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RWANDA

**PREDICTORS OF EXCLUSIVE BREASTFEEDING
PRACTICE IN INFANTS OF URBAN MOTHERS
IN KIGALI – A CROSS-SECTIONAL STUDY**

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In the College of Medicine and Health Sciences

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DECLARATION

I declare that this Dissertation contains my own work except where specifically acknowledged

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Signature...



Date: March 14, 2019

DEDICATION

I dedicate this work to my beloved wife, Janvière MUGORAGOZE and my lovely daughter MPUNDU Lina Briella.

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My thanks goes first to God Almighty for protecting me in this journey

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ABSTRACT

Background: Children face many challenges during their early period of life and are prone to have nutritional deficiency disorders and other forms of malnutrition, infectious diseases such as diarrhea and respiratory infections. Exclusive breastfeeding for the first six months of life is one way of fighting against them. In Rwanda the duration of exclusive breastfeeding in urban is shorter than in rural areas.

Objective: This study aimed to evaluate the predictors of exclusive breastfeeding in infants of urban mothers in Kigali

Methods: A cross-sectional study was done in five health facilities: CHUK, KFH, Muhima DH, Kibagabaga DH and Muhima HC. We targeted mothers of infants aged 6-12 months old. Multivariate logistic regression was used to determine the factors associated with exclusive breastfeeding.

Results: On total, 221 mothers were included in this study, 55.7% have done exclusive breastfeeding for the first six months of life, and 80.5% have initiated breastfeeding within the first hour of life. To be employed (aOR 0.245, 95% C.I 0.16-0.62, $p=0.003$), feeding EBM (aOR 8.500; 95% C.I .64-27.37; $p<0.001$), single gestation (aOR 71.635; 95% C.I 6.56-789.95; $p<0.001$), and feeding plan: exclusive breastfeeding (aOR 4.602; 95% C.I 1.89-11.23; $p=0.001$), breastfeeding and formula milk (aOR 0.12; 95% C.I 0.03-0.45; $p=0.002$) have been found to be significantly associated with exclusive breastfeeding.

Conclusion: Exclusive breastfeeding for the first six months of life is suboptimal in Kigali and there is a need to emphasize on mothers education and advocacy to employers in order to promote exclusive breastfeeding.

KEY WORDS

Predictors,

Exclusive breastfeeding,

Urban mothers,

Kigali

LIST OF SYMBOLS AND ACRONYMS

- ANC: Antenatal care
- aOR: Adjusted Odds Ratio
- C.I: Confidence interval
- C/S: cesarean section
- CHUK: The University Teaching Hospital of Kigali
- CMHS: College of Medicine and Health Sciences
- DH : District Hospital
- DHS: Demographic Health Survey
- EBF: Exclusive Breastfeeding
- EBM: Expressed Breast Milk
- HC: Health Center
- IQ : Intelligence Quotient
- IQR : Interquartile range
- IRB: Institutional Review Board
- KFH: King Faisal Hospital
- Kg: Kilogram
- LRTI: Lower Respiratory Tract Infection
- OR: Odds Ratio
- PI: Principal Investigator
- TVET: Technical and Vocational Education Training
- UNICEF: United Nations Children’s Fund
- UR: University of Rwanda
- URTI: Upper Respiratory Tract Infection
- WHO: World Health Organization

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Chapter 1 INTRODUCTION

1.1 Background

Breastfeeding is the type of feeding of neonates, infants and young children with their best natural food, the human milk (1). Exclusive breastfeeding is defined as the practice of giving the infant only breast milk (no food or water). Half of deaths which occur in children under five years of age are directly or indirectly related to malnutrition, the reason why exclusive breastfeeding is recommended by WHO in the first 6 months of life, as it provides the essential and irreplaceable nutrition to achieve optimal growth and development. The supplementation of breast milk with solid and semi-solid food with continued breastfeeding is recommended after the period of exclusive breastfeeding up to 24 months of life or more (1–4).

Breast milk is the complete and optimal nutrition for the newborn infants; it reduces the morbidity and mortality particularly from infectious causes in the first 6 months of life. Exclusive breastfeeding in the first 6 months reduces by 57% the rate of hospitalization for respiratory infections, and it decreases the morbidity of gastrointestinal infections and otitis media as it serves as the first child's immunization (2,3,5). Human milk also provides long-term benefits of lowering incidence of sudden infant death syndrome, obesity, inflammatory bowel disease and allergy (6).

Early initiation of breastfeeding is defined as “the initiation of breastfeeding within one hour of birth”. It promotes the secretion of colostrum which contains much protective immunoglobulin, and bonding between mother and newborn, hence less cry (7). Early initiation of breastfeeding also has a role on the mother by reducing post-partum hemorrhage, the leading cause of maternal mortality (8). The mothers, who delay to initiate the breastfeeding, tend to give the pre-lacteal feed to their infants. Khan et al in India(9) found that sugar water, jaggery water and honey were given to 30% newborns whose mothers delay to breastfeed them. Nineteen percent of these mothers did not know the importance of early breastfeeding (9), While in In Egypt, 64.5 percent infants were given pre-lacteal feed including mostly herbals and glucose (10).

Early complementary feeding is discouraged as this will decrease the breast milk intake for the infants and hence the suckling; the consequences will be the reduction of breast milk production and therefore weaning before 24 months of age as recommended by World Health Organization (WHO). In poor resource population like Rwanda, sometimes the weaning food is not sufficient in terms of nutrients and the children will be at risk of getting malnutrition (11).

Different factors impairing exclusive breastfeeding and favoring early weaning have been stated and among them maternal workload, insufficient breast milk, being more educated, and cesarean delivery (12). However it has been found that the information about exclusive breastfeeding are mostly got from health facilities, hence the lack of information in postnatal period on exclusive breastfeeding was also considered as one of the factors impairing exclusive breastfeeding (4,12).

1.2 Problem Statement

Children face many challenges during their early period of life and are prone to have nutritional deficiency disorders and other forms of malnutrition, infectious disease such as diarrhea and respiratory infections. Breastfeeding is a significant predictor of health outcome. The infants who have never been breastfed or early weaned are more prone to such complications (5,9,13). 11.6% of children under 5 years-of-age die because of insufficient exclusive breastfeeding, and this is equivalent to 804,000 child deaths in 2011 (14).

Globally, exclusive breastfeeding in infants 0-6 months of age is only practiced in approximately 38% with prevalence goal of 50% in 2025 (14,15). The universal scaling up of breastfeeding could prevent 823,000 deaths annually in children less than 5 years of age and can reduce 20,000 deaths from breast cancer (16).

In Rwanda, the exclusive breastfeeding of infants less than 6 months old was estimated at 87% as reported by the Rwanda DHS 2014-2015. This was an increase 85% in 2010. Urban parts of the country exclusively breastfeed less than rural regions 5.1 months and 5.4 months respectively. Comparing provinces in Rwanda, the City of Kigali has the lowest duration of exclusive breastfeeding(11). The factors related to this low score among other parts of the country are not known.

No study in Rwanda has been performed to evaluate the predictors of exclusive breastfeeding in urban settings and its knowledge will be used to improve the education pregnant mothers preparing for their newborns and those who have already delivered.

1.3 Objectives

1.3.1 General objective

To evaluate the predictors of exclusive breastfeeding in infants of urban mothers in Kigali.

1.3.2 Specific Objectives

Objective 1: To determine the factors that favor exclusive breastfeeding from birth until 6 months of life.

Objective 2: To identify factors that interfere with successful exclusive breastfeeding.

Chapter 2 LITERATURE REVIEW

2.1 Breastfeeding status

Breastfeeding is a basic, optimal human activity which is vital for the infant and the mother. It is simple and cost effective way to reduce morbidity and mortality especially in low income countries, WHO and UNICEF recommend that the child should exclusively breastfeed from 0-6 months of age to achieve optimal growth and development, and complementary solid or semisolid food can be started along with continued breastfeeding until 24months or more. It is discouraged to use bottles and/or any form of pacifiers (2,11,17,18).

Exclusive breastfeeding for the first 6months reduces the risks of childhood diseases like diarrhea or respiratory infection. It is very crucial especially in low income countries as the population don't have money to buy appropriate food supplement, and this can save unnecessary use of money (19). For example in Rwanda, the infant formula milk or commercial fortified baby food are not common. Only one percent children under two years uses infant formula and two percent uses fortified commercial baby food(11). Exclusive breastfeeding can also increases intelligence, as children who breastfed has better cognitive function and better IQ than children who have been fed by other than breast milk (20). Breastfeeding reduces overweight and diabetes type 2. It reduces the risk of getting breast and ovarian cancer on mother side (16).

