Coverage and determinants of newborn feeding practices in rural Burkina Faso

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Abstract

Objectives—Newborn feeding practices are important to neonatal health and survival, but understudied in sub-Saharan Africa. We assessed the prevalence and determinants of newborn feeding practices in Burkina Faso.

Study design—An 18 000 household survey was conducted in rural Burkina Faso in 2010–2011. Women of reproductive age were asked about antenatal, delivery, and newborn care practices for their most recent live birth. Coverage of newborn feeding practices was estimated and multivariate regression was used to assess determinants of these practices.

Results—Seventy-six percent of live births were breastfed within 24 hours of birth, 84% were given colostrum, and 21% received prelacteals. Facility delivery and antenatal care attendance were associated with positive feeding practices.

Conclusions—Positive newborn feeding practices were common in rural Burkina Faso, relative to other low-income settings. Interventions are needed to improve feeding practices among home-born babies, and to encourage earlier initiation of breastfeeding among facility-born newborns.

Keywords

Neonatal; breastfeeding; colostrum; prelacteal; household survey

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Background

Feeding practices in the first few days of life play an important role in neonatal health: studies in Nepal [1], India [2], and Ghana [3] have reported that newborns who were first breastfed within 24 hours of birth had a lower risk of neonatal mortality relative to newborns for whom breastfeeding was initiated after the first day. Several studies in South Asia have drawn attention to harmful practices such as delayed breastfeeding, giving prelacteals, and discarding colostrum [4, 5, 6]. Colostrum is an important source of antibodies and lymphocytes and provides nutrition appropriate to the immature digestive system of the newborn. Giving prelacteals increases exposure to pathogens and thus risk of disease. However, with the exception of Demographic and Health Surveys (DHS), little is known about feeding practices for neonates in sub-Saharan Africa, and particularly in francophone Africa. Globally, there is also limited understanding of the demographic, economic, and cultural factors influencing newborn feeding practices.

Burkina Faso is a predominantly rural landlocked country in West Africa that has high levels of under-five and maternal mortality and has an estimated neonatal mortality rate of 29 per 1000 live births[7]. Feeding practices are generally poor: in the 2010 DHS, less than 25% of infants 0–5 months were exclusively breastfed and 36% received something other than breastmilk in the first three days of life [7]. The prevalence of malnutrition is correspondingly high: 6% of children under 5 years and 11% of those less than 6 months were severely wasted in 2010 (weight for height z-score < −3.0), and 35% of children under 5 years were stunted[8].

A prospective study of exclusive breastfeeding promotion and mortality is underway in southwest Burkina Faso [9], but little is known about feeding practices in newborns or factors influencing those practices. Given the poor coverage of positive feeding practices as well as the high levels of malnutrition and stagnant neonatal mortality rate in Burkina Faso, there is an urgent need to better understand those practices as well as factors influencing them in order to design effective interventions. A cross-sectional household survey to measure coverage of maternal, neonatal, and child health (MNCH) interventions was conducted in 2010–2011 in the context of a program evaluation and included a set of questions addressing newborn care practices. We report on the coverage of newborn feeding practices measured in this survey as well as an analysis of the determinants of those practices.

Methods

Setting

The survey was conducted in 16 health districts across seven regions of Burkina Faso with a population of 4 424 354 in 2010, representing 28% of the country's population [10]. Nine of the survey districts were implementing a MNCH program and were purposively selected by the Ministry of Health because of their high under five mortality rates and weak presence of health partners, relative to other regions of the country. The remaining seven districts, which serve as a comparison arm in the evaluation, were selected using an adapted approach to restricted randomization [11], in which the comparison and intervention districts were balanced on education, health systems, and socio-economic variables.

Sample size

The survey sample size was 18 000 households. Based on previous household surveys, 0.42 women with a live birth in the previous year per household were expected, for a sample size of 7560 live births in the two years preceding the survey. This sample size would allow measurement of newborn feeding indicators with an absolute precision of 3 percentage points or less, assuming a design effect of 2 and alpha of 0.05 [12].

