Original Article

The Determinants of Exclusive Breastfeeding in Rwanda: A Secondary Data Analysis of the RDHS 2019/2020

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Abstract

Background
Exclusive breastfeeding for the first six months is crucial for infant survival, growth, and development. However, factors influencing exclusive breastfeeding practices in Rwanda remain underexplored. This study aimed to assess the determinants of exclusive breastfeeding and identifying associated factors.

Methods
A secondary data analysis of the 2019–2020 Rwanda Demographic and Health Survey (RDHS) was conducted with a nationally representative sample of 4,359 children under five years. A weighted analysis was conducted. Bivariate and multivariable logistic regression analyses identified key determinants for exclusive breastfeeding with significance level set at p value <0.05.

Results
The prevalence of exclusive breastfeeding was 80.5%. Mothers in the Southern Province (AOR 1.948, 95% CI: 1.151-3.299), Western Province (AOR 2.391, 95% CI: 1.549-3.690), and Northern Province (AOR 2.091, 95% CI: 1.141-3.831) had higher odds of exclusive breastfeeding than those in Kigali. Wealthier mothers were less likely to breastfeed exclusively (AOR 0.524, 95% CI: 0.364-0.753). Children aged 6-23 months had significantly lower odds of breastfeeding compared to those under 6 months (AOR 0.014, 95% CI: 0.011-0.018).

Conclusion
This study underscores the need for promoting exclusive breastfeeding practices, particularly among mothers in Kigali and higher-income households, to improve child health outcomes.

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Keywords: Determinants, Exclusive breastfeeding, RDHS, Cross-sectional Study, Rwanda

Introduction

Exclusive breastfeeding practice is fundamentally important for the survival, growth and development of infants. Exclusive breastfeeding (EBF) refers to the practice of feeding only breast milk, which serves as the sole source of nutrients crucial for healthy growth and development for the first six months of life without the addition of any other foods or liquids.[1–3]The World Health Organization (WHO) recommends exclusively nursing newborns, meaning they should only take breast milk with the exception of prescription drugs, vitamin or mineral drops and oral rehydration solution for the first six months of life and thereafter, along with additional foods, until the child is two years old or older.[4]

For newborn babies, breast milk provides the fullest and best nourishment possible; during the first six months of life, it lowers morbidity and mortality, especially from infectious causes.[5,6] For instance, during the first six months, hospitalization rates for respiratory infections are lowered by 57%.[6] It serves as the first child's immunization, it lowers the morbidity of gastrointestinal infections and otitis media.[7–9] In low and middle income nations, infants who are not breastfed face a significantly risk of six to ten times more likely to succumb to mortality compared to their breastfed counterparts.[10,11] Research indicates that breastfeeding reduces the likelihood of mothers experiencing hemorrhages, ovarian cancer, postpartum depression, endometrial cancer, and breast cancer.[12,13] According to certain research, breastfeeding for more than 12 months was linked to a 26% and 37% lower incidence of breast and ovarian cancer, respectively.[14]

In recent years, global attention has focused on promoting exclusive breastfeeding, particularly in developing countries. Failure to practice exclusive breastfeeding guidelines leads to significant infant mortality. Studies estimate that in Asia and Africa combined, approximately 1.24 million infants die within the first six months of life each year due to suboptimal breastfeeding. Within this burden, Sub-Saharan Africa, a sub_region of Africa, experiences some of the highest child mortality rates, accounting for about 56% of all under five deaths worldwide.[15–17] Recent research suggests that universal adherence to exclusive breastfeeding could prevent roughly 12% of deaths among children under five in low- and middle-income countries annually.[18] In East African nations, the exclusive breastfeeding prevalence among infants under 6 months stands at 69.3%, 63.2%, 61.4%, and 50% in Burundi, Uganda, Kenya, and Tanzania respectively.[1] In 2015, Rwanda infant breastfeeding rates were 81% within the first hour of life and 87% exclusively breastfed throughout the first six months, both below the WHO's target of 90%.[1,19] Different programs have been introduced by non-government organizations (NGOs) and the government to enhance exclusive breastfeeding among mothers. These initiatives include providing training to healthcare workers, mobilizing mothers to attend antenatal care, and encouraging exclusive breastfeeding of their children until six months of age through various campaigns.[19]

