

Medical student research project 2005:

KNOWLEDGE REGARDING MOTHER-TO-CHILD-  
TRANSMISSION OF HIV AND BREASTFEEDING PRACTISES  
IN A POPULATION OF WOMEN WITH A KNOWN HIV-STATUS

Moshi, Tanzania.

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## **ENGLISH SUMMARY**

The aim of this study was to assess the knowledge on mother-to-child-transmission (MTCT) of HIV, describe what advice pregnant women receive concerning these issues and investigate breastfeeding practises and infant feeding patterns in general. During six weeks in 2004, a structured interview was carried out among 41 women in Moshi, Tanzania. 11 women were HIV-infected.

90% of the women were aware of MTCT, and 80% knew of the role breastfeeding has in vertical transmission. There was a strong correlation between a higher level of knowledge and increasing age and marital status. When it comes to advice on infant feeding, 100% of the HIV-positive and about half of the non-infected women had received guidance on the topic. The vast majority of women who had been informed on infant feeding, were encouraged to breastfeed exclusively, regardless of their HIV-status.

While 92,7% of the women did breastfeed, only 22% performed exclusive breastfeeding. HIV-positive mothers and mothers of young babies were more likely to breastfeed exclusively. The HIV-infected women stated that fear of revealing their HIV-status was a main reason to why they continued to breastfeed. This is also an important explanation to why exclusive breastfeeding is considered more acceptable and feasible than replacement feeding. 75% of the HIV-positive women did partly succeed in following the recommendations set by WHO concerning infant feeding. This means that they either breastfed exclusively for the first few months or that they abstained from breastfeeding and provided milk substitutes and weaning food for their children in stead.

## **CHOOSING A TOPIC**

During our medical studies in Oslo, all students are obligated to write an assignment corresponding to 6 credit points at the University. The primary aim is to give the students an idea of how research is planned, carried out and interpreted. Another important aspect is that the assignment gives us a unique opportunity to learn more about a subject that we are interested in, without necessarily committing to years of working on a PhD.

Paediatrics has always been my favourite among the different medical fields. This made it easy to decide that I wanted to dig into something that related to children`s health for my elective. I heard of the project about HIV and women`s/children`s health in Tanzania through two medical students in my class. Given the fact that HIV currently is one of our biggest health challenges worldwide, I was eager to find out more about it. I consider it very important for doctors in our fortunate part of the world to increase our knowledge on the health situation in third world countries. This will help us to better understand the difficulties that they are facing. Only then can we be capable of making a contribution when it comes to suggesting how we best can solve the problems together.

One of the reasons to why this project was so tempting to me, was that it included going to Tanzania to collect the data myself. Not only was this necessary to gather the information needed for my work. It was also a great opportunity to get to know the setting that obviously affects the answers given by the women. In addition, becoming somewhat familiar with the health system of Tanzania has also triggered my interest for returning to a third world country to work as a doctor later.

I decided to focus on breastfeeding practises in my population as a whole, and among HIV-positive women in particular. Being able to breastfeed your child and thereby increase the psychological bonding between mother and child, is something that the vast majority take for granted, both in developed and developing countries. But what if breastfeeding your child may transmit HIV to your baby? I wanted to assess the general knowledge about these issues, what advice the women are given, whether they are aware of the official guidelines and whether it is possible for them to follow the international recommendations.

I was fortunate to have two supervisors; professor dr. med Babill Stray-Pedersen at Rikshospitalet in Norway and dr. Sia Msuya, currently requiring her PhD on women`s health in Tanzania. Having a supervisor in Moshi, where the study was executed, was substantial. I would like to thank them both for their help and guidance while I have been working on this project.

## **BACKGROUND INFORMATION**

### ***HIV and AIDS:***

HIV (Human Immunodeficiency Virus) is a retrovirus that infects cells of the human immune system and destroys or impairs their function. Infection with this virus can result in the progressive depletion of the immune system, which ultimately may lead to Aids. The pandemic of HIV started in the mid- to late 1970s, but there are rare, sporadic cases of AIDS, as well as seroarchaeological findings of HIV, dating back years before that (2).

According to the newest WHO numbers (1), there are currently close to 40 million people living with the virus. In 2004 about 5 millions acquired HIV and more than 3 millions were killed by AIDS. Sub-Saharan Africa, were my study took place, is the worst-affected region in the entire world. Despite having a population that holds just a little more than 10% of the world`s inhabitants, it is the home to about 65% of HIV-infected people and more than three quarters of all women living with HIV. The adult (15-49 years) prevalence of the virus is 8,8% in Tanzania (9). A major challenge, however, is that only about 10% of HIV-infected individuals worldwide are aware of their status.

### ***Mother-to-Child-Transmission of HIV:***

Globally, an estimated 640 000 children under the years of 15 were infected with HIV in 2004 alone (3). In more than 90% of these cases, the infection was caused by mother-to-child-transmission (MTCT). As almost 90% of new child infections occurred in Sub-Saharan Africa, this remains the region facing the biggest challenge in preventing the transmission of HIV from mother to child.

In the absence of preventive interventions, it is estimated that the risk of an infant acquiring the virus from his/her infected mother ranges from 15-25% in developed countries and 25-45% in developing countries. The main reason to why MTCT of HIV is less common in the industrialised world, is the fact that breastfeeding in general and prolonged breastfeeding in particular is not used as frequently as in resource-poor settings, such as Sub-Saharan Africa.

Mother-to-child-transmission of HIV may occur either during the second or third trimester of pregnancy, at the time of delivery or after birth through breastfeeding (6). Research shows

that the number of infants being infected in each way is just about equally divided, so that approximately one third is infected in utero, about a third during labour and the remaining group through their mother's milk. According to a meta-analysis performed in 2001, the estimated risk of HIV-1 transmission due to breastfeeding was 16% (4). In the breastfeeding group, 44% of all vertical transmission was attributable to breastfeeding. Unfortunately, there is a substantial shortage on knowledge about MTCT in many areas.

In the Tanzania Reproductive and Child Health survey 2003-2004 (24), 83% had heard of mother-to-child-transmission of HIV. 52% of the females knew that MTCT of HIV could happen either intrauterine, intrapartum or during breastfeeding. 75% were aware that the virus could be transmitted during pregnancy, 62% during delivery and 69% while breastfeeding. In general, when it comes to these questions, the knowledge increases with increasing age and education and with an urban residence as compared to living in a rural setting. Unfortunately, the proportion of Tanzanian women who know that breastfeeding may transmit HIV/AIDS has not changed during the past five years. In addition, only about 17% in the survey knew that antiretroviral medication (ART) administered during pregnancy and breastfeeding can reduce the risk of transmission.

In a recent (2001) cross-sectional interview survey conducted among 500 women in the Kilimanjaro region, the researchers found that only 37% of the women were aware on all three possible routes of mother-to-child-transmission (14). Ninety percent knew that the virus could be transmitted either during pregnancy or through breastfeeding, while two out of three knew that the baby could get infected during labour. However, 37% believed that HIV could be transmitted through breathing, indicating that this is a common misconception in the area.

### ***Feeding options:***

So, what are the different feeding options available? ***Breastfeeding*** is the most natural choice for the majority of mothers all over the world. It is cheap, easy accessible and always available. ***Exclusive breastfeeding*** means that no other liquid or solid from any other source but breastmilk enters the infant's mouth. ***Mixed feeding*** implies providing the infant with other liquids or solids in addition to, or in stead of, breast milk. This is very common, especially in many developing countries. ***Replacement feeding*** means feeding a child commercial infant formula or home-modified animal milk as a substitute for human breast milk. Today, this is primarily used to prevent mother-to-child-transmission of HIV. Artificial formula is developed to secure all the necessary nutrients that a child would otherwise get from breast milk. However, home-modified animal milk (usually from cows) is not considered to contain adequate nutrients when it is given as the only source of energy during the first six months of life, this according to WHO (23). This is the case, despite the fact that micronutrient supplements might be added.

