

Predictors of Exclusive Breastfeeding Practice in Urban Kigali, Rwanda – A Cross-Sectional Study

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ABSTRACT

BACKGROUND: Children face many health challenges during the early period of life and are prone to nutritional deficiency disorders and infectious diseases such as diarrhea and respiratory infections. Exclusive breastfeeding for the first six months-of-life is one way of fighting against them, but the factors influencing the duration of exclusive breastfeeding are not well known in Rwanda.

Our study aimed at evaluating predictors of exclusive breastfeeding in urban mothers.

METHODS: A cross-sectional study was undertaken in five health facilities (two tertiary and two district hospitals and one health center) located in Kigali, the capital city of Rwanda. Participants were mothers of infants aged 6-12 months recruited over two months between December 2018 and January 2019. Multivariate logistic regression was undertaken to determine factors associated with exclusive breastfeeding.

RESULTS: A total of 221 mothers were included and 56% of them reported exclusively breastfeeding their babies for the first six-months-of-life. Breastfeeding initiation within the first hour of life was at 80%. Employment, breast milk expression, single gestation, exclusive breastfeeding plan and breast milk supplementation were factors found to be significantly associated with exclusive breastfeeding.

CONCLUSION: Exclusive breastfeeding for the first six months-of-life is suboptimal in Kigali. Support and education about breastfeeding of expectant parents and after delivery are essential. Further studies to determine suitable interventions for different environments like workplaces are warranted.

Keywords (MeSH): Predictor, Exclusive, Breastfeeding, Infant, Urban, Rwanda.

INTRODUCTION

Exclusive breastfeeding (EBF) is defined as the

practice of giving an infant (0-1year-of-age) only breast milk (no food or water) [1,2]. The World Health Organization (WHO) recommends exclusive

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breastfeeding in the first six months-of-life, as it provides essential and irreplaceable nutrition to achieve optimal growth and development [3]. Half of the deaths which occur in children under five years-of-age are directly or indirectly related to malnutrition [4]. The supplementation of breast milk with solid and semi-solid food with continued breastfeeding is then recommended up to 24 months-of-life or longer [5].

Breast milk is the complete and optimal nutrition for newborn infants; it reduces the morbidity and mortality, particularly from infectious causes in the first six months-of-life. Exclusive breastfeeding in the first six months reduces the rate of hospitalization for respiratory infections by 57%. It decreases the morbidity of gastrointestinal infections and otitis media as it serves as the first child's immunization [1,3,6]. The cost is an important factor in low-middle income countries (LMICs), milk supplements, such as formula, are cost-prohibitive [7]. For example, in Rwanda among breastfeeding children under two years, only one per cent of children receive infant formula. Only two per cent are given fortified commercial baby food as their complementary food [8].

Different factors impairing exclusive breastfeeding and favoring early weaning have been identified in previous studies, these factors include maternal workload, insufficient breast milk, cesarean delivery and mothers with a higher level of education as they are likely to spend less time with their infants were also found to be at higher risk to interrupt exclusive breastfeeding earlier [9]. Additionally, information about exclusive breastfeeding is mostly obtained from health facilities in prenatal and postnatal care. Health care facilities should support expectant and lactating mothers through education on breastfeeding as the evidence suggests that it increases breastfeeding duration [10,11]. The lack of this information was identified as one of the factors impairing exclusive breastfeeding in previous studies [5,9].

Available data in Rwanda show that the duration of exclusive breastfeeding in urban areas is slightly shorter than in rural areas [8]. However, factors influencing its practice are not well outlined in either setting.

This study sought to identify factors associated with exclusive breastfeeding in urban mothers and identify potential strategies to help mothers

provide their infants with the first best optimal breast milk.

METHODS

Design and population: This was a cross-sectional study and this manuscript was described using STROBE checklist [12] The target population consisted of mothers of infants aged six to twelve months living in urban areas. The study population comprised only those living in the urban area of Kigali, the capital city of Rwanda for easy access due to financial constraints. Kigali consists of both urban (76%) and rural (24%) areas. Kigali urban population accounts for nearly 50% of the entire national urban population [8,13].

Inclusion and exclusion criteria: Mothers attending a health facility for routine vaccination and/or pediatric outpatient visit with their children were recruited for the study. The study's eligibility included mothers of children aged six to twelve months living urban Kigali, and who were taking them for outpatient consultation or routine vaccination. Excluded were mothers who did not consent, and mothers aged less than 18 years. Those enrolled but missing information were excluded from data analysis.

Study setting: Five urban health facilities of different levels of care were purposively selected. These are two tertiary level hospitals, (the University Teaching Hospital of Kigali (CHUK) and King Faisal Hospital (KFH)), two (Muhima and Kibagabaga) District Hospitals, and one (Muhima) Health Center.

