Determinants of prelacteal feeding practice in Uganda; a population based cross-sectional study using Uganda demographic and health survey data

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Abstract

Background
Breastfeeding has well-established short-term and long-term health benefits for both the mother and infant. Initiating breastfeeding immediately after birth stimulates breast milk production. Prelacteal feeding (PLF) may result in late initiation of breastfeeding, and thus insufficient production of breast milk. This study aimed to identify the determinants of PLF among children under five years in Uganda.

Methods
This cross-sectional study was conducted using the data from the database of Uganda Demographic and Health Survey 2011. The data of 4,774 children/mothers were evaluated in this study.

Results
The prevalence of PLF was 40.3%. The rate of PLF practice was found to be 2.15 times higher in women with moderate economic status and 2.02 times higher in women with high economic status compared to those who have low economic status. The rate of PLF practice was found to be 1.73 times higher in newborns delivered by an unskilled birth attendant and 4.35 times higher in newborns delivered with no birth attendant compared to those infants delivered by a skilled birth attendant. The ratio of PLF practice was found to be 2.49 times higher in multiple births. Mothers who initiated breastfeeding in the first 24 hours after birth had higher odds of PLF. No relationship was found between PLF practice with some sociodemographic characteristics of mother’s (age, marital status, educational status, religion, residential location), maternal factors (number of children, antenatal and postnatal care attendance, place of delivery), and characteristics of the newborn infants (sex, type of delivery, birth order number) in the multivariate logistic regression analysis.

Conclusions
All mothers should be informed about the importance of initiation of breastfeeding immediately after delivery, the risks associated with PLF, the optimal practices for breastfeeding, and the presence of a skilled birth attendant at delivery.

Keywords: prelacteal feeding, newborn, infants, Uganda, breastfeeding, breast milk.

Introduction
Appropriate feeding of infants is important for healthy growth and development. Breast milk contains all the nutritional requirements for infants below six months of age, except vitamin D1. The World Health Organization (WHO) recommends that breastfeeding should be started within one hour after birth and infants should be exclusively breastfed for the first six months2. Exclusive breastfeeding (EBF) means that the infant is fed only breast milk for six months of life; any additional solids or liquids, including water, are not given2,12.

Breastfeeding has well-established short-term and long-term health benefits for both the mother and infant, particularly for the reduction of morbidity and mortality due to infectious diseases such as gastroenteritis or pneumonia in first two years of life and the risk of obesity in childhood3,4. Initiating breastfeeding immediately after birth stimulates breast milk production1. Thus, exclusive breastfeeding results in abundant milk production5.

Providing any food or liquid, including water, other than breast milk to a newborn during the first three days of birth is defined as prelacteal feeding (PLF)5. It may result in late initiation of breastfeeding, insufficient production of breast milk, and a decrease of the immunological benefits of colostrum, which contains a high proportion of antibacterial agents6. Since gut is immature in the early days of newborn7, prelacteal feeds, which are contaminated easily, may cause infections which may lead to death8.

Using data from the most recent Demographic and Health Survey (2000–2013) for 57 countries, Oakley et al. have found that 51% of the infants receive PLF. The prevalence of prelacteal feeding in these countries ranges from 3 to 97%9. Overall, 39% of children receive a prelacteal feed in Sub-Saharan Africa10. However, PLF rates differ among countries. Only 3% of children receive prelacteal feed in Malawi, while in Ivory Coast the rate of PLF is 67%10. The determinants of PLF are multifactorial and may differ among countries10,11,12. Sociodemographic characteristics of mothers’, characteristics of the infants’, antenatal factors, and postnatal factors are significantly associated with the introduction of prelacteal feeds. For example, younger mothers may lack the required experience to practice appropriate infant feeding10,12,13.

