International Breastfeeding Journal

RESEARCH

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Individual- and community-level factors associated with early initiation of breastfeeding in Mozambique: evidence from the 2022–2023 Demographic and Health Survey

Enyew Getaneh Mekonen[1*]

Abstract

Background Early initiation of breastfeeding is defined as giving breast milk to the newborn within one hour of birth. It strengthens the link between mother and child, promotes cognitive development, and lowers the chance of obesity and non-communicable diseases during the prime years of life. Nowadays, only 50% of newborns worldwide receive breast milk within their first hour of life. This study examined the prevalence and individual- and community-level factors associated with early initiation of breastfeeding using the Demographic and Health Survey data and offers suggestions that can enhance the practice in Mozambique.

Methods Data from the nationally representative Mozambique Demographic and Health Survey were used in this cross-sectional analysis. The study included a weighted sample of 3,548 children born in the two years prior to the survey. Software for statistical analysis, STATA/SE version 14.0, was used to clean, recode, and analyze the data. Utilizing multilevel logistic regression, the factors associated with the outcome variable were identified. Statistical significance was attained by variables having a p-value less than 0.05.

Results The prevalence of early initiation of breastfeeding in Mozambique was 75.03% (95% CI: 73.58%, 76.43%). Factors like non-working [AOR = 0.62; 95% CI (0.50, 0.78)], wanted last pregnancy [AOR = 1.68; 95% CI (1.33, 2.12)], antenatal care attendance [AOR = 0.63; 95% CI (0.43, 0.93)], vaginal birth [AOR = 2.30; 95% CI (1.58, 3.36)], size of the child at birth [AOR = 1.77; 95% CI (1.26, 2.48)], urban residence [AOR = 2.99; 95% CI (1.90, 4.72)], community-level antenatal care utilization [AOR = 0.52; 95% CI (0.35, 0.77)], and community poverty level [AOR = 0.34; 95% CI (0.20, 0.58)] were significantly associated with early initiation of breastfeeding.

Conclusions About three out of four newborn babies in Mozambique have an early initiation of breastfeeding. It is critical to concentrate on developing policies that support the early initiation of breastfeeding, particularly for mothers who have small children, unplanned pregnancies, non-vaginal deliveries, and reside in rural areas.

*Correspondence:
Enyew Getaneh Mekonen
enyewgetaneh12@gmail.com

Full list of author information is available at the end of the article

Keywords Early initiation of breastfeeding, Prevalence, Factors, MDHS, Multi-level analysis

Background

Globally, five million fatalities in children under five were recorded in 2015; of these, nearly half (46%) happened during the newborn period [1]. Prematurity, malnourishment, and septicemia impact an even higher number of children and can have major physical and neurological effects [2]. Reducing mortality and morbidity in children and early babies requires large-scale interventions that begin prior to delivery and continue during the postnatal period [2]. Nowadays, only 50% of newborns worldwide receive breast milk within their first hour of life [3]. A study from 58 low- and middle-income countries (LMICs) showed that the overall prevalence of delayed initiation of breastfeeding was 53.8% [4].

Breastfeeding should begin as soon as possible after birth, according to the World Health Organization's (WHO) Global Strategy for Infant and Young Child Feeding [5]. "All mothers should be supported to initiate breastfeeding as soon as possible after birth, within the first hour after delivery," according to WHO guidelines on maternity care [6]. Early initiation of breastfeeding can be defined as the provision of mothers' breast milk to infants within the first hour of birth [3]. It is important because it guarantees that the infant will receive colostrum, a yellow liquid that serves as both the newborn's first meal and its first vaccination [3]. Early initiation of breastfeeding gave newborns an opportunity to receive the energy and balanced diet they need for healthy growth and cognitive development, strengthened the link between mother and child, lowered the chance of obesity and non-communicable diseases during the prime years of life [3, 7], shielded the newborns against infections like pneumonia, diarrhea, and neonatal sepsis during their crucial window of time, and raised the likelihood of exclusive breastfeeding in subsequent months [7–9].

Skin-to-skin contact is necessary when placing babies on the breast, and this early, postpartum connection between mother and child has both immediate and long-term benefits [10]. Newborns benefit from immediate skin-to-skin contact because it helps control body temperature and introduces healthy germs from their mother's skin [11]. Breastfeeding infants for the first hour after delivery is highly indicative of exclusive breastfeeding in the future [12]. Infants who are not breastfed within the first hour of their lives are more likely to die and get common illnesses [13]. There is a higher chance of introducing prelacteal meals if breastfeeding is delayed past the first hour after birth [14].

