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Trends and disparities in ever-breastfeeding practice and early breastfeeding initiation in Ethiopia: a 20-year trend analysis from EDHS datasets

Hailemariam Mamo Hassen^{1*}

Abstract

Background Ethiopia has had a long-standing national commitment to improving child health for the last five decades. However, evidence on trends of ever-breastfeeding and early initiation remained fragmented, and there existed a paucity of holistic evidence on the extent of the impacts of the policy and the associated factors. This study examined trends, disparities, and factors influencing ever-breastfed and early initiation in the last twenty years.

Methods The Ethiopian Demographic and Health Surveys (EDHS 2000–2019) datasets were used and extracted for children aged 0–23 months and their mothers. Data analyses were performed using SPSS version 25. Trend and time-series analysis was used to visualize changes over time. Multivariable logistic regression was used to identify associated factors.

Results Prevalence of ever-breastfeeding declined from 99.4% in 2000, to 84.01% in 2019; and early initiation showed inconsistency, increasing from 48.55% in 2000 to 69.57% in 2016 and remained unchanged (69.78%) in 2019. Maternal age, religion, and maternal healthcare utilization significantly influenced early initiation ($p < 0.001$). Both ever-breastfeeding and early initiation varied across regional states (< 0.001). Disparities in breastfeeding and early initiation were observed across socio-cultural settings and regional states ($p < 0.05$).

Conclusion The prevalence of ever-breastfeeding declined nationwide between 2000 and 2019, which was not uniform and early initiation showed inconsistency across socio-cultural settings and regional states. These findings highlight the need to revisit current policies and interventions. Further research is crucial to inform the development of regionally tailored and culturally sensitive strategies that promote equitable and sustained breastfeeding improvement across Ethiopia.

Keywords Early breastfeeding initiation, Ever-breastfed, Disparities, Trend analysis

Background

Breastfeeding is a cornerstone of child health, offering essential nutrients and immune system support for optimal growth and development [1]. It is a vital practice for child development because breast milk provides bioactive nutrients and antibodies that bolster a child's immune system and growth [2, 3] promote growth, and facilitate tissue repair [3]. Breastfeeding contributes to preventing

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infectious diseases, gastroenteritis, respiratory disease, childhood diabetes, obesity, and dental disease in children [4]. It affects the intelligence quotient (IQ) and educational and behavioral outcomes of children [5]. Breastfeeding mothers benefit from decreased risks of breast and ovarian cancer, and diabetes [6]. Breastfed children have a reduced risk of acute and chronic illness and improved cognitive outcomes [5], resulting in higher educational achievement and earning potential than non-breastfed children. Hence, breastfeeding is a critical component of infant and child health, playing a pivotal role in providing essential nutrients and immunological factors that ensure optimal growth, development, and disease prevention and survival [7]. To maximize these benefits, the World Health Organization and UNICEF recommend starting breastfeeding within an hour of birth, exclusively nursing for the first six months, and continuing breastfeeding for at least two years [8, 9]. However, challenges persist, particularly in ensuring consistent and equitable breastfeeding and early breastfeeding initiation [10].

For the last five decades, Ethiopia has actively promoted optimal breastfeeding practices [11–15]. This dedication reflects a long-standing national commitment to improving child health. The roots of this focus likely lie in the late 1970s and 1980s [16]. During this period, a global movement to improve infant and young child feeding practices, including breastfeeding promotion, gained momentum. Ethiopia, facing a significant challenge with childhood mortality rates, recognized the well-documented health benefits of breastfeeding as a potential solution [11–15]. This recognition likely set the stage for the ongoing national commitment to promoting these practices reflected in various national policies and strategies [10, 17, 18]. The National Strategy for Infant and Young Child Feeding in Ethiopia aims to improve children's health through better feeding practices [17]. It sets national standards for breastfeeding and complementary feeding, emphasizing early breastfeeding initiation and exclusive breastfeeding for the first six months and continued breastfeeding up to two years. National Adolescents, Maternal, Infant and Young Child Nutrition Guideline (2016–2020) is another policy document in Ethiopia focused on improving nutrition including breastfeeding [10]. Recently, the National Infant and Young Child Feeding in Emergency (IYCF-E) guideline was released providing practical guidance on ensuring appropriate infant and young child feeding in emergency response [18]. According to the World Health Organization (WHO), infants should be exclusively breastfed for six months, initiated on breastfeeding within the first hour of birth, and continue breastfeeding up to two years of

age or beyond [9]. The focus on improving nutritional interventions for early neonatal care practices, mainly ever-breastfeeding and early initiation, are among the standard indicators to measure adherence to this criteria [19]. Disparities in breastfeeding have continued despite global, national, and local efforts and interventions to increase breastfeeding rates [14, 20]. Ever-breastfeeding and early breastfeeding initiation at a population level can be improved rapidly through multilevel and multi-component interventions across the socio-ecological model and settings [1]. Such interventions have to be guided by research findings for well-informed policies and strategies.

Breastfeeding is not the sole responsibility of mothers and requires collective societal approaches [1]. Multiple factors influence breastfeeding practices beyond a mother's control [20]. In low-resource settings, collective efforts are especially crucial. This includes fostering supportive organizational views within healthcare facilities, ensuring birthing environments promote successful initiation, and addressing societal attitudes that contribute to disparities in breastfeeding rates [20]. One such approach is the World Health Organization (WHO) and UNICEF's Baby-Friendly Hospital Initiative (BFHI), which promotes optimal breastfeeding practices by encouraging facilities to implement the Ten Steps to Successful Breastfeeding [21]. Ethiopia is implementing the Baby-Friendly Hospital Initiative (BFHI) as part of its multi-sector National Nutrition Programs to improve child nutrition [22, 23]. While it has seen positive developments in tackling malnutrition over the last ten years, the initial levels were so severe that the country requires ongoing substantial investment in nutritional programs [23].

Although, there are global efforts to promote breastfeeding, disparities persist within and between countries [7]. Ethiopia's diverse socio-cultural landscape and variations in healthcare access necessitate a nuanced examination of ever-breastfeeding and early breastfeeding initiation [24]. Ethiopia has made notable strides in maternal and child health [25]. While previous studies have explored ever-breastfeeding and early breastfeeding initiation, a comprehensive analysis of trends and disparities over an extended period, mainly using EDHS data in the Ethiopian context, remains limited [10, 12, 13, 24, 26]. This lack of clarity is particularly concerning when considering potential disparities in breastfeeding practices across different regions and socio-demographic groups within the country. Investigating the prevalence trends and disparities will offer insights into the effectiveness of existing interventions and guide the development of targeted strategies to improve breastfeeding and its early initiation. Addressing this gap is imperative for evidence-based policy formulation and targeted interventions.

This study analyzed data from five Ethiopian Demographic and Health Surveys (EDHS) (2000–2019) to examine these trends and disparities in ever-breastfeeding and early initiation (0–23 months) across regions, urban/rural areas, and nationally [27–31]. The findings, considering Ethiopia's diverse socio-demographic landscape, reveal variations in breastfeeding rates and potential determinants. This information is crucial for policymakers, healthcare providers, and organizations working to improve child health in Ethiopia.

