Pre-lacteal Feeding Among Infants Within the First Week of Birth in Eastern Uganda: Evidence From a Health Facility-based Cross-sectional Study

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Research

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Abstract

Background: Pre-lacteal feeding hinders early initiation of breastfeeding and exclusive breastfeeding but is understudied in Uganda. We examined the prevalence and factors associated with pre-lacteal feeding among postpartum mothers in Kamuli district in rural eastern Uganda.

Methods: We conducted a cross-sectional study at four large healthcare facilities and randomly sampled mother-baby pairs attending postnatal care clinics. Pre-lacteal feeding was defined as giving anything to eat or drink to a newborn other than breast milk within the first 0-3 days of life. Data were collected using a researcher-administered questionnaire and summarized using frequencies and percentages. The Chi-squared, Fisher's exact, and Student's t-tests were used for comparison while the factors independently associated with pre-lacteal feeding were determined using modified Poisson regression analysis, reported as adjusted prevalence risk ratio (aPRR) with corresponding 95% confidence intervals (CI).

Results: Of 875 participants enrolled, 319 (36.5%) practiced pre-lacteal feeding. Pre-lacteal feeding was associated with being unemployed (aPRR, 0.70; 95% CI, 0.50-0.91), married (aPRR, 0.71; 95% CI, 0.58-0.87), receiving health education on infant feeding practices (aPRR, 0.72; 95% CI, 0.60-0.86), spontaneous vaginal delivery (aPRR, 0.76; 95% CI, 0.61-0.95), health facility delivery (aPRR, 0.73; 95% CI, 0.60-0.89), knowing that pre-lacteal feeding could lead to difficulties in breathing (aPRR, 0.70; 95% CI0.57-0.86), attendance of antenatal care at public health facility (aPRR, 2.41; 95% CI, 1.71-3.39), and a travel distance of 5 km or beyond from home to health facility (aPRR, 1.46; 95% CI, 1.23-1.72).

Conclusion: We observed a high prevalence of pre-lacteal feeding among postpartum mothers in rural eastern Uganda. Pre-lacteal feeding is less likely among the unemployed and married mothers, those who received health education on infant feeding practices, had a spontaneous vaginal delivery, had delivered in a health facility, and knew that pre-lacteal feeding could lead to breathing difficulties in the newborn. Conversely, pre-lacteal feeding is more likely among mothers who attend antenatal care visits at public health facilities and those who travel 5 km or beyond to access health facilities.

Background

Early initiation of breastfeeding especially within the first hour of birth and exclusive breastfeeding for the first six months of life is important for infant growth, health, and survival (1). Breastfeeding confers significant benefits to both the infant and the mother. For the infant, breastfeeding is essential for optimal growth and development and reducing the risks of infections such as diarrhea and respiratory tract infections among others, while for the mother, early initiation of breastfeeding reduces postpartum bleeding by improving uterine contraction (2).

Although breastfeeding is a common practice in most societies, pre-lacteal feeding remains a barrier to its promotion. One systematic review and meta-analysis conducted in Ethiopia reports a 25.3% pooled prevalence for pre-lacteal feeding, with the likelihood of being lower among mothers that attended antenatal care during the most recent pregnancy, received counseling on infant feeding practices, timely

initiated breastfeeding, and resided in an urban setting. However, pre-lacteal feeding is reported to be more likely among mothers who had given birth at home (3). Other studies report that not being aware of the risks associated with pre-lacteal feeding and late initiation of breastfeeding (4), attending less than four antenatal care visits (5), maternal illiteracy and lack of breastfeeding counseling (6), misconceptions about breastfeeding (7), and cesarean section delivery (8), among others are associated with increased risk of pre-lacteal feeding.