The prevalence of timely initiation of breastfeeding ranges from 20.5 to 83% in different parts of the world [15–24]. Factors like maternal age, maternal education, household wealth, media exposure, pregnancy intention, place of delivery, mode of delivery, antenatal care (ANC) attendance, birth order, prelacteal feeding, skilled birth attendants, previous breastfeeding experience, type of birth, residence, and size of the child at birth were associated with early initiation of breastfeeding [15–24]. In order to design workable methods that could help enhance the practice among breastfeeding mothers, it is important to identify individual- and community-level factors of early initiation of breastfeeding, as there is a dearth of information regarding the prevalence and individual- and community-level factors associated with early initiation of breastfeeding in Mozambique. Thus, using the Demographic and Health Survey (DHS) data, this study examined the prevalence and individual- and community-level factors associated with early initiation of breastfeeding and offered suggestions that can enhance the practice in Mozambique. This study used a multilevel modeling statistical approach (looking at individual and community factors) as it can help to avoid misleading conclusions and analyze complex data structures.

Methods

Study design, setting, and data source

Secondary analysis of data from the most recent national representative, the 2022–23 Mozambique Demographic and Health Survey (2022–23 MDHS), collected by the cross-sectional study design, was conducted. The 2022–23 MDHS is the 4th DHS carried out in the country, whose data were collected from 27 July 2022 to 27 February 2023. The DHS is implemented throughout the world through the DHS Program. Mozambique joined the program in 1996 and, until then, carried out the DHS in 1997, 2003, 2011, and recently in 2022–23. The DHS 2022–23 in Mozambique was implemented by the National Institute of Statistics (INE) in collaboration with the Ministry of Health (MISAU) and the Institute National Health Service (INS) and constitutes the main and most reliable source of information on statistics. Five main questionnaires were used in DHS 2022–23, namely: household, questionnaire for women aged 15–49, questionnaire for men aged 15–54, biomarker questionnaire, and water quality testing questionnaire. These questionnaires, based on the DHS Program Model Questionnaires, were translated into Portuguese and adapted to reflect population and health issues relevant to Mozambique. Data were obtained from the DHS website after submitting a request justifying the purpose of the study. The Individual Record (IR) file of the MDHS data set, which contains data related to background characteristics, pregnancy, postnatal care, family planning,

immunization, health, and nutrition of mother-child pairs, was used for this study.

Population and sampling

The present study used a weighted sample of 3,548 children who were born in the 2 years preceding the survey (IR file). The 2022–23 MDHS employed a two-stage stratified sample design and aimed to provide estimates for the national level, urban and rural areas, and each of the ten provinces (Niassa, Cabo Delgado, Nampula, Zambézia, Tete, Manica, Sofala, Inhambane, Gaza, and Maputo), plus the City of Maputo, the capital of the country with provincial status. The first stage involved the selection of the sample of conglomerates (clusters), consisting of areas of enumeration (AE) outlined for the population based on the General Population Census and Housing (GPH) of 2017. A total of 619 enumeration areas were selected with probability proportional to size, with the measure of size being the number of households in each explicit stratum. Of the 619 AEs, 232 were from urban areas and 387 from rural areas. Because of security concerns, eight districts (Ibo, Macomia, Mocímboa da Praia, Mueda, Muidumbe, Nangade, Palma, and Quissanga) in the province of Cabo Delgado were excluded from the sample selection. In the second stage, 26 households were selected systematically for each enumeration area. Based on this procedure, 16,045 households were selected for the current survey. This number is slightly smaller than the sample size of 16,094, because two AEs selected (one in Cabo Delgado and another in Zambézia Province, both rural) could not be completed due to security issues. Additional information related to the population, study area, data collection, sampling procedure, and questionnaires used in the survey can be obtained from the 2022–23 MDHS final report [25].

Study variables and measurements

Dependent variable

The outcome variable was early initiation of breastfeeding, which is giving breast milk to the newborn within one hour of birth. It was measured based on the maternal report and coded as 1 "if the mother initiated breast milk within 1 hour" and 0 "otherwise."

