

Exclusive Breastfeeding up to Six Months is Very Rare in Tanzania: A Cohort Study of Infant Feeding Practices in Kilimanjaro Area

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Abstract: *Background:* Exclusive breastfeeding (EBF) is recommended the first six months after birth as one of cost effective interventions in saving children's lives. *Objective:* To determine the prevalence of exclusive breastfeeding and describe the common foods introduced to infants before 6months. *Design:* A prospective cohort study. *Setting:* Poor community of Moshi urban, Kilimanjaro region, Tanzania. *Subjects:* Women in their third trimester and were followed to 18 months after delivery. A questionnaire was used to collect information on maternal socio-demographics, delivery status and infant feeding practices at each visit. Maternal HIV status was checked at enrolment. *Results:* Out of 2231 women, with a live birth, 70% (1535) came back at least once after delivery and information on infant feeding were collected. 94% of the women were living below the poverty line. The prevalence of EBF at 1, 3 and up to 6 months was 48.8%, 22.0% and 0.2% respectively. Two percent of the infants were given semi-solids at 1 month, 35% at 3 months and 95% at 5 months. Water and cow's milk were the most common liquids introduced to infants by one month, while porridge, cow's milk and *mtori* were commonly introduced at 3 months. *Conclusions:* EBF up to 6 month is very rare in Kilimanjaro. There is an urgent need to strengthen community and health facility based EBF interventions so as to reach the 90% recommended coverage by the WHO. This will help in improving child survival and in attaining the Millennium Development Goal 4.

Keywords: Exclusive Breastfeeding, Breastfeeding, Poverty, Prevalence, Tanzania

1. Introduction

Optimal breastfeeding practices including breastfeeding newborns within one hour of birth, breastfeeding infants exclusively for the first six months of life and continued breastfeeding for two years along with complementary foods is one of key strategies for child survival^(1,2,3). It is estimated that 22% of neonatal deaths could be saved if breastfeeding was initiated within the first hour after birth, and 40-45% reduction in all cause and infection related to neonatal deaths if breastfeeding was initiated within 24 hours of birth⁽⁴⁻⁷⁾. Exclusive breastfeeding (EBF) is defined as giving only

breast milk to the infant, without mixing it with water, other liquids, herbal preparations or food in the first six months of life, with the exception of vitamins, mineral supplements or medicines^(1,8).

In 2011, nearly 11.6% (800,000) of all child deaths were attributed to sub-optimal breastfeeding, especially lack of EBF⁽³⁾. Exclusively breastfed infants have been shown to have lower rates of respiratory tract infections and diarrhoea, have better physical growth, neuro-developmental outcomes and higher intelligent quotient compared to infants who were not exclusively breastfed^(3, 9-13). In Sub Saharan African (SSA) countries where the prevalence of HIV is high, EBF has been shown to have an added advantage of reducing the

rates of mother to child transmission of HIV⁽¹⁴⁾.

Despite EBF being ideal nutrition and cost effective intervention in saving children's lives, the EBF coverage is sub-optimal in many developing countries. Globally it was estimated that in 2010 only 39% of infants aged less than six months were exclusively breastfed in developing countries, a slight increase from 33% in 1995⁽²⁾. In SSA countries where breastfeeding is widely practiced, only 35% of infants are exclusively breastfed with wide variability between countries. Data from the Demographic and Health Surveys (DHS) shows that the coverage of EBF is higher in Eastern Africa (range 32-63%) compared to Southern (32-36%) or West Africa (13% - 25%)⁽¹⁵⁾. Data from Asian countries shows similar variability, with EBF prevalence of 32%, 64% and 76% reported among infants < 6 months in Indonesia, Bangladesh and Sri Lanka respectively⁽¹⁵⁾.

