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Traditional Oral Remedies and Perceived Breast Milk Insufficiency Are Major Barriers to Exclusive Breastfeeding in Rural Zimbabwe[1–3]

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Abstract

Only 5.8% of Zimbabwean infants are exclusively breastfed for the first 6 mo of life despite substantial investment in exclusive breastfeeding (EBF) promotion throughout the country. We conducted a survey of 295 mothers of infants <6 mo of age who were recruited from rural immunization clinics and outreach sites in the Midlands Province of Zimbabwe. We explored infant feeding knowledge, beliefs and attitudes, and details regarding facilitators for EBF mothers and first foods fed by non-EBF mothers to identify and understand barriers to EBF. Among mothers of infants <1 mo, 1 to <2 mo, and 2–6 mo of age, 54%, 30%, and 12%, respectively, were practicing EBF. In adjusted multivariate analyses, EBF practice was positively associated with belief in the sufficiency of EBF ($P = 0.05$), belief in the avoidance of cooking oil feeding (a common traditional practice) in the first 6 mo ($P = 0.001$), and perceived pressure from others regarding infant feeding and traditional medicine use ($P = 0.03$). Psychosocial support and viewing breast milk as sufficient were reported as primary facilitators of EBF practice. Maternal responses to open-ended questions identified protection, nutrition, and crying as the main reasons for EBF interruption. During the first 2 mo of life, ''protection feedings'' using traditional oral remedies (such as cooking oil and water) to prevent or treat perceived illness, specifically colic and sunken/depressed fontanel, made up 78.5% of the non-breast milk feeds. From the second month of life, ''nutrition feedings,'' mainly of water and porridge, were given when mothers believed their breast milk was insufficient in quantity or quality to meet the hunger or thirst needs of their infants. Our findings underscore the importance of exploring cultural beliefs and practices as they pertain to infant feeding and care and present insights for designing and targeting EBF promotion interventions. J. Nutr. 144: 1113–1119, 2014.

Introduction

The large majority of infants in Zimbabwe are breast-fed: in the 2010 Zimbabwe National Nutrition Survey, breastfeeding was initiated within an hour of birth in 75% of infants and 77% continued breastfeeding for at least the first year of life (1). Nevertheless, in the same survey, the prevalence of exclusive breastfeeding (EBF)[9] throughout the first 6 mo of life was only 5.8% (1).

Within the Zimbabwe primary health care system, EBF is usually promoted as part of health education lessons delivered by nurses to mothers during antenatal and postnatal visits. However, in focus group discussions about infant feeding practices, both men and women identified fathers as the final decision maker regarding infant feeding in Zimbabwe (2). Accordingly, in 2008, we designed and implemented an EBF promotion intervention including "edutainment" road shows in the community that targeted men and other influential community members. An evaluation showed that knowledge and positive beliefs, attitudes, and social norms about EBF were positively associated with road show attendance, but the evaluation did not assess the impact on EBF practices (3). Subsequently, the 2010 National Nutrition Survey found that the prevalence of EBF practice was similarly low

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[9] Abbreviations used: EBF, exclusive breastfeeding; EPDS, Edinburgh Postnatal Depression Scale; MBF, mixed breastfeeding.

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in districts where road shows had been conducted compared with other districts in the country (1). This disappointing result led us to conduct the current study to uncover barriers to breastfeeding exclusivity, which continue to drive low EBF rates.

Participants and Methods

Participants. A survey was conducted among 295 mothers with infants <6 mo of age in a rural, drought-prone, subsistence farming region 280 km south of Harare. Approximately equal numbers of women with infants in 3 age categories (0 to <2 mo, 2 to <4 mo, and 4 to <6 mo) were recruited over a 3-mo period (August–October 2011) from immunization clinics and outreach sites. Mothers provided written informed consent. Ethical approval was granted by the Medical Research Council of Zimbabwe and the Johns Hopkins School of Public Health Institutional Review Board.