Recruitment: Participants were opportunistically and prospectively recruited over a period of two months between December 01, 2018, and January 31, 2019, to reach the minimum desired sample.

Study procedures: After obtaining the participants' informed oral consent, the data were collected by interview.

Sample size: The sample size was calculated using the single population formula [14]. The required sample was found to be 174 mothers, with 5% type 1 error.

Data collection and variables: A structured, pre-designed questionnaire was used. The literature contained information on possible predictors of exclusive breastfeeding as the outcome of interest. Closed-ended questions were used. Anonymous data on socio-demographic characteristics,

pregnancy, delivery and breastfeeding history was collected and entered in a password protected computer.

Analysis: Data was analyzed using the SPSS (Statistical Package for Social sciences) 21.0 version software. Summary statistics (frequencies/proportions for categorical data, median and interquartile range [IQR] for numerical variables) were used to present participants characteristics. Bivariate analysis was done using Chi-square to compare the outcome with possible independent variables. The fisher-exact test was used for cell (group) sizes smaller than five. Factors that significantly influenced exclusive breastfeeding were included in a multivariate analysis model of logistic regression to eliminate for confounders. The odds of practicing EBF with 95% confidence intervals were computed with adjusted odds ratios and p-values to assess the association's strengths.

Ethical considerations: For confidentiality purposes, participants were kept anonymous and only assigned study identification numbers. Participation was voluntary and free withdrawal at any time after enrollment was allowed. The research team was in no way linked to the health care service sought by participants. The study was approved by the Institutional Review Board (IRB) of the College of Medicine and Health Sciences

of the University of Rwanda (approval notice No: 361/CMHS IRB/2018).

RESULTS

Participant demographics: A total of 231 eligible mothers were enrolled and 221 were qualified for the final analysis [fig.1]. The maternal age range was between 18 and 42 years (median 28 years) with infants' age range of six to twelve months (median nine months). A third of the mothers were employed (83/221) and over two-thirds of them had attained a secondary school level of education or beyond (Table 1).

Pregnancy, Birth, and Breastfeeding: 98% of mothers had attended antenatal care (ANC), 40% were primipara, 72.7% had delivered vaginally and 95% had given birth to a singleton child. The majority of infants (93.2%) were born with a normal birth weight (equal and above 2.5kg). Education about breastfeeding was offered at 83% and 66% during ANC visits and after delivery, respectively.

Feeding in the first 24 hours of life: Alongside breastfeeding, some mothers (33/221, 15%) had given other feeds within the first 24 hours. Reasons mentioned include not having enough

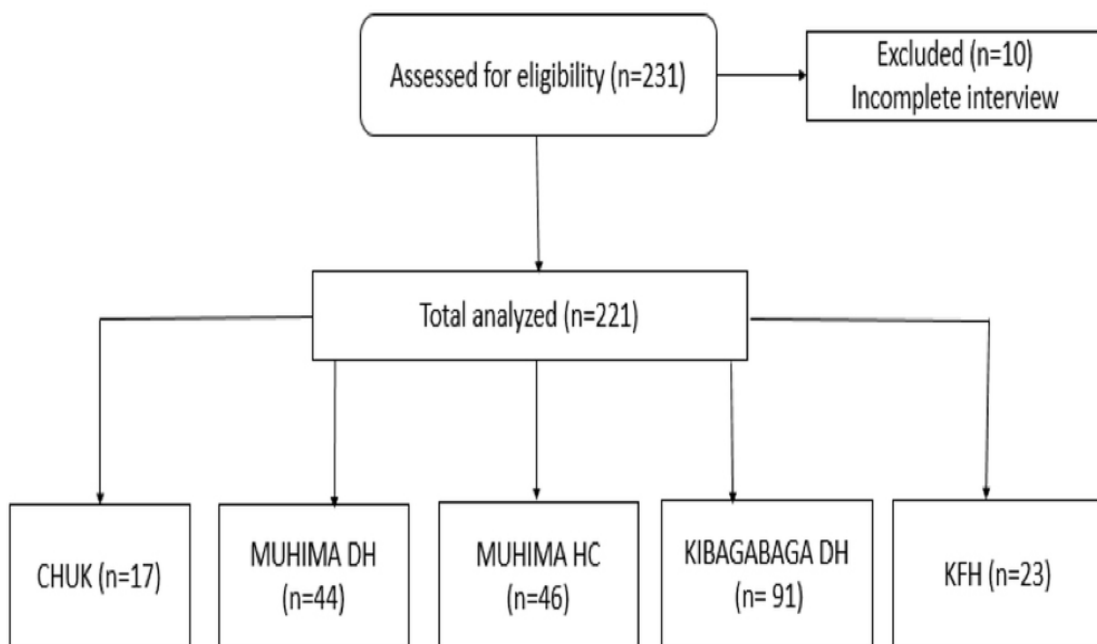


Figure 1: illustration of mothers who participated in the study

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

breast milk (24/33 or 72.7%), a child crying too much (9%), a mother too sick right after delivery to breastfeed (6%) and belief that it is good to give something else (3%) or it (black tea) is preventive of abdominal colic (9%).