Duijts et al in Rotterdam, have found that Compared with never-breastfed infants, those who were breastfed exclusively until the age of four months and partially thereafter had lower risks of infections in the URTI, LRTI, and Gastro-Intestinal until the age of six months [aOR: 0.65; 0.50; 0.41, respectively] and of LRTI between the ages of 7 and 12 months (aOR: 0.46) (21). In a systematic review of studies done in developing countries done by Lamberti et al, in comparison to exclusively breastfed infants 0-5 month of age, the estimated relative risk of prevalent diarrhea was significantly elevated in predominantly (RR: 2.15), partially (RR: 4.62), and not (RR: 4.90) breastfed infants (22).

In comparison to exclusive breastfeeding, predominant, partial and not breastfeeding are more likely to be associated with elevated risk of diarrhea-related mortality. Among infants 0-5 months of age, predominant, partial and not breastfeeding (RR: 2.28), (RR: 4.62) and (RR: 10.52) respectively. Among infants 0-11 months of age, the estimated risk of diarrhea mortality was higher in partially (RR: 4.19) and not (RR: 11.73) breastfed infants as compared to those predominantly breastfed (22).

In Malawi, 43% 0-6months old infants are exclusively breastfed and among the 57% non-exclusively breastfed, 36 % are given plain water only and the rest receive various liquid and food supplements. The children who are exclusively breastfed have high mean of length for Age Z-score -1.13 , and Weight for Age Z score -0.41 ; than infants not being exclusively breastfed -1.59 , and -0.97 respectively (23).

The use of bottle for feeding, cup or pacifier is discouraged by WHO and UNICEF. In Istanbul 44.7% infants and 52.5% infants used pacifiers and bottle feeding respectively. Among the infants of six months old and below, 43 percent were partially breastfed while 7.6 percent were being fed with only formula or juice. And among the infants older than six months, 62 percent were being partially breastfed and 36 percent were being fed only with formula and/or complementary food (24). Whereas in Rwanda, two percent of infants under age six months are given complementary foods, three percent are given milk, one percent are given plain water only, and 6 percent are given non-milk liquids and juice (National institute of Statistics 2015).

Even if in Rwanda the exclusive breastfeeding appears higher than many other countries, but there is a significant reduction of exclusive breastfeeding between 0-1 month of age which is 94% and 4-5 months of age with the rate estimated at 81%. The mean duration of breastfeeding in Rwanda is 27.2 months, the proportion of ever breastfeeding reduces from 99% at 9-11months of age to 88% at 18-23 months of age (11).

Breastfeeding rate is still low in many different parts of the world. The following table shows breastfeeding status in different countries: The rate of breastfeeding, and/or the mean duration of breastfeeding.

Table: Breastfeeding status

Author	Country	Breastfeeding status
Katepa-Bwalya et al (25)	Zambia	EBF: 30.1% Duration: 18months
National Institute of Statistics (11)	Rwanda	EBF: 87%
Ahmad et al (10)	Egypt	Ever breastfeeding in first 24 months: 96% Duration: 12-24 months
Bbaale (19)	Uganda	EBF: 46% Duration: 14.1 months
Kasahun et al (12)	Ethiopia	EBF: 52%
Ahmed Gharib Khamis1& Ali Mohammed Omar1(26)	Zanzibar	EBF: 20.8%

Mgongo et al (27)	Tanzania	EBF: 20.7%
Mohamrf, Ochola & owino (28)	Kenya	EBF: 45.5%
Kunchenbecker et al (23)	Malawi	EBF 43%
Sophie et al (29)	Burkina Faso	EBF: 30%

EBF: Exclusive Breastfeeding

2.2 Predictors of exclusive breastfeeding

Exclusive breastfeeding is feeding your infant only breast milk, not even water except syrup medications. It is recommended by WHO from birth to six months. Considering the rate of its practice, it is still low now at 38% globally (15). Predominant breastfeeding is the feeding of infant where breast milk is the main source of nourishment. But the infant is allowed to receive water, water-based drinks like sweetened and flavored water, teas, infusion, etc; fruit juice, oral rehydration solution, drop and syrup of vitamins in limited quantities. No non-human milk or food-based fluid is allowed under this definition(30).

Many different factors have been found to be associated with different outcome of exclusive breastfeeding. In Rwanda 87% women practices exclusive breastfeeding for the first six months of life, the women from rural areas tend to exclusively breastfeed longer than the ones from urban areas with the median duration of 5.4 months and 5.1 months respectively (11).

In Uganda, 46 percent women exclusively breastfeed and less educated women and women from rural region breastfeed longer than women more educated and from urban region women respectively. But women from urban region are 7% more likely to practice exclusive breastfeeding than women from rural areas; and women who delivered in health facility are 7-8% more likely to exclusively breastfeed than those who delivered at home (19). In Tanzania the exclusive breastfeeding rate in urban region of Kilimanjaro tend to be higher than the EBF in rural part of it but there is no much different 22.7% versus 20.1% respectively (27).

In Jimma town of Ethiopia, the mothers who are more likely to practice exclusive breastfeeding are those one whose infants being 2 months of age and below, mothers who are low parity, mothers with good knowledge on breastfeeding, and those who did antenatal care (31). While in the city of Tabuk in North West Saudi Arabia, Riyadh found that the exclusive breastfeeding is 34.1% and is well practiced by mothers who are aware of what is recommended regarding exclusive breastfeeding in the

first six months of life, while it is not well practiced by mothers who are employed, delivered by cesarean section and those one who had low birth weight babies (32).

In urban region of Addis Ababa in Ethiopia, the mother who earn less (56-113 US\$) are more likely to breastfed exclusively than the ones who earn more (more than 113US\$), and also mothers who have been counseled prenatally and post-natally on breastfeeding practice exclusive breastfeeding longer than the mothers who were not counseled about breastfeeding. In this same study Shifraw found than the mothers who deliver by cesarean section are less likely to exclusively breastfed compared to those who delivered by spontaneous vaginal delivery. Shifraw found that Exclusive breastfeeding in urban mothers in Addis Ababa is low at 29.3%(33).

Chapter 3 METHODS AND MATERIALS

3.1 Study design

This was a cross-sectional study.

3.2 Study setting and period

The study was done in five public health facilities located in the City of Kigali. The City of Kigali is made up of three districts divided in 35 sectors with both urban and rural parts. The districts are Nyarugenge, Kicukiro and Gasabo. Considering the population distribution, the urban area is larger with 22 sectors [76%] than the rural one [24%](34,35).

The public health facilities are University Teaching Hospital of Kigali (CHUK), Muhima District Hospital, Muhima Health Center, Kibagabaga Hospital, and King Faisal Hospital (KFH). Participants were recruited during the two months [December 01, 2018- January 31, 2019] study period.

3.3 Study population

Inclusion criteria

- Mothers of children aged 6-12 months living in urban Kigali
- Mothers of children coming for pediatric outpatient visit or vaccination,

Exclusion criteria

- Mothers who do not consent
- Mothers of children who will be having emergency signs according to WHO triage at the time of recruitment
- Mothers who are themselves <18 years of age
- Participants who are unable to speak Kinyarwanda or English languages.
- Incomplete interview

Sampling and enrolment

Participants were recruited opportunistically at the study sites, prior to consultation with the healthcare professional as undertaking data collection after the consultation may bias the results. Enrolment was done after IRB (Institutional Review Board) approval and until the full sample size is gained.

The number of subjects who declined to participate or excluded from the study (and reasons why) were kept. These data are presented in the form of a Consort diagram.

As the data were collected in the form of interview, those who did not meet inclusion criteria were excluded immediately so no data taken from them

3.4 Study procedures

Procedure at enrollment

The data collection team used a pre-tested and pre coded structured questionnaire and interviewed the eligible participants after getting their verbal consent. The data were collected verbally rather than the participant completing the questionnaire themselves. Closed ended questions were used. Data were collected after getting IRB approval and concerned health facility approval until we got the sufficient number according to our sample size calculation and it was completed in two months period.

Outcome and independent variables

The outcome interest in study is exclusive breastfeeding. The independent variables are: the socio-demographic characteristics, information regarding pregnancy, and delivery, perinatal history and breastfeeding history. All variables are detailed in the study questionnaire (see Appendix).

3.5 Data collection and analysis

Data collection tool: The questionnaire was designed specifically for this study by investigator based upon the study objectives and previous literature on the topic(12,19,26,27,33,36). To insure the content validity, it was reviewed by five experts in research (four pediatricians and one statistician).

Data-collection only occurred on one-occasion. No follow-up data are available. Data were measured solely using the study questionnaire. The information were recorded on pre-coded data questionnaire in English or in Kinyarwanda

Piloting and Translation: To insure readability it was piloted, in English, on five subjects, and amendment was done based on the pre-testing. Translation was then undertaken by a native Kinyarwanda speaker who has studied languages and translation to a bachelor's level. It has then been back translated by a medical professional. It was then piloted in Kinyarwanda in three subjects and modified for understanding.