Although research evidence supports the health benefits of breastfeeding, over 60% of infants under the age of six months are not exclusively breastfed globally; this percentage has not changed significantly in the last two decades. In low-income countries, 53% of infants under six months are not exclusively breastfed, compared to 61% in lower-middle-income countries and 63% in upper-middle-income countries.[20] Rwanda, like many other sub-Saharan African countries, faces challenges in sustaining high rates of exclusive breastfeeding. According to the DHS 2019-2020, exclusive breastfeeding rates in Rwanda declined from 87.3% in 2015 to 80.9% in 2020.[21] This downward trend is concerning given the crucial role of EBF in child survival and development.

Several factors have been identified as being associated with the practice of exclusive breastfeeding, including maternal age, place

of residence, educational level, attendance at antenatal care sessions, and occupation. [15,22–25] However, no national-level analysis has yet been conducted to examine these determinants specifically in the Rwandan context using representative survey data. Without such evidence, the specific drivers behind the recent decline in EBF coverage remain unknown, making it difficult to design targeted and effective interventions. This study was sought to assess the determinants of exclusive breastfeeding practices among mothers of infants aged 0–6 months, using data from the RDHS 2019–2020. Understanding these determinants is vital for policymakers to design strategies intended to boost exclusive breastfeeding rates and improve infant health outcomes in Rwanda.

Methods

Study design and population

This cross-sectional study utilized data from the 2019-20 RDHS. It included a nationally representative sample of children under five years from across the country to explore factors linked to exclusive breast-feeding. It was conducted between November 2019 and July 2020 and the survey collected comprehensive health and demographic data through questionnaires and anthropometric measurements, without any specific interventions.

Study sampling and sample size

The 2019-20 RDHS used a two-stage stratified sampling method to ensure national representativeness for key indicators. In the first stage, clusters composed of enumeration areas (EAs) were selected, with a total of 500 clusters chosen from 112 in urban areas and 388 in rural areas. Higher number of rural clusters reflects Rwanda's predominantly rural population and the need to produce precise estimates for both rural and urban strata at national and subnational levels. Urban areas appear under-sampled because they comprise a smaller share of the national population and thus require fewer clusters to achieve representativeness.

In the second stage, households were systematically sampled from these clusters. A household listing operation conducted in July 2019 in the selected EAs led to the selection of 13,000 households nationwide, averaging 26 households per district. As the sample was not self-weighting, sampling weights were applied during analysis to adjust for the different probabilities of selection across strata, ensuring unbiased national estimates despite the rural–urban disparity in cluster numbers. For this study, data from the RDHS 2019/2020 focused specifically on children under five. Initially, 4,180 children under five years old were considered. After applying weighting factors to adjust for the sampling design and ensure national representativeness, the sample size was further adjusted by an increase of 179 children, resulting in a final sample of 4,359 children and their mothers. The study used Kids Recode (KR) dataset from the RDHS, which provides detailed information on children under five. The dataset used to generate the results for this research is available online at the DHS database at DHS Program website.[26]

Study variables

Dependent (Outcome Variable)

The primary outcome variable in this study was the exclusive breastfeeding status among children under five years of age, assessed based on feeding information provided by mothers Outcome variable was dichotomously classified: those who received only breast milk were classified as exclusively breastfed, while those who received any supplementary foods or liquids, such as water, formula milk, solid foods, fluids, coffee, or juice, were classified as non-exclusively breastfed.

Independent Variables (Explanatory Variables)

Maternal characteristics

Maternal characteristics included region, type of residence (urban or rural), women's age, mother's level of education, mother's occupation, marital status, place of delivery,

receipt of antenatal care during pregnancy, breastfeeding counseling, and postnatal care.

