

Background

Infant feeding represents a controversial and complicated issue in the prevention of mother-to-child transmission of HIV (PMTCT) [1, 2] . According to the UNAIDS update for 2004, 630,000 infants are HIV infected through their mothers every year and 280,000 of these are infected through their mother's milk [3].

The documentation of breastfeeding as a source of HIV infection in babies has come to represent a public health dilemma in countries with a high prevalence rate of HIV and where breastfeeding is the standard norm and essential to child survival [2, 4-6]. Avoidance of breastfeeding eliminates the risk of postnatal transmission of HIV [1], but in environments with poor sanitation and widespread poverty these potential gains in infant survival are counteracted by the high mortality risks associated with replacement feeding. As knowledge about the risk of HIV transmission through breastfeeding has trickled down to health care workers, the general population and to the individual mothers, a vacuum of uncertainty has developed on how best to feed infants in the context of HIV. Women who know or suspect they are HIV-positive are faced with difficult choices [7].

Current international guidelines [5] focus on methods of feeding that reduce the risk of transmission. They generally emphasize replacement feeding (RF) or exclusive breastfeeding (EBF), and the avoidance of mixed feeding. Research documents an increased risk of HIV transmission with a mixed feeding pattern, i.e. introducing other solids, milks or liquid foods while continuing to breastfeed an infant under six months of age [8-10]. Based on the available evidence, the updated international guidelines issued in 2003 state that “when replacement feeding is *not* acceptable, feasible, affordable, sustainable and safe (AFASS), exclusive breastfeeding is recommended during the first months of life” [5]. The principle of informed choice is further emphasized in the guidelines which strongly encourage that HIV-infected women be given the best available information on the risks and benefits of each feeding method, with *‘specific guidance in selecting the option most likely to be suitable for their situation’*.

Cost-effective prevention of mother-to-child transmission (PMTCT) programmes administered through antenatal clinics are rapidly spreading in sub-Saharan Africa and include voluntary counselling and testing (VCT), anti-retroviral prophylaxis (ARV) and infant feeding counselling. However, with limited knowledge on the risks associated with different feeding methods, inadequate follow up in the postnatal period and stigma associated with both replacement feeding and exclusive breastfeeding, appropriate and effective infant feeding counselling is difficult to implement and remains a bottleneck to successful PMTCT [8].

According to previous research, mother's adoption of and adherence to the recommended feeding methods as conveyed by nurses through counselling is a problem [11-13]. A study from Nairobi reported that 31% of the HIV-positive counselled mothers participating in the study practiced mixed feeding at 6 weeks after delivery [14]. Counsellors and mothers alike are not sufficiently well informed about how to protect the infant from HIV transmission. It has also been documented that many counsellors are not even aware of the existence of international guidelines on HIV and infant feeding [7, 11], few have received sufficient training on counselling in the context of HIV [15], and PMTCT programs in general lack counselling tools and other resources [16].

The purpose of the study

This study describes the development of evidence- and theory-based health education materials referred to as 'job aids' using the framework of intervention mapping, IM [17]. The aims of the study were to improve infant feeding counselling, address the limitations of postnatal follow up, and ultimately achieve safer infant feeding practices among HIV-infected mothers enrolled in the PMTCT programme at Kilimanjaro Christian Medical Centre (KCMC). Through improved access to information and improved quality of counselling, the materials aimed to strengthen women's ability to make an informed choice of infant feeding method, as well as their ability to adhere to the method chosen. More generally, the purpose of the study was to develop a cost-effective, socially, culturally and technologically appropriate intervention using participatory formative research and stakeholder review and consensus building. The intervention, an integrated set of job aids, was based on both

current global guidelines and generic WHO and UNICEF materials on HIV and infant feeding in the context of HIV.

The setting

The social and cultural setting for the present study is Kilimanjaro Region in northern Tanzania, where the HIV prevalence rate in the antenatal population is estimated to 5.7% [18]. In Kilimanjaro Region prolonged partial/mixed breastfeeding is the norm, where the baby is partly breastfed and partly fed with water, cows' milk and porridge [11]. Innovative strategies to improve infant feeding counselling and postnatal follow-up are urgently needed. The PMTCT clinic at KCMC recruits its patients from the antenatal clinic, which serves primarily women from Moshi town situated a few kilometres away, and from its rural outskirts. The PMTCT programme at KCMC offered the standard package of VCT, ARV prophylactics to HIV-positive pregnant women and their newborns, and infant feeding counselling to pregnant women and their partners. The infant feeding methods recommended when the study began were based on national guidelines and included exclusive breastfeeding for 4-6 months (with no supplements of any kind) or replacement feeding with either local cow's milk or commercial infant formula. Mixed feeding was discouraged [19].

Methodology

The role of job aids as a tool in health promotion

Job aids, defined as tools providing information and reminders to individuals [20], have gained position in health promotion as a cost-effective way to improve the *performance* of service providers like nurses, and the *adherence* to care or treatment of particular groups of patients [20, 21]. In order to help ensure comprehension of written information to service users, visual images are often employed in job aids. However, as research documents, pictures or images are not always easy to interpret and may be misunderstood [22]. To strengthen the relevance and identification, the images as well as the written messages should resonate with peoples' beliefs about a particular phenomenon. In the current intervention (job aids) on infant feeding reported here, both written messages and visual images were developed within the local social and cultural context in which they would later be employed.

