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Determinants of early initiation of breast feeding during COVID-19 pandemic among urban-dwelling mothers from Tigray, Northern Ethiopia: a community-based cross-sectional study

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ABSTRACT

Objectives The objective of this study was to assess the practice of early initiation of breast feeding (EIBF) and its determinant factors among urban-dwelling mothers from Tigray during the COVID-19 pandemic.

Design A community-based cross-sectional study was conducted from April to June 2021. Data were analysed using StataSE Version 16 software. To identify determinant factors of the dependent variable, multivariate logistic regression analyses was used at a statistical significance of p<0.05. The strength of the association was measured by OR and 95% CI.

Setting and participants The study was conducted among 633 lactating mothers of infants under the age of 6 months living in Mekelle city, Tigray, Northern Ethiopia from April to June 2021. A three-stage cluster sampling was used to select study participants.

Main outcome measure EIBF or no EIBF.

Results Three hundred and sixty eight (59.6%) mothers/caregivers practised EIBF. Maternal education (adjusted OR, AOR 2.45, 95 % CI 1.01 to 5.88), parity (AOR 1.20, 95 % CI 1.03 to 2.20), caesarean section delivery (AOR 0.47, 95 % CI 0.32 to 0.69) and breastfeeding information and support postdelivery (AOR 1.59, 95% CI 1.10 to 2.31) were found to be significant determinants of EIBF.

Conclusions EIBF is defined as initiation of breastfeeding within 1 hour after delivery. EIBF practice was far from optimal. During the COVID-19 pandemic, maternal education, parity, type of delivery and the provision of up-to-date breastfeeding information and support right after delivery determined the time of breastfeeding initiation.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The community-based nature of the study, random selection of the study participants and larger sample size all make generalisability of the findings fair.
⇒ The study may be unable to control for the unprecedented effect of the Tigray war.
⇒ The effect of possible confounders can never be completely ruled out despite several measures to reduce it.
⇒ Recall bias and desirability bias are other possible limitations of this study as mothers/caregivers were expected to remember (recall) about their breastfeeding practices after some interval of time after their delivery.
⇒ This study considered infants under 6 months of age that could bias comparison with other studies that used under 2 years of age children as denominator.

BACKGROUND

The WHO recommends, with a high-quality evidence, initiation of breast feeding within the first hour after delivery.[1] Early initiation of breast feeding (EIBF) grants a myriad of short-term and long-term benefits to both the mother and the child. Decreased risk of postpartum haemorrhage, increased breastmilk production and stronger emotional ties with the baby are some of the benefits mothers could get from EIBF.[2] For the child, the benefits are very much related to the ingestion of colostrum (first milk) which is rich in immunologic, growth and other protective factors and which reduces neonatal mortality.[3 4] EIBF also strongly predicts future exclusive breastfeeding status.[5]

Global practices of EIBF are not satisfying and lag behind the WHO recommendation with only 42% of newborns put to the breast within 1 hour after delivery.[6] According to a recent study on in 57 low-income and middle-income countries (LMICs), the global weighted prevalence of EIBF from 2010 to 2018 was 51.9%.[7] A study done in Bangladesh reported that if all newborns in the world had initiated breast feeding within 1 hour of birth, there would be about 16% possible

corresponding reduction in the prevalence of severe illness.[8]

According to the 2016 Ethiopian Demographic and Health Surveys (EDHS), the country's largest survey, about three-quarters (73%) of children less than 2 years old were breastfed within 1 hour of birth.[9] However, the country continues to suffer from the effects of poor breastfeeding practices. The most talked-about effect is neonatal mortality. According to EDHS 2016 and mini EDHS 2019 reports, twenty-nine and thirty neonates out of 1000 died before reaching the age of 1 month, respectively.[9 10] During the pre-COVID-19 times, the status of maternity care services in Ethiopia, and specifically in Tigray, was far from optimum. In Ethiopia, 50% of women gave birth at home in 2019 without the assistance of a trained birth attendant.[10] Due to the compromise in all necessary services, the Global Finance Faculty predicted that in Ethiopia there would be 238 000 women without access to facility-based deliveries.[11] Maternity care that encompasses institutional delivery, respectful maternity care, including rooming in, is one among the Essential health services that the Ministry of Health recommends as a basic health service.[12]

