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The acceptance and feasibility of replacement feeding at 6 months as an HIV prevention method in Lilongwe, Malawi: Results from the BAN Study

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Abstract

International guidelines recommend exclusive breastfeeding to 6 months among HIV-infected mothers choosing to breastfeed and cessation thereafter if replacement feeding is acceptable, feasible, affordable, sustainable and safe. When mothers wean they are challenged to provide an adequate replacement diet. This study investigates the use and acceptability of a lipid-based nutrient supplement (LNS) as a breastmilk substitute when provided to infants (6-12mo) of HIV-positive mothers, as part of the Breastfeeding, Antiretroviral, and Nutrition (BAN) Study. A sub-sample of mothers (n=45) participated in interviews that explored exclusive breastfeeding, weaning, and strategies to feed LNS. Mothers reported several weaning strategies, including gradual reduction of breastfeeding, expressing breastmilk into a cup, and separation of mother and child. LNS, a peanut-based micronutrient fortified paste, was highly accepted and incorporated into the traditional diet. Weaning is a feasible HIV prevention method among this population in Malawi when supported by the provision of LNS as a breastmilk substitute.

Keywords

HIV; infant feeding; breastfeeding; weaning; LNS

Introduction

Mother-to-child transmission (MTCT) of HIV through breastmilk presents challenges and difficult decisions for HIV positive mothers in resource-poor settings (Piwoz & Bentley, 2005). The risks associated with not breastfeeding include infections that result from the contamination of replacement foods or the use of fluids or foods that are inadequate to

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support growth and development. At the time of this study, the WHO HIV and infant feeding guidelines recommended exclusive breastfeeding to 6 months, introducing complementary foods at 6 months, limiting the duration of mixed feeding, and cessation of breastfeeding once a nutritionally adequate, *affordable, feasible, acceptable, sustainable and safe* (AFASS) replacement diet could be provided (WHO, 2006). Recent revisions to the guidelines recommend the provision of antiretroviral drugs during pregnancy and breastfeeding, continued breastfeeding to 12 months, and gradual cessation over the duration of 1 month (WHO, 2009). The guidelines still suggest that breastfeeding cessation should only occur once a nutritionally adequate and safe diet can be provided. The HIV and infant feeding guidelines conflict with infant feeding patterns in many countries, such as Malawi, where complementary feeding typically begins at 2 months of age and continued breastfeeding to 2 years is the norm (NSO, 2005; Vaahtera et al. 2001; Corneli et al., 2007). Maternal and cultural acceptance of the WHO HIV and infant feeding guidelines is crucial for implementation and adherence.

The data for this study were collected from a sample of HIV-infected mothers who participated in the Breastfeeding, Antiretroviral, and Nutrition (BAN) Study, a postnatal HIV transmission intervention designed to evaluate the efficacy of antiretroviral therapy beyond 6 weeks in a breastfeeding population (van der Horst et al., 2009; Chasela et al., 2010). BAN Study participants were counseled to exclusively breastfeed their infants from 0-6 months, perform rapid breastfeeding cessation at 6 months, and feed a lipid-based nutrient supplement [LNS] provided to 12 months. This energy-dense, micronutrient fortified supplement was produced locally from full-cream powdered milk, peanut butter, sugar, oil, and micronutrients and procured from one of several local producers. LNS was provided by the BAN Study to all infants to reduce the risk of malnutrition following early cessation (van der Horst et al., 2009). The supplement was designed to fulfill infant micronutrient requirements and replace the energy (400kcal) and protein (9.5g) that would have been provided by breastmilk (van der Horst et al., 2009). LNS is bacteria resistant, does not require water for preparation, and can be consumed directly from the container without cooking, making its use safe even in poor hygienic conditions (Briend, 2002).

