

Acceptability of Heat Treating Breast Milk to Prevent Mother-to-Child Transmission of Human Immunodeficiency Virus in Zimbabwe: A Qualitative Study

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Abstract

Although heat treatment of human milk is an official infant-feeding recommendation for human immunodeficiency virus (HIV)-positive mothers in Zimbabwe, its implementation has not been adequately addressed, because knowledge about the safety of this method is rudimentary and its acceptability is poorly understood. To address this knowledge gap, the authors conducted focus group discussions among mothers, grandmothers, midwives, and husbands in various regions of Zimbabwe. Although the practice of heat treating expressed human milk was initially met with skepticism because of potential obstacles, including time constraints and social and cultural stigma, a pattern of opinion reversal emerged in all groups. By the end of each discussion, participants believed that, given its affordability and its potential to protect infants from HIV infection, heat-treated human milk may be a feasible infant-feeding option for HIV-positive mothers in Zimbabwe. These findings merit further investigation so that appropriate behavioral strategies can be designed. *J Hum Lact.* 22(1):48-60.

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Zimbabwe is a breastfeeding nation, with more than 98% of women successfully nursing their babies up to 1 year.¹ The government of Zimbabwe has long supported breastfeeding initiatives through various campaigns, including the Baby-Friendly Hospital Initiative, which first began in 1989.² Zimbabwe is equally a nation under

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siege by the human immunodeficiency virus (HIV) epidemic. It is estimated that 25% of the adult population (15–45 years of age) is infected with HIV, and a national study completed in 2001 showed that the antenatal seroprevalence rate was 32.5% of the overall population and more than 40% of women aged 25 to 35 years.³ Given facts concerning the vertical transmission of HIV, the government of Zimbabwe continues to promote breastfeeding rigorously, as stipulated in its national policy, but within a prevention of the mother-to-child transmission (PMTCT) of HIV strategy. As part of this strategy, the recommended infant-feeding options are exclusive and sustained breastfeeding, modified breastfeeding (early cessation of breastfeeding; expressing and heat treating mother's own milk), and replacement feeding (use of modified animal milk and infant formula feeding).⁴

In the context of PMTCT, the World Health Organization (WHO) and the Joint United Nations Programme on HIV/AIDS (UNAIDS) recommend that breastfeeding should be avoided only when alternative feeding options are acceptable, feasible, affordable, safe, and sustainable.^{5,6} Although substituting infant formula for breastfeeding has essentially eliminated mother-to-child transmission of HIV through breastfeeding in industrialized nations, formula is neither a safe nor affordable option for many HIV-positive mothers in numerous parts of the world. In 1 study, formula feeding was associated with a 14-fold increase in diarrhea-associated mortality for all infants and a 25-fold increased risk in infants younger than 2 months.⁷ Additionally, in 2004, unemployment in Zimbabwe was upward of 70%, and more than 65% of Zimbabweans were living below the poverty datum line, putting the possibility of purchasing formula out of reach for most of them.⁸ Moreover, high rates of HIV prevalence are compounding the nation's current political and economic crisis; 1 in 3 Zimbabweans are HIV-positive. The dual effects of poverty and accelerating rates of HIV infection, with an estimated 50 000 to 60 000 infants infected as a result of MTCT alone in Zimbabwe,⁹ means that an alternative method of infant feeding is desperately needed.¹⁰

Methods of heat treating human milk have been investigated. Holder pasteurization (62.5°C for 30 minutes) inactivates HIV type 1 (HIV-1) and is widely used in human milk banks.^{11–14} Flash-heating (heating human milk in a water bath until the water begins to boil, then

removing the milk from both the water bath and heat source) and Pretoria pasteurization (boiling a pan of water, removing it from the heat source, and immediately placing a covered jar of human milk in the water for 20 minutes) have been reported to denature HIV in the laboratory.^{15–18} Either of these methods, applied to manually expressed human milk, could be simple in-home procedures and could offer a new option of infant feeding in the developing world.

The WHO, the United Nations Children's Fund (UNICEF), and UNAIDS recognize heat treatment of human milk as a possible protective modification to breastfeeding for HIV-positive mothers, but virtually nothing is known about its acceptability by those who could potentially use it.^{4,19–23} The method is briefly addressed in 4 of 7 exploratory studies on replacement feeding in a recent UNICEF report.²⁴ Few participants in these studies, conducted in Tanzania, Kenya, South Africa, and Zambia, spontaneously mentioned expressed, heat-treated human milk as a known option, and their responses suggested that the method would be poorly accepted. The methodology for obtaining these opinions and reasons underlying participants' views were not described. Similarly, in the Mazowe district of Zimbabwe, a quantitative, cross-sectional study (N = 240) of HIV-positive women and infant feeding options noted that expressing and heat treating human milk was the least frequently mentioned method when participants were asked to spontaneously discuss breastfeeding options; it was also rated as the least acceptable of all options on a Likert-type scale. Reasons for low acceptance were neither investigated nor well understood.⁹

To address this notable dearth of information, we designed an acceptability study using qualitative methods to explore knowledge of, attitudes toward, and resources required for heat treating expressed human milk as a potential infant-feeding option for HIV-positive mothers in Zimbabwe. Our study encompassed several geographic regions, targeting persons most involved with the infant-feeding decision-making process. As a preliminary study, it is our intention to use these findings to plan and guide further investigative research in this area and ultimately guide the development and implementation of specific community-based educational interventions designed to promote safe breastfeeding practices.

Methods

Study Design

Given the exploratory nature of the study, focus group methodology was used to elicit a multiplicity of views and processes within the group context. Qualitative data from 13 focus group discussions were collected in 2001. Groups ranged from 4 to 7 people, with a total of 77 study participants, who were recruited by local health care or community center workers. The purpose of the study was explained, and verbal and written consent was obtained prior to beginning the discussion. The Human Subjects Committees of the University of Zimbabwe and the University of California, Berkeley, approved all protocols. Informed written consent was obtained from the volunteers under the guidelines established by the Human Subject Review Committee.