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Table 1: The association between sociodemographic characteristics of mother and prelacteal feeding

| Characteristics       | Total N (%)* | Prelacteal feeding |
|-----------------------|--------------|--------------------|
|                       |              | Yes | No | p     |
|                       | n     | %\(^{a}\) | n     | %\(^{a}\) |       |
| Age                   |        |      |      |        |       |
| 15-19                 | 363 (7.6) | 168  | 46.3 | 195  | 53.7 | 0.019 |
| 20-24                 | 1154 (24.2)| 465  | 40.3 | 689  | 59.7 |       |
| 25-29                 | 1331 (27.9)| 509  | 38.2 | 822  | 61.8 |       |
| 30-34                 | 847 (17.7) | 319  | 37.7 | 528  | 62.3 |       |
| 35-39                 | 664 (13.9) | 293  | 44.1 | 371  | 55.9 |       |
| 40-44                 | 310 (6.5)  | 122  | 39.4 | 188  | 60.6 |       |
| 45-49                 | 105 (2.2)  | 47   | 44.8 | 58   | 55.2 |       |
| Education             |        |      |      |        |       |
| Illiterate            | 837 (17.5)| 268  | 32.0 | 569  | 68.0 | <0.001|
| Primary school        | 2774 (58.2)| 1136 | 41.0 | 1638 | 59.0 |       |
| Secondary/high school | 937 (19.6)| 429  | 45.8 | 508  | 54.2 |       |
| University            | 226 (4.7)  | 90   | 39.8 | 136  | 60.2 |       |
| Marital status        |        |      |      |        |       |
| Not married           | 750 (15.7)| 338  | 45.1 | 412  | 54.9 | 0.004 |
| Married               | 4023 (84.3)| 1585 | 39.4 | 2438 | 60.6 |       |
| Residential location  |        |      |      |        |       |
| Urban                 | 1143 (23.9)| 503  | 44.0 | 640  | 56.0 | 0.003 |
| Rural                 | 3631 (76.1)| 1420 | 39.1 | 2211 | 60.9 |       |
| Economic status       |        |      |      |        |       |
| Low                   | 2074 (43.5)| 710  | 34.2 | 1364 | 65.8 | <0.001|
| Middle                | 816 (17.1)| 368  | 45.1 | 448  | 54.9 |       |
| High                  | 1884 (39.4)| 845  | 44.9 | 1039 | 55.1 |       |
| Mother’s religion     |        |      |      |        |       |
| Christian             | 4061 (85.1)| 1583 | 39.0 | 2478 | 61.0 | <0.001|
| Muslim                | 664 (13.9)| 315  | 47.4 | 349  | 52.6 |       |
| Others                | 49 (1.0)  | 25   | 51.0 | 24   | 49.0 |       |
| Number of children    |        |      |      |        |       |
| 1-2                   | 1753 (37.0)| 736  | 42.0 | 1017 | 58.0 | 0.038 |
| 3-4                   | 1388 (29.2)| 521  | 37.3 | 867  | 62.5 |       |
| ≥5                    | 1603 (33.8)| 652  | 40.7 | 951  | 59.3 |       |

*column percentages, ‡row percentages

High economic status may provide easy access to other expensive breastfeeding alternatives\(^{10,12,13}\). Mothers’ concerns regarding antibiotics that are taken during cesarean and pain that is caused by cesarean may cause a high rate of PLF\(^\text{10}\). To reduce PLF practice, culturally sensitive programs should be developed\(^\text{14}\). Therefore, the determinants of prelacteal feeding should be defined for each country, separately.

PLF is a widespread practice in Uganda. The Uganda Demographic and Health Survey (UDHS) 2011 showed that the prevalence of PLF among the children born in the last two years (2010-2011) was 41\% in Uganda\(^\text{5}\). In the literature search conducted in Pubmed, no study examining the determinants of PLF was found in Uganda, except for the study by Wamani et al. in 2002\(^\text{15}\). In this study that was conducted in a rural area with 720 child/mother couples, few sociodemographic variables were examined and mothers with higher education levels were found to be more likely to give prelecteals\(^\text{15}\). Comprehensive analysis of factors influencing PLF is essential to develop an intervention program to promote the early initiation of breastfeeding and EBF in Uganda. Therefore, this study aims to identify the determinants of PLF among children under five years using a dataset from the UDHS 2011.