While several studies show progress in breastfeeding practices, there is still significant room for improvement in Ethiopia. There has been no recent study on time series data to understand trends in breastfeeding practices. The present study used nationally representative datasets from the Ethiopian Demographic and Health Surveys (EDHS 2000–2019), including the Ethiopian Interim Demographic and Health Survey conducted in 2019 [27–31]. Reports from these surveys remained fragmented, and there existed a paucity of holistic evidence on the extent of the impacts of the policy and implementation strategies. Therefore, this study aims to fill this gap by examining trends, disparities, and determinants of ever-breastfeeding and early initiation over the past two decades.

Materials and methods

Study design and source of data

The present study employed a retrospective observational design using nationally representative Ethiopian Demographic and Health Survey (EDHS) datasets [27–31]. Along with trend analysis, a single multivariate logistic regression model was employed to enhance statistical power and efficiency examining breastfeeding disparities and influencing factors across multiple years of survey data. This approach allowed for a more comprehensive understanding of trends, disparities, and the impact of various factors while controlling for confounding variables through subgroup analysis rather than conducting separate analyses for each year. The data for this study was obtained from the Ethiopian Demographic and Health Survey (EDHS) program, a nationally representative cross-sectional survey conducted periodically by the Ethiopian Central Statistical Agency (CSA) and ICF International with financial support from USAID, UKAID, UNICEF, and other donors [27–31].

The EDHS utilizes a stratified two-stage cluster sampling design to ensure a representative sample of women aged 15–49 across urban and rural areas of Ethiopia. The most recent survey was conducted in 2019 (EMDHS), with previous surveys completed in 2000, 2005, 2011, and 2016. The DHS interviews women in their households, collecting data on a wide range of topics including

demographics, health, and family planning. The specific modules used for collecting breastfeeding data may vary slightly across survey years, but all EDHS surveys adhere to standardized questionnaires and data collection methods to ensure comparability across time periods. By utilizing data from five consecutive DHS datasets (2000–2019), this study provides a valuable opportunity to examine trends and changes in breastfeeding practices in Ethiopia over a nearly two-decade period. The population base of the study was children living with their mother born 0–23 months before the survey, recalling the within 24 h before the survey.

Study variables and operational definition

The paper focused on the prevalence trend and disparities of ever-breastfeeding and early breastfeeding initiation, emphasizing disparities along socio-demographic factors in geographical areas and over time. Prevalence in this study context is the proportion of breastfeeding children aged 0–23 months in Ethiopia from 2000 to 2019 for each EDHS phase, calculated by dividing the number of breastfeeding children aged 0–23 months by the total children aged 0–23 months who lived with their mother. The prevalence trend is the change in the prevalence of ever-breastfeeding and early breastfeeding initiation among children aged 0–23 months from 2000 to 2019. Disparities refer to how breastfeeding among children aged 0–23 months is distributed in a population described by covariates mainly on geographical areas, time factors every five years for 20 years, and maternal and other socio-demographic factors. Hence, the study contains the breastfeeding practices (dependent variables) and characteristics of mothers and their children (covariates).

Outcome variables

The breastfeeding practice indicating variables analyzed in the present study focused on:

1. **Ever-breastfeeding:** It is the prevalence of infants 0–23 months who were given breast milk at least once.
2. **Early breastfeeding initiation** is defined as the prevalence of breastfeeding in children 0–23 months who were breastfed in the first hour of life after birth (mother initiated breastfeeding within the first hour of birth) based on the mother's recall during the survey.

The covariates

The socio-demographic characteristics mainly focused on mothers and their children aged 0–23 months in

Ethiopia. Survey year(time), mother age group, regional states, place of residence, mother’s current marital status, mother education attainment, religion, mother employment status, currently pregnant, place of delivery, antenatal care utilization, postnatal care utilization and number of household members or family size were socio-demographic covariates.

Data acquisition and extraction

The data for this study was acquired from the Ethiopian Demographic and Health Survey (EDHS) datasets covering the period from 2000 to 2019 in Ethiopia obtained following formal application to the program Data Archivist [27–31]. The EDHS surveys employed rigorous sampling methodologies to ensure national representativeness, and the data were collected through standardized interviews, questionnaires, and measurements. Ethical considerations are paramount in the EDHS data collection process, with informed consent obtained from participants. The utilization of these datasets for the current research

follows the terms and conditions specified by the Demographic and Health Survey Program.

The samples of the analysis was done from the five consecutive surveys stratifying and extracting the ever-breastfeeding and early breastfeeding initiation variables and the presumed covariates for children aged < 24 months (Fig. 1). The First datasets for all infants and young children, including children who died were taken and then young children living with their mothers were identified. Next, children aged 0–23 months living with their mothers, those who ever breastfed and early initiation were identified. Finally, from those infants and young children living with their mothers, those who ever breastfed and early initiation was filtered consecutively (Fig. 1).

Data analysis

Data analysis was performed using the Statistical Package for Social Sciences (SPSS) software version 25. Data were weighted for the survey year and mothers’ characteristics. The study utilized descriptive statistics to examine the overall prevalence of breastfeeding over the last five

