Exclusive breastfeeding patterns in Tanzania. Do individual, household, or community factors matter?

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Abstract

Background: Exclusive breastfeeding enhances the infants' immune system and the cognitive capacity besides protecting them against infectious diseases and malnutrition; and can reduce about 20% of neonatal mortality. If practiced optimally, breastfeeding protects mothers against non-communicable diseases as well as promising spaced births. Exclusive breastfeeding knowledge is widely spread among women in Tanzania since the 20th century; however, before the onset of the 21st century, it remained below average. By taking a holistic multilevel approach, this study adds to the body of knowledge by examining the extent to which individual, household, and community factors matter in explaining exclusive breastfeeding practices in Tanzania.

Methods: This cross-sectional data analysis used nationally representative data from the 2015/16 Tanzania Demographic and Health Survey. The dependent variable in this study was exclusive breastfeeding defined as feeding infants breast milk during a period of up to six months without introducing other food supplements. Both univariate and multivariate logistic regressions were used to determine the factors associated with exclusive breastfeeding.

Findings: The exclusive breastfeeding rate was 59%; women had greater odds of practicing exclusive breastfeeding if they lived in a rural area; were aged between 30-39 years; delivered in the short rain season; their infant's size was normal; postal checkups was conducted by nurses or midwives; and the infant's age was below two months.

Conclusion: Exclusive breastfeeding has almost doubled since the 1990s in Tanzania. Women who tend to practice exclusive breastfeeding for up to six months most often live in rural areas. There is an urgent need of researching why exclusive breastfeeding rates among urban women are lower.

***Key terms**: Exclusive breastfeeding, infants, Tanzania; child health; nutritional status; sub-Saharan Africa.*

Background

Exclusive breastfeeding (EBF) is recommended for the initial six months of an infant's life (WHO and UNICEF 2003:7-8) because of its benefits not only to the infant, but also to the mother and the community (Heymann et al. 2013:398, Rochat 2014:1-4, Schulze et al. 2009:346, Victor et al. 2013, Worugji and Etuk 2005:536). EBF enhances the infant's immunity (Wells 2006:39). It contains fatty acids responsible for the infant's cognitive development, while the baby can consume all the nutrients because it is easily digested (Picciano 2001:53). If optimally practiced, EBF prevents mothers from non-communicable diseases such as breast cancers besides acting as a family planning method (Heymann et al. 2013, Victor et al. 2013). At the household and community level, it reduces medical expenses, as children are less vulnerable to diseases. **Studies show that optimal breastfeeding can reduce about 20% of neonatal mortality** (Edmond et al. 2006, Mullany et al. 2008). Finally, breastfeeding also reduces environmental pollution resulting from manufacturing and use of infant formula (Development Initiatives 2017, WABA 2014).

Studies on breastfeeding further acknowledge that the exclusive breastfeeding rate in many countries is far from 100%. Moreover, EBF differs between and within populations. In the year 2016 for example, 23.3% of the mothers practiced EBF in Nigeria; 56.5% in Ethiopia, and 59% in Tanzania (UNICEF. 2018). But what are the determinants of exclusive breastfeeding? Many studies have examined the reasons for low rates of EBF by looking at individual and household factors such as sex and age of the child, age and educational level of the mother and household SES (e.g. Ali et al. 2011, Meena et al. 2018, Mgongo et al. 2013, Shirima et al. 2001). Others hypothesized that the environment of breastfeeding mothers determines exclusive breastfeeding; in this regard health facilities for maternal and childcare were important factors (Kuan et al. 1999). Urban areas were found to provide more health facilities, health services and conducible transport infrastructure (Kimani-Murage et al. 2015, Victor et al. 2013) compared to rural areas.

Literature review and theoretical framework

In this study, we take a holistic approach and try to understand patterns of exclusive breastfeeding by examining the extent to which individual, household, and community factors are associated with exclusive breastfeeding practices in Tanzania. We use the framework of Hector et al. (2005) to address the multilevel factors influencing EBF patterns in Tanzania. The framework suggests that the individual, household and community factors closely interplay (Hector et al. 2005:54). According to their study, the individual level factors are related to the educational level, marital

status, and age of the mother; others are sex, birth order, and the date of birth of the infant. The household level factors include household size, spousal age, partner's educational level and number of other wives, while the health facilities and services, and place of residence constitute the community level factors (Hector et al. 2005:54). Desai and Johnson citing Kaber contend that individual characteristics of a woman may have effects in the community, however, the effects may be as low as compared to group characteristics of women in the same community (Desai and Johnson 2005:56). For example, even uneducated women can have wider knowledge about, say breastfeeding, if she lives in community with many women who are highly educated (Kravdal 2002:235). Hence, the main aim of the study is to understand the influence of both individual, household and community level factors in EBF patterns (Desai and Johnson 2005, Kravdal 2002, Moursund and Kravdal 2003).

We use data from the eighth Tanzanian Demographic and Health Survey (TDHS) released in 2015/2016 to analyse factors influencing EBF patterns in Tanzania. The survey provides estimates of various health indicators including fertility behaviour and preferences, marriage, sexual activities, family planning and breastfeeding (TDHS-MIS 2016). We considered the mother and infant characteristics at the individual level, household characteristics at the household level; and the health facility services and place of residence at the community level. The 2015/2016 DHS is a national representative survey, it qualifies for this analysis because of the different levels of analysis employed. Tanzania is an important country to examine because, though progressing, the rate of exclusive breastfeeding indicates that still more than 40% of the infants are not exclusively breastfed and thus at risk of infectious diseases and malnutrition (TDHS-MIS 2016:221). This study adds to the body of knowledge by examining EBF patterns in Tanzania using a holistic, multilevel approach. The results of the study are also important for professionals who work in health-related fields especially the Reproductive and Child Healthcare (RCH) units, and policy and decision makers who devise and implement feasible interventional plans.

Individual level factors explaining exclusive breastfeeding patterns

Following Hector et al. 2005, the individual level comprises mother and child characteristics. Mother characteristics that have been widely documented to influence exclusive breastfeeding are marital status, educational level, age and occupation of the mother (Anyanwu and Maduforo 2014, Egata et al. 2013, Hunegnaw et al. 2017, Mensah et al. 2017, Onah et al. 2014, Sefene et al. 2013, Shifraw et al. 2015, Sloan et al. 2006). For example, Egata et al. (2013) and Adugna (2017) found for Ethiopia that mothers who failed to practice EBF were often not married. Educational level may also influence the likelihood of EBF. The study of Sefene et al. (2013:156) in Northwest Ethiopia showed that mothers who were unable to read and or write were three times more likely to offer breast milk to their infants for up to six months compared to mothers with secondary or higher educational levels. According to them, educated mothers were more often employed and worked outside their home and thus had less time for their infants (see also Abigail et al. 2013, Khanal et al. 2014). An association of maternal age with breastfeeding practices was found in several studies (Bishop et al. 2008, Naanyu 2008, Narayan et al. 2005, Sloan et al. 2006, Youngwanichsetha 2013). Naanyu's study in Kenya found that breastfeeding duration was longer among mothers of middle and old age compared to young mothers. Younger-aged mothers would have lacked the experience and right information on infant feeding.