During the first 6 months, breastfeeding status:

The prevalence of exclusive breastfeeding for the entire first six months was 55.7%. EBF reduces progressively from birth, where it is 85.1%, 81.9% and 57.5% at 1 month, 3 months and 5 months respectively. Breastfeeding is initiated within the first hour of life at a rate of 80.5%, and breast milk is the predominant type of feeding given to the baby first after delivery at 89.6% (198/221). Other types of first feeds include formula milk (8.1%), sugary water (1.4%) and juice (0.9%).

breast milk (46.8%). Other reasons included the child's readiness to eat (6.4%), conviction that it is appropriate to give something else (6.4%), getting pregnant (1.1%) and going back to school (1.1%). The study found that 76.5% (69/221) of mothers have knowledge about expressing breast milk, yet only 32.5% were practicing it.

Predictors of exclusive breastfeeding: Three factors favored exclusive breastfeeding on multivariate analysis (Table 2): single birth (p -value <0.001), feeding expressed breast milk (EBM) (p -value <0.001), and a prior plan for exclusive breastfeeding ($p=0.001$). However, two factors were found to impact exclusive breastfeeding negatively.

Table 2: Multivariate analysis of factors associated with exclusive breastfeeding

Exclusive Breastfeeding	aOR	95% C.I	P-value
Maternal education (poor)	0.581	0.245-1.381	0.219
Employed	0.245	0.16-0.62	0.003
Economic status (low)	1.206	0.523-3.032	0.606
Educated on breastfeeding before delivery	1.516	0.574-3.998	0.401
Educated on breastfeeding after delivery	2.162	0.958-4.879	0.063
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	Ref
Exclusive BF	4.602	1.89-11.23	0.001
Breastfeeding and Formula	0.119	0.03-0.45	0.002

aOR: adjusted odds ratio; C.I: confidence interval; Ref: Reference; EBF: Exclusive Breastfeeding; EBM: Expressed Breast Milk

Complementary feeding: Early initiation (before six months) of complementary feeding was found to begin as early as age one month at a rate of 7.7% (17/221) while 24.4% (54/221) of mothers start supplementing between four and five months.

Supplemental foods used include formula milk (47.1%), cow's milk (20.4%), porridge (14.5%), fruits (9.5%), cereals (3.6%), and juice (0.5%). The two main reasons mothers gave were to return to work (35/94 or 37.2%) and insufficient

These are formal employment ($p=0.003$), and a prior plan to mix formula feeding with breastfeeding ($p=0.002$). Ten factors on bivariate analysis were found to be associated with exclusive breastfeeding (Table 3).

DISCUSSION

The prevalence of exclusive breastfeeding for the first six months-of-life for urban mothers in Kigali is 55.7%. This is by far below the national average

Table 3: Factors 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
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 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		
High (Ubudehe 3&4)	66 (49.6)	65 (50.4)	131 (100)	0.56	0.323-0.972	0.038
Education on breastfeeding 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 breastfeeding 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 pregnancies						
No	1 (10)	9 (90)	10 (100)	Ref		
Yes	122 (57.8)	89 (42.2)	211 (100)	12.337	1.535-99.145	0.002
Parity						
Primiparous	51 (57.3)	38 (42.7)	89 (100)	Ref		
Multiparity	73 (55.3)	59 (44.7)	132 (100)	0.922	0.536-1.586	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	0.22-0.857	0.015
Plan of feeding in the first 6 months before delivery						
Exclusive breastfeeding	93 (79.5)	24 (20.5)	117 (100)	Ref		

Breastfeeding and formula milk	8 (13.8)	50 (86.2)	58 (100)	0.043	0.018-0.104	<0.001
No plan	23 (50)	23 (50)	46 (100)	0.272	0.131-0.563	<0.001
Feeding something else in first 24hrs						
No	122 (64.9)	66 (35.1)	188 (100)	Ref		
Yes	1 (3)	32 (97)	33 (100)	0.017	0.002-0.127	<0.001
Feeding EBM if not at home						
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

*Good education: completed at least secondary level; Ref: reference; Freq: Frequency

of 87% as per the latest 2014-2015 Rwanda Demographic and Health Survey (DHS) [8], likely because DHS studied a different sample size, design and period; looked on mothers with sick and non-sick infants; and rural as well as urban mothers. In addition, the DHS did find no large discrepancy between urban and rural mothers. The median duration of exclusive breastfeeding was 5.1 and 5.4 months among mothers in the City of Kigali (and all urban areas in general) and those in rural areas, respectively.

