

FACTORS AFFECTING MOTHERS' CHOICE OF BREASTFEEDING VS. FORMULA FEEDING IN THE LOWER UMFOLOZI DISTRICT WAR MEMORIAL HOSPITAL, KWAZULU-NATAL

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ABSTRACT

The aim of this study was to determine which factors influence choice of breast- versus the formula-feeding of infants. This may help to understand where the focus should lie in the promotion of breastfeeding. A structured questionnaire was completed by a 100 women and focus-group discussions were held with 22 women who delivered babies at the Lower Umfolozi District War Memorial Hospital (LUDWM) in KwaZulu-Natal. Most of the mothers (72%) chose breastfeeding and 58% intended to breastfeed for only 6 months. One-third (33%) were influenced by health care professionals and 44% of the mothers made their own decisions in their feeding method. Only one participant stated that she chose formula-feeding due to her HIV-positive status, but in the focus-group discussions, the fear of transmission of HIV through breast-milk was stated as an important reason why mothers chose replacement-feeding. Significantly more HIV-infected than uninfected mothers chose replacement-feeding as the feeding method and mothers who chose breastfeeding were significantly older than mothers who selected replacement-feeding. They made their infant-feeding decision earlier than those who chose replacement-feeding. Findings showed that the majority of women in this study did not have access to running water and flush toilets in their houses. In these areas where replacement-feeding will not be acceptable, feasible, affordable, sustainable and safe, due to lack of sanitation and poor socio-economic status, health professionals should promote exclusive breastfeeding for 6 months, even though there is a high prevalence of HIV infection.

OPSOMMING

Die doel van die studie was om te bepaal watter faktore vroue in hulle keuse van bors- of bottelvoeding beïnvloed. Dit sal help om te verstaan op watter faktore gesondheidswerkers moet fokus wanneer borsvoeding bevorder word. 'n Gestruktureerde vraelys is voltooi deur 100 vroue en fokusgroeppesprekings is met 22 vroue wat by die Laer-Umfolozi Distrik Gedenk-hospitaal (LUDWM) geboorte geskenk het gehou. Die meerderheid vroue (72%) het borsvoeding gekies, 58% het voorgeneem om vir 6 maande te borsvoed. 'n Groot aantal vroue (97%) het inligting oor babavoedingskeuses by gesondheidswerkers ontvang. Een derde van die vroue (33%) is deur die gesondheidswerkers beïnvloed en 44% van die deelnemers het aangedui dat niemand hulle beïnvloed het nie. Beduidend meer MIV-geïnfekteerde as ongeïnfekteerde moeders het kunsvoeding bo borsvoeding verkies. Net een moeder het gerapporteer dat sy kunsvoeding gekies het as gevolg van haar MIV-positiewe status, maar in die fokusgroeppespreking is die mening gelug dat die vrees van MIV oordrag deur borsmelk grootliks bygedra het dat MIV geïnfekteerde moeders kunsvoeding gekies het. Die moeders wat borsvoeding gekies het was beduidend ouer en het die voedingsmetode beduidend vroeër gekies as die wat kunsvoeding gekies het. Die resultate dui aan dat kunsvoeding nie aanvaarbaar, uitvoerbaar, bekostigbaar, volhoubaar en veilig is in die studie-area nie, as gevolg van swak sanitasie en die swak sosio-ekonomiese toestande. Gesondheidswerkers behoort dus eksklusiewe borsvoeding vir die eerste ses maande te bevorder, al is die prevalensie van MIV-infeksie hoog.

INTRODUCTION

One of the most important decisions that a pregnant woman has to make is choosing an infant-feeding method (Chezem, Friesen & Clark 2001:20). The benefits of breastfeeding for newborn infants are well documented (World Health Organization 2000:451). The World Health Organization (WHO) recommends that to achieve optimal growth, development and health in infants, they should be breastfed exclusively for 6 months (World Health Organization 2000:451). According to the South African Demographic and Health Survey (SADHS), in 1998 only 10% of infants from 0 to 3 months were exclusively breastfed (Department of Health 1998:133) and in 2003 only 1.5% of infants from 4 to 6 months and 11.9% of infants younger than 4 months were exclusively breastfed (Department of Health 2003:19). As seen in these SADHS results, the percentage of mothers that breastfeed exclusively is very low. A complex interaction of personal, social, economic and environmental factors influences a mother's decision to breastfeed or formula-feed her infant (Marchand & Morrow 1994:319–322; Shaker, Scott & Reid 2004:260–266).