Selection of households, women, and births

All households in the survey districts were eligible to participate, with the exception of those residing in urban census enumeration areas (EAs), which were excluded from the sampling frame. Households were selected using two-stage cluster sampling stratified by district. In each district, 34 rural census EAs (68 per district in each of two districts implementing community case management of pneumonia) were selected with probability proportional to population size, and 30 households were selected in each EA using systematic sampling. A household questionnaire, including a household listing, was administered to the head of household or other adult household member and used to identify eligible women of reproductive age (15–49 years) residing in the household. No other inclusion or exclusion criteria were used beyond willingness to participate in the survey.

After being read an oral consent script and providing consent to participate, all women were asked to provide summary birth histories and basic socio-demographic data. Women reporting one or more live births in the 24 months preceding the interview date were asked a series of questions about the most recent birth, including antenatal and delivery care, newborn characteristics, and postnatal care. We used standard DHS questions regarding prelacteals and the time to initiation of breastfeeding. The questions concerning which prelacteals were given and whether colostrum was given were adapted from a previous study in Bangladesh. [13]

Data collection

A 14-day training workshop that included training in local languages, role plays, and a field exercise was conducted with 113 potential interviewers, of whom 72 were selected as interviewers and 18 as team leaders based on performance measures. Language experts from the Institut National d'Alphabetisation (INA) translated the questionnaires into the five principal local languages in the survey area (Mooré, Fulfuldé, Gourmatchéma, Kasséna, and Nuni) and trained the interviewers to administer the questionnaires in these languages. Although there was no formal written back-translation, the local language training was conducted as a discussion between study staff, language experts, and interviewers in order to determine the most appropriate terminology and formulation for each question. Interviewers had been selected for the training based on their language capacity. Because local languages are primarily oral and cannot be read by most people in Burkina, interviewers were given French questionnaires with key terms noted in parentheses in the local language. Interviewers practiced administering the questionnaires in the local language during the training to ensure that translation was standard across interviewers. Team leaders and supervisors regularly observed interviews in the field to ensure that questions were being translated correctly.

Data were collected between August 26 and October 31, 2010, corresponding to the end of the rainy season in Burkina. Supplementary data collection was conducted from December 3, 2010 to January 18, 2011 in 31 clusters that had been inaccessible during the rainy season, as well as 55 clusters where data collection was not completed during the study period. In addition, 24 clusters covered during the main data collection period were re-surveyed (households initially surveyed were re-interviewed by different teams), primarily because of low woman/household ratios, which raised questions of omission of eligible women. The re-survey data were used in all cases. Supervision was provided by the team leaders, who had received additional training in supervision methods, and by the study investigators.

Data management and analysis

Questionnaires returned to the central office were re-checked for inconsistencies, and open answers were coded. All questionnaires were then double-entered in CSPro. Data entry errors were reconciled, after which consistency checks were performed.

Four feeding practices were measured: breastfeeding initiation within 1 hour of birth, breastfeeding initiation within 24 hours of birth, giving the colostrum, and giving prelacteals. To estimate coverage levels, the proportion of newborns receiving each feeding practice was calculated. For this analysis, missing and "don't know" responses were included and analyzed as separate categories, as they provided some indication of data quality. When calculating coverage rates, newborns who did not have an opportunity to receive the care practice were excluded. For example, babies who died within 72 hours of birth, or who were less than 72 hours old at the time of the interview, were excluded from the numerator and denominator when calculating the proportion of newborns who received a prelacteal.

Time to breastfeeding initiation was measured as a continuous variable and categorized for analysis as <1 hour, 1–11 hours, 12–23 hours, 24–47 hours, and 48 hours or more. Two coverage indicators were calculated from these categories: newborns breastfed < 1 hours of birth, and newborns breastfed < 24 hours of birth. A newborn was considered to have received a prelacteal if the mother reported giving anything other than breastmilk in the first 3 days of life (definition is consistent with DHS[14]). Mothers were asked whether they had given the newborn any colostrum, and their response was coded as a binary (yes/no) variable.