### ***How to make a choice:***

Let us take a closer look at the advantages and disadvantages of breastfeeding, and consequently the reasons to why mothers of infants choose the different feeding options available. The benefits of breastfeeding are greatest in the first 6 months of life. Breast milk then provides the infant with optimal nutrition (10). This is necessary both to secure normal infant growth through sufficient amounts of carbohydrates, fat and protein (infant growth potential drives milk production) and to pass over antibodies from the mother to strengthen the immune system and, subsequently, prevent diseases in the newborn. On the other hand,

not breastfeeding an infant is associated with an increased risk of morbidity and mortality due to malnutrition and infections other than HIV. If a child is not breastfed, he or she is up to six times more likely to die during the first two months of life from infectious diseases, such as diarrhoea and respiratory tract infections (11). The meta-analysis documenting these numbers shows that the protective effect of breastfeeding gradually diminishes as the infant grows older.

Breastfeeding also stimulates good psychosocial and neurological development in an infant, and it increases bonding between a mother and her child. According to a meta-analysis published in 1999, significantly higher levels of cognitive function were seen in breastfed than in formula-fed children at 6-23 months of age and these differences were stable across successive ages (12). The importance of this aspect has yet to be fully understood, but there is currently research going on.

Another aspect is that breastfeeding contributes to birth spacing. Lactational amenorrhoea has a 98% contraceptive effect. In Sub-Saharan Africa, where the governments provide 4,6 condoms per man aged 15-59 per year (13), and tradition makes protection a rarity in sexual relationships, this advantage of breastfeeding plays an especially important role. However, in a study undertaken in the Kilimanjaro region in 2001 (14), only 17% of the women surveyed knew that breastfeeding could prolong the interval between births.

In several developed countries, three important interventions have brought the Mother-to-Child-Transmission rate of HIV down to less than 2% per cent. This is due to a combination of antiretroviral prophylaxis (given to the mother during pregnancy and delivery and to the neonate), elective caesarean section before rupture of the membranes and complete avoidance of breastfeeding (16).

Given the fact that breastfeeding carries a 16% increased risk of transmitting the virus, why do not more women in developing countries avoid breastfeeding and replace it with other feeding alternatives? There are several reasons for this. I have already outlined the benefits of breastfeeding. In addition, there are several barriers that make it difficult, if not impossible, to use appropriate replacement feeding in many regions.

First of all, artificial feeding depends on sufficient and continuous supply of the food. Economical problems is a limiting factor here. As one mother say; "how can I buy artificial food for my child when I can't even afford food for myself?" Also, there is still not satisfying distribution of breast milk substitutes everywhere.

Another important issue is the fact that artificial food needs to be prepared in a safe and hygienic way. This includes access to clean water (a rarity in many communities, especially in the rural districts), clean utensils, safe storage and knowledge of how to prepare the food.

Finally, misconceptions and taboos concerning HIV make it difficult not to breastfeed, because this may rise suspicion on a woman's HIV status. Unfortunately this may lead to stigmatisation and, in certain cases, women may get abandoned by their partners, families and friends. This is the case, despite the fact that most women are infected by their husbands. Due to fear of rejection, 71 % of the women in a study conducted in Tanzania in 2001, said that they would definitely lie about the reasons for not breastfeeding if found to be HIV-positive. 73 % had witnessed or experienced that people with AIDS had been avoided, rejected, sent

away or in other ways been treated badly, and half of the respondents strongly agreed that AIDS should be kept a secret within the family (14).

A study in Kenya showed that HIV-positive breastfeeding women lost more weight and were three times more likely to die in the two years following delivery than HIV-positive women who did not breastfeed (20). A possible explanation is that the high energy demands of breastfeeding in HIV-infected mothers may accelerate the progression to HIV-related death. However, a different study conducted in South Africa (21) was not able to show an increased morbidity or mortality among women breastfeeding their infants. According to a WHO statement from 2001, there is still insufficient evidence on this and additional research is necessary before they can consider a change in recommendations.

Based on knowledge of these facts, each mother has to balance the nutritional and other benefits of breastfeeding with the risk of possibly transmitting the virus to her child, and consider what is most feasible in her particular situation.

### ***Risk factors affecting MTCT of HIV and the importance of exclusive breastfeeding:***

So, what are the risk factors influencing the mother-to-child-transmission of HIV through breastfeeding?

1. The viral load and levels of CD4+ cell count plays a significant role. Recent maternal infection of HIV or a progression to AIDS in the mother is associated with a higher transmission rate (6).
2. The risk of MTCT through breastfeeding is greatest in early infancy (before six months of age) and persists as long as breastfeeding continues, according to a recognized study from Malawi (15). Discontinuing breastfeeding at six months would have prevented half of the HIV infections seen in this study, but this would probably have led to increased morbidity and mortality from malnutrition and infections. According to WHO, breastfeeding for 6 months has about one third of the risk of breastfeeding for 2 years. Some studies have found that longer duration of breastfeeding increases the overall transmission rate.
3. Some studies have shown an association between inflammatory reactions in the breastfeeding women, such as mastitis, fissures and breast abscesses, and subsequent transmission of the virus (17). Subclinical or clinical mastitis has a two- to fourfold increased risk of vertical transmission due to a higher viral shedding in the milk (18). These conditions are often caused partly by a poor breastfeeding technique with insufficient attachment.
4. Infant oral thrush has also been defined as a risk factor because of easier access for the virus, but the documentation here is not very convincing yet.
5. A risk factor that certainly has caused a lot of discussion, and has led to a change in WHO/UNAIDS/UNICEF guidelines on breastfeeding, is the finding that non-exclusive breastfeeding may be an additional risk factor.

In a prospective study conducted in Durban, South Africa (19), they wanted to assess whether the mode of feeding made an important impact on MTCT of HIV. They compared infant-feeding practises of 549 HIV1-infected mothers divided into three different groups; the ones who performed exclusive breastfeeding, the ones who used mixed feeding/weaning and the ones who gave their infants artificial formula milk. The women received guidance on infant feeding methods, but selected what mode to follow

themselves. The estimated proportion of infants HIV-1 infected by 3 months was significantly lower for those exclusively breastfed to 3 months than in those who received mixed feeding before 3 months (14.6% vs 24.1%). Interestingly, there was a similar transmission risk between the exclusively breastfed children and the ones being given only artificial formula. After adjustment for potential confounders (maternal CD4-cell/CD8-cell ratio, syphilis screening test results, and preterm delivery), exclusive breastfeeding carried a significantly lower risk of HIV-1 transmission than mixed feeding (hazard ratio 0.52) and a similar risk to no breastfeeding (0.85). The hazard ratio describes the relative risk of the intervention based on comparison of event rates. The difference in the cumulative probability of infection remained significant at 15 months, being 24,7% among three months exclusively breastfed infants compared to 35,9% among non-exclusively breastfed infants.

Another study published in “AIDS” this year further supports these findings (22). Here the researchers followed 2060 infants born to HIV-positive mothers. In examining the feeding patterns and its impact on MTCT of HIV, they found that among the infants that were introduced to solid food or animal milk within the first three months of life, there was a four times greater risk of vertical transmission compared with the exclusively breastfed babies. Mixed feeding was associated with a three times greater risk of transmission and death by the age of six months. This study also aimed to assess whether non-milk liquids carried an increase in the transmission rate. The figures actually showed that combining breast milk solely with other liquids, like water or juice, would imply a 2,6-fold increase in the transmission as compared to exclusive breastfeeding.

In the previous mentioned article from the Kilimanjaro region (14), only 17% of the women interviewed were aware of the fact that it is unnecessary to add water to an infant diet during the first 4 months of life. The knowledge of exclusive breastfeeding was more common in urban areas compared to rural settings (23,1% vs 10,4%, OR 2,58), and secondary education (as compared to no formal education at all) was also a factor increasing the knowledge about EBF (21,7% vs 7,8% respectively, OR 3,25).

The following mechanisms have been proposed to explain the reasons why exclusive breastfeeding might have a lower transmission rate than mixed feeding:

- Mixed feeding may increase the ingestion of dietary antigens irritating the intestinal mucosa and leading to an inflammatory reaction in the gut, in some cases through allergic reactions. A damaged mucosa wall will make it easier for the virus to pass this barrier and enter the general circulation.
- Breast milk contains anti-microbial, anti-inflammatory and immune-modulating agents and it may also promote a beneficial intestinal mucosa and thereby strengthen the infants immune response.
- Of perhaps less importance is the fact that mixed feeding may contribute to irritation of the mammarys and thereby increase the viral load as previously explained.