In Tanzania, the median duration of breastfeeding is 21 months while for EBF is 2.4 months respectively⁽¹⁶⁾. EBF prevalence has been increasing slowly from early 2000. While the prevalence of EBF was < 5% in 2001, studies have reported EBF prevalence up to 58% in 2011⁽¹⁷⁻¹⁹⁾. Data from the TDHS also showed EBF prevalence has increased from 41% in 2004/2005 to approximately 50% by 2010. These studies however, estimated the prevalence of EBF in Tanzania either using the 24 hours recall method which overestimates the actual practice, or cross sectional design, which may be affected by recall bias⁽¹⁶⁻²⁰⁾.

A standard method for assessing exclusive breastfeeding used in the DHS is 24 hours recall, where mothers/ caretakers are asked about breastfeeding practices in the past 24 hours preceding the survey^(15, 21, 22). However, the 24 hour recall method tends to overestimate EBF prevalence compared to recall since birth method⁽²²⁻²⁴⁾. In Eastern Uganda for example, Engerbresten et al in (2007) showed the EBF prevalence at 1, 3 and 6 months to be 96%, 81% and 52% when using 24 hours recall method compared to 45%, 7% and 0% respectively when using recall since birth. Agampondi et al, (2011) reported that all retrospective evaluation methods overestimate the duration of EBF, whether using mothers recall (77.7%) or calendar month (41%) compared to prospective cohort design (23.9%).

Cohort studies have been reported to be a better way of estimating EBF rates as it gives reliable information on EBF practices from mothers without a long recall period^(23, 25, 26).

We had a chance to collect prospective data on infant feeding practices in Moshi urban Tanzania in association with prevention of mother to child transmission (PMTCT) of HIV study⁽²⁷⁾. This study used infant data collected in the 1st six months of life with the aims to; determine the prevalence of EBF up to six months, as well as to describe the common foods that the mothers give their infants before 6 months.

2. Materials and Methods

2.1. Study Design and Subjects

This was part of a prospective cohort study that enrolled

women in their third trimester of pregnancy in March 2002-June 2004 and followed them at delivery, at 1 month postpartum and at every 3rd month up to 24 months, infants anthropometric measurements were taken, detailed explanation of the procedures can be found in previous publications^(27, 28).

The study was conducted in two largest government primary health care (PHC) clinics, Majengo and Pasua located at Moshi urban district in Kilimanjaro, a region in the northern part of Tanzania. Moshi urban is the capital of the region, and one of the seven districts in the region. The region has a total population of 1,376,702 people; approximately 191, 000 live in Moshi urban district⁽²⁹⁾. Most people, especially women work in informal sector, and the main income generating activities are tourism, small-scale trading and agriculture.

At the time of the study 2002 – 2006, there were six government primary health care facilities (2 health centres and 4 dispensaries) offering reproductive and child health services (RCH) including antenatal, FP, immunization and postnatal care. These two facilities (Majengo & Pasua) were the only PHC facilities offering delivery care in addition to RCH services plus the regional and referral hospitals. By 2011, the district had 13 government PHC facilities (4 health centres and 9 dispensaries) and 4 hospitals offering RCH services⁽²⁹⁾.

Reproductive health care clinics are well attended in the district, with antenatal coverage of 100%, skilled birth attendance coverage of 100%, 97% of children are fully immunized, and 48% attend for postnatal care compared to the national level of 96%, 50%, 75% and 30% respectively^(16,29). Therefore the population of children aged 0-6 months seen at health facilities, fairly represent children of that age group in general population.

2.2. Enrolment and Follow up Procedures

Women were first informed about the study, its aims and follow up requirement. A total of 2654 pregnant women at their 3rd trimester, who were residing in Moshi urban district, and receiving prenatal care at the two clinics, gave written consent to participate in the study. Trained research nurses conducted individual pre-test counselling for every woman and provided information about HIV and PMTCT.

The women who agreed to participate were interviewed in private, using a pre-tested questionnaire, and the local language Swahili, was used in all the interviews. Information collected included socio-demographics data of the women and their partners (age, education, income, marital status, and alcohol), and obstetric information. Blood was collected for diagnosis of HIV.