Although a decade of research has proven this class of supplements to effectively rehabilitate severe acute malnutrition in children, and more recently moderate malnutrition (Ciliberto et al., 2005; Diop, Dossou, Ndour, Briend, & Wade, 2003; Manary, Ndkeha, Ashorn, Maleta, & Briend, 2004; Matilsky, Maleta, Castleman, & Manary, 2009; Sandige, Ndekha, Briend, Ashorn, & Manary, 2004; Phuka et al., 2008; Adu-Afarwuah et al., 2007; Kuusipalo, Maleta, Briend, Manary, & Ashorn, 2006), little is known about its acceptance and use as a breastmilk substitute among HIV-positive mothers performing early breastfeeding cessation. Previous studies among mothers of unknown HIV status in Ghana and Malawi reported LNS was well accepted by mothers and infants in terms of ease of use and palatability, value as a food, and perceived benefit to infant's health (Adu-Afarwuah et al., 2008; Flax et al., 2009). Since mothers are primarily responsible for infant feeding in Malawi, their attitudes and beliefs regarding exclusive breastfeeding, early breastfeeding cessation, and LNS need to be understood in order to effectively design interventions that promote the HIV and infant feeding guidelines among low-income families in this social and cultural setting (Corneli et al., 2007; Flax et al., 2009).

This study aims to assess the feasibility of EBF, early weaning, and use of LNS as a replacement food among HIV positive mothers to inform future guideline implementation, thereby increasing adherence and reducing pediatric HIV infection.

Methods

The BAN Study Intervention

The BAN Study began in 2004 as a randomized clinical trial of an antiretroviral and nutritional intervention among breastfeeding HIV-positive mothers with CD4+ cell counts >250/mm^3 and their infants (van der Horst et al., 2009). Pregnant HIV-positive mothers were recruited from 3 urban antenatal clinics servicing low-income populations. Mothers received 200mg of nevirapine (NVP) during labor, infants received 2mg/kg of NVP within 72 hours after delivery, both mother and infant received antiretroviral therapy for the first 7 days postpartum. The primary objectives of the BAN Study included evaluating: 1) the benefit of a nutrition supplement given to mothers during breastfeeding; 2) the benefit and safety of antiretroviral medications given to either infants or their mothers to prevent HIV transmission during breastfeeding; and 3) the feasibility of exclusive breastfeeding followed by early, rapid breastfeeding cessation (van der Horst et al., 2009).

HIV-infected mothers enrolled in the BAN Study were counseled to exclusively breastfeed for 24 weeks postpartum and to stop breastfeeding within an additional four weeks. Starting at week 21, mothers with HIV-negative infants were counseled to prepare for weaning using the following strategies: 1) Patiently teach your baby to drink from a cup by practicing cup feeding with expressed milk in-between breastfeeds; 2) Gradually reduce breastfeeding frequency, by lengthening time interval between feeds, at around 5 months; 3) Set routines to help the baby learn the difference between day and night, by breastfeeding your baby late at night and reducing the number of night feedings by using other methods to soothe the child back to sleep. All BAN Study nurses were Malawian, licensed to practice in the country, and received extensive training from the CDC specific to this HIV intervention. Mothers received HIV and infant feeding counseling from nurses during both group and individual sessions. BAN Study nurses were therefore able to tailor the counseling messages mothers received to previous experiences weaning children. Consistent counseling sessions offered social support by enabling mothers and nurses to develop rapport, providing mothers with a knowledgeable contact, and creating a venue in which participants could forge relationships with each other (Ferguson et al., 2009).

At week 24, BAN Study nurses began to teach mothers how to feed their child an adequate diet without breastmilk. The topics covered included: appropriate age for each food introduction, food amounts, nutrient density and variety, feeding frequency, food safety, feeding during illness, responsive feeding, and how to incorporate LNS into the diet. This information was reiterated at weeks 28, 32, 42, and 48. LNS was distributed to mothers by the BAN Study every fortnight at the clinic with instructions to feed the infant a daily ration of ~75 grams (400kcals, 9.5g protein). Mothers were given a small jar to help measure the recommended daily dose. BAN Study participants were not provided with a source of clean water but instead were advised to boil water daily and serve the child that water after every LNS feed due to its high caloric density.