Child characteristics such as sex, birth order, season of birth and age may also affect breastfeeding practices. For example, Sefene et al. (2013:158) showed that because of the custom of son preference in Ethiopia, male infants were two times more likely to be breastfed than female infants. In contrast, a study by Mosha et al. (1998) in Morogoro, Tanzania found that female infants were breastfed for a longer period of time than the male infants were. This could be explained by the matrilineal kinship system of Morogoron society. Similarly, Jayachandran and Kuziamko (2009) found for India that female infants were given mother's breast milk for a longer period of time than male infants. These gender differences widened with parity (higher birth order); higher parity boys received even shorter period of breastfeeding. Taylor et al. (2008) in their study in the U.S. showed that experiences of breastfeeding of the previously born child determined the duration of breastfeeding of the current child. If the previous child was exclusively breastfed, then the chances that the next one was exclusively breastfed were higher. Children's age also plays a role; i.e. age of the child can also influence the period of breastfeeding. According to the WHO, infants who are

exclusively breastfed are less vulnerable to infectious disease compared to infants introduced to complementary feeding before the age six months (WHO 2003:8). Few researches have examined how the season in which the child was born influences breastfeeding practices; this factor has thus been included in this study.

Household level factors explaining exclusive breastfeeding patterns

Research has also indicated the association of household factors with exclusive breastfeeding. Most studies have considered the effects of socioeconomic status (SES) or household wealth, and the size of the household. It is noted that mothers in low SES households experience poor nutritional status, which leads to insufficient production of breast milk for their nursing infants (Boakye-Yiadom et al. 2016, Joshi et al. 2014, Mensah et al. 2017, Sloan et al. 2006). A study in Ghana found that mothers' low financial status "attributable to abject poverty" (Boakye-Yiadom et al. 2016:96), means a low probability of getting enough and balanced food; thus higher chances of insufficient breastmilk production. Other studies found that the nature and type of dwelling the mother lives in may influence exclusive breastfeeding rates (Mensah et al. 2017:7). According to them, poor dwellings are associated with low economic status and likely also poor nutritional status of the mother. Joshi et al. (2014) found that mothers of higher social class background have higher chances of practicing exclusive breastfeeding, because of their better nutritional status and that they thus produce sufficient milk for their infants. In contrast, a comparative study by Ali et al. (2011) for Pakistan revealed significant differences in breastfeeding patterns between mothers from a lower SES and those from middle and higher SES background. While overall EBF in Pakistan was 54%; 61% of lower SES mothers practiced EBF compared to 47% of the middle and higher-class mothers. Mothers in the middle and higher-class preferred using cow or goat milk as a substitute for breast milk because they could afford it.

The size of the household also influences the rates of exclusive breastfeeding. Sefene et al. (2013:158) found that Ethopian mothers living in families with more than five people were three times more likely to provide breast milk to their infants compared to mothers in households with less than five people. They argued that mothers in larger households are more likely to get assistance with household chores from other household members; and can pay attention to breastfeeding infants. Moreover, some studies include decision making on child care, partner's

occupation, spousal age, and partner's education (Khanal et al. 2014, Mensah et al. 2017, Stegeman and Bottona 1998, Thet et al. 2016, Yadavannava and Patil 2011). For example, mothers in Myammar were found sole decision makers when it comes to breastfeeding their baby (Thet et al. 2016). However, in some instances elderly females choose for breastfeeding mothers whether to continue or not (Yadavannava and Patil 2011).

Community level factors explaining exclusive breastfeeding patterns

Evidence shows that exclusive breastfeeding patterns differ by community and environmental factors such as place of residence and by place of delivery. With respect to the setting, mothers living in an urban area were found to have lower rates of EBF compared to rural mothers (Asfaw et al. 2015, Dickson 2012, Kumar et al. 2017, Thu et al. 2012). For example, the study of Asfaw et al. (2015) in Ethiopia indicates that mothers from rural areas were about five times more likely to breastfeed their infants compared to urban mothers. Studies in Tanzania and Kenya show similar results (Greiner 2014, Mgongo et al. 2013, Mosha et al. 1998, Shirima et al. 2001, Talbert et al. 2018, Victor et al. 2013). For example, analyzing the Tanzanian DHS 2010 data, Victor et al. (2013) found that slightly more than half of all rural mothers exclusively breastfed their infants compared to about 48% of the urban mothers. Likewise, home delivery as opposed to delivery in the health facilities lowers the duration of EBF because of a lack of appropriate professional guidelines on infant feeding practices. Findings show that mothers who give birth in a health facility and under the guidance of health professionals have higher probability of practicing EBF than those who give birth at home under the care of a relative or a TBA (Boakye-Yiadom et al. 2016, Exavery et al. 2015, Hunegnaw et al. 2017, Nkala and Msuya 2011, Mohan 2012).

Setting: **Tanzania**

Tanzania is progressing in improving exclusive breastfeeding rates as determined by demographic and health indicators. For example, over a period of thirteen years, EBF has changed from 23% in 1992 to 59% in 2015/16 (NBS and ICF Macro 2011, TDHS-MIS 2016). This progress is a result of establishment and implementation of several nutritional and health interventions for mothers and newborns since 1974. Examples of such interventions are World Breastfeeding Week, Baby Friendly Hospital Initiatives (1991), and the national strategies on Infant and Young Child Feeding and nutrition. Examples of the recent strategies include Health Support Program III (2008-2012),

Primary Health Service Development Program (2007-2017), and the National Road Map Strategic Plan (2008-2018). All being focused at accelerating the reduction of maternal and newborn mortality through improved nutrition

Administratively, Tanzania has 30 regions, 25 in the mainland area and 5 in Zanzibar. These regions form nine zones including Western, Northern, Central, Southern Highlands, Southern, South West, Lake, Eastern and Zanzibar (TDHS-MIS 2016:406). Tanzania is linguistically a very diverse country with more than 126 languages spoken. However, not one language is spoken by a majority of the population. Swahili and English serve as the working languages in the country, with Swahili being the official national language. In most social groups, childcare and other household chores are considered the main responsibility of women. Tanzania is among the African countries which are rapidly urbanizing. According to Wenban (2014), Tanzanian urbanization rates have increased by about 24% since its independence. Besides it had (in 2015) the sixth highest global population growth rate (Worrall et al. 2017), which is currently estimated at 33%.