As means to contain the spread and minimise the effects of COVID-19, several restrictive and lockdown measures were put and are still in place. These measures have interfered with routine healthcare services and practices including breast feeding. In particular to breast feeding, associations/scientific groups such as the US Centers for Disease Control and prevention recommended temporary mother–newborn separation as a measure to control the spread of the virus.[13] Moreover, in 2020, the American Academy of Pediatrics also recommended infected mothers be separated from their newborns immediately after delivery and that babies be fed expressed breastmilk.[14]

In spite of the possible role mother–newborn separation may play in reducing the risk of COVID-19 transmission, a recent report has found that it was associated with negative breastfeeding practices.[15] It is believed that the benefits of skin-to-skin contact outweigh the benefits of separation as the latter, for example, was found to be associated with a negative effect on the physical and mental health of mothers and newborns.[16] Additionally, the Italian Society of Neonatology recommended a COVID-19 positive, asymptomatic or paucisymptomatic, mother to stay in hospital for a week and practice rooming-in and initiate or continue breastfeeding under strict infection control measures.[17]

Notwithstanding the inconsistencies in the literature, international organisations including the WHO and UNICEF recommend that mothers and infants not be separated (rooming-in) and make continuous skin-to-skin contact, particularly immediately after birth during the time of initiation of breastfeeding, even in times when suspected, probable or confirmed COVID-19 cases exist.[18]

Moreover, the effect of the armed conflict in Tigray region could not be overlooked. On top of the significant COVID-19-related disruptions, the armed conflict in the region has left the health system in general, and maternity care services in particular, in a weakened state.[19]

The overwhelming pandemic-related lockdowns and restrictive measures might have denied mothers of essential healthcare services, including breast feeding. In addition, fear of transmission and anxiety might have prevented mothers from following optimal breastfeeding practices, including EIBF. Moreover, although several researchers studied EIBF and its determinant factors before the pandemic, evidence during the pandemic remains very limited. Therefore, the objective of this study was to assess the practice of EIBF and its determinant factors during COVID-19 pandemic among urban-dwelling mothers of infants under 6 months of age from, Tigray, Northern Ethiopia.

METHODS

Study design

A community-based cross-sectional study was conducted among lactating mother/caregiver–infant dyads living in Mekelle city, Tigray, from April to June 2021.

Study setting and participants

Mekelle is a city located around 780 km north of the Ethiopian capital Addis Ababa, with an elevation of 2254 m above sea level. Administratively, it is a special urban zone divided into seven subcities with an estimated population of over half a million. All lactating mother/caregiver–infant dyads who live in Mekelle were considered as source population for this study. Inclusion criteria are as follows: (1) being a lactating mother with under 6 months old infant and (2) permanent residence in Mekelle city. Exclusion criteria are as follows: (1) unwillingness to participate and (2) having critical illness. For households who had more than one infant <6 months of age that meet the inclusion criteria, a lottery method was used to select one.

Sample size determination and sampling procedures

The sample size for this study was determined using the single proportion formula by considering estimated proportion of the mothers who practiced EIBF (50%), Z=the standard normal deviation at 95% confidence level (1.96), margin of error (0.05), design effect of 1.5 and a 10% non-response rate. This yielded a sample size of 633. However, only 617 mother–infant dyads provided an answer to our outcome variable (EIBF) and made it into the final sample.

Study participants were selected using a three step cluster sampling. First, using lottery method, four subcities (namely Adi-Haki, Kedamay Weyane, Ayder and Hawelti) were selected from the total seven. Second, two 'kebelles' (the smallest local administration level that has up to 4000 households under it) from each subcity were selected with a similar way as the first. Third, the number of respondents to be included in the sample

from a kebelle was determined proportionally to the total number of respondents in that selected kebelle. Finally, participants were randomly selected from a sampling frame of eligible households.