The planning process - intervention mapping

The importance of careful theory-based intervention planning has been recognized since the publication of the Precede-Proceed model [23]. According to this planning model, need assessments indicate health problems to be addressed, the health behaviours required to be changed as well as the psychosocial and environmental determinants to be translated into interventions that can be implemented and disseminated. Following need assessments, the IM is a stepwise approach to guide the selection of specified intervention goals, the choice of intervention strategies and the development of intervention tools [17, 24]. IM suggests five different steps based on established theories, empirical evidence and additional qualitative and quantitative research [17]. A basic IM principle is the close collaboration between program developers, the target population and program users. Step 1 of IM is to define the behaviours or performance objectives that need to be taught in order to achieve the aim of the intervention program. In turn, learning objectives are specified (e.g. mothers recognizing the importance of monitoring infant feeding) from performance objectives (e.g. exclusive breastfeeding) and individual- and environmental determinants (e.g. awareness of the importance of exclusive breastfeeding). In addition to teaching mothers safe infant feeding methods in the context of HIV/AIDS, a safe learning environment is important and will be addressed in the present intervention through targeting PMTCT counsellors. After identifying the programme objectives, Step 2 of IM uses theory as a foundation of selecting educational methods and strategies that matches the learning objectives. Step 3 in IM is to develop the programme and to pre-test materials, whereas Step 4 and 5 consist of programme adoption, implementation and evaluation, respectively. In this study, IM [17] is used to guide the process of developing job aids for use in PMTCT counselling and at home, with the aim to promote safer infant feeding practices among HIV infected mothers. Thus, this paper deals specifically with IM steps one through three. Steps four and five will be discussed in a subsequent paper.

In the present study, potential individual and environmental determinants of recommended infant feeding practices (performance objectives) were identified from literature reviews, focus group discussions (FGDs) as well as reviews of theoretical models [17]. The learning objectives specified were intended to answer the question: “What does the target group need to learn with regard to a specific behavioural determinant in order to accomplish the performance objectives” Bandura’s Social

Cognitive Theory (SCT) provides a framework for articulating learning objectives, combining individual and social factors influencing infant feeding practices. In accordance with SCT, it was postulated that 1) mothers who have inadequate *knowledge* about mother-to-child transmission (MTCT) of HIV would not decide to change their infant feeding practice, 2) mothers who consider their baby to be constantly *at risk of HIV infection* will be hampered in their decision to change their feeding method, 3) mothers who perceive serious *disadvantages* associated with recommended feeding methods would not change existing feeding habits, 4) mothers whose *significant others* (e.g. husbands and/or mother-in-laws) insist on a mixed feeding pattern will not easily choose or adhere to exclusive breastfeeding and 5) mothers who lack *confidence* in their ability to carry out a recommended feeding method may end up feed her infant in a customary manner.

Following the SCT [25], the elaboration likelihood model and goal setting theory [26], the selected behavioural and cognitive principles to achieve behavioural change were; information transfer, role modelling, skill building, skill transfer, self-assessment and feedback, social support and guided practice and reinforcement [17, 27]. These selected educational methods were further translated into practical strategies (Table 1 and 2).

Ensuring a participatory approach

For a pilot intervention on infant feeding to be successful and have the potential for being subsequently scaled up, the political support, strategic participation and consensus of key stakeholders was seen as critical from the start. Stakeholders included HIV-positive mothers, their local community members, nurse-counsellors responsible for the day-to-day running of the PMTCT program, the national consultative group responsible for developing guidelines on HIV and infant feeding, and other national and international technical experts. This broad participation helped to ensure the social and cultural relevance of the intervention to the context of Tanzania. Policy makers, technical experts, service providers and service users were involved in all phases. Approval to conduct the research was obtained by national, regional and local authorities in Tanzania including the Tanzania National AIDS Control Programme, the medical authorities in Kilimanjaro region and the ethical committee at KCMC.

Formative research methods

Informed by precede-proceed model, data was collected to identify the predisposing, reinforcing and enabling factors for the recommended infant feeding options. The research was conducted between August 2003 and February 2004 with a double purpose: 1) to identify existing strongly held beliefs and behaviours to be addressed in the intervention, i.e. through key messages and illustrations in the job aids, and 2) to determine how best to communicate these messages, text and illustrations, in order to facilitate change or reinforce desirable infant feeding practices in the particular social and cultural context of Kilimanjaro Region. All discussions and interviews were conducted in Swahili (the national language of Tanzania) using interview guides, and they were tape recorded, transcribed and translated to English.

A total of 8 focus group discussions with 8-12 participants each were conducted in local communities to assess knowledge, beliefs and attitudes about mother-to-child transmission (MTCT) of HIV, breastfeeding, replacement feeding, mixed feeding and safe sex in different groups defined by age and gender (mothers, fathers and other community members). A total of 15 interviews with key informants including nurse-counsellors, traditional birth attendants, community leaders, and members of the community health committees were also conducted. Ten HIV-positive mothers were visited in their homes and interviewed about their views and experiences of infant feeding. The home arena also provided an opportunity for direct observation of infant feeding behaviours and environmental factors, not possible to observe in a clinic or hospital context. With the aim to develop culturally appropriate images that would reflect the local environment, dress code and ideals related to family life and infant feeding, digital photographs were taken in homes and communities for use as references for the development of illustrations, using a state-of-the-art computer graphics technique. Finally, the research team observed nurse-counsellors during simulated counselling sessions with mothers, where different infant feeding options were discussed. Given institutional restrictions on direct observation of counselling, simulation of counselling sessions provided important insights about the standard counselling situation.