Data collection. The survey questionnaire was informed by the road show survey (3) and the literature (4) and included questions to assess breastfeeding exclusivity, maternal knowledge, attitudes, beliefs, and perception of social norms regarding infant feeding, and maternal capacity to care for her child. Specific questions were also included regarding use of traditional remedies given to infants that had been identified in previous work (5).

To assess breastfeeding exclusivity we employed an instrument (with slight modifications) used in a previous study among HIV-positive mothers in which those classified as mixed breastfeeding (MBF) had a 4 times higher risk of breastfeeding-associated transmission at 6 mo, compared with those classified as EBF by the instrument (6). Briefly, mothers were asked whether or not any of 30 liquids (juice, tea, cooking oil), milk (formula, fresh, or tinned animal), medicines (traditional, oral rehydration solution, prescribed), or solid foods (cornmeal porridge, fruits, vegetables, meat, eggs) had been given to the baby in the last day, the last week, or ever since birth. Mothers were classified as practicing EBF if they fed their infant only breast milk since birth (with the exception of prescribed oral medicines and oral rehydration solution). Mothers were classified as practicing MBF if they fed their infant any non-breast milk liquid or food at 1 or more time points since birth in addition to breast milk. Mothers practicing MBF were asked to recall the first time the infant was fed a non-breast milk food or liquid and to describe details of the circumstance including the infant's age at the time, what food or liquid was given, who influenced the decision, and why it was given.

Maternal knowledge about optimal infant feeding practices was ascertained through a series of open-ended questions followed by probing until no further responses were elicited. Maternal attitudes, beliefs, perception of social norms, and self-efficacy regarding infant feeding were assessed based on level of agreement with 60 statements on a 5-point Likert scale (7). Maternal capacity to care for her child was assessed through questions assessing her physical health, her workload and time allocation for breastfeeding among other responsibilities, and her mental health by using the Edinburgh Postnatal Depression Scale (EPDS) (8) as adapted and validated for use in Zimbabwe (9). We modified the EPDS for administration by research enumerators rather than self-administration but did not change the content of the questions.

At the end of the questionnaire, research staff referred mothers with health questions or problems identified during the survey to clinic nurses, and referred mothers diagnosed as "depressed" or "suicidal risk" by the EPDS to mental health care. All interviews were conducted in Shona, the mothers' first language.

Analysis. Demographic characteristics were summarized by using means ± SDs for continuous variables and proportions for categorical variables; differences between mothers practicing EBF and MBF were tested for significance by using *t* tests for continuous variables, the Pearson's chi-square test for nominal categorical variables, and the Kruskal-Wallis test for ordinal categorical variables. The age-specific EBF prevalence for each month of infant age was calculated. Four composite scores were constructed from responses to knowledge questions: 1) "EBF definition score." Mothers were asked to define EBF and were assigned 1 point for each of 4 components of the definition spontaneously given (breast milk only; birth to 6 mo; no water, juice, etc.; nothing but breast milk; and breast milk on demand); points were summed to calculate the score. 2) "EBF benefits score." Mothers were asked to list the benefits of EBF and were assigned 1 point for each of 4 correct responses spontaneously given (reduces illness; provides enough energy for growth; provides enough fluid; and reduces risk of HIV transmission to infants); points were summed to calculate the score. 3) "Breastfeeding frequency score." Mothers were asked how frequently infants should be breast-fed during the day and were assigned 1 point for each of 2 correct responses spontaneously given (at least 10 times; on demand). 4) "Breastfeeding initiation score." Mothers were asked when breastfeeding should be initiated and were classified as "correct" if they responded "immediately" or "within first hour" and "wrong" for any other response. The distributions of each knowledge variable for EBF and MBF mothers were compared, and differences were tested by the Kruskal-Wallis test.