Sample size

According to the recent data from Rwanda DHS, the prevalence rate of exclusive breastfeeding for the first 6 months of age was 87% (11). The sample size was calculated using the single population formula. We want the level of confidence to be 95%, and so the corresponding statistic value is 1.96 and the standard error 5% (37).

$$n = \frac{Z^2 P (1 - P)}{d^2}$$

Where **n**: Sample size, **P**: proportion or expected prevalence, **Z**: statistic value corresponding to the level of confidence. Therefore **n**=174

Statistical analysis:

The data collected were entered and analyzed in SPSS (Statistical Package for Social sciences) 21.0 version. Univariate analysis was done for descriptive statistics. Categorical variables were summarized as proportions and percentage and numerical variables were reported as median and interquartile range

Bivariate analysis was done using Chi-square to compare dichotomous variables and described with p-values and Odds Ratios. Fisher-exact test was used for cell (group) sizes smaller than five and for non-dichotomous variables binary logistic regression was used. A multivariable logistic regression analysis was undertaken to minimize for confounding and to determine which independent variables are associated with the exclusive breastfeeding. Variables were included in the multivariate analysis if they have a p-value <0.10 on the bivariate analysis. The final multivariate analysis is described using adjusted odds ratios and p-values. Significance of an association was taken for p value <0.05

3.6 Ethical considerations

The aim of this study and its significance, benefits and risk were explained to mothers before enrolment. Only mothers who gave their consent were included in the study.

Participation in the study was voluntary, and there was no compensation. Participants were able to withdraw from the study at any point with no adverse consequences on their children's care. There was no direct benefit for study participants but results from this study will help to improve education of mothers regarding exclusive breastfeeding. There were no risks with participation in the study. Confidentiality was kept by creating an identification number instead of the names on the questionnaire. This research was approved by the IRB of the College of Medicine and Health Sciences.

Chapter 4 RESULTS

4.1 Participants

4.1.1 Socio-demographic characteristics

In total 231 mothers met our study criteria but ten mothers did not have time to finish the interview and they were excluded. The remaining 221 mothers were included in our analysis.

Table 1: Socio-demographic characteristics of participants

Characteristics	n (%)	Median/[IQR]
District of origin (n=221)		
NYARUGENGE	70 (31.7)	-
KICUKIRO	33 (14.9)	-
GASABO	118 (53.4)	-
Health facility (n=221)		
CHUK	17 (7.7)	-
KFH	23 (10.4)	-
KIBAGABAGA DH	91 (41.2)	-
MUHIMA DH	44 (19.9)	-
MUHIMA HC	46 (20.8)	-
Maternal age (n=221)		28/[7]
Young age**	201 (91.0)	
advanced age**	20 (9.0)	
Maternal education* (n=221)		
None	6 (2.7)	-
Primary	55 (24.9)	-
Secondary	90 (40.7)	-
University	63 (28.5)	-
TVET	7 (3.2)	-
Marital status (n=221)		
Single	19 (8.6)	-
Married	195 (88.2)	-
Divorced	3 (1.4)	-
Separated	1 (0.5)	-
Widow	2 (0.9)	-
Father alive (n=221)	214 (96.8)	-
Employed (n=221)		
Yes	83 (37.5)	-
No	138 (62.5)	-
Daily time of working (n=83)		9/[1]
<10hrs	63 (75.9)	-
≥10hrs	20 (24.1)	-
Maternal leave (weeks) (n=77)		12/[0]
<12	18 (23.4)	-
≥ 12	59 (76.6)	-
Economic status (n=221)		
Low (Ubudehe 1&2)	90 (40.7)	-
Moderate (ubudehe 3)	131 (59.3)	-

*completed level of education, ** Young age: 18-35 years, advanced age > 35years

The majority of mothers 53.4% are from GASABO district (Table 1), KIBAGABAGA DH is the health facility where we meet about a half of mothers (91/221). The minimum age was 18 and the maximum was 42. The median age of the mothers is 28 years. About only one third of mothers are employed (83/221) and two third have been educated more than primary level. For the children, male are 52% and female 48%, the median age was 9months.

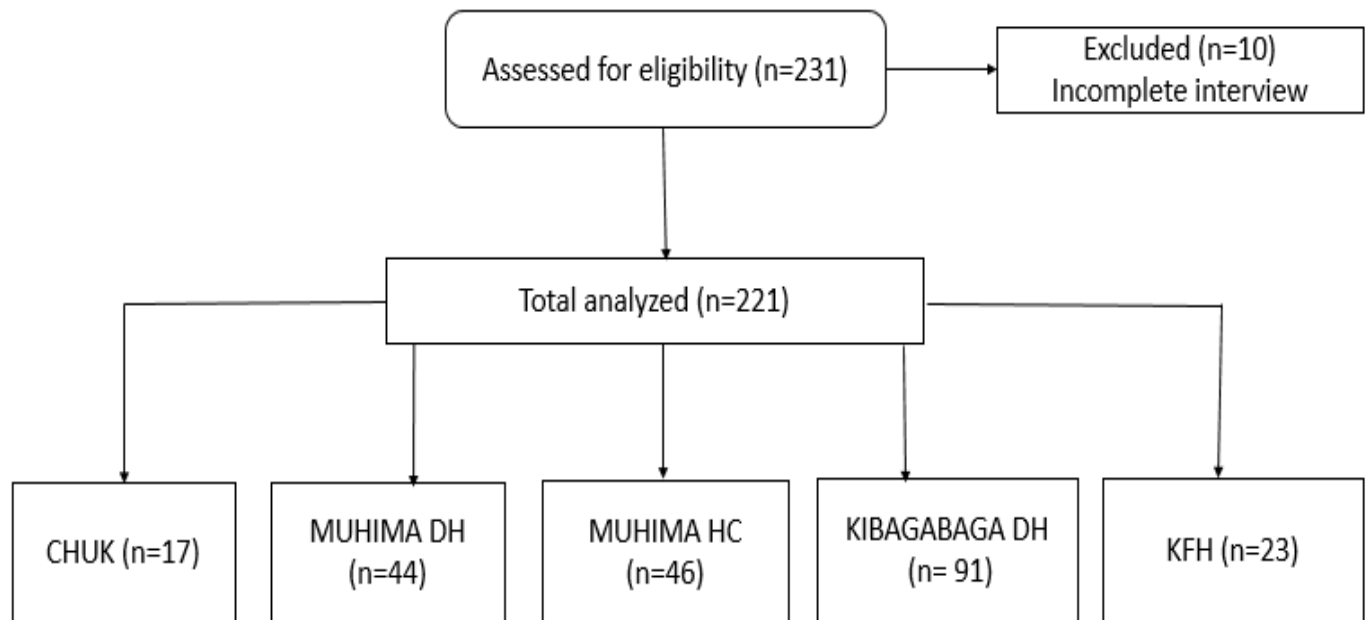


Figure 1: illustration of mothers who participated in the study

4.1.2 Pregnancy and delivery details

Forty percent of mothers were primipara and ninety five percent of mothers have delivered a singleton child. During antenatal care 83% have been educated about breastfeeding whereas after delivery only 66% have been educated about breastfeeding.

Table 2: Pregnancy and delivery details (n=221)

Item	n (%)	Median/[IQR]
Antenatal care		
Yes	216 (97.7)	
No	5 (2.3)	
Education on breastfeeding before delivery		
Yes	184 (83.3)	
No	37 (16.7)	
Education on infant feeding after delivery		
Yes	145 (65.6)	
No	76 (34.4)	
Mode of delivery		
vaginal delivery	160 (72.4)	
Caesarean delivery	61 (27.6)	
Multiple pregnancy		
No	211 (95.5)	
Yes	10 (4.5)	
Parity		
Primipara	89 (40.3)	
Multipara	132 (59.7)	
Skin to skin contact after delivery		
Yes	149 (67.4)	
No	72 (32.6)	
Birth weight (Kg)		3.2/[0.6]
Normal	206 (93.2)	
Low	15 (6.8)	

4.1.3 Breastfeeding details

The prevalence of exclusive breastfed for six months is 55.7%. It reduce progressively from birth where EBF was 85.1%, 81.9% and 57.5% at 1month, 3 months and 5 months progressively. 80.5% initiated breastfeeding within the first hour of life, there are some mothers who tend to give something else alongside with breastfeeding in the first 24hours for different reasons and in our study we found 14.9 % (n=33).

The reasons given by them were mostly not having enough breast milk yet 72.7% (24/33), child crying too much 9% (n=3), 6% (n=2) mothers were too sick just after delivery and could not breastfeed and one mother (3%) thought it was good to give something else. Also among these mothers 9% (3/33) gave a black tea as belief to prevent abdominal colic of their infant.

The breast milk is the predominant type of feeding given to the baby at the very first time after delivery at 89.6% (n=198), but there are some few mothers who have given something else as the first feed for the baby just after delivery. Formula milk is the first among those at 8.1% (n=18), sugary water as the second at 1.4% (n=3) and the last being juice at 0.9% (n=2).