### ***Official guidelines on infant feeding:***

Currents WHO/UNAIDS/UNICEF guidelines concerning infant feeding (8) can be summarised as follows:

1. For women known not to be infected with HIV or whose HIV status is unknown, exclusive breastfeeding for 6 months, followed by continued breastfeeding, together with appropriate complementary feeding, for up to two years or beyond, should be protected, promoted and supported.
2. All HIV-infected women should receive counselling and be provided with information on risks and benefits of the different infant feeding options. They should also be given specific guidance in selecting the option most suitable for their situation. Whatever a woman decides, she should be supported in her choice.
3. When replacement feeding is acceptable, feasible, affordable, sustainable and safe, avoidance of all breastfeeding by HIV-positive mothers is recommended; otherwise, exclusive breastfeeding is recommended during the first months of life.
4. HIV-infected mothers who breastfeed should be assisted to ensure that they use a good breastfeeding technique to prevent breast conditions like mastitis, breast abscesses and nipple fissures, which should be promptly treated if they occur.
5. To minimise HIV transmission risk, breastfeeding should be discontinued as soon as feasible, taking into account local circumstances, the individual woman's situation and the risks associated with replacement feeding (including infections other than HIV and malnutrition).
6. HIV-infected mothers who breastfeed should be provided with specific guidance and support when ceasing breastfeeding to avoid harmful nutritional and psychological consequences and to maintain breast health.
7. When HIV-infected mothers choose not to breastfeed from birth or stop breastfeeding later, they should be provided with specific guidance and support for at least the first 2 years of the child's life to ensure adequate replacement feeding. Programmes should strive to improve conditions that will make replacement feeding safer for HIV-infected mothers and families.
8. HIV-infected women should have access to information, follow-up clinical care, and support, including family planning services and nutritional support.

Through these guidelines WHO wants to emphasise that it is a woman's right to determine herself what is the best feeding option in her circumstance. To be able to make this decision, she should be provided with information and guidance concerning her alternatives. Although the recommendations clearly state that exclusive breastfeeding is advisable for the first 4-6 months unless replacement feeding is available and feasible, no one can force a woman to choose this mode of feeding.

**Objectives:** The main objective of this study is to assess whether it is feasible for women in Tanzania to follow the WHO guidelines on infant feeding. How much do women there know about the possible ways of vertical transmission from mother to child? And what information do they have about the official guidelines? In particular, how much do they know about the concept of exclusive breastfeeding? How do they achieve knowledge on these issues? Also, what are the factors most important in the decision-making and what are the main barriers to follow the recommendations from WHO? How common are the different feeding options really?



## METHODS

My particular study is part of a larger survey undertaken in Moshi, Tanzania, from 2002 to 2005. This study is being performed by dr. Sia Msuya, currently acquiring her PhD on women`s health. Moshi is a city situated at the foot of Kilimanjaro, in the north-eastern part of the country, near the boarder to Kenya. According to the United Republic of Tanzania, Population and Housing Census, Moshi urban district had a population of 143,799 people in 2002. My part of the study took place in May and June of 2004. I then spent five weeks at two health clinics in Moshi together with Hege Holmberg and Fride Sverdrup Efjestad, both medical students from Oslo who worked on different themes concerning HIV.

### *The women:*

All women seeking routine antenatal care at these two clinics between June 2002 and March 2004, were encouraged to participate in the study. After being informed about the study and its aims and receiving pretest counselling concerning HIV and MTCT, 2654 women (99,6%) agreed to join. They all answered structured and detailed questionnaires in a face-to-face interview. It focused on background information, sexual behaviour, obstetric history and knowledge of HIV and MTCT. Venous blood was drawn for diagnosis of HIV and syphilis, and they received their blood results during a posttest counselling session, preferably a week later. The HIV prevalence amongst them was 7%.

To prevent MTCT, HIV-positive women were given a Nevirapine tablet to take at the onset of labour. They were also instructed to return with the infants within three days postdelivery, in order to be able to give them the recommended dose of Nevirapine syrup. Issues regarding infant feeding methods were discussed in detail. Exclusive breastfeeding or exclusive replacement feeding was recommended where feasible, while mixed feeding was discouraged. HIV-negative women were advised to retest three months later in case they were in the window period. They also received guidance on the importance of exclusive breastfeeding.

The women were encouraged to inform their partners and bring them for counselling and testing. All the services were free of charge for both the women, children and the partners. The women were all offered follow-up consultations at 1, 3, 6, 9, 12, 15 and 18 months postdelivery.

As my main interest was feeding practises among mothers of infants in the first four to six months of life, I focused on interviewing women with children aged 3, 6, and 9 months. Then I would get a good impression of the actual situation, as loss of memory with time would not be a big problem.

Participants were recruited in collaboration with the health care staff, depending upon who attended the clinic each day. The women were selected on basis of the age of their child and their own HIV-status. I approached all of the women who fulfilled my criteria, and the vast majority agreed to be asked questions. Participation was based on oral informed consent. My aim was to perform interviews with 15 HIV-positive and 30 HIV-negative women. However, finding enough women with HIV was quite challenging, as only 7% of the population coming to these clinics were infected. In the end, I had talked to 11 HIV-positive and 30 negative individuals.

### *The clinics:*

The study took place at two of the largest government primary health care clinics in Moshi urban district. These community centers were situated in two of the poorest regions of the city, Majengo and Pasua. They were selected because they have the largest number of clients. Together they serve about 200000 inhabitants, 60000 of them being women of reproductive age.

### *The interviews:*

The two clinics were organised in a similar way, but with regards to space and rooms, they were quite different. In one of the clinics, Majengo, I had a separate room where I could perform the interviews. At Pasua, however, most of the clinic work was allocated to a big hall room, where tables and benches allowed separate operations to occur simultaneously.

I first started working on the interview in English. Then, my supervisor, dr. Sia Msuya, assisted in revising the questions and also in translating everything into Kiswahili. A nurse who spoke some English would assist me during the interviews, primarily helping me with the language, as all of the interviews were carried out in Kiswahili, the national language of Tanzania. I had participated in a Kiswahili language course lasting two hours every week for 10 weeks before going to Moshi. As my knowledge of Kiswahili and my familiarity with the questionnaire grew better, I eventually started performing some interviews on my own. Fortunately, the study nurses were available for translations whenever difficulties with understanding arose.

The questionnaire consisted of five parts: (1) demographic factors, (2) knowledge about HIV and MTCT, (3) information regarding the feeding of previous child, (4) what advice they had received on breastfeeding and other feeding options and (5) general feeding practices.

### *Laboratory testing:*

To diagnose HIV, blood samples taken from the women were centrifuged within 6 hours and went through two separate rapid tests; Determine HIV-1/2 test (Abbott Laboratories) and Capillus HIV1/HIV2 (Trinity Biotech, Ireland). HIV was diagnosed when both test results were positive. In case of discordance between the two tests, a third test, the ELISA test, Virinostika HIV Uni-form 2 (Organon Teknika, Boxtel, Netherlands) was used.

### *Statistical analysis:*

I used the statistical system of SPSS for windows, version 13.0, to analyse my data. Statistical comparison between groups was made using Chi-square and Fisher's exact test, when appropriate. For all data I have postulated a 0-hypothesis saying that there is no coherence between the two variables I am comparing (one of which usually is HIV-status). A low p-value indicates that the likelihood of these results to be true is very little given that the 0-hypothesis is correct. With a p-value of  $<0,05$ , statistical indifference can not be proven and the 0-hypothesis is rejected.

### *Ethics:*

Research and ethical clearance for the ongoing study had already been obtained from Tanzanian Ministry of Health and Norwegian Ethical committee.

## RESULTS

### 1. BACKGROUND INFORMATION ON THE POPULATION OF MY STUDY

*Table 1: Frequency and percentage distribution of model variables.*

<b>Item</b>	<b>Number</b>	<b>Percent</b>
<b>HIV-status</b>		
positive	11	26,8
negative	30	73,2
<b>Age</b>		
Less than 25 years	16	39
25 years and older	25	61
<b>Marital status</b>		
Single	2	4,9
Cohabiting	7	17,1
Married	32	78
<b>No of children</b>		
1 child	11	26,8
2 children	9	22
3 children	10	24,4
4 or more children	11	26,8
<b>Age of child in study</b>		
3 months	15	36,6
6 months	13	31,7
9 months	13	31,7
<b>Religion</b>		
Christian	20	48,8
Muslim	21	51,2
<b>Education</b>		
Lower education	39	95,1
Higher education	2	4,9
<b>Monthly income</b>		
None	29	70,7
< 10000 Tzs	2	4,9
>10000 Tzs	10	24,4

In the table above, I have outlined the frequency and percentage distribution of some variables to give an impression of the population being interviewed for my study. This group of people consisted of 41 women, 26,8% of which were HIV-positive. Three out of five were 25 years or older.

