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## Determinants of Early Initiation of Breastfeeding among Mothers of Children Aged less than 24 Months in Ethiopia: Further Analysis of Ethiopia Mini Demographic and Health Survey Data 2019

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1 **Determinants of early initiation of breastfeeding among mothers of children aged less than**

2 **24 months in Ethiopia: Further analysis of Ethiopia mini demographic and health survey**

3 **data 2019**

4

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**Abstract**

14

**Objective**: Globally, about half of the newborns do not get breast milk within the first hour of

15

16   birth. The prevalence was even much higher in sub-Saharan Africa. This study aims to assess the

17   prevalence of early initiation of breast feeding and associated factors among mothers having

18   children less than 2 years of age in Ethiopia.

**Method**: In this analysis, data from 2019 Ethiopia Mini Demographic and Health Survey were

19

20   used. A two stage multilevel mixed-effects logistic regression model was conducted to identify

21   individual and community-level predictors of early initiation of breastfeeding. In the final model,

22   variables with a p-value less than 5% and an adjusted odds ratio (AOR) with a 95% confidence

23   interval were reported as statistically significant variables with early initiation of breastfeeding.

**Result**: The prevalence of early initiation of breastfeeding among mothers having children aged

24

25   0-23 months was 76.12% (95% CI; 74.4%-77.9%). Women who had 4 or more ANC visit

26   [AOR=1.42; 95%CI: 1.00-2.00], delivered at health facility [AOR=1.74; 95%CI: 1.28-2.38],

27   counseled on breastfeeding during first two days of delivery [AOR=1.64; 95%CI: 1.23-2.20], and

28   have children with birth order second-fourth or more [AOR=1.64; 95%CI: 1.19-2.25] were more

29   likely to early initiate breastfeeding than their counterparts. Whereas, women who gave birth by

30   caesarean section [AOR=0.25; 95%CI: 0.16-0.37], have multiple births [AOR=0.64; 95%CI: 0.44-

31   0.91], and had postnatal checkup [AOR=0.28; 95%CI: 0.12-0.66] were less likely to early initiated

32   breastfeeding as compared to their counterparts.

**Conclusion**: In this study, the overall prevalence of early initiation of breastfeeding was good.

33

34   ANC visit, Place of delivery, mode of delivery, postnatal checkup, type of birth, counseling on

35   breastfeeding during first two days after delivery and birth order were factors significantly

36    associated with early initiation of breastfeeding. Therefore, actions oriented on these factors need

37    to be taken to improve the coverage.

38    **Keywords**: Early initiation, Newborn, Breastfeeding, Ethiopia

39

**Introduction**

Early breastfeeding refers to the percentage of infants who have been breastfed, began breastfeeding within one hour after birth, began breastfeeding within one day after birth, and received milk pre-feeding(1). WHO recommends that breastfeeding be started as early as one hour after birth. Although it is one of the core indicators for assessing infant and young child feeding (1,2), it is a far from universal practice. Data from 2002 to 2005 show that 46 low- and middle-income countries (LMIC) have included early initiation of breastfeeding in their population health surveys. Among them, 54% of the records indicate that less than half of newborns are breastfed within one hour after birth. In addition, no country has a baby breastfeeding rate of more than 80% within one hour after birth. Globally, it is estimated that less than half (42%) of newborns are breastfed within the first hour of life(3) .

Recent evidence shows that if breastfeeding is started within the first hour of life, breastfeeding alone can increase the chance of survival for newborns by 44%. Unfortunately, recent global statistics show that only 43% of newborns are breastfed within the first hour after birth, which increases the negative impact on the baby(4).The survival of infants and children, especially children under 5 years of age, is an urgent issue that requires attention and has been on the global agenda since the 1978 Almaty Declaration.

According to the latest research published in The Lancet, breast milk makes the world healthier, smarter and fairer-these are the conclusions of the new series of The Lancet on breastfeeding. Through universal breastfeeding, the deaths of 823,000 children and 20,000 mothers can be avoided every year, while saving 300 billion US dollars in economic costs. The published version of the research confirms the benefits of breastfeeding for mild infections, improved intelligence, increased likelihood of preventing overweight and diabetes, and cancer prevention

63 for mothers. This series represents the most in-depth analysis of the health and economic

64 benefits that breastfeeding can bring.(5).

65 Therefore, breastfeeding has been globally accepted as the easiest, cost effective and the role of

66 breastfeeding has been successful intervention for the satisfactory physical and mental health

67 of children (6,7). Based on the recent studies in Ethiopia, Ghana, Bolivia and Madagascar found

68 that breastfeeding could prevent 20% to 22% of neonatal deaths (8,9). Additionally, late

69 initiation of breastfeeding increases the risk of morbidity and mortality such as diarrhea by

70 fivefold (6,8).

71 In some developing countries other than Ethiopia, the prevalence of early breastfeeding has

72 been recorded in Ghana (41%), Sudan (54.2%), Zambia and other countries; (70%), Jordan

73 (49.5%), North Jordan (86.6%), Nepal (72.2%), Bolivia; (74%).In Ethiopia, a third of babies

74 are not breastfed for the first hour after birth. According to the records, the prevalence of

75 breastfeeding is low throughout the country and there are large regional differences(2,6–8).The

76 Ethiopian government is aware of the importance of starting breastfeeding in a timely manner

77 and developed guidelines for infant and young child feeding in 2004, adequately emphasizing

78 key information to begin breastfeeding in a timely manner.(10).

79 In terms of morbidity and mortality, the benefits of exclusive breastfeeding for children in the

80 first six months are well known(11). In addition, there is evidence that breastfeeding can also

81 promote the health of the mother, including reducing the risk of breast and ovarian cancer,

82 maternal obesity, diabetes, high blood pressure, and coronary heart disease(12).Other evidence

83 suggests that starting breastfeeding as early as one hour after birth can reduce neonatal and early

84 infant mortality by increasing exclusive breastfeeding rates and other mechanisms(13).

85   Therefore, the study aims to address the issues and related factors related to the early initiation of

86   breastfeeding by mothers of Ethiopian children aged 0-23 months: using data from the Ethiopian

87   Population and Health Mini-Survey.

88   **Methods**

89   **Data source**

90   The data for this study comes from a standardized community survey of the 2019 Ethiopian Mini

91   Demographic and Health Survey (EMDHS) data, which was conducted in Ethiopia from March

92   2019 to June 2019. It was included all the nine regional states and two city administrations of

93   Ethiopia. The survey used a two-stage probability sample drawn from the sampling frame created

94   for the upcoming Ethiopian Population and Housing Census (PHC). Therefore, in each stratum,

95   the primary sampling unit is selected in the first stage based on the probability proportional to the

96   size (PPS). Second, use systematic equal probability sampling techniques to select a fixed number

97   of households in the selected cluster. This study used the 2019 EMDHS children's data set, which

98   included women who were breastfed and had children less than 2 years of age. Additional data on

99   survey sampling strategies are provided in the DHS handbook(14).