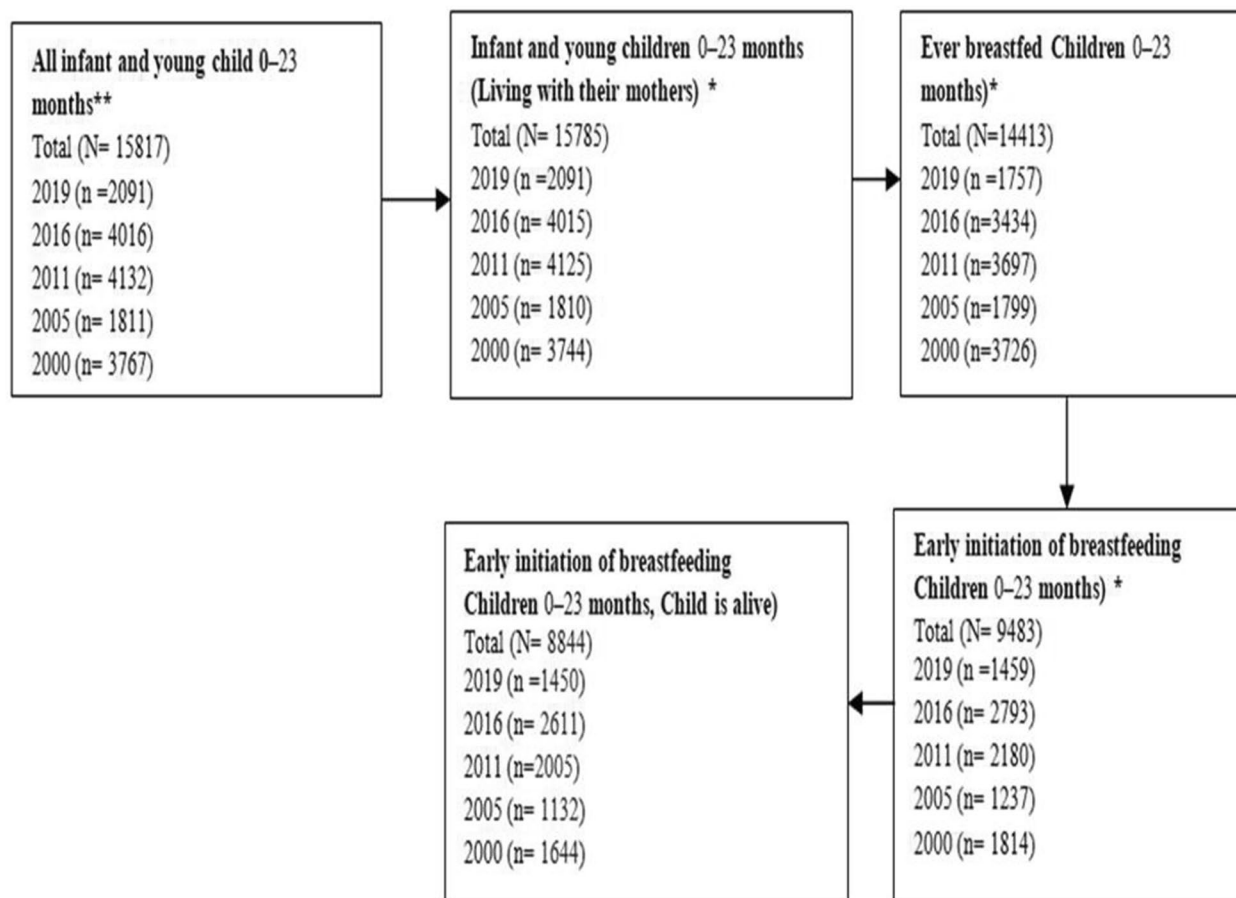


Fig. 1 Flow diagram of samples stratification and extraction for ever-breastfeeding and early breastfeeding initiation among children aged 0–23 months. ** All infants and young children, 0-23 months including died. * All infants and young children living with their mothers (0-23 months)

consecutive surveys. Time-series analysis was employed to discern temporal patterns and changes (trends) in ever-breastfeeding and early breastfeeding initiation. Two separate theory driven logistic regression models were employed to examine the determinants of ever-breastfeeding and early initiation of breastfeeding. The models incorporated a comprehensive set of independent variables, including survey year, mother's age group, and regional state, place of residence, current marital status, education attainment, religion, employment status, delivery place, antenatal and postnatal care utilization and family size. The logistic regression models were specified with the dependent variable as a binary outcome (ever-breastfed/not breastfed or early initiated/not initiated). Independent variables were entered into the model using the forward LR method for the likelihood ratio test, with a significance level of $p < 0.2$ for variable inclusion. Model outputs included odds ratios, and corresponding confidence intervals and significance level for each independent variable with $p \leq 0.05$ at 95% confidence interval. These statistics allowed for the assessment of the association between each predictor and the likelihood of the outcome. Potential confounders were controlled by stratification, restriction, and statistical approaches. The analysis was based on the assumptions of sufficient data, linear relationships between variables (after transformation), absence of multicollinearity (independent variables are not highly correlated) and the absence of outliers.

Result

Socio-demographic characteristics of mothers and their children

Mothers and children in Ethiopia showed substantial distribution differences across the indicated socio-demographic related characteristics as implied by Pearson chi-square test ($p < 0.001$) (Table 1). Almost all (99.8%) children aged 0–23 in Ethiopia live with their mothers. The socio-demographic characteristics of mothers and their children in the five surveys differ significantly (EDHS 2000 to 2019) (Table 1). Most mothers were 20–34 years old, and 90% of the mothers surveyed were married during the survey. Proportionally, about 50% of mothers and their children lived in the three populated regional states, namely, Oromia, Amhara, and the former Southern Nationals and Nationality and Peoples (SNNP). Although most mothers and their children resided in rural areas, the proportion of rural residents declined slightly across the five survey years (from 83.97% in 2000 to 75.3% in 2019). Most mothers were uneducated (49.26–79.03%) and significant number of mothers did not complete primary education, the proportion decreasing across the survey years (Table 1).

About 4–5% of surveyed mothers reported, they were pregnant during the survey. The proportion of home births in Ethiopia steadily declined, dropping from 89.65% in 2000 to 44.01% in 2019. The practice of antenatal care utilization has been improving, from the Ethiopian Demographic and Health Survey in 2000 (16.94% and 14.87%) to the Ethiopian Demographic and Health Survey in 2019 (31.85% and 42.80%), respectively. The practice of postnatal care utilization has been slightly improving significantly after the EDHS survey in 2005. Most of the mothers and their child or children lived in a family with five or more household members (Table 1).

Trends in the ever-breastfeeding and early breastfeeding initiation in Ethiopia

From the visualization of prevalence trends of ever breastfeeding and early breastfeeding initiation using multi-series line graphs the direction and pattern of breastfeeding prevalence has changed in the five Ethiopian Demographic and Health Survey (EDHS) datasets over time across states/regions, urban, rural, and countrywide levels for 20 years (Fig. 2). The prevalence trend showed flatter and slower inconsistent changes across survey years with fluctuation (rising and falling) (Fig. 2). These estimates of ever-breastfed and early breastfeeding initiation prevalence and overtime changes showed disparities across states/regions, urban, rural, and countrywide levels.

Children from rural areas have a higher practice of ever-breastfeeding compared to those in urban areas, which has continued declining in both rural and urban areas since the survey year 2005 (Fig. 2a). The prevalence of early breastfeeding initiation was almost similar in both areas and continued slightly improving since the survey year 2005 (Fig. 2c). Overall, it shows that the pattern of prevalence of ever-breastfed (0–23 months) and early breastfeeding initiation (0–23 months) was almost similar across regional states. It then sharply decreased (worsened) from the survey year 2005 (99.40%) to 2011 (89.60%) and continued decreasing to the survey year 2016 (85.50%) and then to the survey year 2019 (84.01%) (Fig. 2). The countrywide prevalence of ever-breastfeeding continued to remain almost unchanged from the survey year 2000 to 2005 (Fig. 2a). It increased from 48.55% in 2000 to 69.57% in 2016, but remained stagnant in 2019 (69.78%). Ever-breastfeeding rates, however, seem to have declined at two points (from 99.4% in 2000 to 84.01% in 2019), which contradicts previous reports and the figure for ever-breastfeeding in 2019. From the trend analysis, prevalence of ever-breastfeeding and early breastfeeding initiation continued to change inconsistently for 20 years across the regional states, residency, and countrywide levels. It showed flatter, inconsistently uptrend, and then

Table 1 Characteristics of mothers and their children aged 0–23 months in Ethiopia