Study Population

The study targeted 4 homogenous groups that influence the infant-feeding decisions in Zimbabwean culture: women of childbearing age with breastfeeding experience, grandmothers (> 45 years of age), registered nurse midwives or traditional birth attendants, and fathers of children younger than 5 years. Separate focus group discussions were held with each group in 3 geographic regions: Harare (the capital of Zimbabwe), Glenview (a high-density and relatively low-income middle class suburb of Harare), and Chipinge (a tea and coffee estate in the mountains bordering Mozambique, with low-income workers). These regions were selected to provide diverse cultural perspectives and, to the extent possible, to represent high, middle, and low socioeconomic status, respectively. Additionally, because HIV status was not asked of any participant, a discussion group was also held with women of childbearing age in Glenview who were acknowledged members of an HIV support center to ensure that views of women known to be HIV-positive were included. Because of the nature of the groups, as indicated above, male and female participants did not take part in the same discussions. In total, 13 focus group discussions were held: 4 homogenous groups in each of the 3 demographic regions, plus 1 group of HIV-positive women in the Glenview area.

Procedure

A study guide was developed with input from (1) mothers in a clinic who were manually expressing their

breast milk for premature infants, (2) a pilot focus group discussion with female counselors at an HIV support center, and (3) discussions with lactation consultants and other related health professionals. Focus group discussion topics included the current practice and understanding of manual expression of milk, knowledge of the heat treatment method to reduce MTCT, cultural perceptions, required resources, community and familial support, education or counseling that might be required to successfully attempt heat treatment, and the overall potential acceptability of this method. Two methods of pasteurization known at the time of this study were introduced and discussed during the group facilitation—Holder pasteurization and flash heating.

All focus groups were facilitated by 2 investigators (a Zimbabwean research associate and a public health practitioner from the United States); sessions were conducted in either English, Shona, or a combination, depending on group preference. Discussions were held in a private setting for approximately 90 minutes and were audiotaped and then transcribed verbatim for translation to English (if necessary) for analysis. Demographic information was collected, and false names were used throughout the discussions and during analysis to ensure confidentiality. Refreshments and compensation for travel were provided following each discussion.

Analysis

Focus group data were analyzed using a standard content analysis and the organization of analytical categories relevant to the subject areas. Three investigators read the transcripts of the focus groups; 2 coded the data independently of each other. The first investigator stratified and coded all dialogue using a coding framework based on 4 broad thematic areas: knowledge, practice, cultural challenges to the practice of using heat-treated expressed human milk, and feasibility of the practice. A second investigator coded the data and identified thematic areas independently of the first investigator. Then, following discussion, thematic areas from both investigators were merged into similar analytical categories. The 4 themes encompassed all the topics discussed by participants and were categorized as follows. The knowledge and practice themes included the topic “current practice of expressing breast milk”; the cultural challenges theme included the topics “cultural taboos: confession and contamination” and “social stigma: the community and the household”; and the fea-

sibility theme included the topics “feasibility of expressing and heat treating human milk: resources and education” and “resources: equipment and education.” These topics are discussed in detail below. All the findings captured by this study reflect social norms rather than individual behaviors. As with any study reliant upon self-reported data, the potential exists for information bias, especially in the underreporting of stigmatized or risky behaviors.

Limitations

This study encompassed only 3 geographic regions in Zimbabwe, a range that is not fully representative of the country or of ethnicities within the country. Additionally, our findings may not be applicable to other populations with varying cultures and social pressures within sub-Saharan Africa and elsewhere. Finally, there are general limitations with using focus group methodology. The focus group facilitator allowed participants to talk to one another, to ask questions, and to express doubts and opinions, but in some cases not all the necessary data were collected on each variable of interest. Finally, we acknowledge that our methods were exploratory and that we are unable to determine whether a substantial number of women in the community would share the views of our participants.

Results

Demographic characteristics are presented in Table 1. Participant ages ranged from 18 to 65 years, with an overall mean age of 42. Overall, education and employment levels corresponded with location and socioeconomic status: participants from Harare were all gainfully employed and highly educated, with only 1 of 22 participants not having completed a university education. In Glenview, the poor suburban location, education and employment levels were considerably lower among all participants, with the exception being the midwife participants, who were all university educated and employed. In Chipinge, a primarily agricultural setting, employment and education levels were significantly lower, as is typical throughout rural Africa. Notably, male participants in the fathers’ group in Chipinge had all obtained a secondary level education and were all employed, as compared to mothers, grandmothers, and traditional birth attendants. Overall, the age at which participants first became a parent tended to be higher among the educated Harare groups and lower among the less-educated Chipinge groups, especially among

female participants. Likewise, rural participants tended to have larger families than did their suburban or urban counterparts.

Exploring the potential of using expressed and heat-treated milk as a preventative measure to decrease the risk of HIV transmission was facilitated along 5 topical areas: current practice of expressing breast milk; cultural beliefs and barriers surrounding the practice; social stigma associated with the practice; issues around the feasibility of heat treating expressed breast milk; and whether there were enough resources, both physical as well as educational, to advance the practice within Zimbabwe.

Current Practice of Expressing Breast Milk

Zimbabwe has a strong breastfeeding culture. Prolonged breastfeeding is common, although exclusive breastfeeding up to 6 months is practiced by the minority; from 1995-2002, 33% of children younger than 6 months were exclusively breastfed.²⁵ Among all groups, manual expression of human milk was a known and fairly accepted practice for feeding preterm, sick, or orphaned infants; alleviating the pain of sore nipples; coping with employment outside the home; or for cultural reasons. The practice of expressing milk was considerably more common among working women from Harare and Glenview and reflected urban women’s enhanced employment opportunities. Initial difficulty expressing milk was discussed by women across the groups, though most agreed that expression—as with breastfeeding—became considerably easier with practice and significantly so once women were fully lactating. Overall, urban participants found the expression of human milk a relatively easy option, as one mother from Glenview noted: “Even when I had my firstborn, expressing was not a problem. It was only that lactation was not yet in full swing, but the following day it was ok.” Women used both pumps and manual expression techniques. During discussions among women in the urban and suburban groups, there was consensus that while “the pump [is] faster,” manual expression is “a more sustainable approach.” Rural-based participants have distinctly different experiences with expression than do their urban counterparts. Women from Chipinge had expressed their milk considerably less often, usually in cases in which they were forced to leave their immediate village to attend a funeral. Many female participants believed that the mother’s nutritional status, energy level, and lactation capability