Maternal, newborn, and household-level characteristics were included in the model as explanatory variables. For newborns, we included sex, perceived size at birth, place of delivery (home or facility), delivery complications, and ANC attendance (number of visits) during the pregnancy. Maternal characteristics included age categorized in 5 year intervals, education (none, primary, or secondary), parity, previous death of a child, religion, and ethnicity. We also included household wealth quintile, which was determined by applying principal components analysis to a set of household asset variables including household goods, land ownership, and livestock ownership.

Complicated delivery was defined as an unplanned facility delivery, a delivery by cesarean section, or a delivery where women reported staying at the facility for at least 3 days post-

birth. With the exception of delivery by cesarean section, which in rural Burkina Faso would be done exclusively in cases of obstructed labor or other complications, these measures are proxies for complicated deliveries; by definition they include only facility deliveries.

Data on birthweight were not collected in this study because in a previous survey[15], most babies born in rural areas were not weighed at birth. Instead, mothers were asked whether the baby was very large, larger than average, average, smaller than average, or very small at birth. Data on birthweight and perceived size at birth were both collected in the national 2010 Burkina Faso DHS[7], in which 66% of live births had a measured birthweight. In the 2010 DHS, perceived size at birth had good specificity (94%) but poor sensitivity (45%) in detecting low birthweight (< 2500g) [7]. Therefore, perceived size at birth in this analysis was used not as a proxy for low birthweight but rather as an indicator of the mother's perception of the newborn's size.

Bivariate and multivariate poisson regression models were used to estimate relative risk ratios comparing the risk of feeding behaviors (early initiation of breastfeeding, giving colostrum, giving prelacteals) by maternal/newborn characteristic. Only the results of the full model are presented. All variables hypothesized to be determinants, confounders, or effect modifiers were retained in the final analysis, whether statistically significant or not, as causal determinants might not show statistically significant associations with these feeding practices for reasons related to sample size, measurement, or model. Variance inflation factors (VIF) were calculated for variables hypothesized to be collinear. With the exception of maternal age and parity, which had a VIF of 1.74, the other variables had VIFs near 1.00. Standard errors and confidence intervals were adjusted using the Taylor linearization method to account for the effect of stratification and clustering. Survey weights were used to account for unequal probability of selection and for non-response. All analyses were weighted, and weights were standardized by dividing the weight for each live birth by the mean weight. Data analysis was conducted in Stata version 12 [16].

Ethical and administrative clearance

The study was reviewed and approved by the Burkina Faso National Ethics Committee for Health Research (N° 2009-67), by the Burkina Faso National Statistics Council, and by the Johns Hopkins School of Public Health Institutional Review Board (IRB2590).

Results

Study population

From August 26, 2010 to January 18, 2011, 18 360 households across 16 health districts in Burkina Faso were visited by study interviewers. Interviewers completed 17 139 (93%) household interviews identifying 23 134 women of reproductive age, of whom 21 953 (95%) completed the interview. The main reason for household and woman non-response was the absence of the household or of the woman. Data collection was largely completed during the rainy season and harvest period, when individuals and households frequently move away from their compounds to be closer to their fields.

Among the women interviewed, 7 878 reported a live birth in the preceding two years. These women were young (median age 27 years, range 15–49 years), but of high parity (median 4 live births, range 1–15), indicative of the high fertility in this population. The vast majority of the women (94%) had no formal education. Despite declining under-five mortality rates in Burkina Faso, mortality was high: after excluding primiparas, approximately 45% of all women with a live birth in the two years before the survey reported a death of a prior live born child. Respondents reported frequent health service contacts, with 45% reporting 4 or more antenatal care (ANC) visits during the pregnancy and over 70% delivering in a health facility. Ninety five percent of facility deliveries occurred at first level facilities.

Coverage of newborn care practices

Table 1 reports coverage of feeding practices for newborns. Breastfeeding was very common in this population: 0.5% (n=36) of live births were reported as never breastfed, and 64% (23 of 36) of these non-breastfed babies died in the first seven days after birth. Figure 1 shows the distribution of reported time to breastfeeding initiation. One-quarter of newborns were put to the breast within one hour of birth, and three-quarters were breastfed in the first 24 hours. Most mothers reported initiating breastfeeding either in the first few hours of life, or after 24 hours; only 2% reported initiating breastfeeding 12–23 hours after birth.