Characteristics	Survey year					Pearson chi-square <i>P</i> values
	2000	2005	2011	2016	2019	
	n (%)	n (%)	n (%)	n (%)	n (%)	
Mothers Age group						
15–19	299(7.94)	147(8.12)	306(7.41)	262(6.52)	174(8.32)	< 0.001
20–24	935(24.82)	426(23.52)	955(23.11)	987(24.6)	487(23.29)	
25–29	1043(27.69)	532(29.38)	1303(31.53)	1157(28.8)	678(32.42)	
30–34	712(18.90)	335(18.50)	784(18.97)	854(21.3)	422(20.18)	
35–39	529(14.04)	238(13.14)	549(13.29)	542(13.50)	223(10.66)	
40–44	202(5.36)	100(5.52)	188(4.55)	173(4.31)	88(4.21)	
45–49	47(1.25)	33(1.82)	47(1.14)	41(1.02)	19(0.91)	
Regional States						
Tigray	366(9.72)	173(9.55)	419(10.14)	441(10.98)	181(8.66)	< 0.001
Afar	185(4.91)	128(7.07)	358(8.66)	365(9.09)	231(11.05)	
Amhara	552(14.65)	252(13.91)	451(10.91)	370(9.21)	203(9.71)	
Oromia	783(20.79)	336(18.55)	658(15.92)	615(15.31)	254(12.15)	
Somali	212(5.63)	113(6.24)	358(8.66)	522(13.01)	199(9.52)	
Ben-Gumz	281(7.46)	136(7.51)	362(8.76)	319(7.94)	186(8.90)	
SNNP	582(15.45)	337(18.61)	576(13.94)	475(11.83)	241(11.53)	
Gambela	213(5.65)	92(5.08)	300(7.26)	260(6.47)	166(7.94)	
Harari	196(5.20)	106(5.85)	237(5.74)	238(5.93)	155(7.41)	
Addis Ababa	194(5.15)	68(3.75)	161(3.90)	204(5.08)	116(5.55)	
Dire Dawa	203(5.39)	70(3.87)	252(6.10)	207(5.15)	159(7.60)	
Place of residence						
Urban	604(16.03)	248(13.69)	707(17.11)	822(20.47)	517(24.73)	< 0.001
Rural	3163(83.97)	1563(86.31)	3425(82.89)	3194(79.53)	1574(75.27)	
Mother's current marital status						
Never married	40(1.06)	9(0.50)	29(0.70)	30(.75)	16(.77)	< 0.001
Married	3484(92.49)	1691(93.37)	3671(88.84)	3788(94.32)	1965(93.97)	
Living together	32(.85)	33(1.82)	210(5.08)	41(1.02)	19(.91)	
Widowed	42(1.11)	22(1.21)	53(1.28)	31(.77)	13(.62)	
Divorced	98(2.60)	33(1.82)	108(2.61)	90(2.24)	50(2.39)	
Not living together	71(1.88)	23(1.27)	61(1.48)	36(.90)	28(1.34)	
Mother education attainment						
No education	2977(79.03)	1360(75.10)	2758(66.75)	2387(59.44)	1030(49.26)	< 0.001
Incomplete primary	448(11.89)	282(15.57)	1027(24.85)	1009(25.12)	607(29.03)	
Complete primary	59(1.57)	27(1.49)	100(2.42)	102(2.54)	115(5.50)	
Incomplete Secondary	186(4.94)	101(5.58)	131(3.17)	308(7.67)	181(8.66)	
Complete secondary	79(2.10)	24(1.33)	38(0.92)	37(.92)	21(1.01)	
Higher	18(.48)	17(.94)	78(1.89)	173(4.31)	137(6.55)	
Religion						
Muslim	1420(37.70)	714(39.43)	1923(46.54)	2010(50.05)	1024(48.97)	< 0.001
Orthodox	1637(43.46)	705(38.93)	1287(31.15)	1204(29.98)	634(30.32)	
Protestant	556(14.76)	338(18.66)	803(19.43)	706(17.58)	391(18.70)	
Catholic	21(.56)	17(.94)	33(.80)	24(.60)	12(.57)	
Traditional	129(3.42)	20(1.10)	38(.92)	39(.97)	22(1.05)	
Other	4(.11)	17(.94)	48(1.16)	33(.82)	8(.38)	
Mother employment status						
No	1736(46.13)	1425(78.69)	3011(72.96)	3025(75.32)	-	< 0.001
Yes	2027(53.87)	386(21.31)	1116(27.04)	991(24.68)	-	

Table 1 (continued)

Characteristics	Survey year					Pearson chi-square <i>P</i> values
	2000	2005	2011	2016	2019	
	n (%)	n (%)	n (%)	n (%)	n (%)	
Currently pregnant						
No	3606(95.73)	1739(96.02)	3951(95.62)	3835(95.49)	1977(94.55)	0.187
Yes	161(4.27)	72(3.98)	181(4.38)	181(4.51)	114(5.45)	
Place of delivery						
Home	3377(89.65)	1593(87.96)	3465(83.86)	2281(56.80)	920(44.01)	< 0.001
Health Facilities	390(10.35)	218(12.04)	667(16.14)	1735(43.20)	1171(55.09)	
Antenatal care utilization						
No antenatal visits	2569(68.20)	1221(67.42)	2254(54.55)	1249(31.10)	530(25.35)	< 0.001
1–3 antenatal visits	638(16.94)	266(14.69)	999(24.18)	1198(29.83)	666(31.85)	
At least 4 times antenatal visits	560(14.87)	324(17.89)	879(21.27)	1569(39.07)	895(42.80)	
Postnatal care utilization						
No	2710(90.85)	5246(95.47)	6198(95.38)	6518(90.62)	3447(86.63)	< 0.001
Yes	273(9.15)	249(4.53)	300(4.62)	675(9.38)	532(13.37)	
Number of household members/family size						
1–2	33(.88)	9(.50)	51(1.23)	63(1.57)	15(.72)	< 0.001
3–4	993(26.36)	481(26.56)	1065(25.77)	1184(29.48)	632(30.22)	
5–6	1291(34.27)	628(34.68)	1427(34.54)	1290(32.12)	692(33.09)	
7+	1450(38.49)	693(38.26)	1589(39.36)	1479(36.83)	752(35.96)	

downtrend changes and disparities with seasonal patterns and fluctuation (rising and falling) (Fig. 2).

The mothers who put their new-born child to the breast within an hour of birth sharply increased (improved) from 2000 to 2005 and then declined (worsened) in 2011, then increased (improved) again in 2016, and then slightly increased (improved) in 2019 with an exceptionally different pattern for Addis Ababa, Ben-Gumuz, Oromia and Tigray (Fig. 2d). Beyond the estimates of these findings within these 20 years (interpolation), it implied the near future possible trend to the times out of the survey years range to the next years (extrapolation) in the future (Fig. 2).

Associated factors with ever-breastfeeding and early initiation in Ethiopia

A multicollinearity test was done to assess the degree of correlation among the independent variables to ensure the reliability and interpretability of the model, checking that the variables are not highly correlated. The variance inflation factor (VIF) ranged from 1.286 to 3.704, which were within the acceptable limit. After the multicollinearity test, the pooled multivariate logistic regression analysis was performed (Table 2). The independent variables, survey year, mothers' religion, age, and antenatal and postnatal care utilization, were associated significantly ($p < 0.001$) with early breastfeeding

initiation. The prevalence of ever-breastfeeding and early breastfeeding initiation were presented for these variables, respectively (Table 2). The study showed significant decline in breastfeeding practice. The odds ratios consistently decreased over time, indicating a declining likelihood of breastfeeding in subsequent years compared to 2000 survey.