Data, Measures and Methods

Data

The study analysed data from the 2015/2016 Tanzania Demographic and Health Survey. The data are collected by MACRO (USAID) program, with assistance of Tanzanian organizations, the National Bureau of Statistics (NBS) and the Office of Chief Government Statistician (OCGS) of Zanzibar and can easily be accessed through the DHS website https://dhsprogram.com/. The 2015/2016 survey was conducted to measure levels, trends and patterns in demographic and health indicators (TDHS-MIS 2016) including breastfeeding patterns.

The survey employed a national representative cross-sectional study design, using two-stage random sampling (TDHS-MIS 2016). In a first stage, 608 clusters from nine different zones as per delineated enumeration areas by 2012 Tanzania Housing and Population Census (THPC) were selected (NBS 2013). About 13,000 households were selected of which nearly 12,800 had an adult female resident. Of the occupied households close to 12,600 were successfully interviewed yielding a response rate of 98%. In the interviewed households, about 13,600 mothers of childbearing age

(15-49 years) were identified for individual interviews. Interviews were completed by nearly 13,300 women (TDHS-MIS 2016). The sample comprised of singleton mothers and excluded mothers with twins or triplets who do not oftenly afford practicing EBF. In this study we selected only women with children aged <6 months to measure EBF, which left us 998 women. Figure 1 summarizes the steps employed to construct the analytical sample.
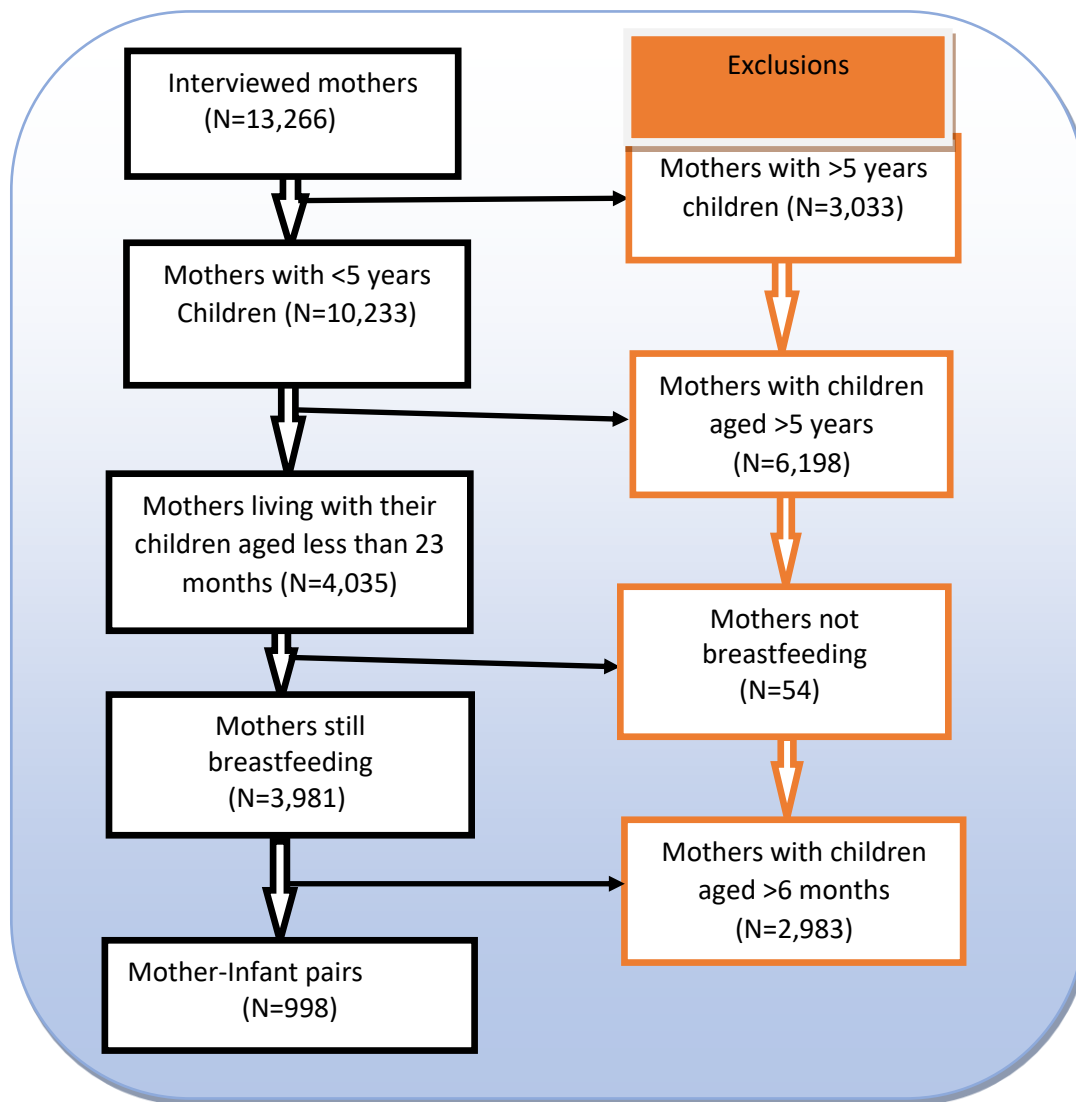
Figure 1: Steps used to construct the analytical sample, TDHS 2015/2016

Measures

Dependent variable
The dependent variable in this study was exclusive breastfeeding (EBF) which, by WHO definition is the act of feeding an infant with breastmilk from his/her mother (direct or expressed) for a period of up to six months. No other liquids, even water, should be provided. An exception are prescriptions from medical specialists of drops and syrups consisting of vitamins, mineral supplements, or medicines. The variable EBF is dichotomous and its measurement followed the definitions by the WHO (*1=Yes and 0=No*) (World Health Organization 2010:34). It was constructed based on the mothers' recall of what the infant was given as food during the 24 hours prior to the survey. Hence, all infants aged <6 months who were either given milk other than breastmilk, liquids, solid, and semi-solid foods were given a 0 on the EBF variable.

Key independent variables

The independent variables included individual factors of the mother (*age, years of education, marital status and occupation of the mother*) and of the child (*sex, birth order, season of birth, size of the child at birth and age*). Second, the household factors (*household wealth index*, *partner's education*, *decision making regarding childcare*, *household size*, *partner's occupation*, and *number of other wives*). We finally included *place of delivery and type of place of residence* as predictor variables at the community level. Illustrations on how each independent variable was measured is indicated the first column of Table 1. Season of birth was constructed based on the month in which the infant was born. Infants born in December through March were categorized as being born in the long rain season; April through July in the short rain season; and August through November in the dry season.