The data from belief and attitude questions were reduced by using exploratory factor analysis. Initially, we entered all 60 statements into a single factor analysis; however, this failed to produce factors that represented singular conceptual items. Therefore, we conducted 2 factor analyses using principal axis factoring as the extraction method with promax rotation and the scree test (10) to determine the number of factors to retain. The first analysis included scaled items related to infant feeding and maternal self-efficacy, and the second included scaled items related to social norms. Inclusion criterion for each factor was a loading at 0.30 or higher. Scaled items that cross-loaded at similar levels on 2 factors and conceptually fit both factors were included in the list of statements that comprised both factors. For each construct, the total score was calculated as the sum of scores for the statements included in that construct.

Responses to 10 EPDS questions were scored according to instructions provided by Cox et al (8). The range for the EPDS score is 0–30 with a score >11 indicating a mother who is likely suffering from a depressive illness of varying severity. Women scoring ≥12 were classified as "depressed." Women who answered "sometimes" or "quite often" to the last EPDS question ("Have thoughts of harming yourself occurred to you?") were classified as "suicidal risk."

Multiple logistic regression analysis was used to investigate the association of EBF practice with the knowledge variables and constructs of beliefs and attitudes, adjusting for other explanatory variables. The multivariate model was constructed by using a hierarchical approach (11) in which variables were introduced in order of their conceptual proximity to EBF practice. This process involved categorizing variables studied in this survey into 3 levels [individual, group (e.g., family, health system), and societal], and considering whether the variables were proximal or distal to EBF practice. Variables with greatest proximity to EBF practice (i.e., proximate individual variables) were introduced first and those that were most distal (i.e., societal level variables) were the last to be included in the model. At each stage of model building, the decision to retain the variable was based on parsimony (minimizing the Akaike's information criterion value) and the degree to which the model explained total variability (maximizing the pseudo r^2 value).

For each of the MBF infants, we listed all the non-breast milk foods and liquids reported to have been fed during each of the first 6 mo of life and listed the reason each food was fed at each time point, and the person(s) who influenced the feeding decision to give the non-breast milk food. Furthermore, we differentiated first non-breast milk feeding from subsequent non-breast milk feedings (henceforth referred to as subsequent feedings) derived from food recall. "Subsequent feedings" refer to unique non-breast milk foods (foods not previously fed) since the first non-breast milk food and do not indicate all feedings after the first feeding.

Statistical analysis was performed by using STATA (Stata statistical software, release 11; Stata Corporation).

Results

Of the 295 mothers interviewed, 65 (22%) had fed their infant only breast milk since birth, and 48 (74%) of these women planned to continue to practice EBF to 6 mo (**Table 1**). Of the 52 neonates, only 28 (53.8%) were EBF. EBF prevalence continued to decline to 29.5% (13/44), 14% (21/150), and 6.1% (3/49) among

TABLE 1 Respondent characteristics according to breastfeeding practice[1]

Maternal characteristics	Total (n = 295)	Breastfeeding practice group		P[2]
		Non-EBF (n = 230)	EBF[2] (n = 65)	
Age, *y*	26.1 ± 8.5	25.7 ± 9.0	27.7 ± 6.1	0.09
Education, *y*	9.6 ± 1.9	9.7 ± 1.8	9.2 ± 2.0	0.07
Married, %	89.8	89.6	90.8	0.77
Live births				0.16
1	93 (31.5)	77 (33.5)	16 (24.6)	
2–4	186 (63.1)	143 (62.2)	43 (66.2)	
≥5	16 (5.4)	10 (4.4)	6 (9.2)	
Religion				0.47
Apostolic	122 (41.4)	97 (42.2)	25 (38.5)	
Pentecostal	56 (19.0)	40 (17.4)	16 (24.6)	
Christian, Roman Catholic	27 (9.2)	19 (8.3)	8 (12.3)	
Christian, all other denominations	76 (25.8)	64 (27.8)	12 (18.5)	
Muslim	2 (0.7)	1 (0.4)	1 (1.5)	
None/other	11 (3.7)	8 (3.4)	3 (4.6)	
HIV status				0.53
Positive	56 (19.2)	41 (18.1)	15 (23.1)	
Negative	222 (76.3)	174 (77.0)	48 (73.9)	
Unknown	13 (4.5)	11 (4.9)	2 (3.1)	
Household size	5.2 ± 2.4	5.2 ± 2.5	5.1 ± 1.9	0.79
Infant age, *mo*	3.0 ± 1.7	3.4 ± 1.6	1.8 ± 1.6	<0.01