Women were seen at delivery, and mother-infant pairs were requested to attend follow-up at the study clinics at 4 weeks and at 3, 6, 9, 12, 18 and 24 months post delivery. At each follow up visit information regarding infant feeding practices was collected using a brief questionnaire. At delivery and 4 weeks information included delivery information plus time of breastfeeding initiation, prelacteal

feeding, introduction of water and maternal breast condition. At other visits detailed information on EBF duration, and age at which liquids including water/semisolids/solids were introduced and frequency of feeding was collected.

2.3. Breastfeeding Cohort Information

This paper is based on data of mother-infants pairs collected from delivery up to 6 months. Figure 1 depicts a flow chart for participants. Delivery information was available for 2256 women, and these form a cohort for analyzing exclusive breastfeeding rates.

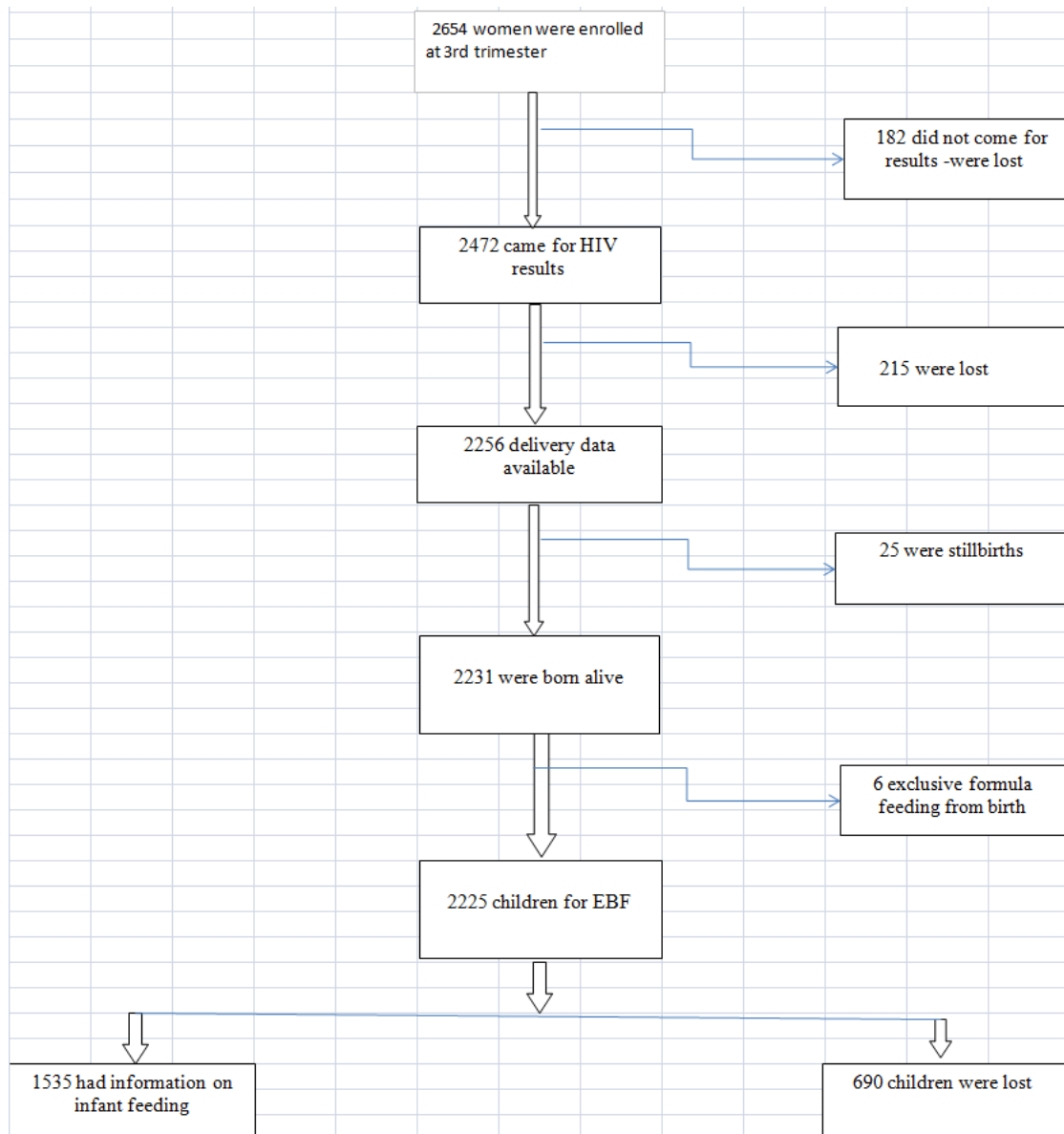


Figure 1. Flow chart of participants from enrolment, delivery up to 6 months

Of the 2256 women, 2231 had a live baby, with 30 set of twins. Sixty nine percent of the 2225 women with live babies and reported ever breastfeeding their babies attended at least once for follow up and gave information about their infant feeding, Table 1.

2.4. Ethical Consideration

Ethical clearance was obtained from the Tanzanian Ministry of Health and Social welfare, KCMC Ethical committee and The Regional Committee for Medical

Research Ethics; Region III (Regional komite for medisinsk forskninetikk region III).

A written informed consent was sought from each participant before the enrolment. Participants were identified only by a code number in all the forms.

2.5. Data Processing and Analysis

Data were entered and analyzed using SPSS versions 20 (SSPS, Chicago, IL, USA). Continuous data were summarized by using means and median with respective