Household characteristics

Household characteristics comprised wealth status, sex of the household head, use of the internet, and religion

Child characteristics

Child characteristics included sex of the child, child's age, birth weight, birth interval, and breastfeeding initiation.

Analysis and data processing

Access to the DHS dataset, Kids Recode (KR) file was obtained through an online application process. Data analysis was conducted using STATA Version 17, with weights adjusted based on the mother's weight to ensure accurate representation. Descriptive statistics were initially used to summarize the socio-demographic characteristics and other relevant participant information. A chi-square test was performed to determine the associated factors of exclusive breastfeeding. Then variables with a p-value < 0.05 in bivariate analysis were then analyzed using univariable logistic regression to calculate Crude Odds Ratios (COR) and their 95% confidence intervals. CORs represent the strength and direction of association between each predictor and exclusive breastfeeding without controlling for other variables. All variables that met the significance threshold in the bivariate analysis were subsequently entered into a multivariable logistic regression model to estimate Adjusted Odds Ratios (AOR) for the predictors of exclusive breastfeeding. Multicollinearity was assessed using the Variance Inflation Factor (VIF), with a threshold of >10 indicating high collinearity. The variable use of internet was excluded from the analysis due to its strong collinearity with wealth status and region. Factors were considered significant if the p-value was < 0.05.

Results

Socio demographic characteristics among mothers and their children

Most mothers (82.9%) were living in rural areas with the highest percentage from the Eastern province (26.7%) and Western province (24.6%) regions. The majority were aged 25-34 years (49%) and 63.5% had primary education. Unskilled workers comprised 63.8%, and 84.9% were married or cohabiting, with 43.1% categorized as poor. Households were predominantly male-headed (78.7%), and religious affiliation was mostly Protestant (65.02%) and Catholic (32.95%). Regarding delivery, 60% gave birth in health centers, and 47.4% had more than three antenatal Visits though only 19% received postnatal care. Internet use was low at 11.1%, but 70.8% received breastfeeding counseling. Children were nearly evenly split by gender, with 50.4% male, and most were aged 6-23 months (55.8%) with a healthy birth weight (94%). The majority (85.9%) were breastfed within the first hour (Table 1).

Table 1. Socio demographic characteristics among mothers and their children

Maternal characteristics	Frequency (%)
Region	
Kigali	635 (14.6)
South	889 (20.4)
West	1073 (24.6)
North	598 (13.7)
East	1165 (26.7)
Residence	
Urban	745 (17.1)
Rural	3615 (82.9)
Women's age in years	
15-24	848 (19.4)
25-34	2138 (49)
35-49	1374 (31.5)
Mother's education	
No education	459 (10.5)
Primary	2767 (63.5)
Secondary and Higher	1133 (26)
Mother's occupation	
No working	872 (20)
Skilled workers	706 (16.2)
Unskilled workers	2782 (63.8)

Table 1. Continued

Maternal characteristics	Frequency (%)
Marital status	
Married/cohabiting	3702 (84.9)
Single/living alone	658 (15.1)
Wealth status	
Poor	1881 (43.1)
Middle	808 (18.5)
Rich	1671 (38.3)
Place of delivery	
Home	208 (4.8)
Hospital	1413 (32.9)
Health center	2577 (60)
Clinic	98 (2.3)
Antenatal care visit	
None	74 (2.3)
1 Visit	147 (4.5)
2 Visit	414 (12.8)
3 Visit	1069 (33)
Above 3 Visit	1536 (47.4)
Sex of household head	
Male	3432 (78.7)
Female	928 (21.3)
Postnatal care	
No	2625 (81)
Yes	616 (19)
Use of internet	
No	3876 (88.9)
Yes	484 (11.1)
Counsel on breastfeeding	
No	944 (29.1)
Yes	2294 (70.8)
Religion	
Catholic	1427 (32.95)
Protestant	2816 (65.02)
Muslim	71 (1.64)
No religion	17 (0.39)
Sex of child	
Male	2197 (50.4)
Female	2163 (49.6)
Child age	
Under 6 months	786 (18)
6-23 months	2431 (55.8)
24-41 months	404 (9.3)
42-59 months	738 (16.9)
Birth weight	
≥ 2.5kg	4098 (94)
< 2.5 kg	262 (6)
Birth interval	
> 24 months	2684 (84.2)
≤ 24 months	504 (15.8)
First breastfeed after delivery	
Within hour	2772 (85.9)
Greater than an hour	457 (14.1)