[1] Values are means ± SDs or n (%) unless noted otherwise. Data are missing for maternal age (1 woman, non-EBF), maternal education (4 women, non-EBF), religion (1 woman, non-EBF), and HIV status (4 women, non-EBF). EBF, exclusively breast-fed (infant fed only breast milk, prescribed medicines, and oral rehydration solution since birth); Non-EBF, not exclusively breast-fed (infant fed non-breast milk foods or liquids at least once since birth).
[2] Based on the ANOVA (t test) for means and χ^2 ordinal/categorical data.

infants aged 1 to <2 mo, 2 to <5 mo, and 5 to <6 mo, respectively. In addition to being younger, EBF infants tended to have older and less educated mothers compared with MBF infants. Other characteristics were similar across the 2 breastfeeding mode groups.

EBF knowledge. Among the surveyed women, 54% knew the meaning of "exclusive breastfeeding" or "EBF," and this knowledge was positively associated with EBF practice (P = 0.0001). A higher proportion of EBF mothers compared with MBF mothers were able to state at least 1 of the 4 components of the EBF definition message (72% vs. 49%). The proportion of mothers stating each of the 4 components of the EBF definition was the following: breast milk only (39%), EBF from birth to 6 mo (39%), feeding nothing but breast milk (21%), and providing breast milk on demand (13%).

A higher proportion of EBF compared with MBF mothers was able to state at least 1 EBF benefit (85% vs. 67%), and the EBF benefit score was positively associated with EBF practice (P = 0.012). The majority of mothers (84%) stated that EBF for the first 6 mo is good for infants, although 25% of these mentioned it is good only for certain infants. The proportion of mothers stating each of the 4 EBF benefits was the following: reduces illness (44%), provides enough energy for growth (39%), reduces risk of HIV transmission to infants (13%), and provides enough fluid (10%).

In bivariate analyses, both the EBF definition score and the EBF benefits score were strongly and positively associated with EBF (**Table 2**). Having correct knowledge regarding breastfeeding initiation and feeding frequency was not associated with EBF practice (Table 2).

Beliefs and attitudes. The exploratory factor analysis of beliefs and attitudes regarding infant feeding and maternal self-efficacy resulted in 4 factors: *1*) belief in the sufficiency of EBF, *2*) maternal self-efficacy regarding infant feeding and care, *3*) an enabling environment for EBF, and *4*) beliefs about cooking oil feeding in the first 6 mo (**Supplemental Table 1**). The odds of practicing EBF were higher in mothers who believed that EBF was sufficient in meeting infant needs and in mothers who did not believe in feeding cooking oil in the first 6 mo [1.15 (95% CI: 1.09, 1.22) and 1.62 (95% CI: 1.41, 1.86), respectively; P < 0.001]. The odds of EBF were marginally higher in mothers who believed they had an enabling environment to practice EBF (**Table 3**). There were no differences in maternal self-efficacy regarding infant feeding and care between the 2 feeding groups.