Explanatory variables

Both individual and community-level independent variables were incorporated in this study. The individual-level factors used in this study were maternal age (15–24 years, 25–34 years, 35–49 years), maternal education (no education, primary, secondary, higher), maternal occupation (not working, working), marital status (unmarried, married), household wealth status (poor, middle, rich), mass media exposure (no, yes), pregnancy (unwanted, wanted), ANC visits (no visit, 1 to 3 visits, 4+visits), place of delivery (home, health facility), mode of delivery (cesarean section, vagina), type of birth (single, multiple), size of the child at birth (small, average, large sized), and sex of the child (male, female). Community-level variables include place of residence (urban, rural), community-level media exposure (low, high), community level of women's education (low, high), community poverty level (low, high), community-level ANC utilization (low, high), and community-level health facility delivery (low, high). The community-level factors were generated by aggregating individual-level factors, as these factors were not directly found from surveys.

Description of explanatory variables

Mass media exposure

A variable that is coded as "yes" if the mother was exposed to at least one of the three media (radio, television, and newspaper) and "no" otherwise based on the respondent's reading, listening, and watching habits.

Pregnancy

Reclassified as unwanted (including both mistimed and unwanted) and wanted (if the pregnancy was desired).

Type of birth

Reclassified as single and multiple (if the mother gave birth to two or more children during the previous gestation).

Size of the child at birth

This is reclassified as an average, small, or large infant based on the mother's claim regarding the size of the most recent child.

Community-level media exposure

A community-level variable that is measured by the percentage of women who have been exposed to at least one media, such as a newspaper, radio, or television, and is classified as low community-level media exposure (communities where ≤50% of women are exposed) or high community-level media exposure (communities where >50% of women are exposed) based on the national median value [26, 27].

Community-level women's education

The percentage of women who have completed at least primary school is used to calculate aggregate values based on respondents' educational attainment. The community level of women's education was then divided into two categories based on the national median value: low (communities where ≤50% of women have completed elementary education) and high (communities where >50% of women have completed primary education) [26, 27].

Community-level health facility delivery

Aggregate values are determined by the percentage of women who give birth in a health facility and are recoded as low (communities where ≤50% of women give birth there) and high (communities where >50% of women give birth there) based on the community level of health facility delivery [26, 27].

Community-level ANC utilization

The percentage of women who have had four or more ANC visits is used to calculate aggregate values. The national median value was used to classify the community level of ANC utilization into two categories: low (communities where ≤50% of women have had at least four ANC visits) and high (communities where >50% of women have had at least four ANC visits) [26, 27].

Community poverty level

Similar to the community-level variables mentioned above, this aggregated variable from household wealth status (poorest, poor, middle, rich, richest) was recoded as low and high community poverty level [26, 27].

Data management and analysis

Data extracted from the 2022–23 MDHS data sets were cleaned, recoded, and analyzed using STATA/SE version 14.0 statistical software. To manage missing data and non-responses, sample weight was used. Sample weighting was performed using the STATA command gen wgt=v005/1,000,000 and tab outcome [iw=wgt]. Because the survey sample is insufficiently representative of all potential combinations of multiple variables, weighting is used. To make sure the weighted sample more closely resembles the population distribution, this method redistributes weights. The categorization of continuous variables and further recategorization of categorical variables were done accordingly. Descriptive statistics like frequencies, percentages, mean, and standard deviation were used to present both the individual and community-level variables in tables and figures. The assumptions of independent observations and equal variance across clusters were broken to employ the traditional logistic regression model due to the hierarchical structure of the DHS data. This is an indication that using a sophisticated model to take into account between-cluster factors is necessary. As a result, multilevel logistic regression was used to determine the factors associated with EIBF. Multilevel logistic regression follows four models: the null model (outcome variable only), model I (only individual-level variables), model II (only community-level variables), and model III (both individual and community-level variables). The model without independent variables (the null model) was used to check the variability of EIBF across the cluster. The association of individual-level variables with the outcome variable (Model I) and the association of community-level variables with the outcome variable (Model II) were assessed. In the final model (Model III), the association of both individual and community-level variables was fitted simultaneously with the outcome variable. The intra-class correlation coefficient (ICC) and proportional change in deviance (PCV) were checked to quantify the magnitude of the clustering effect and the degree to which community-level factors explain the unexplained variance of the null model. A model with the lowest deviance was selected as the best-fitted model (model III). Finally, variables with a p-value less than 0.05 were declared to be statistically significant variables associated with EIBF. The variance inflation factor (VIF) was used to check multicollinearity between covariates. The VIF falls within acceptable limits of 1–10, indicating the absence of significant collinearity across independent variables.