Table 3: Breastfeeding and feeding status (n=221)

Item		n (%)
Feed plan in first 6months	Exclusive breastfeeding	117 (52.9)
	Breastfeeding and formula milk	58 (26.2)
	No plan	46 (20.8)
Initiation of breastfeeding	Early	178 (80.5)
	Late	43 (19.5)
Mastitis during breastfeeding	Yes	20 (9.0)
	No	201 (91.0)
Chronic illness on child	Yes	18 (8.1)
	No	203 (91.9)
Feeding initiation	<1month	17 (7.7)
	1-3 months	23 (10.4)
	4-5months	54 (24.4)
	6-7months	127 (57.5)

About complementary feeding initiation before the recommended age, the rate is increasing progressively; 7.7% (n=17) to 24.4% (n=54) were fed between four and five months of life. For the introduction of complementary feeding, there are four common food type that the mothers were giving their infants. The four main type were formula milk at 47.1%, cow's milk 20.4%, porridge 14.5%, and fruits 9.5%. The other least common are cereals 3.6%, and juice 0.5%.

There are two main reasons of early initiation of complementary feeding that we found, they are: the need to return to work 37.2% (35/94) and the breast milk being no longer enough 46.8% (44/94). Other reasons are 6.4% (6/94) of child showed signs of readiness to eat, 6.4% (6/94) mothers thought it was appropriate to give something else, there is one mother who got pregnant again and stopped to breastfeed 1.1% and another one who wanted to go back to school 1.1%.

In our study we found that 76.5% (n=169) of mothers know expressing breast milk do exist but only 32.5% (n=55) are practicing.

4.2 Factors associated with exclusive breastfeeding

There are different factors associated with exclusive breastfeeding. With the bivariate analysis, only four factors were found likely to be statistically significant. The factors likely to be significantly associated with exclusive breastfeeding (table 4) are: maternal education, good education was reducing the likelihood of exclusive breastfeeding (OR 0.476, 95% C.I 0.255-0.888; p-value=0.018), employment status where mothers who are employed are less likely to breastfeed exclusively than those who are not employed (OR 0.286; 95% C.I 0.162-0.505; p-value <0.001), and mothers who had maternal leave of ≥ 12 weeks are less likely to breastfeed exclusively than those with shorter period of maternal leave (OR 0.258; 95% C.I 0.086-0.776; p-value= 0.013), and economic status was also associated and mothers with good economic status were found to be at risk of not exclusively breastfeed if compared to those with low economic status (OR 0.56, 95% C.I 0.323-0.972, p=0.038).

Table 4: Socio-demographics associated with exclusive breastfeeding in bivariate analysis

Item	EXCLUSIVE BREASTFEEDING			Odds ratio	95%C.I	P-Value
	YES Freq (%)	NO Freq (%)	TOTAL Freq (%)			
Maternal age						
Young	116 (57.7)	85 (42.3)	201 (100)	Ref		
Advanced	8 (40)	12 (60)	20 (100)	0.489	0.19-1.25	0.128
Gender of child						
Female	61 (57.5)	45 (42.5)	106 (100)	Ref		
Male	62 (53.9)	53 (46.1)	115 (100)	0.863	0.507-1.469	0.587
Maternal Education						
Poor education	42 (68.9)	19 (31.1)	61 (100)	Ref		
Good education*	82 (51.3)	78 (48.7)	160 (100)	0.476	0.255-0.888	0.018
Employed						
No	93 (67.4)	45 (32.4)	138 (100)	Ref		
Yes	31 (37.3)	52 (62.7)	83 (100)	0.286	0.162-0.505	<0.001
Daily working time						
<10hrs	24 (38.1)	39 (61.9)	63 (100)	Ref		
≥ 10 hrs	7 (35)	13 (65)	20 (100)	0.875	0.306-2.501	0.803
Maternal leave given						
Yes	28 (36.4)	49 (63.6)	77 (100)	Ref		
No	4 (57.1)	3 (42.9)	7 (100)	2.33	0.49-11.19	0.289
maternal leave in weeks						
Short (<12)	11 (61.1)	7 (38.9)	18 (100)	Ref		
Long (≥ 12)	17 (28.8)	42 (71.2)	59 (100)	0.258	0.086-0.776	0.013
Maternal leave paid						
Yes	23 (34.3)	44 (65.7)	67 (100)	Ref		
No	5 (50)	5 (50)	10 (100)	1.91	0.502-7.29	0.342
Economic status						
Poor (Ubudehe 1&2)	58 (64.4)	32 (35.6)	90 (100)	Ref		
Good (Ubudehe 3&4)	66 (49.6)	65 (50.4)	131 (100)	0.56	0.323-0.972	0.038

*Good education: completed at least secondary level

Six factors were found to be likely associated with exclusive breastfeeding (EBF) in bivariate analysis (Table 5), education on breastfeeding before delivery, and it has been found to increase by two times the likelihood of EBF than no education (OR 2.084, 95% C.I 1.016-4.277, p-value=0.043), while education on breastfeeding after delivery increases by 1.8 times likelihood of appropriate EBF (OR 1.809, 95% C.I 1.016-4.277, p=0.037), having singleton increases by twelve times the likelihood of EBF compared to multiple pregnancy (OR 12.34; 95% C.I 1.535-99.145; p=0.002), late breastfeeding initiation reduces the likelihood of exclusive breastfeeding (OR 0.434, 95% C.I 0.22-0.86, p=0.015), plan of breastfeeding before delivery and feeding EBM have been found also to be associated with EBF. It increases by about threefold the likelihood of EBF (OR 2.67, 95% C.I 1.37-5.20, p=0.003).

Table 5: Other factors associated with exclusive breastfeeding in bivariate analysis

EXCLUSIVE BREASTFEEDING						
Item	YES Freq (%)	NO Freq (%)	TOTAL Freq (%)	Odds ratio	95% C.I	P-Value
Education on EBF before delivery						
No	15 (40.5)	22 (59.5)	37 (100)	Ref		
Yes	108 (58.7)	76 (41.3)	184 (100)	2.084	1.016-4.277	0.043
Education on EBF after delivery						
No	31 (46.1)	41 (53.9)	76 (100)	Ref		
Yes	88 (60.7)	57 (39.3)	154 (100)	1.809	1.032-3.169	0.037
Multiple pregnancy						
Yes	1 (10)	9 (90)	10 (100)	Ref		
No	122 (57.8)	89 (42.2)	211 (100)	12.337	1.54-99.145	0.002
Skin to skin contact after delivery						
No	39 (54.2)	33 (45.8)	72 (100)	Ref		
Yes	84 (56.4)	65 (43.6)	149 (100)	1.093	0.621-1.925	0.757
Parity						
Primipara	51 (57.3)	38 (42.7)	89 (100)	Ref		
Multipara	73 (55.3)	59 (44.7)	132 (100)	0.922	0.54-1.59	0.784
Breastfeeding initiation						
Early(≤1hour)	107 (59.6)	71 (40.4)	178 (100)	Ref		
Late (> 1hour)	17 (39.5)	26 (60.5)	43 (100)	0.434	0.22-0.86	0.015
Breastfeeding plan before delivery						
Exclusive breastfeeding	93 (79.5)	24 (20.5)	117 (100)	Ref		
Breastfeeding and formula	8 (13.8)	50 (86.2)	58 (100)	0.043	0.2-0.104	<0.001
No plan	23 (50)	23 (50)	46 (100)	0.272	0.13-0.56	<0.001
Feeding EBM						
No	83 (50)	83 (50)	166 (100)	Ref		
Yes	40 (72.7)	15 (27.3)	55 (100)	2.67	1.37-5.20	0.003
Mastitis during breastfeeding						
No	114 (56.7)	87 (43.3)	201 (100)	Ref		
Yes	9 (45)	11 (55)	20 (100)	0.624	0.25-1.57	0.351
Chronic pathologies on the child						
No	113 (55.7)	90 (44.3)	203 (100)	Ref		
Yes	10 (55.6)	8 (44.4)	18 (100)	0.996	0.38-2.63	0.993

In multivariate logistic regression analysis (table 6), we included all variables with p-value<0.1 in bivariate analysis and five factors have been found to be associated with exclusive breastfeeding. Among these factors, three of them are positively associated with exclusive breastfeeding which are: delivering singleton, feeding EBM when mother is not at home and having a plan for breastfeeding in the first six months of life. Whereas two factors have been found to be negatively associated with exclusive breastfeeding: to be employed, and planning to mix formula feeding and breastfeeding.

Table 6. Multivariate analysis of factors associated with exclusive breastfeeding

Exclusive Breastfeeding			
	aOR	95% C.I	P-value
Employed	0.245	0.16-0.62	0.003
Single gestation	71.635	6.56-789.95	<0.001
Feeding EBM	8.500	2.64-27.37	<0.001
Feeding plan			
No plan	Ref		
EBF	4.602	1.89-11.23	0.001
Breastfeeding and Formula	0.12	0.03-0.45	0.002

Chapter 5 DISCUSSION

The objective of this study was to evaluate the predictors of exclusive breastfeeding in infants of urban mothers in Kigali. Our findings suggest that the prevalence of exclusive breastfeeding in urban mothers of Kigali is 55.7%, it was found to be reducing progressively from 85.1% in the first month, to 81.9 % at three months and to 57.5% at five month of life. 80.5% mothers have initiated breastfeeding within the recommended time. To be employed, multiple pregnancy, plan of breastfeeding before delivery and feeding expressed breast milk when the mother is not around have been found to be significantly associated with exclusive breastfeeding.