The estimated prevalence of HIV infection was the highest among antenatal clinic attendees in KwaZulu-Natal of all provinces at 37.4% (Averting HIV and Aids 2007:1). HIV has an impact on a mother's infant feeding choice, because of the risk of the transmission of HIV through the breast-milk (Gara *et al.* 2005:1). Bobat *et al.* (1997:1627) found that infants that were exclusively formula-fed had a lower transmission rate of HIV than the infants that received exclusive breastfeeding or mixed-feeding. There was a 15% increase in risk of being infected with HIV when breastfeeding was compared to formula feeding. However, infants who were mixed-fed progressed to AIDS faster than infants who were exclusively breastfed (Bobat *et al.* 1997:1627). Coutsooudis *et al.* (2001:375) found that infants had the highest risk of being infected by HIV when they were mixed fed (breastfeeding and other foods and liquids) by their HIV-infected mothers. A recent study found that breastfeeding and replacement-feeding of HIV-

uninfected infants were associated with similar mortality rates at 18 months. These findings were amongst mothers and infants who received excellent support in their decision and practice of appropriate infant feeding choices (Rollins *et al.* 2008:2349). To decide to breastfeed or formula feed is a difficult decision that must be made by an HIV-infected mother (Bland *et al.* 2007:289).

The WHO recommends that HIV-infected women should exclusively breastfeed their infants unless replacement-feeding is acceptable, feasible, affordable, sustainable and safe (World Health Organization 2006:5). All children have the right to be breastfed by their mothers and no one should interfere with the mothers' right to breastfeed (Kent 2006:1). The problem is that HIV-infected mothers are now faced with a difficult decision on how to feed their infants. Counselling and support to breastfeed exclusively is of utmost importance. Existing research in South Africa indicates that KwaZulu-Natal is the province with the highest prevalence of HIV infection among antenatal clinic attendees (Averting HIV and Aids 2007:1). Bobat *et al.* (1997:1627) found that infants that were exclusively formula-fed had a lower transmission rate of HIV than the infants that received breastfeeding. On the other hand, breastfeeding and replacement-feeding of HIV-uninfected infants was associated with similar mortality rates at 18 months (Rollins *et al.* 2008:2349). In view of the WHO recommendation that HIV-infected women should exclusively breastfeed their infants unless replacement-feeding is acceptable, feasible, affordable, sustainable and safe (World Health Organization 2006:5), it is thus important to determine why mothers decide on a specific feeding method. The aim of this study was to determine mothers' decisions to breast or formula feed and the reasons for the infant feeding choice.

RESEARCH METHOD AND DESIGN

Population and sampling

For the first part of the study, a convenience sample of a 100 women who delivered their babies at the Lower Umfolozi District War Memorial Hospital (LUDWMH) in KwaZulu-Natal was approached by the researcher to participate in the study. The inclusion criteria for this study were that the mother should be living in the Lower Umfolozi District and have delivered an infant at the hospital. The women were approached while they were still in the post-natal ward. Not all the women that had delivered could be included, due to the fact that some of the women were already discharged after delivery before interviews could be done. Approval was obtained from the hospital management and informed consent from the participants. An enrolled nurse, data-capturer and HIV-counsellor were trained by the researcher as field-workers to interview the participants and complete the questionnaires. Training entailed a thorough explanation of all questionnaire items and selection of possible responses during an interview with the respondents. The researcher was present during interviews to clarify any uncertainties that could arise during interviews. Permission was granted by the participants to record their HIV-status from their hospital files. The researcher supervised the data collection. The second part of the study consisted of focus-group discussions with mothers who delivered their babies at LUDWMH. The focus-group discussions were conducted separately with mothers who had previous children and those who had delivered their first infant. A total of four focus-group discussions were conducted with the assistance of a nurse practitioner who assisted with translating the questions and answers. The focus-groups consisted of mothers that had an infant admitted after delivery due to complications and were available to participate in the discussions. There were a total of eight mothers per group and four focus-groups were conducted. Data saturation was reached after three focus-group discussions and no new information was added in the fourth focus-group discussion.

Measuring instruments

Anthropometric status of the mothers after delivery

The body mass index (BMI) was calculated after measuring the weight on an electronic scale (Seca, Japan) and the height with a stadiometer (Seca, Japan) of the participants. Only two participants' BMI could not be calculated, because at the time of the interview they were not yet able to stand up for the measurements to be taken.

Questionnaire and focus-group discussion guide

A structured questionnaire was developed by the research team, consisting of three dietitians and a nurse practitioner, to obtain information about mothers' decisions to breast- or formula-feed their infants. The questionnaire consisted of questions regarding demographic information (four questions), socio-economic information (eight questions) and infant feeding method (10 questions). All alternative feeding methods other than breastfeeding were defined as replacement-feeding, although during the first 6 months of life, replacement-feeding should be a suitable commercial formula. The questions on infant-feeding method was based on information from recent South African and international publications on infant feeding (Bobat *et al.* 1997:1627; Chezem *et al.* 2001:20; Coutsoudis *et al.* 2001:375; Gara *et al.* 2005:1; Bland *et al.* 2007:289; Rollins *et al.* 2008:2349). The questionnaire was available in English and Zulu.