Random-effect results

Measures of variation or random effects of the outcome variable were estimated using the median odds ratio (MOR), ICC, and PCV. The variation between clusters was measured by the ICC and PCV. Taking clusters as a random variable, the ICC reveals that the variation of EIBF between clusters is computed as ICC=VC/(VC+3.29) × 100%. The MOR is the median value of the odds ratio between the area of the highest risk and the area of the lowest risk for EIBF when two clusters are randomly selected, using clusters as a random variable; MOR = $e^{0.95\sqrt{VC}}$. In addition, the PCV demonstrates the variation in the prevalence of EIBF explained by factors and is computed as PCV = (Vnull-VC)/Vnull×100%, where Vnull=variance of the null model and VC=cluster-level variance [28]. The association between the likelihood of EIBF and individual and community-level independent variables was estimated by the fixed effects.

Results

Individual- and community-level characteristics of participants

A total of 3,548 study subjects were included in the present study. The mean age of mothers was 26.40±0.12, and 47.83% of them fall in the age range of 15–24 years. Nearly two-thirds (64.32%) of mothers had no jobs, and 47.49% of them completed primary education. The majority (83.54%) of mothers were married, and 40.59% of them had poor household wealth status. More than half (52.48%) of mothers had no mass media exposure, and 70.74% of them gave birth at a health facility. More than three-fourths (75.17%) of mothers wanted their last pregnancy, and 69.48% of them were rural dwellers. The majority (93.35%) of mothers had vaginal delivery, and 56.14% of them had 4+ANC visits during their recent pregnancy. More than half (50.90%) of the children were

female, and 57.33% of them were reported to have average size. The majority (98.45%) of mothers delivered a single child, and 50.28% of them were from communities with low levels of media exposure. More than half (55.47%) and 53.86% of mothers were from communities with high levels of education and low levels of poverty, respectively. More than half (53.30%) of mothers were from communities with a high level of ANC utilization, and 60.01% of them were from communities with a high level of health facility delivery (Table 1).

Table 1 Individual- and community-level characteristics of study subjects, data from MDHS 2022–23 ($n=3,548$)

Variables	Category	Frequency (*n*)	Percentage (%)
Maternal age	15–24 years	1,697	47.83
	25–34 years	1,273	35.88
	35–49 years	578	16.29
Maternal educational level	No education	959	27.03
	Primary	1,685	47.49
	Secondary	851	23.99
	Higher	53	1.49
Maternal occupation	Not working	2,282	64.32
	Working	1,266	35.68
Marital status	Unmarried	584	16.46
	Married	2,964	83.54
Mass media exposure	No	1,862	52.48
	Yes	1,686	47.52
Household wealth status	Poor	1,440	40.59
	Middle	749	21.11
	Rich	1,359	38.30
Pregnancy intention	Unintended	881	24.83
	Intended	2,667	75.17
Place of delivery	Home	1,038	29.26
	Health facility	2,510	70.74
Number of ANC visits	No visit	460	12.97
	1 to 3 visits	1,096	30.89
	≥ 4 visits	1,992	56.14
Mode of delivery	Cesarean section	236	6.65
	Vagina	3,312	93.35
Sex of the child	Male	1,742	49.10
	Female	1,806	50.90
Type of birth	Single	3,493	98.45
	Multiple	55	1.55
Size of the child at birth	Small	688	19.39
	Average	2,034	57.33
	Large	826	23.28
Place of residence	Urban	1,083	30.52
	Rural	2,465	69.48
Community level media exposure	Low	1,784	50.28
	High	1,764	49.72
Community level of women education	Low	1,580	44.53
	High	1,968	55.47
Community poverty level	Low	1,911	53.86
	High	1,637	46.14
Community level ANC utilization	Low	1,657	46.70
	High	1,891	53.30
Community level health facility delivery	Low	1,419	39.99
	High	2,129	60.01

Prevalence of early initiation of breastfeeding

The prevalence of early initiation of breastfeeding in Mozambique was 75.03% (95% CI: 73.58%, 76.43%). The proportion of early initiation of breastfeeding was high among mothers who wanted their last pregnancy and had vaginal delivery. Similarly, the proportion of early initiation of breastfeeding varied by region, with the highest prevalence reported in Nampula (97.60%) and the lowest in Gaza (30.53%) (Fig. 1).