measures of dispersion, while proportions were used to summarize categorical variables. Comparisons of categorical variables were done using Chi square test at 5% level of significance. Prevalence of EBF is given at 3 time periods; at 1 month, at 3 months and at 6 months after delivery. Kaplan-Meir (KM) survival chart is used to depict EBF at different time periods. Beginning of mix-feeding (cessation of EBF) was taken as the final event.

3. Results

Table 1. Summary of visits by 2225 women who ever breastfed in the first six months after delivery in Moshi urban district, Tanzania

Number of visits attended	Frequency	Percentage (%)
None	690	31.0
Once	244	11.0
Twice	447	20.1
Three times	844	37.9

Table 2 also depicts socio-demographic and reproductive characteristics of 1535 women who were followed at least once. The mean age (standard deviation [SD]) of the women was 24.6 (5.3) years. Majority of the women had primary education (84.5%), were married/cohabiting (91.7%), were not employed (95.0%) and had income of <30 USD per month (94%). Their partner's age ranged from 17 – 71 years

Delivery information was available on 2256 women, 2225 of whom had a live baby and reported ever breastfeeding them (Figure 1). Of the 2225 women-infant pairs, 69% (1535) attended at least once in the first six months after delivery, see Table 1. Comparison of characteristics of the women who did not attend for follow up (n=690) and those who were seen at least once after delivery is shown in Table 2. The two groups did not differ in terms of age, education, marital status, parity and income. But women who were HIV positive were significantly more likely to come for follow up visits compared to those who were HIV negative ($p < 0.01$).

with mean (SD) of 30.6 (7.2) and most had primary education 76.0%.

Seventy percent (1082) of the infants were breastfed within the first hour and 80% within the first 24 hours after delivery. Ninety nine percent of the children were still breastfed at 1 and 3 months after delivery, while this proportion was 96% up to 6 months.

Table 2. Comparison of socio demographics characteristics of 1535 women attended for follow up at least once and 696 who did not in Moshi urban district, Tanzania