A focus-group discussion guide was also developed to gain more insight into the mothers' decisions. The discussion guide started with an introduction of the facilitator, recorder and participants, the procedures during the discussion and an ice-breaker question to put participants at ease. Focus-group discussion topics included questions about the person(s) who had an influence on the participants' infant feeding choice, their own and the community's feelings towards breastfeeding and formula feeding, as well as reasons why they selected a specific feeding method. To ensure validity the questionnaire items, as well as the focus-group discussion guide were based on the literature focusing on decisions that a pregnant woman has to make when choosing between breast and formula feeding (Kong & Lee 2004:369; Shaker *et al.* 2004:260; Grossman *et al.* 1990:30; Doherty *et al.* 2006:90). To ensure reliability, the researcher supervised all aspects of data collection and checked questionnaires for correctness and completeness immediately after completion. The questionnaires were filled in while the mother was in the ward and the researcher was present during the interviews. The hospital staff that were chosen to help with the completion of the questionnaires assisted the researcher mostly with the translation of the information. The questionnaires were filled in during the daytime when the researcher was available. The focus-group discussions were done on consecutive Saturdays in the mothers' lodge dining room where the mothers stayed. Eight mothers per group sat around a table with the researcher, a facilitator and a recorder. The facilitator translated the focus-group questions to the respondents and also translated responses from Zulu to English. Focus-group discussions were recorded in a written format, as well as on tape so that the correctness of responses could be checked and confirmed afterwards. The hospital staff that helped with the focus-group discussions were mainly used to translate the questions and the responses. The researcher was the primary person conducting the focus-group discussions.

Data analysis

Responses from the questionnaires were computerised in an Excel spreadsheet and exported to the Statistica data analysis software system (Statsoft, Inc, version 7, Tulsa, OK, 2004) for processing the documented data. Notes from the focus-group discussions were reviewed and completed by the facilitator and researcher immediately after meetings. Key statements, ideas and attitudes expressed for each topic of discussion were coded according to topics. The following topics were



TABLE 1
Body mass index distributions of participants (n = 97)*

Body mass index categories	Breastfeeding mothers (n = 71)	Mothers who selected replacement feeding (n = 26)
< 18.5	0	0
18.5–24.9	21 (29.6%)	7 (26.9%)
25–29.9	28 (39.4%)	12 (46.2%)
≥/ 30	22 (31%)	7 (26.9%)

*2 woman could not be measured due to illness; 1 woman chose mixed feeding.

TABLE 2
Resources available to the mothers (n = 100)

Resource	
Electricity	73 %
Inside tap water	33 %
Outside tap water	59 %
River / dam	8 %
Toilet facilities	
Pit toilet	63 %
Inside flush	2 %
Outside flush	8 %
Other: Bush	9 %
Energy source for cooking	
Gas	13 %
Electricity	67 %
Paraffin	8 %
Wood or coal	33 %

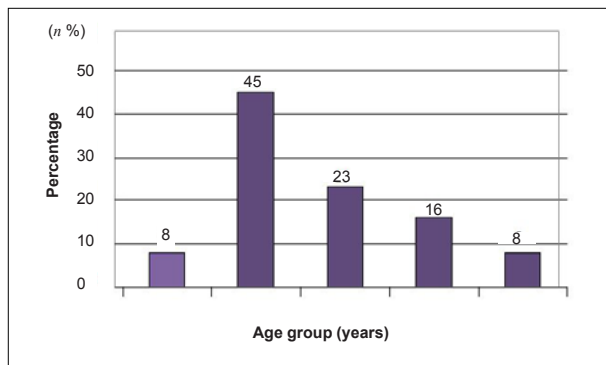


FIGURE 1
Distribution of age of participants (n = 100)

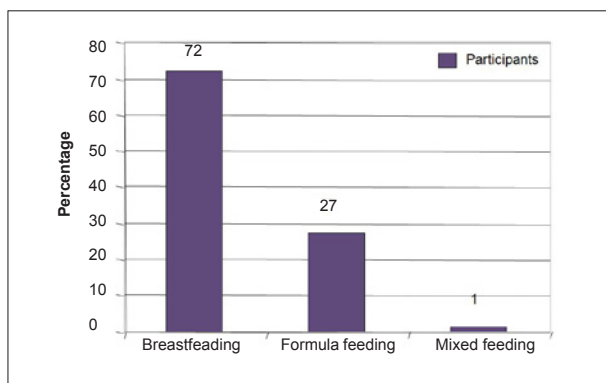


FIGURE 2
Infant feeding choice of the mothers (n = 100)

identified: feelings about breastfeeding, feelings about formula feeding, feelings in the community about formula feeding by HIV-infected mothers, most important reasons for choice of an infant-feeding method. After coding the responses, all data were summarised in a compilation sheet. The major findings of the focus-group discussions were summarised in a narrative report and key statements were listed according to topics.