Measures of variation and model fitness

A null model was used to determine whether the data supported the decision to assess randomness at the community level. Findings from the null model showed that there were significant differences in early initiation of breastfeeding between communities, with a variance of 3.186 and a p-value of <0.001. The variance within clusters contributed 50.80% of the variation in early initiation of breastfeeding, while the variance across clusters was responsible for 49.20% of the variation. In the null model, the odds of early initiation of breastfeeding differed between higher- and lower-risk clusters by a factor of 5.70 times. The intra-class correlation value for Model I indicated that 44.71% of the variation in early initiation of breastfeeding accounts for the disparities between communities. Then, with the null model, community-level variables were used to generate Model II. According to the ICC value from Model II, cluster variations were the basis for 43.80% of the differences in early initiation of breastfeeding. In the final model (model III), which attributed approximately 42.45% of the variation in the likelihood of early initiation of breastfeeding to both individual and community-level variables, the likelihood of early initiation of breastfeeding varied by 4.57 times across low and high early initiation of breastfeeding (Table 2).

Individual- and community-level factors associated with the early initiation of breastfeeding

In the final fitted model (model III) of multivariable multilevel logistic regression, maternal occupation, pregnancy intention, number of ANC visits, mode of delivery, size of the child at birth, place of residence, community-level ANC utilization, and community poverty level were significantly associated with early initiation of breastfeeding. Accordingly, working mothers were 38% less likely to practice early initiation of breastfeeding than non-working mothers [AOR=0.62; 95% CI (0.50, 0.78)]. The

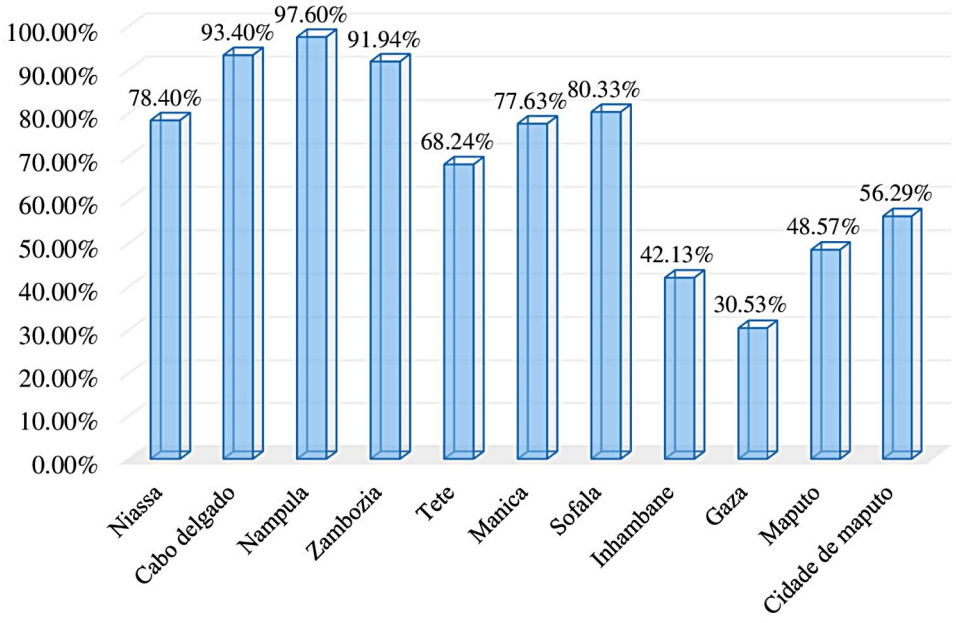

Fig. 1 Propotion of early initiation of breastfeeding by region in Mozambique, data from MDHS 2022-2023(*n*=3,548)

Table 2 Model comparison and random effect analysis for early initiation of breastfeeding and its associated factors in Mozambique, MDHS 2022–23 (*n* = 3,548)

Parameter	Null model	Model I	Model II	Model III
Variance	3.186347	2.660058	2.564326	2.427151
ICC	49.20%	44.71%	43.80%	42.45%
MOR	5.70	4.90	4.76	4.57
PCV	Reference	16.52%	19.52%	23.83%
Model fitness				
LLR	-1733.0129	-1676.1135	-1691.8758	-1648.258
Deviance	3,466.0258	3,352.227	3,383.7516	3,296.516