The prevalence odds ratio showed an increasing prevalence of early breastfeeding initiation in the recently conducted Ethiopian Demographic and Health Surveys compared with the 2000 survey. For instance, the prevalence of early breastfeeding initiation in the 2019 survey was 2.45 times higher than in the 2000 survey. The highest odds of early breastfeeding initiation were observed in 2016 and 2019, with AORs of 2.423 and 2.446, respectively, compared to the 2000 survey. There is a general disparity of breastfeeding prevalence with maternal age. All age groups except 45–49 have significantly lower odds ratio of breastfeeding compared to the 15–19 age group ($p < 0.001$). The most pronounced difference in breastfeeding practice was observed in the 40–44 age group (AOR: 0.677; CI: 0.564–0.812) compared to the mothers in the 15–19 age group (Table 2). There was a progressive rise in the likelihood of early breastfeeding initiation compared to the 15–19 age groups ($p < 0.001$). The highest odds ratio was observed in the 45–49 age group (Table 2).

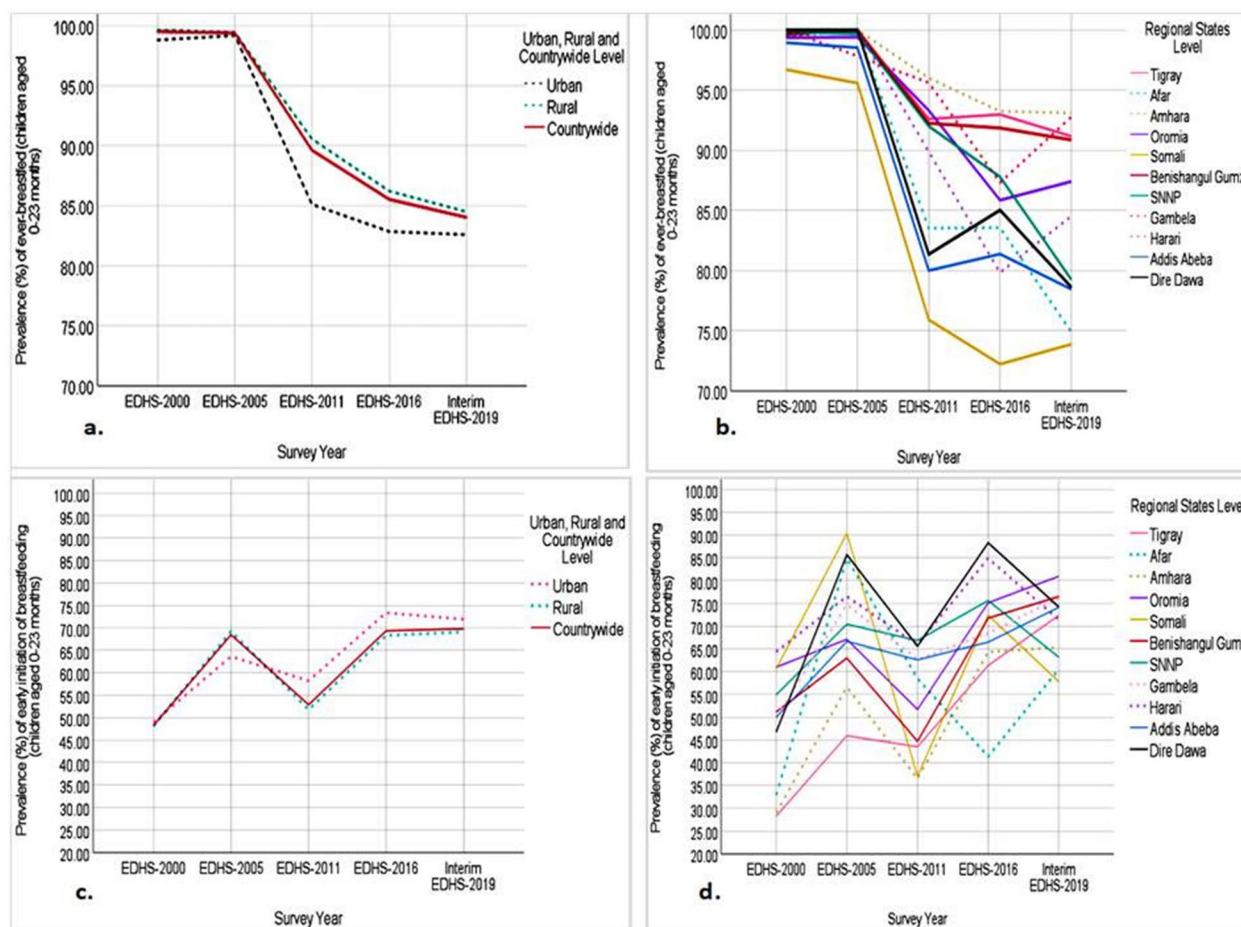


Fig. 2 The prevalence trends and disparities of (a) ever-breastfeeding in urban, rural and countrywide level, (b) ever-breastfeeding across regional states level (c) early initiation of breastfeeding in urban, rural and countrywide level and (d) early initiation of breastfeeding across regional states level among Ethiopian children (0–23 months). (EDHS-Ethiopian Demographic and Health Survey)

Early breastfeeding initiation was significantly associated with regional states ($p < 0.001$) (Table 2). Most regional states have significantly lower odds of breastfeeding practice compared to Tigray ($p < 0.001$) except to the Amhara regional state (AOR: 1.358; CI: 1.134–1.625). For example, the lowest likelihood of breastfeeding prevalence rates was observed in Somali (AOR: 0.221; CI: 0.192–0.253) and Addis Ababa (AOR: 0.343; CI: 0.291–0.404) compared to Tigray. Higher likelihood of early breastfeeding initiation was observed in Dire Dawa (AOR: 2.360; CI: 2.125–2.621) and Harari (AOR: 2.346; CI: 2.117–2.601), compared to Tigray. While lower likelihood of early breastfeeding initiation was observed Amhara (AOR: 0.926; CI: 0.854–1.005) and Afar (AOR: 0.893; CI: 0.821–0.973) compared to Tigray.