Table 1. Characteristics of Participants in Group Discussions in Each Region

	Harare (n = 22)				Glenview (n = 30)				Chipinge (n = 25)				
	Mothers (n = 5)	Fathers (n = 4)	Grandmothers (n = 7)	Midwives (n = 6)	HIV Support Center Members (n = 6)	Mothers (n = 6)	Fathers (n = 5)	Grandmothers (n = 7)	Midwives (n = 6)	Mothers (n = 6)	Fathers (n = 7)	Grandmothers (n = 6)	Traditional Birth Attendants (n = 6)
Age,* y													
15-24	0	0	0	1	0	1	0	0	0	3	0	0	0
25-34	1	1	0	0	5	5	1	0	1	2	4	0	0
35-44	2	4	0	0	0	0	0	4	2	1	1	0	2
> 45	2	0	7	3	1	0	4	3	3	0	1	4	1
Education													
< Grade 7	0	0	0	0	1	0	1	3	0	1	0	5	4
Grades 7-12	0	2	0	0	0	6	4	4	0	5	7	1	2
University	5	2	7	6	0	0	0	0	6	0	0	0	0
Employment (all ages)													
Age at birth of first child,**† y													
15-24	2	0	4	4	6	5	1	7	4	6	5	3	4
> 25	1	4	2	2	0	1	4	0	2	0	2	2	2
No. of children													
< 2	1	1	0	1	0	0	0	0	0	2	0	0	0
2-4	4	3	6	4	5	6	2	5	5	3	5	2	2
> 4	0	0	1	1	1	0	3	2	1	1	2	4	4

* Ages were unknown for 2 mothers and 3 traditional birth attendants in Chipinge.

** No births were to women younger than 15 years.

† Age at birth of first child was unknown to 2 Harare mothers, 1 Harare grandmother, and 1 Chipinge grandmother.

could limit success, whereas others cited examples from their own experience to support their view that these issues could be alleviated. Some mothers gave examples of expressing for extended durations of time, such as with a mother from Glenview who “exclusively expressed for 6 weeks and started training her [baby] on the seventh week.” Although not asked directly, 18 female participants (30%) volunteered that they had expressed their milk at some point during lactation. Some women also reported that they had heated their milk to comfort their infants. However, only 5 participants (all of whom had received training in HIV clinical or research settings) out of 77 were aware that heating expressed milk could prevent HIV transmission.²⁶

Most participants, both male and female and across all socioeconomic groups, voiced considerable initial concern about a mother’s inability to bond with her child in the absence of breastfeeding. At the start of the discussion, the majority of participants were adamant that only a breastfeeding child was capable of recognizing its mother by touch, voice, and smell. However, a shift in opinion occurred throughout the process of open discussion, attesting to the power of dialogue. Several of the mothers, midwives, and traditional birth attendants from all 3 geographic areas (all of whom had experience expressing milk), were adamantly opposed to these opinions, since they had personally overcome issues around bonding through conscientious efforts to connect with their nonbreastfed infants. Interestingly, one father from the rural areas even believed that the issue of bonding could be overcome: “Mothers should maintain that relationship, feel the love between mother and child just as if she is breastfeeding.”

Cultural Taboos: Confession and Contamination

While knowledge about and actual practice with expressing milk were discussed openly within the different group contexts, these discussions segued into considerable debate regarding cultural taboos around the practice of expressing and storing human milk. Figure 1 illustrates these beliefs according to geographic region and population. Knowledge of cultural taboos and superstitions associated with the practice of expressing milk were undifferentiated by gender or socioeconomic status. Knowledge of these beliefs were surprisingly consistent among both lay and health care professionals. However, participants from Harare and Glenview were less concerned with the implications of these beliefs as compared to rural participants from

Chipinge. Urban groups would often refer to these cultural beliefs as originating “in the rural areas.” A university-educated mother from Harare confirmed this tendency, noting, “We still have a lot of attachment to common beliefs, because a lot of people leave the rural areas and come to the city.” The most commonly cited belief, in both rural and suburban settings, was that a nonbreastfed infant was acting as a prophet to reveal that either the mother or the father had been unfaithful. In Glenview, for example, a trained midwife remarked that the expression of human milk was a sign of infidelity and that the child who refuses to nurse, and who thus receives expressed milk, is said to suffer until a mother confesses her wrongdoing.

The concept of one becoming contaminated by touching human milk was a widespread concern among participants in all groups. Vessels that hold expressed milk, such as bottles, cups, or pots, were considered contaminated, and this contamination could affect anyone entering the home, according to several midwives and birth attendants from both Glenview and Chipinge. A grandmother from Harare was open about her disdain: “All in all, it is very difficult. . . . It will be like I am eating human meat. People need a lot of education to accept this.” Several participants from all groups indicated that it was common to view nonbreastfeeding women as witches: “A lot of suspicion will be raised, like [a nonbreastfeeding woman] is a witch. [And that] she wants to feed her [breast milk] to snakes, goblins, and hyenas.” The social implications of this practice are serious and could result in the community accusing a nonbreastfeeding mother of being responsible for the potential death of her child. Although taboos around confession and contamination associated with expressed milk were discussed and agreed upon by all focus group participants, Harare participants seemed to have less attachment to such beliefs.