Colostrum was given to 84% of newborns, and 21% of those surviving to 3 days were given something other than breastmilk in the first 3 days of life (Table 1). Water, sugar-water, and teas were the most common prelacteals (Table 2).

Receipt of colostrum was more frequent among those breastfed in the first 24 hours: 88% of those breastfed within 24 hours received the colostrum, as compared to 75% among those who began breastfeeding at 1 day or later (aRR=1.16). Receipt of prelacteals was more frequent among babies first breastfed after 24 hours relative to those breastfed in the first day (42% vs. 15%, aRR=2.67).

Determinants of breastfeeding practices

The full results of the adjusted models are provided in Supplementary Table 1. Birth in a health facility was associated with receipt of positive feeding practices: facility-born babies were slightly more likely to be breastfed within 24 hours (aRR=1.06 95% CI: 1.02–1.10) and to receive colostrum (aRR=1.07, 95% CI: 1.04–1.11), relative to those born at home. Facility-born babies were also 34% less likely to be given prelacteals (aRR=0.66, 95% CI: 0.57–0.75). However, there was a slight negative association between facility birth and breastfeeding within one hour of birth (aRR=0.81, 95% CI: 0.71–0.94). More frequent ANC attendance was associated with an increased probability of giving colostrum (aRR=1.12, 95% CI: 1.01–1.24 for 4 or more ANC visits as compared to no ANC), and decreased risk of giving prelacteals (aRR=0.57, 95% CI: 0.45–0.73 for 4 or more ANC visits).

Newborn sex and maternal education, age, parity, and death of a child were not consistently associated with breastfeeding practices, except that women with a secondary education, relative to no education, were more likely to give colostrum to the newborn (aRR=1.13, 95% CI: 1.08–1.19). Maternal ethnicity and religion, however, were strongly associated with all

feeding practices, although the direction of these associations varied. Bissa ethnicity was associated with protective breastfeeding practices, relative to the majority Mossi ethnic group (aRR=2.47 95% CI: 2.04–2.98 for breastfeeding within one hour, aRR=1.12, 95% CI: 1.06–1.17 for colostrum, aRR=0.32, 95% CI: 0.15–0.66for prelacteals). Women of the Gourmatché ethnic group were slightly more likely than the Mossi to initiate breastfeeding within 24 hours (aRR=1.16, 95% CI: 1.11–1.21) and to give colostrum to the newborn (aRR=1.11, 95% CI: 1.05–1.16), but less likely to give prelacteals (aRR=0.67, 95% CI: 0.49–0.91). Traditional or animist religion was negatively associated with initiation of breastfeeding within one hour of birth (aRR=0.74, 95% CI: 0.59–0.94), and with giving the colostrum (aRR=0.94, 95% CI: 0.88–1.00), and positively associated with giving prelacteals (aRR=1.57, 95% CI: 1.30–1.90) relative to Muslim religion.

Discussion

This paper describes current feeding practices in the early neonatal period in rural Burkina Faso, and identifies factors associated with positive feeding practices. Breastfeeding was almost universal, and initiation of breastfeeding occurred in the first 24 hours for 76% of newborns, which is similar to breastfeeding initiation patterns reported in Northern Ghana (71% within 24 hours) [3]. Studies of breastfeeding initiation in South Asia have reported a wide range of coverage rates for breastfeeding initiation within 24 hours (15% – 90%) [1, 2, 17, 18]. Consistent with the high coverage for breastfeeding initiation in the first day, most women in our survey also reported giving colostrum to their newborns. Although colostrum has traditionally been perceived as dirty or old milk and was often discarded in many settings [4, 5, 19], recent studies in India and the Gambia have also documented increased acceptance of the practice of giving colostrum [4, 19].

Harmful practices such as giving prelacteals were reported for only 21% of newborns. In this study, after accounting for confounders, early initiation of breastfeeding was associated with a reduced risk of receiving prelacteals, perhaps because early initiation of breastfeeding reduced the perceived need for prelacteals, or because mothers had received counseling on both practices. This finding contradicts previous qualitative studies in India and the Gambia that have reported that prelacteals are given to newborns even when breastfeeding is initiated soon after birth [4, 19], but is consistent with a study in rural Nepal that found an eight-fold increase in the odds of being exclusively breastfed among newborns breastfed within 24 hours of birth relative to those for whom breastfeeding was initiated after 24 hours [1].