Mothers who received antenatal care utilization were more likely to practice early initiation of breastfeeding ($p < 0.001$) (Table 2). Mothers with at least four antenatal care (ANC) visits during pregnancy were more

likely to be breastfed in Ethiopia (AOR = 1.317, CI: 1.152–1.505). Compared to mothers residing in urban areas, those living in rural areas were more likely to ever breastfeed their children (AOR = 1.284, CI: 1.184–1.390). Mothers delivering at health facilities in Ethiopia have a higher likelihood of early initiation of breastfeeding (AOR = 1.27, CI: 1.178–1.376) compared to those delivering at home. Mothers with some level of education (incomplete primary, complete primary, incomplete secondary) were more likely to breastfeed compared to mothers with no education (AOR ranged from 1.310 to 1.432). However, mothers with a higher level of education (full secondary education and above) were less likely to start breastfeeding early. The study findings reveal interesting variations in early initiation of breastfeeding practices based on mothers' religion (Table 2). Catholics (AOR: 4.073; CI: 2.328–7.129), Orthodox (AOR: 2.047; CI: 1.902–2.202) and Protestants (AOR: 1.928; CI: 1.771–2.100) were more likely to breastfeed compared

Table 2 Prevalence rates and associated factors of ever breastfed and early breastfeeding initiation (children 0–23 months)

Characteristics	Ever breastfed (0–23 months)		Early breastfeeding initiation (children 0–23 months)	
	Prevalence rate (%)	AOR (95% CI)	Prevalence rate (%)	AOR (95% CI)
Survey year				
2000	99.50	1	48.55	1
2005	99.40	.786(.421–1.467)	68.36	2.289(2.082–2.517)***
2011	89.60	.041(.026–.066)***	52.88	1.189(1.105–1.279)***
2016	85.50	.028(.018–.045)***	69.57	2.423(2.254–2.604)***
2019	84.01	.025(.016–.040)***	69.78	2.446(2.266–2.640)***
Mothers age group				
15–19	93.18	1	54.12	1
20–24	91.01	.722(.633–.825)***	59.92	1.229(1.135–1.330)***
25–29	91.11	.772(.678–.879)***	60.90	1.263(1.170–1.364)***
30–34	90.60	.709(.619–.811)***	61.38	1.305(1.203–1.415)***
35–39	91.98	.755(.653–.874)***	60.60	1.349(1.237–1.472)***
40–44	90.01	.677(.564–.812)***	62.02	1.351(1.207–1.513)***
45–49	93.18	.750(.548–1.026)	63.10	1.625(1.331–1.982)***
Regional state				
Tigray	95.06	1	48.80	1
Afar	85.95	.352(.305–.407)***	52.80	.893(.821–.973)**
Amhara	96.88	1.358(1.134–1.625)**	46.23	.926(.854–1.005)
Oromia	93.58	.637(.552–.736)***	64.78	1.782(1.650–1.924)***
Somali	78.99	.221(.192–.253)***	60.83	1.244(1.144–1.352)***
Ben-Gumz	94.39	.910(.767–1.081)	58.88	1.350(1.237–1.475)***
SNNP	92.94	.562(.486–.650)***	66.08	1.845(1.703–1.998)***
Gambela	94.08	.881(.737–1.053)	65.37	1.735(1.577–1.909)***
Harari	89.70	.456(.388–.536)***	72.64	2.346(2.117–2.601)***
Addis Ababa	86.81	.343(.291–.404)***	62.58	1.566(1.408–1.742)***
Dire Dawa	87.43	.376(.321–.441)***	69.47	2.360(2.125–2.621)***
Place of residence				
Urban	88.06	1	63.56	1
Rural	92.05	1.284(1.187–1.390)***	59.32	1.014(.957–1.074)
Mother's current marital status				
Never married	89.52	1	56.45	1
Married	91.32	1.439(1.051–1.971)*	60.26	1.285(1.031–1.601)*
Living together	92.84	1.516(1.029–2.233)*	61.19	1.197(.928–1.545)
Widowed	93.17	1.453(.923–2.287)	60.87	1.512(1.120–2.040)**
Divorced	89.71	1.008(.707–1.439)	56.73	1.146(.891–1.472)
Not living together	91.32	1.326(.884–1.989)	54.34	1.001(.760–1.319)
Mother education attainment				
No education	92.03	1	58.77	1
Incomplete primary	90.78	1.317(1.225–1.416)***	61.90	.981(.935–1.029)
Complete primary	89.83	1.432(1.205–1.702)***	63.03	.979(.871–1.099)
Incomplete Secondary	90.30	1.362(1.202–1.543)***	66.70	1.094(1.005–1.191)*
Complete secondary	89.45	.885(.684–1.145)	52.26	.720(.598–.867)**
Higher	82.51	1.059(.917–1.224)	65.25	.856(.767–.956)**
Religion				
Muslim	87.77	1	61.94	1
Orthodox	94.79	2.047(1.902–2.202)***	53.72	.866(.828–.905)***
Protestant	93.13	1.928(1.771–2.100)***	67.04	1.084(1.025–1.145)**

Table 2 (continued)

Characteristics	Ever breastfed (0–23 months)		Early breastfeeding initiation (children 0–23 months)	
	Prevalence rate (%)	AOR (95% CI)	Prevalence rate (%)	AOR (95%CI)
Catholic	96.26	4.073(2.328–7.129)***	58.88	.826(.654–1.043)
Traditional	93.55	1.120(.861–1.458)	63.31	1.136(.948–1.362)
Other	91.82	1.515(1.068–2.150)*	75.45	1.777(1.380–2.289)***
Maternal employment status/currently working				
No	91.38	1	60.70	1
Yes	94.58	1.226(1.129–1.332)***	54.38	.931(.887-.978)**
Delivery place				
Home	92.52	1	57.59	1
Health Facilities	88.26	1.273 (1.187–1.365)***	66.97	1.238 (1.178–1.301)***
Antenatal care utilization				
No antenatal visits	93.83	1	58.97	1
1–3 antenatal visits	92.33	1.276(1.134–1.436)**	61.45	1.033 (.982–1.085)
At least four times antenatal visits	85.78	1.317(1.152–1.505)**	60.97	.867(.822-.912)***
Postnatal care utilization				
No	92.28	1	61.74	1
Yes	92.37	1.125 (.994–1.274)	61.49	.887(.821-.958)**
Number of household members/family size				
1–2	91.23	1	53.22	1
3–4	91.25	.983 (.742–1.302)	61.26	1.341 (1.122–1.602)**
5–6	92.01	1.005 (.759–1.330)	58.84	1.235 (1.034–1.475)*
7+	90.76	.851 (.643–1.126)	60.56	1.359 (1.138–1.622)**

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

to Muslims. Traditional and Other religious groups did not show a significant difference in breastfeeding odds compared to Muslims. Muslim women had a lower likelihood of early breastfeeding initiation compared to other religious groups. Protestant were more likely to initiate breastfeeding early compared to Muslim women (AOR: 1.084; CI: 1.025–1.145). Other religious groups (Orthodox, Catholic, Traditional, and Other) did not show a statistically significant difference in the odds of early breastfeeding initiation compared to Muslim women.

Regarding family size, mothers in households with 1–2 members were more likely to initiate breastfeeding early compared to those in households with 3–4 members (AOR=0.983) and 5–6 members (AOR=1.005). However, the trend reversed for households with 7 or more members (AOR=1.359) (Table 2). Married, living together, and widowed women have significantly higher odds of breastfeeding compared to never-married women ($p < 0.05$). For example, women living together were more likely to breastfeed (AOR: 1.516; CI:1.029–2.233) compared to compared to never-married women. Similarly, married, widowed, and divorced women have significantly higher odds of early breastfeeding initiation compared to never-married women ($p < 0.05$). For

example, widowed women were more likely to have early breastfeeding initiation (AOR: 1.512; CI: 0.120–2.040) compared to compared to never-married women (Table 2). Employed women were more likely to breastfeed (AOR: 1.226; CI: 1.129–1.332), compared to non-employed women $p < 0.001$). However, employed women were less likely to initiate breastfeeding early (AOR: 0.931; CI: 0.887–0.978), compared to non-employed women (Table 2).