100  **Variables of the Study**

101  **Dependent variable**: Early initiation of breastfeeding (EIBF) is the outcome variable of the study.

102  It is defined as the percentage of the last child born in the last 2 years who started breastfeeding in

103  the first hour after birth(14). During the survey, all women were asked how long after their babies

104  were born to breastfeed for the first time. According to the self-report of the child's mother, it is

105  coded as 1"if the child is breastfed within the first hour after birth" and 0 "otherwise".

106 **Independent variables**: The covariates in this study include variables at the individual and

107 community level. The selection of explanatory variables is based on data from previous similar

108 studies and the availability of variables in the 2019 EMDHS data set. Maternal age (categorized

109 as "15-24", "25-34", "35-49 years"), the mother's highest education level ("no education",

110 "primary", "secondary", "higher"), marital status ("married", "unmarried"), religion ("Orthodox",

111 "Catholic", "Protestant", "Muslim", "Other"), family size ("1-4", "5-8", "9 and above"), wealth

112 index ("poor", "medium", "rich"), Television/radio owned ("yes", "no"), were individual level

113 socio-demographic and economic characteristics of the mothers included in the analysis.

114 Obstetric and those related to the use of health services included in the study were parity (recoded

115 as "primiparous", "multiparous", "grand multiparous"), number of antenatal care (ANC) visits

116 ( "none", "1-3 visits", "4 and above visits"), place of delivery ("health facility", "home"), mode of

117 delivery ("vaginal", "caesarean section"), type of delivery assistance ("health professionals",

118 "traditional birth attendants", "untrained individuals", "no one"), Postnatal checkup ("yes", "no"),

119 type of birth ("single", "multiple"), and counsel on breastfeeding during first 2 days ("yes", "no").

120 Other individual level factors included in the analysis were child related characteristics. These

121 were age of child in months (categorized as "0-5", "6-11", "12-17", "18-23 months"), sex of child

122 ("male", "female"), number of living children ("no child", "1-4", "5-8", "9 and above"),birth order

123 ("first-born", "second to fourth", "fifth or more"), preceding birth interval ("<24 months", >=24

124 months), and child lives with whom ("respondent", "lives elsewhere").

125 Place of residence (categorized as "urban", "rural"), region ("Tigray", "Afar", "Amhara",

126 "Oromia", "Somali", "Benishangul", "SNNPR", "Gambela", "Harari", "Addis Ababa", "Dire

127 Dawa"), community-level women education ("low", "high"), community-level health facility

128 delivery ("low", "high"), community-level ANC utilization ("low", "high"), and community

129 poverty level ("low", "high") were community-level variables included in the analysis.

130 Community-level factors which were not directly obtained from the survey dataset were derived

131 by aggregating individual-level factors.

132 Community-level women education: We measured it based on the education level of the

133 respondents. If more than 50% of the women in the cluster have at least attended primary school,

134 we categorized it as "high", otherwise "low".

135 Community-level health facility delivery: This factor was generated using the proportion of

136 women gave birth in the health facility. If more than 50% women of the cluster gave birth in the

137 health facility, it was recoded as "high", otherwise "low".

138 Community-level ANC utilization: If more than 50% women of the cluster have utilized 4 and

139 above ANC visits, this variable is recoded as "high", otherwise "low".

140 Community wealth level: This community level factor was derived from household wealth index

141 data and recoded as "high" if more than 50% of the cluster women were in the middle and above

142 wealth class, otherwise "low".

143 **Data management and statistical analysis**

144 STATA version 14 was used to clean, recode and analyze the 2019 EMDHS kid's data. Sample

145 weight was applied to adjust for sampling error and for non-responses. Descriptive statistics were

146 used to present the distribution of background characteristics among the study participants. We

147 employed a two level multilevel mixed-effects logistic regression analysis so as to account for the

148 hierarchical nature of the EMDHS data and to identify the true association between the individual

149 and community-level factors and early initiation of breastfeeding. Consequently, four models

150 containing variables of interest were fitted: null model (without any explanatory variables), model

151  I (with only individual level variables), model II (with only community level variables) and model

152  III (with both level variables). Intra-class correlation coefficient (ICC) and a proportional change

153  in deviance (PCV) were tested to determine the clustering effect and the degree to which

154  community-level factors explain the unexplained variance of the null model. Moreover, goodness

155  of fit of the model was assessed by the deviance and the model with the lowest deviance was used

156  as the best-fitted model. Finally, multicollinearity between explanatory variables were checked by

157  variance inflation factor (VIF) and a mean value of VIF <10 indicates absence of multicollinearity.

158  Both individual and community-level factors having a p-value of less than 0.2 in the bivariable

159  analysis were selected as candidate variables for the multivariable multilevel mixed-effects logistic

160  regression analysis. Likewise, variables with a p-value less than 5% and an adjusted odds ratio

161  (AOR) with a 95% confidence interval were reported as statistically significant variables with

162  early initiation of breastfeeding in the final model.

**Patient and public involvement**

163

164  Patients and/or the public were not involved in the design, or conduct, or reporting, or

165  dissemination plans of this research.

**Result**

166

**Socio-demographic characteristics of women and children**

167

168  A total of 2,228 women who had children aged 0-23 months at the time of survey were included

169  in this analysis. Out of the total respondents, half (49.6%) were aged 25-34 years, 1,093 (46.06%)

170  were not attended formal education, vast majority (95.09%) were married and slightly greater than

171  half (53.32%) respondents had 5-8 family members. Nearly two third (64.37%) of the respondents

172  owned radio or television and 43.14% were in poor wealth status. In the current study, relatively

173   one quarter of the respondents (26.3%) were rural residents, majority (39.48%) were from Oromia

174   regional state, and 35.56% were Orthodox religion followers.

175   Of the participants, one quarter has no ANC visits, 46.07% gave birth at home, 93.55% gave birth

176   through vagina and almost three fourth of women (71.9%) gave multiple births. In addition, nearly

177   one tenth women (9.64%) were received postnatal care at least once and 37.56% women were

178   counseled on breastfeeding by healthcare provider within the first two days.