Interestingly, during the groups’ conversation on barriers to the practice of expressing human milk, sequential turns in the discussion occurred to counteract these strong cultural beliefs. For example, one participant, who described in detail the negative cultural implications for nonbreastfeeding women and their children, noted by the end of the conversation: “With enough education, people can learn more. If this word is spread everywhere, people can accept because people are looking for any means to survive and save their lives.” Although cultural taboos may exist, through discussion many participants concluded that, with the suffering of

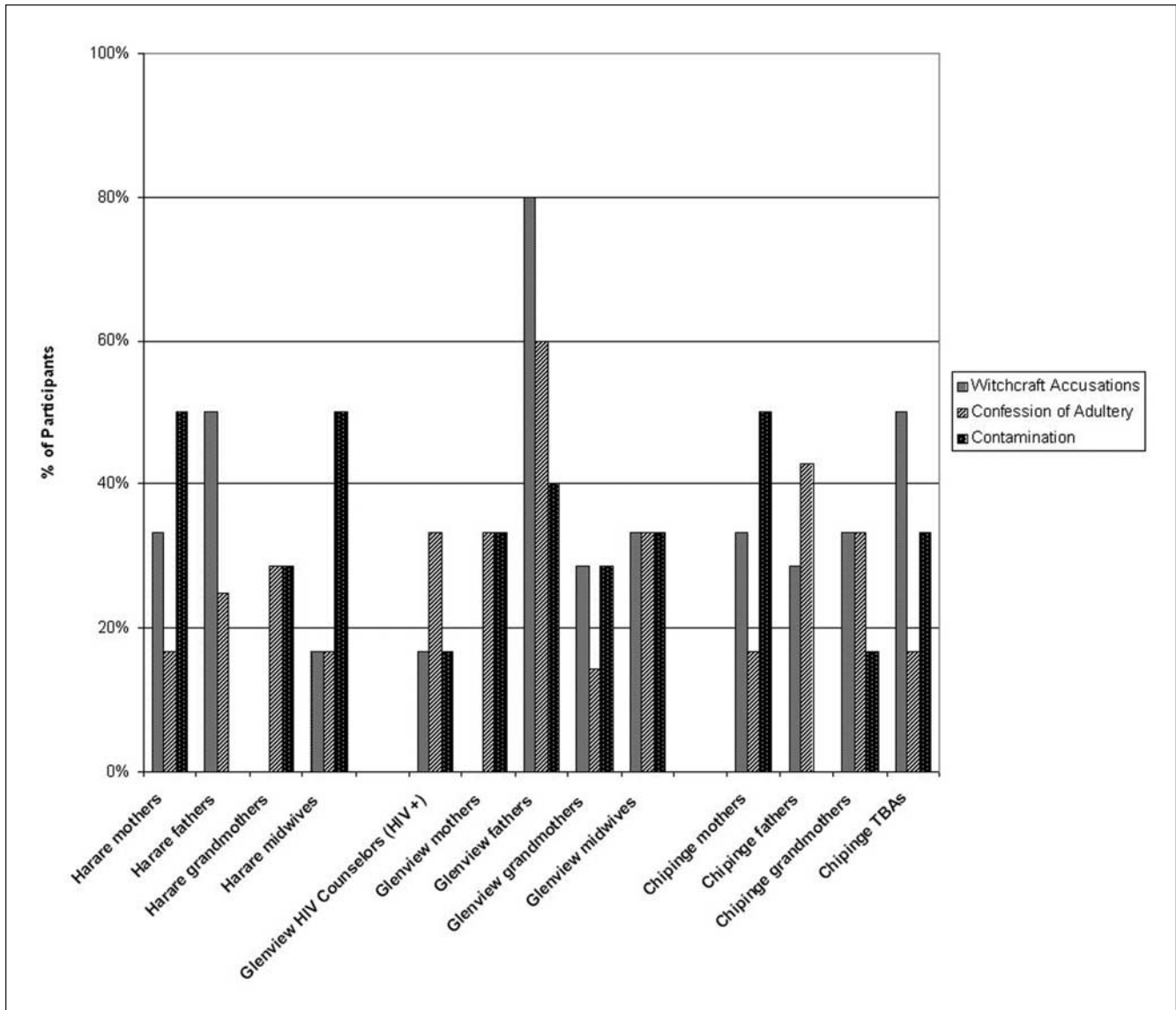


Figure 1. Cultural issues voiced by participants surrounding the expression of breast milk by groups and demographic regions.

HIV/AIDS in their communities, no obstacle was too great. Once the facilitator introduced the topic of HIV transmission through breastfeeding, the discussion moved to a new level. Knowledge that HIV transmission could occur through breastfeeding was high, with the exception of some of the rural-based Chipinge birth attendants and mothers, who were generally misinformed about transmission. However, knowledge that heating expressed human milk could prevent HIV transmission was limited to only 5 of the 77 participants, all of whom were health care workers who had received targeted training in HIV clinical or research settings. Once the technicalities of the process were explained and understood, the conversation shifted from taboos to

stigma within the community and household contexts. The HIV/AIDS stigma figured prominently in the discourse.

Social Stigma: The Community and the Household

Participants openly discussed fears of rejection by community and family due to not breastfeeding. A midwife from Harare placed this stigmatization within a broad cultural and community context: "In the African societies, [an issue around] the family, you know, is not an individual decision. Although the final decision lies with me, because I decide to do whatever I want to do. But culturally, it's not acceptable. I might have given birth to that baby, but that baby does not belong to me

alone. It belongs to the clan.” Corroborating this opinion, one grandmother from Chipinge noted, “Everyone is affected when the child is not breastfed.” Discussion around community pressures in turn elicited discussion around forms of social control and witchcraft, which surfaced again, even among participants living in urban settings. Participants agreed that using formula or other human milk substitutes, as well as expressing human milk, could indicate that the mother was HIV-positive and thus target her for further stigma in the community. “They will say you have been attacked by AIDS,” concluded one mother from Glenview. The extent to which people framed this stigma as socially alienating within the larger community setting was significant. As a father from Glenview noted: “You’ll be saying to people, ‘I’m infected.’”

At the household level, views varied concerning negative family perceptions. Although the majority of urban and suburban participants believed that decisions around feeding should be equally shared by the mother and father, others believed that ideally, the decision should rest with the mother alone. Many participants believed that in practice, the mother-in-law, who plays a significant role in the family constellation, should make decisions affecting babies in the households. Several participants noted that a mother-in-law would also lay blame on the woman for infecting her son. Participants in the rural-based focus groups were decidedly more unilateral in their opinions about infant-feeding decisions and believed that if a mother were HIV-positive, the father or the doctor should choose and that this decision should then be shared with the mother, reflecting more traditional gender-based roles. Several of the women’s groups noted that financial dependence of the mother may dictate who has the right to decide, giving the employed urban mother a distinct advantage in her ability to make decisions around infant-feeding options, independent of her spouse or family. Although opinions among urban and suburban participants were overall weighted favorably toward a mother’s prerogative, gender inequities can in practice curtail, if not forbid, women from making these decisions on their own. Patriarchy is strong in Zimbabwe. In several cases, even women from both the urban and suburban areas noted that they run the risk of strained relationships and, in the worst case, dissolved marriages should they choose feeding options independent of their spouses and outside of traditional breastfeeding practices. The

implications of this patriarchal tendency are even more pronounced for women living in rural Zimbabwe.