The most recent Uganda Demographic and Health Survey data show that 66% of infants receive exclusive breastfeeding (9). The report further showed that 34% of postpartum mothers practice pre-lacteal feeding, with 7% of newborn babies reported to have received plain water, 6% non-milk liquids, 8% other milk, 11% complementary foods to breastmilk, and 2% no breastmilk at all (9). Pre-lacteal feeding is therefore common practice in Uganda but has been understudied. To the best of knowledge, one study conducted in astern Uganda found that more than half of postpartum mothers practiced pre-lacteal feeding in the first three days of newborn life (10). Another study conducted in Western Uganda found that slightly more than three in every 10 postpartum mothers engage in pre-lacteal feeding (11). However, the evidence presented in the study in Eastern Uganda dated more than 10 years ago while than in Western Uganda is nearly 10 years as well. Therefore, the evidence from the previous studies is obsolete and might not be appropriate to provide credible evidence on the current status of pre-lacteal feeding in either region. Recent data are therefore needed to understand pre-lacteal feeding in Uganda.

In Kamuli district in Eastern Uganda, unpublished program data show that postpartum mothers practice pre-lacteal feeding. However, data describing the magnitude of pre-lacteal feeding and the associated factors are lacking. We examined the prevalence and factors associated with pre-lacteal feeding in the district. This information will help in designing context-specific interventions to tackle pre-lacteal feeding in the district and the rest of the districts in Eastern Uganda including similar regions in Uganda and sub-Saharan Africa.

Methods

Study design and setting

This was a health facility-based cross-sectional study conducted between December 2020 and January 2021 at four health facilities with large patient numbers in Kamuli District. These included three public health facilities namely Kamuli General Hospital, Namwendwa Health Center IV, Nankandulo Health Center IV, and one private-not-for profit health facility, Kamuli Mission Hospital. Kamuli District is located in East Central Uganda and has an estimated population size of 545,900 people (9). Each of the health facility has a maternal and child health (MCH) clinic which offers antenatal care, delivery, and postnatal care services. Although antenatal care services are provided daily to ensure service continuity. Mothers are encouraged to attend up to eight antenatal care visits through their pregnancy. At each visit, various services are provided including maternal-child health education and individual counseling. Delivery

services are provided 24 hours a day, 7 days a week by midwives and/or doctors. Postnatal care services are provided at 6 hours, 24 hours, 6 days, 6 weeks, and 6 months after delivery.

Study population and sampling

The study population consisted of mother-baby pairs aged 4-42 days attending postnatal care and immunization clinics at the respective study sites. We excluded newborn babies whose biological mothers had died because we deemed that the practice of pre-lacteal feeding would be almost inevitable. Since pre-lacteal feeding occurs within 0-3 days, we excluded mother-baby pairs within this period. The mother-baby pairs were sampled via systematic and simple random sampling approaches. First, we proportionally allocated the required sample size to each of the four study sites. We then employed systematic random sampling to establish the sampling interval at each of the study sites. To do so, we reviewed the postnatal care records to establish the average number of mother-baby pairs that attend the postnatal clinic per day.

We then divided the average number of postpartum mother-baby pairs at each clinic by the site's sample size to obtain the sampling interval. We used a simple random sampling approach, a lottery method, with a random start to select the first and subsequent participants until all the required number of participants was reached.

Study variables and measurements

The dependent variable was pre-lacteal feeding measured as giving anything to eat or drink to a newborn baby other than breast milk within the first 0-3 days of life. The independent variables included maternal age, ethnicity, level of education, type of employment, marital status, religion, HIV status, and the number of antenatal care visits at the recent pregnancy. Others included birth order, place and mode of delivery, maternal residence, and knowledge about the risks of pre-lacteal feeding. We also collected data on the level of health facility, place of recent antenatal care attendance, and the estimated distance from the place of residence to the health facility.

Data collection and processing

Data were collected within the health facility premises in a quiet and convenient room using a pre-tested researcher-administered questionnaire in the local language, *Lusoga.* On average, the administration of the questionnaire lasted 30-45 minutes. Each completed questionnaire was checked for completeness in real-time before the data were entered in Epi-Data version 3.1. We employed data quality control measures impregnated in Epi-Data such as range and legal values, skips, and alerts to ensure data integrity.

