

Breast feeding and sociodemographic factors in rural Tanzania

Which factors are associated with breast feeding?

Nima Neolene Rao

Master Thesis in Nutrition



Supervisors:

Anne Bergljot Bærug

Knut Inge Klepp

Germana Henry Leyna

Milada Småstuen

Department of Nutrition, Faculty of Medicine,

University of Oslo, Norway

July 2007

Acknowledgements

This thesis was written using data collected by the project “ Health Systems Research and Health Promotion in Relation to Reproductive Health in Tanzania” in 2005. The project was supported by the Norwegian Council of Universities Committee for Development Research and Education and is facilitated by four collaborating institutions: Muhimbili University College of Health Sciences, Kilimanjaro Christian Medical Centre; Centre for Educational Development in Health Arusha (Tanzania) and the university of Oslo and Bergen.

I would like to thank Knut Inge Klepp for introducing me to this project and for supervision and guidance. Thanks to Germana Leyna for supervision and for insights about the project and about Tanzania. Thank you both for sharing your knowledge and for good ideas and advice.

A very special appreciation goes to Anne Bergliot Bærug for being so encouraging, inspiring and supportive from the day I met her. Thank you for comments and articles, for your interest and for always being available! I would also like to express my gratitude to Milada Småstuen for helping me with the data analysis. Thank you so much, I would never have made it without you both! Thanks to Sheri, James, Hafsa and Mangi for making my stay in Tanzania an experience I will never forget! Special thanks go to Hafsa for the translation in Oria, and to Mangi and Alicewambui wamwere for helping me translate the Swahili data to Norwegian and English. Warm thoughts go to Sheri Bastien for proofreading, guidance and for friendship. Thanks to my fellow master students for support, numberless fruitful discussions, coffee breaks and good times shared. I would also like to thank my friends outside the world of nutrition (especially Jon), my brother and my mother for making me happy and for being supportive and patient with my lack of spare time.

Oslo; July 2007 Nima Neolene Rao

Abstract

Background and aim: Protection, promotion and support of infant and young child feeding contribute to the wellbeing of mother and child, social equality, socioeconomic development, food security and poverty reduction. The aim of this study is to identify different socio-demographic factors affecting breast feeding behaviour of mothers. This includes how long they breast fed their last born child, if they gave predominant feeding or breast milk few days after birth, when they gave complementary food and what kind of complementary food they gave. We also wanted to study how HIV affected the mothers.

Material and method: This project was first part of the Tanzanian-Norwegian AIDS Project (MUTAN; 1990-1995) and later part of the NUFU (Norwegian Universities' Committee for Development Research and Education) funded project, "Health Systems Research and Health Promotion in Relation to reproductive Health in Tanzania". The cross sectional survey included a total of 1,528 subjects between 15-45 years. This present study included 666 women between 15-45 years. The women were mothers and had their last delivery between 1995 and 2005. Data was collected by questionnaires. Association between breast feeding duration and demographic factors was studied, using Cox survival analysis. Practises of predominant and complementary food's relation to socio-demographic factors were studied using multiple logistic regressions. The main variables were; breast feeding duration (months), food given few days after birth (predominant food), timely introduction of complementary foods and type of complementary foods (fluid/solid).

Results: A majority initiated breast feeding (98, 7%). Median breast feeding duration was 24 months. Most of the mothers who had terminated breast feeding applied that the child was old enough. The oldest women breast fed significantly longer than the youngest age group. Women who had their last delivery after 2002 breast fed significantly shorter than women who had their last delivery before 2003. Farmers, married/cohabiting women and women who had their last delivery between 2003 and 2005 were more likely to give breast milk few days after birth. HIV positive women and women who had their last

delivery between 2003 and 2005 introduced complementary food before the child was 4 months old. Almost 85% of the mothers give solid food as complementary food. Children who were born between 2003 and 2005 and children who got predominant food, few days after birth had higher risk of getting fluids as complementary food.

Conclusion: The study indicates that breast feeding prevalence in Oria is high. The practice of predominant feeding and the onset of complementary food is however not optimal. Young women, single mothers, employed mothers, HIV positive women, and women who gave birth after 2002 are groups that need extra support and protection in breast feeding interventions. Education is important to promote safe breast feeding and sexual behaviour. Paternal support is also essential to secure optimal breast feeding patterns.

List of Tables and Figures

Table 1: Distribution of sample characteristics

Table 2: Breast feeding duration of the last born child

Table 3: Reasons for breast feeding termination

Table 4: Univariate and multivariate analysis of breast feeding duration

Table 5: Adjusted odds ratio of breast feeding duration <18 months>, by socio-demographic characteristics.

Table 6: Unadjusted and adjusted odds of the type of food given few days after birth by socio-demographic variables

Table 7: Unadjusted and adjusted analysis of age of initiation of complementary food

Table 8: Univariate and multivariate analysis of type of complementary food and its relationship to demographic factors

Figure 1: Determinants of infant feeding behaviour

Figure 2: Cumulative breast feeding duration among mothers who are currently not breast feeding

Figure 3: Breast feeding pattern from 1976-2005

Figure 4: Reasons for not breast feeding in relation to age

Figure 5: Probability of continued breast feeding in relation to age of mother

Table of content

| | |
|--|-----------|
| Acknowledgement | 2 |
| Abstract | 3 |
| List of Tables and figures | 5 |
| Table of content | 6 |
| 1. Introduction | 9 |
| 1.1. Global health and nutrition situation for children | 9 |
| 1.2. Health and nutrition situation for children in Tanzania | 10 |
| 1.3. Global strategy | 10 |
| 2. Background for recommendations | 12 |
| 2.1. Breast feeding | 12 |
| 2.2. Complementary feeding | 13 |
| 2.3. HIV and infant feeding | 14 |
| 2.4. Recommendations | 14 |
| 3. Breast feeding prevalence- a global perspective | 16 |
| 3.1. Exclusive breast feeding | 16 |
| 3.2. Timely introduction on complementary foods | 16 |
| 3.3. Total duration of breast feeding | 16 |
| 4. Determinants of infant feeding | 18 |

| | |
|---|-----------|
| 4.1. Social support, cultural norms and attitudes | 18 |
| 4.2. Socioeconomic and demographic factors | 19 |
| 5. Objectives and definitions | 22 |
| 5.1. Objectives | 22 |
| 5.1.1. Research questions | 22 |
| 5.2. Definitions | 23 |
| 6. Materials and methods | |
| 6.1. Project background | 24 |
| 6.2. Study area/population | 25 |
| 6.3. Study design | 26 |
| 6.3.1. Inclusion and exclusion criteria and data collection | 26 |
| 6.4 Data analysis | 27 |
| 6.5. Variables | 28 |
| 6. 5.1. Dependent variables | 28 |
| 6.5.2.Independentvariables | 29 |
| 7. Results | 31 |
| 7.1. Demographic characteristics | 31 |
| 7.2. Duration of breast feeding | 33 |
| 7.3. Reasons for breast feeding termination | 36 |
| 7.4. Factors associated with breast feeding duration | 38 |

| | |
|---|-----------|
| 7.5. Supplementations given few days after birth | 41 |
| 7.6. Age started complementary food | 42 |
| 7.7. Does the complementary food differ according to demographic factors? | 43 |
| 8. Discussion | 45 |
| 8.1 Samples and Methodology | 45 |
| 8.2. Objectives | 46 |
| 8.2.1 Breast feeding prevalence | 46 |
| 8.2.2 Reasons for not breast feeding | 46 |
| 8.2.3 Factors associated with breast feeding duration | 47 |
| 8.2.4 Neonatal nutrition | 48 |
| 8.2.5. Introduction of complementary feeding | 50 |
| 8.2.6. Type of complementary feeding | 51 |
| 9. Suggestions for further research | 54 |
| 10. Challenges for the future | 55 |
| 11. Conclusion | 57 |
| 12. References | 59 |
| Appendix | 66 |
| Interview; NUFU project: Kahe cohort study 2005 | 67 |

1.Introduction

1.1 Global health and nutrition situation for children

Malnutrition is responsible for millions of deaths every year, especially among children under five. Hunger and malnutrition are the underlying cause of more than half of all child deaths. The majority of these children die of neonatal disorders or of infectious diseases, including diarrhoea, pneumonia, malaria and measles (1). Most of these children would survive if their immune systems had not been weakened by hunger and malnutrition (2; 3).

The Bellagio Study Group on Child Survival found in their investigations that interventions which have been available for many years, such as oral rehydration therapy and promotion of exclusive breastfeeding, have great life-saving potentials. Breast milk protects the infant against infectious and chronic diseases. Exclusive breastfeeding reduces infant mortality due to common childhood illnesses such as diarrhoea or pneumonia, and helps for a quicker recovery during illness (4). Complementary feeding, typically covers the period from 6 to 18-24 months of age. This is the time when malnutrition starts in many infants, contributing significantly to the high prevalence of malnutrition in children under five years of age world-wide. WHO estimates that 2 out of 5 children are stunted in low-income countries.

Demographic factors (such as education, social class and parity), economic conditions, commercial pressure, national and international policies and norms are underlying determinants influencing breastfeeding behaviour and nutritional status in a country (3; 5-7).

1.2 Health and nutrition situation for children in Tanzania

Protein-energy malnutrition (PEM) is common in Tanzania and it is mainly due to low food consumption, bulkiness of foods (due to carbohydrate-rich food), poor economic status of the population and poor availability of foods (5). The most recent Tanzania and health survey (THDS) reported that almost half of the children under five were stunted. Rural children were more affected than urban children (2, 8). Tanzania is one of Africa's poorest countries. In 1995 more than one third of the population lived below the national poverty line. Life expectancy at birth is 46 years in Tanzania (9) compared to 77 years in industrialized countries (10). Breast feeding is almost universally practised in Tanzania. Results from the 1999 Tanzania Reproductive and Child Health survey (TRCHS), document a long duration of breastfeeding, however supplementation of breastfeeding with other liquids and foods occurs too early in Tanzania, thus exclusive breast feeding is not widely practised. However the 2004-2005 Tanzania Demographic and health survey (TDHS) indicated a significant decrease in infant and child mortality rates in recent years. An association between increasing women's status and decreasing levels of child mortality has been shown (3, 8)

1.3 Global strategy

The Global strategy on infant and young child feeding emphasized the need for comprehensive national policies on infant and young child feeding, ensuring that all health services protect, promote and support exclusive breast feeding and timely and adequate complementary feeding with continued breast feeding (WHO, 55th world health assembly). The International Code of Marketing of Breast milk substitutes, drafted by WHO, UNICEF, NGOs and representatives of the infant food industries, provides guidelines for the marketing of breast milk substitutes, bottles and teats (11). The Baby-Friendly Hospital Initiative (BFHI) is an effort to ensure that all maternities become centres of breastfeeding support. Many Tanzanian mothers, especially urban mothers have had access to current information on recommended infant feeding, however little is

known about the effect of this programme in promoting exclusive breast feeding, in particular if the mothers continue with optimal breast feeding once they return to the community (12).

Few studies have investigated breast feeding behaviour and complementary foods in relation to social factors in rural areas of Tanzania and they are rarely based on representative samples. In order to promote breastfeeding and evaluate programs that a country has to prevent nutrition and health problems, it is important to identify factors affecting the breast feeding behavior (13). The main objective of this current study is to describe the breast feeding patterns, trends, complementary feeding and the associating socio-demographic characteristics, in Oria, Tanzania, in the period from 1995-2005.

2. Background for recommendations

2.1 Breast feeding

Breast feeding has clear short-term benefits for child health by reducing mortality and morbidity from infectious diseases. In resource limited settings breast milk contributes substantially to the energy requirements of infants onto the second year of life. Breast milk provides a complete source of nutrition for the first six months of life, and one third of requirements in the second year of life (11). Studies conducted in middle/low-income countries reported a reduced risk of mortality from infectious diseases among breastfed infants, up to the second birthday (14). Studies show that infants who were exclusively breastfed for 6 months presented lower morbidity from gastrointestinal and allergic diseases, compared to non-breastfed children. Studies suggest that breast feeding may have long-term benefits. Subjects who had been breastfed were found to have a lower mean blood pressure and lower total cholesterol, and showed higher performance in intelligence tests (15). Breastfeeding has benefits throughout the life cycle. Early suckling stimulates the release of hormone that helps the mother's uterus to maintain a contracted state. This means that breastfeeding affect mother's period of postpartum infertility, and hence the lengths of the birth interval, fertility levels, and also iron status (8; 16)

A randomized trial in Belarus found a decreased risk of gastrointestinal tract infection and atopic eczema in the first year of life when they increased the duration (from 4 to 6 months) and degree (exclusivity) of breast feeding (4). These findings add to growing evidence that breast feeding benefits are dose- and duration- responsive and support current recommendations that infants receive only breast milk during the first 6 months of life (4; 17). Breast feeding into the second year of life, accompanied by appropriate complementary feeding, maintains good nutritional status and continues to help prevent

diarrhea (UNICEF). As a result UNICEF and many ministries of health developed the recommendations (11).