Overview of the Feasibility Study

Sample selection and location—Participants were eligible for this study if they were HIV-infected women, had completed the BAN Study to 12 months, lived in Lilongwe, and had an infant 15-16 months of age. As only infant feeding behaviors were investigated in this sub-study, infant HIV status was not considered. Recruitment of the sample for this sub-study took place at the same three clinics as for the BAN Study. Women were recruited in one of the following ways: at the BAN clinic following the exit interview; at a catchment clinic following HIV+ support group meetings or healthy baby clinic visits; or using home locator maps left on file for future research at the BAN Study. Forty-five HIV-positive

mothers participated in the semi-structured interviews between April and December 2008. Interviews were conducted by two trained Malawians in Chichewa within a private office at Bwaila Hospital. The interviews were audio-recorded and transcribed into Chichewa then translated into English text. Remuneration included 600MK ($4) for transport and 1kg fortified corn-soya blended flour.

Background questionnaire—The Malawian interviewers administered a background survey completed by each mother to collect data on age, marital status, education and occupation of both parents, number of household members, household socio-economic indicators, and food availability.

Research Questions & Interview Questionnaire—The interview guide was developed based on the socio-ecological model, which recognizes that human environments are multi-dimensional, resulting from the complex interplay between individual, interpersonal, institutional, community, and social policy factors (Bronfenbrenner, 1977; McLeroy, Bibeau, Steckler, & Glanz, 1988; Bentley et al., 1991). The core research questions around which the interview guide was built are listed in Table 1. Ethical approval for this study was obtained from the institutional review boards at the U.S. Centers for Disease Control and Prevention, the University of North Carolina at Chapel Hill, and the National Health Science Research Committee in Malawi. Most importantly, participants in the original BAN Study had signed a consent form to be contacted after the study was completed.

Data Analysis

Transcripts were coded using MAXQDA 2007. Descriptive summaries were written immediately following each interview to capture concepts and emergent themes. Qualitative findings were summarized within four days of data collection to ensure topics needing further exploration were incorporated into the fieldwork. Data display matrices (Miles & Huberman, 1994) were created following themes to conceptualize and compare responses between mothers. The first author and 2 interviewers developed the coding scheme, which consisted of 13 themes, and 93 deductive and inductive codes. For each topic, quotes were extracted from the transcripts to identify themes and mother's response patterns. Data reduction methods helped identify natural groupings within the sample (e.g. food security status, household head).

Results

Demographics

Of the 45 mothers interviewed, 35 lived with their husband, 4 lived with extended family, and 6 supported children on their own. While most married women did not have paid employment, mothers in female-headed households earned money selling goods in the market. Nearly all mothers had some primary school education but only 20% had completed secondary school. Less than 20% were first time mothers and thus most had previous infant feeding experience. Only 22% had electricity and 18% had access to piped water at their homestead. Selected socioeconomic and demographic characteristics of the sample are shown in Table 2.

Exclusive Breastfeeding

When mothers were asked to define exclusive breastfeeding they explained it as 'breastfeeding frequently', which is consistent with the Chichewa translation for exclusive breastfeeding. Upon further probing, nearly every mother described the correct protocol.

The following excerpts highlight mothers' understanding of the EBF protocol and its purpose.

- "They told me that exclusive breastfeeding means that the baby not be given any type of foods. So it required breastfeeding the child as frequent as possible so that he does not get hungry at any other moment."

  (Married mother, 27yrs old)

- "Up to the sixth [month] you don't give water or food because when you give food with breastmilk the baby gets the virus because the baby's intestines are not mature and they can be scratched with the food and have sores inside. So when you feed your baby, the virus can get in."

  (Married mother, 30 yrs old)

All mothers in the sample, with the exception of one, reported following the EBF protocol. This mother worked far from home to support 7 children so the infant began mixed feeding at 2 months. Adherence, however, was challenging for women who had family members visiting the household, concerned friends, or who left the child with another caregiver for short periods of time. Among our sample of mothers, 6 (13%) were advised to feed porridge before 6 months by grandmothers, and 10 (22%) by sisters or acquaintances. Mothers were able to maintain EBF by restating the nurse's advice or lying about feeding a mixed diet.

- "They (relatives) were saying it's better you should be giving your baby foods… So I was just saying "Ah, I will make porridge when I get home" … but it wasn't that I will make the porridge because I knew the truth."

  (Married mother, 23 yrs)

- "[My friends] they were asking 'Why are you not giving this child food? How about porridge?' I was telling them that 'No, he's not old enough. I will start feeding him after 6 months'. So they were saying 'No. you need to be giving him porridge to eat because in the breast he will not find anything and it only contains a little bit of milk'."