Sample size estimation and statistical analysis

Two approaches were used to establish the required sample size. Based on the prevalence of pre-lacteal feeding, a sample size of 377 participants was required using Kish and Leslie formula when the following

assumptions were made: 57% prevalence of pre-lacteal feeding among children aged 6-24 months (1), 95% confidence level, and 5% maximum allowable error. To determine factors associated with pre-lacteal feeding, the sample size was estimated using the two proportions sample size estimation approach.

Based on estimates from a previous study (12), half of the postpartum mothers who never received breastfeeding counseling engaged in pre-lacteal feeding while among those who received breastfeeding counseling, 60% had engaged in pre-lacteal feeding. We estimated that 875 participants would be needed to ensure 80% statistical power in detecting a true difference at a 95% confidence level. Accordingly, the study used a large sample size to minimized biased estimation of the measure of effect.

Concerning statistical analysis, in the bivariate analysis, we computed frequencies and percentages for categorical data. For numerical data, we computed means with standard deviation when the data were not skewed, otherwise, the median with interquartile range was computed. In the bivariate analysis, we compared differences in pre-lacteal feeding and categorical independent variables using the Chi-squared test for larger cell counts, otherwise, Fisher's exact test was employed for smaller cell counts. Mean differences in pre-lacteal feeding with numerical independent variable was established using the Student's t-test when the data were normally distributed, otherwise the Wilcoxon-rank sum test was used. The level of statistical significance was set at less than 0.15 to avoid residual confounding. In the multivariate analysis, we computed both unadjusted (crude) and adjusted prevalence risk ratio with the corresponding 95% confidence intervals using modified Poisson regression analysis with robust error variance for all statistically significant variables at the bivariate analysis. The prevalence risk ratio (PRR) was preferred over the odds (OR) to minimize overestimation since the outcome of interest, pre-lacteal feeding, was large (13). Robust error variance was used to ensure convergence and avoid mild violations of the assumptions of Poisson regression as recommended by Trivedi and Cameron (14). Variables with $p<0.05$ were considered statistically significant. We assessed the model fitness using Akaike Information Criteria (AIC), Hosmer-Lemeshow Chi-square goodness-of-fit statistics, and link test. In the multivariate analysis, we dropped variables that did not improve the fit of the model based on the log-likelihood. The analysis was conducted in Stata version 15.

Ethical approval

Our study was reviewed and approved by Clarke International University Research Ethics Committee (reference # CLARKE-2020-23). Administrative approval was obtained from the District Health Office, Kamuli district, and the Heads of the respective study sites.

All the participants were informed about the purpose of the study, confidentiality of information, privacy, the benefits and potential risks involved in the study, and the potential to withdraw at any time. The participants provided written or thumb printed informed consent before their participation.

Results

General characteristics of the participants

Table 1 shows the general characteristics of the study participants. Overall, a total of 875 participants with a mean age of 26.2 ± 5.9 were enrolled in the study. Of all the participants, 491 (56.1%) were aged 25 years or older, 611 (69.8%) were of the Basoga ethnic group, 388 (44.3%) had secondary education as their highest level of education, 437 (49.9%) had no employment, 710 (81.1%) were married, 637 (75.4%) were Catholic, and 80 (9.1%) were mothers living with HIV. The majority of the participants had attended less than four antenatal care visits at the most recent pregnancy (651 or 74.4%), 227 (25.9%) had a baby with a second birth order, 727 (83.1%) had delivered in a health facility, 346 (39.4%) lived in a rural area, 654 (74.7%) knew that pre-lacteal feeding could cause diarrhoea, while 611 (69.8%) reported that pre-lacteal feeding could cause difficulties in breathing. Furthermore, the majority of the participants attended postnatal care at a general hospital (507 or 57.9%) and public health facility (675 or 77.1%). 510 (58.3%) travelled less or equals to 5 km from their place of residence to the health facility for postnatal care services. The mean distance travelled was 7.0 ± 8.2 km.