On the other side, evidence from trials in Honduras (18) demonstrates poorer iron status in infants exclusively breast fed for six months than in infants exclusively breast fed for four months followed by partial breast feeding to six months, but this finding is likely to apply to populations in which maternal weight is low and iron status and infant endogenous stores of iron are not optimal. Other potential risks associated with exclusive breast feeding for six months, including growth faltering and other micronutrient deficiencies, in some infants can not be excluded (See the optimal duration of exclusive breast feeding. Systematic review WHO 2002). In all circumstances, these risks must be weighed against the benefits provided by exclusive breast feeding, especially the potential reduction in morbidity and mortality (18-20)

2.2 Complimentary feeding

The complementary food in many parts of Tanzania are made from gruels made up of locally produced foods such as maize, cassava, sorghum, finger millet, and sweet potato, and milk products other than breast milk (8). These are starch-based complementary foods with high water content, and low energy and nutrient density. To achieve an intake that is sufficient to meet energy and nutrient requirements, a child has to eat large volumes of such foods. The food has a dietary bulk characteristic, and this is one of the most important factors contributing to the protein and energy malnutrition in children (20; 21). Improved nutrition at an early age and energy dense complementary foods may give beneficial effects on growth and health of infants (5; 20; 22). Field studies show that complementary foods introduced between four and six months of age replace nutrients from breast milk and confer no advantage on growth or development (11). The nutritional role of mother's milk in the second year is inversely related to the adequacy of the complementary diet. Adelheid W. Onyango et al (23) found that breast milk was an irreplaceable source of fat and vitamin A. When the weaning diet is inadequate for key nutrients because of low intake or poor bioavailability, breast milk assumes greater

nutritional significance in the second year of life but does not guarantee adequate nutrient intakes. Programmes in Tanzania have brought a number of significant improvements in household level preparation of good quality complementary food, including porridge with reduced viscosity designed to increase consumption by young children (24).

2.3 Hiv and infant feeding

In resource limited settings, where breast feeding is a norm, mother to child transmission of HIV (MTCT) ranges from 8%-16% when lactation continues into the second year (19). UNAIDS, WHO and UNICEF recommended in the 2001 policy document, that “when replacement feeding is acceptable, feasible, affordable, sustainable, and safe, avoidance of all breastfeeding by HIV-infected mothers is recommended. Otherwise, “exclusive breast feeding for the first few months of life” is recommended (19).

Replacement feeding in Tanzania is not without risks, therefore WHO recommends them to exclusively breast feed. Early weaning is known to increase susceptibility to infections, due to increased risk of sub clinical mastitis, which occurs during breast engorgement, and decreased integrity of the infant’s intestinal wall. This can cause malnutrition and MTCT (5; 25). However many undernourished and HIV infected mothers believe that complimentary feeding in combination with breast milk is better for their children than breast milk alone (25). Covadia et al (26) found an association between mixed breastfeeding and increased HIV transmission risk in their studies.

2.4 Recommendations

Breast feeding is an optimal way of providing food for the healthy growth and development of infants; it is also an integral part of the reproductive process. WHO recommends exclusive breast feeding for six months. Further the recommendations address the evolving nature of children’s nutritional requirements. Infants should receive

nutritionally adequate and safe complementary foods while breast feeding continues for up to two years of age or beyond. Exclusive breast feeding from birth is possible except for a few medical conditions (11; 21). When the child is six months old, the nutritional needs for growth can no longer be fully met by breast feeding (21). WHO recommend that all infants be breast fed and also receives complementary food from 6 months of age (11) (WHO, Global strategy on infant and child nutrition).

To enable mothers to establish and sustain exclusive breast feeding for 6 months, WHO and UNICEF recommend:

- Initiation of breast feeding within the first hour of life;
- Exclusive breast feeding; No supplements
- Breast feeding on demand – that is as often as the child wants, day and night;
- No use of bottles, teats or pacifiers (27).

(Global Strategy on Infant and Young Child Feeding).

3. Breast feeding prevalence – a global perspective

Incidence of breast feeding initiation is 90% to 95% in a majority of developing countries (11). Breast feeding initiation followed by predominant breast feeding is universal in Tanzania, and the practice is regarded positively extending into the second year of life. Complementary food is usually given to the child after four months (28-30). Data from the Demographic and Health survey 1990-1996, show that the recommendation of exclusive breast feeding is not widely practised (11).

3.1 Exclusive breast feeding

In general, the proportion of infants under four months of age who were exclusively breast fed is highest on average in Asia, and the near East/ North Africa, followed by Latin America and sub Saharan Africa. Although breast feeding is universal in sub Saharan Africa, it's far from optimal. In Zimbabwe only 7.6% of mothers report exclusive breast feeding for 3 months; in Cote d'Ivoire only 18% and 10 % reported it for 1 and 3 months respectively (31).

3.2 Timely introduction on complementary foods

In 1991-1992, 58.7 % of Tanzanian women gave breast milk and complementary food when the child was 6-9 months old as recommended by WHO (11).

3.3 Total duration of breast feeding

The prevalence of breast feeding is relatively high (11). The 2004-2005 TDHS indicates that 59% of children are breast fed within one hour after birth, while 92 % are breast fed within one day. Among Tanzanian mothers 94.7 % breast fed 12-15 months, in 1991-

1992. Prevalence of breast feeding among children 20-23 months of age are highest in Sub Saharan Africa and Asia (over 50%) and lowest in Latin America and the Caribbean and the Near East/ North Africa (25%) (6; 11). The reporting of young women with some modern attributes (unmarried, not farmers, few children) to have intention to breast feed for a shorter period of time than women with traditional attributes, have worried some that the average breast feeding duration might gradually decline in Tanzania in the coming years, as this segment of the population increase (29; 32) .Data on world wide trends in the median duration of breast feeding show positive changes between 1975 and 1996 (11). Increases in the median duration of breast feeding measured over a ten year period range from about one month in the Near East / North Africa to 2.5 months in Sub Saharan Africa (11). Improvements in breast feeding behaviours have occurred at the same time as demographics have changed, such as increased urbanization and increases in hospitalization for child birth, female education and employment and use of contraceptives (11).

4.Determinants of infant feeding

4.1 Social support, cultural norms and attitudes

Whether or not optimal behaviours are adopted is a result of the interaction of many factors. The closest determinants relate to women's choice and her ability to act upon these choices (6). Intermediate factors, such as infant feeding information and physical and social support affects the infant feeding behaviour. According to mothers in Tanzania, a spouse could support exclusive breastfeeding by providing nourishing food for the mother, thereby improving her breast milk (33). Studies show that number of friends who breast feed is also a key determinant of the mother's choice to breast feed (6).

The intermediate factors are in turn influenced by underlying determinant, such as gender roles and familial, medical and cultural attitudes and norms (34). Burke et al (35) found that the most important advisers to mothers in central Tanzania were their own mothers, health workers, older women in the community, husbands and female relations. Most cultural norms do not support exclusive breastfeeding even in the first few weeks of life, and situations occur frequently in which the mother is not available and the infant is given water or other liquids by care takers (31). Rural mothers rely on traditional birth attendants. Tanzanian mothers who delivered at home and reported having received information from traditional birth attendants, had a shorter duration of exclusive breast feeding (28). Studies in Brazil and in Botswana found that women who were more likely to exclusively breast feed their infants came from more "traditional" homes (i.e. married, farmers, many children), where alternatives to breast feed are simply not the norm (34; 36). The duration of breast feeding increased when mothers perceived their infants as satisfied and well grown (34).

4.2 Socioeconomic and demographic factors

The duration of breastfeeding has been quite stable in Tanzania. More than 95% of infants in Tanzania are currently breastfed regardless of the background and characteristics of the child or the mother. However there are some modest differences in breast feeding behaviour between different social and economic classes (5). Breast feeding duration and frequency seems to decrease slightly as educational level rises (8). Other factors identified as predictors for infant feeding behaviours in Tanzania are; demographic factors like mothers age at the time of birth, residential area (rural/urban) and the mother's religion (37). In general, the health care staffs at urban clinics have better education, the work of the staff is better supervised, and staff members are exposed to more training opportunities compared to their rural counterparts. This may be the explanations for why urban mothers are more likely to initiate and practise exclusive breast feeding compared to rural mother. However rural mothers in Tanzania breast feed for a longer time than urban mothers (32).

The cost of infant formula is among the determinants in a women's choice to breast feed (6). Minimum formula prices, receipts for a sample and distribution of free samples of formula during pregnancy had important effects on duration of breast feeding, while higher prices on the products were associated with slightly longer breast feeding duration in the Philippines (16). The socio-demographic variables age and maternal parity have also been mentioned in a study from Brazil, as important for women's decisions and success in breast feeding (34). Although socio economic and demographic factors influence baby feeding practise to some extent, Californian researchers speculate that knowledge and attitudes may be stronger determinants (53).

The determinants of infant feeding behaviour are shown in Figure 1. To prevent confusion, policy harmonizing is needed in this area (11).

Figure 1: Determinants of infant feeding behaviour

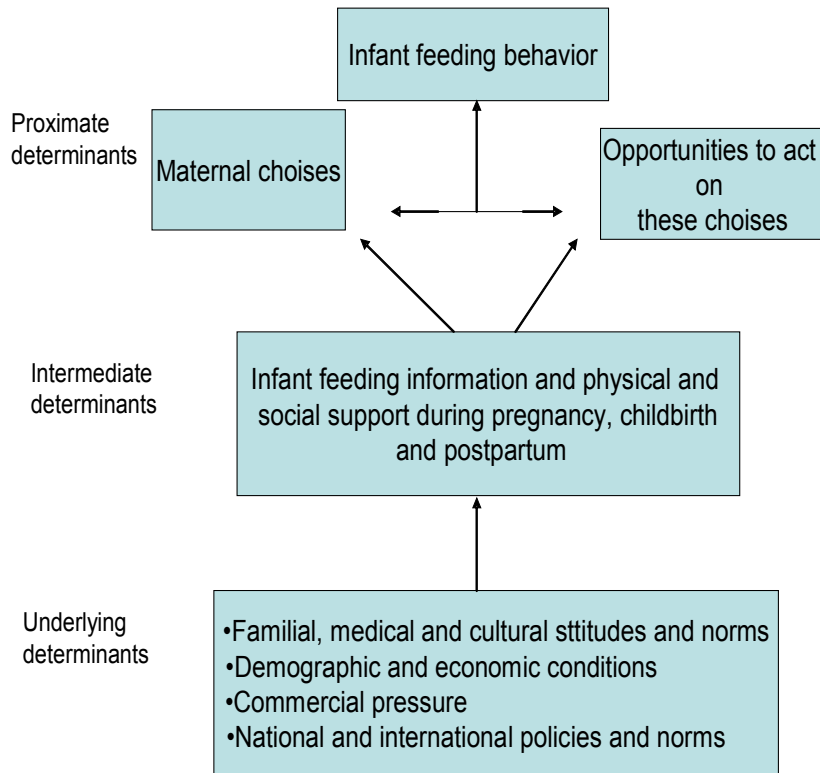


Figure 1: The figure elaborates the interplay between factors that determines the capacity, resources and care practises for young children (11).

Thus, to promote optimal breast feeding and complementary feeding patterns, interventions need to be targeted the individual women and to the context in which infant and child feeding choices are made. Breastfeeding and complementary food is affected by many factors that have to do with the mother and child, socio-demographic factors, factors in the society, factors with the health staff, routines, knowledge that has to do with the pregnancy and childbirth. The baby friendly hospital initiative was initiated in Tanzania in 1992. Many hospitals in the urban areas have been assessed baby friendly by now. In rural areas of Tanzania however, traditional birth attendants are important advisers. These groups should be the key target for community education (35). Research from the African region show that many health workers have inadequate knowledge and skills to help mothers with common every day problems, related to baby feeding (16; 33).

5.Objectives and definitions

5.1 Objectives

The main objective of this study is to describe what the mothers in 2005 stated about their infant feeding practices of their last born child (in the period from 1995 - 2005), and the related socio-demographic factors, in Oria, Tanzania.

5.1.1 Research questions

1. How long did mothers (in 2005) state that they breast feed their last born child in the period from 1995 to 2005?
2. Has breast feeding duration changed in the period from 1976 to 2005?
3. What are the reasons for not initiating breast feeding or for early termination of breast feeding?
4. Does the duration of breast feeding vary according to socio-demographic factors such as; mothers age, education, occupation, religion, number of children, and marital status?
5. Does supplementation of breast fed newborn vary according to socio-demographic factors such as; mothers age, education, occupation, religion, number of children, and marital status?
6. Does the timely introduction of complementary food vary according to socio-demographic factors such as; mothers age, education, occupation, religion, number of children, and marital status?
7. Does the quality of complementary food differ according to demographic factors; such as education, occupation, religion, number of children, marital status?

8. Is HIV status associated with breast feeding duration, to the type of supplementation given to the breast fed new born, to the timely introduction of the complementary food or to the quality of the complementary food?

5.2 Definitions

We will be using the WHO/UNICEF definitions as follows:

Breast feeding: The child has received breast milk direct from the breast or expressed.

Exclusive breast feeding: The infant has received only breast milk from the mother or a wet nurse, or expressed breast milk, and no other liquids or solids with the exception of drops or syrups consisting of vitamins, mineral supplements, or medicines.

Predominant breast feeding: The infant's predominant source of nourishment has been breast milk. However, the infant may also have received water and water-based drinks (sweetened and flavoured water, teas, infusions, etc.), fruit juice; oral rehydration salts solution (ORS), drop and syrup forms of vitamins, minerals and medicines, and ritual fluids (in limited quantities). With the exception of fruit juice and sugar water, no food-based fluid is allowed under this definition.

Full breast feeding: Exclusive breast feeding and predominant breast feeding together constitute full breast feeding.

Complementary feeding: The child has received both breast milk and solid or semi-solid food.

Bottle-feeding: The child has received liquid or semi-solid food from a bottle with a nipple/teat (38).