The practice of giving water as a prelacteal echoes the findings from studies in other African settings, where water was perceived to be necessary for breastfed infants in order to prevent dehydration. In Mozambique and the Gambia, for example, caregivers interviewed were resistant to exclusive breastfeeding [19, 20], believing that children needed to be given water even in the newborn period. Addressing this belief through mass media campaigns and/or counseling during antenatal and postnatal visits could reduce the use of prelacteals and increase the prevalence of exclusive breastfeeding.

In an analysis of DHS data in Bangladesh, secondary education was positively associated with early initiation of breastfeeding [18, 21]. In this study, however, secondary education was positively associated with giving colostrum but not with any other practice, possibly because the proportion of women with any secondary education was very small (1.5% in Burkina Faso vs. 34% in Bangladesh). Surprisingly, maternal characteristics other than ethnicity, religion, and education showed no association with feeding practices after adjusting for confounders. The association with ethnicity suggests that feeding behavior may be largely determined by established practices within the mother's ethnic group. To date, educational and behavior change campaigns related to newborn feeding practices in this setting have been limited and not explicitly designed to meet the varying needs of specific ethnic groups, which may also explain our failure to find associations between feeding practices and maternal age or education.

Newborns perceived to have been smaller than average or very small at birth were less likely to have been breastfed within 24 hours of birth, relative to newborns perceived to have been of average or larger than average size. Studies in Brazil and Sri Lanka have also reported that breastfeeding initiation was delayed among low birthweight newborns relative to normal birthweight newborns [22, 23]. It should be noted that our analysis used maternal perception of size at birth, which may not be a good proxy for birthweight. Of concern, however, is that even when mothers perceived a newborn to be smaller than average, he or she was no more likely to receive positive feeding practices than larger newborns. Further exploring breastfeeding practices among vulnerable babies (low birth weight, preterm) is critically important given the suspected high prevalence of low birthweight in this population (19%, based on adjusted DHS data [24]) and the vulnerability of these babies.

Limitations

An important limitation to this study is that the indicators are based on maternal recall of events soon after birth, with the recall period extending up to 2 years after the birth. Standard survey questions were used where possible, both to increase comparability with other surveys and because the questions had already been tested in various settings. As is true of most MNCH survey questions, however, these questions had not been validated. In addition, there were limitations to some of our explanatory variables, such as complicated delivery, which was based on imperfect proxies. Some misclassification is therefore likely to have occurred for both feeding practices and explanatory variables. To the extent that the misclassification was non-differential, it would have biased relative risk estimates towards the null. However, differential misclassification by explanatory variables (such as place of delivery) is possible and would have resulted in biased relative risk estimates, though the direction of the bias is difficult to predict.

The effectiveness of early initiation of breastfeeding may be dependent on its timing in relation to birth [1, 2, 3]. Recall of the interval between birth and initiation of breastfeeding is likely to be difficult for women in many settings; in this study population an additional complication was that most of the women in the sample had no formal education and had difficulty providing a numeric response when asked to recall time intervals. If women were not accurately able to gauge or recall these time intervals, misclassification is likely to have

occurred. If the ability to recall or gauge time was differential (e.g., women with some education were able to recall or estimate time more accurately), it may have biased observed associations between maternal characteristics and feeding practices. We considered asking about the timing of breastfeeding initiation in relation to an event such as the delivery of the placenta; however, the use of this as an anchoring time point is not recommended [25], given the substantial natural variability in time to placental delivery. In addition to misclassification, social desirability bias may have led women to over-report practices like early initiation of breastfeeding, if they perceived those practices to be positive. However, this risk may be minimal in this study given the lack of educational activities or campaigns about newborn feeding practices.