Most of the women (78%) were married, while 17% were living with their partner, unmarried (cohabiting). Only a small percentage (4,9%) described themselves as single. In the HIV-positive group, four out of eleven did not live with their partner (although everyone claimed to be married), while only four out of 30 were living without their partner in the HIV-negative group. The children included in the study were just about equally divided between 3, 6 and 9 months (36,6%, 31,7% and 31,7% respectively). 73,2% of the population had more than one child, 11 women (about every fourth) had four or more.

The majority (95%) had lower education, indicating no formal education or up to 7 years of primary school. A large percentage (71%) did not earn any money themselves, while one out of four had a monthly income of >10000 Tzs, equivalent to > 55 Norwegian kroner.

When it came to religious beliefs, the group was divided in two. Half of them defined themselves as Christians, the remaining part as Muslims. None of the women considered themselves as being non-believers or having traditional religions.

## 2. KNOWLEDGE REGARDING MTCT OF HIV

When it comes to the general knowledge of HIV and MTCT, all of the HIV-infected mothers in my study were aware of the possible risk of transmission from a mother to her infant. Among the HIV-negative mothers, though, I found a few women who either were uncertain (2) or who denied (3) the concept of vertical transmission. Together they account for 16,7 %

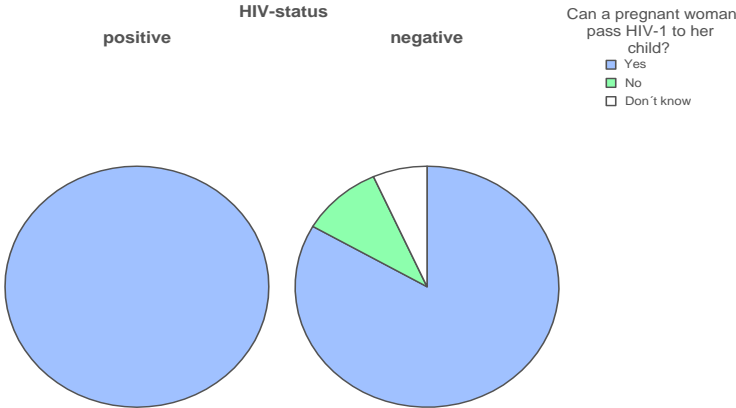


Figure 1: Knowledge on MTCT of HIV among HIV-positive as well as HIV-negative mothers.

of the non-infected group (p-value 0,759). Several factors can influence the proportion of people having knowledge about these issues. As can be observed in table 1, mother`s age and

Table 2: Knowledge of MTCT of HIV.

<b>Can a pregnant woman pass HIV-1 to her child?</b>				
<b>Predictor</b>	<b>Yes No. (%)</b>	<b>No No. (%)</b>	<b>Don't know No. (%)</b>	<b>Sigificans (p-value)</b>
<b>Age of mother</b>				
Less than 25 years	13 (81,3)	3 (18,8)		
25 years and older	23 (92)		2 (8)	0,028
<b>No of children</b>				
1 child	9 (81,8)	2 (18,2)		
2 or more children	27 (90)	1 (3,3)	2 (6,7)	n.s.
<b>Income</b>				
None	25 (86,2)	2 (6,9)	2 (6,9)	
< 10 000	2 (100)			
> 10 000	9 (90)	1 (10)		n.s.
<b>Marital status</b>				
Single	1 (50)	1 (50)		
Cohabiting	5 (71,4)	2 (28,6)		
Married	30 (93,8)		2 (6,3)	0,021

marital status are the only two significant predictors. For these two factors, independence between predictor and knowledge can not be proven statistically.

Apparently, the majority (87,8%) have heard about mother-to-child-transmission of the virus. But what do they really know about the different routes of transmission? 22% of the entire group agree that HIV can be transmitted either intrauterine, intrapartum or during breastfeeding. 26,7% of the women testing negatively possess this knowledge, while just one of the HIV-positive ladies (9,1%) can say the same.

80,5% of the women (91% among the HIV-infected vs 76,7% among the non-infected, p-value 0,412) are aware of breastfeeding being a risk factor. However, among the ones who have heard about mother-to-child-transmission of HIV, 22,2 % believe that breastfeeding is the only way that this can occur. Only about every third woman (36,6%) know that the fetus can get infected in utero (27,3% vs 40,0% for the HIV-pos. and the HIV-neg. group respectively, p-value 0,716). Knowledge about delivery as a time for possible transmission is more widespread. 53,7% (63,7% vs 50,0%, p-value 0,499) mention this as a route for MTCT. The p-value for the association between HIV-status and knowledge of the different routes of transmission is 0,628.

### 3. ADVICE GIVEN TO PREGNANT WOMEN WITH REGARDS TO INFANT FEEDING

To discuss infant feeding with pregnant women appears to be very common in our society. Before taking a closer look at what advice the women of my population are receiving, it is important to assess how many of them who actually are advised about these issues.

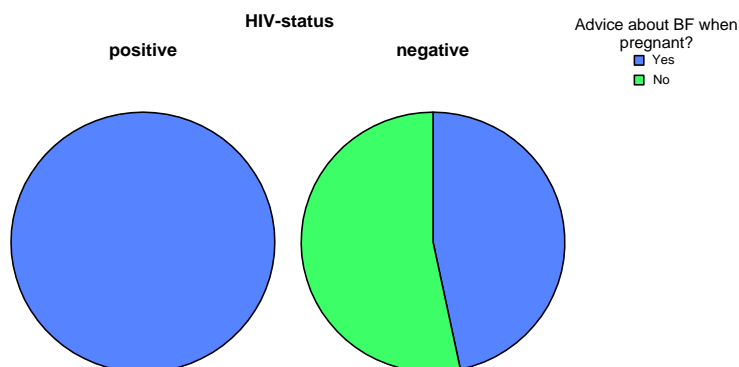
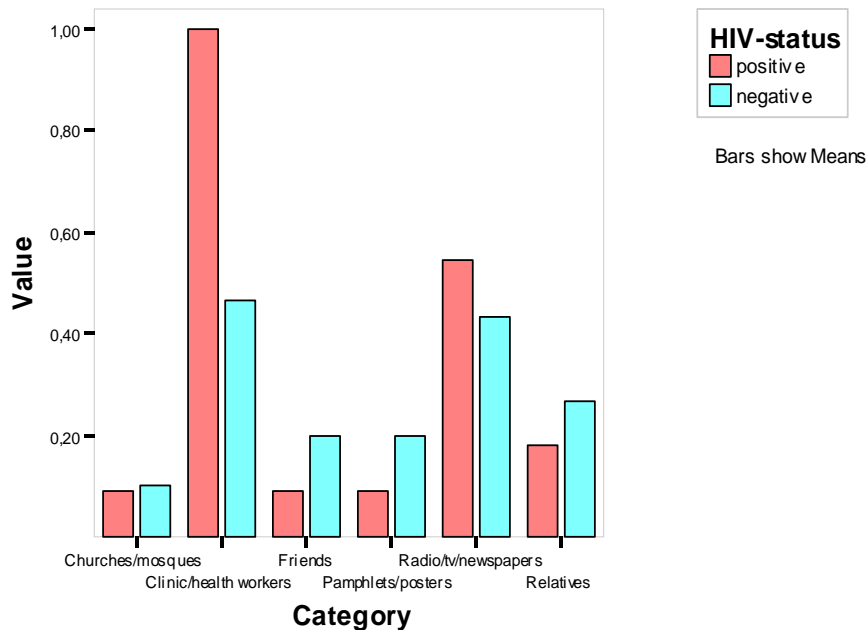


Figure 2: Advice about infant feeding given during pregnancy.

As seen in the figure above, all of the HIV-infected women state that someone talked to them about infant feeding during pregnancy. However, a significant number of HIV-negative women (53,3%) claim not to have received guidance on infant feeding at all. The p-value is 0.03, indicating a probable association between HIV-status and guidance practises.

Another aspect that obviously has a major impact on the advice being given, is who is providing this information. As seen in the graph below, there is a difference when it comes to HIV-status and the amount of guidance given from various authorities.