6. Materials and Methods

6.1 Project background

The Kahe project was first part of the Tanzanian-Norwegian AIDS Project (MUTAN; 1990-1995) and later part of the NUFU (Norwegian Universities' Committee for Development Research and Education) funded project, "Health Systems Research and Health Promotion in Relation to reproductive Health in Tanzania". This was collaboration in research and competence building between Muhimbili University College of Health Sciences, Kilimanjaro Christian Medical Centre (KCMC) and Centre of Educational Development in Health (CEDHA), Arusha, Tanzania, The Centres for International Health and Health Promotion Research, University of Bergen, and the Department of Nutrition, University of Oslo, Norway. The overall objective of the programme was to improve reproductive health in Tanzania through research and competence building within the fields of clinical medicine, health systems research and health promotion. Health promotion studies were conducted in the same areas as health systems studies. The aim of these studies was to identify risk factors for health problems related to reproduction in order to design and implement primary prevention measures and to strengthen people's ability to promote their own health. Clinical studies in the field of reproductive health have also been conducted. The aim was to monitor and identify health problems during pregnancy and childbirth in order to develop preventive measures.

From 1991 -2005 several surveys was conducted in Oria, a rural village in Kahe ward. Qualitative studies addressing breastfeeding and voluntary testing for HIV/AIDS was carried out, as well as surveys on sexually transmitted disease (STD) and HIV (39). One study investigating breast feeding practice and pregnant women's knowledge about breast feeding and mother-to child transmission (MTCT) of HIV, concluded that exclusive breast feeding is a rare practice, and that MTCT of HIV may complicate the practice further. Another study on pregnant women's views on infant feeding options

recommended for HIV infected women showed that mothers would change to alternative infant feeding methods if they were found to be HIV infected, but social barriers were identified, such as lack of support from partner and potential negative reactions from the community. Mothers would also participate in a MTCT prevention programmes if their partners were involved and committed to the process. In addition to this, it appeared that counsellors needed training in counselling and on infant feeding options to ensure a better quality of the advice and support given to the women. A population based study in Oria showed that women were at increased risk for both HIV and reproductive tract infections (RTI), and that they got less treatment than men. They also found that more women than men were HIV infected, as in other countries in Africa. The maternal mortality is also high in Africa and Tanzania compared to more developed countries (25; 39). One of the most recent studies from the Kahe ward shows that HIV-1 was highly prevalent in this population. Compared to previous finding, they observed a shift from a younger to an older age group and from educated to uneducated individuals. Women and married or separated individuals remained at higher risk of infection (40). The present study will add knowledge about how demographic factors, including HIV status affect breast feeding behaviors of mothers in Oria, Tanzania.

6.2 Study area/population

Tanzania has a mixed economy in which agriculture plays a key role. A growing agriculture sector accounts for about 46% of Tanzania's GDP. Seventy percent of the population in Tanzania lives in rural areas, and a large percentage of them are farmers (9; 10; 41). There are differences in lifestyle between urban and rural populations and growing economic inequalities (42). In 1977, universal primary education was introduced in Tanzania, but due to limited educational resources and teachers, but most young people today do not have education beyond primary level (42). Tanzania is one of the East African countries that have been most severely affected by the HIV/AIDS epidemic. Five percent of all the reported AIDS cases in 2001 were estimated to have occurred

through mother-to-child-transmission (MTCT) of HIV (25). Kilimanjaro is one of the regions in Tanzania that is most severely hit by the HIV /AIDS epidemic (42).

The study area, Oria is on the outskirts of the vast farming areas. In 1994 the village had no electricity and a poor water supply; which could only supply parts of the community. People suffer from contaminated water and poor hygiene as well as malaria. Most villagers are farmers who grow maize, vegetables and rice, and some keep goats and cattle. Some are peasant farmers and others sell agricultural products and fish (39). The village has a market once a week where everything from fruit and vegetables to clothes and shoes are sold. The market is used by people from the village and neighbouring villages and by businessmen from Moshi town.

6.3 Study design

This was a community based cross sectional study in 2005. The purpose was to determine the prevalence of food insecurity and its associated socio demographic characteristics in Oria. An additional objective was to explore the relationship between food insecurity and nutritional and health outcomes in this population.

6.3.1 Inclusion and exclusion criteria and data collection

All individuals between 15-44 years of age (N= 2093) residents with a permanent address in Oria were suitable for participation and included in the study. Subjects that had lived in Oria for less than 6 months before the survey was conducted were excluded from the study. Participants who didn't have children and who had their last delivery between 1976 and 1994 were excluded in the present analysis.

The village administration helped to register all of the eligible subjects and the subjects were also counterchecked with existing village census lists. Each participant was interviewed near household. The interviewer received research assistance and was

supervised by one of the principal investigators. A written consent from the participants was acquired. One participant was excluded after two visits failed. Every day, before leaving the field the questionnaires were checked. Illogical or missing information was corrected.

Testing strategies: HIV-1 antibodies were detected using two independent enzyme-linked immunoassay (ELISA) systems (Vironostica Uniform II plus O; Organon, Boxtel, the Netherlands and Enzygnost Anti HIV 1/2 Plus; Dade Behring, South Africa). If the ELISA results were discordant or weakly concordant, Western Blot (Bio-Rad Laboratories Ltd, Dartford, UK) was used for confirmation. All specimen were tested at the clinical laboratory of the Kilimanjaro Christian Medical Centre, Moshi, Tanzania.

Since this study was conducted as part of the on going project “Health Systems Research and Health Promotion in Relation to reproductive Health in Tanzania”, it was approved by the Norwegian ethical committee and the Tanzanian ethical committee. Local authorities in Moshi Rural district, Kahe ward and Oria Village have also given permission for the study.

6.4 Data analysis

Because the duration of breast feeding was censored in some cases, i.e. mothers still breast feeding at the time of interview, a survival analysis using Cox regression (43) was carried out, using SPSS software version 14.0. The survival pattern, i.e. the probability pattern of continued breast feeding and its 95% confidence intervals were calculated. The Cox test was used to compare the probability pattern of continued breast feeding in different subgroups with respect to the covariates. Univariate and multivariate Cox regression analysis were used to estimate the factors associated with the duration of breast feeding. The crude risk ratio in the univariate analysis, the adjusted risk ratio in the multivariate analysis of Cox regression model and their 95% confidence interval were estimated. Logistic regression was used to study which factors that were associated with a short breastfeeding period.

6.5 Variables

All variables were divided into categories and they were made non-parametric and categorical.

Demographic and social determinants were analysed individually and in combination when statistically significant, to determine the impact of these factors on breastfeeding pattern (44).

6.5.1 Dependent Variables

Breast feeding duration was determined by asking “For how long did you breastfeed your last born child?” Two different variables were made on the basis of this question; the variable “months breast fed your last child” is a continuous variable, used in the survival analysis. In the logistic regression the categorization is as follows; 0-18 months in one group and 19 – 42 months in the other group. On the basis of information on supplements given few days after birth; the following categories were made:

- exclusive breast feeding (only breast milk)
- and a combination of predominant breast feeding (only water/ water-based drinks allowed), and of partially breast feeding (formula, porridge and other food, including tea, water, flour, juice, banana, fish oil, glucose, porridge, sugar and a mix of sugar and salt. This was also used as an independent variable).

The variable “age started complementary food” was divided into 0-3 and 4-12, as most women start to give complementary food at the age of 4 months. This variable is also used as an independent variable. The categorization of the complementary food was done by combining fluids in one group and solid food an other group. The reason for this categorization was that the majority of the women, who gave fluids, gave cow milk. We had no variables for exclusive breastfeeding.

6.5.2 Independent variables.

Socio-demographic variables: socio-demographic variables collected included age, marital status, religion, occupation, level of education, number of children under five years in the house hold. The age used, was the age at last delivery. This was calculated by subtracting number of years since their last delivery from their current age. Age of the mother was divided into four groups, 12-20, 21-25, 26-29 and 30-45. This variable was used in the survival analysis. Age was also divided into two groups to be used in logistic regression; 12-25 and 26-45. The variable of marital status was grouped into 2; married/cohabiting and not married (including single, separated, divorced, widowed). The occupation was a condensation of eight occupational categories into 2, namely farmers and others (employee, petty business, student and housewife. The reason for this grouping was that the majority of the women were farmers, and the other occupations were very small groups. The grouping of the variable for education was done by combining seven groups (no formal education, standard 1-4, standard 5-7, form 1-4, form 5-6, higher secondary school, other education). The categorization was done by combining no formal education and standard 4 into one group and standard 5 to secondary high school into one other group. The reason for this grouping was that a majority of the individuals (78, 7%) had completed standard 5-7. Mothers number of children under five years were grouped into 1 child and 2-5 children.

Reproductive, nutritional and health variables: age at first pregnancy, number of pregnancies, HIV test, age at last delivery, age at onset of complementary feeding and food given few days after birth. The “age at first pregnancy” variable was grouped into 11-18, 19, 20 and 21-33. This variable was only used in the survival analysis, to test if early pregnancies had an impact on breast feeding duration. Numbers of pregnancies were condensed into 1-2 and 3-20. The HIV test was grouped into positive and negative. Last delivery was categorized into four groups in the survival analysis. In the logistic regression “last delivery” i.e. the mothers age at last delivery was divided into 1995-2002 and 2003-2005. We restricted the population to be from the last ten years because the

community is quite stable and because none of the women with HIV had their last delivery before 1995.

7.Results

A total of 1,528 individuals out of 2093 men and women participated in the survey, which gave a participation proportion of 73%. Number of women participating in the study was 742 (48%). The subjects responded to questions about infant feeding practice i.e. current breast feeding practice, history of predominant feeding and age at which complementary feeds were started. During the survey period 291 (43.7%) were currently breast feeding, and 666 of the women were mothers and they had their last delivery between 1995 and 2005. These women will be the focus sample in my analysis.

7.1 Demographic characteristics

Table 1: Frequency distribution of sample characteristics (n=666).

| <i>Variables</i> | | <i>N (%)</i> |
|-------------------|------------------------------------|---------------|
| Age | 12-20 (ref) | 134 (21.6) |
| | 21-25 | 169 (27.3) |
| | 26-30 | 158 (25.5) |
| | 31-45 | 158 (25.5) |
| Education | No formal education - Standard 4 | 85 (12.8) |
| | Standard 5 – secondary high school | 578 (87.2) |
| Occupation | Farmers (ref) | 554 (84.5) |
| | Other | 102 (15.5) |

| | | |
|-------------------------------------|-------------------------|---------------|
| Religion | Christian (ref) | 334(51.1) |
| | Muslim | 319 (48.9) |
| Marital status | married/cohabited (ref) | 516 (77.5) |
| | Unmarried | 150 (22.5) |
| HIV test | Positive (ref) | 64 (9.9) |
| | Negative | 585 (90.1) |
| Age at first pregnancy | 11-18 (ref) | 236 (41.5) |
| | 19 | 87 (15.3) |
| | 20 | 111 (19.5) |
| | 21-33 | 135 (23.7) |
| | | |
| Nr of pregnancies | 1-2 (ref) | 308 (46.5) |
| | 3-20 | 355 (53.5) |
| Nr of children under 5 years | 1 (ref) | 354 (67.8) |
| | 2-5 | 166 (32.0) |
| Last delivery | 1995-1999 | 111 (16.7) |
| | 2000-2002 | 185(27.8) |
| | 2003 | 150(22.5) |
| | 2004-2005 | 220(33.0) |

The total percent of subjects in the analysis is not always 100%, due to a number of missing cases.

The majority (87.2%) of the women had basic levels of education, which means that they completed more than standard 5. Most of them (84.5 %) were farmers, most were also married/cohabiting (77.5 %), the rest were single, widowed or divorced. Almost 10 % were HIV positive. Many of the women were relatively young at the age of their first pregnancy, where as 41.5 % were between 11 and 18 years old.

7.2 Duration of breast feeding

The median duration of breast feeding in Tanzania is 21 months (8). A breast feeding period of 18 months is considered short in Tanzania.

Table 2: Frequency distribution of breast feeding duration of the last born child (n=666).

| Variables | Age of child (Months) | N (%) | Cumulative percent of breast feeding | Median (months) |
|---|----------------------------------|--------------|---|----------------------------|
| Duration of breast feeding their last born child | 0-60 | 370 (98.7) | | 24 |
| Number of months they breastfed their last born child | 0 | 9 (2.4) | 97.6 | |
| | 1-3 | 15 (4.0) | 93.5 | |
| | 4-6 | 9 (2.4) | 91.1 | |
| | 7-12 | 20 (5.3) | 85.7 | |
| | 13-24 | 194 (51.7) | 33.2 | |
| | 25-36 | 104 (27.7) | 5.1 | |
| | 37-60 | 19 (5.1) | 0 | |
| Breast fed 0-18 months (short breast feeding duration) | 0-18 | 119 (31.7) | | |
| | 19-60 | 251 (66.9) | | |

Population: Women with a child born after 1995 who are not currently breast feeding. Because of missing cases, the total percent of subjects in the analysis is not always 100%.

Table 2 shows that among the women who completed breastfeeding, the median breast feeding duration was 24 months. 97.6 % of the women initiated breast feeding, and most of the women breast fed for at least one year, while 33, 2 % breast fed between one and two years. Among the women who were not breast feeding at the time of intervention, 66, 9 % breast fed more than 1, 5 years.

Figure 2: Cumulative breast feeding duration among mothers who are currently not breast feeding.