179   Majority of the respondents (72%) had 1-4 numbers of living children and more than half of the

180   children (51.16%) were male. Out of the total children, nearly one quarter was first-born, almost

181   all (99.24) lived with the respondents and 26.8% children were in the age group of 0-5 months at

182   the time of the survey (Table1).

183   **Table 1: Distribution of socio-demographic characteristics of women and children among**

184   **women with children aged 0-23 months in Ethiopia, 2019 EMDHS**

| Variables | Category | Weighted Frequency (n) | Percent (%) |
|---|---|---|---|
| Respondent's current age (in years) | 15-24 | 689.64 | 31.86 |
| | 25-34 | 1072.27 | 49.63 |
| | 35-49 | 400.45 | 18.50 |
| Maternal highest educational level | No education | 1009.89 | 46.66 |
| | Primary | 856.88 | 39.59 |
| | Secondary | 191.40 | 8.84 |
| | Higher | 106.19 | 4.91 |
| Current marital status | Married | 2058.17 | 95.09 |
| | Unmarried | 106.19 | 4.91 |

| Religion | Orthodox | 770.27 | 35.59 |
|---|---|---|---|
| | Catholic | 8.48 | 0.39 |
| | Protestant | 568.73 | 26.28 |
| | Muslim | 786.78 | 36.35 |
| | Others | 30.10 | 1.39 |
| Family size | 1-4 | 747.45 | 34.53 |
| | 5-8 | 1154.03 | 53.32 |
| | 9 and above | 262.89 | 12.15 |
| Possession of radio or TV | No | 1393.15 | 64.37 |
| | Yes | 771.21 | 35.63 |
| Wealth index | Poor | 933.69 | 43.14 |
| | Medium | 406.42 | 18.78 |
| | Rich | 824.26 | 38.08 |
| Parity | Primiparous | 20.95 | 0.97 |
| | Multiparous | 1556.75 | 71.93 |
| | Grand multiparous | 586.66 | 27.11 |
| ANC visits | No visit | 542.88 | 25.08 |
| | 1-3 visit/s | 629.16 | 29.07 |
| | 4 and more visits | 992.32 | 45.85 |
| Place of delivery | Health facility | 1167.14 | 53.93 |
| | Home | 997.22 | 46.07 |
| Mode of delivery | Vaginal | 2024.69 | 93.55 |
| | Caesarean section | 139.67 | 6.45 |

| Type of delivery assistance | Health professionals | 1203.06 | 55.58 |
|---|---|---|---|
| | Traditional birth attendants | 580.67 | 26.83 |
| | Untrained individuals | 121.23 | 5.60 |
| | No one | 259.40 | 11.99 |
| PNC checkup | No | 1901.34 | 90.36 |
| | Yes | 202.90 | 9.64 |
| Type of birth | Single | 2115.39 | 97.74 |
| | Multiple | 48.97 | 2.26 |
| During 1st 2 days health provider counsel on BF | No | 1314.18 | 62.44 |
| | Yes | 790.44 | 37.56 |
| Current age of child in months | 0-5 months | 580 | 26.80 |
| | 6-11 months | 508.15 | 23.48 |
| | 12-17 moths | 572.93 | 26.47 |
| | 18-23 months | 503.29 | 23.25 |
| Sex of child | Male | 1107.29 | 51.16 |
| | Female | 1057.07 | 48.84 |
| Number of living children | No child | 33.45 | 1.55 |
| | 1-4 | 1558.72 | 72.02 |
| | 5-8 | 531.02 | 24.53 |
| | 9 and above | 41.19 | 1.90 |
| Birth order | First-born | 516.18 | 23.85 |
| | Second-fourth | 983.75 | 45.45 |
| | Fifth or more | 664.44 | 30.70 |

| | | | |
|---|---|---|---|
| Preceding birth interval | <24 months | 316.25 | 14.61 |
| | >=24 months | 1848.12 | 85.39 |
| Child lives with whom | Respondent | 2051.37 | 99.24 |
| | Lives elsewhere | 15.72 | 0.76 |
| Region | Tigray | 158.93 | 7.34 |
| | Afar | 33.32 | 1.54 |
| | Amhara | 436.01 | 20.14 |
| | Oromia | 854.57 | 39.48 |
| | Somali | 135.56 | 6.26 |
| | Benishangul | 25.66 | 1.19 |
| | SNNPR | 426.69 | 19.71 |
| | Gambella | 10.17 | 0.47 |
| | Harari | 6.14 | 0.28 |
| | Addis Ababa | 64.49 | 2.98 |
| | Dire Dawa | 12.80 | 0.59 |
| Place of residence | Urban | 569.17 | 26.30 |
| | Rural | 1595.19 | 73.70 |
| Community-level women education | Low | 629.38 | 29.08 |
| | High | 1534.98 | 70.92 |
| Community-level ANC utilization | Low | 884.85 | 40.88 |
| | High | 1279.52 | 59.12 |
| Community-level health facility delivery | Low | 792.82 | 36.63 |
| | High | 1371.54 | 63.37 |

| Community wealth level | Low | 653.84 | 30.21 |
| | High | 1510.53 | 69.79 |

**Prevalence of early initiation of breastfeeding (EIBF)**

185

186  In the current study, the prevalence of early initiation of breastfeeding among women having

187  children aged 0-23 months in Ethiopia was 76.12% (95% CI; 74.4%-77.9%) (Fig. 1).

**Predictors of early initiation of breastfeeding**

188

189  From both individual and community-level independent variables which were eligible (p-value

190  <0.20) for multivariable multilevel analysis; literacy, place of delivery, delivery attendant,

191  postnatal checkup, during first two days health provider counsel on breast feeding and preceding

192  birth order  were significantly associated variables with early initiation of breastfeeding among

193  women having children aged 0-23 months in Ethiopia.

194  The odds of early initiation of breastfeeding was 1.4[AOR=1.42; 95%CI: 1.00-2.00] times higher

195  among women who had four and above visits of ANC as compared to those women who had no

196  ANC visit. The likelihood of early initiation of breastfeeding was nearly 1.7[AOR=1.74; 95%CI:

197  1.28-2.38] times higher among women who were delivered at health facility than their counterparts.