Statistical analyses

Descriptive statistics were used to present the frequencies of the responses of the women on the questionnaire items. The chi-square test was performed to assess statistically significant differences between the group who chose to breastfeed and those who chose replacement-feeding for the following categories: age groups, marital status, education level, employment status, number of people in household, number of previous children, BMI after delivery, type of house, access to electricity, water or toilet facilities, the person who made the feeding choice, when the decision was made, if they received counselling about feeding choice and HIV-status.

RESULTS

Questionnaire

Demographic information

From the age distribution of the participants shown in Figure 1 it is clear that most women were younger than 30 years. The majority of the women (96%) were of African ethnicity, while one was White, one Indian and the other two were Coloured. Most of the women (83%) were not married, 15% were married and only two were living with their partners. Concerning education level, a total of 86% went to high school, but only 47% completed Grade 12.

Socio-economic factors

The majority of the women (81%) were either unemployed or students and only 19% of the participants were employed, either in formal or informal employment. Almost half of the women (49%) lived in households with more than seven members, 44% lived in households with 4–6 members and only 7% lived in households with only 1–3 members. Thirteen per cent were primigravida, 76% indicated that they had 1–3 children, 7% had 4–6 children and only 4% had more than seven children. Only one of the participants (1%) smoked cigarettes. The BMI distribution of the participants on the day after delivery is shown in Table 1. No significant differences were found between the BMI categories of the breastfeeding mothers and those who selected replacement-feeding.

Eighty-one per cent lived in brick houses and 15% lived in traditional Zulu clay huts. The resources that were available for these women are summarised in Table 2. The majority of the women had electricity (73%), outside tap water (59%) and a pit toilet (63%). Some of the participants indicated that they had no toilet facilities and had to use the veld. Sixty-seven per cent used electricity for cooking, 33% wood or coal, 13% gas and 8% paraffin. Some of the women used more than one energy source for cooking.

HIV status

According to the hospital records, 37% of the participants were infected with HIV, whereas 55% were not infected and 8% had an unknown HIV-status.

Infant-feeding choice

Of the 72% of women who chose breastfeeding as first infant feeding method (Figure 2), only 42 (58%) were intending to breastfeed for the first six months. Some of the participants indicated that when they stop breastfeeding at six months they will switch to formula feeding. On the question of who or what

TABLE 3
Age distribution of mothers and timing of feeding decision according to infant feeding choice group

Age category (years) ¹	Breastfeeding mothers [†]	Replacement feeding mothers [‡]
18	8 (11.1%)	9 (33.3%)
19–24	35 (48.6%)	9 (33.3%)
25–29	14 (19.4%)	7 (25.9%)
30–34	9 (12.5%)	2 (7.4%)
>35	6 (8.3%)	0
When was the infant choice made:²		
Pre-pregnancy	50 (69.4%)	10 (37.0%)
First trimester of pregnancy	3 (4.2%)	2 (7.4%)
Second trimester of pregnancy	8 (11.1%)	4 (14.8%)
Third trimester of pregnancy	7 (9.7%)	7 (25.9%)
Post partum	4 (5.6%)	4 (14.8%)

¹Significant difference between groups, ($\chi^2 = 5.5, p = 0.02$).

²Significant difference between groups, ($\chi^2 = 8.6, p = 0.003$).

[†], The value $n = 72$

[‡], The value $n = 27$

BOX 1

Feelings about breastfeeding

- 'Breastfeeding is good, when you are HIV positive or not.'
- 'It is better to breastfeed, because you develop a strong and healthy baby.'
- '... you bond with your baby.'
- 'It is better to breastfeed even if you are positive. You have a right to breastfeed your baby.'
- 'It is better to breastfeed if there are no problems.'
- 'Breastmilk is always there, you will not run short of it.'
- 'I am seeing that I am nourishing my baby.'
- 'It is a good idea.'
- 'When the baby is sucking she gets more love from the mum'