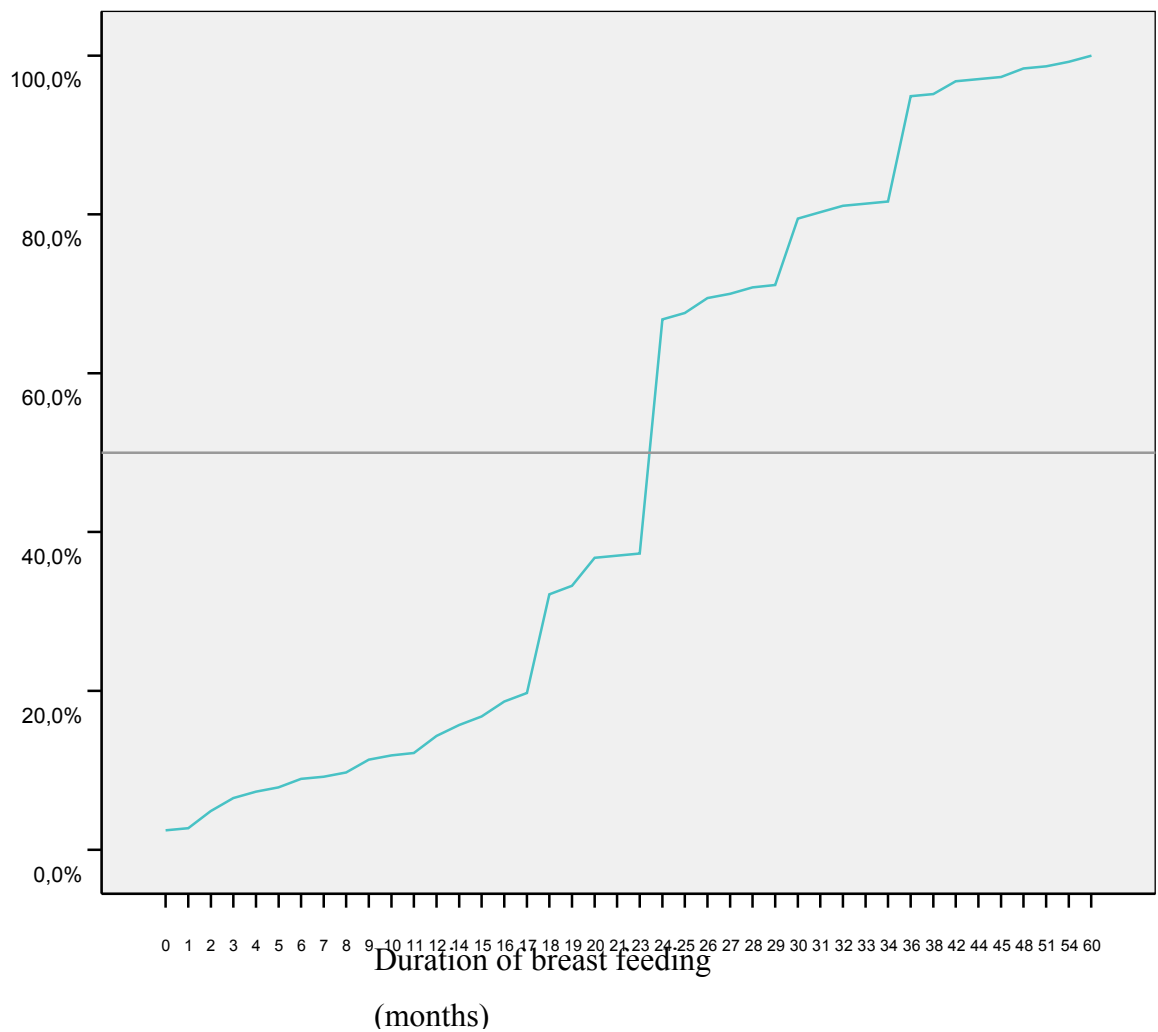


Figure 2 illustrates the cumulative breast feeding trend of the mothers. The figure shows the percent of women who terminated breast feeding after a certain number of months. About 30% terminated breast feeding after 18 months, as also shown in table 2. Breast

feeding was terminated after 24 months by at least 65 % of the women. This means that about 40 % breast fed for more than one year.

Figure 3: Breast feeding pattern from 1976-2005

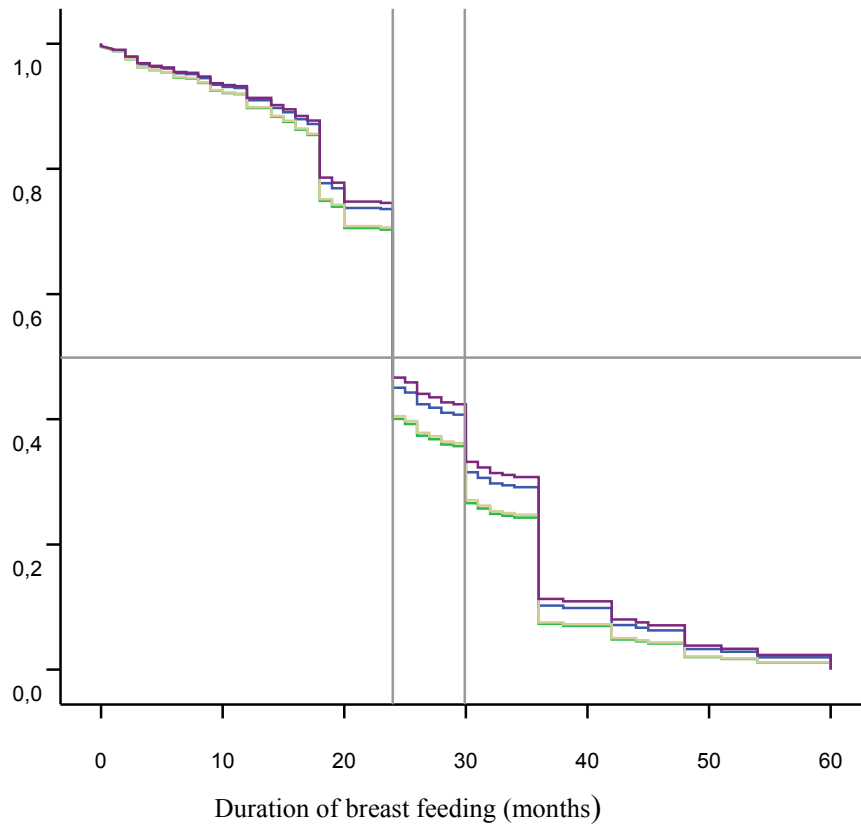


Figure 3 illustrates the breast feeding trend from 1976-2005; Blue: 1976-1998 (n=135), Green: 1999-2002 (n=215), Yellow: 2003 (n= 144), Purple: 2004-2005 (n= 203).

The duration declines between 1999 and 2003, but increase again after 2004.

7.3 Reasons for breast feeding termination

In Tanzania, breast feeding is the norm. If the mother was currently not breast feeding, she could give more than one reason for why she terminated breast feeding.

Table 3: Frequency distribution of reasons for breast feeding termination (n=454).

| Stated reasons for breast feeding termination | N (%) |
|---|---------------|
| Old enough / breast fed to much | 326 (35,4) |
| Pregnancy | 9 (1,4) |
| Illness of child | 7 (1,1) |
| Not enough milk | 7 (1,1) |
| Work/study/travel | 17 (2,6) |
| Death | 8 (1,2) |
| Child stopped itself/didn't want to eat | 58 (8,7) |
| Divorce/alone with child | 2 (0,3) |
| Mothers physical and psychological health/ mothers decision/tired/mothers don't want/ pain in breast | 20 (3,0) |

Most of the women who gave a reason (35%) stated that they stopped breast feeding when the child was old enough, about two and a half percent didn't breast feed due to work, study or travel or because of mothers health and decision. More than 8% said that the child stopped itself, and none of the women gave HIV infection as a reason for not breast feeding.

Figure 4: Reasons for not breast feeding in relation to age

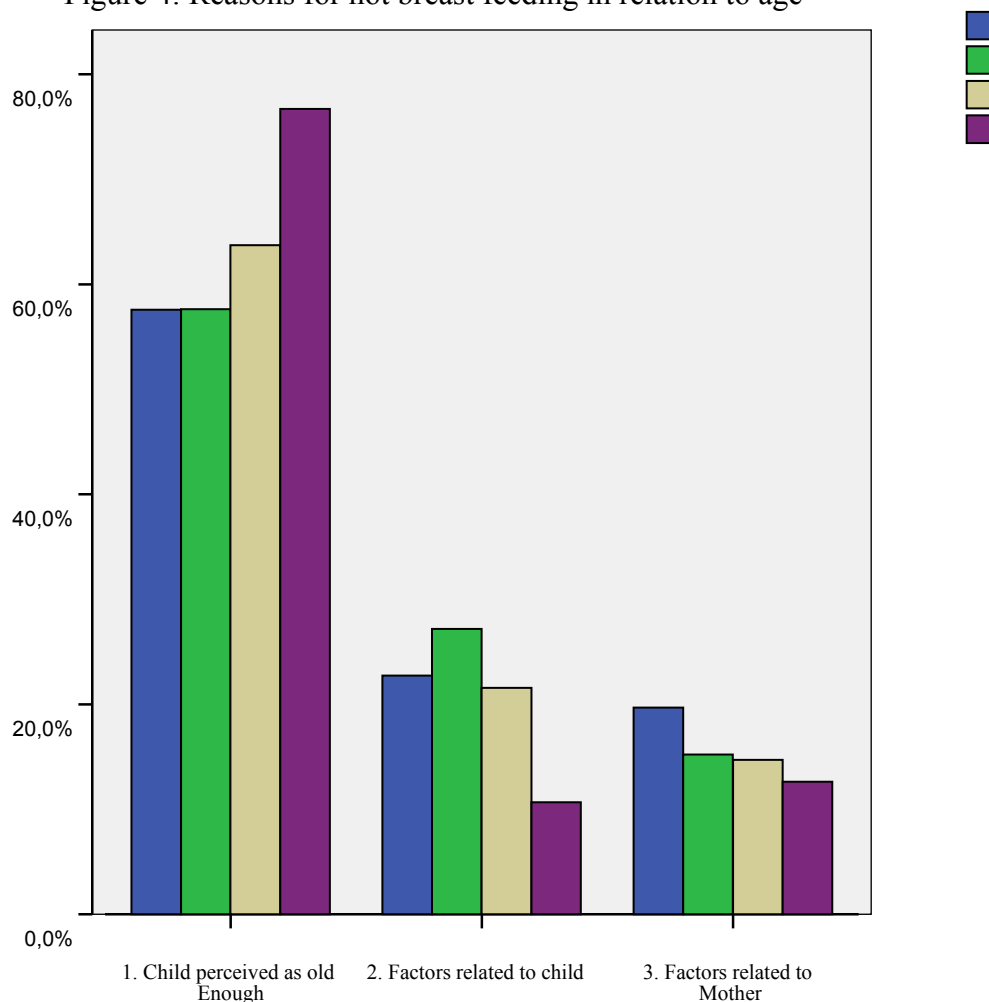


Figure 4: Age at last delivery (Years); Blue: 12-20 years, Green: 21-25 Years, Yellow: 26-30 Years, Purple: 31-44 years.

1. Mother applied that she had breast fed long enough?
2. Illness of child, death, child stopped itself, Child didn't want to eat.
3. Pregnancy, work, study, travel, not enough milk, mothers' health and decision.

Figure 4 shows that the most common reason why they stopped breast feeding was because the child was old enough. A higher proportion of women between 21 and 25 years said that they stopped because of death or illness of child. And the youngest women answered that factors related to the mother was the reason, more frequently than the other women.

7.4 Factors associated with breast feeding duration

What influences breastfeeding duration

Table 4: Cox regression model; adjusted hazard ratio (HR) of breast feeding duration (n=666).

| Variables | Univariate | | | Multivariate | | |
|--------------------------|----------------|---------|----------------|---------------------|---------|-------------------------------------|
| | N | p-value | HR (95% CI) | N | p-value | HR (95% CI) |
| Age | 12-20 (ref) | 125 | | 124 | | |
| | 21-25 | 162 | 0.95 | 0.99 (0.72-1.37) | 161 | 0.94 1.01 (0.68-.20) |
| | 26-30 | 154 | 0.08 | 0.75 (0.55-1.04) | 154 | 0.27 0.81 (0.72-1.42) |
| | 31-45 | 153 | 0.001 | 0.58 (0.42-0.80) | 153 | 0.03* 0.63 (0.42-0.96) |
| Nr of pregnancies | 1-2 (ref) | 290 | | 266 | | |
| | 3-20 | 344 | 0.003 | 0.72 (0.58-0.89) | 326 | 0.47 0.90 (0.68-1.20) |

Observation time: (breast feeding duration) "How long did you breast feed your last child?"
 Event: presently breast feeding = 0, Not breast feeding anymore = 1. The variables ; education, occupation, religion, marital status, HIV test, last delivery, number of children under five, age started complementary food, type of complementary food, food given few days after birth and age at first pregnancy have been independent but un significant variables in this analysis.
 Because of missing cases, the total percent of subjects in the analysis is not always 100%.

Breast feeding duration had no relationship to most of the socio-demographic factors except age. Women aged 31-45 years had 37% higher chance of breast feeding for more than 23 months compared to women aged 20 years and younger. Number of pregnancies were significant in univariate analysis, but not when adjusted for age.

Figure 5: Probability of continued breast feeding in relation to age of mother.