Data collection tools and procedures

Data were collected using structured and pretested interviewer-administered questionnaire via home to home visits. The questionnaire was composed of three main sections: The first section comprised questions related to demographic and socioeconomic characteristics including age, sex, religion, income, educational status and occupation. The second section contained questions on health service and obstetric-related factors such as Antenatal care (ANC), parity, place of delivery, type of delivery, postnatal breastfeeding information and COVID-19 infection. Finally, the third section asked about the time of breastfeeding initiation.

Data were collected by three trained, local language (Tigrigna) speaker, and experienced diploma nurses under close follow-up of supervisors who were holders of master's degree in nutrition and nursing. As means to assure data quality, a 3-day training on objectives of the study, data collection techniques, recording of responses, research ethics and COVID-19 prevention precautions was provided to data collectors and supervisors.

The tool was translated into Tigrigna, and then back to English to check for consistency and accuracy. A pretest was done in 63 (10% of the sample) participants to make any necessary amendment and modification before the main data collection started. Finally, a revised and corrected form of the Tigrigna version of the questionnaire was used for data collection.

Data were collected by following strict precautions of COVID-19. Both the data collectors and the respondents were made to wear face masks, to wash their hands using a soap or alcohol based hand sanitiser, and to maintain at least 2 m of physical distance between them.

Variables

The independent variables of this study include maternal education, place of delivery, ANC, parity, caesarean section (CS) delivery and getting breastfeeding information and support postdelivery. Maternal education was categorised in to two groups of 'formal education' and 'no formal education'. Place of delivery was also a categorical variable with home delivery and institutional delivery being the categories. Parity (primiparous vs multiparous) and number of ANC visits (less than 4 vs 4 or more) were used as categorical variables. Moreover, CS delivery and getting breastfeeding information postdelivery were both categorised into 'yes' or 'no' groups.

The outcome variable for this study is EIBF. Mothers were asked about when after delivery they started to breastfeed their baby. First, responses were recorded into three options initiated within 1 hour after delivery, initiated breastfeeding after 1 hour but within the first day after delivery, and initiated breast feeding after the first day of delivery). Later, the variable was dichotomised into two groups ('no'=initiated breastfeeding after 1 hour after delivery and 'yes'=initiated breast feeding within 1 hour after delivery) for final statistical analysis.

Patient and public involvement

Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this study.

Data analysis and presentation

First, data were entered into and cleaned using EPI-INFO V.3.5.1 Software. Then, the dataset was exported to STATA SE V.16.0 for further statistical analysis. To determine the independent determinants of the outcome variable (EIBF), binary logistic regression was run in two steps. We run binary logistic regression because the outcome variable was categorised into two levels (1=initiated breastfeeding with 1 hour of birth and 0=did not initiated breast feeding with 1 hour of birth).

In the first step, a bivariate logistic regression analysis between each independent variable and the outcome variable was run to screen candidate variables for the final model at $p \leq 0.20$. In the second step, variables that passed the screening step were put together in a multivariate logistic regression model. From this step, only those variables that showed associations at statistical significance of $p<0.05$ were considered as determinants of EIBF. The strength of the associations was estimated using ORs and their respective 95% CI. Model fitness was tested by Hosmer and Lemeshow test using $p>0.05$ as a cut-off. Multicollinearity among independent variables was assessed using variance inflation factor considering values 1–10 as a sign of no multicollinearity.

Descriptive statistics for categorical variables are presented using frequencies and percentages. For continuous variables, they are presented by mean with SD if normally distributed and median with IQR if not normally distributed. When reporting results, observations with missing values were also shown.

RESULTS

Socioeconomic and demographic characteristics of participants

Out of the total 633 sampled mothers, 617 completed the study yielding a response rate of 97.4%. All respondents were urban-dwellers and 496 (80.4%) lived in female-headed households. Five hundred and forty one (87.7%) and 559 (90.6%) were Orthodox Christians and married, respectively. In addition, the mean (±SD) maternal and infant age were 27.5 (±4.95) years and 2.8 (±1.4) months, respectively. With regard to educational status, 594 (96.3%) mothers/caregivers and 559 (90.6%) fathers attended formal education. The average (±SD) family size and monthly income of the households were 4.54 (±1.48) and US$164.2 (±111.7), respectively (table 1).