Formative research results

Perceived risk of maternal-to-child transmission of HIV

The issue of mother-to-child transmission of HIV was discussed at length in each focus group discussion and in-depth interview, revealing a high level of knowledge about the fact that infants can be infected with HIV through their mothers during pregnancy, delivery and through breastfeeding. However, the relative risk of transmission was generally overestimated. The common and strongly held belief was that if a mother is HIV-positive, her infant will be automatically infected. The belief that the baby is fed directly by the mothers' blood in the womb and by her milk (thought to be made from her blood) after delivery, reinforces the idea that transmission of HIV from an HIV-infected mother to her child is unavoidable. Although the HIV-positive women who had been counselled were generally better informed about PMTCT than other community members, they also overestimated the risk of MTCT and underestimated the potential of prevention through safe infant feeding and safe sex during breastfeeding.

Knowledge, practices and beliefs associated with infant feeding options for HIV-positive women

Exclusive breastfeeding: According to the participants in the focus group discussions, breastfeeding was seen as the best way to feed an infant and should preferably be practiced into the second and third year of life. At the same time, however, there was a common understanding that exclusive breastfeeding was not customary. Exclusive breastfeeding was not seen as feasible beyond three months as mothers had to resume their work or other activities outside the house. Poor maternal nutrition was also mentioned as a major obstacle to continue to exclusively breastfeed for more than three months. Supplements and water are generally introduced even earlier than three months, sometimes even before breastfeeding is established. Both men and women stated that babies need water already in their first month of life because they "feel thirsty". Boiled water and gripe water were seen as essential for relief of abdominal colic, and many believed that they should be given at least once a day.

Mothers reported giving additional foods, such as light porridge mixed with cow's milk, as early as two months because they believed that their milk was not enough. To be regarded as healthy, babies are expected to be "fat and shiny" at the end of the

confinement period (customarily three months in Kilimanjaro) and according to the mothers, it is hard to obtain that effect through breastfeeding only.

Home prepared formula using cow's milk: Cow's milk feeding was reported to be the most common supplement to breastfeeding, but according to the focus group discussion participants it was not generally regarded as an adequate replacement for breast milk for an infant. It was an acceptable replacement only if the mother had died or had a very good health reason not to breastfeed. Usually the milk was diluted with water and some sugar was added, but there are no exact measurements for both sugar and water. Cow's milk was more easily available to people living in rural areas than commercial infant formula, and the cost was substantially lower.

Commercial infant formula: Although the cost was generally prohibitive, commercial infant formula might represent the best alternative to breastfeeding for HIV-infected mothers, especially in towns, if women have a steady personal or family income. In urban settings, although some people may wonder why a woman is not breastfeeding, there may be less stigma associated with replacement feeding.

Mothers interviewed reported that they were generally uncertain about the use of infant formula, however, and of those who reported to use it, many experienced problems calculating the right amounts of formula powder and water. Opinions on the use of leftover milk were divided. While many of the focus group discussion participants were concerned that the milk should not be discarded, the mothers who were counselled said that leftover milk should be thrown away. In terms of storage, however, mothers reported that for convenience they generally prepared the milk once a day and kept it in a thermos from morning to evening (a practice known to encourage microbial proliferation).

Other animal-milk replacement feeding options: Although the updated international guidelines provide guidance on the preparation of other animal milks as breast milk replacements, such as goat, camel, evaporated cow's milk and powdered whole cow's milk, the formative research revealed that these alternatives were either not available in the local markets in Kilimanjaro and/or not highly regarded or viewed as being acceptable.

Expression and heat treatment of breast milk: The idea of expressing breast milk and then heating it to kill the virus was generally received with abhorrence and was not considered an acceptable way to feed an infant by either focus group discussion participants nor counselled mothers. The expression of breast milk was said to be highly associated with the death of a child. Some nurse counsellors noted, however, that when the Baby Friendly Hospital Initiative was actively promoted in Tanzania during the 1990s, hand expression was taught to all mothers who delivered in Baby Friendly facilities before discharge. Anecdotal evidence indicated that Tanzanian professional mothers who worked outside of the home were known to express breast milk to be given to their infants during their separation.

Wet nursing: While wet-nursing by a close relatives, such a grandmother or an aunt, used to be an alternative for orphans and infants born to sick mothers, this custom in the HIV context is no longer regarded as safe for neither the infant nor for the wet-nurse. The practice is said to have been discontinued. The potential infection of a wet nurse by HIV-infected infant was speculated, and participants also noted that precautions would have to be taken to ensure that a potential wet-nurse was not herself infected with HIV.

Perceived disadvantages associated with both replacement feeding and prolonged exclusive breastfeeding

One of the strongest common concerns that emerged from the formative research was the fact that **not** breastfeeding in the Kilimanjaro context is regarded as “failing to fulfil the obligations of motherhood”. According to the focus group participants, a mother in Kilimanjaro derives respect through nurturing and raising her children. Failing to do so in a customarily acceptable manner raises suspicion and provokes gossip that the woman has a lover or, if she does not look healthy, that she may be HIV-infected.

Also of great importance is the fact that the research highlighted that both not breastfeeding (using replacement feeding) and failure to thrive on the part of the baby are increasingly associated with HIV infection in the mother. The focus group participants could not think of any disease other than HIV/AIDS that would prevent a

mother from breastfeeding. In both instances not breastfeeding reflects failure and/or a bad moral character. The social sanctions for not breastfeeding may be severe in terms of loss of respect, rejection and withdrawal of the assets otherwise granted to a woman during postnatal confinement. Of additional particular note, however, was the finding that a mother's insisting to exclusively breastfeed beyond the first few months of life was also identified, by some participants, as an indication that the mother might be HIV-positive.