Of the 998 mothers about 50% (n=497) were aged between 20-29 years and nearly 54% (n=536) were engaged in agricultural activities. Close to 37% (n=366) of the mothers had a parity of 2-3 children; about 58% (n=575) gave birth in the dry season; 67% (n=673) gave birth to normal weight babies; and 56% of the interviewed mothers had babies aged below two months. Nearly a quarter (24%, n=244) of the mothers decided on the infant's care; about 26% (n=254) received postnatal care from nurses or midwives; and approximately three quarter (72%, n=720) of the sampled mothers were residing in rural areas (see Table 1).

Methods

Frequencies and weighted percentages are presented along with univariate logistic regressions examining how each of the predictor variables related to the outcome variable (EBF). This was followed by a multivariate logistic regression to determine the influence of all selected predictor variables on EBF. All models were conducted at the confidence level of 95% using SPSS IBM version 25. Unadjusted and adjusted odds ratios of the association between predictor variables and the outcome variable were reported.

Findings

Table 1 shows that slightly more than half (59%) of all mothers practiced exclusive breastfeeding. As illustrated in Table 1, the univariate logistic regression analysis indicated that mothers aged 15-19 years were about 30% less likely to practice EBF (OR=0.685, P<0.05) compared to mothers in the age group 20-29 years. Mothers who performed casual or unskilled work were about 0.7 (P<0.05) times less likely to exclusively breastfeed their infants compared to mothers whose occupation was in agriculture. Mothers on leave during the last seven days prior to the survey had about 2.0 (P<0.001) times higher odds of EBF compared to mothers found working during the survey. Based on the season in which the baby was born, findings showed that mothers whose infants were born in the short rain season were about 4 (P<0.001) times more likely to practice EBF than mothers whose infants were born during the dry season.

Mothers whose babies had larger sizes were 30% (OR=0.654, p<0.05) less likely to practice EBF compared to mothers whose babies had average sizes at birth. Likewise, infants aged 2-3 months were about 70% (OR=0.338, P<0.001) less likely to be exclusively breastfed compared to infants aged <2 months. Decision-making on childcare was an important predictor at the household level. Mothers whose partners or husbands made the decisions about childcare were about 40% (OR=0.628, P<0.05) less likely to practice EBF compared to mothers who themselves decided on childcare. Postnatal care and place of residence also featured as important predictors of EBF. Mothers whose postnatal care was conducted by doctors were about 70% (OR=0.293, P<0.01) less likely to practice EBF compared to mothers whose postnatal services were conducted by nurses and midwives. Furthermore, urban mothers were about 40% (OR=0.641, P<0.01) less likely to practice EBF compared to rural mothers.

The multivariate logistic analysis showed that the age of the mother, the season of birth, the size of the child at birth, the current age of the child, postnatal checkup and the place of residence were significantly associated with EBF (see Table 2). Mothers aged 15-19 years had about 0.6 times the odds of EBF as compared to mothers aged 20-29 years. Infants born in the short rain season were about two times as likely to be exclusively breastfed compared to infants born in the dry season. Also, infants with larger than average size at birth were about 50% less likely to be exclusively breastfed compared to infants with an average size at birth. Exclusive breastfeeding decreased with higher infant's age. The results show that infants aged below two months were about 60% (OR=0.335, P<0.001) less likely to be exclusively breastfed compared to infants aged <2 months. Mothers whose postnatal checkup was conducted by a doctor were about 80% (OR=0.151, P<0.05) less likely to practice EBF compared to those whose postnatal service was conducted by nurses or midwives. With regard to place of residence, urban mothers were 40% (OR=0.581, P<0.05) less likely to perform EBF compared to rural mothers.

Table 1: Summary Statistics and unadjusted regression coefficients (N=998)

Characteristic	N (%)	OR	P-Value
Exclusive breastfeeding			
No	407(40.8)		
Yes	591(59.2)		
Age of the mother			
15-19 years	179(17.9)	0.685*	0.031
20-29 years	497(49.8)	1	Reference
30-39 years	271(27.2)	0.727	0.924
40-49 years	51(5.1)	0.752	0.335
Marital status			
Not married	173(17.3)	0.953	0.775
Married	826(82.7)	1	Reference
Occupation of the mother			
Casual/unskilled	378(37.9)	0.725*	0.018
Agriculture	536(53.7)	1	Reference
Small scale business	38(3.8)	0.520†	0.052
Skilled/professional	47(4.7)	0.991	0.978
Respondent worked past 12 months			
No	239(23.9)	0.834	0.254
In the past year	85(8.5)	1.938*	0.010
Currently working	480(48.0)	1	Reference
Have a job, but on leave last 7 days	195(19.5)	2.056***	0.000
Educational years of the mother			
No education	192(19.2)	0.849	0.326
1-7 years	647(64.8)	1	Reference
8-11 years	136(13.7)	1.259	0.242
12+ years	24(2.4)	0.505	0.106
Birth order of the child			
1st born	276(27.6)	0.882	0.437

Characteristic	N (%)	OR	P-Value
2nd – 3rd born	366(36.7)	1	Reference
4th – 6th born	230(23.0)	1.375✝	0.070
7th born and above	127(12.7)	0.805	0.296
Season of Birth			
Long rain season	138(13.8)	0.701✝	0.062
Dry Season	575(57.6)	1	Reference
Short rain season	285(28.6)	3.715***	0.000
Sex of the child			
Male	519(51.9)	1	Reference
Female	480(48.1)	1.016	0.903
Size of the child at birth			
Very large	54(5.4)	0.664	0.149
Larger than average	161(16.1)	0.654*	0.016
Average	673(67.4)	1	Reference
Smaller than average	70(7.0)	0.747	0.247
Very small	34(3.4)	0.763	0.448
Don't know	6(0.6)	1.489	0.648
Current age of the child			
<2 months	560(56.1)	1	Reference
2-3 months	158(15.8)	0.338***	0.000
4-5 months	281(28.1)	0.107***	0.000
Household wealth index			
Poorest	265(26.6)	1	Reference
Poorer	205(20.6)	1.190	0.363
Middle	179(17.9)	0.992	0.967
Richer	204(20.5)	0.968	0.862
Richest	145(14.5)	0.917	0.679
Spouse years of education			
No education	123(12.3)	0.992	0.969
1-7 years	541(54.1)	1	Reference
8-11 years	154(15.4)	0.793	0.209
12+ years	8(0.8)	2.589	0.281
Missing	173(17.3)	0.918	0.629
Spouse age			
17-21 years	31(3.1)	0.916	0.812
22-41 years	642(64.3)	1	Reference
42-61 years	140(14.0)	1.103	0.610
62+ years	13(1.3)	0.574	0.324
Missing	173(17.3)	0.956	0.798
Decision making on childcare			
Mother	244(24.4)	0.940	0.691
Husband/partner	140(14.0)	0.628*	0.014
Joint decision	561(56.1)	1	Reference
Someone else	54(5.4)	0.959	0.885
Household size			
1-6 people	489(49.0)	1	Reference
7-16 people	459(45.9)	1.207	0.155
17+ people	51(5.1)	1.230	0.494
Number of other wives			
No co-wife	686(68.7)	1	Reference
One co-wife	108(10.8)	0.868	0.497
2+ co-wives	32(3.2)	0.812	0.567
Missing	173(17.3)	0.927	0.662