Discussion

This nationwide population-based study investigated the 20-year trend in prevalence and disparities of ever-breastfeeding and early breastfeeding initiation among children aged 0–23 months in Ethiopia from the periodic national demographic and health surveys from 2000 to 2019, potentially indicating the last two decades' impact of policies and strategies [10, 17, 18]. WHO and UNICEF recommend that mothers should put their new born child to the breast within an hour of birth [32, 33]. Prior research on breastfeeding in Ethiopia were most likely fragmented and focused on specific areas, populations, and timeframes, hindering a complete national understanding of prevalence and disparities [10].

This study suggests the prevalence of breastfeeding and early initiation practice in Ethiopia has shown mixed trends and inconsistencies over the past two decades. Early initiation increased from 48.55% in 2000 to 69.57% in 2016, but remained stagnant in 2019 (69.78%). Ever-breastfeeding rates, however, seem to have declined at two points (from 99.4% in 2000 to 84.01% in 2019). From the trend analysis, prevalence of ever-breastfeeding and early breastfeeding initiation continued to change inconsistently for 20 years across the regional states, residency, and countrywide levels. It showed flatter, inconsistently uptrend, and then downtrend changes and disparities across survey years and fluctuation (rising and falling) (Fig. 2).

The regional disparities of ever-breastfeeding and early initiation and its fluctuation across survey years suggested complex trends and potential future implications (Fig. 2). The possible explanation might be a transition of the socio-demographic characteristics of mothers and their children from the survey year 2000 to 2019. The findings of this study aligned with previous studies that early breastfeeding initiation has improved in Ethiopia but remained slow and lower than the national target and the SDG [10, 25]. Ethiopia Federal Ministry of Health National Adolescents, Maternal, Infant and Young Child Nutrition Guideline explicitly presented that adolescent, maternal, and child health issues remain a challenge for the health sector development in Ethiopia [10].

Several studies revealed that the suboptimal rates of breastfeeding in Ethiopia are associated with a variety of factors, including cultural norms, socioeconomic disparities, and inadequate breastfeeding support systems [2, 25, 34, 35]. Transition of these socio-demographic characteristics has an impact on breastfeeding practices [36]. The present study highlights the complex interplay between changing socio-demographic characteristics and breastfeeding practices in Ethiopia. Over the past three decades, Ethiopia has undergone significant social and economic transformations [37]. This includes rising maternal education, increased female labour force participation, and a shift towards institutional deliveries. These changes can influence breastfeeding practices in various ways [25, 38, 39].

Survey year, mothers' religion, residence, age, education, occupation, place of delivery and antenatal care utilization were statistically significantly associated ($p < 0.001$) with early breastfeeding initiation, consistent with previous studies [34, 40–42]. However, compared to mothers residing in urban areas, those living in rural areas were more likely to ever breastfeed their children, which was not reported in previous studies (Table 2). The probable explanation could be breastfeeding might be more ingrained in rural cultures and traditions compared

to urban settings [13, 14]. Social pressure and community expectations surrounding breastfeeding could be stronger in rural areas [38]. Another reason may be urban mothers might have greater exposure to formula milk advertising and bottle-feeding practices [43]. This exposure could be lower in rural areas with limited access to such marketing or resources. Additionally, rural mothers might have occupations that are more compatible with breastfeeding, such as subsistence farming or home-based work. Urban jobs, especially formal employment, might require stricter schedules or limit breastfeeding opportunities. Prevalence of early breastfeeding initiation tended to increase when mothers got older compared to mothers within 15–20 years (Table 2). The possible explanation could be older mothers might have learned from experiences and have more confidence in their ability to breastfeed successfully. However, a review revealed that maternal age in Ethiopia was not significantly associated with early breastfeeding initiation [44].

Early breastfeeding initiation was very significantly associated with regional states ($p < 0.001$). These finding was consistent with previous studies [25, 34, 45–47]. Regional variations in early breastfeeding initiation rates could be attributed to a complex interplay of socioeconomic factors (poverty, education levels, access to information), traditional practices, and the strength of social support networks. However, further investigation into the unique socio-economic, healthcare, and cultural contexts of each Ethiopian region is necessary to fully understand these disparities.

The finding revealed that mothers delivering at health facilities in Ethiopia have a higher likelihood of early breastfeeding initiation compared to those delivering at home. Children who were born at a health facility were significantly associated with early breastfeeding initiation [25]. Health facilities provide immediate support and guidance on initiating breastfeeding right after birth [25].

Early breastfeeding initiation was significantly associated with antenatal care utilization ($p < 0.001$). Increased utilization of antenatal and postnatal care services offers valuable opportunities to promote breastfeeding [25, 48]. The finding showed a positive association between antenatal care visit and early initiation; that mothers with more antenatal visits are more likely to initiate breastfeeding early (within 1 h of birth). This association suggests several benefits including increased likelihood of ever breastfeeding and improved breastfeeding success rates. However, there's a nuance. While mothers with at least four visits had a statistically significant increase in early initiation compared to none, the increase for mothers with 1–3 visits wasn't statistically significant. Lack of trained personnel, time constraints during consultations, or inadequate resources for breastfeeding support

contribute for effectiveness of antenatal and postnatal care services [25, 34, 49, 50]. This indicates a potential need for further research to understand the optimal dosage of antenatal care visits for maximizing early breastfeeding initiation. The study highlights the need for additional interventions beyond just antenatal care to address breastfeeding challenges. Existing research suggests that strengthening support systems within healthcare facilities, promoting workplace lactation policies, and tackling cultural misconceptions surrounding breastfeeding could be crucial steps towards achieving optimal early initiation rates. This implies that the Ethiopian population is changing, and these changes are significantly influencing the lives of mothers and their children [49, 50].

The study findings in Ethiopia reveal interesting variations in early breastfeeding initiation practices based on mothers' religion. These explanations are based on potential connections between religious teachings, cultural norms, and exposure to health information within different faith communities [51]. Social and cultural variables influencing breastfeeding behavior due to subjective standards and support structures may be expressed in different religious systems differently affected by cultural influences [52]. The extent of these influences is also affected by spirituality influencing the management of breastfeeding behavior [53].

The findings highlight the importance of considering religious context when designing breastfeeding promotion interventions in Ethiopia. Public health campaigns or healthcare provider training could be tailored to address specific beliefs and practices within different religious communities [39, 51, 54]. Collaboration with religious leaders and faith-based organizations could be crucial for promoting early initiation messages that resonate with their congregations. More in-depth research is needed to understand the specific religious teachings, cultural norms, and access to health information within each faith group to develop more effective interventions.