**Methods**

Study setting and ethics

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Table 2: The association between maternal utilization of healthcare services and prelacteal feeding practice

| Characteristics                  | Total N (%) | Prelacteal feeding |          |          |          | p         |
|----------------------------------|-------------|--------------------|----------|----------|----------|-----------|
|                                  |             | Yes n | % | No n | % |          |           |
| Antenatal care attendance        | Yes         | 4514 (96.3) | 1805 | 40.0 | 2709 | 60.0 | 0.447     |
|                                  | No          | 175 (3.7) | 75 | 42.9 | 100 | 57.1 |           |
| Place of delivery                | Health facility | 1792 (37.5) | 744 | 41.5 | 1048 | 58.5 | 0.401     |
|                                  | At home     | 2934 (61.5) | 1160 | 39.5 | 1774 | 60.5 |           |
|                                  | Other place | 48 (1.0) | 19 | 39.6 | 29 | 60.4 |           |
| Birth assistant at delivery      | No birth attendant | 290 (6.1) | 143 | 49.3 | 147 | 50.7 | 0.005     |
|                                  | Unskilled birth attendant | 1468 (30.7) | 582 | 39.6 | 886 | 60.4 |           |
|                                  | Skilled birth attendant | 3016 (63.2) | 1198 | 39.7 | 1818 | 60.3 |           |
| Postnatal care attendance        | Yes         | 1001 (35.2) | 409 | 40.9 | 592 | 59.1 | 0.945     |
|                                  | No          | 1844 (64.8) | 751 | 40.7 | 1093 | 59.3 |           |

*column percentages, †row percentages

This cross-sectional study was conducted using the data from the database of UDHS 2011. Authorization to use the data was given by The Demographic and Health Surveys Program (Date: 14th Dec. 2015). The UDHS 2011 was the fifth in the series of Demographic and Health Surveys conducted in Uganda. Ethical approval was obtained from the Non-interventional Clinical Research Ethics Committee of Dokuz Eylul University, Izmir, Turkey (Decision No. 2016/33-28).

**Study sample**

The UDHS 2011 was designed to provide population and health indicator estimates for the country as a whole and for urban and rural areas separately. Estimates were reported for the 10 regions of Uganda. The UDHS 2011 was conducted on a stratified sample. In total, a representative sample of 10,086 households (2,977 in urban areas and 7,109 in rural areas) was selected for the UDHS 2011. Details of sampling technique, selection of households, questionnaire and validation procedure were published in the UDHS 2011 report.

The data of UDHS 2011 were collected between June and December 2011. A total of 9,247 women aged 15-49 years (urban= 2,805 and rural= 6,442 women) were identified as eligible for individual interviews, and 94 percent (8,674 women) were successfully interviewed.

Analysis for our study was restricted among last-born children who were born in the five years preceding the survey. In our study, the total sample size was 7,581. Because their PLF data were not recorded in the database, 2,807 mothers were excluded from our study. Therefore, the data of 4,774 children/mothers were evaluated in this study.

**Outcome variable**

In the UDHS 2011 women questionnaire, mothers were asked: “In the first three days after delivery, was (NAME) given anything to drink other than breast milk?”, “What was (NAME) given to drink? (Options: milk (other than breast milk), plain water, sugar or glucose water, gripe water, sugar-salt-water solution, fruit juice, infant formula, tea/infusions, honey, coffee, and other)”.

In this study, PLF, the dependent variable, was defined as providing any food or liquid other than breast milk to a newborn during the first three days after delivery. The independent variables were chosen based on previous studies and grouped into four categories: sociodemographic characteristics of mothers, characteristics of the infants, antenatal factors, and postnatal factors.

**Statistical analysis**

Continuous variables were presented as mean and standard deviation whereas categorical variables were expressed as number and frequency. The association between the categorical independent variables and PLF was analyzed by using a chi-square test. The variables that were found statistically significant in the chi-square test and variables based on previous literature were included in the logistic regression analysis. A p value higher than 0.05 was considered statistically significant. Statistical analyses were performed using the Statistical Package for Social Sciences, Version 20.0 (IBM Corp., Armonk, NY, USA).
Results

Prevalence of prelacteal feeding according to sociodemographic characteristics of mothers and newborn infants