Conclusions

Positive early feeding practices may positively influence breastfeeding duration and exclusivity later in infancy: delayed breastfeeding initiation and use of prelacteals have been associated with shorter duration of breastfeeding, relative to newborns breastfed within 12 hours of birth and who received breastmilk as their first feed [26]. The prevalence of positive feeding practices in the newborn period is therefore of critical importance, particularly in settings with a high prevalence of malnutrition, such as Burkina Faso. The results of this study indicate that positive feeding practices, including breastfeeding initiation within 24 hours, giving colostrum, and not giving prelacteals, are relatively common in the study population, although more progress is needed, particularly with respect to breastfeeding initiation. The data also suggest that early initiation of breastfeeding led to reduced use of prelacteals and a higher likelihood of receiving the colostrum.

The finding that facility-born neonates are more likely to receive positive feeding practices is encouraging, especially given the increasing coverage of facility birth in rural Burkina. However, initiation of breastfeeding appeared to be somewhat delayed in facility births. This delay may have been due to other activities surrounding the birth (weighing of the newborn, monitoring of the third stage of labor) and suggests the need for additional promotion of immediate breastfeeding among auxiliary midwives and nurses who are in the delivery room. These results suggest several avenues for improving feeding practices for newborns in Burkina Faso, such as through counselling during postnatal health checks after home births, and increased efforts to improve facility practices around breastfeeding initiation. The findings also highlight the need for a qualitative assessment of factors influencing feeding practices in the neonatal period. If water is given after birth in an effort to prevent dehydration, for example, then addressing this understanding will be essential to reducing the use of prelacteals. It could also increase early initiation of breastfeeding, if breastfeeding was promoted as a means of preventing dehydration. Research is also needed to understand the role ethnicity plays in determining feeding practices in Burkina in the neonatal period and beyond, and to assess what interventions might be effective in changing these practices.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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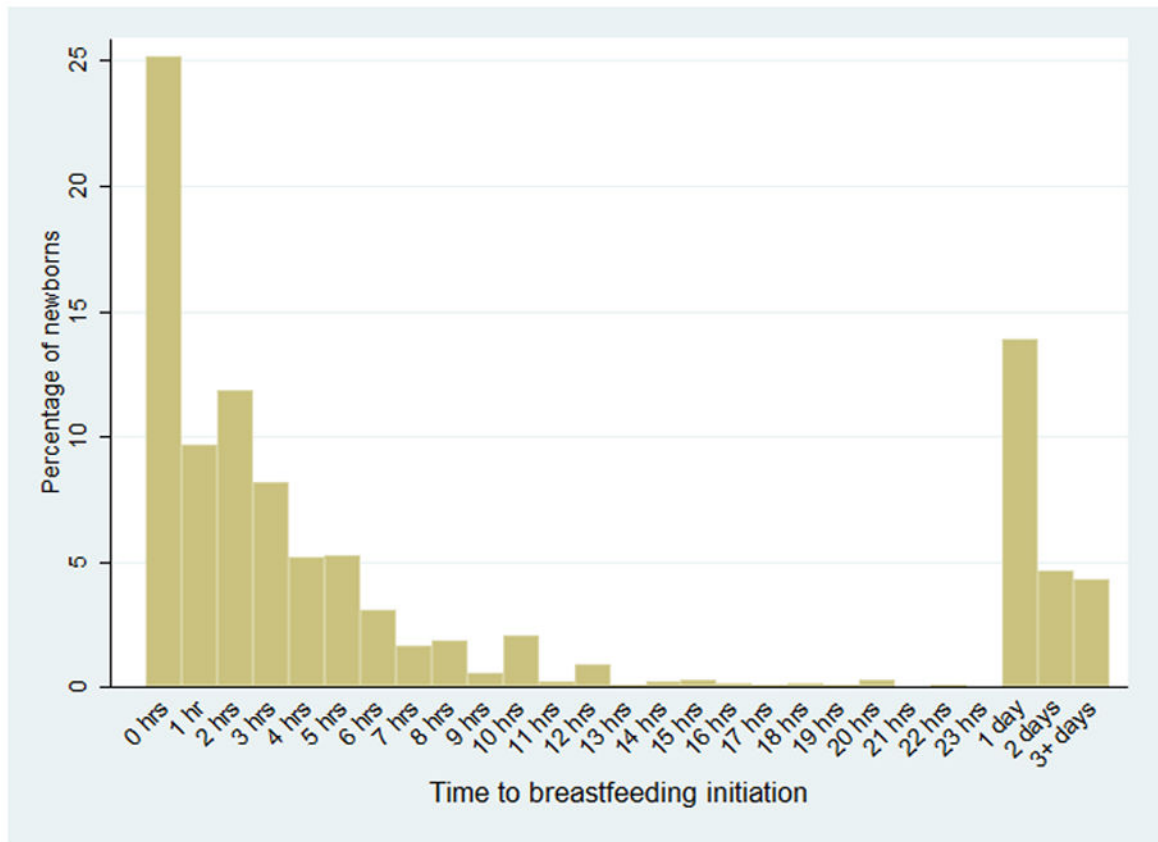
Figure 1.
Distribution of newborns by time to breastfeeding initiation [SEE SEPARATE FILE]