The findings show that married, living together, and widowed women in Ethiopia have significantly higher odds of breastfeeding and early breastfeeding initiation compared to never-married women. For married women, partner support and attitudes significantly influence breastfeeding duration, while unmarried women's decisions are often shaped by personal beliefs, healthcare provider recommendations, and social norms [52]. In Ethiopian culture, marriage often signifies a transition to adulthood and values motherhood to have better economic conditions, social support networks, and access to more information about breastfeeding, including antenatal care services, and childcare responsibilities. Widowed women, while facing challenges, often have a

strong sense of responsibility for their children, leading to higher breastfeeding rates.

Educational attainment among mothers in Ethiopia has demonstrably increased in recent years [55]. From the present study, mothers' education has a positive association with early initiation. This aligns with the assumption that basic education can increase awareness about the benefits of early breastfeeding [46]. However, mothers with higher education showed a negative association with early initiation. This supports the possibility that exposure to a wider range of information sources, including potentially conflicting ones, might influence decisions about early initiation.

The study found an interesting trend regarding family size and early initiation of breastfeeding in Ethiopia. Mothers in households with 1–2 members were more likely to initiate breastfeeding early compared to those in households with 3–4 members (AOR=0.983) and 5–6 members (AOR=1.005). However, the trend reversed for households with 7 or more members (AOR=1.359). Possible explanations could be mothers with more children might need to attend to the needs of other children, leading to a delay [25, 45, 56, 57]. In larger households, there might be more demands on a mother's attention, making it challenging to dedicate uninterrupted time for early initiation [45]. Conversely, larger households might have older children or other family members who can offer support with childcare or household chores, freeing up the mother to initiate breastfeeding soon after birth. The potential positive influence of larger families suggests the value of promoting community support systems. Encouraging breastfeeding-friendly environments where mothers can receive practical help from family or neighbors could be beneficial. This study highlights the complex interplay between family size and breastfeeding practices. Further research is needed to explore the specific cultural beliefs and social dynamics within larger households that might influence early initiation.

Despite the inconsistency and disparities, prevalence of early breastfeeding initiation has shown increment over the last twenty years. One possible implication of this is that the increase in urbanization may lead to more mothers having access to better healthcare and educational opportunities for their children [49]. The increase in educational attainment and labour force participation among women may lead to more mothers having the economic resources to provide for their children [50]. These changes will likely have several implications for ever-breastfeeding and early breastfeeding initiation. This could improve the ever-breastfeeding and early breastfeeding initiation. Overall, the significant differences in the characteristics of mothers and their children aged 0–23 months in Ethiopia

from survey year 2000 to 2019 are reflections of the positive changes that are taking place in the Ethiopian population. These changes will likely have positive implications for mothers and their children's future breastfeeding practices, health, and well-being.

Generally, the interplay of these socio-demographic changes paints a complex picture of how breastfeeding practices are evolving in Ethiopia. While increased education, facility deliveries, and healthcare utilization present opportunities for improvement, challenges like balancing work with breastfeeding and potential inconsistencies in lactation support require further attention. By acknowledging these factors and implementing targeted interventions, Ethiopia can strive for optimal breastfeeding practices across the nation. This highlights the need for further interventions to address persistent challenges. Studies suggest that strengthening breastfeeding support systems within healthcare facilities, promoting workplace lactation policies, and addressing cultural misconceptions surrounding breastfeeding can be crucial steps towards achieving optimal early initiation rates [58].

The strengths and limitations of the study

The study used data from the Demographic and Health Surveys (EDHS) for Ethiopia from 2000 to 2019. The EDHS is a large-scale household survey that collects data on a variety of topics, including breastfeeding practices. This provides a strong foundation for the study. The study used a variety of statistical methods, including a multicollinearity test, pooled multivariate logistic regression analysis, and prevalence odds ratio. This demonstrates a strong understanding of statistical methods and an ability to apply them to complex data.

The study has some considerable limitations. It is based on data from the EDHS, which is a cross-sectional survey. This means that the data can only show associations between factors, and it cannot be used to establish causality. The study did not control for some potential confounding factors, such as the wealth index due to lack of availability of the data in all EDHS datasets. The study did not include variables of some other potential factors that could influence breastfeeding practices, such as social support. Future research should address these limitations by using longitudinal data and collecting more comprehensive data on potential confounding factors. While this study provides valuable insights into trends, disparities, and factors influencing breastfeeding over the past twenty years, it acknowledges limitations in comprehensively addressing temporal dynamics.

Conclusions

The prevalence of breastfeeding practice in Ethiopia has shown mixed trends over the past two decades. These challenges persist, particularly in ensuring consistent and equitable ever-breastfeeding and early breastfeeding initiation. The prevalence trend of ever-breastfed children has declined from 2000 to 2019. This decline is evident across all regional states, urban, rural, and countrywide levels. There have been periods of improvement in early breastfeeding initiation and the trend has fluctuated over time, with periods of improvement and decline. This pattern was reflected across regional states, with some regions experiencing more consistent change than others did. The prevalence of early breastfeeding initiation is significantly associated with survey year, mothers' religion, age, and antenatal care utilization. Children born to mothers who received antenatal and postnatal care are less likely to experience early breastfeeding initiation. Regional states with the highest prevalence of early breastfeeding initiation are Harar, Oromia, and Tigray. The lowest prevalence was observed in Afar and Amhara. These findings highlight the need for targeted interventions to improve breastfeeding practices in all areas of Ethiopia. Further research is needed to identify the factors that contribute to these fluctuations and to develop effective interventions to increase breastfeeding rates.

Recommendations

Generally, the findings of this study showed inconsistency of progress implying the need to revisit the policies and interventions with further research to guide these policies and interventions considering the regional differences and socio-cultural settings for equitable and sustained breastfeeding improvement in Ethiopia. The findings of the study highlight the need for targeted public health messages about early initiation that cater to different education levels. Messages for mothers with some education can focus on reinforcing the benefits, while those for highly educated mothers can address potential misconceptions and emphasize the feasibility of early initiation alongside work or other commitments. Integrating education about breastfeeding benefits and techniques into the primary and secondary school curriculum could ensure consistent and accurate information reaches all mothers, regardless of their final education level. Policies and support systems that allow mothers to effectively combine breastfeeding with work schedules are crucial. This could include lactation rooms, flexible breaks, and access to breastfeeding resources. Future research should explore time-varying effects of predictors and conduct subgroup analyses to identify factors emerging

or persisting over time, enhancing our understanding of breastfeeding patterns and interventions.

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Author's contributions

HMH conceived and designed the studies, extracted the data, performed data analysis, drafted and write the manuscript, made revisions, and submitted for publication and be accountable for all aspects of the work.

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Availability of data and materials

"Publicly available datasets were analyzed in this study, available from <http://www.dhsprogram.com/> upon reasonable request."

Declarations

Ethics approval and consent to participate

Ethical considerations are paramount in the EDHS data collection process, with informed consent obtained from participants. The data for this study was acquired from the Demographic and Health Survey (DHS) datasets covering the period from 2000 to 2019 in Ethiopia obtained permission following formal application to the program Data Archivist (<https://EDHSprogram.com/>).

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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