During all of the focus groups, the discussion of these gender issues made it clear that gross inequalities between men and women, or fathers and mothers, could forbid safe breastfeeding practices. Through effective facilitation within the groups and the process of group dialogue, participants began to make the important link that heat-treated breast milk might be a lifesaving option for young infants. This process in turn helped participants, particularly in the 3 groups of fathers, reflect on the issue of a child’s survival in a broader context. Here too, as with issues surrounding bonding and cultural taboos, an interesting shift in perspective occurred. Numerous fathers from all 3 socioeconomic classes altered their previous male-centered decision-making perspectives, with the turn most notable among rural fathers. “If it’s my child, yes, I can be comfortable,” remarked one father from Chipinge. Another father from Glenview noted that men’s lack of access to antenatal care has meant that their opportunities for education on the topic of feeding options have been hampered: “With enough education, they [husbands] can handle it.”

Feasibility of Expressing and Heat Treating Human Milk: Resources and Education

Cultural and gender issues aside, facilitators asked participants to consider the feasibility of using heat-treated expressed human milk for infant feeding. Nearly all the participants were interested to hear of the data supporting the safety of heat-treated human milk and of there existing a means to kill the virus. However, skepticism prevailed; many of the participants were concerned that heating could reduce the nutrients in human milk or that milk could easily spoil during storage, and they asked for research evidence to ensure that the practice of heating human milk would be safe for the infant. When facilitators encouraged participants to talk about the possible advantages of this method if it could be proven to be safe, participants across all groups cited the low cost of using expressed human milk compared to formula as the major benefit of the heat treatment method. Other significant advantages of human milk that they cited were its convenience and consistent availability, compared to the perhaps undependable supply of formula or other human milk substitutes. Overall, the feasibility of the method, voiced here by a

father from Harare, was generally shared by all: "It is very cheap, if you consider other options like formula, for instance. It is cheaper to express mother's milk and heat it up. It's automatic. So this is a consideration, and it would work well for people in the rural communities, where money is scarce. This idea appears to be too simple to be true from what we've heard about HIV/AIDS." This was echoed by a grandmother in Chipinge: "It is good because it's almost for free and there is not time where your baby can starve because you do not have money; it's always available."

When the feasibility of heat treating and expressing milk was first introduced to most of the groups, it was hesitantly accepted as "convenient" for its low-cost and low-technology approach but not as particularly "practical." Major concerns were related to the time required for the process and convenience of the method. One male participant from Chipinge noted that for mothers who travel frequently, especially in the rural areas, finding a pan and a heating source could be highly problematic. And yet opinion reversals, from negative to positive, also occurred on the subject of feasibility within the group context. Through animated discussion among participants, during which facilitators contributed only to clarify a process or verify a fact, people's attitudes changed in remarkably positive ways. For example, at the beginning of the conversation, a grandmother from Harare noted, "Is the mother able to do it right away? The mother is working in the field, time to express, and boil. You are right there in the field. It's cumbersome, it's inconvenient, and it's also . . . we don't want to say this is not practical, but it has got constraints." At the end of the discussion on this topic, the same grandmother commented, "It is possible; it can be done."

Another participant, from the same group, was only slightly persuaded: "I think that to some extent it can work. I would want to think that when this is introduced the mother would have been counseled and she will know that she is HIV-positive. And she will have been counseled to understand that the only way she can save her child is to boil the milk. So I would want to think that it can work, but it calls, as she had said, [for] a lot of commitment." However, following heated discussions around feasibility and sheer survival, this woman also shifted her position: "What if you say it's cumbersome, but then when it's your own child . . . we've had sick babies who cried all night. You don't sleep because

you're just sympathizing with your baby. . . . So if you're expressing and seeing your child surviving . . . you're doing all this because you're sympathizing and you think that your baby will be all right."

Resources: Equipment and Education

Facilitators explained how the 2 heating methods, flash-heating and Holder pasteurization, worked. Detailed discussions ensued around resources; both physical (such as equipment and fuel) as well as educational issues (such as advancing the practice in the community and households) were cited as areas that could make the act of expressing and heat treating milk challenging.

Overall, participants were unanimously in favor of the flash-heating method, given its simplicity. Stated benefits included minimal equipment (neither thermometer nor clock would be needed), less required time and fuel, and the fact that the flash-heat method was similar to the procedure commonly utilized to sterilize cow or goat's milk in the home. Initially, participants from the urban and suburban groups were biased in their preference that bottle-feeding be used for feeding expressed human milk, although in the process of conversing, participants agreed that bottles were both expensive and difficult to keep clean. During the course of the discussion, nearly all the participants agreed that it was better to use less equipment: a plastic cup is available in homes throughout Zimbabwe, as are a jar and pot for heating and soap for keeping these basic utensils clean. Establishing separate utensils for infant feeding and extensive cleaning with boiling water and cleaning solution were already the cultural norms. A comment from a Harare midwife ("It doesn't have to be new, just a clean cup used, nothing special.") reflects a sense of pragmatism that was echoed in all the group discussions.

The availability of fuel supplies is central in developing countries, and Zimbabwe is no exception. Overall, urban and suburban participants had access to fuel sources for both the boiling and storing of milk, whereas in rural areas, these conveniences were less available. Issues around proper storage of the milk surfaced most frequently among participants who did not have access to refrigerator and freezer facilities, although alternatives were discussed. Increasingly, the loss of electricity, even in Harare's most exclusive neighborhoods, is likely to be a problem, though at the time of the inter-

views, this was not cited as an obstacle. Some of the urban participants believed that finding the time to fetch wood, make a fire, and boil the milk could be cumbersome for women living in rural areas, but surprisingly, no rural participants commented on this area as a potential obstacle.