Table 1

Breastfeeding practices in newborns

	Number	Percent	95%CI
Ever breastfed (n=7878)			
Yes	7757	98.5	[98.1 – 98.8]
No	36	0.5	[0.3 – 0.7]
Missing	85	1	
Time to initiation of breastfeeding (n=7784)			
< 1 hr	1871	24	[22.5 – 25.7]
1–23 hrs	4053	52.1	[50.4 – 53.7]
24–47 hrs	960	12.3	[11.4 – 13.3]
>47 hours	651	8.4	[7.6 – 9.3]
Don't know	202	2.6	[2.1 – 3.2]
Died before initiating breastfeeding	27	0.3	[0.2 – 0.5]
Missing	20	0.3	[0.1 – 0.4]
Newborns given colostrum (n=7784)			
Yes	6538	84	[82.5 – 85.3]
No	1161	14.9	[13.6 – 16.4]
Don't know	16	0.2	[0.1 – 0.4]
Died before initiating breastfeeding	27	0.4	[0.2 – 0.5]
Missing	42	0.5	[0.4 – 0.8]
Prelacteals in first 3 days (n=7729)			
Prelacteal received	1624	21	[19.4 – 22.7]
Breastmilk only	6089	78.8	[77.1 – 80.4]
Don't know	7	0.1	[0.0 – 0.2]
Missing	9	0.1	[0.0 – 0.3]

Table 2

Prelacteals received, among newborns who received a prelacteal[*] (n=1624)

Prelacteal	All births		Home births		Facility births	
	Percent	95% CI	Percent	95% CI	Percent	95% CI
Water	61	[57.5 – 64.5]	60.2	[54.1 – 66.1]	61.6	[57.9 – 65.1]
Sugar/glucose water	30.2	[26.4 – 34.3]	30.5	[24.2 – 37.5]	30.1	[26.3 – 34.2]
Tea/infusion	16.6	[14.1 – 19.3]	21.8	[17.5 – 26.8]	13.2	[10.8 – 16.1]
Juice	5.1	[3.4 – 7.5]	3	[1.4 – 6.3]	6.4	[4.2 – 9.7]
Other milk	2.6	[1.7 – 3.9]	1.8	[0.8 – 3.7]	3.1	[2.0 – 4.8]
Sugar-salt solution	1.8	[1.2 – 2.8]	2.1	[1.1 – 4.0]	1.6	[0.9 – 2.8]
Infusions for colic	1.7	[1.1 – 2.6]	2.5	[1.4 – 4.4]	1.2	[0.6 – 2.2]
Formula	1	[0.6 – 1.7]	1	[0.5 – 2.4]	0.9	[0.5 – 1.9]
Honey	0.9	[0.5 – 1.6]	0.7	[0.2 – 2.8]	1	[0.5 – 1.9]
Other	3	[2.1 – 4.3]	3.7	[2.1 – 6.3]	2.6	[1.6 – 4.0]
Don't know	0.1	[0.0 – 0.6]	0	- -	0.2	[0.0 – 1.0]
Missing	0.6	[0.1 – 0.7]	0.2	[0.1 – 0.7]	0.9	[0.4 – 1.9]

[*] Multiple responses possible