Characteristics	Attended follow up visits		P-value
	Yes (N=1535) n (%)	No (N=690) n (%)	
Mother's age(years)			
14 – 24	831(54.1)	398 (57.2)	0.18
25 -49	704 (45.9)	298 (42.8)	
Education			
Never attended school	69 (4.5)	24 (3.4)	0.29
Primary	1297 (84.5)	605 (86.9)	
Secondary and higher	169 (11.0)	67 (9.7)	
Employment			
Employed	77 (5.0)	31 (4.5)	0.57
Not employed	1458 (95.0)	665 (95.5)	
Marital status			
Married/cohabiting	1408 (91.7)	633 (90.9)	0.54
single/separated/Divorced/widowed	127 (8.3)	63 (9.1)	
Income per month (TZS)			
<30,000/=	1437 (93.6)	658 (94.5)	0.55
30,000 - 59,999/=	80 (5.2)	33 (4.7)	
≥60,000	18 (1.2)	5 (0.6)	
Children			
None	615 (40.1)	264 (37.9)	0.07
One	429 (27.9)	201 (28.9)	
Two or more	491 (32.0)	231 (33.2)	
Partners Education			
Never attended	5 (0.3)	4 (0.6)	<0.01
Primary	1168 (76.1)	566 (81.3)	
Secondary and higher	362 (23.6)	126 (18.1)	
HIV status of the woman			
Positive	134 (8.7)	22 (3.2)	<0.01
Negative	1401 (91.3)	674 (96.8)	

The prevalence of exclusive breastfeeding was lower however, 48.8 % at 1 month, 22.0 % at three months and

0.2 % at six months after delivery, Figure 2. At 1 month the EBF prevalence was higher among women who had premature babies compared to those with term babies, RR

1.56 (95% CI: 1.49 – 1.63) and among older women aged 25-49 years compared to those aged 15-24 years, RR 1.28 (95% CI: 1.01 – 1.63).

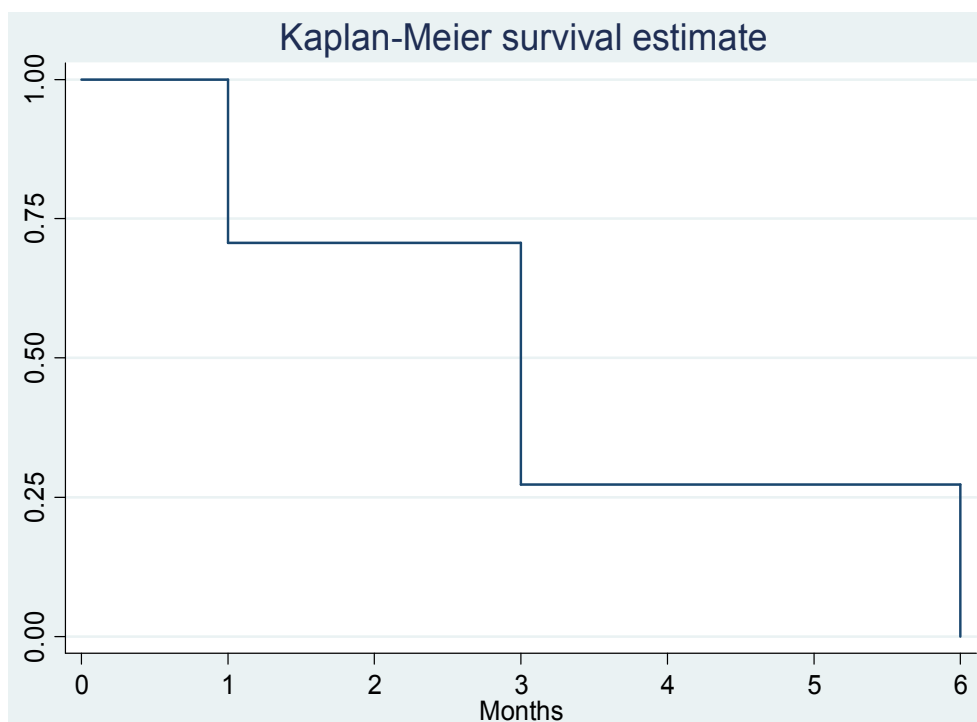


Figure 2. Kaplan-Meier for duration of EBF at 1, 3 and 6 months after delivery

At 3 months the EBF prevalence was significantly higher among older women 25-49 years $P=0.003$ and HIV positive women; RR 1.62 (95% CI: 1.07-2.44), compared to those who were younger & HIV negative respectively, Table 3.

Other socio-demographic and infant factors like education, income, marital status, birth weight, mode of delivery, place of delivery were assessed, but did not influence the EBF practice.