Experiences of social pressure and lack of self control

Although all mothers who were counselled at the PMTCT programme at KCMC perceived replacement feeding as the best option in terms of MTCT risk reduction, the great majority ended up breastfeeding, some after initially opting for replacement feeding. They explained their decision based on the fact that they could not withstand the social pressure to breastfeed and they were concerned about their reputation as a good mother. The mothers interviewed were aware that in order to reduce the risk of HIV transmission to the infant, they should adhere to one feeding method (e.g. exclusive breastfeeding or exclusive replacement feeding), but they all perceived this as a big challenge given the role of other family members in infant feeding decisions. Mothers explained that they could not fully control the feeding situation themselves. When it comes to decision-making it was reported by all groups that mothers-in-law have considerable power in issues related to pregnancy, birth and infant feeding. As the issue of infant feeding concerns a clan member on the paternal side, the final decisions rest with the husband and his mother.

Women, who spent the confinement period in the house of their mother-in-law all felt that they had to breastfeed, otherwise the mother-in-law would become very suspicious. At the same time they experienced great problems preventing the mother-in-law from giving water and other supplements to the baby, often within the first few days or weeks of birth. Some mothers worried that their body would not look healthy or fat enough by local standards after the confinement period was over if they exclusively breastfed. Many gave their babies additional fluids and foods to "save their own energy". As one mother expressed it: "I rather mix-feed the baby than have people pointing fingers at me, whispering behind my back that my body looks thin and that I am probably HIV-infected. It will harm the reputation of my husband and

the whole clan. People will run away from me and they will gossip about me. I will rather die than live in that situation.”

Lack of knowledge and confidence in implementing the recommended feeding options

Mothers who had received counselling reported that it was difficult for them to understand and thus appreciate the advantages of exclusive breastfeeding as compared to mixed feeding, and that exclusive breastfeeding was hard to implement. In particular it was hard to understand that while breastfeeding, supplementation with cow's milk, water and/or porridge increases the risk of mother-to-child transmission of HIV.

Mothers generally reported that they did not feel adequately informed on infant feeding. HIV-positive women are typically counselled on infant feeding during post-test counselling; generally on the same day that they receive their HIV test results. Only two out of ten HIV-positive women interviewed in their homes could recall infant feeding information that was discussed during post-test counselling. They said learning about their HIV-positive status was shocking and that it was hard to listen to and concentrate on any other information from the counsellor on the same day. They recommended that information on infant feeding be repeated during subsequent visits in the antenatal clinic.

Mothers who chose replacement feeding (commercial infant formula or cow's milk) after being counselled by the nurse expressed that they felt uncertain about preparation of the formula or cow's milk and how to calculate feeding quantities and frequency.

In relation to exclusive breastfeeding, mothers reported receiving little guidance and no demonstrations. Problems mentioned included uncertainty about how to handle cracked or bleeding nipples and thrush in baby's mouth. The experience of painful, hot and engorged breasts was confirmed as a major cause for discontinuation of breastfeeding. Bad positioning of the baby during breastfeeding (known to contribute to breast problems) was observed during home visits.

Nurse-counsellors' knowledge, practices, perceptions and beliefs

The nurse-counsellors reported that they did not believe that the mothers would be able to breastfeed exclusively, especially for more than two or three months. Consequently, it was difficult to promote exclusive breastfeeding for more than a few months. As they perceived replacement feeding, and in particular infant formula, as the best option in terms of preventing mother-to-child transmission of HIV, they generally recommended this feeding method even if they believed that it would not be feasible for the majority of HIV-positive women being counselled. Furthermore, the nurse-counsellors consistently defined the problem of replacement feeding primarily in economic terms, which they believed could be overcome if the family was committed to reducing MTCT. They seldom referred to or took into consideration the other environmental criteria and available resources of the individual mother, specifically literacy; access to clean water; fuel for boiling water and utensils; decision making power; fear of disclosure and social pressure to breastfeed.

During the counselling simulation exercise, it was observed that the counselling session was constructed as a traditional provider-client situation in which the nurse-counsellor informed the client about the different infant feeding options and gave advice on the basis of her own knowledge and judgement. Time constraints, lack of counselling tools and lack of infant feeding demonstration materials and resources were reported to be the reason for not establishing a proper dialogue, identifying the concerns and resources of the individual woman, or showing women how to either properly position their baby at the breast or safely and adequately prepare replacement feeds.

The development of job aids prototypes

Dissemination and analysis of findings and initial consensus building

These formative research findings underscore the challenges on several levels of infant feeding counselling and adherence of mothers to recommended feeding options in the context of HIV. Problems range from the individual woman's knowledge, confidence and decision-making power, community norms and beliefs to limited knowledge and skills of nurse-counsellors and inadequate resources for counselling services.

In line with the participatory approach of the project, the research team disseminated and subsequently discussed the preliminary findings of the formative research with different groups of stakeholders at the facility, district, regional, national and international level. Both electronic correspondence and face-to-face meetings were utilized to achieve the broadest possible participation of various national and international stakeholders and other technical experts. The aim of these discussions was to disseminate information on the barriers and facilitators of change of infant feeding and to identify a feasible behaviour change *strategy*, and to obtain consensus and support for the proposed intervention.

Rationale for the focus on job aids

The PMTCT counselling situation was acknowledged as the major arena of information exchange and motivational work related to infant feeding and thus the development of counselling tools was prioritized as a major focus for the intervention (job aids for counselling). At the same time, the importance of access to information at home during and after infant feeding is established and when potential problems can arise was also recognized. Given that follow up of PMTCT clients after delivery, either through home visits or post partum check-ups are limited or non-existent, the intervention strategy emphasized the role of take home educational materials (job aids for the mother). The strategy agreed upon included the adaptation/development of an integrated set of counselling job aids to be used during counselling sessions in both the PMTCT and antenatal clinics and for mothers to take home.