198  Concerning mode of delivery, mothers who were delivered through caesarean section had 75%

199  (AOR=0.25; 95%CI: 0.16-0.37] lower odds of early initiation of breastfeeding as compared to

200  their counterparts. Women who had postnatal checkup at least once had 36% [AOR = 0.64; 95%CI:

201  0.44-0.91] lower odds of early initiation of breastfeeding as compared to those who had no

202  postnatal checkup. The odds of early initiation was 72% [AOR=0.28; 95%CI: 0.12-0.66] lower

203  among mothers who gave multiple births as compared to those who gave a single birth.  Women

204  who had counseled on breastfeeding during first two days by health provider were 1.6 [AOR =

205  1.64; 95%CI: 1.23-2.20] times  more  likely  to  early  initiate breastfeeding  their  children  as

206 compared to those who had not counseled by health provider on breastfeeding during first two

207 days. The odds of early initiation of breastfeeding was 1.6[AOR=1.64; 95%CI: 1.19-2.25] and

208 1.56[AOR=1.56; 95%CI: 1.01-2.43] times higher among mothers whose children birth order was

209 between second to fourth and fifth or more respectively than first-born children (Table 2).

210 **Table 2: Factors associated with EIBF among women having children aged 0-23 months in**

211 **Ethiopia, 2019 EMDHS**

| Variables | Null Model | Model I AOR (95% CI) | Model II AOR (95% CI) | Model III AOR (95% CI) |
|---|---|---|---|---|
| **Respondent's current age** | | | | |
| 15-24 | | 1.00 | | 1.00 |
| 25-34 | | 1.05[0.79-1.41] | | 1.05[0.78-1.41] |
| 35-49 | | 1.12[0.73-1.73] | | 1.10[0.71-1.69] |
| **Family size** | | | | |
| 1-4 | | 1.00 | | 1.00 |
| 5-8 | | 1.26[0.96-1.66] | | 1.24[0.94-1.63] |
| 9 and above | | 1.33[0.88-2.01] | | 1.32[0.87-2.00] |
| **ANC visit** | | | | |
| No visit | | 1.00 | | 1.00 |
| 1-3 visit | | 1.36[1.01-1.84] | | 1.28[0.95-1.74] |
| 4 and above visits | | 1.56[1.12-2.18] | | 1.42[1.00-2.00]* |
| **Place of delivery** | | | | |
| Health facility | | 1.81[1.33-2.46] | | 1.74[1.28-2.38]*** |
| Home | | 1.00 | | 1.00 |

| | | | |
|---|---|---|---|
| **Mode of delivery** | | | |
| Vaginal | 1.00 | | 1.00 |
| Caesarean section | 0.25[0.16-0.37] | | 0.25[0.16-0.37]*** |
| **Postnatal checkup** | | | |
| No | 1.00 | | 1.00 |
| Yes | 0.65[0.45-0.94] | | 0.64[0.44-0.91]* |
| **Type of birth** | | | |
| Single | 1.00 | | 1.00 |
| Multiple | 0.30[0.13-0.69]* | | 0.28[0.12-0.66]** |
| **During 1st 2 days health provider: counsel on BF** | | | |
| No | 1.00 | | 1.00 |
| Yes | 1.62[1.21-2.16] | | 1.64[1.23-2.20]** |
| **Birth order** | | | |
| First-born | 1.00 | | 1.00 |
| Second – fourth | 1.60[1.17-2.20] | | 1.64[1.19-2.25]** |
| Fifth or more | 1.48[0.96-2.29] | | 1.56[1.01-2.43]* |
| **Preceding birth order** | | | |
| <24 months | 1.00 | | 1.00 |
| >=24 months | 0.78[0.56-1.08] | | 0.75[0.54-1.05] |
| **Region** | | | |
| Tigray | | 1.00 | 1.00 |
| Afar | | 0.51[0.28-0.95] | 0.77[0.42-1.40] |

| | | | | |
|---|---|---|---|---|
| Amhara | | | 0.69[0.37-1.27] | 0.84[0.47-1.52] |
| Oromia | | | 1.20[0.65-2.23] | 1.56[0.85-2.84] |
| Somali | | | 0.37[0.20-0.68] | 0.56[0.30-1.03] |
| Benishangul | | | 1.05[0.54-2.04] | 1.42[0.74-2.72] |
| SNNPR | | | 1.06[0.57-1.97] | 1.42[0.77-2.61] |
| Gambella | | | 0.90[0.46-1.76] | 1.10[0.57-2.10] |
| Harari | | | 0.58[0.30-1.12] | 0.73[0.39-1.39] |
| Addis Ababa | | | 0.87[0.43-1.78] | 1.04[0.51-2.12] |
| Dire Dawa | | | 0.85[0.44-1.66] | 1.23[0.64-2.36] |

212  Note: *** = p < 0.001, ** = p ≤ 0.01 and * = p < 0.05

**Discussion**

214  Early initiation of breastfeeding significantly reduces the risk of neonatal morbidity and mortality.

215  It also lessens the risk of postpartum hemorrhage of mothers by stimulating contraction of uterus

216  after delivery(15–17). In this study we examined the effect of individual and community-level

217  factors on early initiation of breastfeeding among women who have children 0-23 months in

218  Ethiopia. The current study result showed that 76.41% (95% CI; 74.4%-77.9%) of women having

219  children aged 0-23 months in Ethiopia put their child to breast within first hour of birth. The

220  prevalence was higher when compared to studies conducted in Ethiopia(18–24), other Sub-

221  Saharan Africa countries(25–32) and Papua New Guinea(33). The finding was consistent with

222  other study findings done in different parts of Ethiopia(34–36) and Malawi(37).  Conversely, the

223  prevalence was lower than the studies conducted in South Ethiopia(38–41), North Ethiopia(42)

224  and Tanzania(43). These discrepancies could be due to the variation of the study period, access

225  and utilization of health service, and socio-cultural conditions among the respondents.  Moreover,

226 the differences might be due to poor maternal educational status, access to various sources of health

227 information and resistance to change in behavior due to traditional beliefs.

228 In the present study, women who had visited four and more times were more likely to initiate early

229 breastfeeding than those who had no ANC visit. This finding is in agreement with studies done in

230 Northwest Ethiopia(23,35) and South Ethiopia(44) . This may be due to antenatal care visits create

231 the best opportunity for skilled health professionals to counsel and promote pregnant mothers on

232 essential maternal health services including early initiation of breastfeeding.

233 The study at hand also revealed that early initiation of breastfeeding was significantly associated

234 with place of delivery. It was found that women who were delivered at health facility were almost

235 1.8 times more likely to initiate breastfeeding within first one hour of birth than their counterparts.

236 This finding is in line with studies conducted in South Ethiopia(40), Northwest Ethiopia(23,35),

237 Economic Community of West African States(45), sub-Saharan Africa(30), Peru(46), and

238 Romania(47). As it is stated in literatures, initiation of breastfeeding within the first hour of birth

239 is an integral part of the safe delivery procedure. Accordingly, qualified health professionals

240 attending the delivery can motivate, empower and assist to start breastfeeding within the first hour

241 of birth. This might be the possible explanation for the discrepancy of early initiation of

242 breastfeeding among women who delivered at health facility and home.