Characteristic	N (%)	OR	P-Value
Spouse occupation			
Casual/unskilled	110(11.1)	0.799	0.291
Agriculture	498(49.8)	1	Reference
Small scale business	59(6.0)	1.096	0.747
Skilled/professional	158(15.9)	0.850	0.381
Missing	173(17.3)	0.901	0.563
Place of delivery			
Home	339(34.0)	1.035	0.807
TBA premises	4(0.4)	2.117	0.505
Public health facility	539(54.0)	1	Reference
Private health facility	106(10.6)	1.366	0.159
Other	10(1.0)	1.369	0.644
Person performed postnatal check up			
Doctor	26(2.6)	0.293**	0.007
Nurse/Midwife	254(25.5)	1	Reference
TBA/CHW	9(0.9)	1.337	0.672
Relative/Friend	21(2.1)	0.410†	0.061
Missing p/natal checkup	688(68.9)	1.289†	0.088
Distance from health facility			
Big problem	450(45.10	0.948	0.679
Not big problem	548(54.9)	1	Reference
Source of drinking water			
Unimproved	470(47.1)	1.253†	0.081
Improved	529(52.9)	1	Reference
Type of place of residence			
Urban	278(27.9)	0.641**	0.002
Rural	720(72.1)	1	Reference

Source: Generated from TDHS 2015/2016.

*Note: *=P<0.05; **=P<0.01 ***=P<0.001; †=P<0.10; TBA=Traditional Birth Attendant; CHW=Community Health Worker.*

Table 2: Adjusted Characteristics of respondent who exclusively breastfed their infants (N=998)

Characteristic	AOR	P-Value
Age of the mother		
15-19 years	0.575*	0.039
20-29 years	1	Reference
30-39 years	1.102	0.694
40-49 years	0.617	0.278
Marital status		
Not married	0.757	0.377
Married	1	Reference
Occupation of the mother		
Casual/unskilled	0.757	0.294
Agriculture	1	Reference
Small scale business	0.700	0.440
Skilled/professional	0.952	0.916
Respondent worked past 12 months		
No	0.938	0.824

Characteristic	AOR	P-Value
In the past year	1.106	0.742
Currently working	1	Reference
Have a job, but on leave last 7 days	1.327	0.236
Education of the mother		
No education	0.713	0.122
1-7 years	1	Reference
8-11 years	1.253	0.404
12+ years	0.828	0.751
Birth order of the child		
1st born	1.013	0.958
2nd – 3rd born	1	Reference
4th – 6th born	1.126	0.641
7th born and above	0.516✝	0.067
Season of Birth		
Long rain season	1.319	0.256
Dry Season	1	Reference
Short rain season	1.964**	0.001
Sex of the child		
Male	1	Reference
Female	1.028	0.864
Size of the child at birth		
Very large	0.600	0.152
Larger than average	0.498**	0.001
Average	1	Reference
Smaller than average	0.773	0.419
Very small	0.676	0.388
Don't know	0.980	0.983
Current age of the child		
<2 months	1	Reference
2-3 months	0.335***	0.000
4-5 months	0.106***	0.000
Household wealth index		
Poorest	1	Reference
Poorer	0.981	0.939
Middle	1.125	0.653
Richer	1.220	0.503
Richest	1.304	0.498
Spouse years of education		
No education	0.822	0.470
1-7 years	1	Reference
8-11 years	0.759	0.257
12+ years	1.1084	0.936
Spouse age		
17-21 years	1.996	0.180
22-41 years	1	Reference
42-61 years	1.725✝	0.064
62+ years	0.993	0.992
Decision making on childcare		
Mother	1.323	0.229
Husband/partner	0.672✝	0.095
Joint decision	1	Reference
Someone else	1.077	0.861
Household size		

Characteristic	AOR	P-Value
1-6 people	1	Reference
7-16 people	1.114	0.534
17+ people	0.982	0.964
Number of other wives		
No co-wife	1	Reference
One co-wife	0.756	0.295
2+ co-wives	0.790	0.644
Spouse occupation		
Casual/unskilled	0.876	0.653
Agriculture	1	Reference
Small scale business	1.988	0.092
Skilled/professional	0.831	0.479
Place of delivery		
Home	0.815	0.305
TBA premises	4.342	0.223
Public health facility	1	Reference
Private health facility	1.143	0.618
Other	1.065	0.937
Person performed postnatal check up		
Doctor	0.151**	0.001
Nurse/Midwife	1	Reference
TBA/CHW	1.572	0.589
Relative/Friend	0.386†	0.098
Missing p/natal checkup	1.228	0.265
Distance from health facility		
Big problem	0.868	0.398
Not big problem	1	Reference
Source of drinking water		
Unimproved	1.184	0.326
Improved	1	Reference
Type of place of residence		
Urban	0.581*	0.024
Rural	1	Reference

Constant=1.469
Nagelkerke R^2=0.36

Source: Generated from TDHS 2015/2016.
Note: *=P<0.05; **=P<0.01 ***=P<0.001; †=P<0.10; TBA=Traditional Birth Attendant; CHW=Community Health Worker

Discussion

Many factors may influence mothers to practice exclusive breastfeeding. However, these factors differ by national context and may include individual, household, and community characteristics. In this study we attempted to establish whether some of the individual, household, and community factors, which we believed might influence EBF, had the expected impact on exclusive breastfeeding in Tanzania. EBF has been shown to be a cost-effective mode of infant feeding in the public health arena. Infants who are exclusively breastfed are believed to have lower chances

of infectious diseases; and thus, lower chances of malnutrition and lower probabilities of dying. Besides strengthening the infant's immune system and cognitive capacity, EBF has the potential to protect mothers against non-communicable diseases (e.g. breast cancers), moreover, it increases the duration of child spacing. Currently (2015/16), Tanzania's EBF rate is 59% compared to below 30% in the 1990s (TDHS-MIS 2016:225). It is important to continue studying EBF patterns in Tanzania and else-where to improve child health and survival.