Pre-lacteal feeding and the relationship with personal and health services related factors

Table 2 summarizes the results for the comparison of differences in pre-lacteal feeding with personal and health service-related factors. Our data show that 319 (36.5%) participants practiced pre-lacteal feeding. Participants who practiced pre-lacteal feeding were on average similar to those who never practiced pre-lacteal feeding: 26.4 ± 6.2 versus 26.1 ± 5.7 years, p = 0.491. Pre-lacteal feeding was more common among participants aged 25 years and beyond (57.1%), the Basoga ethnic tribe (64.9%), those with a secondary level of education (43.9%), the self-employed (43.9%), the married (74.3%), and those living with HIV (90.0%).

Participants who attended less than four antenatal care visits at the most recent pregnancy (79.9%), gave birth to the second child (23.8%), delivered in a health facility (73.4%), and resided in a rural setting (40.1%) had a higher prevalence of pre-lacteal feeding. The distribution of pre-lacteal feeding by knowledge of risks of diarrhoea and breathing difficulties, place of antenatal and postnatal care attendances, and travel distance is equally shown in Table 2. We observed statistically significant differences in pre-lacteal feeding concerning the type of employment (p = 0.003), marital status (p < 0.001), number of antenatal care visits at the most recent delivery (p = 0.005), mode of delivery (p = 0.022), place of delivery (p < 0.001), knowledge of whether pre-lacteal feeding causes breathing difficulties or not (p < 0.001), place of recent attendance of antenatal care (p < 0.001), and distance travelled from place of residence to a health facility for postnatal care (p < 0.001).

Factors associated with pre-lacteal feeding at unadjusted and adjusted analysis

In the unadjusted analysis (Table 3), pre-lacteal feeding was less likely when the participant was unemployed (PRR 0.72; 95% CI 0.55–0.93), married (PRR 0.65; 95% CI 0.53–0.79), had attended four or more antenatal care visits at the most recent pregnancy (PRR 0.73; 95% CI 0.58–0.92), had received health education on infant feeding practices during antenatal care visits (PRR 0.53; 95% CI 0.45,0.63), had a spontaneous vaginal delivery (PRR, 0.56; 95% CI, 0.47–0.67), had delivered in a health facility (PRR 0.56; 95% CI 0.47–0.67), had given birth to a new born that had a birth weight of 2.5-5.0 kilograms (PRR,

0.68; 95% CI, 0.50–0.92), knew that pre-lacteal feeding could cause breathing difficulties (PRR 0.65, 95% CI 0.52–0.81), had given the baby colostrum (PRR, 0.50; 95% CI, 0.40–0.61), and had attended postnatal care at a general hospital (PRR 0.84; 95% CI 0.70–0.99). However, recent attendance of antenatal care at a public health facility (PRR 2.85; 95% CI 2.03–4.02) and travel distance of 5 km and beyond to access postnatal care services (PRR, 1.46; 95% CI, 1.23–1.74) was associate with a higher likelihood of pre-lacteal feeding.

In the adjusted analysis (Table 3), the number of antenatal care visits at the most recent pregnancy, birth weight, receipt of colostrum, and the level of health facility did not improve the model fitness so they were dropped. Our final model was parsimoniously characterized by the following: the lowest Akaike Information Criteria (AIC) of 1207.2, a goodness-of-fit value of 533.9 (Chi-square = 864, p = 1.000), and a statistically insignificant p-value associated with a linktest (p = 0.807).

In the adjusted analysis, our data show that pre-lacteal feeding was less likely among unemployed participants (aPRR, 0.70; 95% CI, 0.50–0.91), married (aPRR, 0.71; 95% CI, 0.58–0.87), had received health education on infant feeding at the most recent pregnancy (aPRR, 0.72; 95% CI, 0.60–0.86), had a spontaneous vaginal delivery (aPRR, 0.76; 95% CI, 0.61–0.95), had delivered outside a health facility (aPRR, 0.73; 95% CI, 0.60–0.89), and knew that pre-lacteal feeding could lead to difficulties in breathing (aPRR, 0.70; 95% CI, 0.57–0.86). Conversely, pre-lacteal feeding was more likely among mothers who attended antenatal care services at public health facilities compared to those who attended recent antenatal care services at a private-not-for profit health facility (aPRR, 2.41; 95% CI, 1.71–3.39), and among participants who travelled 5 km and beyond to receive postnatal care services compared to those who travelled less or equals to 5 km (aPRR, 1.46; 95% CI, 1.23–1.72).