243 Similar to reports from earlier studies(6,48), the present study depicted the positive effect of

244 provision of health information and counseling for mothers by qualified health professional.

245 Women who had counseled on breastfeeding during first two days by health provider were more

246 likely to early initiate breastfeeding their children as compared to their counterparts. This is an

247 expected finding in view of the fact that skilled healthcare provider counseling can inspire and

248 enable mothers to initiate breastfeeding within the first hour of childbirth. Conversely, in the

249 present study, postnatal checkup was inversely associated with early initiation of breastfeeding.

250 Women who had odds of early initiation of breastfeeding among women who had postnatal

251 checkup had lower odds of early initiation of breastfeeding as compared to those who had no

252 postnatal checkup. Women who had postnatal checkup at least once had lower odds of early

253 initiation of breastfeeding as compared to those who had no postnatal checkup.

254 It has been reported in previous work that one of the preconditions to early initiate breastfeeding

255 is keeping the mother with the newborn and putting the infant skin-to-skin contact on mother's

256 abdomen immediately after delivery(49). This fact was also supported by our current study.

257 Women who were delivered via caesarean section had lower odds of early initiation of

258 breastfeeding as compared to delivery through spontaneous vaginal. This finding is in concordance

259 with the findings of various studies conducted inside and outside Ethiopia. As it was documented

260 in previous studies, long postoperative care delays skin-to-skin mother to baby contact for mothers

261 who gave birth through caesarean section. This separation of mother to baby for a short period of

262 time due to factors attributed to caesarean section results in delayed initiation of

263 breastfeeding(23,35,46,49,50).

264 Consistent with studies done in elsewhere(23,30,46), the odds of early initiation of breastfeeding

265 was lower among women with multiple births when compared to women who gave a single birth.

266 The reason behind this might be, in most cases, a woman with multiple pregnancy gave birth via

267 caesarean section.  As discussed earlier, delivery via caesarean section necessitate mother to baby

268 separation resulting in delayed initiation of breastfeeding.

269 The current study showed that odds of early initiation of breastfeeding was higher among mothers

270 whose children birth order was between second to fourth and fifth or more respectively than first-

271 born children. This is in agreement with studies conducted in different countries of sub-Saharan

272   Africa(18,26,36,45,51). This might be as if a woman has more birth experience, it is more likely

273   that the following newborn could be early initiated to breastfeed. Since women who gave birth

274   more than once would be more exposed for and use maternal health services as compared to their

275   counterparts. It has been also suggested that mothers with earlier breastfeeding experience were

276   correlated with both intention and early breastfeeding initiation (Table 2).

277   **Strengths and limitations**

278   The current study was conducted in Ethiopia and individual and community-level factors

279   associated with early initiation of breastfeeding were identified by using a multilevel analysis. As

280   a result, policy makers and other stakeholders can use the findings of this study to plan and

281   implement appropriate strategies and interventions. However, this study has some limitations. The

282   study was subjected to recall and social desirability bias since the outcome variable was assessed

283   based on the maternal report. In addition, we are unable to supplement our findings with qualitative

284   data and also unable to include some quantitative variables like access to mass media, size of the

285   child at birth and others since this study was used a secondary data of a national survey.

286   Furthermore, the current study was not out of the limitations of cross-sectional study.

287   **Conclusion**

288   According to the WHO infant and young child feeding rating, the overall prevalence of early

289   initiation of breastfeeding among women having children aged 0-23 months in Ethiopia was good.

290   Place of delivery, mode of delivery, postnatal checkup, type of birth, counseling on breastfeeding

291   during and birth order were factors significantly associated with early initiation of breastfeeding.

292   Therefore, concerned bodies need to promote health institutional delivery, strengthen

293   breastfeeding counseling during the first two days of delivery and encourage mothers of first-born

294   infants to early initiate breastfeeding.

295 **Abbreviation**

296 ANC: Antenatal care, AOR: Adjusted odds ratio, C/S: Caesarean section, CI: Confidence interval,

297 EIBF: Early initiation of breastfeeding, EMDHS: Ethiopia Mini Demographic and Health Survey,

298 WHO: World health organization

299 **Acknowledgments**

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301 allowing us to use the 2019 EMDHS data.

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303 Not applicable

304 **Patient and public involvement**

305 Patients and/or the public were not involved in the design, or conduct, or reporting, or

306 dissemination plans of this research.

307 **Patient consent for publication**

308 Not required.

309 **Provenance and peer review**

310 Not commissioned; externally peer reviewed.

311 **Availability of data and materials**

312 The survey dataset used in this analysis are third party data from the demographic and health

313 survey website (http://www.dhsprogram.com/data/) and permission to access the data can be

314 granted after sending a request for registration.

315 **Authors' contribution**

316    SS was involved in conceptualization, data curation, analysis, and writing the manuscript. GG,

317    BT, and SA was equally involved in the data analysis, and writing the manuscript. All authors have

318    read and approved the final manuscript.

319    **Ethics approval and consent to participate**

320    This study was used a secondary data of the EMDHS. Hence, consent to participate is not

321    applicable.