Table 1 Socioeconomic and demographic characteristics of mother/caretaker-infant dyads in Mekelle city, Tigray, 2021 (n=617)

Variable	Category	Frequency	Percentage
Household head sex	Male headed	496	80.4
	Female headed	121	19.6
Marital Status	Married	559	90.6
	Other*	58	9.4
Maternal formal education	No	23	3.7
	Yes	594	96.3
Mother's occupation	Housewife	397	64.3
	Employed	220	35.7
Father's occupation	Unemployed	11	1.8
	Employed	606	98.2
Infant sex	Male	253	41.0
	Female	364	59.0

*Single, divorced or widowed.

Table 2 Health and obstetric characteristics of mother/caretaker-infant dyads in Mekelle city, Tigray, 2021 (n = 617)

Variable	Category	Frequency (%)
Parity	Primiparous	170 (27.5)
	Multiparous	447 (72.5)
≥4 ANC	No	19 (3.1)
	Yes	598 (96.9)
Place of delivery	Home	48 (7.8)
	Health facility	569 (92.2)
Breastfeeding information and support received	No	175 (28.4)
	Yes	442 (71.6)
Caesarean delivery	No	463 (75.0)
	Yes	154 (25.0)
Birth weight	<2500 g	7 (1.3)
	≥2500 g	533 (98.7)
	Unknown	77
COVID-19 ever infection	No	610 (98.9)
	Yes	7 (1.1)
COVID-19 vaccine received	No	608 (98.5)
	Yes	9 (1.5)

ANC, antenatal care.

Health and obstetric characteristics of study participants

About three-fourth (72.5%) of the mothers were multiparous. Majority (96.9%) had four or more ANC visits for their last pregnancy. In addition, 569 (92.2%) mothers delivered their babies at health facilities and a quarter (25%) of the total number of mothers delivered by CS. Moreover, 442 (71.6%) mothers/caregivers reported to have received breastfeeding information support after delivery. Regarding COVID-19, almost all (98.9%) and majority (98.5%) reported to have never been infected with the virus and to have never been vaccinated, respectively (table 2).

EIBF and its predictors

Three hundred and sixty eight (59.6%) mothers/caregivers began to breastfeed their babies within 1 hour of giving birth. The remaining 211 (34.2%) and 38 (6.2%) mothers started to breastfeed 1–23 hours and 24 hours after delivery, respectively (figure 1).

Table 3 shows the output of the adjusted binary logistic regression model for the significant determinants of EIBF. Maternal education, parity, CS delivery and getting breastfeeding information and support postdelivery were found to be significantly associated with the outcome variable. Mothers/caregivers who attended any formal education were 2.45 (adjusted OR, AOR 2.45; 95 % CI 1.01 to 5.88) times more likely to initiate breastfeeding with 1 hour of birth. The odds of EIBF were 20% (AOR 1.20; 95% CI 1.03 to 2.20) higher among multiparous women compared with their primiparous counterparts.

In the logistic regression analysis, it was also observed that the odds of EIBF were 53% (AOR 0.47; 95 % CI 0.32 to 0.69) lower among mothers who delivered by CS in contrast to those who gave birth vaginally. In additions, mothers who got breastfeeding information and support postdelivery showed a 59% (AOR 1.59; 95 % CI 1.10 to 2.31) greater odds of EIBF when compared with those who did not.

DISCUSSION

Practice of EIBF during COVID-19

In this study, 368 (59.6%) mothers/caregivers practised EIBF. This figure is considerably low compared with practice levels from studies conducted in Ethiopia before the pandemic.[20–22] Such relatively low practice level in this study could be due to the limited access to healthcare services, mainly antenatal and early postnatal. It has already been established that ongoing contact with health professionals is effective in promoting EIBF.[22] Nevertheless, other studies done in Bangladesh[23] and Spain[24] reported lower practice rates of EIBF. The lower practice level of EIBF in the former study could be because it used the 2014 Bangladesh DHS data for analysis, which is about 7 years older than this study, and breastfeeding practices are thought to be improving through time. Despite being conducted in a similar time with this study, the COVID-19 pandemic, the Pereira *et al* study involved a smaller sample size that could be the main reason for the lower practice level.