Looking at the age of the mother, our findings indicate that the practice of EBF increased with the age of the mother, but again decreased for mothers aged 40+ years. Similar studies show that young mothers have less breastfeeding experience as compared to older mothers. Infants who were born in the short rain season were two times more likely to be exclusively breastfed compared to those born in the dry season. The short rain season (*April-July*) is a period in which many parts of Tanzania experience plenty of food compared to the dry season (*August-November*); and thus, breastfeeding mothers are assured of eating balanced diet food which enables them a better production of breastmilk. Other studies note that infants experiences thirst during hot weather (dry season) and more often need water to wet their mouths (Fjeld et al. 2008) or quench their thirst (Joel 2013).

It also became evident that the size of the baby at birth and the current age of the baby were significantly associated with exclusive breastfeeding. A normal baby is born with a weight of 2.5-4.0 kg. Our study indicated that children born with sizes larger than average were less likely to be breastfed. This could be a result of maternal depletion during delivery and her possible inability to breastfeed during the recommended period (within an hour after delivery). This study and other research indicate that the chances of the infant to be exclusively breastfed decreases with age. Reasons associated with this decline may include breastfeeding norms related to the size and age of children and the fact that mothers returned to work after maternity leave.

Both postnatal checkups and place of residence were also significantly associated to the outcome variable. The findings indicate that mothers were less likely to practice EBF if their postnatal checkups were conducted by doctors compared to nurses and midwives. This would mean that perhaps nurses and midwives advice better on breastfeeding than doctors. Like Victor et al. (2013) the findings of our study found that rural mothers had higher chances of practicing EBF. This would be explained by the fact many urban mothers are employed in public and private sectors and they

have less time for their babies; because they often work outside their home compared to rural mothers.

This study has several limitations. The TDHS 2015/2016 report indicated that the response rate was above 90%. However, this rate may have suffered from recall bias. It also became clear that not every factor included in this study was significantly associated with EBF. For example, most of the household variables were insignificantly associated with the predictor variable in the univariate and multivariate analyses. Conversely, other explanatory variables that may have been associated with EBF were not included such as average community factors of mothers (examples, educational level, marital status, and age). Additionally, the data set used is a cross-sectional survey, so no statement about the causality can be made.

Conclusion

We identified five factors associated with EBF among women in Tanzania and found that rural women breastfed longer compared to urban women. There has been a significant improvement in EBF in Tanzania since the 1990s; EBF rates are currently higher (59%) as compared to two decades ago (about 30%). In developing countries like Tanzania, EBF provides several benefits to infants including strengthening their immune system; improves their health and cognitive capacity; and protecting them against infectious diseases and malnutrition. EBF protects breastfeeding mothers against non-communicable diseases; lengthens birth intervals; and reduces environmental pollution resulting from the use of infant formula products. Breastfeeding programs and interventions need to focus more on women living in urban areas. However, it is equally important to train more female reproductive and child health (RCH) professionals who would counsel breastfeeding mothers in the same way as the nurses and midwives who, in the Tanzania's context, show to do much better job than doctors. Further research is required to understand why the EBF rates among urban women are lower and what would be the consequences associated with this. The need to understand why the EBF rates among urban women are lower is important because more rural areas are acquiring urban characteristics not only in Tanzania but also in other African countries with similar population characteristics. Future research should also consider the month or season of birth of the baby as this may mean a lot about the food availability and the nutrition status of the mother.

References

Abigail, A.H., E.A. Envuladu, H. Adams, E. Inalegwu, E. Okoh, A. Agba et al. (2013) 'Barriers and Facilitators to the Practice of Exclusive Breast Feeding among Working Class Mothers: A Study of Female Resident Doctors in Tertiary Health Institutions in Plateau State', *E3 jornal of medical research* 2(1): 112-116. http://www.e3journals.org. Accessed on 20/9/2014.

Adugna, B., H. Tadele, F. Reta and Y. Berhan (2017) 'Determinants of Exclusive Breastfeeding in Infants Less than Six Months of Age in Hawassa, an Urban Setting, Ethiopia', *International breastfeeding journal* 12(1): 45.

Ali, S., S.F. Ali, A.M. Imam, S. Ayub and A.G. Billoo (2011) 'Perception and Practices of Breastfeeding of Infants 0-6 Months in an Urban and a Semi-Urban Community in Pakistan: A Cross-Sectional Study', *Journal of the Pakistan Medical Association* 61(1): 99.

Anyanwu, J. and A. Maduforo (2014) 'Mothers Beliefs and Obstacles as Limitations in Promoting Exclusive Breastfeeding among Working Class Mothers Attending Infant Welfare Clinic at University of Nigeria Teaching Hospital (UNTH), Enugu State', *Clin Med Res* 3(4): 105-111.

Asfaw, M.M., M.D. Argaw and Z.K. Kefene (2015) 'Factors Associated with Exclusive Breastfeeding Practices in Debre Berhan District, Central Ethiopia: A Cross Sectional Community Based Study', *International breastfeeding journal* 10(1): 23.

Bishop, H., W. Cousins, K. Casson and A. Moore (2008) 'Culture and Caregivers: Factors Influencing Breastfeeding among Mothers in West Belfast, Northern Ireland', *Child Care in Practice* 14(2): 165-179.

Boakye-Yiadom, A., A. Yidana, N.B. Sam, B. Kolog and A. Abotsi (2016) 'Factors Associated with Exclusive Breastfeeding Practices among Women in the West Mamprusi District in Northern Ghana: A Cross-Sectional Study', *Public Health Research* 6(3): 91-98.

Desai, S. and K. Johnson (2005) 'Women's Decisionmaking and Child Health: Familial and Social Hierarchies', *A focus on gender: Collected papers on gender using DHS data* 2005: 55-68.

Development Initiatives (2017) 'Global Nutrition Report 2017: Nourishing the SDGs', pp. 1-121. Bristol, UK: Development Initiatives.

Dickson, I.L. (2012) , *The Association Between Breastfeeding Practices in Mongolia and Geographical Location of the Mother and Child* .

Edmond, K.M., C. Zandoh, M.A. Quigley, S. Amenga-Etego, S. Owusu-Agyei and B.R. Kirkwood (2006) 'Delayed Breastfeeding Initiation Increases Risk of Neonatal Mortality', *Pediatrics* 117(3): e380-6.

Egata, G., Y. Berhane and A. Worku (2013) 'Predictors of Non-Exclusive Breastfeeding at 6 Months among Rural Mothers in East Ethiopia: A Community-Based Analytical Cross-Sectional Study', *International breastfeeding journal* 8(8): 1746-4358.