Discussion

The focus of this study is on the prevalence and factors associated with pre-lacteal feeding in Kamuli district in Eastern Uganda. Our data show that at least three in every ten postpartum mothers practice pre-lacteal feeding, which is distant from the prevalence of pre-lacteal feeding reported in a previous study in South Sudan at 53% (12) and Eastern Uganda at 57% (10). The variation could be due to differences in study settings. The present study was conducted in a health facility setting while the previous studies were conducted in a community setting. Community-based studies often provide a higher prevalence compared to health facility-based studies hence the difference (11). Conversely, the present prevalence of pre-lacteal feeding is comparable with the findings of the 2016 Uganda Demographic and Survey which places the prevalence at 34% (9), and another health facility-based study in Western Uganda which reports a prevalence of 31.3% (11). Therefore, our data show that the prevalence of pre-lacteal feeding is high and should be a concern for the healthcare system to address as it predisposes newborn babies to significant morbidity and mortality (15).

Our study shows that unemployed mothers are less likely to engage in pre-lacteal feeding compared to mothers with formal employment. Our finding is consistent with one Ethiopian study which found a

higher likelihood of pre-lacteal farming among mothers engaged in farming compared to housewives (16). The unemployed mothers in our study are mainly housewives, often without any form of employment in the formal or informal sectors.

Our finding could be explained by differences in word demands between the unemployed and the employed mothers. For example, insufficient maternity leave days might have forced employed mothers to introduce pre-lacteal feeds to enable their early return to work. However, further studies are needed to explore this finding further. Our finding highlights there is a need to promote baby-friendly workplaces to allow mothers to freely breastfeed their babies while working.

We found that married mothers are less likely to practice pre-lacteal feeding compared to single or separated mothers. A previous study in Ethiopia showed that single or never-married mothers rarely use existing maternal child health services compared to the married mothers (17). Accordingly, married mothers tended to have sufficient information about breastfeeding practices compared to single or never-married mothers hence their lower chances of pre-lacteal feeding. Another possible explanation could be that married mothers tend to receive support from their spouses particularly encouragement concerning breastfeeding and the use of maternal and child health services hence the observed difference.

Our data show a lower likelihood of pre-lacteal feeding among mothers who received health education on infant feeding practices during antenatal care visits compared to those who never received such information. Health education is important in demystifying cultural and traditional beliefs against breastfeeding and empowering mothers with the correct information about breastfeeding. Our finding is consistent with existing literature. Previous studies report that lack of counseling on breastfeeding (6), lack of information about the risks of pre-lacteal feeding (6, 8), and inadequacies of knowledge on breastfeeding practices (6) are associated with a higher likelihood of pre-lacteal feeding. Other studies report that counseling on breastfeeding is associated with a reduction in pre-lacteal feeding (3, 12).

Our study shows that pre-lacteal feeding is less likely among mothers who had spontaneous vaginal delivery compared to those who had a cesarean section delivery. Our finding is consistent with the results of previous studies (8, 18, 19). The plausible biological explanation is that as a baby breastfeeds, the nipple is stimulated, and this causes the release of oxytocin into the maternal bloodstream resulting in the contraction of the uterine muscles. Uterine contraction is usually associated with pain which potentially is much more pronounced in mothers who delivered by cesarean section compared to those who delivered through spontaneous vaginal delivery.

Furthermore, discomfort in breastfeeding is experienced much more among mothers with cesarean section delivery compared to those with spontaneous vaginal delivery. The tendency to avoid breastfeeding and opt for pre-lacteal feeding is therefore highly likely.

The study found that pre-lacteal feeding is less likely among mothers who delivered in a health facility compared to those who delivered at home. Home delivery is associated with a higher likelihood of pre-lacteal feeding in several studies in sub-Saharan Africa (3, 5, 6, 8). This could be because mothers who

deliver at home miss skilled attendance at birth resulting in poor immediate newborn and postnatal care. Mothers who deliver at home are also easily influenced by traditional birth attendants to give pre-lacteal feeds instead of immediate initiation of breastfeeding. Conversely, mothers who deliver in a health facility receive immediate information on correct infant feeding practices and this reduces the likelihood of pre-lacteal feeding.