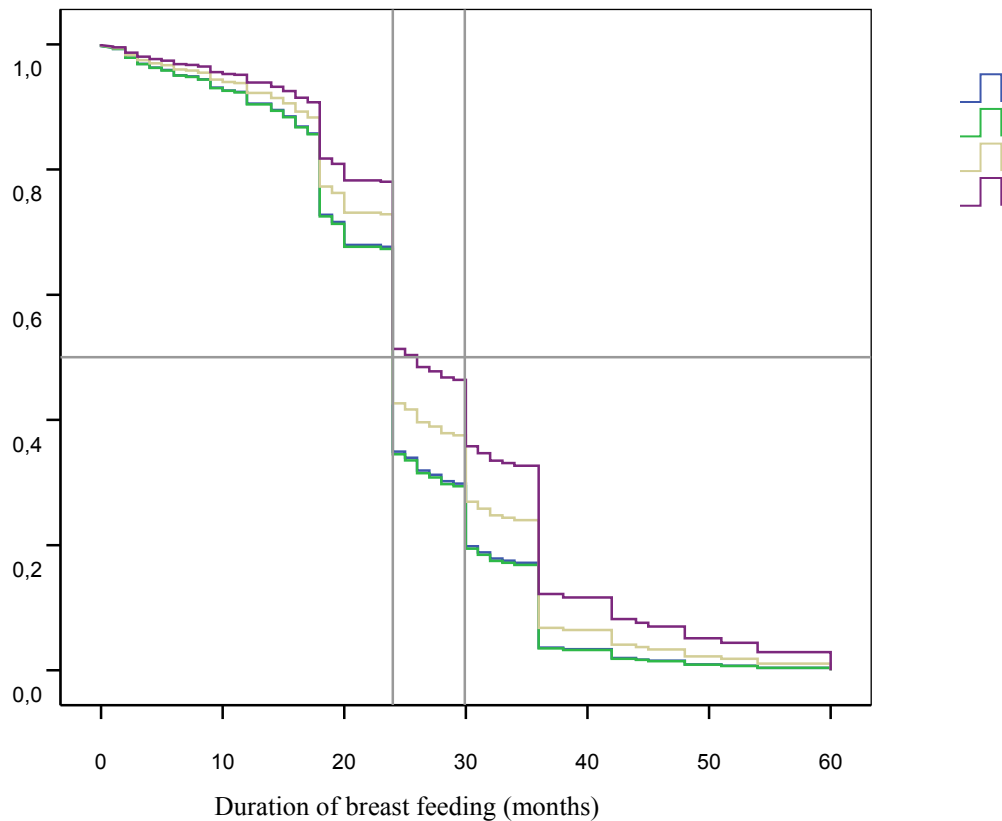


Figure 5: Age at last delivery (years); Blue: 12-20 years, Green: 21-25 years, Yellow: 26-30 years, Purple: 31-44 years.

The figure illustrates the difference of breast feeding pattern between the different age groups. 40% of women who were between 12 and 25 at their last delivery breast fed on average 24 months. 40% of the eldest women breast fed on average 30 months.

Table 5: Logistic regression; adjusted odds ratio (OR) of breast feeding for at least 18 months or for longer (<18 months>), by socio-demographic characteristics (n=666).

| Variables | Univariate | | | Multivariate | | |
|-----------------------|-----------------|---------|---------------|---------------------|---------|---------------|
| | N | P-value | OR (95%CI) | N | P-value | OR (95%CI) |
| Age | 12-25 (ref) | 159 | | 158 | | |
| | 26 – 45 | 204 | 0.00 | 2.95 (1.86-4.66) | 204 | 0.00** |
| Number of pregnancies | 1-2 (ref) | 157 | | 155 | | |
| | 3-20 | 212 | 0.004 | 1.91 (1.23-2.98) | 207 | 0.99 |
| Last delivery | 1995-2002 (ref) | 280 | | 280 | | |
| | 2003-2005 | 90 | 0.000 | 0.23 (0.14-0.38) | 82 | 0.00** |

Dependent variable: 0-18 months=0, 19-42 months=1. No significant effect was found for the following variables; education, occupation, religion, marital status, HIV test, number of children under five, age started complementary food, type of complementary food, food given few days after birth and age at first pregnancy was un significant variables in this analysis. Because of missing cases, the total percent of subjects in the analysis is not always 100%. Table 5 shows that women older than 25 years have almost three times higher chance of breast feeding nineteen months or longer compared to women between 12 and 25 years. Women who gave birth between 2003 and 2005 had a lower chance of breast feeding longer than 18 months compared to those who gave birth before 2003. This shows a decline in breast feeding duration after 2002.

7.5 Supplementations given few days after birth

Table 6 presents information about the type of food received by children, few days after birth. Breast feeding is the norm in Tanzania, but exclusive breast feeding is not widely practised. Water in addition to breast milk, may be given to quench a baby's thirst or simply by tradition (37).

Table 6: Logistic regression; unadjusted and adjusted odds ratio (OR) of the type of food given few days after birth, by socio-demographic variables (n=666).

| | | <i>Univariate</i> | | | <i>Multivariate</i> | | |
|-----------------------|-------------------------|-------------------|----------------|-----------------------------|---------------------|----------------|-----------------------------|
| | Variables | N | P-value | OR (95%CI) | N | P-value | OR (95%CI) |
| Occupation | Farmers (ref) | 522 | | | 522 | | |
| | Others | 97 | 0.03 | 1.67 (1.07-2.61) | 97 | 0.014** | 1.78 (1.12-2.81) |
| Marital status | Married/cohabitant(ref) | 489 | | | 485 | | |
| | Unmarried | 139 | 0.001 | 1.90 (1.28-2.81) | 134 | 0.002** | 1.91 (1.28-2.86) |
| Last delivery | 1995-2002 (ref) | 281 | | | 275 | | |
| | 2003-2005 | 347 | 0.002 | 0.58 (0.41-0.81) | 344 | 0.001** | 0.56 (0.39-0.79) |

Dependent variable: Breast milk (n=436) = 0, other predominant food (n=192) = 1. The total percent of subjects in the analysis is not always 100%, due to a number of missing cases. Percent giving breast milk was 69, 4, while 30, 6% gave predominant food. The variables ; education, religion, HIV test, number of children under five, age started complementary food, type of complementary food, food given few days after birth and age at first pregnancy have been independent but un significant variables in this analysis.

Three demographic factors; namely occupation, marital status and last delivery, had an association with the type of food given few days after birth, in multivariate analysis. Farmers had higher odds of giving breast milk to their newborns, compared to women with other occupations. Unmarried women have almost twice the odds of giving predominant food compared to married women and the odds of a women giving breast milk is more than 40 % higher if she gave birth after 2002.

7.6 Age started complementary food

The WHO recommends timely introduction of complementary food at six months, however mothers in Tanzania may tend to give porridge to satisfy the child if it is crying. Porridge could be given as early as 1 month (37).

Table 7: Logistic regression; unadjusted and adjusted analysis of age of initiation of complementary food (n=666).

| | | <i>Univariate</i> | | | <i>Multivariate</i> | | |
|----------------------|-----------------|-------------------|----------------|-----------------------------|---------------------|----------------|-----------------------------|
| Variables | | N | P-value | OR (95%CI) | N | P-value | OR (95%CI) |
| HIV test | Positive (ref) | 62 | | | 62 | | |
| | Negative | 546 | 0.02 | 1.89 (1.11-3.20) | 546 | 0.01** | 1.98 (1.16-3.38) |
| Last delivery | 1995-2002 (ref) | 290 | | | 282 | | |
| | 2003-2005 | 335 | 0.001 | 0.56 (0.41-0.80) | 326 | 0.001** | 0.56 (0.40-0.79) |

Dependent variable: 0-3 Months (n= 230) = 0, 4-12 Months (n=395) = 1. Because of missing cases the total percent of subjects in the analysis is not always 100%. Percent of women who started between 0-3 months was 36, 8, while 63, 2% started between 4-12 months. The variables ; education, occupation, marital status, religion, number of children under five, age started complementary food, type of complementary food, food given few days after birth and age at first pregnancy have been independent but un significant variables in this analysis.

Table 7 shows that HIV positive women had twice the odds of giving complementary food before four months compared to HIV negative women. Mothers who had her last delivery after 2003 were more likely to give complementary food after the child was four months old.

7.7 Does the complementary food differ according to demographic factors?

Studies from Kahe found that cow milk was regarded as the most affordable, feasible, sustainable and acceptable replacement feeding; however, many of the women gave solid complementary foods (29).

Table 8: Logistic regression; univariate and multivariate analysis of type of complementary food given to the child and its relationship to demographic factors (n=666).

| | | <i>Univariate</i> | | | <i>Multivariate</i> | | |
|--|--------------------|-------------------|---------|---------------------|---------------------|---------|---------------------|
| | Variables | N | P-value | OR (95%CI) | N | P-value | OR (95%CI) |
| Last delivery | 1995-2002 (ref) | 292 | | | 274 | | |
| | 2003-2005 | 330 | 0.03 | 0.60 (0.38-0.94) | 316 | 0.03** | 0.59 (0.37-0.95) |
| Occupation | Farmers (ref) | 522 | | | 500 | | |
| | Others | 91 | 0.059 | 0.59 (0.34-1.02) | 90 | 0.18 | 0.67 (0.38-1.20) |
| Food given few days after birth | breast milk(ref) | 409 | | | 404 | | |
| | other | 189 | 0.00 | 0.33 (0.21-0.52) | 186 | 0.00** | 0.33 (0.21-0.53) |

Dependent variable: Fluid (n=96) = 0, Solid food (n=526) = 1. Because of missing cases the total percent of subjects in the analysis is not always 100%. A percent of 15 gave fluids, while 84, 6% gave solid food as complementary food. The variables ; education, marital status, religion, number of children under five, age started complementary food, type of complementary food, HIV test and age at first pregnancy have been independent but un significant variables in this analysis.

Several socio demographic factors had an association to the type of complementary food given to the child. Women who had their last delivery after 2002 had more than half the risk of introducing solid food, compared to women who gave birth before 2003. The odds of introducing solid food as complementary food were higher for those who gave breast milk few days after birth. This means that children who got predominant food few days after birth were more likely to get fluids as complementary food. In univariate analysis, farmers had higher odds of introducing solid food compared to others. This difference between occupations was not significant in multivariate analysis, when adjusted for last delivery and food given few days after birth. Only one person in this current study applied that she gave infant formula.

8. Discussion

8.1 Sample and Methodology

The strength of this study was that we had a larger sample compared to other studies on social determinants in Tanzania. Our large sample and compliance may imply that we can generalize our findings to similar areas; however we don't know anything about the non respondents

One of the limitations in our study is a problem with the stratification of the sample: When stratifying mothers into different variables i.e. education, occupation and so on, dividing subjects into too few groups make conclusions and definitions of groups difficult. Statistically significant differences can be lost when analytic groups become small (6). This problem may explain the weak correlation in our study between reported breastfeeding duration and socio-demographic factors. On the other hand, the weak correlation may as well come from a society with small differences.

Our study was based on retrospective data. The answering of the questionnaire depended on recall of the mothers over a period of 6 months or several years. It has been pointed out that interviews done long after the behaviour occurred can be affected by recall bias (6). The delay also influences mothers to heap events into convenient age (whole months, half years) or socially acceptable times for weaning. This is a disadvantage, not only in Tanzania but also in other non western countries, where precision in terms of months (weeks) is not perceived as important (6). Accordingly, this method can only be used successfully with groups of literate, understanding, patient, cooperative and willing mothers. Precisely formulated research definitions were needed, so that we could avoid ambiguous, misleading and erroneous answers. Accuracy is necessary when defining if the child was exclusively breast fed or predominantly breast fed (6). This was not precisely defined in our questioner, which is why the variable "exclusive breast feeding" could not be studied.

8.2 Objectives

8.2.1 Breast feeding prevalence

During the survey more than half of the women were presently not breast feeding. The median breast feeding duration among women who had ended their breast feeding period was relatively long, more than 24 months (Table 2) which is somewhat above the level reported in the Tanzanian Health and Demographic survey and other studies (37; 45), which reports of a breast feeding duration for about 21-22 months. More than 60% of the women terminated breast feeding after 24 months (Figure 2). The breast feeding duration declined between 1999 and 2003, but increased again after 2004. This may be due to the Baby Friendly Hospital initiative and to other breast feeding programmes in Tanzania (46).

Figure 3 illustrates an increasing trend in breast feeding duration. This finding is supported by other studies from Tanzania (5) where recent trends show an increase in early initiation and in duration of breastfeeding as a result of promotion efforts deployed by WHO and UNICEF, local governments, and non-governmental organizations (5).

8.2.2 Reasons for not breast feeding

Reasons given for why the mothers in our study didn't breast feed are shown in table 3. The most common reason was: The child was old enough and the mother thought she had breast fed too much (35.4 %). Three women answered that they had painful breast or nipples (0.3%), in contrast to 16% in other studies (6). Only one person answered that she didn't have enough milk, a lot different from 60-75% observed Chile, Hungary, Guatemala and Botswana (6; 36). Figure 4 shows that a higher proportion of young

mothers applied factors to do with the child or the mother as reasons for not breast feeding. This may have to do with lack of support and knowledge. Tanzanian mothers may not give the reason “insufficient milk”, due to rationalizations for more acceptable reasons. Although obviously a strong breastfeeding culture, there are several misconceptions around not breast feeding in Tanzania. For instance; mothers who did not breast feed were likely to be labelled as HIV-infected and faced a high risk of being stigmatized (32). Impaired lactation can be caused by stresses inherent in modern urban societies (although only temporarily). Kahe remains a rural area and thus they may not have noticed this effect. Almost 9% of the women in our study said the baby rejected breast. This is almost the same as observed in another study done in England, where 11% gave the same answer. However England and Tanzania may not be compared due to different social, demographic and nutritional conditions. A surprising aspect of this study was the lack of mention of HIV as a reason for not breast feeding. Stigmatisation may be a reason why mothers do not mention it in connection to baby feeding decisions.