  (Married mother, 21 yrs old)

Early breastfeeding cessation

Adherence to the counseling guidelines for weaning was high when infants were 6-7 months of age: 23 mothers (51%) achieved complete breastfeeding cessation within 2 weeks, 17 mothers (38%) took 4 weeks to complete the process, and 3 mothers (7%) took approximately 6 weeks. Approximately 89% of mothers performed rapid weaning within the recommended 4 week time period and 91% completed cessation by 28 weeks. The quotes below illustrate their motivations for performing rapid weaning.

- "[The nurse] said that when the child reaches the age of 7 months… he will have started teething, right? So the child may start biting you when breastfeeding, and may get the HIV so it's important that when he reaches 6 months, he should stop breastfeeding."

  (Widowed mother, 29 yrs old)

- "Ee! I was just thinking that my baby would get infected. I was just feeling pity for my baby. It's an injustice for him to get infected with such a virus, an innocent child."

  (Married mother, 30yrs old)

Mothers credited their ability to perform early weaning to the knowledge and skills they learned from counseling sessions; the social support received from the BAN Study nurses and fellow participants; and the provision of a breastmilk substitute. The following quote highlights a mother's attitudes and experiences with the weaning process.

- "I was happy about [getting this advice] because at first I was ignorant about it. Because otherwise I could have just abruptly stopped him without knowing how to do it well. But for them to give us that advice, it meant that the child should slowly stop."

  (Married mother, 30yrs old)

BAN Study nurses provided mothers with strong support and empowered them to think of HIV/AIDS not as a death sentence but rather as a challenge. In this quote, a mother repeats what the nurse had said to her during enrollment:

- "Don't be worried because most of the people, even us the doctors, we have this problem – this problem like yours - so you don't have to be worried by saying that you are going to die today. But the most important thing is that you've come here for the first month so that you can start the antenatal care in order to protect the baby, the one you are expecting."

  (Married mother, 41yrs old)

Throughout the interviews mothers consistently expressed their positive perceptions of LNS, the breastmilk substitute, stating that it tasted great and promoted infant health.

- "Ah! I used to see the chiponde [LNS] as good food for the child. When I gave him the chiponde he used to like it and you could see that his body also is becoming healthier and more energetic. And actually I was wondering is it the chiponde that is making my child to grow like this? And then I knew that there is indeed a lot of good nutrients in chiponde - especially those that give energy."

  (Married mother, 26yrs old)

The main perceived barrier to performing early cessation was household food insecurity and the fear of causing malnutrition. Most mothers expressed concerns about having enough money to provide an adequate diet, child weight loss, and the child's age. Although mothers had fears and their attitudes towards cessation oscillated, they still believed they should follow the hospital's advice.

- "I was worried because I was stopping him while he was still very young, because I normally stop breastfeeding my children when they have reached 2 years, but this one, I stopped too early. Although I was worried, I had no choice, because if I continued breastfeeding then I was doing harm to the child."

  (Single mother, 33yrs old)

Four women did not disclose their HIV status to their husband at the start of the BAN Study for fear of marital problems. Two of these mothers felt compelled to disclose their HIV status at the time of early cessation in order to ensure they could purchase sufficient replacement feeds using the husband's income. Failure to disclose HIV status by 6 months created challenges for the remaining two mothers, but these challenges were not substantial enough to prevent adherence to the early cessation guidelines. These quotes highlight the issues they encountered:

- "So at night the breasts were swollen and my husband was like 'why is the baby just crying' and 'why are you not breastfeeding him' and I said 'he is

not sucking', but I was doing that for him not to see that I don't want to breastfeed the baby."

(Married mother, 30 yrs old)

- "[My ex-husband] hated that I should stop the baby from breastfeeding … when I told him that he should buy milk he was refusing…"

(Single mother, 22 yrs old)

Three mothers admitted that they did not follow the early cessation protocol. One mother was advised by the BAN Study to continue breastfeeding because her child contracted HIV before 6 months and two mothers explained that they were too poor to provide an adequate diet.