A total of 4774 mother-child pairs participated in our study. A total of 1923 (40.3%) mothers reported providing prelacteal feeds to their newborn infants. The average age of the mothers was 28.7±7.1 (mean ± SD) years. Results of the chi-square tests to determine the association of factors between sociodemographic characteristics of mothers’ and prelacteal feeding are shown in Table 1. In chi-square analysis, the highest rate of PLF was observed among mothers who are between 15-19 years old, who have secondary/high school education, who are not married, who live in urban areas, who have higher economic status, who have religions other than Christianity and Islam, and who have one and/or two children (p<0.05), (Table 1). The frequency of infants with prelacteal feeds was also higher among in women with no birth attendant at delivery (p<0.05), (Table 2).

| Characteristics of infant | Total N (%) | Prelacteal feeding | p |
|---------------------------|-------------|---------------------|---|
|                          |             | Yes | % | No | % |
| Sex                      |             |     |    |    |    |
| Male                     | 2402 (50.3) | 986 | 41.0 | 1416 | 59.0 | 0.276 |
| Female                   | 2372 (49.7) | 937 | 39.5 | 1435 | 60.5 |
| Weight of infant at birth (gram) |     |      |    |    |    |
| Small (<2500)            | 247 (9.4)   | 95 | 38.5 | 152 | 61.5 | 0.914 |
| Average-Large (2500-6000) | 2373 (90.6) | 921 | 38.8 | 1452 | 61.2 |
| Type of delivery          |             |      |    |    |    |
| Caesarean section        | 318 (6.7)   | 179 | 56.3 | 139 | 43.7 | <0.001 |
| Normal birth             | 4456 (93.3) | 1744 | 39.1 | 2412 | 60.9 |
| Type of birth             |             |      |    |    |    |
| Multiple births          | 85 (1.8)    | 47 | 55.3 | 38 | 44.7 | 0.004 |
| Single birth             | 4689 (98.2) | 1876 | 40.0 | 2813 | 60.0 |
| Birth order number       |             |      |    |    |    |
| 1<sup>st</sup> born      | 789 (16.5)  | 362 | 45.9 | 427 | 54.1 | 0.001 |
| 2<sup>nd</sup> born      | 808 (16.9)  | 315 | 39.0 | 493 | 61.0 |
| 3<sup>rd</sup> born      | 652 (13.7)  | 236 | 36.2 | 416 | 63.8 |
| ≥4<sup>th</sup> born     | 2525 (52.9) | 1010 | 40.0 | 1515 | 60.0 |
| The timing of breastfeeding initiation |     |      |    |    |    |
| The first 24 hours at any time | 262 (7.8) | 180 | 68.7 | 82 | 31.3 | <0.001 |
| Within 1<sup>st</sup> hour | 668 (19.9) | 251 | 37.6 | 417 | 62.4 |
| Immediately              | 2432 (72.3) | 758 | 31.2 | 1674 | 68.8 |

In the chi-square analysis, we found that type of delivery (cesarean section), multiple births, birth order number (first birth order), and timing of breastfeeding initiation (first 24 hours) were significantly associated with prelacteal feeding practice (p<0.05), (Table 3).
Table 4: Multivariate logistic regression analysis prelacteal feeding practice and associated factors

| Characteristics                        | Crude Odds Ratio | 95% CI       | Adj. Odds Ratio † | 95% CI       | p   |
|----------------------------------------|-----------------|--------------|------------------|--------------|-----|
| Economic status                        |                 |              |                  |              |     |
| Low                                    | 1.00 (ref.)     |              | 1.00 (ref.)      |              |     |
| Middle                                 | 1.58            | 1.34-1.86    | 2.15             | 1.38-3.36    | 0.001|
| High                                   | 1.56            | 1.37-1.78    | 2.02             | 1.44-2.82    | <0.001|
| Birth assistant at delivery            |                 |              |                  |              |     |
| Skilled birth attendant                | 1.00 (ref.)     |              | 1.00 (ref.)      |              |     |
| Unskilled birth attendant              | 1.00            | 0.88-1.13    | 1.73             | 1.04-2.88    | 0.035|
| No birth attendant                     | 1.48            | 1.16-1.88    | 4.35             | 1.01-18.67   | 0.048|
| Type of birth                          |                 |              |                  |              |     |
| Single birth                           | 1.00 (ref.)     |              | 1.00 (ref.)      |              |     |
| Multiple births                        | 1.85            | 1.21-2.87    | 2.49             | 1.04-5.94    | 0.040|
| The timing of breastfeeding initiation |                 |              |                  |              |     |
| Immediately                            | 1.00 (ref.)     |              | 1.00 (ref.)      |              |     |
| Within 1st hour                        | 1.33            | 1.11-1.59    | 1.34             | 0.96-1.87    | 0.088|
| The first 24 hours at any time         | 4.85            | 3.69-6.40    | 5.08             | 2.98-8.64    | <0.001|

