu	Very thin, watery, maize porridge
Mgaiwa	Unrefined maize flour
Chintuwe	Porridge with milk and maize flour

ran out of or expected to run out of maize (as an indicator of food security), and an SES index. The SES index consisted of a rating for housing, ownership of material goods, and maternal education. Housing materials were ranked from low to high for the following materials: sticks, thatch or grass, unfired brick, clay tiles, fired brick, and iron sheets. The material goods were oxcart, wheelbarrow, radio, plow, motorcycle, ridger (a soil-tilling implement), mosquito net, bicycle, sofa or armchair, table and chairs, and tobacco press. The index assigned one point for each item owned.

Qualitative interviews, participant observation, and focus group discussions suggested that housing materials and ownership of goods were good SES indicators. Other studies in Malawi have included ownership of goods and housing type as good proxy indicators of SES [19]. Maternal education was included because other studies in Malawi and elsewhere have found that maternal education can have a significant effect on children’s nutritional status [11]. The independent variables are treated as fixed effects in this model. There was good concordance between individual indicators and SES points.

Results

In the results presented in this paper, there are no differences between intervention and control villages (data not shown), and therefore the data are presented for the villages combined.

Perceptions of breastfeeding

Informants felt that the first milk (colostrum) was good for babies, as well as breastmilk, but exclusive breastfeeding was not widely practiced. They said that breastmilk protects a baby from diseases, helps their bowels develop, and gives them energy. All women

interviewed named breastmilk as the primary source of food for babies, but several other foods could be given to a baby if it cried. The crying of a baby was seen as a sign of hunger and an indication that the baby was not getting enough food from breastmilk. Many women said that breastmilk was given until the baby cried after breastfeeding, at which time a thin maize porridge was given. Some informants said that certain babies are “born hungry” and may have to be fed porridge at a very early age, or gripe water or different herbal infusions, discussed below, in some cases. The mothers said that the most important reason for introducing porridge was that the baby was crying.

Age at introduction

The age at introduction of the 19 foods is summarized in **figure 2** in a cumulative frequency plot. The percentage of children who have been given a food by the end of each month of age is shown. Sixty-five percent of the children are given some type of food in the first month. By 6 months, 96% of the children have been given some type of food (see the “Any food” line in **fig. 2**).

There are three notable patterns in the introduction of foods. First, mzuwula (an infusion made with the leaves of a local tree) is introduced to 50% of the children in the first month and then to only an additional 10% over the next 17 months. Mzuwula is an infusion of water and pounded leaves and roots from a particular tree species. Approximately 80% of the children who were given any food in the first month were given mzuwula. Second, plain water or water with dawale,

another kind of root water, is introduced to 20% of the children in the first month and then to an additional 10% per month for the next 6 months. Third, porridge with chinthipu (thin porridge with white maize flour) or porridge with dawale is introduced to 10% of children in the second month and to 70% of children by the sixth month.

The exact amount given to children varied with the substance. In the qualitative interviews, informants were asked to estimate the amounts given to children. They indicated that mzuwula was typically given in small amounts (e.g., a teaspoon or about 5 mL), whereas porridge, water, or dawale could be given in amounts ranging from 25 to 500 mL. Specific amounts were not measured.

There was no relationship between age at introduction of each food, anthropometric measurements, and household food security or SES. There was a significant relationship between total SES points and the introduction of dawale. Households with a higher SES index were more likely to introduce dawale to children after the age of 6 months. The reasons for this difference may be linked to a local perception that food-insecure women produce insufficient breastmilk [20]. These perceptions and links to breastfeeding patterns are being further studied through qualitative research.

Reported reasons for introduction

The caregivers’ reported reasons that the various foods were introduced to the children are summarized in **table 2**. A commonly reported reason for introducing

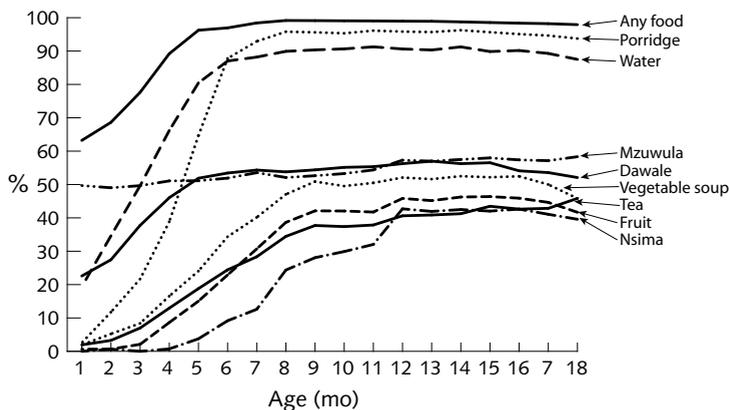


FIG. 2. Age at introduction of foods to Ekwendeni children: cumulative frequency.