Graph 1: Where do the women get advice about infant feeding?

When analysing the graph above, it is important to bear in mind that the columns demonstrate the people out of the entire group who have received advice from friends, relatives etc. As an example, let us take a closer look at the columns for advice from clinics and health care workers. Although all of the HIV-negative women who did receive guidance on infant feeding were informed by health staff, the column is less than half of the one for HIV-positive women (p-value 0,003). This is simply due to the fact that more than half of the non-infected women deny having received any information on infant feeding at all.

Discussing infant feeding with relatives or friends is quite uncommon. Only one in five HIV-positive and one in four HIV-negative women have talked to their relatives about these issues (p-value 0,700). It is even less common to share these thoughts between friends. 10% (one individual) among the positive women and twice the percentage in the negative group claim to have discussed infant feeding with friends (p-value 0,651).

Apparently, feeding options for infants is not a theme frequently talked of within the religious circles. Only a minority of 10% has experienced conversations on this topic in their church or mosque. The prevalence is similar for HIV-positive and HIV-negative women (p-value 1,000).

A total of 46,3% of the entire population say that they have received information on infant feeding through the radio, television or newspapers (54,5% vs 43,3% in the HIV-positive and the HIV-negative group respectively, p-value 0,725). Pamphlets and posters is obviously not yet a common form of information about these subjects. Only 17,1% (9,1% vs 20%, p-value 0,651) claim to have been informed by these sources.

### What advice do the women get?

Among the women who did receive advice concerning infant feeding, 84% (81,8% vs 85,7%, p-value 0,763) were encouraged to practise exclusive breastfeeding in the first 4-6 months. Only a single HIV-positive mother was told that replacement feeding would be the best choice in her situation, while 12% (9,1% vs 14,3%) had experienced other people trying to convince them that mixed feeding was the most optimal option.

Among the women who had received information on infant feeding, 88% state that they have been given advice when it comes to the duration of breastfeeding. This is almost as common in the HIV-negative as in the HIV-positive group. 14,3%, of which all were HIV-positive, were advised to discontinue breastfeeding at 3 or 4 months. The remaining women were all encouraged to breastfeed for two years or beyond that. While nearly a third (11,1% vs 41,7% in the HIV-positive and the HIV-negative group respectively) were given information to stop breastfeeding at two years postpartum, the most common advice (given to 42,9%) was to continue breastfeeding until the child reached three years (44,4% vs 41,7%, p-value 0,1).

The concept of exclusive breastfeeding is widespread. In the group of women who, at some point during pregnancy, had received advice concerning infant feeding, 100% had been given information on exclusive breastfeeding. All of them said that the advice included to practise exclusive breastfeeding in the first 3-6 months. The majority, consisting of 63,6% (66,7% vs 61,5%, p-value 1,00) stated 4 months as the right time for introducing other food, while 22,7% (similarly divided between the two groups of HIV-statuses) had been encouraged to quit exclusive breastfeeding already at 3 months postpartum.

## 4. PREVALENCE OF BREASTFEEDING AND REASONS FOR PERFORMING THIS?

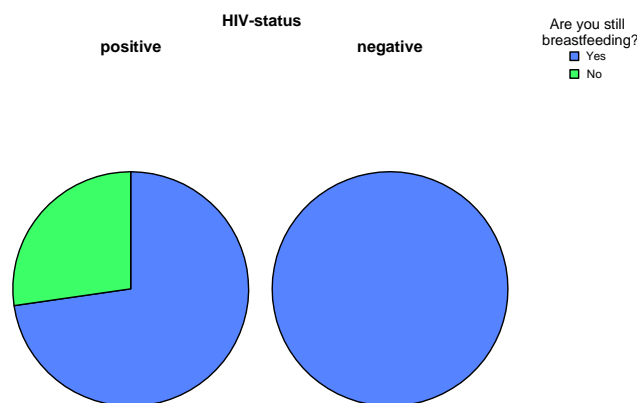


Figure 3: Amount of women still breastfeeding their child; HIV-positive vs HIV-negative respectively.

As demonstrated in the figure above, three of the HIV-positive mothers do not breastfeed their child. The next question to be answered, is obviously what factors make women choose breastfeeding as their mode of infant feeding?

When asked to name the factors that made them choose breastfeeding as the number one feeding option, the women could name as many reasons as possible. Consequently, the table below outlines the most common determinants in this decision process.

Table 3: What are the reasons to breastfeed your infant? (BM = breast milk. EBF = exclusive breastfeeding).

What are your reasons for continuing to breastfeed your child?				
Reason	HIV-positive No. (%)	HIV-negative No. (%)	Total No. (%)	Significans (p-value)
<i>Total</i>	8 (100)	30 (100)	38 (100)	
BM protects the baby from many diseases	8 (100)	29 (96,7)	37 (97,4)	n.s.
BM is free and always available	8 (100)	24 (80)	32 (84,2)	n.s.
BM does not need any special preparation	5 (62,5)	19 (63,3)	24 (63,2)	n.s.
EBF may lower chance of HIV-transmission	<b>6 (75)</b>	16 (55,2)	22 (59,5)	n.s.
People will not suspect the mother of having HIV	<b>8 (100)</b>	<b>15 (51,7)</b>	23 (62,2)	<b>0,015</b>
Protection from becoming pregnant again too soon	3 (37,5)	13 (44,8)	16 (43,2)	n.s.
The child is still young and needs mother`s milk	8 (100)	30 (100)	<b>38 (100)</b>	n.s.
The child must breastfeed up to 2 years (norm)	2 (25)	10 (33,3)	12 (31,6)	n.s.
The child must breastfeed up to 2,5 years (norm)	2 (25)	4 (13,3)	6 (15,8)	n.s.
The child must breastfeed up to 3 years (norm)	3 (37,5)	13 (43,3)	16 (42,1)	n.s.

The most frequent answer, given by 100% of the contestants, is that “the child is still young and needs her/his mother`s milk”. The role of breastfeeding as a protector against diseases in the infant also seems to be substantial in the decision-making process. 100% in the HIV-positive vs 96,7% in the HIV-negative group states this as a reason for breastfeeding.

75% of the HIV-positive vs 55,2% of the HIV-negative women say that the ability of exclusive breastfeeding to lower the risk of MTCT of HIV was an important factor when they chose to breastfeed their child. The fact that people will not suspect the mother of having HIV when she breastfeeds, is a reason given by 100% of the HIV-positive mothers, compared to 51,7% of the non-infected women (p-value 0,015).

### *The non-breastfed infants*

Only three out of 41 children were not breastfed at the time when these interviews were performed. The mothers of these children were all HIV-positive and they stopped breastfeeding at 0 months, 4 months and between 4 and 6 months respectively. The two main reasons (given by all three mothers) that made them abstain from breastfeeding, was that

1. the baby could get infected with HIV during breastfeeding
2. that you could not mix breastfeeding with other foods before 6 months (otherwise: an increased risk of MTCT)

Other answers included that it might be difficult to breastfeed if the mother gets very sick and that the study nurse encouraged them to stop breastfeeding for the reasons previously mentioned.



## 5. GIVING THE CHILD COMPLEMENTARY FOOD

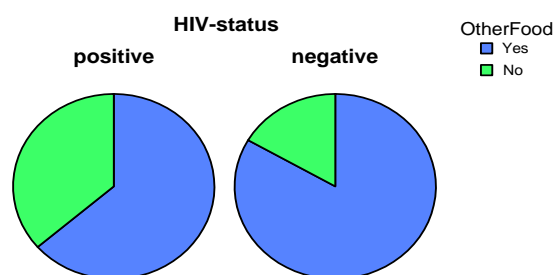


Figure 4: Proportion of women giving their children other food in addition to breast milk.

A larger proportion of the HIV-positive mothers (36,4%) choose exclusive breastfeeding compared with 16,7% among the HIV-negative women (p-value 0,217). 8 out of 9 infants being exclusively breastfed were 3 months old (p-value 0,001). 60% of the HIV-positive mothers still breastfed exclusively at 3 months and 33,3% did so at 6 months (p-value 0,455). The group of HIV-negative women who did not give their child complementary food, all had infants of 3 months. 50% of the youngest children of non-infected mothers were actually exclusively breastfed, giving a p-value of 0,005.

Table 3: What kind of complementary food is most often given to the children? (S/W/J = soup, water or juice).