BOX 2

Feelings about formula feeding

- 'Formula feeding is not right. If you are not sterilizing the bottles the baby can get infections.'
- 'I do not think it is better to formula feed because you are only supplied for six months and after that you do not have money to buy formula. It is better to breastfeed and not formula feed.'
- 'It is not good when she is diluting the formula or not cleaning the utensils properly.'
- 'Formula feeding is bad, you do not always have money to buy it.'
- 'Formula is very expensive.'
- 'Formula is better, you can leave baby with relatives.'
- 'Good for children that are not raised by their parents.'
- 'When mother is sick, other one can make the milk and feed the baby.'

influenced their infant feeding decision, 44% of the participants indicated that no one influenced them and that they decided for themselves. The second highest percentage (33%) of participants indicated that the nurses or counselors or someone at the clinic influenced their decision. Only 4% mentioned that they chose formula feeding due to full-time work or study because they would not be able to stay at home with their infants. Thirteen per cent of the participants were influenced by their mothers or female relatives in their decision to breastfeed or formula feed. Only one participant stated that she chose formula feeding because of her positive HIV-status.

The decision with regards to their infant feeding method was mostly made before pregnancy (61%). Only 8% made the decision after delivery, 5% in the first trimester, 12% in the second trimester and 14% in the third trimester. A third (32%) of the participants lived with someone that used the same infant feeding method. Fifty-seven per cent had previous experience in their infant feeding choice. Five of the participants could not remember how long they breast or bottle-fed their infants, nine women fed their infants less than six months and 24 women more than twelve months. The majority of the women (97%) received counselling about their infant feeding method. Ninety-three per cent of the women obtained information from a health care worker at the clinic. Other sources of information were the mother, sister, printed material, including books, magazines and pamphlets and the television or radio.

There were significant differences between the age group intervals of the group who chose breastfeeding and the group who chose replacement-feeding ($\chi^2 = 5.5, p = 0.02$) and a significantly higher percentage of breastfeeding mothers made their infant feeding decision before pregnancy ($\chi^2 = 8.6, p = 0.003$) (Table 3). There were no significant differences between the group who chose to breastfeed and the group who chose replacement-feeding regarding the following categories: marital status, education level, employment status, number of people in household, number of previous children, BMI after delivery, type of house, access to electricity, water or toilet facilities, the person who made the feeding choice, and if they received counselling about feeding choice.

More than half of the participants (55%) were not HIV-infected, whereas 37% were infected and 8% had an unknown HIV status. Nineteen (51%) of the HIV-infected women chose breastfeeding. Sixteen of these women wanted to breastfeed for less than six months. The WHO recommendation is to breastfeed exclusively for 6 months (World Health Organization 2006:5). In the group of uninfected mothers or those with an unknown HIV-status, only 10 (18%) chose not to breastfeed. A significantly smaller percentage of the HIV-infected women decided to breastfeed their infants, than women with known HIV negative status or unknown status (Figure 3).

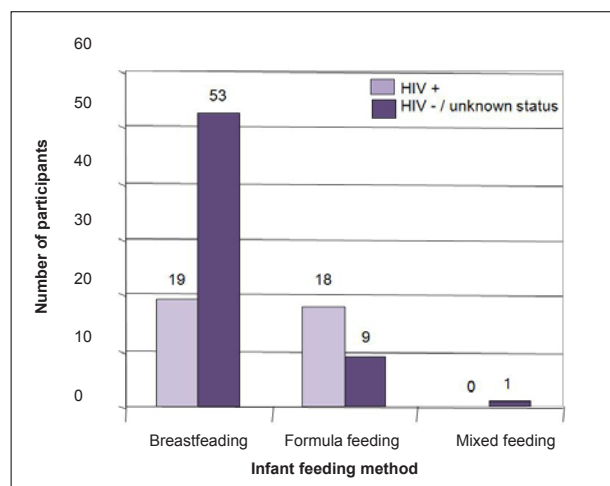


FIGURE 3

Comparison of choice of infant feeding method by HIV infected vs. HIV-negative women and women with unknown status (significant difference in distribution, $\chi^2 = 12.7, P = 0.0004$, chi-square test)

**BOX 3**

Community's feelings about formula feeding when HIV positive

'The community would prefer the formula feeding because the child will not get infected.'

'They just point at you and say that you are positive.'

'They think it is the better way when you are giving formula. They also think you are positive when you formula feed.'

'They think you do not want to provide your baby with the best milk when you are formula feeding.'

'They do not feel happy when you are breastfeeding, must rather formula feed.'

'They are also saying that if you give the formula you are HIV positive.'

'They ask you why you are not breastfeeding.'

'Others say the woman is right and they recommend it.'

'It means you are rich and that you have lots of money to buy milk.'

'You are right to give formula, the baby will not get infected.'

BOX 4

The most important reason why they chose their infant feeding method

'I chose formula feeding because I can leave the baby with the nanny when I am working.'