Development of performance objectives, learning objectives and key messages on infant feeding

The performance objectives that needed to be reached or the behaviours that needed to be learnt to achieve the ultimate goal of improved infant feeding practices in HIV positive mothers were to either exclusively breastfeed for 4-6 months or exclusively replacement feed. The performance objective identified for the counsellors was to practice culture-sensitive counselling grounded on the national recommended infant feeding options and on the AFASS criteria. Based on the formative research and guided by the IM protocol, personal and social determinants of the recommended feeding method (e.g. perceived risk, knowledge and beliefs, perceived social and practical disadvantages) were articulated as learning objectives and matched with

selected educational strategies including sets of key messages. Table 1 and 2, lists the learning objectives and their modifiable determinants with related educational strategies for HIV positive mothers and counsellors that were applied in the present study. Drafts of WHO and UNICEF generic counselling materials along with other existing infant feeding-related information, education and communication (IEC) materials were collected. All existing materials were reviewed as part of a benchmarking process, and their appropriateness was assessed in light of the formative research findings and feedback from stakeholders and other technical experts. Local adaptations for the generic WHO and UNICEF materials were proposed by the study team based on both the culturally and socially acceptable/relevant *key messages* on infant feeding and ideas for illustrations identified through the formative research.

Composition of the integrated set of job aids prototypes

The integrated set of job aids developed in this study was designed as complementary memory cues for both counsellors and mothers. The job aids were seen as tools with which to strengthen counselling and to serve several other functions, contributing to a positive counselling environment and aimed for knowledge transfer and reinforcement through application of visual aids and printed material. The text was developed in the local vernacular, Swahili, and adapted to the educational level and socio-cultural values of the target group. The illustrations reflected clothing, ideas of family life and local level technology, with images of mothers feeding infants using one of the various recommended feeding options that were identified as being most appropriate.

The set was initially comprised of three counselling/take home brochures identified as being socially and culturally appropriate with the performance objectives, that was most prevalent and popular infant feeding options counselled on. They included exclusive breastfeeding, fresh cow's milk feeding and commercial infant formula feeding. A fourth counselling brochure on the expression and heat treatment of breast milk was also developed at the strong technical suggestion of both WHO and UNICEF. Although heat treatment was regarded as controversial by both nurse-counsellors and mothers, it is being promoted as an option for consideration by the international community. A Question and Answer guide for counsellors on HIV and

Infant Feeding was also prepared, entitled “Answers to questions commonly asked by mothers, their families and communities,” to provide counsellors with easy to use language for use during counselling. Lastly, a counselling card explaining the relative risk of HIV transmission from mother-to-child during pregnancy, birth and breastfeeding was drafted. Just prior to launching the operations research on the intervention, however, an infant feeding counselling toolkit for demonstration of the preparation of replacement feeds was conceptualized and produced for use in the counselling setting.

Description of each job aid

The exclusive breastfeeding brochure: A major concern in the development of the key messages was that the breastfeeding job aids should address the issue of infant feeding in general and not only infant feeding in HIV-positive mothers. Great caution was therefore taken in the development of the brochure on exclusive breastfeeding to avoid a close link between exclusive breastfeeding and HIV-positive status that could harm the individual mother and at the same time undermine efforts to promote exclusive breastfeeding in the general public. Along the same lines, safe sex, particularly use of condoms, is mentioned in all brochures as a general precaution to prevent new pregnancies as well as sexual transmitted infections (STIs) including HIV for all women after delivery.

The breastfeeding brochure, unlike the other materials, was specifically designed so that it could be used with HIV-positive women, HIV-negative women and women of unknown status. Strategically, the brochure does not make reference to a woman’s HIV status. The cover contains a culturally sensitive graphic image of a mother breastfeeding her baby. The images, as well as the text emphasize the importance of practicing on demand *exclusive* breastfeeding, avoiding water or any other fluid or solid foods during the period of breastfeeding. The images illustrate the techniques and routines facilitating this feeding method including proper positioning and attachment to reduce breast pathology (such as engorgement, soreness, bleeding and abscesses), how to cope with common *breastfeeding problems* and the importance of practicing *safer sex*, with emphasis on using a condom, especially while breastfeeding (see Figure 1 and 1b).

Three replacement feeding brochures: The three brochures addressing replacement feeding options (cow's milk, infant formula feeding and expression and heat treatment) show an image of a mother feeding her baby using cup and spoon. The images and the text of the cows' milk feeding brochure emphasize the use of local existing resources e.g., firewood and local pots in the preparation of the milk and safe procedures in terms of boiling the water and the milk, and the steps needed to calculate and mix the right amounts of milk, water, sugar and micronutrients for each feed according to baby's age. Likewise the brochure on infant formula feeding illustrates safe procedures for boiling the water and the steps to be followed in calculating the right amounts of formula powder and water for each feed, as well as the number of feeds according to the baby's age. Both brochures emphasize avoidance of mixed feeding, the importance of safer sex, and the use of family planning to achieve adequate child spacing given the loss of natural infertility experienced by women who exclusively breastfeed. The expression and heat treatment brochure provides guidance on hand expression; storage of expressed breast milk, hygiene, heating procedure needed to destroy the virus, and emphasizes feeding the infant using an open cup (see Figure 2).

The Question & Answer Guide: The Question & Answer Guide was developed as a summary of current international guidance on HIV and infant feeding and a personal reference tool to inform and help guide counselling around difficult issues related to mother-to-child transmission of HIV and infant feeding. The materials were envisioned by the study team as a focus for HIV and infant feeding training and take home material for participating nurse-counsellors. Both questions and answers were formulated in simple language to fit a context where access to updated information is otherwise limited (see Figure 3).

The counselling card on relative risk: A counselling card explaining the relative risk of HIV transmission from mother-to-child during pregnancy, birth and breastfeeding which was drafted based on the WHO generic counselling material. The card graphically presents the number of babies infected during pregnancy, birth and breastfeeding out of 100 babies born to HIV-infected mother (see Figure 4).