5.1 Perinatal and feeding details

In this study we found the reduction of number of mothers who attended ANC 97.7% with those who were taught about breastfeeding before delivery 83.3% and this difference might be due to the fact that in hospitals there are no programmed breastfeeding education during antenatal visits. After delivery the number reduces even more to 65.6%, and this may be explained by the fact that the health care providers forget or do not have enough time to educate mothers and they are just focused on quick things like physical exam and treatment and no formal breastfeeding education program post natally in hospitals. These findings are consistent with those found in urban mothers of Addis Ababa where also the mothers who attended ANC are 97.%, those who were informed on breastfeeding during ANC are 73.8% and the ones who were counseled on breastfeeding postnatally are 68.2% (33).

In our study, 80.5 % mothers have initiated breastfeeding within the first hour after delivery as it is recommended by WHO (19), this find is the same as Rwanda DHS 2014-2015. Our finding results are higher than the findings of Edward in Uganda (19) and it is about the same findings in Ethiopia (12). But the number is not yet ideal (100%) and this could be because for some mothers delivering by cesarean section the immediate post-surgical recovery may delay longer than an hour, whereas those delivering vaginally may have complication like hemorrhage or complicated perineal tear which need to be cared urgently than breastfeeding initiation.

In the current study, 14.9% mothers provided their newborns other feeds not breast milk within first days of life, and the main reason reported by mothers for this was insufficient breast milk. There are mothers who may think that colostrum is not breast milk because it appears a bit different and this can contribute to the thinking that the breast milk is not enough and pushing them to feed their babies something else. Giving something which is not breast milk reduces breastfeeding time for the infants, and this may even have a negative impact to the quantity of breast milk production.

The prevalence of exclusive breastfeeding for the first six months of life in the current study is 55.7%. This rate of EBF is lower than the national prevalence found in Rwanda DHS 2014-2015 (11), the reason of low exclusive breastfeeding rate may be that our sample size is smaller than in Rwanda DHS, and for us we studied mothers from one part of the country. Another reason in the current study might be that some mothers occasionally were found to give something else other than breast milk when they were going out of their home for short time, and when they came back they keep breastfeeding. And also to ask mothers to recall events from birth may contribute to this low prevalence. The prevalence in our study is higher than the prevalence in mothers of urban Kilimanjaro 22.7% (27), and it is also higher than the prevalence in urban refugee women in Kigali 34.4% (4).

In our findings, the prevalence reduces from one month old, through six months old. It is 85.1%, 81.9%, and 57.5% at one, three and five months old respectively. These findings of declining of exclusive breastfeeding are consistent with the findings in different parts of Africa: Tanzania, Nigeria, and Egypt (27,38,39). The decline in EBF rate goes with the increase in early introduction of feeding. The reason for this decline in EBF and increase in introduction of complementary feeding might be that there is a number of mothers who return to work after the twelve weeks, the usual maternal leave in Rwanda.

In this current study, the main reason for early introduction of complementary feeding was the need to return to work 37.2%, and the breast milk which is no longer sufficient 46.8%. These findings are inconsistent with the findings in the study in Brisbane, Australia; here the most motivator to introduce feeding early was the fact that their children showed interest in family food and keen to eat(40). The reason is quite the same like in coast region of Tanzania (41).

5.2 Factors associated with exclusive breastfeeding

Factors favoring exclusive breastfeeding

In this current study, single gestation was associated with exclusive breastfeeding with odds higher than multiple gestation. This might be simply explained by the fact that having twins or triplets requires more quantity of breast milk and most of the mothers might not be able to meet the requirements of breast milk of more than one infant until six months. But parity was not found to be associated with exclusive breastfeeding, this was the same finding like in Wajir county, Kenya where there was no difference in multiparous and primiparous and the same results were also found in Debre Berhan Ethiopia (28,42). These results are different from what have been found in Brazil where primiparous women have greater chance of exclusive breastfeeding interruption (15) Whereas in Jimma town of Ethiopia being low parity increases by three fold the chance of exclusive breastfeeding (31).

Feeding expressed breast milk was found to be significantly associated with exclusive breastfeeding and it increases about eight times the likelihood of exclusive breastfeeding. The explanation for this might be that women who feed their infants with EBM are more likely to keep doing it even when they have gone to work or else where up to six months and also they have an experience of expressing themselves. When they express themselves they stimulate the breast to keep producing breast milk hence reducing the risk of insufficient breast milk. Our findings were consistent with the findings in the study done in Australia(43), they found that feeding EBM increases the chance of exclusive breastfeeding .

Planning how you will feed your infant in the first six months of life was also found to be associated with exclusive breastfeeding. Women who planned to exclusively breastfeed in the first six months were four times more likely to do so than not having a plan at all. This is simply explained by the fact that when the mothers are committed to exclusively breastfeed during the first six months it increases the chance to achieve it because they are motivated. These mothers can do whatever is required to fulfil their commitment, and probably they know the benefits of exclusive breastfeeding.

Factors interfering with exclusive breastfeeding

Employment status was associated with exclusive breastfeeding and mothers who are employed (by governmental institution, private company or self-employed) were less likely to practice exclusive breastfeeding. This can be easily explained by the fact that working mothers are given maternal leave most of the time lasting for twelve weeks and after this time they resume the work and so they will not have time to exclusively breastfeed their infants, and also the one hour time given during the working hours for breastfeeding, is not enough. These findings are consistent with those in Debre Berhan, Ethiopia where house wives were more likely to exclusively breastfeed than those employed. (42) and also same findings in Tabuk, Saudi Arabia where employed mothers are less likely to breastfeed exclusively than non-employed mothers(32).

Planning to mix breastfeeding and formula milk was having high risk of interrupting exclusive breastfeeding than those without any plan or with plan of exclusive breastfeeding. This can be explained by the fact that mothers planning to mix breastfeeding and formula milk are mostly those who are employed, and they know they will have to return to work after maternal leave (usually twelve weeks in Rwanda). Another reason we think is that these mothers planning to feed formula and breast milk are those with good socio-economic status who can afford formula milk as it is expensive. The findings are consistent with the findings in Wajir district of Kenya (28).

Education and economic status in our study were not found to be associated with exclusive breastfeeding. This might be due to accessibility and availability of information regarding breastfeeding in Rwanda regardless the level of maternal education and economic status. In the study done in Ethiopia, our results are not the same regarding maternal education where women without ability to read and right had higher odds of exclusive breastfeeding than those with better education, but it is again different from results in a study done in Brazil where the lower the maternal educational level, the greater risk of exclusive breastfeeding interruption; whereas we have the same findings regarding the economic status of the women (15,42).

Maternal age and mode of delivery in our study were not found to be associated with exclusive breastfeeding, whereas in other studies they were found to be associated with exclusive breastfeeding like in study done in Ethiopia and Egypt (39,44), and the mode of delivery was linked with EBF in the study done in South Ethiopia where mothers who delivered vaginally were more likely to breastfeed exclusively than their counterparts (12). The reason of lack of association between maternal age and exclusive breastfeeding, mode of delivery and exclusive breastfeeding, we think is again because mothers are educated on breastfeeding largely in our country at the same level.

5.3 Study strength and limitations

Apart from demographic health survey, to my knowledge this is the first study on predictors of exclusive breastfeeding in urban settings. Even if the study did not cover the whole country, it is still very important as more Rwandan population choosing to live in urban settings are increasing (45,46).

This study did not cover the whole country, and was done in urban settings. The results must be interpreted cautiously as they are not generalizable to the rural settings and to the whole country in general. This study was cross sectional, so we did not measure the trend of outcome, the consequences of non-exclusive breastfeeding were not evaluated also and this study cannot determine the causality. Another limitation of this study may be a recall bias and acquiescence bias as the verbally administered questionnaire was used.

Chapter 6 CONCLUSION AND RECOMMENDATION

6.1 Conclusion

Our study found different predictors of exclusive breastfeeding, but many of them were not statistically significant to be associated with exclusive breastfeeding. To be employed and planning to breastfeed mixed with formula milk were found to reduce the likelihood of exclusive breastfeeding whereas single gestation compared to multiple gestation, feeding the infant with expressed breast milk and planning before delivery to exclusively breastfeed were found to increase the likelihood of exclusive breastfeeding. The prevalence of exclusive breastfeeding was 55.7% which is low compared to Rwanda DHS 2014-2015. The future researches should evaluate the nutritional outcome of exclusive and non-exclusive breastfeeding; and can compare the rural and urban settings. It is also likely that since the last DHS and given the changes in the country's socio-economic landscape, exclusive breast feeding rates are dropping and a wider national survey to inform a relevant educational approach for mothers is required.