The exploratory factor analysis of beliefs and attitudes regarding social norms resulted in 5 factors: *1*) community expectations regarding infant feeding and traditional medicine, *2*) maternal autonomy regarding infant feeding decisions, *3*) expectations of partners, mothers, and mothers-in-law regarding infant feeding, *4*) perceived pressure regarding infant feeding and traditional medicine use, and *5*) health worker involvement in maternal infant feeding decisions (**Supplemental Table 2**). The odds of practicing EBF were significantly higher among mothers who did not perceive suboptimal infant feeding expectations from partners, mothers, and mothers-in-law (OR = 1.09; 95% CI: 1.03, 1.14; P < 0.01); who had higher autonomy (OR: 1.06; 95% CI: 1.00, 1.11; P < 0.05), and whose health worker was more involved with regard to infant feeding decisions (OR: 1.16; 95% CI: 1.00, 1.34; P < 0.05); there were no differences in perceived community expectation or pressure regarding infant feeding and traditional medicine use between the 2 feeding groups (Table 3).

Maternal capacity. We did not find variability in our sample regarding maternal workload and time allocation, and physical and mental health. The majority of surveyed mothers (90%)

TABLE 2 Exclusive breastfeeding knowledge according to breastfeeding practice[1]

Knowledge variable	Total (n = 295)	Breastfeeding practice group		P^2
		Non-EBF (n = 230)	EBF (n = 65)	
EBF definition score[3]				<0.01
0	135 (45.8)	117 (50.9)	18 (27.7)	
1	48 (16.3)	37 (16.1)	11 (16.9)	
2	60 (20.3)	46 (20.0)	14 (21.5)	
3	42 (14.2)	26 (11.3)	16 (24.6)	
4	10 (3.4)	4 (1.7)	6 (9.2)	
EBF benefits score[4]				0.01
0	86 (29.2)	76 (33.0)	10 (15.4)	
1	122 (41.4)	91 (39.6)	31 (47.7)	
2	66 (22.4)	48 (20.9)	18 (27.7)	
3	20 (6.8)	14 (6.1)	6 (9.2)	
4	1 (0.3)	1 (0.4)	0 (0.0)	
When to start breastfeeding[5]				0.75
Wrong	55 (18.6)	42 (18.3)	13 (20.0)	
Correct	240 (81.4)	188 (81.7)	52 (80.0)	
How often to breastfeed score[6]				0.51
0	122 (41.4)	98 (42.6)	24 (36.9)	
1	171 (58.0)	130 (56.5)	41 (63.1)	
2	2 (0.7)	2 (0.9)	0 (0.0)	

[1] Values are n (%). EBF, exclusively breast-fed (infant fed only breast milk, prescribed medicines, and oral rehydration solution since birth); Non-EBF, not exclusively breast-fed (infant fed non-breast milk foods or liquids at least once since birth).
[2] Based on χ^2 (Kruskal-Wallis with ties for ''EBF definition score'' and ''EBF benefits score'' and Pearson for ''When to start breastfeeding'' and ''How often to breastfeed score'').
[3] Summative score with 1 point issued for each of the following answers provided: breast milk only; birth to 6 mo; no water, juice, etc., nothing but breast milk; and breast milk on demand.
[4] Summative score with 1 point issued for each of the following answers provided: reduces illness; provides enough energy for growth; provides enough fluid; and reduces risk of HIV transmission to infants.
[5] Correct denotes a response of immediately or within the first hour. Wrong denotes any other response provided.
[6] Summative score with 1 point issued for each of the following answers provided: at least 10 times, and on demand.

indicated that they would prioritize breastfeeding their babies over demands from partners, other children, and other household members. Most mothers also reported that, since the birth of their baby, they have had normal or above normal levels of energy (80%) and never felt sick (75%). The majority of mothers also stated "never" experiencing breast complications including engorged breasts (86%), cracked nipples that bled (97%), and pain during breastfeeding (72%). According to the EPDS assessment tool, 7.5% (n = 22/295) and 4% (n = 12/295) of the mothers were depressed and had suicidal thoughts, respectively; these were not associated with EBF practice.