The study identified many predictors affecting exclusive breastfeeding for urban mothers in Kigali and may serve to inform policies. These are number of births (single versus multiple), expression of breast milk, a prior plan on how the expectant mother or family will feed their infant, and the mother's employment. Women who planned to exclusively breastfeed in the first six months were almost five times likely to do so more than those with no plan at all ($p=0.001$, $aOR=4.602$, 95% CI [1.89 -11.23]), and those feeding their infants with expressed breast milk are eight times more likely to practice exclusive breastfeeding ($p<0.001$ and $aOR = 8.5$, 95% CI [2.64 – 27.37]). On the other hand, mothers who initially planned to give formula in addition to breastfeeding were 88% less likely to exclusively breastfeed than those who had no plan ($p=0.002$ and $aOR = 0.12$, 95% CI [0.03 – 0.45]). Employment is a significant factor negatively impacting exclusive breastfeeding where employed mothers are 75% less likely to exclusively breastfeed ($p=0.003$ and $aOR = 0.245$, 95% CI [0.16 – 0.62]). A single birth was found to significantly favor exclusive breastfeeding ($p<0.001$ and $aOR = 71.6$, 95% CI [6.6 – 789.9]) however this need to be interpreted with caution and within the limit the study sample size since only 5% of participants had given birth

to more than one baby. A study in Japan, however, got the same findings [15]. Although factors like an expression of breast milk and employment have been consistently documented in other studies to affect exclusive breastfeeding in the same directions as in the present study [16–18], other factors described in the literature were not reflected this particular setting. They include parity, education, economic status, maternal age and mode of delivery [16,19–23]. Differences in settings may play a role, and results should be interpreted within each study's limits.

Policies to reinforce factors that favor and eliminate those hindering exclusive breastfeeding in this urban population should be elaborated and implemented by all concerned authorities having social affairs in their attributions like the ministry of health, the local governance and the city Kigali among others. Positive attitudes like high turnout of ANC attendance should be utilized to sensitize expectant parents about the benefits, management and maintenance of exclusive breastfeeding. This may be of great impact to approach them during this period to learn about their plans to feed their infant, to teach the mother how to express breast milk, remove confusion or erroneous beliefs about breast milk alone, and help them to overcome other obstacles impeding exclusive breastfeeding. A well-structured program such as Baby-Friendly Initiative to ensure all mothers received the same package of education information wherever they go should be adopted in all health facilities. It has shown its evidence in promotion of EBF [24].

More efforts are needed to maintain EBF among employed mothers. For example, campaigns aimed at supporting breastfeeding mothers and promoting exclusive breastfeeding at the workplace, to sensitize employers and their

institutions to take the lead in this promotion by providing a dedicated breastfeeding space and other needed support to breastfeeding mothers as per WHO and Centers for Disease Control and Prevention (CDC) recommendations to support exclusive breastfeeding in working mothers [25,26]; however further studies to determine the suitable intervention according to the working environment is necessary both to promote EBF and improve the stability and efficiency at work for breastfeeding mothers. It is important to consider that with the current evidence, breastfeeding has proven to be a “smart and cost-effective” investment as the World Bank and WHO highlight it, every one dollar invested in breastfeeding will produce 35 dollars in economic returns [27,28].

This is a particular interest in low-resource settings where formula milk is not affordable to many families. This is indirectly expressed in the current study, where 47.1% and 20.4% of those who supplemented breast milk in the first six months used formula and cow’s milk, respectively. Feeding cow’s milk to young infants would add more of the risk of iron deficiency anemia and cow’s milk protein allergy [29]. Families should be well supported and educated that breastfeeding is all that is needed for infants within their first six months-of-life and breast milk is by far superior

and cannot be compared to both formula and cow’s milk. Studies have found that another advantage of breastfeeding is mother-infant attachment security in the long term which was not present in less breastfed infants [30,31].

This study was only conducted in urban Kigali where eligible participants that were taking their infants to a health facility were enrolled. Participants from rural locations were not included. Results should be interpreted within the limit of its location and sample size. It may be associated with recall and acquiescence biases as a verbally administered questionnaire was used. However, the low prevalence of exclusive breastfeeding and identified predictors are useful for policy-making and can be explored in other settings. Further studies with larger and more representative samples are necessary.

CONCLUSION

Exclusive breastfeeding for the first six months is suboptimal in Kigali. Support and education about breastfeeding of expectant parents and after delivery are essential. Further studies to determine suitable interventions for different environments, like workplaces, are warranted.

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