322    **Consent for publication**

323    Not applicable

324    **Competing interests**

325    The authors declare that they have no competing interests.

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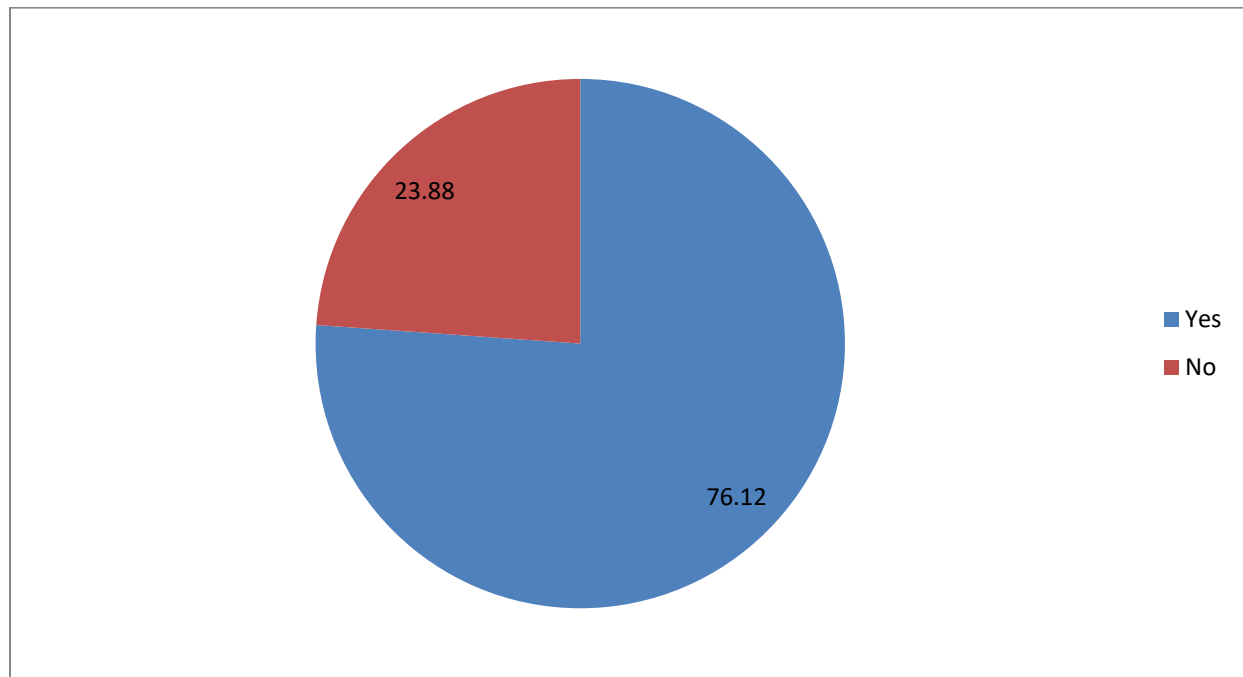
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Fig. 1: Prevalence of early initiation of breastfeeding among mothers of children aged less than 24 months in Ethiopia, the 2019

# BMJ Open

## Determinants of early initiation of breastfeeding among mothers of children aged less than 24 months in Ethiopia: A community based cross-sectional study

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1  **Determinants of early initiation of breastfeeding among mothers of children aged less than**

2  **24 months in Ethiopia: A community based cross-sectional study**

3

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15 **Abstract**

16 **Objective**: This study aims to assess the prevalence of early initiation of breast feeding and

17 associated factors among mothers having children less than 2 years of age in Ethiopia.

18 **Design:** Community based cross-sectional study

19 **Setting**: In this analysis, data from 2019 Ethiopia Mini Demographic and Health Survey (EMDHS)

20 were used. The survey included all the nine regional states and two city administrations of Ethiopia.

21 **Participants**: We extracted data of 2,054 mothers who had last-born children and those mothers

22 who ever breastfed or still breastfeeding during the survey from the 2019 EMDHS datasets.

23 **Main outcome measures**: We performed a two-stage multilevel mixed-effects logistic regression

24 to identify individual and community-level determinants of early initiation of breastfeeding (EIBF).

25 In the final model, variables with a p-value less than 5% and an adjusted odds ratio with a 95%

26 confidence interval were reported as statistically significant variables with EIBF.

27 **Result**: The prevalence of EIBF among mothers having children aged 0-23 months was 73.56%

28 (95% CI; 71.65%-75.47%). Women who delivered at health facility [AOR=1.98; 95% CI: 1.39-

29 2.79] and have children with birth order second-fourth [AOR=1.76; 95% CI: 1.24-2.49] were more

30 likely to early initiate breastfeeding than their counterparts. Whereas, women who gave birth by

31 caesarean section [AOR=0.21; 95% CI: 0.13-0.33], had multiple births [AOR=0.35; 95% CI: 0.13-

32 0.92], and had postnatal checkup [AOR=0.62; 95% CI: 0.44-0.91] were less likely to practice EIBF

33 as compared to their counterparts. Region of residence of women was also significantly associated

34 with EIBF.

35 **Conclusion**: In this study, the overall prevalence of early initiation of breastfeeding was good.

36 Place of delivery, mode of delivery, postnatal checkup, type of birth, birth order and region were

37 factors significantly associated with EIBF. Therefore, concerned bodies have to improve access to

38 and utilization of basic maternal health services to advance the practice of early initiation of

39 breastfeeding.

40 **Keywords**: Breastfeeding, Early initiation, Newborn, Ethiopia

41 **Strengths and limitations of this study**

42 • The current study used most recent nationwide secondary data that shows proportion of

43 EIBF practice among women of children aged less than 24 months in Ethiopia.

44 • We extracted data of 2,054 mothers of under 24 months' children from the 2019 Ethiopia

45 mini demographic and health survey (EMDHS) dataset for this analysis.

46 • Multilevel mixed effect model was performed to overcome the hierarchical nature of

47 EMDHS data and to identify both individual and community-level factors of EIBF.

48 • Recall bias is the most relevant limitation of the study.

49

50

**Introduction**

51

52 Early breastfeeding refers to the percentage of infants who have been breastfed, began

53 breastfeeding within one hour after birth, began breastfeeding within one day after birth, and

54 received breast milk pre-feeding [1]. WHO recommends that breastfeeding be started as early as

55 one hour after birth. Although it is one of the core indicators for assessing infant and young child

56 feeding [1,2], it is a far from universal practice. Data from 2002 to 2005 show that 46 low- and

57 middle-income countries (LMIC) have included early initiation of breastfeeding in their population

58 health surveys. Among them, 54% of the records indicate that less than half of newborns are

59 breastfed within one hour after birth. In addition, no country has a baby breastfeeding rate of more

60 than 80% within one hour after birth. Globally, it is estimated that less than half (42%) of newborns

61 are breastfed within the first hour of life [3] .

62 Recent evidence showed that late initiation of breastfeeding (2-23 hours) increases the

63 probability of a baby dying in its first month by 40% and the risk doubles if delay exceeds a

64 day or more. Unfortunately, recent global statistics show that 3 in 5 newborns not breastfed

65 within the first hour after birth, which increases the negative impact on the baby [4,5]. Other

66 evidence suggests that starting breastfeeding as early as one hour after birth can reduce neonatal

67 and early infant mortality by increasing exclusive breastfeeding rates and other mechanisms

68 [6]. The survival of infants and children, especially children under 5 years of age, is an urgent

69 issue that requires attention and has been on the global agenda since the 1978 Almaty

70 Declaration.

71 Therefore, breastfeeding has been globally accepted as the easiest, cost effective and the role of

72 breastfeeding has been successful intervention for the satisfactory physical and mental health

73 of children [7,8]. Based on the recent studies in Ethiopia, Ghana, Bolivia and Madagascar found

74 that breastfeeding could prevent 20% to 22% of neonatal deaths [9,10]. Additionally, late

75 initiation of breastfeeding increases the risk of morbidity and mortality such as diarrhea by

76 fivefold [7,9].