Our study shows that pre-lacteal feeding is less likely among mothers who knew that pre-lacteal feeding could lead to difficulties in breathing among newborn babies. This finding is consistent with the results of a previous study (20). Our findings highlight the significance of empowering mothers with correct and adequate information about infant feeding. The healthcare system should ensure that every mother receives information about the risks associated with pre-lacteal feeding to mitigate the practice.

This study shows that mothers who attended antenatal services at a public health facility were more likely to give pre-lacteal feeds compared to those who attended antenatal care services at a private-not-for-profit facility. This could be attributed to the high workload at public health facilities compared to private-not-for profit health facilities resulting in a lack of ample time to provide health education messages or even counsel pregnant mothers about appropriate infant feeding practices (21). There is also the possibility that this finding might have resulted from differences in sample sizes between the public and private-not-for profit health facilities, with most of the data analyzed drawn from the former than the latter health facilities.

We found that mothers who travel more than 5 km to a health facility to receive postnatal care services are more likely to practice pre-lacteal feeding compared to those who travel 5 km or less. This finding is consistent with the requirements of the Uganda National Health Policy framework (22). Accordingly, a population that lives within a radius of 5 km to a health facility has easy access to health services while those who live beyond 5 km have difficult access to health services (23). Our finding is thus an implication of difficult access to existing maternal and child health services. Longer travel distances thus present a physical barrier to seeking essential maternal and child health services due to the associated direct and indirect costs. This finding is consistent with a previous study that reported longer travel distance limits access to health services (24).

Study strengths and limitations

Our study has several strengths and limitations. To the best of our knowledge, this is the first study on pre-lacteal feeding in the study setting. The study has a large sample size and is adequately powered to detect a statistical difference. The study was conducted at health facilities with the highest patient loads in the district so the results are likely representative. However, notable limitations of the study include the lack of qualitative data to explain some of the reasons for pre-lacteal feeding. There is also the possibility of recall bias especially among mothers who were nearly 42 days postpartum. Another limitation is that our findings demonstrate association but not causation.

Conclusions And Recommendations

Our study shows that pre-lacteal feeding is highly prevalent in rural eastern Uganda. Pre-lacteal feeding is less likely among the unemployed and married mothers, those who received health education on infant feeding practices, had a spontaneous vaginal delivery, had delivered in a health facility, and knew that pre-lacteal feeding could lead to breathing difficulties in the newborn. Conversely, pre-lacteal feeding is more likely among mothers who attend antenatal care visits at public health facilities and those who travel 5 km or beyond to access health facilities. Our study demonstrates a need to reinforce the baby-friendly health facility initiatives policy at both health facility and community levels to promote appropriate infant and young child feeding practices among postpartum mothers.

Abbreviations

AIC: Akaike Information Criteria

aPRR: Adjusted Prevalence Risk Ratio.

HIV: Human Immunodeficiency Virus.

uPRR: Unadjusted Prevalence Risk Ratio.

Declarations

Ethics and consent to participate

This study was approved by Clarke International University Research Ethics Committee (reference # CLARKE-2020-23). All participants provided informed consent.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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None.

Authors contributions

RA and JI: Study conception and design. RA: Acquisition of data. JI and DK: Analysis and interpretation of data. DK and JI: Drafting of manuscript. RA, DK, SO, AK, and JI. Critical revision. All authors read and approved the final manuscript.