8.2.3 Factors associated with Breast feeding duration

Most socioeconomic factors studied had no significant association with breast feeding pattern in Kahe. Other studies in Tanzania have got the same result (28). Our significant findings that there was a positive association between breast feeding duration, age and number of pregnancies is similar to findings from other studies conducted in Tanzania, although these studies did not find significant associations (32). Women who were 31 to 45 years old had higher chance of breast feeding for at least two years, compared to the youngest women. Number of pregnancies had an association with length of breast feeding, however the significant association did not remain when adjusted for age. The reason for this is probably that number of pregnancies increase with age (43). There has also been observed a trend in rising age at marriage (37; 43), which may mean a higher age at first pregnancy. Experience and knowledge also increase with age (37; 43). These determinants may be reasons for longer breast feeding duration (43). Studies from the Philippines and from Botswana also saw a strong affect of mother’s age on breast feeding duration i.e. older mothers breast fed for a longer time. However older mothers

supplemented their infants earlier in the Philippines (16; 36) .The latter was not confirmed in our study.

Table 5 show that the odds of breast feeding more than eighteen months, was more than twice as high for women who were older than 25 years compared to the youngest women. These results correspond with an other study done in the Kilimanjaro region in 1983, where 15, 3 % and 34 % breast fed 12 months and 18 months respectively. Breast feeding patterns are obviously quite stable in this area (45). However, this present study show that women who had their last delivery after 2003 had a higher risk of breast feeding shorter than 18 months. This supports other studies that show a decline in breast feeding duration among young women with modern attributes (unmarried, not farmers, few children) in some African countries (33; 36). Another explanation may be that the number of women in the group who had their last delivery after 2003 is a lot smaller than the groups who had their last delivery before 2003, thus there may be statistical problems in comparing these groups.

The absence of socio-demographic associations to breast feeding duration is a positive trend. The rural mothers of Tanzania have the same conditions for breast feeding duration, regardless of their social status. However mother's age has shown to be an important source of inequalities, there for it especially need for education for young girls (46).

8.2.4 Neonatal nutrition

Predominant feeding (food given few days after birth), an infant feeding practise which is common in Tanzania was also investigated. The proportion of women who gave predominant feeding (30.6 %) is lower than what is shown in other studies in Tanzania, where 35%-46% had introduced water, sugar water and/or cows milk at an early stage in Moshi. Among Pastoralists in Tanzania 75% had introduced predominant feeds (8; 32; 48). Barriers to exclusive breastfeeding among Tanzanian women are insufficient maternal nutrition, which is perceived to give low milk production and thus infant hunger and crying. This often leads to early supplementation of liquids and food. It is also a

common belief that is necessary to give water to infants. It is assumed that when a baby cries, he or she is hungry. Norms about infant hunger, crying and maternal malnutrition discourage women to continue breast feeding past the first few weeks. Lack of early contact has been shown to affect breast feeding (25; 35). The 2004-2005 TDHS show that mothers assisted by traditional birth attendants are more likely to give predominant feeds compared to women assisted by health professionals (8). This indicates that the health sector can influence early onset of breast feeding (16).

Farmers and married women were more likely to give breast milk few days after birth, so were the women who had their last delivery after 2002 (Table 6). The reason for this may be that farmers are more traditional in their beliefs and behaviours. Women who had their last delivery after 2002 may give breast milk few days after birth because they have more knowledge about infant feeding. Other demographic factors had no association with type of food given few days after birth. Being married was also significantly associated with longer duration of exclusive breast feeding in Marina de Pauli's studies (32), and indicated the importance of family support. Other studies show that a good marital relationship is associated with parental involvement in the care of the infant and support of the infant (32). Babies in Arusha and Kilimanjaro are more likely to start breast feeding within one hour of birth than their counterparts in other regions. Children are less likely to receive early breast feeding if their mothers have no education, if the delivery was assisted by a traditional midwife, or if they were delivered at home (49), however our studies did not find a significant link between education and the initiation of breast milk. Early introduction reflects the short duration of exclusive breast feeding (TDHS 1999). In the early months of life, the infants receive adequate energy, put on weight, but it may be unable to mobilize all the substrates required to grow normally in length. The mechanism most likely responsible in the early months is displacement of breast milk, not by solid food usually, but by sweetened water, teas and by gruels of various kinds (50).

8.2.5 introduction of complementary feeding

The WHO recommended the onset of complementary feeding to be changed from four to six months since the HIV epidemic. More than half of the women in this study initiated complementary food to their children when they were four months or older, but this doesn't mean that the babies were exclusively breast fed for the initial three months. Tanzanian mother's introduction of water and traditional foods soon after birth and their high prevalence of mixed feeding of infants less than six months of age have been highlighted by other studies (35; 46), thus we should assume that the infants are not exclusively breast fed for the first four months of age, unless specified by the mothers.

The age at which the child was given complementary food is probably dictated by the social, cultural factors that surrounds the women and common practise within the area. However economical conditions may also play a role, as different infant feeding patterns have been observed between rural and urban areas (28).

This present study and the study of Mmbaga et al (40) are using the same data sample. The prevalence of HIV infected participants (mothers who had their last delivery between 1995 and 2005) in our study was higher than what was found in by Mmbaga et al, as they studied the total sample of 1528 participants, male and female. They found an overall age and sex adjusted HIV-1 prevalence at 5, 6 %. Mmbaga et al concluded that women remain at high risk of infection (40). This supports our findings of 10 % HIV infected women. Table 7 shows that HIV positive women had higher odds of giving complementary food before the child was four months old. This may be due to attitudes and lack of knowledge that has been linked to low educational level. Michelo et Al. (51) found a reduced risk in HIV infections among more educated younger groups in Zambia. Education may suggest a positive response to preventive messages on behaviour changes (51; 52). If HIV positive youth have a lower educational level, they may not be aware of the recommendations concerning the onset of complementary food. Although significant

the number of HIV positive women are a lot less than HIV negative women, and it is therefore questionable if these groups are comparable in a statistic analysis. A study done in Moshi in 1999 reported that the information level of the protective effects of exclusive breast feeding against MTCT of HIV was high, but the message was not easily understood and was received with scepticism. The information was perceived as contradictory to the women's resent awareness that breast milk can transfer the virus and that the infants born to an HIV infected mother is already infected in utero. This may be the reason why mothers do not regard the recommendation to exclusively breast as an option (32). The HIV test was not connected to any of the other independent breast feeding factors in this study.

Our findings also show that women who had their last delivery after 2003 had a risk of giving complementary food before the child was four months old. This is a negative trend which may be due to the shift to a more "western" form of breast feeding. This has been attributed to improved socio-economic status among other factors. However studies show that women in rural communities have limited resources rendering them with no other options than to breast feed (46; 51). Our findings are consistent with other studies conducted in Moshi, where the mean age at which solid food was introduced was about three months of age (32). Tanzanian women have only three months maternity leave (32). Employment may be an obstacle for long breast feeding duration, because they may have problems expressing milk at work, or because women with hazardous occupations might be concerned their exposure might affect breast milk (28; 53). None of the other demographic factors had a significant relationship with age of initiation of complementary food.

8.2.6 Type of complementary feeding

Meat, poultry, fish and eggs contain proteins and other nutrients and are important for growth and mental development. However it is not common to introduce these types of foods as complementary food (1999 TDHS). The main types of food given were Cow milk and porridge similar to other studies in Tanzania. The Demographic and health

survey reports that 12% in the survey gave milk products, which is similar to our study (8). Women who had their last delivery between 2003 and 2005 had a higher risk of giving fluids as complementary food compared to women who gave birth before 2003. Women who gave breast milk few days after birth had higher odds of giving solid food as complementary food, compared to women who gave predominant foods. The main factors to explain this may be knowledge and economy. Women who give breast milk few days after birth may be the most traditional women, thus they gave solid complementary food, which is traditional in Tanzania. The proportion of women who gave solid food as complementary food was higher among farmers than among others, although not significant in multivariate analysis, when controlled for by “last delivery” and “food given few days after birth”. As mentioned earlier, farmers were more likely to give breast milk few days after birth, thus they are susceptible to give solid food as complementary food. Women with other occupations than farming was only 15.5 %, and actually not comparable with the 84, 5% of the participants who were farmers. Marina de Pauli found in focus group interviews that cow’s milk was regarded as most feasible and acceptable replacement feeding, it was perceived as most affordable and available, and it was commonly used to supplement the child’s diet (30; 48). This has been contradicted by one other study done in Tanzania in 2004, where it was reported that the price of cow milk was quite high and thus many women do not have an alternative then to breast feed. It was also suggested in the same study that women who had cow milk would sell it (35). Perhaps Marina De Pauli’s study captured what the women thought was the best alternative, while the latter study captured the women’s practice. Applied to the results of our study; since the price of cow milk was quite high (35), women who gave birth between 2003 and 2005 may have had higher economical status compared to women who gave birth before. The same would apply to women who gave predominant food (35).

A study done in Zimbabwe shows that few people can afford infant formula, and it was felt that mothers who do not breastfeed may face negative social consequences (54). Only one person in this current study applied that she gave infant formula. This is an improvement since 1983 where one study in the Kilimanjaro region showed that 15%

used artificial milk feeds in combination with breast milk. This may be due to the practice of hospital in the 80s, where milk companies gave milk tins with feeding bottles as a present to the mothers after delivery (45). This practice may have stopped after the innocenti declaration in the early 90s, because resent studies from Tanzania report that infant formula is too expensive for most women. It is perceived as complex, time consuming impractical and inconvenient (35). However women returning to paid work after maternity leave may organize replacement feeding in their absent (35). The high price of the formula may indicate that women of higher status make use of it.

9.Suggestion for further research

Continuing clinical and population-based research and investigation of behavioural concerns

are essential ingredients for improving feeding practices (19). There is a need for further investigation of the extent and quality of the support provided by the husband as well as other family members (32). It would also be interesting to investigate intentions to breast feed and actual duration (6). Quantitative and qualitative research is necessary, along with cost effective analysis (11). A study based on 24-hour recall data rather than retrospective data would also give us a more accurate picture of the population. In illiterate populations structured interviews should be used instead of questionnaires (6). More investigation should be done on exclusive breastfeeding.

10.Challenges for the future

The challenge from the public health perspective is to translate the vast scientific literature on breast feeding and complementary feeding recommendations to effective interventions and campaigns that are understood and accepted by the population at large and those who need it the most. Providing safe and adequate amounts of food appropriate for infants and young children is not simple. Complementary food must be adequately dense in energy and micronutrients to meet the requirements of this age group. They must also be prepared, stored and fed in a hygienic way to reduce the risk of diarrhoea (11). Ways to do this is to give mothers, fathers and other care givers access to objective and complete information about appropriate feeding practice, free from commercial influence.

Mothers should have access to skilled support to help them initiate and sustain appropriate feeding practices. It would be helpful to inform about the normal appearance of breast milk. Health workers should work at a community, or neighbourhood level to promote both tangible and emotional support of new mothers in the early faces of lactation (34). Mothers should also be able to continue breastfeeding and caring for their children after they return to paid employment. Maternity leave, day-care facilities and paid breastfeeding breaks should be available for all women employed outside the home (19; 47)

Since young people and out of school youth is in at risk to lack knowledge about healthy infant feeding behaviour and sexual behaviour, it has been highlighted that policies aimed at women and young people staying at school is important. This may give them an educational basis, which may be useful when learning about healthy behaviours (51)

In their efforts to accelerate economic development in a long-term sense, Governments should secure optimal child growth and development, especially through appropriate feeding practices. They have the responsibility to cover areas such as public information and education, pre-service education and training of health care workers. Inappropriate feeding practices and their consequences are major obstacles to sustainable socioeconomic development and poverty reduction. Promotion of exclusive breastfeeding

and protection of prolonged breastfeeding among non-infected mothers will limit the mother-to-child transmission of HIV while preserving the benefits of breast feeding (5; 19; 21).

Work which is incompatible with breast feeding may lead to earlier supplementation of breast feeding and total weaning (36). Programmes aimed at the promotion of breast feeding should therefore focus on constraints faced by the women. The work load of the mother, the duration of maternity leave and the economic conditions for mothers on maternity leave are important factors for this issue (36). As we already have learned, paternal knowledge and support is very much involved in breast feeding decision (44; 47; 53). A woman with an absent spouse may have to work outside the home (36), thus fathers should be targeted in breast feeding promotions as well. Paternal education is a relatively new finding that may be of value in designing breast feeding promotion programmes (44; 47; 53).

11. Conclusion

Breast feeding is widely practised in Tanzania and is actually improving in spite of demographic trends, such as urbanization, which exerts a downward pressure (11). We found a longer breast feeding duration in Kahe, than reported in other studies. However the full impact of optimal breast feeding and complementary feeding will never be realized unless women and care givers adopt recommended behaviours (11).