The infant feeding tool-kit: The infant feeding tool-kit was designed to be used in counselling sessions, and contains basic items including cups, spoons, a sample tin of formula, thermos, pot, sugar and micronutrients needed for demonstration of how to prepare infant formula and cow's milk respectively, as well as soap for hand washing and cleaning utensils (see Figure 5).

Pre-testing of illustrations and development of mock-ups of the job aids

Proposed illustrations for use in the job aids were developed using a state-of-the-art computer graphics technique, resulting in fairly unique images that could be easily altered based on feedback from both communities and technical subject experts. Initial drafts of the illustrations were pilot tested in four focus group discussions composed of mothers and community members in different villages in the outskirts of Moshi town as well as among PMTCT counsellors working at KCMC. A colour copy of each image was laminated for circulation during focus group discussions to elicit participant feedback on the colours. Black and white photocopies of all images were given to each focus group participant to hold and study during the group session.

Process of incorporating pre-test results and technical feedback on the job aids

After pre-testing the draft illustrations on the community level, modifications and final adjustments were made and subsequently incorporated into the layout of key text messages for each job aids (four brochures, Q&A and counselling card on relative risk). Adjustments and corrections were made, for instance, to the size of infants, colours and type of clothing, fires and utensils used in the preparation of replacement feeds.

Each material was produced initially in English and subsequently translated into Swahili. Electronic versions (PDF) of each material (both English and Swahili) were widely circulated for technical feedback from local and national stakeholders and other international technical experts. Comments were incorporated and adjustments to the technical content and illustrations were made prior to producing a limited package of the integrated set of job aids for use in a one-day training/orientation workshop for 15 nurse-counsellors from the KCMC PMTCT programme. During this event, additional technical comments and corrections to the Swahili translations were received and immediately incorporated. All changes were made prior to printing a

sufficient number of each material for use during the six month operational research project to evaluate the effectiveness of these job aids, reported in a forthcoming article. The significance of the one-day training/orientation workshop, which focused on interpersonal communication, counselling skills and the effective use of the job aids, is also reported elsewhere.

The results of the pre-test of illustrations at the community level, as well as the feedback on the mock-ups of the integrated set of materials from PMTCT counsellors and other stakeholders during the one-day training/orientation were encouraging. Both the illustrations and the job aids mock-ups were considered attractive and the key messages, highlighted with local imagery, easy to grasp. Also messages represented only as illustrations were well understood. The aim of developing ownership of the job aids through the participatory approach was achieved and clearly expressed in the enthusiasm demonstrated by focus group discussion participants, counsellors and stakeholders.

Discussion

This study recognizes that infant feeding norms and practices are produced and reproduced or transformed in the encounter between local ideas and customs on the one hand, and forces emanating from the larger national and international community on the other. Through participatory qualitative research, the current study aimed to improve the relevance and appropriateness of the international WHO/UNICEF guidelines on HIV and infant feeding in the local social and cultural context of infant feeding and HIV in Kilimanjaro Region. Because infant feeding practices are socially and culturally embedded, community norms and the cultural beliefs and practices of mothers and those who influence them must be taken into consideration in designing an intervention. By tailoring present educational intervention to the specific needs and characteristics of the study participants, it was made socially and culturally acceptable for the targeted study population in Kilimanjaro region, northern Tanzania. This finding underscores the importance of formative research in the intervention development process.

Intervention Mapping with its dual focus on health promotion theory and empirical evidence obtained through formative research provided a useful reference guiding the

development of the intervention. Although time and resources prohibited a full application of IM, the modified version applied, which restricted the complexity of the change objectives, was a valuable tool in the development of goals, methods, strategies, materials and procedures. Through the definition of performance objectives, modifiable determinants and specified learning objectives as outlined in Table 1 and 2, outcome indicators were identified at individual- and environmental levels.

To ensure “ownership” of or “buy-in” to an intervention by key stakeholders, and to position a pilot intervention for subsequent scale-up, the development process required the active and strategic participation of all relevant groups, including participation in or the initial review of the intervention strategy and technical reviews of the related products. Through the participatory approach prescribed, IM facilitated an active and systematic dialogue with relevant actors in the environment of the PMTCT intervention.

Through the needs assessment, the intervention planning, as well as the strategy and job aids development process a number of questions related to potential impact and sustainability of the intervention have emerged. As the IM framework underscores, change is very often the result of change in the behaviour of decision makers or role actors on different levels. For example, as has been documented in the current paper, there is no doubt that a woman’s husband, her mother in law and her PMTCT counsellor are important actors in the infant feeding environment of a mother. However, whereas PMTCT as a policy and health issue has been addressed in this intervention, PMTCT as a family issue remains tricky because of challenges pertaining to the issue of confidentiality. The framework reported in the current intervention addresses primarily individual motivational factors, i.e. factors internal to the actor herself. Changing knowledge, attitudes and beliefs are important and necessary conditions for behavioural change, but may not be sufficient to change mothers’ infant feeding practices. There are many influences on mothers when making a choice of the feeding method to the baby. There are also a number of barriers to and facilitators to change, which vary depending on determinants of choice and the individual or group of mothers in question. In the context of HIV, stigma and the fear of disclosure of positive HIV status is a major concern influencing mothers in

making their infant feeding choice. At the same time, mothers are very much committed to prevent the transmission of HIV to their babies. This study hence, underscores the complexity of promoting recommended infant feeding practices and clearly indicated the need for a multi-dimensional behaviour change strategy involving both mothers and counsellors and if possible significant others who have a say in decision making processes. In a context where disclosure to partner is a major challenge, the participation of relatives in counselling, although an ideal, is rarely realized.