Dawale includes “dawale,” “dawale water,” and “dawale porridge.” Dawale is a root that is cut up and added to water, which is boiled and then strained and given as water or added to porridge. Porridge includes *chinthipu* (made from maize and water), *mgaiwa* (made from fermented, unrefined maize), and *chinthuwe* (made from milk and maize flour). Note that the percentage of children given the food fluctuates after the age of 6 to 9 months. This is a sampling artifact (fewer children are sampled at older ages); in reality there would be a plateau at the percentage of children who ever eat a food. There are other foods or food groups not shown that never exceed 10% cumulative frequency (gripe water, *chindongwa* [a groundnut-maize bread], soft drinks, sugar water, and milk) or 20% cumulative frequency (infant formula)

many foods was that the child was hungry or crying. The most common reason reported as “other” was that the child was thirsty. However, mzuwula was given in 84% of cases to “protect” the child from illness believed to be caused by “promiscuity” of the mother or father (even within marriage) within 1 year of birth, or in some instances by promiscuity of anyone in the village [20].

Decision makers

The individuals who decided when a given food was to be introduced are summarized in **table 3**. Most often the caregiver (in 99% of cases the mother) was the decision maker, but the mother-in-law and occasionally the father-in-law were also important decision makers, particularly with regard to foods that were given to protect the child.

Cross-tabulations of “reasons × decision makers” revealed that water and porridge were given in 80% of cases because the child was perceived by the mother or mother-in-law to be hungry and crying. However, in 78% of cases when mzuwula was introduced, the mother-in-law made the decision and it was given to protect the child from the disease associated with promiscuity. Young women noted in focus groups that their mothers-in-law have tremendous influence over all child-care and feeding activities [20]. A crying baby is perceived as a sign of poor child care, and a grandmother can even remove a child from the home if she feels the child is not getting enough food. Vigorous discussions with older women indicated a very strong belief that breastmilk is not adequate for young babies, particularly during the “hungry season” from December to March, which is also the period reported by informants to have the highest level of illness from water-borne diseases.

Relationship between early infant-feeding practices and anthropometric measurements

We tested the relationship between anthropometric measurements of 160 children 6 to 48 months of age (of whom 112 were less than 24 months old) and the timing of introduction of four food types during infancy. The model tested the z-score vs. the age at introduction of water, mzuwula, porridge, or dawale, while controlling for the child’s age and sex and the age at which the household ran out of or expected to run out of maize, as a general indicator of food security and SES. Age at introduction was classified as < 1 month, 1 to 3 months, 4 to 6 months, or > 6 months or never). The models

TABLE 2. Number of times various reasons were given by mothers for feeding particular foods to their children ($n = 157$)^a

Reason	Water	Maize porridge	Mzuwula	Vegetable soup	Fermented, unrefined maize porridge (mgaiwa)	Fruit	Tea	Nsima	Dawale	Dawale water	Dawale porridge	Formula	Gripe water	Milk	Sweet potato	Maize bread	Soft drink	Milk and maize porridge	Sugar water
Advised to feed	4	2	1	1	4	1	1	3	1	1	1	0	0	1	0	1	0	0	0
Child ill	3	0	2	0	0	2	1	0	1	0	0	0	3	0	0	1	0	1	0
Child crying or hungry	102	103	9	26	40	21	29	28	19	16	15	14	4	5	6	1	6	8	1
Child's interest in food	1	1	0	4	2	23	19	16	0	0	0	5	0	0	6	2	2	0	1
Mother ill	2	1	0	2	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0
Not enough breastmilk	9	15	0	0	5	1	4	3	0	3	1	0	0	4	0	0	1	3	0
To protect child	2	1	72	16	0	12	6	1	15	10	6	0	11	3	0	0	0	0	0
To strengthen child	2	17	6	27	30	19	5	16	7	11	6	6	0	4	2	1	3	0	0
Mother couldn't breastfeed	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Other	22	0	0	0	1	2	0	1	0	2	1	0	0	0	2	2	1	0	2
No. of children given food	138	125	86	73	71	68	62	55	41	35	25	23	18	14	13	12	11	9	4

a. Up to three reasons were given per food.

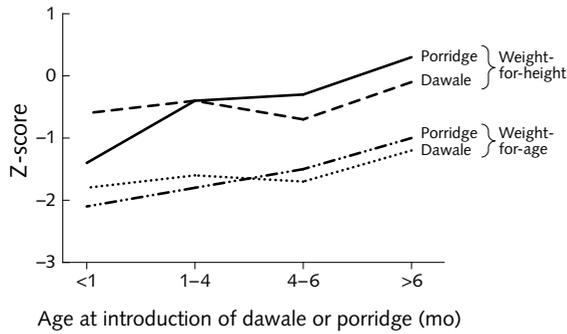


FIG. 3. Least-square means of weight-for-height and weight-for-age in children according to age at first introduction of porridge or dawale

such promotion may be inappropriate or inadequate, since the mother does not always decide what a child eats and often it is the mother-in-law who decides. Mzuwula is given to “protect” children against an illness believed to be caused by promiscuity [20]. This belief is firmly held by many villagers. Is it therefore necessary to promote the reduction of the practice of feeding mzuwula to infants? Conventional exclusive breastfeeding policy would certainly discourage giving infants mzuwula. However, mzuwula is often prepared with boiled water (and therefore is likely to be sterile), and it is given infrequently and in small amounts (and thus displaces little breastmilk). Perhaps not surprisingly, then, its early introduction is not related to child growth. Furthermore, it is tied in to a very strongly held belief system, the behavior is deeply engrained, and it would probably be very difficult to change. Project staff initiated a nutrition program with villagers that attempts to promote healthy ways of using mzuwula, such as always boiling the water prior to preparation, or bathing the child in mzuwula rather than feeding it to the child. Thus, the Project does not attack strongly held traditional beliefs while trying to improve child-feeding practices.