'I chose breastfeeding so that my baby can grow well.'

'I chose breastfeeding so that my baby will get love from me and get strong.'

'I chose formula feeding because I am working.'

'Breastfeeding, so that my baby will get love from me and get strong.'

'I chose breastfeeding so that I can be near my baby.'

'I chose formula feeding because I am still at school.'

'Breastfeeding, so that my baby can get all the good food that I am eating.'

'Breastfeeding is healthier, but my milk dried up and I had to give the formula.'

Focus-group discussion

Most of the information that mothers received about infant feeding was from the clinics and health care workers. They mostly received information about the benefits of breastfeeding. The mothers that were breastfeeding their infants felt very positive about breastfeeding and mentioned many benefits of breastfeeding when asked what their feelings were about breastfeeding (Box 1).

In discussion about formula-feeding, the mothers stated that it is important that one mixes formula correctly and ensures that the utensils that one uses are sterilised. The mothers who chose formula said that with formula feeding one could go back to work or school and then someone else can look after the baby. In discussions about infant feeding and HIV, some mothers said that it is better to formula feed, because with breastfeeding one can transmit the virus to the baby. Others felt that breastfeeding was still important for the first six months, but after that one should stop breastfeeding and not mix-feed.

According to the respondents, some communities think that when one is HIV-infected that one should not breastfeed because one can infect the baby. They stated that non-educated people think that it is wrong to breastfeed a baby. Stigmatisation is still very important, because when you formula feed you are labeled as being HIV-infected. There are some communities that prefer mothers to formula feed. One mother pointed out that there is a lack of education in the community because they do not understand why one would choose a formula feeding regimen while other would choose to breastfeed (Box 3).

The mothers that decided on formula feeding said that the most important reason was either because they were at school or going back to work (Box 4). There was one mother that stated one should use formula because it is available for free from the Government. Reasons for choosing breastfeeding were the benefits for the health of the infant.

ETHICAL CONSIDERATIONS

The Ethics Committee of the North-West University approved the research protocol (project number NWU-0025-08-S1). Written informed consent forms were completed by all the participants and they were also given verbal information about the purpose of this research. Confidentiality was ensured by not recording the personal details of the participants. The participants granted permission for the researcher to note their HIV status, if known, from their hospital files. The interviews and focus-group discussions were, however, conducted without referring to the participants' HIV status. It was also made clear to all participants that some of the topics in the focus-group discussion would be about HIV, but that they could state their own or the community's opinions and feelings about these issues, without disclosing their own HIV status. They were once again reassured that their HIV status would not be revealed to anybody.

DISCUSSION

There was a relatively high prevalence of breastfeeding in this group of women. This could be because the hospital is accredited by the Baby-Friendly Hospital Initiative (BFHI). It has been shown that the BFHI can partly be responsible for an increase in breastfeeding rates (Perez-Escamilla 2008:484). The information from the questionnaires and the focus-group discussions gives an indication that the mothers received good education about breastfeeding and formula feeding from health professionals. The finding that 33% of participants indicated that nurses or counselors at the clinics influenced their infant feeding decision is an indication that they obtained information about first infant feeding choices from the clinic. The high number of women choosing breastfeeding may probably also be linked to the fact that the majority had a high school education. It has been shown that breastfeeding women tend to have a higher level of education than non breastfeeding women (Grossman *et al.* 1990:30). The mothers that decided on formula feeding said that the most important reason was either because they were at school or going back to work. Only a small group (1.1%) of the women that chose formula-feeding chose it because they were going back to work or school. Even if a mother is not going to be with her infant during the day, it is still possible to breastfeed her infant. The mother can express her breast-milk and leave it at home for the caregiver to give using a cup. Also, when she is at home she can still breastfeed her infant. In this study, it was not yet known whether the women that chose breastfeeding would be doing so exclusively. The rates of exclusive breastfeeding in South Africa are very low (Anon 2002). This will also have implications with regards to HIV-infected women that would not breastfeed exclusively for the first 6 months, because it would increase the risk for transmission of HIV through breast-milk (Fowler 2008:359). The 32% of the participants who lived with someone that used the same infant-feeding method that they chose, would thus have a person in their own household who could support them in their infant-feeding method.