Maternal and child characteristics associated with exclusive breast-feeding practices

Region, residence, women's age, wealth status, internet use, and child age were significant variables influencing exclusive breastfeeding. Mothers in the West had higher exclusive breastfeeding rates compared to other regions ($p<0.001$), and rural areas had more exclusive breastfeeding than urban areas ($p=0.012$). Younger mothers (15-24 years) were more likely to exclusively breastfeed ($p<0.001$). Wealthier mothers had lower exclusive breastfeeding rates (15.9%, $p=0.012$). Internet use was associated with less exclusive breastfeeding ($p=0.049$) (Table 2).

Multivariable analysis of factors associated with exclusive breastfeeding

Compared to mothers in Kigali, those from the Southern, Western, and Northern provinces had significantly higher odds of exclusively breastfeeding, as shown in Table 3. In contrast, mothers in the rich wealth category were substantially less likely to breastfeed exclusively compared to those in the poor category, as indicated by the adjusted odds ratios and confidence intervals in (Table 3).

Table 2. Maternal and child characteristics associated with exclusive breast-feeding practices

Variables	Exclusive breastfeed	Non-exlcusive breastfeed	X^2 value	p-value
	Frequency (%)	Frequency (%)		
Region				
Kigali	81 (12.8)	554 (87.2)		
South	177 (19.9)	712 (80.1)		
West	238 (22.1)	835 (77.9)	32.11	**<0.001**
North	120 (20)	479 (80)		
East	178 (15.3)	987 (84.7)		
Residence				
Urban	109 (14.6)	636 (85.4)	7.39	**0.012**
Rural	684 (18.9)	2931 (81.1)		
Women's age				
15-24	185 (21.9)	662 (78.1)	2417.58	**<0.001**
25-34	368 (17.2)	1770 (82.8)		
35-49	240 (17.5)	1134 (82.5)		
Mother's education				
No education	92.9 (20.2)	366 (79.8)	2.04	0.497
Primary	505.6 (18.3)	2261 (81.7)		
Secondary and Higher	194.4 (17.2)	939 (82.8)		
Mother's occupation				
No working	176.9 (20.3)	695 (79.7)	3.79	0.211
Skilled workers	117 (16.6)	589 (83.4)		
Unskilled workers	499 (17.9)	2283 (82.1)		
Marital status				
Married/cohabiting	660 (17.8)	3042 (82.2)	1.96	0.223
Single/living alone	133 (20.2)	525 (79.8)		
Wealth status				
Poor	378 (20.1)	1503 (79.9)	10.19	**0.012**
Middle	149 (18.4)	659 (81.6)		
Rich	266 (15.9)	1405 (84.1)		
Place of delivery				
Home	27 (12.9)	181 (87.1)		
Hospital	267 (18.9)	1146 (81.1)	7.41	0.124
Health center	483 (18.7)	2095 (81.3)		
Clinic	11 (11.5)	87 (88.5)		
ANC during pregnant				
No contact	25 (33.8)	49 (66.2)		
1 contact	43 (29.3)	104 (70.7)	9.75	0.078
2 contact	112 (27.2)	302 (72.8)		
3 contact	237 (22.2)	832 (77.8)		
4 and above contact	375 (24.4)	1161 (75.6)		
Sex of household head				
Male	624 (18.2)	2808 (81.8)	0.00	0.973
Female	169 (18.2)	759 (81.8)		