77 In some developing countries other than Ethiopia, the prevalence of early initiation of

78 breastfeeding has been recorded in Ghana (41%), Sudan (54.2%), Zambia and other countries;

79 (70%), Jordan (49.5%), North Jordan (86.6%), Nepal (72.2%), Bolivia; (74%).In Ethiopia, a

80 third of babies are not breastfed for the first hour after birth. According to the records, the

81 prevalence of breastfeeding is low throughout the country and there are large regional

82 differences [2,7–9]. Moreover, the coverage of early initiation of breastfeeding in Ethiopia

83 ranges from 47.3% to 81.8% [11–15]. According to the DHS report, there was progress in the

84 practice of early initiation of breastfeeding in the country from 2011 (52%) to 2019 (72%) [16].

85 The Ethiopian government is aware of the importance of starting breastfeeding in a timely

86 manner and developed guidelines for infant and young child feeding in 2004, adequately

87 emphasizing key information to begin breastfeeding in a timely manner [17].

88 Even though previously conducted studies examined different determinants of early initiation

89 of breastfeeding in the country, the coverage is still below the national target indicating the need

90 for further investigation. Therefore, this study aims to assess the prevalence and determinants

91 of early initiation of breastfeeding among mothers who had 0-23 month's old children in

92 Ethiopia using secondary data from the 2019 EMDHS.

93 **Methods**

94 **Study design**

95    The current study used a secondary data of the Ethiopian mini demographic and health survey

96    (EMDHS) 2019. Originally, the survey sample was stratified and selected in two stages. The

97    country is stratified into 9 regions and 2 city administrations. Then, each region was stratified into

98    urban and rural areas. In the first stage of selection, 305 enumeration areas (EA) were selected

99    using probability proportional to EA size according to the sampling frame created for the

100   upcoming Ethiopian population and housing census. Consecutively, a list-containing household in

101   all selected EAs was developed. In the second stage, a fixed number of households (30) per cluster

102   were selected from the newly created household listing using an equal probability systematic

103   selection. Additional data on survey sampling strategies are provided in the DHS handbook [18].

104   **Participants**

105   Generally, all women in childbearing age (15-49) who were either permanent residents of the

106   selected households or visitors who slept in the household the night before the survey were eligible

107   for the survey. The source population for the present study were mothers who breastfed and had

108   children less than 2 years of age.

109   **Eligibility criteria**

110   All mothers of last-born children born in the 2 years preceding the survey (both surviving and

111   dead) were included in the analysis. Whereas, mothers who had never breastfed their children were

112   excluded from the study. hence, 2054 mothers who had last-born children and those mothers who

113   ever breastfed or still breastfeeding data were extracted from the 2019 EMDHS datasets for this

114   analysis. Fig. 1 depicts the method of selection of study participants that we followed to identify

115   eligible mothers for this study (Fig. 1).

116   **Study setting**

117 The data for this study comes from a standardized community survey of the 2019 EMDHS data,

118 which was conducted in Ethiopia from March 2019 to June 2019. It was included all the nine

119 regional states and two city administrations of Ethiopia.

120 **Measurements of variables of the Study**

121 **Dependent variable**: Early initiation of breastfeeding (EIBF) is the outcome variable of the study.

122 It is defined as giving breast milk within the first hour of birth to the last child born in the last 2

123 years preceding the survey [18]. During the survey, all women were asked how long after their

124 babies were born to breastfeed for the first time. According to the self-report of the child's mother,

125 it is coded as 1"if the child is breastfed within the first hour after birth" and 0 "otherwise".

126 **Independent variables**: The covariates in this study include variables at the individual and

127 community level. The selection of explanatory variables is based on data from previous similar

128 studies and the availability of variables in the 2019 EMDHS data set. Maternal age, the mother's

129 highest education level, marital status, religion, family size, wealth index, Television/radio owned,

130 were individual level socio-demographic and economic characteristics of the mothers included in

131 the analysis.

132 Obstetric and those related to the use of health services included in the study were parity, number

133 of antenatal care (ANC) visits, place of delivery, mode of delivery, type of delivery assistance,

134 Postnatal checkup, type of birth, and counsel on breastfeeding during first 2 days of delivery.

135 Other individual level factors included in the analysis were child related characteristics. These

136 were age of child in months, sex of child, number of living children, birth order, preceding birth

137 interval, and child lives with whom.

138  Place of residence, region, community-level women education, community-level health facility

139  delivery, community-level ANC utilization, and community poverty level were community-level

140  variables included in the analysis. Community-level factors, which were not directly obtained from

141  the survey dataset, were derived by aggregating individual-level factors (Table 1).

142  **Table 1: Description of individual and community-level variables of early initiation of**

143  **breastfeeding among mothers of under 2 years children in Ethiopia, 2019**

| Variables | Description |
|---|---|
| Maternal age | It is the current age of respondents in years and categorized as 15-24, 25-34 and 35-49. |
| Marital status | This variable indicates the current marital status of the women. It is recoded as "married" if a woman responds as "married" or "living with partner" otherwise "unmarried" |
| Religion | It is a religious group to which the woman associates herself and it was categorized as Orthodox, Protestant, Muslim and Other. Other category include those women who were traditional or other religious followers. |
| Wealth index | In DHS, the wealth index is constructed using HH asset data via PCA following the three steps. National level wealth quintles are obtained by assigning the HH score to each de jure HH member, ranking each person in the population by their score and then dividing the ranking into five equal parts as poorest, poorer, middle, richer and richest. In this study, the variable was recoded as poor, middle and rich. |
| Parity | It measures the number of deliveries where pregnancies reached viable gestational age. Parity was recoded as primiparous, multiparous, and grand multiparous. |

| | |
|---|---|
| Number of ANC visits | DHS guideline categorizes number of ANC visits in groups of none, 1-3, and 4 and or more. In addition, WHO recommends a minimum of four ANC visits based on a review of the effectiveness of different models of antenatal care. Hence, we used the same |
| Type of delivery assistance | We categorized delivery assistance in groups of health professionals, traditional birth attendants, others, and no one |
| Region | Region of residence is typically the first administrative level within the country, or a grouping of the first administrative level. It includes Tigray, Afar, Amara, Oromia, Somali, Benshangul Gumuz, SNNPR, Gambela, Harari, Addis Ababa, and Dire Dawa. |
| Community-level women education | We measured it based on the education level of the respondents. We categorized it as "high" if more than 50% of the women in the cluster had at least attended primary school otherwise "low". |
| Community-level health facility delivery | This factor was generated using the proportion of women who gave birth in the health facilities. It was recoded as "high" if more than 50% women of the cluster gave birth in the health facilities otherwise "low". |
| Community-level ANC utilization. | The variable was categorized as "high" if more than 50% women of the cluster had utilized four and above ANC visits otherwise "low". |
| Community wealth level | This community level factor was derived from HH wealth index data and recoded as "high" if more than 50% of the cluster women were in the middle and above wealth quintiles otherwise "low" |