ICC: Intra cluster correlation; LLR: log-likelihood ratio; MOR: median odds ratio; PCV: Proportional change in variance

odds of early initiation of breastfeeding were 1.68 times higher among mothers who wanted their last pregnancy compared with their counterparts [AOR=1.68; 95% CI (1.33, 2.12)]. Mothers who had 1 to 3 ANC visits were 37% less likely to practice early initiation of breastfeeding than those who had no ANC visit [AOR=0.63; 95% CI (0.43, 0.93)]. The odds of early initiation of breastfeeding were 2.30 times higher among mothers who had vaginal delivery compared with mothers who had cesarean section delivery [AOR=2.30; 95% CI (1.58, 3.36)]. Infants reported to be average or large-sized at birth were 1.54 and 1.77 times more likely to have early initiation of breastfeeding compared with those reported to be small-sized at birth, respectively [AOR=1.54; 95% CI (1.15, 2.06)] and [AOR=1.77; 95% CI (1.26, 2.48)]. Urban dwellers were 2.99 times more likely to practice early initiation of breastfeeding compared with rural dwellers [AOR=2.99; 95% CI (1.90, 4.72)]. Mothers from communities with low levels of poverty were 66% less likely to practice early initiation of breastfeeding than their counterparts [AOR=0.34; 95% CI (0.20, 0.58)]. Furthermore, mothers from communities with a high level of ANC utilization were 48% less likely to practice early initiation of breastfeeding than those with low utilization [AOR=0.52; 95% CI (0.35, 0.77)] (Table 3).

Discussion

The present study was conducted to determine the prevalence of early initiation of breastfeeding and identify its associated factors in Mozambique using the most recent DHS dataset. In this study, the prevalence of early initiation of breastfeeding was 75.03% (95% CI: 73.58%, 76.43%). This finding is consistent with a study conducted in Ethiopia (75.2%) [29]. The finding of the current study is higher than studies conducted in Ghana (52.3-72%) [30–32], Guinea (60%) [23], Tanzania (71.1%) [33], Rwanda (20.5%) [34], Uganda (68%) [35], Bangladesh (61.19%) [20], Brazil (56.7%) [21], Chad (23.8%) [15], Colombia (65.6%) [17], Haldwani (45.1%) [36], India (43.5%) [37], Indonesia (57%) [18], Nepal (49.5%) [19], and Turkey (70.7%) [38]. On the other hand, the current finding was lower than a study conducted in Tanzania (83%) [22]. Variations in sample size, methodology, socioeconomic and demographic variables, and cultural differences could all be reasons for this discrepancy. Differences in national health facility availability may potentially account for the divergence of this finding from other investigations. The disparity between the results of the current study and those of previous studies could also be explained by the difference in study periods. The author couldn't access the final report from the previous

Table 3 Individual- and community-level factors associated with early initiation of breastfeeding in Mozambique, MDHS 2022–23 ($n = 3,548$)

Variables	Category	Model I AOR (95% CI)	Model II AOR (95% CI)	Model III AOR (95% CI)
Maternal age	15–24 years	1.00		1.00
	25–34 years	0.85(0.68, 1.07)		0.84(0.67, 1.05)
	35–49 years	0.98(0.72, 1.33)		0.99(0.73, 1.34)
Maternal educational level	No education	1.00		1.00
	Primary	0.92(0.70, 1.21)		0.98(0.74, 1.31)
	Secondary	0.70(0.49, 1.01)		0.75(0.52, 1.09)
	Higher	0.96(0.41, 2.23)		0.99(0.42, 2.33)
Maternal occupation	Not working	1.00		1.00
	Working	0.61(0.49,0.77)*		0.62(0.50,0.78)*
Marital status	Unmarried	1.00		1.00
	Married	1.02(0.78, 1.34)		1.00(0.76, 1.31)
Mass media exposure	No	1.00		1.00
	Yes	1.12(0.87, 1.44)		1.11(0.85, 1.44)
Household wealth status	Poor	1.00		1.00
	Middle	0.78(0.57, 1.06)		1.05(0.75, 1.46)
	Rich	0.54(0.37,0.77)*		0.78(0.51, 1.20)
Pregnancy intention	Unintended	1.00		1.00
	Intended	1.73(1.37,2.18)*		1.68(1.33,2.12)*
Place of delivery	Home	1.00		1.00
	Health facility	1.08(0.81, 1.43)		1.21(0.90, 1.63)
Number of ANC visits	No visit	1.00		1.00
	1 to 3 visits	0.57(0.39,0.85)*		0.63(0.43,0.93)*
	≥4 visits	0.58(0.40,0.85)*		0.71(0.48, 1.04)
Mode of delivery	Cesarean section	1.00		1.00
	Vagina	2.32(1.59,3.38)*		2.30(1.58,3.36)*
Sex of the child	Male	1.05(0.86, 1.29)		1.05(0.86, 1.29)
	Female	1.00		1.00
Type of birth	Single	1.88(0.91, 3.90)		1.88(0.92, 3.87)
	Multiple	1.00		1.00
Size of the child at birth	Small	1.00		1.00
	Average	1.54(1.15,2.06)*		1.54(1.15,2.06)*
	Large	1.79(1.27,2.51)*		1.77(1.26,2.48)*
Place of residence	Urban		2.54(1.63,3.97)*	2.99(1.90,4.72)*
	Rural		1.00	1.00
Community level media exposure	Low		1.00	1.00
	High		1.02 (0.65, 1.59)	1.07(0.68, 1.70)
Community level education	Low		1.00	1.00
	High		0.63(0.41, 0.96)*	0.71(0.46, 1.10)
Community poverty level	Low		0.29(0.18, 0.48)*	0.34(0.20,0.58)*
	High		1.00	1.00
Community level ANC utilization	Low		1.00	1.00
	High		0.50(0.34, 0.74)*	0.52(0.35,0.77)*
Community health facility delivery	Low		1.00	1.00
	High		0.96 (0.61, 1.50)	0.90(0.56, 1.43)