- "When I told the father of the child that I am supposed to stop breastfeeding the child by the 6th month, he also used to refuse. He said '*No, don't stop breastfeeding him at that age. Do you want him to lose weight or what? Where are you going to get the food for him when you stop breastfeeding him?*' So I stopped breastfeeding him when he was 12 months old … and actually they criticized me here at BAN to say 'Why have you not stopped breastfeeding him yet?' "

(Mother, 42yrs old, 7 children, earns $3.50/wk)

Weaning Techniques—Most mothers reported using two or more of the weaning strategies suggested by the BAN Study. Most reduced the number of breastfeeding episodes per day and had the child drink expressed breast milk out of a cup or bottle. Additional strategies reported by mothers included leaving the child with an alternate caregiver (10); abrupt cessation (9); sleeping clothed to cover breasts (4); finding ways to soothe the child back to sleep (7); bringing food to bed (6); serving melted/diluted LNS in a baby bottle (5); supplementing with porridge (11), milk or infant formula (18); juices, tea, water, and yoghurt (8); and bananas (3). Mothers reported a wide range of effective strategies:

- "So I made up my mind that he would stop breastfeeding completely. I decided to go to sleep with my clothes on so that he does not get any chance to breastfeed. During the next day I did not even breastfeed him but instead I went to the shops…"

(Married mother, 31 yrs old)

- "I stopped on the 7th month because he was difficult. On that day I took him to my mother's [house], and he slept with her. I just prepared bottled milk so that he drinks later on. The next day my mother told me not to take him [so that he gets used to it]."

(Married mother, 19 yrs old)

- "To wean my child I had to use a [baby] bottle which I bought from the shops… And they gave us chiponde [LNS] … So I took the chiponde and melted it in a cup. And then I used boiled water to mix the chiponde well [water + chiponde] and poured the contents into the bottle. So I could use the cooled chiponde to feed the child whenever he starts crying."

(Divorced mother, 31 yrs old)

Weaning Problems—Some mothers described problems when trying to rapidly transition their baby off the breast and onto semi-solid foods. Typical infant reactions to the rapid weaning process are explained in these excerpts:

- "At first he used to refuse the drinking from the bottle, but then he could cry a lot. After about 3 days he started getting used to it."

  (Married mother, 26 yrs old)

- "He was difficult. I tried to give him porridge although he used to refuse it since he was eating this for the first time – he was used to the breast. So those were the problems. He could cry refusing the food that was being given to him. But I used to force him until he eats it."

  (Married mother, 26 yrs old)

Stigma of Early Breastfeeding Cessation—The recent implementation of PMTCT trials in resource-poor areas has increased public awareness in Malawi of the HIV and infant feeding guidelines and attached HIV-stigma to early breastfeeding cessation (Piwoz & Bentley, 2005). Half of the mothers in this sample believed that friends and neighbors had become suspicious of their HIV status due to early cessation. Nearly 1/3 of the sample believed they were the victim of back-biting or discrimination because they followed the HIV infant feeding guidelines; examples included being gossiped about, neighbors falling silent in their presence, and 2 reported friends not wanting to touch their belongings for fear of infection. A third of the sample contended with neighbors' comments and peer-pressure to resume breastfeeding. A quarter of the women reported successfully deflecting stigma using confident speech and a variety of explanations including the following:

- "I say, 'like nowadays he will be breastfeeding in the evenings only while it's not true… I just say 'Ah, he only breastfeeds in the evening [because] when he breastfeeds very much I might lose weight'."

  (Married mother, 23 yrs old)

- "…they also used to ask why I stopped breastfeeding my child, so I told them that it is because my child was very sick at a certain time and from that time on she has been refusing to breastfeed."

  (Divorced mother, 31 yrs old)

- "They say that 'How can I stop breastfeeding a child who is so young'. So I could tell them that 'It's because I would like to start work – so I will be leaving the child with my mother'".

  (Married mother, 19 yrs old)

Lipid-based nutrient supplements

Acceptance of LNS—Maternal attitudes and beliefs towards LNS were very positive. Mothers believed LNS was good for their child's health (84%), tasted sweet and the child liked eating it (75%), increased the child's appetite (38%), helped maintain child health without breastmilk (56%), promoted weight gain (53%), improved the child's health (31%), and gave the child energy (29%). Our interviews revealed that most mothers attributed their infant's good health after breastfeeding cessation to LNS consumption.