Exavery, A., A.M. Kanté, A. Hingora and J.F. Phillips (2015) 'Determinants of Early Initiation of Breastfeeding in Rural Tanzania', *International breastfeeding journal* 10(1): 27.

Fjeld, E., S. Siziya, M. Katepa-Bwalya, C. Kankasa, K.M. Moland and T. Tylleskär (2008) ''No Sister, the Breast Alone is Not enough for My Baby'a Qualitative Assessment of Potentials and Barriers in the Promotion of Exclusive Breastfeeding in Southern Zambia', *International breastfeeding journal* 3(1): 26.

Greiner, T. (2014) 'Exclusive Breastfeeding: Measurement and Indicators', *International breastfeeding journal* 9: 18-4358-9-18. eCollection 2014.

Hector, D., L. King, K. Webb and P. Heywood (2005) 'Factors Affecting Breastfeeding Practices. Applying a Conceptual Framework', *New South Wales public health bulletin* 16(4): 52-55.

Heymann, J., A. Raub and A. Earle (2013) 'Breastfeeding Policy: A Globally Comparative Analysis', *Bulletin of the World Health Organization* 91(6): 398-406. http://dx.doi.org/10.2471/BLT.12.109363. Accessed on 20/10/2014.

Hunegnaw, M.T., L.D. Gezie and A.S. Teferra (2017) 'Exclusive Breastfeeding and Associated Factors among Mothers in Gozamin District, Northwest Ethiopia: A Community Based Cross-Sectional Study', *International breastfeeding journal* 12(1): 30.

Jayachandran, S. and I. Kuziemko (2009) 'Why do Mothers Breastfeed Girls Less than Boys? Evidence and Implications for Child Health in India': 1-51.

Joel, A.B. (2013) 'Appraisal of Nursing Mothers' Knowledge and Practice of Exclusive Breastfeeding in Yobe State, Nigeria', *Journal of Biology, Agriculture and Healthcare* 3(20): 75-81.

Joshi, P.C., M.R. Angdembe, S.K. Das, S. Ahmed, A.S. Faruque and T. Ahmed (2014) 'Prevalence of Exclusive Breastfeeding and Associated Factors among Mothers in Rural Bangladesh: A Cross-Sectional Study', *International Breastfeeding Journal* 9(1): 7.

Khanal, V., da Cruz, Jonia Lourenca Nunes Brites, R. Karkee and A.H. Lee (2014) 'Factors Associated with Exclusive Breastfeeding in Timor-Leste: Findings from Demographic and Health Survey 2009–2010', *Nutrients* 6(4): 1691-1700.

Kimani-Murage, E.W., F. Wekesah, M. Wanjohi, C. Kyobutungi, A.C. Ezeh, R.N. Musoke et al. (2015) 'Factors Affecting Actualisation of the WHO Breastfeeding Recommendations in Urban Poor Settings in Kenya', *Maternal & child nutrition* 11(3): 314-332.

Kravdal, Ø (2002) 'Education and Fertility in Sub-Saharan Africa: Individual and Community Effects', *Demography* 39(2): 233-250.

Kuan, L.W., M. Britto, J. Decolongon, P.J. Schoettker, H.D. Atherton and U.R. Kotagal (1999) 'Health System Factors Contributing to Breastfeeding Success', *Pediatrics* 104(3): e28-e28.

Kumar, M.V., I. Acharya, J.P. Acharya, P.R. Shravani and S. Ramya (2017) 'A Comparison of Breast Feeding Practices among Urban and Rural Areas of Rangareddy District of Telangana', *International Journal Of Community Medicine And Public Health* 4(6): 2136-2140.

Meena, J.S., S. Sethia, V. Nagar, A. Thakur, V. Aarutagi and S. Tiwari (2018) 'A Comparative Study of Breast Feeding and Complimentary Food Practices in Catchment Area of Urban and Rural Health Centres of Community Medicine Department, Gandhi Medical College, Bhopal', *International Journal Of Community Medicine And Public Health* 5(8): 3293-3297.

Mensah, K.A., E. Acheampong, F.O. Anokye, P. Okyere, E. Appiah-Brempong and R.O. Adjei (2017) 'Factors Influencing the Practice of Exclusive Breastfeeding among Nursing Mothers in a Peri-Urban District of Ghana', *BMC research notes* 10(1): 466.

Mgongo, M., M.V. Mosha, J.G. Uriyo, S.E. Msuya and B. Stray-Pedersen (2013) 'Prevalence and Predictors of Exclusive Breastfeeding among Women in Kilimanjaro Region, Northern Tanzania: A Population Based Cross-Sectional Study', *International breastfeeding journal* 8(1): 12.

Mohan, L. (2012) 'Patterns and Determinants of Breast Feeding Practices in Dodoma Municipality: A Cross Sectional Study', *Journal of Food Studies* 1(1): 77-85.

Mosha, T., H. Laswai and S. Dakiyo (1998) 'Breastfeeding, Weaning Practices and Anthropometric Status of Children in Morogoro District, Tanzania', *Ecology of Food and Nutrition* 37(4): 309-338.

Moursund, A. and Ø Kravdal (2003) 'Individual and Community Effects of Women's Education and Autonomy on Contraceptive use in India', *Population studies* 57(3): 285-301.

Mullany, L.C., J. Katz, Y.M. Li, S.K. Khatry, S.C. LeClerq, G.L. Darmstadt et al. (2008) 'Breast-Feeding Patterns, Time to Initiation, and Mortality Risk among Newborns in Southern Nepal', *The Journal of nutrition* 138(3): 599-603.

Naanyu, V. (2008) 'Young Mothers, First Time Parenthood and Exclusive Breastfeeding in Kenya', *African Journal of Reproductive Health* 12(3).

Narayan, S., N. Natarajan and K. Bawa (2005) 'Maternal and Neonatal Factors Adversely Affecting Breastfeeding in the Perinatal Period', *Medical Journal Armed Forces India* 61(3): 216-219. http://medind.nic.in/maa/t05/i3/maat05i3p216.pdf. Accessed on 21/9/2014.

NBS (2013) '2012 Population and Housing Census'. Dar es Salaam: National Bureau of Statistics. (Population Distribution by Administrative Areas).

NBS and ICF Macro (2011) *Tanzania Demographic and Health Survey 2010. .* Dar es Salaam, Tanzania: NBS and ICF Macro.

Nkala, T.E. and S.E. Msuya (2011) 'Prevalence and Predictors of Exclusive Breastfeeding among Women in Kigoma Region, Western Tanzania: A Community Based Cross-Sectional Study', *International Breastfeed Journal* 6(1): 17-24. http://www.internationalbreastfeedingjournal.com/content/6/1/17. Accessed on 19/9/2014.