*Statistically significant at p-value < 0.05

DHS of the country. As a result, comparison with previous estimates could not be performed given the lack of published data.

This study also identified community- and individual-level variables associated with the timely initiation of breastfeeding. Working mothers were less likely to initiate breastfeeding within one hour of birth than non-working mothers. This finding is in agreement with studies conducted in Uganda, Indonesia, and Chad [15, 18, 35]. This could be as a result of working women

worrying about their appearance and career, leading them to view breastfeeding as a barrier to getting back to the physical form they had before being pregnant [7, 39]. Working women also have access to income, which enables them to pay for C-section births and additional baby food, such as formula, both of which are linked to delayed initiation of breastfeeding [40]. Nowadays, women prefer C-section births over spontaneous vaginal delivery to avoid labor pain [41]. In order to help women resolve their breastfeeding issues and practice early initiation of breastfeeding, it is crucial to tackle maternal attitudes amongst working mothers and misconceptions around breastfeeding. The odds of early initiation of breastfeeding were higher among mothers who wanted their last pregnancy compared with their counterparts. This finding is consistent with studies conducted in Ghana [30] and sub-Saharan Africa [24]. Mothers who did not plan their pregnancies may experience negative effects on their physical and mental health, delayed prenatal care, premature birth, and a lower prevalence of timely initiation of breastfeeding when compared to mothers whose pregnancies were planned [42–44]. The low prevalence of timely breastfeeding initiation among mothers whose pregnancies were unplanned may be explained by these detrimental results for the health of both the mother and the child.

Mothers who had 1–3 ANC visits were less likely to initiate breastfeeding within one hour of birth than those who had no ANC visit. Likewise, mothers from communities with a high level of ANC utilization were less likely to initiate breastfeeding within one hour of birth than those with low utilization. This finding is in agreement with a study conducted in Chad [15] and Mauritania [45]. However, this has been contrasted with studies conducted in Ethiopia [46] and Bangladesh [47]. This implies that the focus should be on the quality of ANC rather than counting the number of visits. Prior research indicated that mothers who receive breastfeeding counseling at ANC visits have a higher success rate when it comes to starting breastfeeding their babies early [48, 49]. Breastfeeding counseling is highly beneficial since it teaches mothers the proper techniques of breastfeeding and expands their knowledge, self-efficacy, and skills on the subject [50]. This study highlights the need for additional empirical research to determine the cause(s) of the unfavorable relationship between early initiation of breastfeeding and ANC attendance. It is further argued that before delivery and during ANC, more efficient and customized teaching ought to be provided. Additionally, the country should prioritize providing pregnant women with one-on-one counseling and education in order to assist in stopping this threat. The odds of early initiation of breastfeeding were higher among mothers who gave birth through the vagina compared with mothers who had cesarean section delivery. This finding is supported by studies conducted in Ethiopia [29], Ghana [30], Guinea [23], Tanzania [22], sub-Saharan Africa [16, 24], Turkey [38], Indonesia [18], India [37], Chad [15], and Bangladesh [20]. The length of the procedure, the pain following it, the anesthesia's side effects and fatigue, which make it difficult to start breastfeeding right away, and the postoperative care period, which prolongs mother-child contact, could all be contributing factors to this [51]. Longer time spent apart from the baby after a C-section, changes in the mother's endocrinology brought on by the procedure, and stressful circumstances for the mother, who also needs time to recuperate from the anesthesia, are all consequences of the procedure [52–54].