It should be clear that choice is a complex issue, and information is only one among many factors influencing mothers' confidence and courage in implementing her decision on how to feed her baby. This intervention study underlines the importance of providing culturally compatible support to improve self-esteem and confidence that correspond to social norms and to the perceptions of mothers.

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Table 1: Selected educational strategies and key messages related to learning objectives and modifiable determinants messages among HIV pregnant women

Learning objectives	Modifiable determinants	Strategy	Key message	
<u>Exclusive breastfeeding</u>				
Mothers can explain positive health consequences for the baby following exclusive breastfeeding and giving colostrum.	(Preferences, skills, awareness)	Image & content of exclusive breastfeed-ing brochure	1. Breastfeed exclusively from birth until 6 months	
Mothers have confidence and can practice proper positioning and attachment.	(skills, self-efficacy, awareness)		2. Breastfeed on demand	
Mothers can name important persons to consult in case of breast problems	(awareness, social influence, skills)		3. Start giving colostrum	
Mothers can explain what she herself can do in case of breast problems and in case of babies having sore mouths or temporary separation	(skills, awareness)		4. Proper positioning and attachment of baby when breastfeeding is important	
Mothers can explain the positive health consequences of avoiding mixed feeding before baby is 6 month	(awareness, preferences, skills)		5. Consult a trained counsellor in case of health and breast problems	
Mother can explain positive health consequences of safe sex when breastfeeding	(awareness, skills, preferences)		6. Express breast milk in case of breast problems or temporary Separation	
Mothers have adequate perception of incidence and prevalence of MTCT transmission of HIV	(awareness, skills)	Counselling card on relative risk of transmission	7. Check babies mouth for sores and get them treated as soon as possible	
<u>Exclusive replacement feeding</u>				
Mothers can explain positive health consequences for the baby following exclusive replacement feeding	(preferences, skills, awareness)		8. Babies need only breast milk during the first 6 months. Avoid mixed feeding before 6 months. If a mother is HIV-positive, mixed feeding increases the risk of HIV passing from mother to child	
Mothers have confidence with respect to preparation and feeding of replacement feeds	(skills, self-efficacy, awareness)		9. Practice safe sex while breastfeeding to avoid STI infections, including HIV. HIV can be transmitted to the infant through breast milk.	
Mothers can negotiate replacement feeding with other influencing persons	(awareness, social-influence, skills)		10. Relative risk of mother-to child transmission of HIV during pregnancy, birth and breastfeeding	
Mothers can explain how to prepare and mix replacement feeding	(skills, awareness)		11. MTCT can be avoided by replacement feeding	
Mothers can explain why the use of bottles is dangerous for feeding infants	(awareness, preferences, skills)		12. Specific preparation techniques are necessary to ensure that replacement feeding is safe for infants under six months	
Both breastfeeding and replacement feeding mothers can explain why it is important to practice safe sex as soon as possible	(awareness, preferences, skills)		13. HIV-positive mothers opting for replacement feeding should never breastfeed the infant	
			14. Specific instructions must be followed in providing replacement feeding to infants under six months,	
			15. Use an clean, open cup when feeding the baby	
		16. Mothers who breastfeed and who are infected with HIV while breastfeeding have a significantly higher chance of passing HIV to their infants		
		17. Mothers who replacement feed lose the natural child spacing protection associated with breastfeeding and therefore should practice safe sex and use a family planning method		

Table 2: Selected educational strategies and key messages related to learning objectives and modifiable determinants messages among PMTCT counsellors.

Learning objective	Modifiable determinants	Strategy	Key message	
PMTCT Counsellors				
A counsellor maintains good interpersonal relationship with mothers during counselling	(awareness, skills, social-influence)	Training in interpersonal communication / counselling (IPC/C)	<ol style="list-style-type: none"> 1. Have a good attitude at the first patient contact 2. Greet the clients 3. Offer a seat to the client 4. Let the client trust you 5. Respect clients' confidentiality 6. Give advice clearly, precisely, and comprehensibly 7. Guide the mother in making an informed choice of infant feeding method 8. Demonstrate how to position and attach the baby to the breast when breastfeeding 9. Listen to the mother carefully 10. Explain to all mother about: <ul style="list-style-type: none"> - Protecting babies from HIV infection - Infant feeding options - How to feed the baby - Advantages & disadvantages of the most popular feeding options 11. Explain to HIV positive mothers who opt replacement feeding about: <ul style="list-style-type: none"> - Importance of exclusive replacement feeding for six months from child birth - Importance of replacement feeding on demand according to the baby's needs - Use of a cup when feeding the baby - Importance of cleanliness when preparing and feeding replacement feeding - Use of correct measurements when preparing replacement feeding - Importance of safe sex as soon as possible after birth 12. Demonstrate steps in preparing replacement feeding 13. Explain the relative risk of mother-to-child transmission of HIV during pregnancy, birth and breastfeeding 14. Verify the mothers comprehension 15. Explain the important of avoiding mixed feeding 16. Explain how to express and heat treat breast milk, especially during the transition from exclusive breastfeeding to replacement feeds 17. Tell the mother when to come back for a follow up visit 	
A counsellor has confidence with respect to counselling mothers on infant feeding and HIV	(skills, self-efficacy, awareness)			
A counsellor has confidence with respect to guiding mothers in making an informed choice on infant feeding (ability to explain AFASS criteria)	(skills, self-efficacy, awareness)			
A counsellor has confidence with respect to the demonstration on how to position and attach the baby to the breast when breastfeeding	(skills, self-efficacy, awareness)			
A counsellor can explain basic facts about transmitting and preventing HIV transmission from mother to child during counselling sessions	(awareness, risk perception, skills)			Images and content in the brochures & Q& A Guide for counsellors
A counsellor can explain positive health consequences of exclusive replacement feeding to the HIV-positive mother who opts for replacement feeding	(preferences, skills, awareness)			
A counsellor has confidence with respect to demonstrating the safe preparation, mixing and feeding of replacement feeds to the HIV-positive mother who opts for replacement feeding	(skills, self-efficacy, awareness, preferences)			
A counsellor can explain to the HIV-positive mother how to negotiate replacement feeding with other influencing persons	(awareness, social-influence, skills)			Use of demonstration kit
A counsellor can explain why it is important for a mother to practice safe sex as soon as possible after birth	(awareness, skills, preferences)			
A counsellor can explain the technique of expressing and heat treating breast milk to kill HIV and prevent transmission to the infant	(skills, self-efficacy, awareness)			Counselling Card & Brochures on infant formula, fresh cow's milk and expression and heat treatment of breast milk