- "(His weight) was increasing every month…because of the supplement that I put in his porridge. The chiponde [LNS] must have good nutrients that we could not afford to provide without it… With good appetite, he could even finish the whole plate of porridge - because it was sweet."

  (Married mother, 30 yrs old)

Mothers felt safe feeding LNS to their child as a breast milk substitute because they knew it contained substantial nutrition.

- "Because I think all the nutrients that are in chiponde [LNS] are also available in the breast milk - so it is like an equivalent to breast milk."

  (Married mother, 30 yrs old)

- "E! I don't know what they put in the chiponde [LNS], but I understand there is everything that is required for growth of a child."

  (Married mother, 32 yrs old)

Among the 45 mothers interviewed, only 2 encountered HIV-stigma related to LNS. However, these mothers believed such comments were only voiced because suspicions had previously formed regarding their HIV status. The 2 mothers did not let such comments deeply affect them and were able to deflect stigma by acting like they did not care what others thought.

- "When they were chatting they were saying like 'That one- that one has got the virus' talking about me, my neighbors. They were like, when they see the LNS, 'This food is for AIDS people'. So I wasn't saying anything. I was just staying and doing my own things. They talked and talked until they get tired."

  (Married mother, 35yrs old)

LNS introduction at 6-7 months—LNS was first introduced to the infant diet between 24 and 28 weeks. Eight (18%) of the mothers reported that their babies had side-effects such as diarrhea or vomiting, and 1 experienced constipation. Only 1 infant experienced persistent vomiting and diarrhea; this mother temporarily switched to formula and reintroduced LNS later using smaller amounts and it was tolerated when mixed with porridge.

Incorporating LNS into family foods—The traditional infant diet includes maize porridge, nsima (a thicker, more starchy version of maize porridge), & vegetable relish, meat or fish broths, fruits, and sugary juices. Most mothers listed 2 different ways they incorporated LNS into the infant diet; these methods included serving it in the staple maize porridge (100%) or cold on a spoon (53%). A third of mothers served LNS warm and diluted with water in a baby bottle (27%). Less commonly, LNS was also served as a spread on bread (9%); mixed into nsima (2%); and mixed with milk or juice (4%). Almost all infants enjoyed eating LNS mixed into hot porridge; nearly half the mothers explained their child developed cravings for the sweet LNS and would cry for it.

- "I used to give chiponde [LNS] by mixing it with porridge…Yes. She used to like it a lot - up to the point that when I finish feeding the child using the (baby) bottle and put it somewhere she could cry and crawl towards it to get it herself."

  (Married mother, 30 yrs old)

Nearly half refused to eat cold LNS on a spoon or finger straight out of the jar.

- "He was refusing to eat the LNS alone and when I offered it to him alone he reached the point that he could vomit. So to avoid those problems, I was just mixing it with porridge only."

  (Married mother, 28 yrs old)

Discussion

The aim of this study was to investigate the acceptance and feasibility of the WHO HIV and infant feeding guidelines and the acceptance of LNS as a breastmilk substitute among low-income, HIV-infected mothers living in a resource-poor setting. Exclusive breastfeeding was accepted and feasible as demonstrated by the high adherence rate. Early breastfeeding cessation was challenging due to maternal fears, household food insecurity and social stigma. Mothers learned to accept early weaning as an HIV prevention strategy with consistent counseling and support. The variety of weaning techniques learned during infant feeding counseling sessions made this strategy feasible. LNS was highly accepted as a breastmilk substitute and easily incorporated into the traditional infant diet without stigma.