Table 3. Exclusive breastfeeding rates at different ages by HIV status

Time of visit	HIV positive	HIV negative	Total
	n (%)	n (%)	n (%)
Total	134	1401	1535
EBF at 1 month	74 (55.2)	675 (48.2)	749 (48.8)
EBF at 3 months	39 (29.1)	295 (21.1)	334 (22.0)
EBF at 6 months	1 (0.7)	2 (0.1)	3 (0.2)

Prelacteal feeding was given to 3% of the infants. Water was introduced early, by 1 month, a third (36%) of the infant had been given water and this proportion rose to 73% by third month of infant's life, Table 4. Of those who gave water, 43% introduced it at first week of infant's life. By 3 months of infant life, cow's milk and semi-solid foods like porridge

of maize flour and mashed bananas with soup (*mtori*) were common introduced foods, given to a third of infants. By the time infants turn into 6 months, nine out of ten have been given semisolid foods (porridge & *mtori*), 7 in 10 had been given cow's milk and 33% had been started on solids, see table 4.

Table 4. Types of fluids, solids and semi-solid foods introduced at different ages among infants aged < 6 months in Moshi urban district.

Different types of fluids/foods introduced	AGE N (%)			Total (n=1535)
	1 Month (n=1161)	3 Months (n=1241)	Up to 6 Months (n=1227)	
Water	412(35.5)	901 (72.6)	1227 (100)	1535 (100)
Cow's milk	27 (2.3)	384 (30.9)	962 (78.4)	1049 (68.3)
Fluids other than milk	1 (0.1)	90 (7.2)	964 (78.6)	983 (64.0)
Semi solid foods (porridge/ <i>mtori</i>)	22 (1.9)	439 (35.4)	1218 (99.3)	1291 (84.1)
Solids	0 (0.0)	0 (0.0)	416 (33.9)	416 (27.1)
Fruits	0 (0.0)	0 (0.0)	806 (65.7)	806 (52.5)
Fish	0 (0.0)	12 (0.9)	272 (22.1)	281 (18.3)
Eggs	0 (0.0)	0 (0.0)	24 (1.9)	24 (1.6)
Green vegetables	0 (0.0)	0 (0.0)	201(16.4)	201 (13.1)

4. Discussion

The key result of the study is that EBF from birth up to six months is rare in this setting. These results are similar with findings in Tanzania, Uganda, and South Africa^(17, 24, 30, 31). Researchers in Morogoro, Tanzania observed that the average duration of EBF was 9 days and 23 days in rural and urban Morogoro, while in Uganda the EBF prevalence of 45%, 7% and 0% was observed at 1, 3 and at 6 months post delivery^(17,24). Leshabari et al, (2007) and Falness et al, (2011) also observed that EBF was rare and considered a new and challenging concept by HIV positive women, health providers, and mother-in laws in Kilimanjaro^(30,32). The low EBF in SSA African setting is contrary to EBF observed in countries like Sri Lanka, where using a cohort design similar to this study or recall from birth it was found 66% to 71% of infants are exclusively breastfed from birth up to six months⁽²⁶⁾. There is an urgent need for strategies to address sub-optimal breastfeeding practices in this area in order to improve child survival.

Methodology used in estimating the EBF prevalence can lead to different estimates. The prevalence of EBF in this study at 1, 3, and <6 months of 49%, 22% and 0.2% was generally low compare to the national EBF prevalence figure from TDHS of 2004/05 which was 70% at < 2 months, 42% at 2-3 months and 14% at 4-5 months respectively. The TDHS data were collected using the 24 hours recall compared to cohort design, and it has been shown that 24 hours recall tend to overestimate the real picture of what is happening on the ground compared to recall since birth of more than 7 days⁽²⁵⁾. Even in developed countries with high literacy level, Aarts and colleagues in Sweden observed that, there was 41% and 43% points difference in EBF prevalence at 2 and 4 months of age when 24 hours recall was compared to recall since birth⁽²³⁾. Health workers need to take into account different methodologies used when reading/interpreting EBF coverage literature^(25, 33, 34).