TABLE 3 Unadjusted ORs of beliefs and attitudes by EBF practice[1]

Variable	OR	95% CI	P
Infant feeding and maternal self-efficacy			
Factor 1: Belief in sufficiency of EBF	1.15	1.09, 1.22	<0.01
Factor 2: Maternal self-efficacy regarding infant feeding and care	0.99	0.91, 1.08	0.87
Factor 3: Enabling environment for EBF	1.11	1.00, 1.22	0.05
Factor 4: Beliefs about cooking oil use in the first 6 mo	1.62	1.41, 1.86	<0.01
Social norms			
Factor 1: Community expectations regarding infant feeding and traditional medicine	1.02	0.98, 1.06	0.41
Factor 2: Maternal autonomy regarding infant feeding decisions	1.06	1.00, 1.11	0.04
Factor 3: Expectations of partners, mothers, and mothers-in-law regarding infant feeding	1.09	1.03, 1.14	0.02
Factor 4: Perceived pressure regarding infant feeding and traditional medicine use	0.98	0.92, 1.05	0.64
Factor 5: Health worker involvement in maternal infant feeding decisions	1.16	1.00, 1.34	0.04

[1] EBF, exclusive breastfeeding.

Multivariate analyses. In multivariate analysis (**Table 4**), the adjusted odds of exclusively breastfeeding were 2.16 (95% CI: 1.40, 3.31; P < 0.001) times higher in mothers who reported stronger beliefs and attitudes about avoiding the use of cooking oil in the first 6 mo, and 1.23 (95% CI: 1.01, 1.50; P = 0.04) times higher among those who reported believing EBF provided sufficient nutrition for their infants during the first 6 mo of life. Contrary to expectation, the odds of EBF were lower in mothers who did not perceive pressure from others regarding infant feeding and traditional medicine use (OR: 0.85; 95% CI: 0.73, 0.99; P < 0.04). In adjusted analyses, no differences were detected in the knowledge variables or other belief and attitude constructs between the 2 feeding groups.

Facilitators of EBF. Among the 65 mothers practicing EBF, the most common reasons they reported for their choice were "information from health workers" (41%), "taught to EBF" (19%), and "breast milk is good enough" (12%). Fewer than 10% of mothers reported that "baby is too young for non-breast milk foods," "baby's intestines are too immature," or "EBF prevents transmission of HIV to the baby."

TABLE 4 Multivariate model to predict EBF[1]

Variable	OR	95% CI	*P*
Demographic characteristics			
Maternal age (y)	1.00	0.89, 1.13	0.95
Maternal education (y)	0.79	0.52, 1.19	0.26
Infant age (mo)	0.44	0.27, 0.73	<0.01
Knowledge variables			
EBF definition score	0.99	0.57, 1.72	0.96
EBF benefits score	0.70	0.27, 1.82	0.46
Beliefs and attitudes regarding infant feeding and maternal self-efficacy[2]			
Belief in sufficiency of EBF	1.23	1.01, 1.50	0.04
Maternal self-efficacy regarding infant feeding and care	0.84	0.66, 1.08	0.18
Beliefs about cooking oil use in the first 6 mo	2.16	1.40, 3.31	<0.01
Beliefs and attitudes regarding social norms[2]			
Maternal autonomy regarding infant feeding decisions	0.98	0.87, 1.10	0.76
Expectations of partners, mothers, and mothers-in-law regarding infant feeding	1.01	0.91, 1.11	0.88
Perceived pressure regarding infant feeding and traditional medicine use	0.85	0.73, 0.99	0.04

[1] EBF, exclusive breastfeeding.
[2] Summative scores of 5-point Likert statements that loaded in exploratory factor analysis.

Psychosocial support from health workers/system (28%), family members (15%), or other unspecified people (13%) was the primary facilitator of EBF reported by mothers. Other significant contributing facilitators of EBF practice included "baby seems healthy or satisfied" (19%) and "maternal self-confidence" (16%). The majority of mothers (79%) reported they had no difficulty practicing EBF, although 10% reported family/social pressure to feed non-breast milk foods/liquids.