“Education,” noted one father from Harare, “is our best resource.” Another father from Harare corroborated this statement, saying, “I think the only reason it doesn’t work is because people haven’t known about this.” Fathers from all the socioeconomic groups were surprisingly vocal about how best to address issues around education, HIV/AIDS testing, and counseling overall. Even rural fathers, who are said to be the most traditional in their views, were open to the process of education. As one Chipinge father said, “I think it can work because they [husbands] will be taught to accept and understand.”

Toward the end of the focus group discussions, participants offered numerous suggestions for implementing this infant feeding method in their communities. Zimbabwe’s HIV/AIDS crisis is slowly forcing communities to come to terms with the devastation of the illness, and as one mother from Harare poignantly stated, “We need to raise a lot more awareness; you ought to feed, and everybody knows that she’s doing everything to take care of the baby, regardless of if she has AIDS or not. It’s no longer finger pointing, but the survival of the child.” The majority of participants emphasized that denial of HIV and stigma toward those known to be HIV-positive are general problems that must be addressed at individual, family, and broader societal levels. Most participants recommended both community education and individual counseling for HIV-positive mothers and their extended families, including detailed descriptions and demonstrations of how to express and heat treat human milk safely with extensive postnatal follow-up support through home visits. Participants recommended targeting mothers and fathers at antenatal and postnatal clinics as well as fathers at workplaces, beer halls, and town meetings. Most participants felt that trained counselors from the community, rather than medical doctors, would be preferred educators. However, participants from the Chipinge area cautioned that using counselors from within their community would threaten confidentiality. Some participants from the Harare groups recommended that because many women are unaware of their status, information about HIV-protective infant-feeding options be widely

discussed, through the media and the existing community structures such as headmen, chiefs, and village meetings, rather than simply directed to those women known to be HIV-positive.

Discussion

The use of focus groups to identify the acceptability and feasibility of expressing and heat treating milk in the Zimbabwean context proved to be a highly fortuitous choice for exploring how perceptions change as a result of information delivery. Although the method of heat treating expressed human milk was initially met with general skepticism, with time and movement through various topical areas, participants spontaneously countered these views by citing personal experiences as examples that the method could succeed. As the process was discussed in detail, participants’ perceptions of the potential feasibility of heat-treated breast milk shifted to a more open and hopeful perspective, and a pattern of opinion reversal was observed on diverse topics, including concerns about bonding, cultural taboos, male authority on infant-feeding options, and the overall feasibility of the method. Initial concerns regarding community and household acceptance, issues of stigma, and finding clean utensils and fuel shifted to a strong desire to live and to save the infants within the community, if not within the nation. Enthusiasm for the idea increased in all groups but was correlated with educational attainment: the Harare groups expressed a greater sense of autonomy toward adopting this method, whereas the less-educated participants of Chipinge were least confident. The opinion reversal that occurred during these focus groups suggests that, because the practice and benefits of heat-treated breast milk are largely unknown, it may be necessary to first provide sufficient background information as part of the research process and to encourage participants to share their personal experiences and openly discuss heat treating as a potential method.

All groups voiced the desire to protect their children from HIV as the reason for needing an alternative infant feeding method. Issues around the knowledge and practice of expressing human milk were relatively well-accepted among urban and suburban participants, though less so among rural mothers. Yet there was no reluctance to discuss the practice of expression in any of the groups, and opinion reversals around bonding indicated that rural women, with education, would certainly be open to more information on the practice.

Likewise, issues around community and household stigma seemed to pale in comparison to participants' understanding of how enormously HIV is affecting Zimbabwean society. The transmission of HIV from mother to child through breastfeeding, and the potential to avoid this transmission, incited strong emotive comments from all group members, which in turn helped participants reflect on their inability to adapt to this method thus far, described by one Zimbabwean researcher as "unacceptable and not utilized."²⁷ Cultural taboos appear to work against expression of human milk and are quite strong in parts of Zimbabwe. The double stigma associated with expressing human milk as well as with being HIV-positive was a topic that caused considerable debate. Participants in all of the groups cited concern over contamination of the entire household by the presence of "human" milk. These taboos regarding contamination, coupled with the feeding of spirits, are particularly powerful in rural Zimbabwe, where mothers in the most extreme cases are accused of trying to kill their own children if they refuse to breastfeed. Even so, in the changing context of the HIV/AIDS pandemic, these beliefs appear to be mutable. A nurse from Glenview summarized these sentiments: "The community can accept this. With enough education, people can learn more. . . . I think people can accept because people are looking for any means to survive and save their lives."

Gender too seemed to be a considerable obstacle for women who might seek safer infant feeding options, since men are likely to be opposed to women making these decisions independently of them. Women, especially those during childbearing years, are more vulnerable to HIV transmission for reasons of biology, gender, and cultural norms. Two thirds of newly infected youth aged 15 to 19 years in sub-Saharan Africa are female. Among women, the peak age for HIV prevalence tends to be around 25 years—10 to 15 years younger than the peak age for men.²⁸ However, many male participants suggested that if consulted beforehand, most husbands would support a mother's decision to express and heat treat her milk to protect their baby and that problems could be prevented if both parents discussed their HIV status and infant-feeding choice with trained health personnel in advance. If these findings can be substantiated, then dual testing and counseling for women and men, as couples and new parents, could go a long way toward identifying HIV infection rates, preventing new infections, educating couples about safe sexual prac-

tices, and ultimately ensuring that the couple's child is given the best chance to survive through safe feeding options. Involving men as partners and fathers in the perinatal period has long been encouraged in developed countries; pushing for these same standards in countries like Zimbabwe appears to be highly feasible if the public health system is willing to respond.