The most common reason for breast feeding termination is the mother's opinion of her breast feeding long enough. The breast feeding pattern is not affected much by demographic factors. However age is a generally significant determinant of breast feeding duration. Mothers above thirty seem to breast feed much longer than younger mothers. Mothers over thirty may be keeping the traditions intact, while the younger girls are influenced by the growing urbanization of the country. We have also seen a general difference between those who had their last delivery before and after 2002, where the latter breast feed for a significantly shorter time than before. However these same women give their newborns breast milk few days after birth, which on the other hand reflects a positive trend, probably due to knowledge. Our survival analysis also shows us an upward and positive trend in breast feeding duration after 2004. This may be the result of the breast feeding programmes and education done to promote breast feeding in the area. Farmers and married/cohabiting mothers give breast milk few days after birth. Traditions and social support may play a central part in these findings. Predominant feeding is quite common in this Kahe, but complementary food is usually given after four months. On the contrary, HIV positive women and women who had their last delivery between 2003 and 2005 are shown to give complementary food before the child is four months old. Those who gave predominant food and those who gave birth between 2003 and 2005 gave fluids, mostly cow milk as complementary food. Programmes should be targeting young women and women with HIV. And an effort should be made to promote exclusive breast feeding, followed by the onset of complementary food by six months. What types of food to give, how much and how often; and how to feed these foods safely are also issues that

have to be targeted. Interventions for preventing mother-to-child transmission of HIV in relation to infant feeding are also crucial (19). Social change takes time. Promotion by government policy, education, commitment and openness to acknowledging the problem, as well as promoting positive attitudes is necessary (35). The nutritional status of children is an outcome of biological, environmental, economic, educational, political and cultural factors (1999TDHS) (13). Protection, promotion and support of infant and young child feeding contribute to the wellbeing of future generations, social equality, socioeconomic development, food security and poverty reduction (2; 11; 37).

12. References

1. Robert e. Black et al. The Bellagio Study Group on Child Survival. Where and why are millions of children dying every year? *Lancet* 2003; 361, 2226-2234.
2. WHO. Fifty fourth health assembly. Infant and young child nutrition. 2001. World Health Organization (WHO), Geneva.
3. FAO. The state of food insecurity in the world 2005. Food and Agricultural Organization of the United Nations (FAO), Rome Italy.
4. Michael S. Kramer M, Beverly Chalmers P., Ellen D. Hodnet p, Promotion of breast feeding intervention trial (PROBIT). A randomized trial in the republic of Belarus. *Jama* 2001; 285 (4), 413-420.
5. Dop MC. Breast feeding in Africa: Will positive trends be challenged by the HIV epidemic? *Sante* 2002; 12(1), 64-72.
6. Artemins P. Simopoulos. Gilman D. Greave. Factors associated with the choice and duration of Infant feeding Practice. *Paediatrics* 1984; 74, 603-614.
7. Cesar G. Victoria et al. The Bellagio Study group on Child Survival. Applying an equity lens to child health and mortality: More of the same is not enough. *Lancet* 2003; 362, 233-241.
8. Bureau of Statistics, Macro International Inc. Tanzania Demographic and Health Survey, 2004-2005. Calverton, Maryland: Bureau of Statistics and Macro International.

9. World Bank, Tanzania Development brief, Development results 2006. New York/ Rome: United Nations Children's Found (UNICEF)/ International Found for Agriculture Development (IFAD), 2006.
10. FAO. The state of food insecurity in the world 2005. Food and Agricultural Organization of the United Nations (FAO), Rome Italy.
11. Administrative Committee on Coordination/ Subcommittee on Nutrition, United Nations (ACC/SCN). Fourth Report on the World Nutrition Situation, Nutrition throughout the lifecycle. ACC/ SCN 2000, Geneva.
12. Restituta Shirima et al. Exclusive breast feeding is rarely practised in rural and urban Morogoro, Tanzania. Public health Nutrition 2007; 4(2), 147-154.
13. Statistics Norway. Norske mødre ammer mye. Kostholdsundersøkelse blant spedbarn. 1998. Statistisk sentralbyråd 2003.
14. WHO. Bernardo L. Horta et al. Evidence on the long term effects of breast feeding. Systematic revues and Meta analysis. World Health Organization (WHO), Geneva.
15. Kramer MS et al. The Optimal duration of breast feeding: a systematic review. Advances in Ekspermental Medicine and Biology 2004;554, 63-77.
16. Linda S. Adair, Popkin B.M, Guilkey D.K. The duration of breast feeding; how is it affected by biological, socio-demographic, health sector and food insecurity factors? Demography 1993; 30 (1), 63-80.
17. Chantry J C. Full Breast feeding duration and Associated Decrease in respiratory tract Infection in US children .Paediatrics 2006; 117, 425-432.

18. Dewey KG. Effects of exclusive breast feeding for four versus six months on maternal nutrition status and infant motor development: Results of two randomized trials in Honduras. *The journal of Nutrition*. 2000; 262-267.
19. WHO. World Health Assembly Resolution related to Nutrition. World Health Organization (WHO), Geneva.
20. Mamiro Peter S. et al. Feeding Practises and factors contributing to wasting, stunting, and iron deficiency anaemia among 3-23 month old children in Kilosa District, rural Tanzania. *J Health Popul nutr*. 2005; 23(3), 222-230.
21. WHO. The World Health Organizations infant feeding recommendations. World Health Organization (WHO), Geneva. Available at: http://www.who.int/nutrition/topics/infantfeeding_recommendation/en/index.html
22. Mazengo M.C. et al. Food consumption in rural and urban Tanzania. *Acta Tropica* 1997; 313-326.
23. Adelheid W. Onyango et al. The contribution of breast milk to toddler diets in western Kenya. *Bulletin of the World Health Organization (WHO)* 2002: 80(4).
24. UNICEF. State of the worlds children 1998. Focus on nutrition. New York: UNICEF 2007.
25. Marina De Paoli et al. To breast feed or not to breast feed? Infant feeding dilemmas facing women with HIV in the Kilimanjaro region, Tanzania. Dissertation for the degree of Dr Med. Faculty of Medicine, University of Oslo, 2004.

26. Hoosen M Coovadia et al. Mother-to-child transmission of HIV-1 infection during exclusive breast feeding in the first 6 months of life: an intervention cohort study. *Lancet* 2007; 369 (1107).
27. WHO. Exclusive breast feeding. World Health Organization (WHO), Geneva. Available at:
http://www.who.int/nutrition/topics/exclusive_breastfeeding/en/index.html
28. Restituta Shirima et al. Information and Socioeconomic factors associated with early breast feeding practices in rural and urban Morogoro, Tanzania. *Acta Paedrica* 2001; 90(8), 936-942.
29. Marina de Paoli et al. Are infant feeding options that are recommended for mothers with HIV acceptable, feasible, affordable, sustainable and safe? Pregnant women's perspective. *Public health Nutrition* 2003; 7(5), 611-619.
30. Marina de Paoli et al. Factors influencing acceptability of voluntary counselling and HIV- testing among pregnant women in Northern Tanzania. *AIDS CARE* 2004; 16(4), 411-425.
31. Catherine M. Wilfert et al. Balancing maternal and infant benefits and the consequences of breast feeding in the developing world during the era of HIV infection. *The journal of infectious disease* 2007;195 (165-167).
32. Marina de Paoli et al. Exclusive breast feeding in the era of AIDS. *J Hum Lact* 2001; 17 (4).
33. Amal Omer Salim et al. Whom can I rely on? Mothers approach to support for feeding: an intervention study in suburban Dar es Salam, Tanzania. Elsevier midwifery 2006.

34. Pain P. and Dorea J.G. Gender role attitudes and other determinants of breast feeding intentions in Brazilian women. *Child: care, health and development* 2001; 27 (1), 61-72.
35. Jean Burke. Infant HIV infection: Acceptability of preventive strategies in central Tanzania. *AIDS education and prevention* 2004; 16(5), 415-425.
36. L. Owour Omondi et al. Determinants for breast feeding and bottle feeding in Botswana. Oxford University press, *Journal of tropical Pediatrics* 1990; 36.
37. Hinde P.R. Social and economical factors related to breast feeding duration in Tanzania. *Journal of Biological Science* 1996; 28(3).
38. Mirriam Labbok et al. What is the definition of breast feeding? *Lactation resource centre*. 2000; 19(3).
39. Klouman E. Women at risk. Population based research on HIV, sexual transmitted infection and female genital cutting in northern Tanzania. Dissertation for the degree of Dr Med. Faculty of medicine, university of Oslo, 2004.
40. Elia J Mmbaga et al. Prevalence and risk factors for HIV-1 infections in rural Kilimanjaro region of Tanzania: implications for prevention and treatment. *BMC* 2007; 7(58).
41. Tanzania National website (no authors listed). The United Republic of Tanzania. The Government of Tanzania, 2006. Available from: <http://www.tanzania.go.tz/>
42. Klepp K.I. et al. Young People at risk. Fighting AIDS in Northern Tanzania. Scandinavian University Press, 1995.

43. Hajian-Tilaki K.O. Factors associated with the pattern of breast feeding in the north of Iran. *Annals of human Biology* 2005; 32(6), 702-713.
44. Duboise L. et al. Social Determinants of Initiation, duration and exclusivity of breast feeding at the population level. The results of the Longitudinal Study of Child development in Quebec (ELDEQ 1998-2002). *Canadian Journal of Public Health* 2003; 94(4), 300-3005.
45. Kimati V.P. et al. Breast feeding in rural and urban areas of Tanzania. *Journal of Tropical Paediatrics* 1983; 29.
46. Agnarsson et al. infant feeding Practices during the first six months of life in rural area in Tanzania. *East Africa Medical Journal* 2001; 78(1)9-13.
47. Duboise L. et al. Social inequalities in infant feeding during the first year of life. The longitudinal study of child development in Quebec (LSCDQ 1998-2002). *Public health Nutrition* 2007; 6(8)773-783.
48. Sellen Daniel W. et al. Infant and young child feeding practice among African pastoralists: The Datoga of Tanzania. *J.Biosoc. Sci* 1998; 30, 481-499.
49. Bureau of Statistics, Macro International Inc. Tanzania Demographic and Health Survey 1996. Calverton, Maryland: Bureau of Statistics and Macro International.
50. Greiner Ted et al. A new Theory: Breast milk displacement may be the major cause of nutritional stunting. *Nutrition and Millennium Development goals*. United Nations System, Standing Committee on nutrition.
51. Michelo C. et al. marked HIV prevalence declines in higher educated young people: evidence from population based surveys (2005-2003) in Zambia. *AIDS* 2006; 20, 1031-1038.

52. Kwesigabo G. et al. HiV-1 Infection Prevalence trend in Areas of contrasting Levels of Infection in the Kagera region, Tanzania, 1987-2000. *J Acquir Immune Defic Syndrome* 2005; 40(5), 585-591.
53. Heck K et al. Socioeconomic status and breast feeding initiation among Californian Mothers. *Public health reports* 2006; 121, 51-59.
54. Piwoz Ellen G. et al. An education and counselling Program for preventing Breast feeding associated HIV transmission in Zimbabwe: design and Impact on Maternal knowledge and behaviour. *The Journal of Nutrition* 2005; 135, 959-955.

Appendix

NUFU PROJECT: KAHE COHORT STUDY 2005

Name of Interviewer: _____ Date: _____

STUDY PARTICIPATION STATUS

1. Name of respondent _____

2. Previous names used by the respondent _____

3. New 2005 Participation ID No. _____

4. Did the respondent participate in? (*Circle all surveys participated*)

1. 1991 survey

2. 1993 survey

3. 1997 survey

5. Age of respondent in previous surveys _____ 1991; _____ 1993;
_____ 1997.

6. Former Identification number(s) 1. _____ 2. _____ 3.

7. Name of previous ten cell leader _____

8. Name of current Hamlet leader _____

9. Sex of respondent 1. Male
2. Female

10. How old is the respondent: (Probe for best estimate)
_____ Years; Year of birth _____

Respondent not attending place for interview

11. Not found on first visit

Reason: _____

12. Not found on second visit

Reason: _____

13. Not found on third visit

Reason: _____ ()

14. Respondent away for the duration of the survey

Reason: _____ ()

15. Respondent refused; Why? (Optional): _____

()

16. Other: _____

()

3. Standard 5-7
4. Form 1-4
5. Form 5-6
6. Higher secondary school
7. Other.

21. What is your present main occupation?
1. Farmer/peasant
 2. Government employee
 3. Private business owner
 4. Private business employee
 5. Housewife
 6. Student (primary/sec. school)
 7. Unemployed
 8. Petty (small) business
 9. Others

22. What additional activities do you do to supplement your income?
1. None
 2. Specify _____

23. What is your current marital status? 1. Single → **go to Q29**
2. Married
3. Cohabiting
4. Divorced/separated → **go to Q27**
5. Widow/widower → **go to Q27**

24. Are you in a polygamous marriage? 1. Yes
2. No → **go to Q26**

25. A: Male: How many wives do you have? _____

B: Female: How many wives does your
husband have including yourself? _____

26. If married, do you live with your spouse? 1. Yes, all the time
2. Yes, one to four times a year
3. Yes, every month or after one
month
4. Yes, So many times per month

27. How old were you when you first married? _____ Years old.
(or started cohabiting)?

28. If divorced, separated or widowed, how many
years ago did this happen? _____ years ago.
(Write 0 if less than 1 year)

29. Do you have any children?

1. Yes; How many
0. No

30. How many are five years old or younger? (*Request for MCH card if respondent does not know age of children*) _____

31. How long have you lived in this village? _____ years.

(If below one year write 00; if since birth write 98)

32. What is your tribe?

1. Chagga

2. Pare

3. Mkahe

4. Mkamba

5. Others, Specify _____

The next questions are about food eaten in your household.