Good breastfeeding practice was observed; 70% percent of the women initiated breastfeeding within one hour of birth, reflecting the regional prevalence of (76%), and slight higher than the national figure of 59% in 2004/05⁽²⁰⁾. And 96% percent of the women were still breastfeeding their infants at 6 months, contrary to observations in South Africa⁽³¹⁾. But these advantages were offset by early introduction of water, cow's milk and semi-solids. Between birth and one month water was the main addition making predominant breastfeeding common mode of feeding. From one to third month after birth foods used for complementary feeding i.e. cow's milk, porridge and mashed bananas were introduced leading to a predominant mix feed group of children. This is almost the similar to the TDHS report 2004/05 and 2010 which showed that 33%-37% of infants below six months had receive complementary foods i.e. any solid and semisolid foods a day proceeding the interview day^(16, 20).

Mix feeding is responsible for frequent risk of infections like diarrhoea and pneumonia, increased mortality and higher

risk of HIV transmission to infants^(3, 8). Most of the women in the study had low income, living under 1 USD a day (94%). It is a known fact neonatal and infant mortality is high in low income countries, and within those countries it is higher among the poorer and among poorly educated women^(16, 35). One was expecting this community to practice EBF more since its cheap and most effective method of infant feeding. Despite EBF being cheap it seems the mothers were not able to practice EBF. The need for innovative, affordable and acceptable interventions to address sub-optimal breastfeeding practice in this setting cannot be overemphasized. Recent positive results of two cluster randomized trials on EBF duration and practices in SSA countries give evidence-based information which can be adapted in Tanzania and Moshi to address sub-optimal breastfeeding practices^(36, 37). The PROMISE-EBF Study, which was multi-country, showed that EBF promotion by using peer counsellors during antenatal and postnatal periods significantly increased EBF duration at 12 and 24 weeks after birth respectively⁽³⁶⁾. In Malawi, clusters which received health education by peer counsellors and they had women's group addressing maternal and child health problems synergistically improved EBF duration by 5-fold compared to control cluster⁽³⁷⁾.

Age and HIV status of the women influenced EBF in this study. Mothers aged 25 years or more EBF their infants more at 1 and 3 months after birth compared to those less than 25 years. It maybe that many of those aged < 25 years are first time mothers and have incorrect feeding techniques (attachment and positioning) compared to experienced mothers, leading to breast problems, perception that breast milk is inadequate and introduce other foods^(1,17,31). It was also observed HIV positive women came for follow up more, and had higher EBF prevalence at 3 months after birth compared to HIV negative women. This is different from the studies done in Eastern Uganda and South Africa where HIV positive mothers had lower EBF rates, have higher prevalence of giving pre-lacteal feeding, of introducing solid foods earlier and stop breastfeeding compared to HIV negative or general population^(31,38). In Tanzania, HIV positive mothers and their infants are followed very closely & frequently at CTC clinics, with intense counselling on EBF to reduce breastfeeding HIV transmission, and maybe this is why we observed the difference between the two groups.

While cohort design gives a more valid estimate of EBF information because events are recorded prospectively during the follow up visits than retrospective evaluation measures, its major limitation is loss to follow up. The study had drop-out of 30% of the mother-infant pairs after delivery, despite intense efforts of home follow/ tracing for defaulters. Comparison of basic socio-demographic characteristics between defaulters and those who were seen at least once after delivery showed no significant difference between the two groups. The second limitation of the study is that we did not probe for the reasons of introducing other liquids, semi-solids or solid before 6 months, the information which future

studies should strive to collect in order to help in adapting/guiding counselling.

5. Conclusion

The prevalence of exclusive breastfeeding is still low in this setting. Complementary foods were introduced early, most after first months of infant's life. Health care workers should use the opportunity of having women-infants for immunization at 4 weeks to strength counselling on skills to support breastfeeding and on benefits of EBF. Qualitative studies are required to explore why women continue to mix feed, despite intensive efforts by the government to improve breastfeeding practices and having policies like BFHI, IYF feeding since early 90's.

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