Are you giving your child other food in addition to breast milk?				
Item	HIV-positive No. (%)	HIV-negative No. (%)	Total No. (%)	Significans
<b>Total</b>	7 (100)	25 (100)	32 (100)	
<b>Yes</b>				
Soup, water or juice	0 (0)	2 (6,7)	2 (4,9)	n.s.
S/W/J and cow`s milk	6 (54,5)	16 (53,3)	<b>22 (53,0)</b>	n.s.
S/W/J and formula milk	1 (9,1)	0 (0)	1 (2,4)	n.s.
S/W/J, cow`s and formula milk	0 (0)	7 (23,3)	7 (17,1)	n.s.
<b>No</b>	<b>4 (36,4)</b>	<b>5 (16,7)</b>	9 (22,0)	n.s.

As can be observed from the table above, 78% of the mothers provide their children with complementary food. The most common choice seems to be a mixture of cow`s milk and soup, water and/or juice. Formula milk is less common, only given to 19,5% of the infants, of which only one individual (12,5%) is the child of a HIV-infected mother.

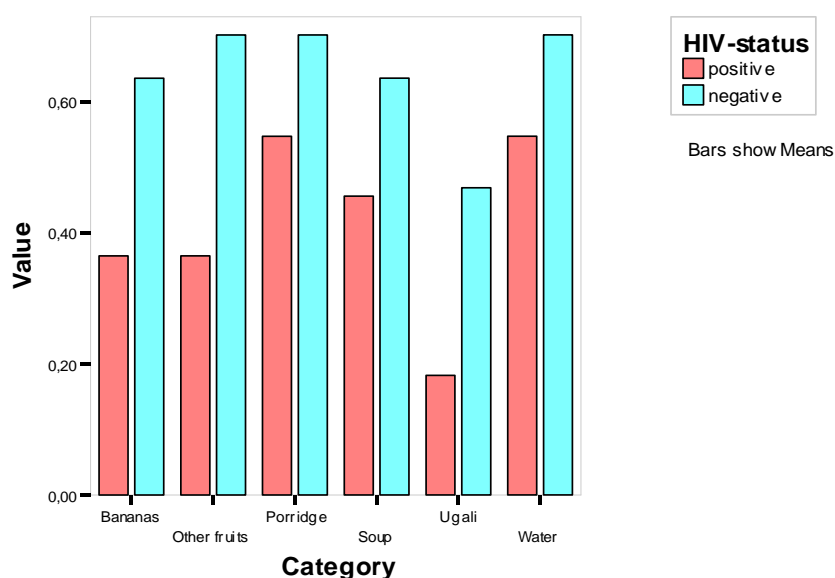
Table 4: Why are children given replacement food (RF), meaning cow`s or formula milk, by their mothers?

Why do you give your child cow`s or formula milk in addition to breastmilk?				
Reason	HIV-positive No. (%)	HIV-negative No. (%)	Total No. (%)	Significans P-value
<b>Total</b>	6 (100)	17 (100)	23 (100)	
No risk of HIV-transmission through RF	5 (83,3)	9 (52,9)	14 (60,9)	n.s.
Consists of most nutrients that a child needs	4 (66,7)	12 (70,6)	16 (69,6)	n.s.
RF is easy available	4 (66,7)	14 (82,4)	18 (78,3)	n.s.
Other caregivers can help feeding the child	4 (66,7)	10 (58,8)	14 (60,9)	n.s.
The mother did not have enough milk	3 (50,0)	16 (94,1)	19 (82,6)	0,04

Table 5: Factors explaining why children are given weaning food (WF), meaning soup, water, juice etc, in addition to breast milk.

Why do you give your child weaning food in addition to breastmilk?				
Reason	HIV-positive	HIV-negative	Total	Significans
	No. (%)	No. (%)	No. (%)	
Total	7 (100)	22 (100)	29 (100)	
No risk of HIV-transmission through WF	4 (57,1)	6 (27,3)	10 (34,5)	n.s.
WF is easy available	3 (42,9)	16 (72,7)	19 (65,5)	n.s.
Wf is cheap	3 (42,9)	12 (54,5)	15 (51,7)	n.s.
Other caregivers can help feed the child	4 (57,1)	12 (54,5)	16 (55,2)	n.s.
The mother did not have enough milk	3 (42,9)	18 (81,8)	21 (72,4)	n.s.

Reading from the two previous tables, it is obvious that a fair amount of the HIV-positive women give their children supplementary food because they feel that this implies no increased risk of HIV-transmission. The most common explanation for why non-infected mothers provide their infants with additional food, is that their own milk supply is scarce.



Graph 2: What kind of supplementary food (weaning food) are the children given?

A general tendency is that a lower percentage of the HIV-positive mothers give their children weaning food. This is the case for all different kinds of food. However, when it comes to what they give their children, the choice of food seems quite similar. Water and porridge are the most common supplementary food for children of HIV-positive, as well as HIV-negative, mothers.

## DISCUSSION

### A. KNOWLEDGE REGARDING MTCT OF HIV

The awareness of MTCT is more widespread among this certain sample than in the general population of Tanzania. 87,8% of the women in my study have heard about transmission of HIV from mother to child compared with 83% of all Tanzanian women (24). This is most likely due to the fact that the women in the study have been informed of MTCT by a study nurse before entering the program.

When comparing the group of HIV-positive women with the HIV-negative group, the most profound difference is probably that every sixth non-infected woman has no knowledge of vertical transmission at all. This may be explained by the fact that MTCT may seem of less significance to some non-infected women, given that they do not have to make up their mind on infant feeding or other issues based upon a positive test result.

The knowledge of breastfeeding being a risk factor for MTCT, is more common in the group of women that I interviewed than in the general Tanzanian population (80,5% vs 69%). This is not that surprising given that one of the major goals for the study is to increase the awareness of the role of breastfeeding when it comes to transmission of HIV. On the other hand, one in five women who know about MTCT believe that breastfeeding is the only way that vertical transmission can occur. Perhaps the study has focused a bit too much on the role of breastfeeding without emphasising enough the risks of MTCT during pregnancy and delivery?

Surprisingly, only about every third women knows that transmission can occur in utero. This correlates badly with the general perception in Tanzania, where 75% of women are aware of pregnancy being a possible time for transmission. However, my numbers on this are not statistically significant (p-value 0,628); probably much due to the low number of people included.

I found that 53,7% of the women are aware of delivery as a time for transmission of the virus. Both for this and when it comes to breastfeeding, the general knowledge is better among HIV-positive women than among the non-infected ones. However, this conclusion is not necessarily representative for the general population, given that the p-values can not exclude statistical independence between HIV-status and knowledge of MTCT.

When it comes to predictors that may influence the knowledge of MTCT, this study shows that the knowledge increases with a higher age; 25 years and above (p-value 0,028), and status as a married woman (p-value 0,021). In other words, both predictors prove to be statistically significant and these findings also correspond well with previous studies (14/24). It may seem obvious that older women know more considering their more extensive experience in different fields of life. Nevertheless, it may also reflect the fact that a higher age may carry a more responsible and active attitude towards their own and their children`s health. The fact that marital status also affects the knowledge of MTCT rises several questions; whether married women are more likely to be responsible, whether they have a lower threshold for discussing HIV and vertical transmission with others, or if it simply reflects the fact that older women have a higher marriage prevalence.

## B. ADVICE GIVEN TO PREGNANT WOMEN WITH REGARDS TO INFANT FEEDING

One of the most interesting and astonishing findings in my study, was that more than half of the HIV-negative women had never received advice on infant feeding. A p-value as low as 0.03 is a strong indicator of an association between HIV-status and information given. One probable explanation is that HIV-positive women are more likely to seek guidance concerning HIV in general and MTCT, included infant feeding, in particular. Another aspect is that HIV-infected women most likely pay more attention to the information provided by the media and other public authorities when it comes to these issues, simply because it is of greater relevance to them.

In a society where only a small proportion has higher education, there are numerous challenges that seem more urgent than health issues and media does not yet play a superior role in the influence of peoples` awareness on different issues, HIV, MTCT and consequently infant feeding may have a less significant place in peoples` consciousness than it ideally should have. Interestingly, all of the women in the study were given pretest counselling on infant feeding, with an emphasis on exclusive breastfeeding. These data therefore suggest that perhaps the non-infected women would have benefited from one or more additional follow-up consultations on the topic, as well, or that the information maybe should have been presented in a slightly different way.