6.2 Recommendations

Recommendations to the health facilities

- ✓ Reinforce education on breastfeeding during pre and post natal clinics and vaccination visits
- ✓ Teach and encourage mothers to express breast milk, when they intend to leave their infants at home
- ✓ Encourage mothers to plan for exclusive breastfeeding before delivery

Recommendations to Ministry of Health

- ✓ Develop the guidelines to establish breastfeeding support group in each health facilities
- ✓ Advocate for establishment of breastfeeding rooms and providing time for breastfeeding at workplace

Recommendation to the Government of Rwanda

- ✓ Make a law which facilitate working mothers to breastfeed exclusively for six months

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APPENDIX

Appendix 1: DATA COLLECTION SHEET

Topic: *Predictors of exclusive breastfeeding practice in infants of urban mothers in Kigali”*

Q no	Questions	Codes
	Respondent number:..... Health facility : Date:	
Section I: Participant identification		
1	Where do you live?	District.....sector.....
2	Maternal age	 DNA – 99 ☐ ,
3	Child age (months)	 DNA – 99 ☐ ,
4	Sex of the child:	Male – 1 ☐ Female – 2 ☐ , DNA – 99 ☐
5	What is your higher level of education?	None – 1 ☐ , - Primary - 2 ☐ , Secondary - 3 ☐ , University 4 ☐ , TVET 5 ☐ , DNA - 99 ☐ ,
6	Marital status	Single -1 ☐ , Married -2 ☐ , Divorced -3 ☐ , Separated-4 ☐ , Widow -5 ☐ , DNA – 99 ☐ ,
7	Is the father of the child alive?	Yes - 1 ☐ , No - 2 ☐ , DNA – 99 ☐ ,
8	Are you employed (including self-employment) ? (If No go to Question 13)	Yes - 1 ☐ , No - 2 ☐ , DNA – 99 ☐ ,
9	If Yes, how many Hours do you work per day:	 DNA – 99 ☐ ,
10	Did you get any maternal leave?	Yes - 1 ☐ , No - 2 ☐ , DNA – 99 ☐ ,
11	How old was your baby when you returned to work?	_____ weeks DNA – 99 ☐ ,
12	Was the maternal leave paid?	Yes - 1 ☐ , No - 2 ☐ , DNA – 99 ☐ ,
13	If no are you still a student?	Yes - 1 ☐ , No - 2 ☐ , DNA – 99 ☐ ,
14	What is your UBUDEHE category?	Cat I - 1 ☐ , Cat II -2 ☐ , Cat III -3 ☐ , Cat IV - 4 ☐ , DNA – 99 ☐
Section II: Delivery details		
1	Did you attend Ante-natal care for this child?	Yes - 1 ☐ , No - 2 ☐ , DNA – 99 ☐ ,
2	Did you receive any information about breastfeeding before delivery by a health care provider?	Yes - 1 ☐ , No - 2 ☐ , DNA – 99 ☐ ,

3	What was the mode of delivery? :	Vaginal delivery -1 ☐ , Cesarean delivery -2 ☐ , DNA – 99 ☐ ,
4	How many did you deliver? :	Singleton - 1 ☐ , Twin - 2 ☐ , Triplets- 3 ☐ , Others (precise)..... 4 ☐ , DNA – 99 ☐ ,
5	What was the birth weight of your child?	 kg DNA – 99 ☐ ,
6	Did you have skin to skin contact with your baby after he/she was born	Yes - 1 ☐ , No - 2 ☐ , DNA – 99 ☐ ,
7	Is this your first child?	Yes - 1 ☐ , No - 2 ☐ , DNA – 99 ☐ ,
8	If No, how many children do you have?	Two -1 ☐ , Three - 2 ☐ , More than three -3 ☐ , DNA – 99 ☐
9	How old was your baby when he/she left the hospital?	<1 week -1 ☐ , 1-2weeks - 2 ☐ , 3weeks-4weeks - 3 ☐ , >4weeks -4 ☐ , DNA – 99 ☐ ,
Section III: Details of breastfeeding		
1	What did you feed on the very first time after delivery?	Breast milk -1 ☐ , Infant formula -2 ☐ , Cow milk - 3 ☐ , Plain water -4 ☐ , Water containing sugar - 5 ☐ , Juice -6 ☐ , Other(precise)..... 7 ☐ , DNA – 99 ☐ ,
2	When did you breastfed related to the time of delivery? (OR try to breastfeed)	_____hrs/_____minutes DNA – 99 ☐ ,
3	Did you ever give anything else apart from breast milk within the first 24hours? (If No got to Q 6)	Yes - 1 ☐ , No - 2 ☐ , DNA – 99 ☐ ,
4	If Yes, what did you give? (Tick all right answers)	Cow milk - 1 ☐ , Infant formula - 2 ☐ , Juice - 3 ☐ , Plain water- 4 ☐ , Tea -5 ☐ , Honey -6 ☐ , porridge -7 ☐ , Other – 8 ☐ DNA – 99 ☐ ,
5	Why did you give it?	The child was crying too much -1 ☐ , There was no enough breast milk - 2 ☐ , Other (explain)..... ☐ , DNA – 99 ☐ ,
6	How old was your baby when you gave anything by mouth other than breast milk	 DNA – 99 ☐ ,

7	What did you give at the very first time? (tick only one thing)	Water - 1 ☐ Formula milk -2 ☐ , Cow milk -3 ☐ , Juice -4 ☐ , Porridge -5 ☐ , cerelac -6 ☐ , Fruits -7 ☐ , potage -8 ☐ , vegetables-9 ☐ DNA – 99 ☐ ,
8	Why did you start feeding at this age?	It was the right time to introduce feeding (6-7months) -1 ☐ I had to return to work -2 ☐ , Breast milk was no longer enough -3 ☐ , I was pregnant for another baby -4 ☐ , I thought it is better give something else -5 ☐ , child refused to breastfeed -6 ☐ , the child wanted to eat -7 ☐ , other.....-8 ☐ DNA – 99 ☐ ,
9	What did you feed your child when you were not at home in the first 6months of your child? (tick as many as apply)	Expressed breast milk -1 ☐ , Cow milk - 2 ☐ , Infant formula -3 ☐ , EBM+ soft food -4 ☐ , Porridge -5 ☐ , Cerelac -6 ☐ , Potage -7 ☐ , vegetables-8 ☐ , I did not leave him/her at home - 9 ☐ DNA – 99 ☐ ,
10	How are you feeding your child today? (tick as many as apply):	Exclusively breastfeeding -1 ☐ , breastfeeding and semi-solid food -2 ☐ , breastfeeding and cow milk -3 ☐ , Breastfeeding and formula milk -4 ☐ , cow milk only -5 ☐ , formula milk only -6 ☐ , semi-solid food only- 7 ☐ DNA – 99 ☐ ,
11	Did you receive any teaching from healthcare provider on how to breastfeed after delivery?	Yes - 1 ☐ , No - 2 ☐ , DNA – 99 ☐ ,
12	Do you know you can feed your baby with expressed breast milk?	Yes - 1 ☐ , No - 2 ☐ , DNA – 99 ☐ ,
13	Do you feed express breast milk?	Yes - 1 ☐ , No - 2 ☐ , DNA – 99 ☐ ,
14	Before you deliver this child, how did you plan to feed him/her in the first six months?	Exclusive breastfeeding - 1 ☐ Formula - 2 ☐ , Combination of breast and formula -3 ☐ , I didn't have any plans. -4 ☐ , DNA – 99 ☐
15	Since the delivery of your baby have you had any breast complications (e.g. infection, pain)	Yes - 1 ☐ , No - 2 ☐ , DNA – 99 ☐ ,
16	Does your baby have any serious, long-term medical problems?	Yes - 1 ☐ , No - 2 ☐ , DNA – 99 ☐ ,