Previous studies suggest that cost is a greater obstacle to formula feeding than is the stigma associated with not breastfeeding.^{23,29-31} Participants in this study agreed that the strongest benefit of heat-treated human milk would be its affordability, especially given Zimbabwe's economic struggle. The participants questioned a mother's ability to produce and maintain an adequate milk supply with manual expression and what effect heat treatment may have on the nutritional, immunological, and antimicrobial safety of human milk. Participants were also realistic about the effort required by this approach because of time and physical constraints, but they believed that increased community and family support would be highly beneficial. Many expressed hope that these challenges could be addressed through the sufficient education and counseling of the mother, couple, family, and community. Overall, the pattern of opinion reversal on the feasibility of this infant feeding option was clear—a general hesitancy about the feasibility was replaced by a vital discussion about ways in which the medical and public health community could creatively tackle education, counseling, and follow-up for new mothers and fathers. During the course of group conversations, several innovative ideas surfaced, such as in-home visits, demonstrations of the method to new families, and targeted counseling for different audiences. For this enthusiasm to take hold, national support for expressing and heat treating human milk will be of paramount importance.

Exclusive breastfeeding for 6 months followed by abrupt weaning has been proposed as a protective strategy for HIV-positive mothers in communities where formula is not affordable or safe to use.^{32,33} However, if a high-quality nutrition source is not available, the weaning process may result in an increased risk of morbidity and mortality. If new data support exclusive breastfeeding followed by abrupt weaning as a means to reduce the risk of HIV transmission, then expressed, cup-fed, heat-treated human milk could serve as an affordable and continuing source of species-specific nutrition and immunological protection during the 6- to 24-month period, an age at special risk for infants in developing

countries to develop malnutrition, stunting, and wasting.³⁴ The transition from exclusive breastfeeding to successful manual expression may be more feasible when the mother's milk supply has already been well established; however, with frequent emptying of the breasts, whether by breastfeeding or manual expression, lactation can be maintained, and birth-spacing due to lactational amenorrhea may be observed. Furthermore, by 6 months of age, infant nutritional needs can be supplemented by complementary foods; thus, manually expressed human milk would not need to be the sole source of nutrition. Heat-treated human milk could also be partially used during breastfeeding. A recent study of Kenyan mothers concluded that the probability of infant transmission per liter of human milk consumed (0.00064) was approximately equivalent to the risk of 1 unprotected sex act with an HIV-positive partner.³⁵ This finding suggests that even a partial reduction in exposure to HIV-infected human milk, such as 1 or more feedings of heat-treated human milk per day, could translate into a meaningful reduction in risk of acquiring HIV through breastfeeding.

Although this formative research study was limited in some respects by the research design, the findings indicate that additional research in other populations is needed. Our findings also indicate that when research involves an issue that may be widely unknown, such as heat treating manually expressed human milk, it is imperative that sufficient background information be provided to the participants as part of the research process so they fully understand the context and can openly participate. In light of increasing rates of HIV/AIDS throughout Zimbabwe and many other developing countries, particularly among young women of child-bearing age who are likely to breastfeed their infants, our findings are vitally important. This study suggests that heat treatment of expressed human milk may be an acceptable and affordable infant feeding alternative to help prevent vertical HIV transmission in Zimbabwe.

However, during a World Breastfeeding Week conference in Zimbabwe in 2004, the practice of expressing and heat treating human milk was not a priority issue on the agenda, indicating that it is not a widely promoted or practiced method, though it may be a practical option in resource-starved countries. This is testimony to the fact that additional research is needed to ascertain the biological safety of expressed and heat-treated human milk, the ability of women to express milk successfully, and the impact of using expressed milk on postnatal

HIV transmission.³⁶ We recognize that participants' voicing an interest in attempting this method does not ensure their willingness or ability to actually implement it. The participants did not view the use of manually expressed heat-treated human milk as a panacea; indeed, they were realistic about the obstacles and level of commitment that the method would require. Nonetheless, participants urged that, if proven safe, the heat treatment of expressed human milk should be presented as an infant-feeding option for HIV-positive mothers within their communities.

References

1. Zimbabwe Ministry of Health and Child Welfare. *Zimbabwe National Health Survey*. Harare, Zimbabwe: Government of Zimbabwe; 1988.
2. United Nations Children's Fund (UNICEF), World Health Organization (WHO). *Breastfeeding Management and Promotion in a Baby-Friendly Hospital: An 18-Hour Course for Maternity Staff*. New York, NY: UNICEF; 1993.
3. Zimbabwe Ministry of Health and Child Welfare. *Sentinel Surveillance Report*. Harare, Zimbabwe: Government of Zimbabwe; 2000.
4. Zimbabwe Ministry of Health and Child Welfare. *Infant Feeding and HIV/AIDS Guidelines for Health Workers in Zimbabwe*. Harare, Zimbabwe: Government of Zimbabwe; 2000.
5. World Health Organization (WHO), United Nations Children's Fund (UNICEF). *HIV and Infant Feeding: Framework for Priority Action*. Geneva, Switzerland: WHO; 2003.
6. World Health Organization (WHO), United Nations Children's Fund (UNICEF), Joint United Nations Programme on HIV/AIDS (UNAIDS). *New Data on the Prevention of Mother-to-Child Transmission of HIV and their Policy Implications*. Geneva, Switzerland: WHO; 2000.
7. Victora CG, Smith PG, Vaughan JP, et al. Evidence for protection by breast-feeding against infant deaths from infectious diseases in Brazil. *Lancet*. 1987;2:319-322.
8. Zimbabwe increases poverty datum line. Available at: www.newzimbabwe.com/pages/inflation12.11615.html. Accessed September 2004.
9. Sibanda L. *HIV Positive Women and Infant Feeding Options in Prevention of Mother to Child Transmission Programmes, Mozowe District Zimbabwe* [master's thesis]. Harare, Zimbabwe: University of Zimbabwe; 2003.
10. De Cock KM, Fowler MG, Mercier E, et al. Prevention of mother-to-child HIV transmission in resource-poor countries: translating research into policy and practice. *JAMA*. 2000;283:1175-1182.
11. Orloff SL, Wallingford JC, McDougal JS. Inactivation of human immunodeficiency virus type I in human milk: effects of intrinsic factors in human milk and of pasteurization. *J Hum Lact*. 1993;9:13-17.
12. Eglin RP, Wilkinson AR. HIV infection and pasteurisation of breast milk. *Lancet*. 1987;1:1093.
13. McDougal JS, Martin LS, Cort SP, Mozen M, Heldebrant CM, Evatt BL. Thermal inactivation of the acquired immunodeficiency syndrome virus, human T lymphotropic virus-III/lymphadenopathy-associated virus, with special reference to antihemophilic factor. *J Clin Invest*. 1985;76:875-877.
14. Lawrence R, Lawrence R. *Breastfeeding: A Guide for the Medical Profession*. 5th ed. St. Louis, Mo: Mosby; 1999.
15. Jeffery BS, Mercer KG. Pretoria pasteurisation: a potential method for the reduction of postnatal mother-to-child transmission of the human immunodeficiency virus. *J Trop Pediatr*. 2000;46:219-223.