Global health pandemics such as the COVID-19 and their consequences exert several programme and policy implications. It should be made sure that local COVID-19 policies and guidelines support early and safe breastfeeding practices, and be considering of newer pandemic-related information.[25] A guidance paper by Davanzo *et al* suggested that the initial mother–infant relationship after

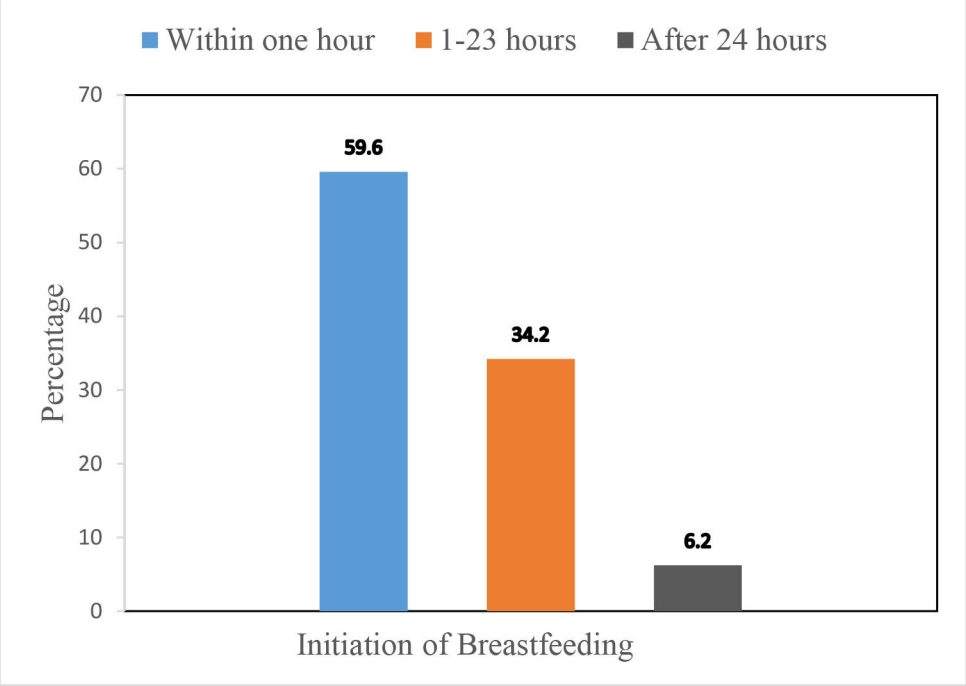

Figure 1 Time of initiation of breast feeding during COVID-19 by mothers/caregivers in Mekelle city, Tigray, 2021 (n=617).

birth and breastfeeding should be promoted by complementing with appropriate COVID-19 infection control measures.[26] The WHO recommends that, in order to achieve the Sustainable Development Goals at the planned time, such suboptimal practice of EIBF needs to be improved.[27]

Determinants of EIBF during COVID-19

In this study, mothers/caregivers who attended any formal education were 2.45 (AOR 2.45; 95 % CI 1.01 to 5.88) times more likely to initiate breastfeeding with 1 hour of birth. This is similar to studies done in Gurage zone of Ethiopia[28] and Nepal.[29] Although maternal education has been mainly used as the sole women's empowerment component of any EIBF-promoting intervention, it was only successful in communities where traditional values are not seriously held or in contexts where qualified health facilities are available.[30]

Opposed to the above narrative, a study conducted in Bangladesh showed a negative association between maternal educational status and EIBF.[31] Such a higher

Table 3 Multivariate logistic analysis showing crude and adjusted associations of independent variables with EIBF during COVID-19 among lactating mothers in Mekelle, Tigray, 2021 (n=617, first categories used as references, Hosmer-Lemeshow p value=0.21)