Table 2. Continued

Variables	Exclusive breastfeed Frequency (%)	Non-exlcusive breastfeed Frequency (%)	X² value	p-value
Postnatal				
No	648 (24.7)	1978 (75.3)	0.32	0.582
Yes	145 (23.6)	471 (76.4)		
Use of internet				
No	725 (18.7)	3151 (81.3)	5.99	**0.049**
Yes	68 (14.1)	416 (85.9)		
Counsel on breastfeeding				
No	256 (27.1)	688 (72.9)	5.66	0.061
Yes	537 (23.4)	1757 (76.6)		
Religion				
Catholic	251 (17.6)	1176 (82.4)	8.11	0.367
Protestant	526 (18.7)	2290 (81.3)		
Muslim	8 (11.9)	63 (88.1)		
No religion	0 (0)	17 (100)		
Sex of child				
Male	404 (18.4)	1793 (81.6)	0.11	0.755
Female	389 (18)	1774 (82)		
Birth weight				
>=2.5kg	751 (18.3)	3347 (81.7)	0.89	0.347
<2.5 kg	42 (16)	220 (84)		
Child breastfeed when				
Within hour	695(25.1)	2077 (74.9)	2.61	0.125
Greater than an hour	98 (21.5)	359 (78.5)		

Table 3. Univariate and multivariable logistic regression of factors associated with exclusive breastfeeding

Variables	Univariable logistic regression	Multivariable logistic regression
	COR 95% (CI)	AOR 95% (CI)
Region		
Kigali	ref	ref
South	1.697 [1.263-2.278]***	1.948 [1.151-3.299]*
West	1.941 [1.461-2.578]***	2.391 [1.549-3.690]***
North	1.705 [1.19-2.443]**	2.091 [1.141-3.831]*
East	1.23 [0.88-1.719]	0.933 [0.554-1.572]
Residence		
Urban	ref	ref
Rural	1.364 [1.071-1.736]*	1.009 [0.632-1.613]
Womens age		
15-24	ref	ref
25-34	0.742 [0.590-0.934]*	1 [0.711-1.407]
35-49	0.757 [0.598-0.958]*	1.037 [0.720-1.495]
Wealth status		
Poor	ref	ref
Middle	0.899 [0.709-1.139]	0.767 [0.540-1.090]
Rich	0.751 [0.620-0.908]***	0.524 [0.364-0.753]***
Use internet		
No	ref	
Yes	0.711 [0.505-1.001]	

COR: crude odd ratio, AOR: adjusted odd ratio, Ref: reference , * p-value <0.05, ** p-value<0.01, *** P-value<0.001

Discussion

The objective of this study was to examine the determinants influencing EBF practices in Rwanda. The proportion of EBF practice was 80.5% and the study also identified two key factors associated with EBF in Rwanda: the mother's age, and household wealth.

The DHS indicate a decline in the rate of EBF in Rwanda, from 87% in 2015 to 80.5% in 2020.[21] This decrease may be attributed to lifestyle changes, increasing urbanization, and the effects of globalization, where more mothers spend extended hours at work, reducing the time available for breastfeeding. Despite this decline, Rwanda maintains a relatively high prevalence of EBF compared to other East African countries. In Kenya, a cohort study found that among 1,662 mothers at 6 weeks postpartum, 93% practiced EBF, yet by 9 months only 73% reported maintaining EBF for the full six months, reflecting the common decline in adherence as infants age. In Uganda, the prevalence of EBF among infants under six months was 62.3%, and in Tanzania, only 45% of babies were exclusively breastfed at 4–5 months, with maternal employment identified as a significant barrier.[27–30] This difference could be explained by the robust health promotion initiatives implemented by the Rwandan government, including nationwide EBF awareness campaigns, enhanced antenatal care (ANC) services, and comprehensive postnatal care (PNC) programs.[31,32]