NB: in this study breastfeeding= feeding with Expressed breast milk

DNA: Data Not Available

Appendix 2: URUPAPURO RUFATIRWAHO AMAKURU Y'UBUSHAKASHATSI

Inyito y'ubushakashatsi: “Predictors of exclusive breastfeeding practice in infants of urban mothers in Kigali”

no	IBIBAZO	Kode
	Numero y'usubiza:..... Nomero y'ivuriro: Itariki:	
Igice cya I: Imyirondoro		
1	Mutuye he?	Akarere.....umurenge.....
2	Imyaka ya mama w'umwana	 Nta makuru – 99 ☐ ,
3	Imyaka y' umwana (mu mezi)	 Nta makuru – 99 ☐ ,
4	Igitsina cy'umwana	Gabo-1 ☐ Gore-2 ☐ Nta makuru – 99 ☐ ,
5	Wize amashuri kugeza ku ruhe rwego?	Ntayo – 1 ☐ , Abanza - 2 ☐ , Ayisumbuye - 3 ☐ , Kaminuza- 4 ☐ , Imyuga- 5 ☐ , Nta makuru – 99 ☐ ,
6	Irangamimerere	Ingaragu-1 ☐ ; Gusezerana byemewe n'amategeko-2 ☐ Gutandukana byemewe n'amategeko-3 ☐ Gutandukana bitemewe n'amategeko-4 ☐ Umupfakazi-5 ☐ Nta makuru – 99 ☐ ,
7	Papa w'umwana ariho?	Yego -1 ☐ Oya-2 ☐ Nta makuru – 99 ☐ ,
8	Ufite akazi (harimo no kuba yikorera)? (Niba ari oya jya ku kibazo cya 13)	Yego -1 ☐ Oya-2 ☐ Nta makuru – 99 ☐ ,
9	Niba ari yego, ukora amasaha angahe ku munsu?:	 Nta makuru – 99 ☐ ,
10	Waba warahawe ikiruhuko cyo kubyara?	Yego -1 ☐ Oya-2 ☐ Nta makuru – 99 ☐ ,
11	Wasubiye ku kazi umwana angana ate?	Ibyumweru----- Nta makuru – 99 ☐ ,
12	Igihe wari uri mu kiruhuko cyo kubyara warahembwaga?	Yego -1 ☐ Oya-2 ☐ Nta makuru – 99 ☐ ,
13	Niba ari oya, uracyari umunyeshuli?	Yego -1 ☐ Oya-2 ☐ Nta makuru – 99 ☐ ,

14	Icyiciro cyawe cy'UBUDEHE ni ikihe?	Icyiciro 1 -1□; icyiciro 2 -2□; icyiciro 3-3□; icyiciro 4-4□; sinkizi-5□; Nta makuru – 99 □,
Igice cya 2: Ibyerekeranye no kubyara		
1	Wigeze wipimisha inda utwite?	Yego -1□ Oya-2□ Nta makuru – 99 □,
2	Umuganga yigeze akuganiriza ku bijyanye no konsa mbere yo kubyara?	Yego -1□ Oya-2□ Nta makuru – 99 □,
3	Wabyaye mu buhe buryo? :	Uburyo busanzwe-1□, Uburyo bwo kubagwa-2□; Nta makuru – 99 □,
4	Wabyaye bangahe icyo gihe? :	Umwe -1 □; babiri-2 □; Batatu-3 □; Abarenze batatu-4 □; Nta makuru – 99 □
5	Umwana yavukanye ibiro bangahe?	Kg Nta makuru – 99 □
6	Umwana wawe amaze kuvuka bigeze bamugushyira kunda?	Yego -1□ Oya-2□ Nta makuru – 99 □,
7	Uyu mwana ni we mfura?	Yego -1□ Oya-2□ Nta makuru – 99 □
8	Niba ari oya, ubu ufite abana bangahe?	Babiri-1□; Batatu -2□; barenze batatu -3□; Nta makuru – 99 □
9	Umwana asohoka mu bitaro yanganaga ate?	Munsi y'icyumweru 1-1□; Ibyumweru 1-2 -2□ ibyumweru 3-4 -3□ arengeje ibyumweru 4 -4□ Nta makuru – 99 □
Igice cya 3: Ibyerekeranye no konsa		
1	Ni iki wahaye umwana akimara kuvuka?	Amashereka-1□ amata y'abana-2□ amata y'inka-3□ amazi -4□ amazi arimo isukali-5□ umutobe-6□ ikindi(sobanura)-7□..... Nta makuru – 99 □
2	Ni ryari wonkeje umwana bwa mbere amaze kuvuka ugereranyije n'igihe yavukiye?	Amasaha...../Iminota..... Nta makuru – 99 □
3	Hari ikindi kintu wigeze uha umwana kitari amashereka mu masaha 24 ya mbere nyuma yo kubyara? (niba ari oya jya ku kibazo cya 6)	Yego -1□ Oya-2□ Nta makuru – 99 □
4	Niba ari yego wamuhaye iki? (shyiraho ibishoboka byose)	Amata y'inka-1□ Amata y'abana-2□

		Umutoke-3□; Amazi-4□; icyayi-5□ Ubuki-6□; Igikoma-7□ ikindi (sobanura)-8□..... Nta makuru – 99 □
5	Kuki wakimuhaye?	Amashereka adahagije-1 □ Umwana yarariraga cyane-2 □ Ikindi (sobanura)-3 □ Nta makuru – 99 □
6	Umwana wawe yangana ate utangira kumuha ikindi kintu kitari amashereka?	 Nta makuru – 99 □
7	Wamuhaye iki? (shyiraho ibishoboka byose)	Amazi-1□ ; Amata y’abana-2□ Amata y’inka -3□ ; Umutoke-4□ Igikoma-5□; Serelake-6□ Imbuto-7□ ; Ibiryo biseye-8□ Imboga-9□ ; Nta makuru – 99 □
8	Kuki watangiye kumugaburira angana gutyo?	Ni cyo gihe cya nyacyo giteganyijwe -1□ Nagombaga gusubira ku kazi-2□ amashereka ntiyari akimuhaza -3□ Nari nongeye nasamye indi nda -4□ Numvaga ari byiza kumuha ikindi kintu -5□ Umwana yanze konka -6□ umwana yashakaga kurya -7□ Nta makuru – 99 □
9	Mu gihe wabaga utari mu rugo, ni iki wahaga umwana? (shyiraho ibishoboka)	Amashereka-1□; amata y’inka-2□ amata y’abana -3□; amashereka n’ibiryo byoroshye-4□ igikoma-5□; serelake-6□ ibiryo biseye-7□; Imboga-8□ sinigeze musiga wenyine -9□ Nta makuru – 99 □
10	Ubu umwana wawe umugaburira gute? (shyiraho ibishoboka byose):	Konsa gusa-1□ Amata y’abana-2□ Amashereka akamye-3□ Amata y’inka-4□ ; Imbuto-5□ ibiryo biseye-6□; imboga-7□ ikindi (sobanura)-8□..... Nta makuru – 99 □
11	Wigeze wigishwa n’umuganga ibijyanye no konsa nyuma yo kubyara?	Yego -1□ Oya-2□ Nta makuru – 99 □
12	Uzi ko ushobora guha umwana amashereka wakamye?	Yego -1□ Oya-2□ Nta makuru – 99 □

13	Ujya usigira umwana wawe amashereka akamye?	Yego -1 ☐ Oya-2 ☐ Nta makuru – 99 ☐
14	Mbere y’uko ubyara uyu mwana, ni gute wari warateganyije kuzamugaburira mu mezi 6 ya mbere?	Kumwonsa gusa-1 ☐ ; amata y’abana-2 ☐ Kuvanga ibere n’amata y’abana-3 ☐ Ntacyo nigeze nteganya-4 ☐ Nta makuru – 99 ☐
15	Nyuma y’uko umaze kubyara wigeze ugira ibibazo by’uburwayi bw’ibere?	Yego -1 ☐ Oya-2 ☐ Nta makuru – 99 ☐
16	Umwana wawe yaba afite uburwayi bwa karande?	Yego -1 ☐ Oya-2 ☐ Nta makuru – 99 ☐

ICYITONDERWA: muri ubu bushakashatsi konsa bingana no guha umwana amashereka akamye.

Appendix 3: Consent for participating in a study

Consent for participating in this study “**predictors of exclusive breastfeeding practice in infants of urban mothers in Kigali**”.

Respondent number:

This study is intended to know feeding practices in the first year of life” in mothers living in urban region of Kigali.

To participate in this study is voluntary. There is no money paid to the participants or other benefits. The information given will be used for population education and will be kept confidential. The participation in this study will not cause any harm to you.

I understand well the above given explanations; and I have had an opportunity to ask questions.

Do you agree to participate in this study? YES NO

Participant.....
.....

Date...../...../.....
.....

Researcher

Names:

.....

Signature:

Who to contacts

If any question and concern for this study please contact:

Dr RUTAGUMBA Dieudonne: Principal investigator, +250788752426, rdodos2020@yahoo.fr

Dr KALIMBA Edgar: Supervisor, +250788531514, dreddiekalimba@gmail.com

Dr HITAYEZU Janvier: co-Supervisor, +250788491748, jhitayezu@gmail.com

Appendix 4: Amasezerano yo kwinjira mu bushakashatsi ku bushake

Inyito y’ubushakashatsi: “predictors of exclusive breastfeeding practice in infants of urban mothers in Kigali”

Numero y’usubiza:

Ubu bushakashatsi bugamije kumenya uko ababyeyi bo mu mugi wa Kigali bagaburira abana bari muni y’umwaka

Kujya muri ubu bushakashatsi ni ubushake, nta mafaranga cyangwa ikindi gihembo bihabwa ababujyamo. Ibizava muri ubu bushakashatsi bizatangazwa mu rwego rwo kwigisha abatwariye kandi amakuru yose batanze azagirwa. Kujya muri ubu bushakashatsi nta bibazo bizatera uwemeye kubujyamo.

Numvise neza ibisobanuro nahawe ndetse nahawe umwanya wo kubaza ibibazo.