†Adjusted according to sociodemographic characteristics of mother (age, marital status, educational status, economic status, religion, residential location), maternal factors (number of children, antenatal and postnatal care attendance, place of delivery, birth assistant history at delivery) and the newborn infants characteristics (sex, type of delivery, type of birth, birth order number, timing of breastfeeding initiation).

Discussion

This study investigated the prevalence of PLF practice in children under five and associated factors in Uganda. In this study, about two-five of mothers reported that they provided prelacteal feeds to their newborn infants. The rate of PLF practice was higher in mothers who have high and moderate economic status, in newborns who delivered by an unskilled birth attendant, in newborns who delivered without a birth attendant, in multiple births, and in newborns who began breastfeeding in the first 24 hours after delivery.

We found that prevalence of PLF was 40.3% in Uganda. Although it is known that PLF has a negative effect on the growth and development of infants, the prevalence of PLF is higher in Uganda. Our observed prevalence was higher than the overall prevalence of PLF in twenty-two sub-Saharan African (SSA) countries which was reported to be 32.2%\(^10\). The prevalence of PLF in African countries varies from 2.5% to 85.2%\(^10,12,16-22\). The prevalence of PLF in Asian countries has been reported as 73.3% in Vietnam\(^23\), 49.8% and 42.7% in India\(^24,25\), 26.5% in Nepal\(^13\), and 12.3% in Timor-Leste\(^26\).

Using data from the most recent Demographic and Health Survey (2000-2013) for 57 countries, Oakley et al. found that prevalence of PLF was 51%\(^9\). The differences in the prevalence of PLF among countries may be attributed to differences in culture and local beliefs and availability of an adequate level of maternal and health service. Misconception towards breastfeeding among Vietnamese mothers may cause to high PLF rates\(^23\). Decreased suckling time of an infant and prelacteal feeding can result in decreased breast milk supply. The decrease in breast milk creates a vicious circle by encouraging the mother to PLF. Therefore, breastfeeding practices may explain different rates of PLF between countries. For example, while the PLF rate is 3% in Malawi, where the rate of exclusive breastfeeding is
71%\(^2\), the rate of PLF is 73% in Vietnam, where the rate of exclusive breastfeeding is 20%\(^2\).

In the chi-square analysis, we found that PLF practice associated with some sociodemographic characteristics of mother’s (age, educational status, marital status, residential location, economic status, religion of mother), maternal factors (birth assistant at delivery, number of children), and characteristics of the newborn infants (type of delivery, multiple births, birth order number, timing of breastfeeding initiation). In this study, the variables found to be significant in the chi-square analysis were examined together in the multivariate logistic regression model. Some variables that were found to be significant in the chi-square analysis were not significant in the logistic regression analysis.

In the logistic regression analysis, we found that economic status, the presence of a birth assistant at delivery, multiple births, and the timing of breastfeeding initiation were significant predictors affecting PLF. Consistent with the results of a recent pooled analysis from Demographic and Health Surveys in twenty-two SSA countries\(^3\), we found that mothers who have high and moderate economic status are more likely to give prelacteal feeds to infant. Our findings are also similar to other studies indicating that lower economic status has a protective effect on PLF\(^1,2,3,26\). A possible explanation is that mothers who have lower economic status may have less access to the expensive prelacteal feeds and therefore exclusive breastfeeding is the only alternative available to them\(^1,2,3,24\). In contrast to our study and previous studies\(^3,3,2,3,26\), two studies from Nigeria reported that high socioeconomic status has a protective effect on PLF\(^12,17\). These contradictory results among countries could be attributed to differences in population characteristics.