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What do I need to know?



- It is very important to practice exclusive breastfeeding from the moment your baby is born, until your baby is six months old.
- Colostrum, or the first milk, is very important, because it protects your baby from many diseases. Exclusive breastfeeding continues to protect your baby, especially from diarrhea and pneumonia.
- Breast milk is the perfect food for babies. It provides all of the nutrients and water that your baby needs to grow during the first six months of life.
- Exclusive breastfeeding means giving breast milk only, and nothing else, not even sips of water, except for medicines prescribed by a doctor or nurse.
- Breast milk can contain HIV if the mother is infected. This virus can pass to a baby through breast milk. Exclusive breastfeeding, however, reduces the chances that a baby will become infected.

How should I breastfeed?



- Start breastfeeding within the first one hour of birth. When you first begin to breastfeed, you may need to help the baby attach well to the breast to avoid hurting your nipples.
- Your baby's tummy should be facing your tummy. Touch the baby's lips to your nipple. When the baby's mouth is opening wide, move the baby quickly onto the breast, aiming the lower lip below the nipple.
- Check that your baby is feeding well by seeing that the baby's
 - mouth is wide open
 - lower lip is turned outward
 - chin is touching the breast
 - cheeks are rounded
- The baby should take most of the dark skin (areola) into its mouth. The baby's tongue should be over the bottom gums. If the baby is in a bad position, or if you feel any pain, then gently take the baby off the breast and start again.
- Your baby should take slow, deep sucks while breastfeeding, sometimes pausing. You may also hear the baby swallowing.

Continuing to breastfeed



- Let your baby finish one breast first and come off the breast on his or her own. This is a sign that the baby has gotten most of the milk out of that breast. Then give your baby the other breast. This will ensure that your baby gets the most nutritious and satisfying milk.
- Feed your baby frequently, day and night, as often and for as long as the baby wants, at least 10 times in 24 hours.
- Frequent feeding will help your body begin to produce enough milk and keep your breasts from getting engorged (swollen). Let the baby sleep close to you at night to make it easier to feed.
- You will know that your baby is getting enough milk if the baby urinates at least six times per day. The baby's urine should be light in color and not strong smelling.



Breastfeed Your Baby

How to prevent problems:

- Check for sores in your baby's mouth often. If you find any, get them treated as soon as possible.

- If your nipples become cracked or sensitive or if one or both of your breasts become too full, painful, hot to the touch or develop a red streak, this is a sign that something is wrong. Consult a trained counselor or other health care worker immediately for advice or treatment.

- Try not to miss a feed, or your breasts may become swollen (engorged) with milk which makes it difficult for both you and the baby. If you must miss a feed, you should express some milk to keep your breasts soft. You can also express some milk and store it in a cool place so that someone else can feed your baby while you are away.

- "Mixed feeding" (which means combining breast milk with other milks, water, liquids or any kind of foods), is not healthy for your baby before six months of age. It can reduce the amount of milk that you produce and can make your baby sick. If you are having trouble practicing exclusive breastfeeding, discuss your situation with a trained counselor.

- When your baby is six months old, it is time to begin giving other foods that are clean and prepared in a safe way. Talk to a trained counselor about how and when to introduce new foods to your baby.



Things to remember:

- If your nipples become cracked or painful, your baby may not be attached correctly to your breast. You may need help to position the baby better. Breastfeeding should not hurt.
- If you develop cracked nipples, put some breast milk on them, and let them air dry. This helps to heal the cracks. Do not use any other types of creams or ointments unless a doctor has diagnosed thrush or candidiasis on the nipples and has given you a special medicine for this.
- If a woman is HIV-positive, she should not feed her baby from a nipple that is cracked or bleeding. It is best to express and discard the milk from that breast until it has completely healed.
- To protect your baby from becoming exposed to HIV while you are breastfeeding, you and your partner should practice safe sex. This means that both partners stay faithful to each other, abstain from having sex, or use a condom. Consult a trained counselor about family planning options.



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How To

**Feed Your Baby
Fresh Cow's Milk**



How To

**Feed Your Baby
Infant Formula**



How To

**Express & Heat Treat
Breast Milk**

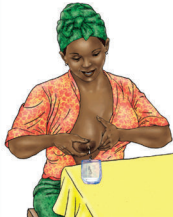


Figure 3

HIV & Infant Feeding



Answers to questions commonly asked by mothers, their families and communities



What is the risk of HIV passing from HIV-positive mothers to their babies when NO preventive actions are taken?



Most babies become infected with HIV during pregnancy and birth



Other babies are infected with HIV through breastfeeding



The majority of babies are **not infected** with HIV, but should be protected

Figure 5



Figure 6