Eighteen (48.6%) of the HIV-infected mothers chose formula feeding as a first infant feeding method. One participant stated that she chose formula feeding because of her HIV-status. This may have been a reason for some of the mothers who chose formula feeding, but because of the stigma of HIV they did not want to divulge their status. Permission was however granted by the participants to look up their status in their files. The interviewer reassured participants that their HIV status would remain confidential and that all results would be reported anonymously. Many mothers lived in resource-poor settings and would not be able to formula-feed their infants safely. The WHO (2006:4), stated that replacement-feeding is recommended for HIV-infected women only when it is acceptable, feasible, affordable, sustainable and safe. This high percentage of mothers that chose formula-feeding is a cause for concern, because of the problems that are associated with not breastfeeding infants in an environment where replacement-feeding is not sustainable and safe. Infants that are formula-fed have a six times greater risk of dying in the first two months of their life, at age 2-3

months they have a four times greater risk and at 4–5 months a two and a half times greater risk than infants that are being breastfed at the same age (World Health Organization 2000:451). Formula-feeding cannot be regarded as a safe feeding method in Kwazulu-Natal due to the fact that there was a cholera epidemic in 2000 (Coutsoudis *et al.* 2002:154). During such an epidemic, the risk for formula-fed infants to develop cholera increases and can lead to death. Sixty-three per cent of the women had pit toilets, 59% had tap water outside and 8% obtained their water from rivers or dams. The water supply and toilet facilities available to the women could cause hygiene problems due to the fact that they did not have proper sanitation in their homes.

Mothers who chose formula feeding would be obtaining free formula from clinics. However, sometimes mothers run out of formula milk due to lack of money for transport to the clinics, and at some facilities the formula milk is only given on specific dates (Doherty *et al.* 2006:90). Some mothers could even be pressurised into making an inappropriate decision and could end up harming the health of their children (Coutsoudis *et al.* 2002:154). The finding that 81% of the women were unemployed could be an indication that the participants would not be able to afford infant formula if that was their choice of infant feeding method. They may also not have money for transport to the clinics if they do not live within walking distance. For women who do not know their HIV-status, it is important to still promote exclusive breastfeeding, because of the low association between exclusive breastfeeding and postnatal transmission of HIV (Piwoz *et al.* 2007:1249).

Coovadia *et al.* (2007:1107) assessed the HIV-1 transmission risks and survival associated with exclusive breastfeeding and other types of early infant feeding by HIV-infected and uninfected women. Breastfed infants who also received solids were significantly more likely to acquire infection than exclusively breastfed children were, as were infants who at twelve weeks received both breast-milk and formula milk. Cumulative 3-month mortality in exclusively breastfed infants was 6.1% versus 15.1% in infants given replacement feeds. The association between mixed breastfeeding and increased HIV-transmission risk led to revision of the UNICEF, WHO, and UNAIDS infant feeding guidelines (WHO 2006:4).

Rollins *et al.* (2008:2349) reported the probability of HIV-free survival beyond the first 6 months of life in children born from HIV-infected mothers according to early infant feeding methods. The probability of HIV-free survival in infants alive at 6 months was not significantly different between the different feeding method groups, namely 0.98 amongst infants who received replacement-feeding from birth, 0.96 in those breastfed for less than six months and 0.91 in those breastfed for more than 6 months, respectively. In multivariable analyses, maternal unemployment and low antenatal CD-4 cell counts were independently associated with more than three-fold increased risk of infant HIV-infection or death. They concluded that breastfeeding and replacement-feeding of HIV-uninfected infants were associated with similar mortality rates at 18 months. However, these findings were amongst mothers and infants who received excellent support to first make and then practice appropriate infant feeding choices. The authors emphasised that the quality of counselling and identification of mothers with low CD-4 cell counts need to be the targets of improvement strategies in programs to support mothers in making and practicing appropriate infant feeding choices. Evidence that exclusive breastfeeding can be successfully supported in HIV-infected women was taken into account in the revised UNICEF, WHO, and UNAIDS infant feeding guidelines (WHO 2006:4).

The intended duration of breastfeeding in this group of women was low. Fifty-seven per cent of the breastfeeding women were intending to breastfeed their infants for less than 6 months. Only 26% of these mothers were HIV-infected and had a reason to stop

breastfeeding before 6 months. If breastfeeding should continue it could lead to mixed-feeding associated infections in those infants. Infants are exposed to a lower risk of HIV-transmission when they are exclusively breastfed, but this protection ends when complementary foods are introduced while they still receive breast-milk. Duration of breastfeeding increases the risk of HIV-transmission through breast-milk, probably due to the addition of foods and other liquids (Coutsoudis *et al.* 2001:379; Coovadia *et al.* 2007:1107). It was difficult in this study to determine whether the mothers would practice exclusive breastfeeding. Mixed-feeding is a problem in South Africa, because not many children are exclusively breastfed in the first six months of their lives (Department of Health 2003:19).