Porridge and dawale, on the other hand, are given to the child because the decision maker believes the child is hungry or thirsty. Implicitly tied to this idea is the notion that mothers produce insufficient breastmilk for babies, a belief found in other parts of southern Africa [22]. Porridge is prepared in the morning and then allowed to cool and is served throughout the day, and thus is a potential source of pathogens [23]. It has limited nutritional value but is filling, and it is given to the child regularly and in amounts that are likely to displace breastmilk. Further, its early introduction is related to poor growth in this population (fig. 3). Anthropometric status is not significantly associated with “age at introduction of any food” (or, to say it in a different way, months of exclusive breastfeeding), but is significantly associated only with the age at introduction of those specific foods that are of par-

ticularly low nutritional quality and are potentially contaminated, i.e., porridge and dawale.

There is no concordance between the timing of introduction of the four types of food discussed here. Many caregivers who introduce mzuwula early do not introduce dawale early, and vice versa, and therefore there can be differences in the relationship between age at introduction and anthropometric measurements for the different foods. Although the relationships may indicate causality, there is no evidence from this dataset to support a causal relationship. The early introduction of porridge and dawale may be associated with other harmful but unobserved behaviors, or it may be a general marker of food insecurity, maternal education, or some other macro-level variable. It also may be an example of reverse causality if children who are growing poorly are given infant foods earlier by concerned caregivers. If that is the case, the early introduction of non-breastmilk foods did not improve growth in these children, who up to 4 years later were still lagging behind their peers. Future research in the region, using longitudinal rather than cross-sectional sampling, will address this question.

A recent study that compared infant-feeding patterns and child growth in Ghana, Peru, and India found that there was no significant difference in the risk of death between exclusively breastfed and predominantly breastfed infants, and that nonbreastfed infants had a significantly greater risk of death than those who were exclusively or predominantly breastfed [24]. The authors of this study concluded that the risk of not breastfeeding needs to be taken into account when advising HIV-infected mothers about their infant-feeding options, and that rather than focusing on exclusive breastfeeding in areas where predominant breastfeeding is the norm, continued high rates of breastfeeding should be encouraged. Our findings support the idea of promoting predominant breastfeeding and the need to identify specific infant-feeding practices that may be particularly problematic, such as early introduction of porridge. Breastfeeding provides other important non-growth-related benefits to both mother and child, such as reduced child infections and delayed maternal fertility postpartum.

Whether or not the relationships are causal (or reverse-causal), the biological plausibility of the relationships and the importance of discouraging early introduction of foods, encouraging exclusive breastfeeding or predominant breastfeeding, and, in particular, discouraging early introduction of porridge and dawale should be priorities in nutrition programs in Ekwendeni. The next step in this project will be to use these findings to develop an appropriate exclusive breastfeeding campaign and to monitor the success of the campaign in terms of changing behavior and improving child health. An additional complicating factor in Malawi is the recommendation of exclusive

breastfeeding in the face of HIV infection rates. The World Health Organization continues to recommend exclusive breastfeeding unless replacement feeding is "acceptable, feasible, affordable, sustainable and safe," which is not the case for most households in the Malawian context. Nonetheless, the current recommendation of the Ekwendeni Hospital staff for mothers who are HIV-positive is exclusive breastfeeding for 6 months followed by abrupt weaning. The recommendation is based on studies indicating that this method reduces the transmission of HIV [25]. Informants in follow-up qualitative research have expressed confusion about what breastfeeding method is the best for their babies in the face of conflicting messages. Abrupt weaning is against current common practice and suggests that breastmilk becomes unsafe. Given the prevalence of herbal remedies such as mzuwula that are used to protect infants, mothers may consider providing different herbal remedies to mitigate the dangers of infected breastmilk.

Because extensive promotion of exclusive breastfeeding appears to have had limited success in this region, we are launching a new phase of participatory research with households to encourage exclusive breastfeeding through small group discussions involving all household members who influence child nutrition, including grandmothers, mothers, and fathers. These small groups will try to use a problem-solving approach to encourage exclusive breastfeeding. If successful, the

model (first, find the reasons why exclusive breastfeeding is not practiced; second, find out who has the decision-making power to change the practice; and third, consider which particular foods should be targeted for reduction) may be used elsewhere in Malawi and in other countries where conventional exclusive breastfeeding promotional methods have not been successful.

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