Onah, S., D.I.C. Osuorah, J. Ebenebe, C. Ezechukwu, U. Ekwochi and I. Ndukwu (2014) 'Infant Feeding Practices and Maternal Socio-Demographic Factors that Influence Practice of Exclusive Breastfeeding among Mothers in Nnewi South-East Nigeria: A Cross-Sectional and Analytical Study', *International breastfeeding journal* 9(1): 6. https://doi.org/10.1186/1746-4358-9-6. Accessed on 04/01/2018.

Picciano, M.F. (2001) 'Nutrient Composition of Human Milk', *Pediatric clinics of North America* 48(1): 53-67.

Rochat, P. (2014) *Early Social Cognition: Understanding Others in the First Months of Life.* Psychology Press.

Schulze, P.A., B. Zhao and C.E. Young (2009) 'Beliefs about Infant Feeding in China and the United States: Implications for Breastfeeding Promotion', *Ecology of Food and Nutrition* 48(5): 345-368.

Sefene, A., D. Birhanu, W. Awoke and T. Taye (2013) 'Determinants of Exclusive Breastfeeding Practice among Mothers of Children Age Less than 6 Month in Bahir Dar City Administration, Northwest Ethiopia; a Community Based Cross-Sectional Survey', *Science* 2(6): 153-159.

Shifraw, T., A. Worku and Y. Berhane (2015) 'Factors Associated Exclusive Breastfeeding Practices of Urban Women in Addis Ababa Public Health Centers, Ethiopia: A Cross Sectional Study', *International breastfeeding journal* 10(1): 22.

Shirima, R., T. Greiner, E. Kylberg and M. Gebre-Medhin (2001) 'Exclusive Breast-Feeding is Rarely Practised in Rural and Urban Morogoro, Tanzania', *Public health nutrition* 4(02): 147-154.

Sloan, S., H. Sneddon, M. Stewart and D. Iwaniec (2006) 'Breast is Best? Reasons Why Mothers Decide to Breastfeed Or Bottlefeed their Babies and Factors Influencing the Duration of Breastfeeding', *Child Care in Practice* 12(3): 283-297.

Stegeman, M. and M.H. Bottona (1998) 'Breastfeeding Practices in Northeastern Brazil', *Ecology of Food and Nutrition* 36(6): 443-461.

Talbert, A.W., B. Tsofa, E. Mumbo, J.A. Berkley and M. Mwangome (2018) 'Knowledge of, and Attitudes to Giving Expressed Breastmilk to Infants in Rural Coastal Kenya; Focus Group

Discussions of First Time Mothers and their Advisers', *International breastfeeding journal* 13(1): 16.

Taylor, J.S., L. Geller, P.M. Risica, U. Kirtania and H.J. Cabral (2008) 'Birth Order and Breastfeeding Initiation: Results of a National Survey', *Breastfeeding Medicine* 3(1): 20-27.

TDHS-MIS (2016) 'Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC) [Tanzania Mainland], Ministry of Health (MoH) [Zanzibar], National Bureau of Statistics (NBS), Office of the Chief Government Statistician (OCGS), and ICF. 2016. Tanzania Demographic and Health Survey and Malaria Indicator Survey (TDHS-MIS) 2015-16. Dar Es Salaam, Tanzania, and Rockville, Maryland, USA: MoHCDGEC, MoH, NBS, OCGS, and ICF', pp. 1-630. Dar es Salaam, Tanzania, and Rockville, Maryland, USA: .

Thet, M.M., E.E. Khaing, N. Diamond-Smith, M. Sudhinaraset, S. Oo and T. Aung (2016) 'Barriers to Exclusive Breastfeeding in the Ayeyarwaddy Region in Myanmar: Qualitative Findings from Mothers, Grandmothers, and Husbands', *Appetite* 96: 62-69.

Thu, H.N., B. Eriksson, T.T. Khanh, M. Petzold, G. Bondjers, C.N.T. Kim et al. (2012) 'Breastfeeding Practices in Urban and Rural Vietnam', *BMC public health* 12(1): 964.

UNICEF. (2018) 'Infant and Young Child Feeding' https://data.unicef.org/wp-content/uploads/2018/07/August-iycf-continuum-mdd-mmf-mad-regions3-2018-1.pdf. Accessed 09/01/2019.

Victor, R., S.K. Baines, K.E. Agho and M.J. Dibley (2013) 'Determinants of Breastfeeding Indicators among Children Less than 24 Months of Age in Tanzania: A Secondary Analysis of the 2010 Tanzania Demographic and Health Survey', *BMJ open* 3(1): 10.1136/bmjopen-2012-001529.

WABA (2014) 'Breastfeeding: A Winning Goal for Life!', World Breastfeeding Week 1-7 August, 2014, pp. 1-6.

Wells, J. (2006) 'The Role of Cultural Factors in Human Breastfeeding: Adaptive Behaviour Or Biopower', *J Hum Ecol* 14: 39-47. http://krepublishers.com/06-Special%20Volume-Journal/JHE-00-Special%20Volumes/JHE-14-Eco-Cul-Nut-Hlth-Dis-Web/JHE-SI-14-06-039-047-Wells-J/JHE-SI-14-06-039-047-Wells-J-Text.pdf. Accessed on 24/10/2014.

Wenban-Smith, H. (2014) 'Urbanisation in Tanzania: Population Growth, Internal Migration and Urbanisation in Tanzania 1967–2012: A Census Based Regional Analysis', *International Growth Centre* .

WHO and UNICEF (2003) 'Global Strategy for Infant and Young Child Feeding', pp. 1-37. Geneva: World Health Organization. http://apps.who.int/iris/handle/10665/42590. Accessed 8/10/2014.

World Health Organization (2010) 'Indicators for Assessing Infant and Young Child Feeding Practices: Part 2: Measurement'.

Worrall, L., S. Colenbrander, I. Palmer, F. Makene, D. Mushi, J. Mwijage et al. (2017) 'Better Urban Growth in Tanzania: Preliminary Exploration of the Opportunities and Challenges'.

Worugji, I. and S. Etuk (2005) 'The National Breastfeeding Policy in Nigeria: The Working Mother and the Law'*, Health care for women international* 26(7): 534-554. http://dx.doi.org/10.1080/07399330591004863. Accessed on 15/10/2014.

Yadavannava, M.C. and S.S. Patil (2011) 'Socio-Cultural Factors Affecting Breast Feeding Practices and Decisions in Rural Women'*, International Journal of Plant, Animal and Environmental Science* 1(2).

Youngwanichsetha, S. (2013) 'Factors Related to Exclusive Breastfeeding among Postpartum Thai Women with a History of Gestational Diabetes Mellitus'*, Journal of Reproductive and Infant Psychology* 31(2): 208-217.