Infants reported to be average or large-sized at birth were more likely to be put to the breast within one hour of birth compared with those reported to be small-sized at birth. This finding is consistent with studies conducted in Ghana [30], sub-Saharan Africa [24], India [37], Bangladesh [20], and Turkey [38]. This could be explained by the fact that large or average-sized babies frequently have robust reflexes for breastfeeding and are healthy when they start breastfeeding on time [49]. Conversely, small-sized babies frequently have low birth weight, are born prematurely, have weak sucking reflexes, have poor coordination, and have trouble swallowing [7, 49]. The misconception of mothers that formula may be better for smaller infants is also another reason to initiate breastfeeding lately for small-sized children. This finding suggests that mothers with small infants will require more breastfeeding support to initiate breastfeeding within the first hour of birth. Another plausible explanation could be that the patient needed to be admitted to a newborn intensive care unit because of medical issues such as low birth weight, respiratory distress, jaundice, and meconium aspirations [55, 56]. Urban dwellers were more likely to initiate breastfeeding within one hour of birth compared with rural dwellers. This finding is in agreement with studies conducted in sub-Saharan Africa [16] and Turkey [38]. This outcome could be caused by misconceptions about breastfeeding, a lack of social and environmental support, and inadequate prenatal counseling in remote locations. Furthermore, mothers from communities with low levels of poverty were less likely to initiate breastfeeding within one hour of birth than their counterparts. This finding is in line with studies conducted in Namibia [57] and Sri Lanka [58]. This result would indicate that socioeconomic factors are having less of an impact on Mozambique's adoption of child and infant feeding practices.

Strengths and limitations of the study

The following are the strengths of this study: First, the hierarchical character of the DHS data was addressed

by estimating variables at the individual and community levels using a multilevel mixed-effects model. Second, the study used the most recent data from the 2022–23 MDHS, which will assist the relevant authorities in developing appropriate plans to improve breastfeeding practice, specifically the timely initiation of breastfeeding. Thirdly, this research uses nationally representative data to investigate an issue that has not been explored in Mozambique. The present investigation is not without limitations. First, because the data were secondary, factors including women's attitudes and knowledge about early initiation of breastfeeding were not considered. Second, because the survey relied on women's self-report, recall and social desirability bias may have been introduced. Thirdly, because the study was cross-sectional in nature, it was not possible to determine the cause-and-effect relationship between the factors. Furthermore, the child's size is self-reported by the mother, rather than based on information in the child's health card.

Conclusions

About three out of four newborn babies in Mozambique have an early initiation of breastfeeding. Non-working mothers, mothers who wanted their last pregnancy, mothers who had vaginal delivery, having average and large-sized children at birth, and urban dwellers had higher odds of early initiation of breastfeeding. It is critical to concentrate on developing policies that support early initiation of breastfeeding, particularly for mothers who have small children, unplanned pregnancies, non-vaginal deliveries, and reside in rural areas. For the newborns' and their mothers' long-term health, all of these actions would significantly aid the government in consistently encouraging and supporting the early initiation of breastfeeding and its continuation for up to two years or longer.

Abbreviations

AOR	Adjusted Odds Ratio
CI	Confidence Interval
DHS	Demographic and Health Survey
MDHS	Mozambique Demographic and Health Survey
ICC	Intra-class Correlation Coefficient
LMICs	Low- and middle-income countries
MOR	Median Odds Ratio
PCV	Proportional Change in Variance
VIF	Variance Inflation Factor
WHO	World Health Organization

Acknowledgements

I am grateful to the DHS program for letting me use the relevant MDHS data in this study.

Author contributions

Conceptualization, data curation, formal analysis, investigation, methodology, software, supervision, validation, visualization, writing the original draft, writing, reviewing, and editing were done by E.G.M.

Funding

Not applicable.

Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethical approval and consent to participate

Permission was granted to download and use the data from http://www.dhs.program.com before conducting the study. Ethical clearance was obtained from the Institutional Review Board of the DHS Program, ICF International. The procedures for DHS public-use data sets were approved by the Institutional Review Board. Identifiers for respondents, households, or sample communities were not allowed in any way, and the names of individuals or household addresses were not included in the data files. The number for each EA in the data file does not have labels to show their names or locations. There were no patients or members of the public involved since this study used a publicly available data set.

Consent for publication

Not applicable.

Competing interests

The author declares no competing interests.

Author details

[1]Department of Surgical Nursing, School of Nursing, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia

Received: 23 May 2024 / Accepted: 19 December 2024
Published online: 25 December 2024

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