Interruption of EBF. Of the 229 MBF infants, 144 (62.9%) were administered their first non-breast milk food during the first month of life, and 37 (16.2%), 23 (10.0%), 11 (4.8%), 3 (1.3%), and 11 (4.8%) during the second, third, fourth, fifth, and unknown month of life, respectively (**Supplemental Tables 3** and **4**).

The reasons mothers gave for this first non-breast milk feeding fell into 3 broad categories.

Of the 229 MBF infants, 167 (72.9%) were administered their first non-breast milk feeding for protection from or treatment of a perceived illness associated with early infancy ["nhova" (fontanel issues associated with perceived metaphysical reasons), "ruzoka" (colic or stomach problems), or other illness]. All of these "protection feedings" were 1 of 3 foods: cooking oil (81.4%), water (10.8%), or traditional medicine (7.8%). The decision to give protection feedings was influenced by the mother herself (43.1%), her mother or mother-in-law (26.9%), the church (13.2%), health workers (4.2%), her husband (2.4%), and other family and community members (9.0%).

For 24 (10.5%) MBF infants, mothers reported giving the first non-breast milk feeding to provide nutrition (baby was thirsty, not breastfeeding, or hungry). "Nutrition feedings" included water (50.0%), porridge (45.8%), and yogurt (4.2%). The decision to give foods for nutrition purposes was influenced by the mother herself (54.2%), her mother or mother-in-law (29.2%), her husband (8.3%), and other family members (8.3%). The remaining 17 (7.4%) MBF infants were administered their first non-breast milk food because they were crying. "Crying feedings" included cooking oil (35.3%), porridge (29.4%), water (17.6%), vegetables (5.9%), fruit (5.9%), and yogurt (5.9%). The decision was influenced by the mother herself (58.8%), her mother or mother-in-law (11.8%), her husband (5.9%), other family member (5.9%), and the church (5.9%). Twenty-one of the first feedings did not fall into the protection, nutrition, or crying categories.

Following the first non-breast milk feeding, the 229 MBF mothers reported 351 subsequent feedings. Once EBF had been interrupted, the reasons subsequent non-breast milk feedings were given during the first 6 mo of life were the following: 23.6% for protection, 28.2% for nutrition, 17.9% for crying, and 30.2% for other reasons. The decision to give subsequent feedings was influenced by the mother herself (57.8%), her mother or mother-in-law (24.5%), her husband (4.0%), the church (1.1%), the clinic (1.4%), and other family and community members (10.3%).

Discussion

In this study of 295 women breastfeeding infants under 6 mo of age, the large majority were not practicing EBF. The primary reason for first EBF interruption was to provide protection from or treatment of a perceived illness associated with early infancy. "Protection feedings" were usually not interpreted by mothers as interrupting EBF because they were perceived as a remedy rather than food. Importantly, "protection feedings" made up 78.5% of the non-breast milk feedings during the first 2 mo of life when the infant's gut is most vulnerable and the immune system least developed. Moreover, infant feeding data from previous work (5) has indicated that the provision of cooking oil is not a onetime event; in that study, 11% of mothers reported feeding cooking oil in the last week at 2 different data collection points during the first 6 mo of life.

"Nutrition feedings" made up only 11% of first non-breast milk feedings but made up 28% of subsequent feedings. These were given when mothers believed their breast milk was insufficient in quantity or quality to meet the hunger or thirst needs of their infants. This misconception of breast milk insufficiency was widely reported and is commonly addressed in EBF promotion interventions (4,12–18). Once EBF had been interrupted by the first non-breast milk food, concerns about breast milk sufficiency (i.e., "nutrition feedings") became the most important barrier to EBF.

Our findings suggest that the mother herself is the main decision maker for first non-breast milk feedings, followed by her mother or mother-in-law. Husbands, church leaders/members, other family members, and community members were less commonly reported as influencing the decision to feed non-breast milk foods. This finding seems contrary to earlier focus group findings in which men and women said husbands were the primary decision makers about infant feeding (2). However, these differences may mean that husbands primarily influence the decision of whether to breastfeed and for how long to continue, whereas mothers themselves primarily influence breastfeeding mode or exclusivity.