Maternal utilization of healthcare services can play an important role on the early breastfeeding practice\(^1\). We found that mothers who had an unskilled birth attendant at delivery were approximately 1.7 times more likely to practice PLF, while women who had no birth attendant at delivery were approximately 4.4 times more likely to practice PLF. However, we could not find a relationship between PLF with the place of delivery, mothers who had antenatal care attendance and postnatal care attendance in the multivariate logistic regression analysis. Oakley et al. reported that the presence of a skilled birth attendant is positively correlated with favorable breastfeeding practices in Middle East/ Europe, Latin America, particularly in SSA and Asia. PLF practice was higher among deliveries without skilled birth attendant except Latin America\(^4\). Similarly, studies have found lower prevalence of PLF in mothers who have a skilled birth attendant at delivery\(^1,15,17,19\). When birth occurs without a skilled birth attendant, the most significant source of breastfeeding information comes from family and friends who may advise PLF\(^3,12,19,22,23\). Inconsistent with our study, some studies have demonstrated a strong link between PLF practice and mothers who have antenatal and postnatal care visits\(^12,1,6,17,19\). As a result, the presence of a skilled birth attendant is an important factor in terms of avoiding from PLF. Mothers who have no skilled birth attendant may not receive health information on optimal breastfeeding practices, which could be a likely reason for the high odds of PLF observed in these mothers. Within this scope, breastfeeding counseling should be integrated into routine prenatal and postnatal care in Uganda.

It may be difficult to breastfeed the twin infants at the same time\(^28\). We found that multiple births were significantly associated with higher PLF practice compared to those who gave birth to a single baby in Uganda. This finding is in agreement with another study conducted in Nigeria using the 2013 demographic and health survey data\(^7\). Due to the fact that multiple births are likely to be difficult, it is suggested that breastfeeding after birth may be more problematic. The information and support from health staff are the most critical factors associated with the success of breastfeeding in mothers delivering multiple births\(^29\).

The strongest finding of our study was that PLF practice was more common in mothers who initiated breastfeeding in the first 24 hours after birth as compared to those who initiated breastfeeding immediately after birth. This finding is in agreement with other studies conducted in India\(^23\) and Ethiopia\(^18\). Moreover, a community based cross-sectional study conducted in the Ethiopia has demonstrated that PLF practice is nine times more likely in mothers who discardcolostrum, compared to mothers who givecolostrum to their infant\(^19\). In another study, similarly, the presence of PLF has been found to be five times more likely among mothers who discard thecolostrum\(^16\). All mothers should be informed and supported about the importance of initiation of EBF practice immediately after delivery\(^14\). An intervention trial conducted in Burkina Faso, Uganda and South Africa has found that PLF practice is lower the women in the intervention group, receiving EBF counselling, than in the control group\(^20\). The main strengths of this study were the collection of data by using a validated questionnaire and the use of an internationally validated study method. In addition, since response rate was high, this study may be considered a study representing the nation. Therefore, the findings are generalizable to the entire country. Moreover, this is the first study conducted in Uganda to describe the predictors associated with PLF. Despite these strengths, the current study has some limitations. First, the data set we used is cross-sectional, which limits the ability to show any causality. Second, since the data of study were collected through a questionnaire, it may be associated with the potential recall bias. Third, other unknown factors such as local beliefs and culture may have played a role as a confounding factor in the study. Fourth, our study was conducted using the data received from the database of UDHS 2011. The data of the article may seem to be outdated, because another report was published in 2016. As we mentioned in the Method section, we got permission to use the database in December 2015. At that date, UDHS 2011 data had not yet been shared. Accordingly, we think that it is important to publish the results of our study, since the last study on this subject in Uganda was conducted in 2002.

**Conclusions**

In Uganda, the prevalence of PLF was relatively high (40.3%). Economic status of the mother, the presence of a birth assistant at delivery, multiple births, and timing of breastfeeding initiation were found to be associated with PLF. Improving the awareness of mothers on subjects such as the risks associated with PLF, the optimal practices for breastfeeding, and the presence of a skilled birth attendant at delivery is recommended for Uganda. During antenatal and postnatal care visits, all mothers should be informed about the importance of initiation of breastfeeding immediately after delivery. It is recommended to establish baby friendly hospitals for the promotion of mother and baby health in

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Conflict of interest

All authors declare that they have no competing interests related to this work.

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