Uremera kujya mu bushakashatsi? YEGO OYA

Amazina y’ubazwa:

Italiki:/...../.....

Uhagarariye ubushakashatsi

Amazina.....

Umukono.....

Abo wabaza ukeneye ibisobanuro

Ku bindi bisobanuro cyangwa ibibazo kuri ubu bushakashatsi mwahamagara:

Dr RUTAGUMBA Dieudonne: Principal investigator, +250788752426, rdodos2020@yahoo.fr

Dr KALIMBA Edgar: Supervisor, +250788531514, dreddiekalimba@gmail.com

Dr HITAYEZU Janvier: co-Supervisor, +250788491748, jhitayezu@gmail.com

Appendix 5: WHO Triage of Emergency signs

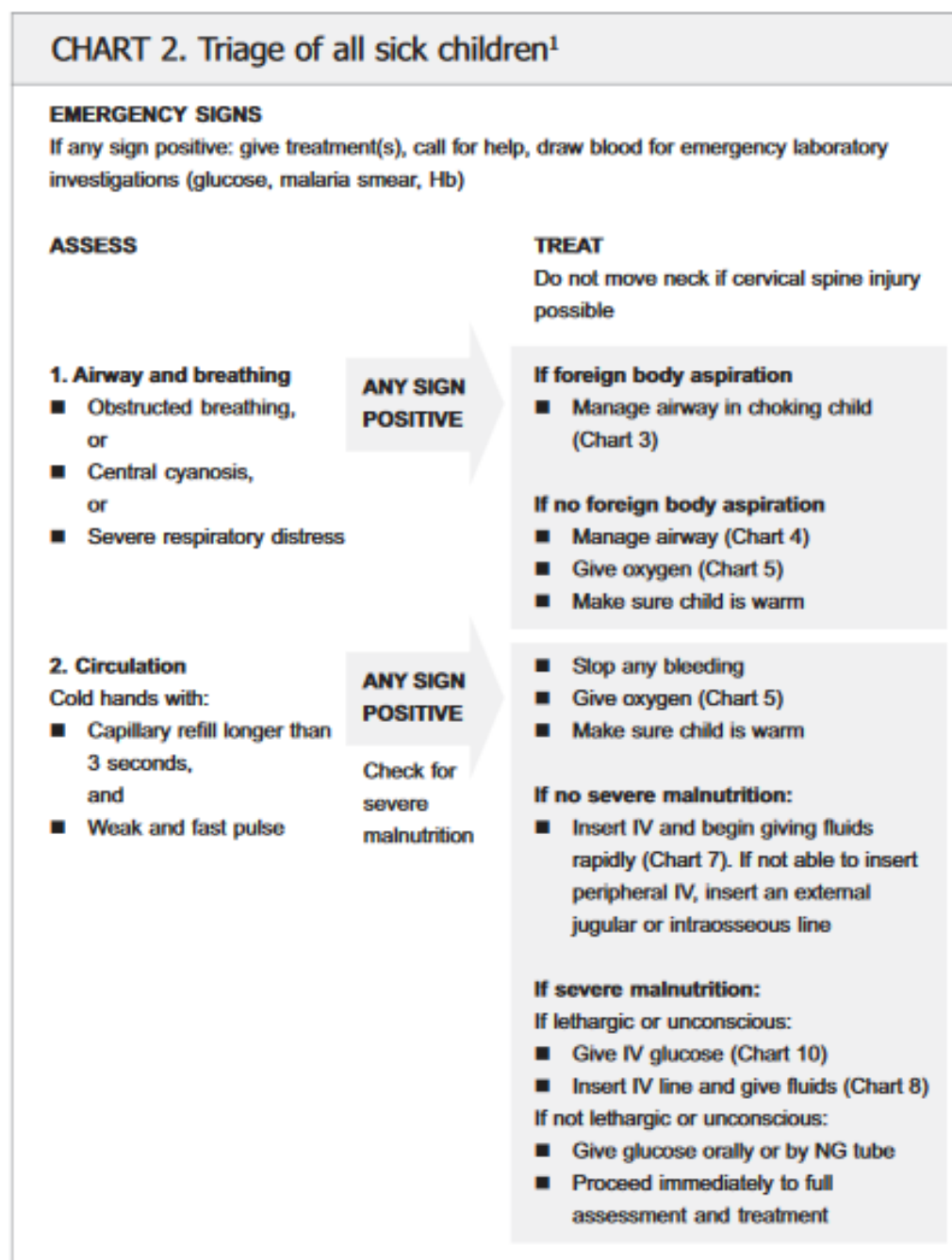


CHART 2. Triage of all sick children (continued)

EMERGENCY SIGNS

If any sign positive: give treatment(s), call for help, draw blood for emergency laboratory investigations (glucose, malaria smear, Hb)

ASSESS

3. Coma/convulsing

- Coma
or
- Convulsing (now)

**IF COMA OR
CONVULSING**

TREAT

Do not move neck if cervical spine injury possible

- Manage airway (Chart 4)
- If convulsing, give diazepam or paraldehyde rectally (Chart 9)
- Position the unconscious child (if head or neck trauma is suspected, stabilize the neck first) (Chart 6)
- Give IV glucose (Chart 10)

4. Severe dehydration (only in child with diarrhoea)

Diarrhoea plus any two
of these:

- Lethargy
- Sunken eyes
- Very slow skin pinch

**DIARRHOEA
plus TWO
SIGNS
POSITIVE**

Check for
severe
malnutrition

- Make sure child is warm.

If no severe malnutrition:

- Insert IV line and begin giving fluids rapidly and Diarrhoea Treatment Plan C in hospital

If severe malnutrition:

- Do not insert IV
- Proceed immediately to full assessment and treatment

Appendix 6: IRB Ethical approval



UNIVERSITY OF
RWANDA

COLLEGE OF MEDICINE AND HEALTH SCIENCES

CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 26th /10/2018

Dr Dieudonne RUTAGUMBA
School of Medicine and Pharmacy, CMHS, UR

Approval Notice: No 361/CMHS IRB/2018

Your Project Title *“Predictors of Exclusive Breastfeeding Practice in Infants of Urban Mothers in Kigali”* has been evaluated by CMHS Institutional Review Board.

Name of Members	Institute	Involved in the decision		
		Yes	No (Reason)	
			Absent	Withdrawn from the proceeding
Prof Kato J. Njunwa	UR-CMHS	X		
Prof Jean Bosco Gahutu	UR-CMHS	X		
Dr Brenda Asimwe-Kateera	UR-CMHS	X		
Prof Ntaganira Joseph	UR-CMHS	X		
Dr Tumusiime K. David	UR-CMHS	X		
Dr Kayonga N. Egide	UR-CMHS	X		
Mr Kanyoni Maurice	UR-CMHS	X		
Prof Munyanshongore Cyprien	UR-CMHS	X		
Mrs Ruzindana Landrine	Kicukiro district		X	
Dr Gishoma Darius	UR-CMHS	X		
Dr Donatilla Mukamana	UR-CMHS	X		
Prof Kyamanywa Patrick	UR-CMHS		X	
Prof Condo Umutesi Jeannine	UR-CMHS		X	
Dr Nyirazinyoye Laetitia	UR-CMHS	X		
Dr Nkeramihigo Emmanuel	UR-CMHS		X	
Sr Maliboli Marie Josee	CHUK	X		
Dr Mudenge Charles	Centre Psycho-Social	X		

After reviewing your protocol during the IRB meeting of where quorum was met and revisions made on the advice of the CMHS IRB submitted on 16th October 2018, **Approval has been granted to your study.**

Please note that approval of the protocol and consent form is valid for **12 months.**

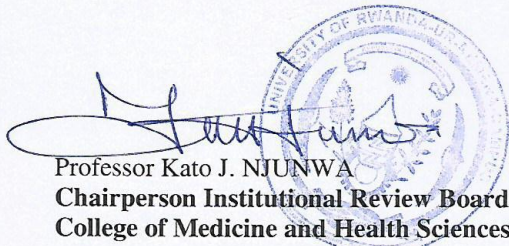
You are responsible for fulfilling the following requirements:

1. Changes, amendments, and addenda to the protocol or consent form must be submitted to the committee for review and approval, prior to activation of the changes.
2. Only approved consent forms are to be used in the enrolment of participants.
3. All consent forms signed by subjects should be retained on file. The IRB may conduct audits of all study records, and consent documentation may be part of such audits.
4. A continuing review application must be submitted to the IRB in a timely fashion and before expiry of this approval
5. Failure to submit a continuing review application will result in termination of the study
6. Notify the IRB committee once the study is finished

Sincerely,

Date of Approval: The 26th October 2018

Expiration date: The 26th October 2019



Professor Kato J. NJUNWA
Chairperson Institutional Review Board,
College of Medicine and Health Sciences, UR

Cc:

- Principal College of Medicine and Health Sciences, UR
- University Director of Research and Postgraduate Studies, UR