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Tables

Table 1
General characteristics of the participants

Characteristics	Levels	Total (n = 875)
Age categories	15–24	384 (43.9)
	25 and beyond	491 (56.1)
	mean (SD)	26.2 (5.9)
Ethnicity	Basoga	611 (69.8)
	Baganda	103 (11.8)
	Basamia	23 (2.6)
	Mugishu	21 (2.4)
	Others	117 (13.4)
Level of education	None	83 (9.5)
	Primary	323 (36.9)
	Secondary	388 (44.3)
	Tertiary and beyond	81 (9.3)
Type of employment	Formal	102 (11.7)
	Self	336 (38.4)
	None	437 (49.9)
Marital status	Single/never married	116 (13.3)
	Married	710 (81.1)
	Divorced/separated	49 (5.6)
Religion	Catholic	637 (75.4)
	Muslim	195 (23.1)
	Others	13 (1.5)
A mother living with HIV	No	795 (90.9)
	Yes	80 (9.1)
Number of antenatal care visits at recent pregnancy	Less than 4	651 (74.4)
	4 and more	224 (25.6)
	mean (SD)	3.7 (1.7)

Characteristics	Levels	Total (n = 875)
Birth order	First	181 (20.7)
	Second	227 (25.9)
	Third	197 (22.5)
	Fourth	112 (12.8)
	Fifth and beyond	158 (18.1)
Place of delivery	Outside a Health facility	148 (16.9)
	In a Health facility	727 (83.1)
Maternal residence	Urban	194 (22.2)
	Peri-urban	335 (38.3)
	Rural	346 (39.5)
Pre-lacteal feeding causes diarrhea	No	221 (25.3)
	Yes	654 (74.7)
Pre-lacteal feeding causes breathing difficulties	No	611 (69.8)
	Yes	264 (30.2)
Level of health facility	Health center	368 (42.1)
	General Hospital	507 (57.9)
Place of recent antenatal care attendance	Private-not-for profit	200 (22.9)
	Public/or government	675 (77.1)
Distance from home to health facility (km)	Less or equals 5km	510 (58.3)
	Beyond 5 km	365 (41.7)
	Mean (SD)	7.0 (8.2)

Table 2

Prevalence of pre-lacteal feeding and the relationship with personal and health services related factors

Characteristics	Levels	Pre-lacteal feeding		
		No (n = 556)	Yes (n = 319)	P value
Age categories	15–24	247 (44.4)	137 (42.9)	0.723
	25 and beyond	309 (55.6)	182 (57.1)	
	mean (SD)	26.1 (5.7)	26.4 (6.2)	0.491
Ethnicity	Basoga	404 (72.7)	207 (64.9)	0.059
	Baganda	58 (10.4)	45 (14.1)	
	Basamia	17 (3.1)	6 (1.9)	
	Mugishu	13 (2.3)	8 (2.5)	
	Others	64 (11.5)	53 (16.6)	
Level of education	None	46 (8.3)	37 (11.6)	0.374
	Primary	212 (38.1)	111 (34.8)	
	Secondary	248 (44.6)	140 (43.9)	
	Tertiary and beyond	50 (9.0)	31 (9.7)	
Type of employment	Formal	58 (10.4)	44 (13.8)	0.003
	Self	196 (35.3)	140 (43.9)	
	None	302 (54.3)	135 (42.3)	
Marital status	Single/never married	56 (10.1)	60 (18.8)	< 0.001
	Married	473 (85.1)	237 (74.3)	
	Divorced/separated	27 (4.9)	22 (6.9)	
A mother living with HIV	No	508 (91.4)	287 (90.0)	0.543

Characteristics	Levels	Pre-lacteal feeding		
		No (n = 556)	Yes (n = 319)	P value
	Yes	48 (8.6)	32 (10.0)	
Number of antenatal care visits at recent pregnancy	Less than 4	396 (71.2)	255 (79.9)	0.005
	4 and more	160 (28.8)	64 (20.1)	
	mean (SD)	3.9 (1.6)	3.2 (1.9)	< 0.001
Birth order	First	124 (22.3)	57 (17.9)	0.160
	Second	151 (27.2)	76 (23.8)	
	Third	122 (21.9)	75 (23.5)	
	Fourth	70 (12.6)	42 (13.2)	
	Fifth and beyond	89 (16.0)	69 (21.6)	
Mode of delivery	Caesarean section	69 (12.4)	58 (18.2)	0.02
	Spontaneous vaginal delivery	487 (87.6)	261 (81.8)	
Delivered in a health facility	No	63 (11.3)	85 (26.6)	< 0.001
	Yes	493 (88.7)	234 (73.4)	
Birth weight (kg)	Less than 2.5	20 (3.6)	22 (6.9)	0.095
	2.5-4.0	478 (86.0)	265 (83.1)	
	Above 4.0	58 (10.4)	32 (10.0)	
Maternal residence	Urban	121 (21.8)	73 (22.9)	0.822
	Peri-urban	217 (39.0)	118 (37.0)	
	Rural	218 (39.2)	128 (40.1)	