Household wealth was found to be significantly associated with EBF. Compared to mothers from poor household Mothers from middle and upper-class families were less likely to practice EBF, similar to the study conducted in Uganda.[27] This finding is consistent with other studies in Tanzania, Uganda, and Peru, which suggest that wealthier mothers may have less time to care for their babies due to work commitments.[33–36] A likely explanation Rwanda is that Wealthier women are more likely to live in urban areas such as Kigali, where formal jobs with inflexible schedules limit time for breastfeeding, and access to breast milk substitutes is greater. Social perceptions that formula feeding is modern or prestigious, along with reduced family and community support for breastfeeding in urban environments, may also contribute to the decline.[37,38] Although studies from East Africa, including Ethiopia,[38] support this relationship, research from countries such as Nigeria and Bangladesh has reported higher exclusive breastfeeding (EBF) prevalence among wealthier mothers, a pattern likely driven by stronger postnatal support systems and cultural norms that place greater emphasis on EBF in those settings. [39–40] While Rwanda provides 12 weeks of paid maternity leave, wealthier mothers in urban Kigali are more likely to return quickly to demanding formal sector jobs, have greater exposure to formula marketed as modern or prestigious, and often lack traditional community breastfeeding support, which may undermine EBF duration. Research in urban Kigali found that maternal employment and breastmilk supplementation such as formula use significantly reduced the likelihood of EBF. [7]

Additionally, the study highlighted significant regional differences in EBF practices. Mothers residing in the Southern, Northern, and Western provinces of Rwanda were more likely to exclusively breastfeed compared to those living in Kigali City. This supports earlier research from Karongi District, where EBF prevalence reached 87.1% and was strongly linked to antenatal care (ANC), postnatal care (PNC), and breastfeeding counseling.[1] In Rwanda, almost all women (about 99%) see a skilled provider during pregnancy, but only around 48% complete four or more ANC visits. Rural provinces are more likely to meet this target because of active community health worker programs.[42] These areas also tend to hold on to traditional and religious values that encourage early initiation and sustained breastfeeding, supported by close family and community networks.

Living conditions in rural provinces where mothers can keep their babies close because they often work at home and don't have to travel long distances make it easier to breastfeed whenever the baby is hungry. In contrast, in cities like Kigali, mothers may be away from their babies for many hours due to work and travel, which can make exclusive breastfeeding more difficult.[1,7] Overall, this variation in Rwanda, similar to patterns observed in Uganda where rural areas consistently show higher EBF prevalence than urban areas,[29] may be shaped by differences in cultural practices, religious beliefs, living conditions, and lifestyle.[1,7]

Strengths and limitations

This study used RDHS data 2019-2020 which provides high-quality, nationally representative data on various demographic and health indicators. However, there are some limitations. This study used secondary data to determine the predictors of exclusive breastfeeding in Rwanda; this resulted in few factors associated with it as the data set had limited general variables that can potentially be associated with exclusive breastfeeding. Furthermore, certain variables were omitted due to high rates of missing data. Additionally, the inclusion of children under six months old introduces potential bias due to loss of follow-up until that age.

Conclusion

In conclusion, this study underscores the vital role of exclusive breastfeeding in improving child health outcomes, particularly among mothers living in Kigali and those from wealthier households. These groups may face unique challenges, such as increased work demands, limited time, and greater access to formula feeding, which can hinder optimal breastfeeding practices. Therefore, tailored interventions are needed, including targeted educational campaigns focusing on the benefits of exclusive breastfeeding, the provision of private breastfeeding rooms in workplaces and public spaces, and enhanced support through antenatal and postnatal care services. Such initiatives can help address barriers and ensure that exclusive breastfeeding rates continue to improve across Rwanda Future researchers should explore qualitative and longitudinal approaches to better understand underlying behavioral, social, and economic factors influencing exclusive breastfeeding practices in different population groups.

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Authors' contribution

ICM, and PD contributed to the conception, design, data analysis, interpretation, and drafting and reviewing the original manuscript; IT, JLT, PM, WGN, TKM, AC, HB, EMU, JPN, and CI contributed to the conception, data analysis, interpretation and review of the manuscript; PU and MH contributed to conception, reviewing the manuscript and supervision. All authors approved the manuscript and agreed on the submission to the journal.

Conflict of interest

The authors declare no conflict of interest.

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