16. Jeffery BS, Webber L, Mokhondo KR, Erasmus D. Determination of the effectiveness of inactivation of human immunodeficiency virus by Pretoria pasteurization. *J Trop Pediatr*. 2001;47:345-349.
17. Chantry CJ, Morrison P, Panchula J, et al. Effects of lipolysis or heat treatment on HIV-1 provirus in breast milk. *J Acquir Immune Defic Syndr*. 2000;24:325-329.
18. Israel-Ballard K, Chantry C, Dewey K, et al. Viral, nutritional, and bacterial safety of flash-heated and Pretoria-pasteurized breast milk to prevent mother-to-child transmission of HIV in resource-poor countries: a pilot study. *J Acquir Immune Defic Syndr*. 2005;40:175-181.
19. Hankins C. Preventing mother-to-child transmission of HIV in developing countries: recent developments and ethical implications. *Reprod Health Matters*. 2000;8:87-92.
20. Joint United Nations Programme on HIV/AIDS (UNAIDS). *AIDS in Africa: An UNAIDS fact sheet*. Johannesburg, 30 November, 1998. South Africa: UNAIDS; 1998.
21. Tomlinson RJ, Madjarov A. Global voices on HIV/AIDS: pasteurised human breast milk should be considered. *BMJ*. 2002;324:1034-1035.
22. Latham MC, Preble EA. Appropriate feeding methods for infants of HIV infected mothers in sub-Saharan Africa. *BMJ*. 2000;320:1656-1660.
23. Coutsooudis A. Promotion of exclusive breastfeeding in the face of the HIV pandemic. *Lancet*. 2000;356:1620-1621.
24. United Nations Children's Fund—Regional Office for Eastern and Southern Africa (UNICEF ESARO). Analysis of studies on knowledge and perceptions of health workers and communities on HIV transmission and infant feeding options for HIV-positive mothers. Paper presented at: Meeting on HIV and Infant Feeding; October 9-10, 2000; Nairobi, Kenya.
25. United Nations Children's Fund (UNICEF). *Infant Feeding Practices in Zimbabwe*. New York, NY: UNICEF; 1996.
26. World Health Organization (WHO), Joint United Nations Programme on HIV/AIDS (UNAIDS), United Nations Children's Fund (UNICEF). *HIV and Infant Feeding Counselling: a Training Course—Participants' Manual*. Geneva, Switzerland: WHO; 2000.
27. Sibanda L, Jones D, Chirenda J, Tshimanga M, Babaera B. Acceptability of infant feeding options by HIV-positive women in prevention of mother to child transmission programmes (PMTCT) in Mazowe District, Zimbabwe. Paper presented at: World Breast Feeding Week Conference; August 2004; Bulawayo, Zimbabwe.
28. Joint United Nations Programme on HIV/AIDS (UNAIDS), World Health Organization (WHO). *AIDS Epidemic Update: December 2001*. Geneva, Switzerland: UNAIDS/WHO; 2001. UNAIDS/01.74E-WHO/CDS/CSR/NCS/2001.2.
29. Bassett MT. Psychosocial and community perspectives on alternatives to breastfeeding. *Ann N Y Acad Sci*. 2000;918:128-135.
30. Coovadia HM, Coutsooudis A. Problems and advances in reducing transmission of HIV-1 through breastfeeding in developing countries. *AIDS Science*. 2001;1:1-12.
31. Coutsooudis A, Goga AE, Rollins N, Coovadia HM. Free formula milk for infants of HIV-infected women: blessing or curse? *Health Policy Plan*. 2002;17:154-160.
32. Coutsooudis A, Pillay K, Kuhn L, Spooner E, Tsai WY, Coovadia HM. Method of feeding and transmission of HIV-1 from mothers to children by 15 months of age: prospective cohort study from Durban, South Africa. *AIDS*. 2001;15:379-387.
33. Ogundele MO, Coulter JB. HIV transmission through breastfeeding: problems and prevention. *Ann Trop Paediatr*. 2003;23:91-106.
34. World Health Organization (WHO). *Complementary Feeding of Young Children in Developing Countries: A Review of Current Scientific Knowledge*. Geneva, Switzerland: WHO; 1998. WHO/NUT/98.1.
35. Richardson BA, John-Stewart GC, Hughes JP, et al. Breast-milk infectivity in human immunodeficiency virus type 1-infected mothers. *J Infect Dis*. 2003;187:736-740.
36. Jeffery BS, Soma-Pillay P, Moolman G. The effect of Pretoria pasteurization on bacterial contamination of hand-expressed human breastmilk. *J Trop Pediatr*. 2003;49:240-244.

Resumen

A pesar de que el tratamiento de calentamiento de la leche humana es la recomendación oficial de alimentación infantil de madres VIH positiva en Zimbabwe, su implementación no se ha hecho adecuadamente debido al conocimiento rudimentario de seguridad del método y el poco entendimiento de la aceptabilidad del método. Para enfocar este vacío en el conocimiento, los autores realizaron grupos de enfoque con madres, abuelas, comadronas, y esposos en varias regiones de Zimbabwe. A pesar de que la práctica de tratar la leche materna extraída con calor se recibió con escepticismo debido a los obstáculos potenciales (entre ellos tiempo, estigma social y cultural), el patrón de opinión inversa surgió en todos los grupos. Al final de cada discusión, los participantes creían que, tratar la leche materna con calor puede ser posible como una opción de alimentación infantil para las madres VIH+ en Zimbabwe debido a su bajo costo. Estos hallazgos merecen más investigaciones futuras para desarrollar y diseñar estrategias adecuadas de comportamiento.