Variables		EIBF		Crude OR (95% CI)	Adjusted OR (95% CI)	P value
		No	Yes			
Maternal education	No formal education	14	9	1	1	–
	Formal education	235	359	2.37 (1.01 to 5.57)	2.45 (1.01 to 5.88)	0.048*
Parity	Primiparous	88	82	1	1	–
	Multiparous	161	286	1.90 (1.33 to 2.73)	1.20 (1.03 to 2.20)	<0.001†
≥4 ANC visits	No	12	7	1	1	–
	Yes	237	361	2.6 (1.01 to 6.72)	2.39 (0.89 to 6.41)	0.08
Caesarean delivery	No	165	298	1	1	–
	Yes	84	70	0.46 (0.32 to 0.67)	0.47 (0.32 to 0.69)	0.036*
Breastfeeding information and support postdelivery	No	89	86	1	1	–
	Yes	160	282	1.82 (1.28 to 2.60)	1.59 (1.10 to 2.31)	0.01*

*Significant at p<0.05
†significant at p<0.001.
ANC, antenatal care; EIBF, early initiation of breast feeding.

EIBF practice level in lower education groups might be somehow suggestive of the role breastfeeding plays in curtailing the health gaps between children from both extremes of socioeconomic classes. This could also be explained by the fact that most maternal and child health and nutrition interventions focus on lower socioeconomic communities. Breastfeeding stands one among the few desirable health related practices in lower socioeconomic classes in LMICs.[32]

The odds of EIBF were 20% (AOR 1.20; 95 % CI 1.03 to 2.20) higher among multiparous women compared with their primiparous counterparts. Studies conducted in Gondar,[33] rural Ethiopia[34] and Saudi Arabia[35] also reported similar findings. A study done in Brazil also corroborated that multiparous women started breast feeding earlier than primiparous women.[36] Relatively, multiparous mothers are more likely to be exposed to and to experience any child nutrition related information, including breast feeding.

In the logistic regression analysis, it was also observed that the odds of EIBF were 53% lower among mothers who delivered by CS in contrast to those who gave birth vaginally. This is in line with a number of studies done across the world including in Ethiopia,[20 37 38] Uganda,[39] Tanzania,[40] Namibia,[41] India[42] and Turkey.[43] Such types of deliveries are associated with physical pain and tiredness due to anaesthesia, prolonged mother–child separation and psychological stress that might not give EIBF the due attention and priority.[44]

In addition, mothers who got breastfeeding information and support postdelivery showed a 59% (AOR 1.59; 95 % CI 1.10 to 2.31) greater odds of EIBF when compared with those who did not. Other studies[45 46] done in Ethiopia reported similar findings. The time postdelivery is one of the critical periods to provide key breastfeeding-related information. Provision of information during prenatal and/or postnatal care should be promoted as exposure to any source of information has been found to be associated with increasing the proportion of women experiencing optimal breastfeeding practices, including EIBF.[47] A hospital in Brazil provides all mothers at discharge with written information about breastfeeding during COVID-19.[48]

The impact of the Tigray war may be impossible for the study to account for. Despite numerous steps taken to lessen it, the impact of potential confounders can never be entirely eliminated. Other potential limitations of this study include recall bias and desirability bias since mothers and caregivers were expected to remember (recall) about their nursing habits after a period of time following delivery. Moreover, this study considered infants under 6 months of age that could bias comparison with other studies that used under 2 years of age children as denominator.

Conclusions

During the COVID-19 pandemic, the practice of EIBF is far from optimal. Such practice levels were found to be associated with maternal education, parity, CS delivery and postnatal breastfeeding information and support. Encouraging women to attend/continue formal education and provision of updated information on breast feeding during COVID-19 to mothers could lead to higher EIBF practice. For mothers giving birth by CS, a special protocol of breast feeding that takes into account the associated stress and physical trauma needs to be followed. In addition, for primiparous women, special service approach regarding breast feeding might be needed during ANC or in the early postnatal period.

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Competing interests None declared.

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Patient consent for publication Not applicable.

Ethics approval The study obtained ethical approval from Mekelle University, college of health sciences, institutional review board (reference number: MU-IRB 1880/2021). Participants provided informed consent to take part in the study before being included.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available on reasonable request. All data relevant to the study are included in the article or uploaded as online supplemental information.

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