Thus, non-breast milk feedings given during the first couple months of infancy were given to protect the very young infant from illness, whereas most of those given beginning in the third month of life were given to augment the infant's nutrition because of concerns about breast milk sufficiency. This suggests that EBF interventions must address these 2 distinct paradigms to optimize effectiveness. To our knowledge, this observation has not been translated into EBF promotion interventions.

Addressing the first barrier, concerns about fontanels and stomach problems, requires specific messages regarding the normality of an open fontanel, the cause and treatment of a sunken fontanel, and effective methods of comforting a colicky baby. In designing these messages, interventionists should strive to evoke the strong maternal value of nurture, e.g., by highlighting the protective properties of breast milk and the adverse properties of even small amounts of non-breast milk foods. Addressing the second barrier, concerns about breast milk sufficiency, should include advising the mother to breastfeed frequently to ensure adequate quantity and to eat and drink well herself to ensure adequate quality. Thus, programs in which health workers deliver a series of messages to mothers over the prenatal and postnatal periods, addressing barriers at relevant times, may be most effective. Moreover, receiving infant feeding information and psychosocial support from health workers was a primary facilitator of EBF in our study.

Knowledge about the definition and benefits of EBF did not differ between mothers that exclusively breast-fed and those that did not after controlling for other explanatory variables, suggesting that simply increasing knowledge through educational interventions may not be sufficient in increasing EBF rates, which is consistent with other studies (13,19). Rather, knowledge is a requisite antecedent to other behavioral outcomes, such as the belief in health benefits and the trial and adoption of behaviors.

The negative association between EBF practice and lower perceived pressure regarding infant feeding and traditional medicine use may be due to reverse causality if mothers who practice EBF (i.e., mothers who are deviating from the normative feeding practice) feel pressured to give cooking oil to protect young infants from perceived illness and to give porridge to 3- to 4-mo-old infants because breast milk is no longer sufficient. Conversely, mothers practicing MBF do not feel pressured by the same advice because it is consistent with their feeding practice.

The prevalence of depression in our sample was lower than expected. Chibanda et al. (9) found a prevalence of 33% among peri-urban postnatal women in Zimbabwe by using the *Diagnostic and Statistical Manual of Mental Disorders, 4th edition*, criteria for clinical depression—the gold standard they used to validate the EPDS in Zimbabwe. Three reasons for the low depression prevalence may include the following: *1*) the absence of peri-urban factors that are not relevant to our rural setting, *2*) the administration of the EPDS by data enumerators, which may have caused mothers to be uncomfortable disclosing their anxiety and depressive symptoms, and *3*) selection bias due to the lower prevalence of depression among women accessing immunization services.

Our study has some limitations. First, the low prevalence of EBF among the sample compromises the statistical power to observe other potential determinants of EBF in this population, particularly ones that were highlighted in our bivariate analyses. Second, we did not collect data on infant gender, so we are unable to make inferences regarding differences in infant practice by gender. Third, our sample comprised women accessing immunization services, who may not be representative of the larger community. Although immunization coverage for vaccines delivered between birth and 5 mo is fairly high in Zimbabwe, ranging from 72.9 to 86.9%, the mothers of infants not reached may have lower maternal education and wealth. Thus, our sample may have been slightly biased toward more educated and wealthier respondents (1).

Despite these limitations, our study highlights 2 distinct barriers to EBF in the rural Zimbabwean context: *1*) a prevalent conviction that non-breast milk foods will prevent or treat perceived illnesses in neonates and young infants, and *2*) a common belief that breast milk alone is insufficient to meet the nutritional requirements of infants throughout the first 6 mo of life. These observations provide a framework for interventions that may be more effective than previous programs in increasing EBF rates in Zimbabwe. Finally, our work highlights the utility of scrutinizing and incorporating relevant cultural beliefs and practices into behavior change communication.

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