33. Which of the following statements best describes the amount of food eaten in your household:
your household:
eat

1. We have enough food to eat

2. Sometimes we have enough

3. We often do not have enough food to

4. Don't know

34. In the last year (12 months), did you
ever NOT eat for a whole day because
Q36
there wasn't enough food?
to Q36

1. Yes
0. No →**Skip to**
8. Don't know →**Skip**

35. How often did this happen?
month

1. Almost every month
2. Some months, but not every
3. Only 1 or 2 months
4. Don't know

36. Sometimes people lose weight because
they don't have enough to eat. In the
last year (12 months), did you lose
weight because there wasn't enough food?

1. Yes
2. No
8. Don't know

37. Do you worry that your family may run out of 1. Always

Food before you have money to bury again? 2. Sometimes/often

0. Never

38. Do you worry about where the next day's food 1. Always

is going to come from? 2. Sometimes/often

0. Never

39. Has your family ever eaten the same type of 1. Always

food for several days consecutively because 2. Sometimes/often

you did not have enough money to buy 0. Never

different food?

40. Can you afford to eat the way you think you 1. Always

should? 2. Sometimes/often

0. Never

41. Have you often been hungry but don't eat 1. Always

because you cant afford enough food? 2. Sometimes/often

0. Never

42. Have you ever eaten less than you wanted because you don't have enough money to buy food? 1. Always
2. Sometimes/often
0. Never

The following three questions apply ONLY for those who said they have children under five years of age.

Check Q30 1. Yes 2. No

43. Have your children (according to you) not had enough to eat because you do not have enough money to buy food? 1. Always
2. Sometimes/often
0. Never

44. Do you know that your children are hungry sometimes but you just do not have enough money to buy food? 1. Always
2. Sometimes/often
0. Never

45. Do you not have enough money to buy healthy and nutritious/balanced food for your children?
1. Always
2. Sometimes/often
0. Never

These questions are about the types of food eaten in your household.

(Put a \checkmark in the correct box)

Start the following questions with “**How often do you drink/eat**”

| Question no. | Food item | 1. Everyday | 2. Several times a week | 3. Once a week | 4. Once or twice a month | 5. Less often than a month or never |
|--------------|------------|-------------|-------------------------|----------------|--------------------------|-------------------------------------|
| 46 | yoghurt | | | | | |
| 47 | Cheese | | | | | |
| 48 | Margarine | | | | | |
| 49 | Eggs | | | | | |
| 50 | Dried fish | | | | | |
| 51 | Fresh fish | | | | | |

| | | | | | | |
|----------|-------------------|----|----|-----------|---------|---------|
| 52 | Beef | | | | | |
| 53 | Goat meat | | | | | |
| 54 | Mutton | | | | | |
| 55 | Pork | | | | | |
| 56 | Chicken | | | | | |
| 57 | Liver | | | | | |
| 58 | Pumpkin leaves | | | | | |
| 59 | Cowpea leaves | | | | | |
| 60 | Salad | | | | | |
| 61 | Cabbage | | | | | |
| 62 | Tomatoes | | | | | |
| 63 | Cucumbers | | | | | |
| 64 | Pumpkins | | | | | |
| 65 | Okra | | | | | |
| 66 | Aubergines | | | | | |
| 67 | Peas | | | | | |
| 68 | Oranges | | | | | |
| 69 | Grapefruits | | | | | |
| Question | Food item | 1. | 2. | 3. Once a | 4. Once | 5. Less |

| no. | | Everyday | Several times a week | week | or twice a month | often than a month or never |
|-----|--------------------------|----------|----------------------------|------|---------------------|--------------------------------------|
| 70 | Tangerines | | | | | |
| 71 | Grapes | | | | | |
| 72 | Passion fruit | | | | | |
| 73 | Mango | | | | | |
| 74 | Pawpaw | | | | | |
| 75 | Watermelo n | | | | | |
| 76 | Avocado | | | | | |
| 77 | Ripe Bananas | | | | | |
| 78 | Sugarcane | | | | | |
| 79 | milk | | | | | |
| 80 | Water | | | | | |
| 81 | Juice | | | | | |
| 82 | Local alcohol brew | | | | | |
| 83 | Bottled alcohol | | | | | |

The next questions are about HIV/AIDS. Please answer YES or NO or whether you DON'T KNOW the answer to a question.

89. Can someone who looks healthy but who has the AIDS virus pass it on to other people?
1. Yes
0. No
8. Don't know
90. Can one get AIDS by touching the body of a person who has AIDS or AIDS virus?
1. Yes
0. No
8. Don't know
91. Can one get AIDS by kissing a person who has AIDS or AIDS virus?
1. Yes
0. No
8. Don't know
92. Can one get AIDS by sharing food or cups with a person who has AIDS or AIDS virus?
1. Yes
2. No
3. Don't know

-
93. Can one get AIDS by having sex with someone
who has AIDS or AIDS virus?
1. Yes
0. No
8. Don't know
94. Can one get AIDS by being bitten by
mosquito or other blood sucking insects?
1. Yes
0. No
8. Don't know
95. Can one get AIDS by wearing clothes used
by a person who has AIDS or AIDS virus?
1. Yes
0. No
8. Don't know
96. Can one get AIDS by being cursed by another
person?
1. Yes
0. No
8. Don't know
97. Can a woman who has AIDS pass it on her
baby during pregnancy or at delivery?
1. Yes
0. No
8. Don't know

-
98. Do you think that a person who has AIDS
or AIDS virus can be cured?
- 1. Yes
 - 0. No
 - 8. Don't know

Now I will ask you some questions about your own opinions. Let me know which one of the answers fits best for you (read all response categories)

99. How much of a threat do you think HIV/AIDS
is to the health of your local community?
- 1. No threat at all
 - 2. Some threat
 - 3. Serious threat
 - 4. Don't know

100. Are you personally at risk of getting HIV/AIDS?
- 1. No, not at all
 - 2. Yes, at slight risk
 - 3. Yes, at serious risk
 - 4. Don't know

101. Can you protect yourself against getting HIV/AIDS? 1. No, not at all

2. Yes, with difficult

3. Yes, I can easily protect
myself

4. Don't know

The following questions are about sexually transmitted infections

102. Can you mention any STI you know?

(Probe for local names)

1. Syphilis

2. Gonorrhoea

3. Genital warts

4. Chancroid

5. HSV

6. Don't know

7. Others, mention _____

103. Where can a person get infected with an STI?

| | No | Yes |
|------------------------|----|-----|
| 1. Spouse/partner | 0 | 1 |
| 2. Casual acquaintance | 0 | 1 |
| 3. Multiple partners | 0 | 1 |

| | | |
|---------------|---|---|
| 4. Don't know | 0 | 1 |
|---------------|---|---|

104. How can you tell when a person has an STI?

| | No | Yes |
|-------------------------------------|----|-----|
| 1. Genital sores | 0 | 1 |
| 2. Genital itch | 0 | 1 |
| 3. Small vaginal discharge | 0 | 1 |
| 4. Copious smelly vaginal discharge | 0 | 1 |
| 5. Lower abdominal pain | 0 | 1 |
| 6. Painful micturation | 0 | 1 |

105. How can a person protect themselves from getting an STI?

| | No | Yes |
|-----------------------------------|----|-----|
| 1. Not having sexual intercourse | 0 | 1 |
| 2. Using a condom | 0 | 1 |
| 3. Having ONLY ONE sexual partner | 0 | 1 |
| 4. I don't know | 0 | 1 |

106. Can an STI be treated? 1. Yes

2. No

8. Don't know

107. What happens when a person who has
an STI is not treated?

| | No | Yes |
|------------------------------|----|-----|
| 1. Uterine pain | 0 | 1 |
| 2. Infertility | 0 | 1 |
| 3. Adverse pregnancy outcome | 0 | 1 |
| 4. May be infected with HIV | 0 | 1 |
| 5. Cures without treatment | 0 | 1 |
| 6. No any effect | 0 | 1 |
| 7. Don't know | 0 | 1 |

**I will now ask you some personal questions regarding sexual behaviour.
Remember that your answers will be treated strictly confidential.**

(Do not ask the following question to those who are married/cohabiting or have given birth; check Q23 and Q29)

108. Have you ever had sexual intercourse in your lifetime? 1. Yes
0. No →go to Q118

109. How old were you when you had your first intercourse? _____ years.

110. How many different persons have you had sex with in the last 4 weeks, including your spouse /regular partner? _____ Total no. of persons

111. How many different persons have you had sex with in the last 1 year (12 months), including your spouse/regular partner? _____ Total no. of persons

112. How many different persons have you had sex with in the last 1 year (12 months), including your spouse/regular partner? _____ Total no. of persons

with in the last 5 years, including your spouse
/regular partner?

113. In your last sexual intercourse, did you give or
receive money or any other gift in order to
participate in the act?
1. Yes
0. No

**For the condom questions: refer to “your partner” when interviewing women,
but make sure that questions refer to when the interviewee is having sex with
her partners**

114. Have you (or your partner) ever used
condom during sex?
1. Yes
0. No → go to Q118
115. Do you (or your partner) use condom with
your spouse/regular partner?
1. Yes, always
2. Yes most of the time
3. Yes, sometimes
4. No, never

*(Check if the interviewee has responded to Q110-112 to answer the following
question)*

116. Do you (or your partner) use condoms with other partner/regular partner?
1. Yes, always
2. Yes most of the time
3. Yes, sometimes
4. No, never

117. Did you (or your partner) use condom at the last sexual intercourse?
1. Yes
0. No

If Skipped Q108 and/or Q114 continue here!

I will now ask you questions concerning your medical history

Have you during the last 5 years had?

| | No | Yes |
|---------------------------------------|----|-----|
| 118. Shingles (Herpes zoster)..... | 0 | 1 |
| 119. Tuberculosis (not including BCG) | 0 | 1 |
| 120. Abnormal genital discharge | 0 | 1 |
| 121. Genital ulcers | 0 | 1 |
| 122. Genital warts | 0 | 1 |

| | | |
|---|----|---|
| 123. Abscess in the groin | 0 | 1 |
| 124. Have you been treated for an STI in the past five (5) years? | | 1. Yes 0. No → go to Q126 |
| 125. If yes above by whom? | | 1. Private practitioner 2. Non- government dispensary 3. Government dispensary 4. Government hospital 5. Traditional healer 6. Others, mention _____ |
| During the last month, have you had any of the following health complaints? | | |
| | No | Yes |
| 126. Mucous stool | 0 | 1 |
| 127. Prolonged fever > 1 month | 0 | 1 |
| 128. Prolonged cough >1 month | 0 | 1 |
| 129. Prolonged diarrhoea >1 month | 0 | 1 |
| 130. Considerable weight loss | 0 | 1, Specify: _____ |
| 131. Pruritic dermatitis | 0 | 1 |

132. Painful urination 0 1

133. Abnormal genital discharge 0 1

134. Genital ulcer 0 1

135. Have you received any antibiotics during 1. Yes

the last two weeks?

0. No → **go to Q138**

136. What is the name of medicine given? (*Probe to know what kind of medication was given*) _____

137. How days passed since the treatment ended? _____ days.

138. Do you have any other health complaints? 1. Yes, specify _____

0. No

Women (Gynaecological/obstetric history) Men , go to Q153

139. How old were you at menarche? 1. _____ years,

0. Not yet → **go to Q153**

-
140. Do you have regular menstrual periods? 1. Yes
2. Irregular, Specify _____
3. Menopause → **go to Q142**
141. When was your last menstrual period? _____ days ago → **go to Q143**
142. (For those who are menopause), at what age
did you have your last menstrual period? _____ years.
143. Have you ever been pregnant? 1. Yes, Age at first pregnancy _____
0. No → **go to Q153**
144. How many times have you been pregnant? Total (lifetime) _____
- After 1991 _____
145. Are you presently pregnant? 1. Yes
0. No

8. Don't know

146. When was your last delivery? _____ Year

147. For your last born child still alive, for how

many months did you breastfeed him/her? _____ months breastfeeding

(If the child was not breastfeed AT ALL GO TO Q149)

148. Are you still breastfeeding the last child? 1. Yes, Age of child _____ months

0. No

149. If NOT, why did you stop breastfeeding?

1. Child was old enough

2. Pregnancy

3. Illness of the child; specify _____

4. Not enough milk

5. Work situation; specify _____

6. Death of the child

7. I was advised not to breastfeed because of my HIV status

8. Other _____

150. At what age did you start giving your child complimentary food?

_____ months

151. What kinds of food was this?

152. What did you feed the child during the first few days after birth?

We are now requesting you and your children between 6 months and five years old to have your anthropometric measurements taken.

153. **Respondents:** weight. _____ kg. 105. height. _____

cm

154. Hip circumference _____ cm. 107. Waist circumference _____
cm

Children anthropometry

Number of children qualifying for measurements _____

Reasons for children qualifying not being measured

_____.

157. Child 1: Age _____ months, weight _____ kg and height _____
cm.

158. Child 2: Age _____ months, weight _____ kg and height _____
cm.

159. Child 3: Age _____ months, weight _____ kg and height _____
cm.

160. Child 4: Age _____ months, weight _____ kg and height _____
cm.

161. Child 5: Age _____ months, weight _____ kg and height _____
cm.

WE HAVE REACHED THE END OF OUR QUESTIONNAIRE

THANK YOU FOR PARTICIPATING IN THIS SURVEY

INTERVIEWER: PROCEED WITH AIDS HEALTH EDUCATION

162. How will you feel if you find out that you are HIV positive?

163. Do you have a relative whom you would like to share with these results?

1. Yes, Name and relations _____

2. No

164. Participant agrees to blood test for HIV

1. Yes

2. No, why not? (Optional)

Reason: _____

165. Would you like to know the results of your HIV-test:

1. Yes

2. No, why not? (Optional)

Reason: _____