In contrast to other studies in Malawi and elsewhere in sub-Saharan Africa (de Paoli, Manongi, Helsing, & Klepp, 2001; Sibeko, Dhansay, Charlton, Johns, & Gray-Donald, 2005; Shirima, Gebre-Medhin, & Greiner, 2001; Kerr, Berti, & Chirwa, 2007; Kamudoni, Maleta, Shi, de Paoli, & Holmboe-Ottesen, 2010; NSO, 2005; Vaahtera et al., 2001), which found that exclusive breastfeeding during the first six months was not commonly practiced, nearly all mothers (98%) in the present study reported adherence to the BAN Study exclusive breastfeeding protocol. This finding was confirmed when we examined the entire BAN sample of 2,369 mothers (Chasela et al., 2010). The self-reported frequency of exclusive breastfeeding at 21 weeks post-partum was 97% on the infant-nevirapine arm and 96% on the maternal-antiretroviral and control arms. Although it is possible that self-reports of EBF were inflated in this study due to social desirability, exclusive breastfeeding to 6 months is widely promoted for optimal feeding within the general population of Malawi, regardless of HIV status, and thus carries no stigma. Other HIV-breastfeeding interventions in southern Africa have also reported success using counseling sessions to promote exclusive breastfeeding. In Zimbabwe, the ZVITAMBO Project evaluated the impact of counseling on infant feeding and HIV-related decisions and found the education and counseling intervention efforts alone increased the rate of EBF by 8.4 times (Piwoz et al., 2005). In KwaZulu-Natal, South Africa, an intensive counseling intervention significantly increased the duration of EBF among HIV-positive mothers from 6% to 60% at 4 months and to 40% at 6 months (Bland et al., 2008).

The results of the present study are consistent with research reporting psychological stress and household food insecurity (Lunney et al., 2008; de Paoli, Mkwanazi, Richter, & Rollins, 2008) as barriers to early breastfeeding cessation. Similar to other qualitative study findings, mothers were motivated to stop breastfeeding early to protect their child from HIV transmission (Lunney et al., 2008; de Paoli, Mkwanazi, Richter, & Rollins, 2008). In the BAN Study (N=2,369), only 67-68% of mothers reported completing breastfeeding cessation by 28 weeks while 91% of mothers in the present study reported cessation by 28 weeks (Chasela et al., 2010). Rates of early breastfeeding cessation in this study were also much higher than reports from other larger quantitative studies (Becquet et al., 2005; Goga et al., 2009). It is likely that women in this follow-up study were more likely to be cooperative having completed 12 months of follow-up and agreed to this follow-up study. Among the greater BAN Study population, there were some anecdotal reports that mothers who had reported weaning their infants were seen breastfeeding in the clinic hallway while waiting to be seen by research staff, creating some doubt about the validity of self-reported cessation. In future studies, it may be useful to verify cessation by testing samples of infant blood and breastmilk for elevated levels of prolactin that are present after weaning (Thea et al., 2006).

Mothers in this sample used some of the weaning techniques suggested by the study nurses, including reducing the frequency of breastfeeding episodes and teaching the child to drink

expressed breast milk out of a cup or bottle. They also reported using weaning methods that have been described in other studies in Malawi and South Africa, such as leaving infants in the care of grandmothers, wearing bras or clothes to bed, not sleeping in the same bed with the child, feeding infant formula, and taking a baby bottle to bed (Bezner-Kerr, Dakishoni, Shumba, Msachi, & Chirwa, 2008; Goga et al., 2009; de Paoli et al., 2008).

Among participants in the Zambia exclusive breast-feeding study (ZEBS), early breastfeeding cessation at 4 months significantly increased the risk of growth faltering, severe morbidity, and death (Arpadi et al., 2009; Kuhn et al., 2010). ZEBS participants were not provided with a breastmilk substitute upon weaning thus it is likely that such deleterious outcomes could be reduced by providing LNS. The impact of early breastfeeding cessation on infant growth among BAN Study participants is undergoing analysis currently.

The acceptability and patterns of LNS use found in this study were similar to another study in Malawi where LNS was used for rehabilitating moderately malnourished children (Flax et al., 2009). In both studies, LNS was most commonly served mixed in porridge or alone on a spoon. Unique to this study was the use of LNS served in a bottle as though it were infant formula. Mothers in the BAN Study were advised to feed the child plain LNS, but they reportedly adapted their feeding strategies to the needs of the child and household situation to ensure adequate intake. In Malawi, LNS is commonly used to treat malnourished children and is distributed at nutrition rehabilitation units (NRU). Since LNS has never before been used as a breast milk substitute for HIV-positive mothers, it was very unlikely to arouse suspicion and thus carried very little HIV-stigma.