Characteristics	Levels	Pre-lacteal feeding		
		No (n = 556)	Yes (n = 319)	P value
Pre-lacteal feeding causes diarrhea	No	134 (24.1)	87 (27.3)	0.332
	Yes	422 (75.9)	232 (72.7)	
Pre-lacteal feeding causes breathing difficulties	No	362 (65.1)	249 (78.1)	< 0.001
	Yes	194 (34.9)	70 (21.9)	
Level of health facility	Health center	220 (39.6)	148 (46.4)	0.055
	General Hospital	336 (60.4)	171 (53.6)	
Place of recent antenatal care attendance	Private-not-for profit	170 (30.6)	30 (9.4)	< 0.001
	Public/or government	386 (69.4)	289 (90.6)	
Distance from home to health facility (km)	Less or equals 5km	354 (63.7)	156 (48.9)	< 0.001
	Beyond 5 km	202 (36.3)	163 (51.1)	
	Mean (SD)	5.7 (6.5)	9.3 (10.1)	< 0.001

Table 3
Factors associated with pre-lacteal feeding at unadjusted and adjusted modified Poisson regression analysis

Characteristics	Level	Modified Poisson regression analysis	
		Unadjusted	Adjusted
		PRR (95% CI)	aPRR (95% CI)
Type of employment	Formal	1	1
	Self	0.97 (0.75–1.25)	0.89(0.69–1.15)
	None	0.72*(0.55–0.93)	0.70** (0.54–0.91)
Marital status	Single/never married	1	1
	Married	0.65*** (0.53–0.79)	0.71***(0.58–0.87)
	Divorced/separated	0.87 (0.61–1.24)	0.89 (0.64–1.22)
Number of antenatal care visits at recent pregnancy	Less than 4	1	
	4 and more	0.73** (0.58–0.92)	
Received health education on infant feeding at recent antenatal care visits	No	1	1
	Yes	0.53*** (0.45,0.63)	0.72*** (0.60–0.86)
Mode of delivery	Caesarean section	1	1
	Spontaneous vaginal delivery	0.76*(0.62,0.95)	0.76* (0.61–0.95)
Delivered in a health facility	No	1	1
	Yes	0.56*** (0.47–0.67)	0.73** (0.60–0.89)
Birth weight (kilograms)	Less than 2.5	1	

Note: Exponentiated coefficients are for prevalence risk ratios; 95% confidence intervals in brackets; Significance codes at 5% level: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. PRR: Unadjusted prevalence risk ratio; aPRR: Adjusted prevalence risk ratio.

	2.5-4.0	0.68*(0.50–0.92)	
	Above 4.0	0.68 (0.45–1.01)	
Pre-lacteal feeding causes breathing difficulties	No	1	1
	Yes	0.65*** (0.52–0.81)	0.70*** (0.57–0.86)
Baby received colostrum	No	1	
	Yes	0.50*** (0.40–0.61)	
Level of health facility	Health center	1	
	General Hospital	0.84* (0.70–0.99)	
Place of recent antenatal care attendance	Private-not-for profit	1	1
	Public/or government	2.85*** (2.03–4.02)	2.41*** (1.71–3.39)
Distance from home to health facility (km)	Less or equals 5km	1	1
	Beyond 5 km	1.46*** (1.23–1.74)	1.46*** (1.23–1.72)

Note: Exponentiated coefficients are for prevalence risk ratios; 95% confidence intervals in brackets; Significance codes at 5% level: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. PRR: Unadjusted prevalence risk ratio; aPRR: Adjusted prevalence risk ratio.