Previous breastfeeding experience independently contributes to predicting breastfeeding intention (Kloeblen-Tarver, Tompson & Miner 2002:182). If mothers chose breastfeeding for their first infant, they would probably also choose breastfeeding for their other infants. The attitude of family members about breastfeeding also plays a role in the decision about feeding method (Kloeblen-Tarver *et al.* 2002:182). The women who had a family member at home that breastfed earlier would have support to breastfeed their infants. Thirteen per cent of the participants in the present study were influenced by their mothers or female relatives in their infant feeding decision. The family still plays an important role in the decision on an infant feeding method. It is important that family members are included during health education about breastfeeding (Chezem *et al.* 2001:20).

Most of the women (90%) received counselling from health professionals about infant feeding methods and these professionals had an influence on their infant feeding decision. This has also been documented in other studies (Chezem *et al.* 2001; Doherty *et al.* 2006; Piwoz *et al.* 2006:1). Women who receive information about breastfeeding from health care workers have a tendency to breastfeed exclusively for longer periods and avoid prelacteal feeds more (Ludvigsson 2003:1). A study in South Africa also showed that health education about infant feeding at clinics plays a significant role in the choice of early infant feeding (Minnie & Greeff 2006:19). It is important that education about breastfeeding should start before or during early pregnancy and continue after delivery. The perceptions of health care workers are important, because they can have an influence on the information that is given to mothers during counselling and on the choices that they make (Piwoz *et al.* 2007:1249).

According to the focus-group discussion results, the community believed it is important to protect the infant against being infected with HIV (Box 3). This could be an indication that the community is not aware of all the information with regard to HIV-transmission through breast-milk. A study by Doherty *et al.* (2006:90) found through focus-group discussions that early infant-feeding choices were made mostly because mothers wanted to protect their infants. However, some of these mothers felt forced into their decision of replacement-feeding because of their HIV-positive status (Doherty *et al.* 2006:93). Other community members felt that they would not be giving their infant the 'best milk' when they practice formula feeding. Responding to these beliefs in the community can lead to mixed-feeding, when mothers choose formula feeding, but give in to pressure to give breast-milk also. The perception that one should use formula because it is available for free from the Government is an indication of lack of knowledge in the community.

From the focus-group discussions it was evident that mothers that chose breastfeeding had a positive attitude towards breastfeeding and those that chose formula feeding had a positive attitude towards formula feeding. Attitudes can determine behaviour and if women display a positive attitude towards breastfeeding it will help to support them in choosing breastfeeding as an early infant-feeding method (Shaker *et al.* 2004:260).



LIMITATIONS OF THE STUDY

The limitations of the study were that it was only done in a district hospital in Kwazulu-Natal and cannot necessarily be generalised to the population of South Africa. Most of the women were unemployed and going back to work did not play a role in their choice of infant feeding method in this study. Some mothers were discharged from the hospital in under 24 hours and could not be included in the study.

RECOMMENDATIONS

Breastfeeding remains an important part of health education during antenatal clinic visits and the emphasis should be on exclusive breastfeeding for those mothers who choose breastfeeding. Breastfeeding women should receive consistent and accurate messages concerning appropriate infant feeding from health care personnel, family members at home, peer supporters and community members. With the high prevalence of HIV-infection in this community, it is important that women of childbearing age receive all the necessary information about exclusive breastfeeding and the dangers of mixed-feeding. HIV-infected women should receive individual and unbiased counselling on early infant feeding options to enable them to make informed choices on the infant feeding option that is most suited for their circumstances. This study shows that some HIV-infected mothers chose to breastfeed and nutritional support should be offered to HIV-infected women choosing to breastfeed. National programs should provide all HIV-exposed infants and their mothers with a full package of child survival interventions and not only avoidance of HIV-transmission. Further research is necessary to explore the extent of such counselling and support to promote exclusive breastfeeding and the impact of these services from health care professionals, including nurse practitioners on exclusive breastfeeding practices.

CONCLUSION

The majority of the women in this study came from a poor socio-economic background and they would not be able to formula feed their infants safely and sustainably. Many of these infants of mothers who did not have access to water and flush toilets may then get diarrhoea, infections and malnutrition that may even lead to death. Most of the mothers in this study received information about infant feeding methods from health professionals and some of the mothers were influenced in their choice of early feeding method by health care workers, or relatives. The majority of the mothers stated that they made their own decisions even after receiving information about infant feeding choices. Significantly more HIV-infected mothers than uninfected mothers chose formula feeding as first infant feeding method. From the focus group discussions it became clear that fear for mother to child transmission of HIV infection was regarded as an important factor in the decision of an infant feeding method. The focus group discussion results also revealed positive feelings towards breastfeeding and an awareness of the disadvantages of formula feeding, as well as the opinion that mothers who give formula will be stigmatized as being HIV-infected.

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