The two most common sources of information on infant feeding among both HIV-positive and HIV-negative women, are health clinics and media, both public institutions. Stigma, taboos and misconceptions obviously make HIV a rare theme in familiar settings. However, this study shows that a non-infected woman is more likely to discuss such topics with her family or relatives than a woman carrying the virus. This may be due to the previously described problem of women being left alone when their positive HIV-status is revealed to family and friends. Religious settings does not prove to be an open arena for discussion about infant feeding, maybe due to the perception that this is more of a private matter.

Health clinics are the only source of information where HIV-status is a statistically significant predictor of advice given (p-value 0,003). Traditionally, the health system has always put more effort into treating diseases, rather than to prioritise preventive measures. Naturally, HIV-positive women will then receive more extensive care, included more detailed information on how appropriate feeding practises can minimise the chance of vertical transmission.

Among the women who did receive advice on infant feeding, all of them were aware of the concept of exclusive breastfeeding. The vast majority (84%) was encouraged to choose this feeding option during the first 3-6 months, regardless of HIV-status.

The official guidelines state that exclusive breastfeeding should continue till the baby reaches 4-6 months. Almost every fourth woman interviewed claimed that the advice given was to quit exclusive breastfeeding at three months. An apparent challenge here is to increase the general knowledge that exclusive breastfeeding is more beneficial for the child with respect to MTCT when continued for a longer period of time than three months. In cases where appropriate replacement feeding is an option, early cessation of all breastfeeding is of course the preferable choice.

85,7% of the women interviewed said that they were encouraged to breastfeed for two years or beyond and almost every second woman would aim to breastfeed for at least three years. This is far from the reality in Western countries. According to Norwegian dr. med. Trond Markestad (25), the guidelines in our own country states that exclusive breastfeeding is the recommended choice for the first six months and that breastfeeding in general should continue up to one year. When such a large majority of women in the study supports prolonged breastfeeding beyond two years, it has to be interpreted in the context of a completely different society where breastfeeding always has been a strong tradition and where this is considered the safest, most nutritious and cheapest option. In the following section I take a closer look at the reasons why women still prefer breastfeeding above anything else.

### C. PREVALENCE OF BREASTFEEDING AND REASONS FOR PERFORMING THIS?

92,7% of the women in the sample were still breastfeeding. The remaining three women had all tested positive for HIV, and abstained from breastfeeding to prevent vertical transmission. Given the low number of non-breastfed children, I can not draw any absolute conclusions on basis of the data collected from these mothers.

However, when examining the women still breastfeeding, there are a few interesting observations that requires closer attention. First of all; for several of the answers given to why they continue to breastfeed, the replies given by the HIV-positive women corresponds well with those given by the HIV-negative group. “The child is still young and needs her/his mother’s milk” (answered by 100%) and “breast milk protects the baby from many diseases” (97,4%) may seem like simple explanations, but merely reflect the faith that Tanzanian women have in the qualities that breast milk possesses.

89,5% state that the general norm is to breastfeed for at least two years. Naturally, people tend to follow the general trend in the population. For many women it is difficult, if not impossible, to choose a different direction when the vast majority have breastfed successfully for centuries.

The fact that “exclusive breastfeeding may lower the chance of HIV-transmission” is considered an important reason for why 75% of the HIV-positive mothers breastfeed. Even more interesting is it to see that 100% of the HIV-positive mothers consider breastfeeding as an important measure to prevent suspicion on her HIV-status. A p-value of 0,015 indicates a strong association between HIV-status and the emphasis on this aspect of breastfeeding. As previously mentioned, the Tanzanian society is not yet a place where HIV-related topics can be openly discussed. 71 % of the women in a study conducted in Tanzania in 2001 said that they would definitely lie about the reasons for not breastfeeding if found to be HIV-positive. Due to fear of rejection and discrimination, a positive test result is still something that usually is kept within the family. In a country where 8,8% of the adult population does carry the virus, it may seem somewhat surprising that taboos and misconceptions concerning HIV is so common. Hopefully, the last years` effort to bring HIV into the public discussion and focus on the disease in the health system may contribute to gradually change these attitudes.

## D. GIVING THE CHILD COMPLEMENTARY FOOD

The infants who are exclusively breastfed (22%) carry two characteristics in particular. They are usually young (88,9% are 3 months old) and this is a statistically significant predictor. Not only is this a reflection of the fact that prolonged exclusive breastfeeding is difficult to carry out in Tanzania, but it is also in accordance with international guidelines.

The exclusively breastfed children are also more likely to have an HIV-infected mother. 36,4% of the mothers with HIV choose not to use complementary food, compared with only 16,7% among the HIV-negative women. This is the case, despite the fact that the guidelines promote exclusive breastfeeding for the first 4-6 months independently of HIV-status. A negative HIV-status seems to correlate well with the length of exclusive breastfeeding. 50% of non-infected mothers wait to introduce other food till the baby is older than 3 months, and this is a statistically significant finding.

Among the HIV-positive women in my study, 3 out of 5 were breastfeeding exclusively at three months (and one was not breastfeeding at all), meaning that only 1 (20%) did not manage to follow the guidelines. At six months, only one out of three had started introducing other food in addition to breastfeeding. The bottom line is that 75% of the HIV-positive women at least partly succeeded in following the recommendations given by WHO when it comes to infant feeding (the women who were not breastfeeding, all gave their children some sort of milk substitute; not necessarily formula, and also weaning food). Given what we know about sources of information on HIV, it is evident that the health clinics have played a major role in influencing HIV-positive women to choose the right feeding option, whether it was to breastfeed exclusively or to provide milk substitutes for their child. Another conclusion that can be drawn from these numbers, is that breastfeeding exclusively is a much more acceptable and feasible measure than replacement feeding in the society of Moshi. Based on my findings and several previously published articles, I expect this trend to be valid in similar settings in the third world.

When it comes to what kind of complementary food the infants are given, a combination of cow's milk and weaning food is the most common. 95,1% are given some sort of additional milk, indicating that many feel that the breast milk provided by the mother is not sufficient to meet the child's needs. Being HIV-negative is a statistically significant predictor of giving the infant extra milk because the mother did not have enough milk. HIV-positive mothers are more likely to have other explanations. Most importantly, 83,3% say that milk supplements carry no risk of vertical transmission. Knowing that providing the child with a combination of breast milk and other food actually may increase the overall transmission risk does not seem to be a well known fact. A major challenge in the future will therefore be to further emphasise the reasons for breastfeeding exclusively in addition to informing people of the official guidelines.

As in all research, these findings also carry insecurity as to whether they are valid and trustworthy. There are a few sources of errors that require closer attention.

1. First of all, the population of my study had all received certain information concerning HIV, MTCT and infant feeding. I would therefore expect a higher knowledge about these issues than in the general population, and consequently conclusions on knowledge about HIV among Tanzanian women can not be drawn from this study.
2. A study like this should ideally be based upon a randomised group of people. We offered the interview to all women attending the clinics (with a child of 3,6 or 9 months) during these five weeks. However, it is likely to suspect that the group of women seeking help at the clinics not necessarily was representative. It is possible that these women were more responsible and enlightened than the average Tanzanian woman, making them more susceptible to attend follow-up visits.
3. Another aspect is that the questions were partly retrospective, increasing the chance of people not remembering certain things. This is particularly important when it comes to what advice the women received. I tried to minimise this source of error by talking to mothers of the youngest children.
4. The interviews were all performed in Kiswahili, the national language of Tanzania. Although I had attended a Kiswahili course before going there, my knowledge of the language was rather scarce. During my stay, both my familiarity with the questionnaire and the language improved, and it may be that the answers given in the last few weeks were somewhat more reliable than the others. We had nurses helping us to translate the answers into English, but the local nurses` knowledge of English was often limited. Having different nurses assisting us at the different clinics also may have caused slightly different interpretations of the questions and answers given. I tried to minimise this risk by making clear and concise questions and by making alternative answers for many of them. I also encouraged the women to add answers that were not already included in the questionnaire.
5. The setting where the interviews were carried out, was very different at the two clinics. In one clinic, I had my own room, and complete anonymity and confidentiality was never an issue. In the other clinic, most of the work was allocated to one big hall room, leaving less room for “private” conversations. However, we put a lot of effort into avoiding other people from hearing the answers given by removing ourselves physically from the other women and also lowering our voices during the interviews. Making a woman certain that her acquaintances could not hear her answers was a necessity to achieve honesty.
6. The amount of time spent in Moshi and the relative low proportion of HIV-infected women did not allow more women to be included in the study. Naturally, the conclusions drawn are less certain than whether this had been a larger study. However, I have tried to differentiate between the statistically significant findings and the rest, who serve more as trends in this population.
7. Finally, I would like to add that I did not have any personal interests in the results of this study. I have therefore interpreted the answers as objectively as possible.