Malawian cultural is rooted in Christian and Muslim values that promote purity and form the basis of societal intolerance towards sexually transmitted infections. However, the public's increasing awareness of HIV in recent years has helped to create a more accepting society and empower those infected by the knowledge that they are not alone (Eide et al., 2006). While many women believed they experienced some form of stigma, these experiences were not significant enough to impede their adherence to the HIV and infant feeding recommendations. The maternal desire to protect the child from HIV infection was ubiquitously described across the sample. We believe the intensive education and counseling intervention received by BAN Study mothers, and the bonds formed between nurses and participants, strengthened confidence in their choices and helped them to deflect stigma. Previous qualitative studies conducted in Lesotho, Malawi, South Africa, Swaziland, and Tanzania have reported persons living with HIV/AIDS (PLWHA) experienced HIV/AIDS-related stigma in the form of verbal and physical abuse, and neglect after disclosure (Dlamini et al., 2007). Although stigma may have caused some social stress in mother's lives it did not create a barrier to following the HIV and infant feeding guidelines.

Limitations

For this study, we were fortunate to have in-depth qualitative data from a large sample size. We gained insight into the maternal perspective on the guidelines, if and why mothers followed the guidelines, and how they adapted them to their personal situation. Since mothers were counseled several times about exclusive breastfeeding, early cessation, and the use of LNS as a breastmilk substitute they may have felt uncomfortable admitting that they did not comply with the guidelines, resulting in an over estimate of guideline adherence due to a social desirability bias (Bezner Kerr et al., 2008). The retrospective nature of our data collection process may have hindered mother's ability to accurately recall their attitudes and beliefs towards the guidelines and exact actions. In addition, our findings stemmed from a research intervention and thus measure best case scenario efficacy. It is also important to measure the effectiveness of the guidelines when implemented on a larger scale. Although guideline implementation was feasible, there may be associated health consequences in this

environment thus guideline safety must still be evaluated. Additional papers will be published from this same research group evaluating the child growth outcomes associated with early cessation and LNS feeding.

Conclusions

To our knowledge, this study is the first qualitative investigation into the use of LNS as a breastmilk substitute for the purpose of reducing HIV transmission. Our findings show that exclusive breastfeeding with early cessation at 6 months can be accepted and practiced by HIV-infected mothers receiving consistent counseling and an adequate breastmilk substitute. The most recent revisions to the WHO HIV and infant feeding guidelines recommend continued breastfeeding to 12 months coupled with the receipt of maternal or infant antiretroviral medications during the breastfeeding period. However, some women may not have access to or may not want to take antiretroviral medications. For these women, who wish to stop breastfeeding early, another option would be the coupling of early cessation and LNS provisions.

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Table 1

Research questions used to develop the qualitative interview guide.

Individual Level

- What challenges do mothers face when trying to perform exclusive breastfeeding?
- What methods did caregivers use to perform early breastfeeding cessation?
- What are the barriers and facilitators of performing early breastfeeding cessation?
- What methods are used to feed LNS?

Interpersonal Level

- To whom did you disclose your HIV+ diagnosis? Why or Why not?
- How did family members respond to non-traditional infant feeding practices?

Institutional Level

- How did the BAN Study affect adherence to the HIV infant feeding guidelines?

Community Level

- How did community social issues & cultural norms influence adherence to the HIV and infant feeding guidelines?

Environmental Level

- How did household food security and season influence the weaning process?

Table 2

Sample demographics

Age in years (±SD)	28.5 (5.7)
Marital Status	
Married	35 (78%)
Separated	7 (16%)
Divorced	2 (4%)
Widowed	1 (2%)
Socio-economic status	
Fridge	4 (9%)
Electricity	10 (22%)
Personal water pipe	8 (18%)
Cement floor	30 (67%)
Mud floor	14 (31%)
Iron sheet roof	38 (84%)
Highest level of education	
0	1 (2%)
< 8 yrs	18 (40%)
8 yrs	11 (24%)
8-12 yrs	5 (13%)
12 yrs	9 (20%)
Mom's Occupation	
Labor (non-agriculture)	3 (7%)
Labor (agriculture)	1 (2%)
Paid employment with salary	2 (4%)
Self employed (non farming)	14 (31%)
Health Worker	1 (2%)
None	24 (53%)
Primiparous	8 (18%)
Total number of Living Children	2.8 (1.4)