## CONCLUSION

HIV and AIDS has during the last decades become the biggest health challenge that Africa is facing; affecting large numbers of children as well as adults. Knowing that more than 75% of HIV-infected women in the world live in Sub-Saharan Africa, the concept of mother-to-child-transmission poses a dilemma for thousands of women in this region on a daily basis. In my study I found a high knowledge about MTCT (87,8%) and the role of breastfeeding in particular, especially among the HIV-positive women. The knowledge is higher with an increased age and also with being married.

Based on the data from my study, it seems like the advice about infant feeding given from various authorities is mostly directed towards HIV-infected women. It is clearly satisfying to find that all of the HIV-positive mothers have received guidance on infant feeding with respect to their HIV-status. However, when more than half of the non-infected women claim never to have been advised about infant feeding, it is evident that a lot of effort is required to change these depressive statistics. Although not at risk of transmitting a dangerous virus to their baby, these mothers need to be aware of the official guidelines in order to be able to bring up a healthy child by providing their infants with the best possible nutrition.

More than 90% of the women in the study were still breastfeeding and 22% practised exclusive breastfeeding. HIV-positive mothers and mothers of young babies were more likely to breastfeed exclusively. The HIV-infected women stated that fear of revealing their HIV-status was a main reason why they continued to breastfeed. This is also one of the explanations why exclusive breastfeeding is looked upon as a much more acceptable and feasible alternative than replacement feeding. Stigma and discrimination is apparently still major barriers in the fight against HIV. Fortunately, 75% of the HIV-positive women did at least partly succeed in following the recommendations given by WHO when it comes to infant feeding. This means that they either breastfed exclusively for the first few months or that they abstained from breastfeeding and provided their children with milk substitutes and weaning food in stead. Only 25% used mixed feeding in the first few months.

The concept of exclusive breastfeeding is widespread. The vast majority of women who had received advice on infant feeding, were encouraged to choose this option, regardless of their HIV-status. Nevertheless, there are obvious barriers that make it difficult to follow the international recommendations. The two misconceptions that mother`s milk is not sufficient to meet the child`s nutritional needs and that weaning food does not carry a risk of vertical transmission when combined with breastfeeding, need to be taken seriously. More effort to spread information on the fact that mixed feeding may in fact increase the risk of MTCT is obviously necessary, as this is a simple and yet effective measure in the fight against mother-to-child-transmission of HIV.



## Appendix 1: Sources of information

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## Appendix 2: QUESTIONNAIRE CONCERNING FEEDING PATTERNS

### **A. BACKGROUND**

#### GENERAL INFORMATION:

- 1) Identification number: Sia:            Mine:
- 2) **HIV-status (mother)** + :            - :
- 3) Age of child:            1) 3 months            2) 6 months            3) 9 months
- 4) Age of mother:
- 5) Marital status:
  1. Single
  2. Living with partner, unmarried
  3. Married
- 6) a. Number of living children  
b. Age of the second youngest child
7. Living pattern: who are you living with?
  1. Partner and children
  2. Partner, children and other members of the mother`s family
  3. The children and members of the mother`s family
  4. Partner, children and other members of the partner`s family
  5. Other options
- 8) Religion:
  1. None
  2. Christian
  3. Muslim
  4. Traditional religion
  5. Other
- 9) a. Education:
  1. Primary school (7 years, age 7-14)
  2. Secondary school (low level - 4 years, age 15-19)
  3. Secondary school (high level – 2 years, age 19-21)
  4. Higher education (college/university, max 5 years)

b. Work:

c. What is your monthly income?

  1. None
  2. <5000 Tzs (< 27,50 NOK)
  3. 5000-10000 Tzs (27,50-55 NOK)
  4. 10000-15000 Tzs (55 NOK-82,50 NOK)
  5. >15000 Tzs (>82,50 NOK)
- 10) Economical status:
  - a. Material possessions: do you possess any of the following?
    1. Radio
    2. Bike
    3. Car
    4. Fridge
    5. Telephone
    6. Television

- b. Electricity: do you have electricity at home? Yes: No:  
 c. House ownership: Do you (and your partner) own the house you live in or are you renting? We own it: We are renting:

**QUESTIONS CONCERNING HIV:**

- 11) Can a pregnant woman pass HIV-1 to her child? 1. Yes  
 2. No  
 3. Don` t know
- 12) If yes, when does this happen?  
 1. During pregnancy  
 2. During delivery  
 3. During breastfeeding

**PREVIOUS PREGNANCY:**

- 13) Age of the older child?  
 14) Did you breastfeed your last child? Yes: No:  
 15) For how long did you breastfeed?  
 16) How old was your child when you introduced other food in addition to breastfeeding?

**B. FEEDING PATTERN OF THE CURRENT CHILD**

**ADVICE GIVEN DURING THE PREGNANCY OF CURRENT CHILD:**

- 17) Did you get any advice about breastfeeding in general when you were pregnant?  
 Yes: No:

If yes:

- 18) Who did you get advice from?  
 1. Relatives  
 2. Friends  
 3. Clinic/health workers  
 4. Churches/mosques  
 5. Radio, television, newspapers  
 6. Pamphlets, posters
- 19) What did they advise you about breastfeeding in the first 4-6 months?  
 1. To breastfeed exclusively  
 2. To use replacement feeding  
 3. To use mixed feeding
- 20) a. Did they advise you about duration of breastfeeding? Yes: No:  
 b. If yes, for how long did they advise you to breastfeed?
- 21) a. Did they talk to you about exclusive breastfeeding? Yes: No:  
 b. For how long did they advise you to breastfeed exclusively?

**FEEDING THE CHILD:**

- 22) Are you still breastfeeding? Yes: No:

If yes:

- 23) What are you reasons for continuing to breastfeed? (several options possible)  
 1. Breast milk protects the baby from many diseases  
 2. Breast milk is free and always available

3. Breast milk does not need any special preparation
4. Exclusive breastfeeding may lower the chance of mother-to-child-transmission of HIV
5. People will not suspect the mother of having HIV
6. Breastfeeding protects the mother from becoming pregnant again too soon
7. The child is still young and needs mother`s milk
8. The child must breastfeed up to two or three years (norm)
9. Others

If no:

- 24) a. How old was your child when you stopped breastfeeding?
1. < 4 months
  2. 4-6 months
  3. > 6 months

- b. What were your reasons for discontinuing breastfeeding? (several options possible)
1. The baby can become infected with HIV
  2. The mother can not mix breastfeeding with other foods before the baby is six months because it will increase the risk of transferring HIV
  3. It is difficult to breastfeed if the mother works
  4. Breastfeeding may be difficult if the mother gets very sick
  5. The baby stopped/refused to breastfeed
  6. Was advised by the study nurse
  7. Others

25) Are you giving your child other types of food apart from breast milk? (several options possible)

1. Yes, I give my child cow milk
2. Yes, I give my child formula milk
3. Yes, I give my child other types of food, like soup, water or juice
4. No

26) If you give, gave your **child cow or formula milk** before the child is/turned 4-6 months, what were your reasons for doing so? (several options possible)

1. There is no risk of passing HIV through replacement food
2. It consists of most of the nutrients that a child needs
3. It is easy available
4. Other caregivers can help feeding the child
5. The mother did not have enough milk
6. Others

27) If you give/gave you child **other types of food like soup or water (weaning food)**, what were your reasons for doing so? (several options possible)

1. There is no risk of passing HIV through other types of food
2. It is easy available
3. It is cheap
4. Other caregivers can help feeding the child
5. The mother did not have enough milk
6. Others

28) What types of weaning food(s) do you give your child?

- |             |                   |               |
|-------------|-------------------|---------------|
| 1. Water    | 4. Mashed bananas | 7. Other food |
| 2. Soup     | 5. Other fruits   |               |
| 3. Porridge | 6. Ugali          |               |