144    **Where**: PCA – Principal Component Analysis, HH - Household

**Data management and statistical analysis**

145

146 STATA version 14 was used to clean, recode and analyze the 2019 EMDHS kid's data. Sample

147 weight was applied to adjust for sampling error and for non-responses. Descriptive statistics were

148 used to present the distribution of background characteristics among the study participants. We

149 employed a two level multilevel mixed-effects logistic regression analysis so as to account for the

150 hierarchical nature of the EMDHS data and to identify the true association between the individual

151 and community-level factors and early initiation of breastfeeding. Consequently, four models

152 containing variables of interest were fitted: null model (without any explanatory variables), model

153 I (with only individual level variables), model II (with only community level variables) and model

154 III (with both level variables). Intra-class correlation coefficient (ICC) and a proportional change

155 in deviance (PCV) were tested to determine the clustering effect and the degree to which

156 community-level factors explain the unexplained variance of the null model. Moreover, goodness

157 of fit of the model was assessed by the deviance and the model with the lowest deviance was used

158 as the best-fitted model. Finally, multicollinearity between explanatory variables were checked by

159 variance inflation factor (VIF) and a mean value of VIF <10 indicates absence of multicollinearity.

160 Both individual and community-level factors having a p-value of less than 0.2 in the bivariable

161 analysis were selected as candidate variables for the multivariable multilevel mixed-effects logistic

162 regression analysis. Likewise, variables with a p-value less than 5% and an adjusted odds ratio

163 (AOR) with a 95% confidence interval were reported as statistically significant variables with

164 early initiation of breastfeeding in the final model.

**Patient and public involvement**

165

166 Patients and/or the public were not involved in the design, or conduct, or reporting, or

167 dissemination plans of this research.

168 **Result**

169 **Socio-demographic characteristics of women and children**

170 A total of 2,054 women who had children aged 0-23 months at the time of survey were included

171 in this analysis. Out of the total respondents, nearly half (51.70%) were aged 25-34 years, 992

172 (48.30%) were not attended formal education, vast majority (94.69%) were married and slightly

173 greater than half (55.01%) respondents had 5-8 family members. Nearly two third (63.88%)

174 households of the respondents did not owned radio or television and almost half (48.30%) were

175 from low-income family. In the current study, relatively one quarter of the respondents (24.88%)

176 were urban residents, 12.41% were from Oromia regional state, and 49.22% were Muslim religion

177 followers.

178 **Obstetric and maternal healthcare service utilization related characteristics of the**

179 **respondents**

180 Of the participants, one quarter has no ANC visits, 44.84% gave birth at home, 92.89% gave birth

181 through vagina and almost all women (98.83%) gave multiple births. In addition, nearly one-tenth

182 women (12.37%) received postnatal care at least once and healthcare provider counseled

183 healthcare provider counseled four in ten (40.21%) women on breastfeeding within the first two

184 days of delivery.

185 Majority of the respondents (73.03%) had 1-4 numbers of living children and about half of the

186 children (49.81%) were male. Out of the total children, nearly one quarter was first-born, almost

187 all (99.00%) lived with the respondents and 28.14% children were in the age group of 0-5 months

188 at the time of the survey (Table 2).

189 **Table 2: Distribution of individual and community-level characteristics of women with**

190 **children aged 0-23 months in Ethiopia, 2019**

| Variables | Category | Weighted Frequency (n) | Percent (%) |
|---|---|---|---|
| Respondent's current age (in years) | 15-24 | 665 | 32.38 |
| | 25-34 | 1,062 | 51.70 |
| | 35-49 | 327 | 15.92 |
| Maternal highest educational level | No education | 992 | 48.30 |
| | Primary | 725 | 35.30 |
| | Secondary | 202 | 9.83 |
| | Higher | 135 | 6.57 |
| Current marital status | Married | 1,945 | 94.69 |
| | Unmarried | 109 | 5.31 |
| Religion | Orthodox | 627 | 30.53 |
| | Catholic | 13 | 0.63 |
| | Protestant | 379 | 18.45 |
| | Muslim | 1,011 | 49.22 |
| | Others | 24 | 1.17 |
| Family size | 1-4 | 657 | 31.99 |
| | 5-8 | 1,130 | 55.01 |
| | 9 and above | 267 | 13.00 |
| Possession of radio or TV | No | 1,312 | 63.88 |
| | Yes | 742 | 36.12 |
| Wealth index | Poor | 992 | 48.30 |
| | Medium | 286 | 13.92 |
| | Rich | 776 | 37.78 |

| | | | |
|---|---|---|---|
| Parity | Primiparous | 477 | 23.22 |
| | Multiparous | 1,019 | 49.61 |
| | Grand multiparous | 558 | 27.17 |
| ANC visits | No visit | 522 | 25.41 |
| | 1-3 visit/s | 667 | 329.47 |
| | 4 and more visits | 865 | 42.11 |
| Place of delivery | Health facility | 1,133 | 55.16 |
| | Home | 921 | 44.84 |
| Mode of delivery | Vaginal | 1,908 | 92.89 |
| | Caesarean section | 146 | 7.11 |
| Type of delivery assistance | Health professionals | 1,166 | 56.77 |
| | Traditional birth attendants | 612 | 29.80 |
| | Untrained individuals | 113 | 5.50 |
| | No one | 163 | 7.94 |
| PNC checkup | No | 1,800 | 87.63 |
| | Yes | 254 | 12.37 |
| Type of birth | Single | 2.030 | 98.83 |
| | Multiple | 24 | 1.17 |
| During 1st 2 days health provider counsel on BF | No | 1,228 | 59.79 |
| | Yes | 826 | 40.21 |
| Current age of child in months | 0-5 months | 578 | 28.14 |
| | 6-11 months | 509 | 24.78 |
| | 12-17 moths | 547 | 26.63 |

| | 18-23 months | 420 | 20.45 |
|---|---|---|---|
| Sex of child | Male | 1,023 | 49.81 |
| | Female | 1,031 | 50.19 |
| Number of living children | No child | 14 | 0.68 |
| | 1-4 | 1,500 | 73.03 |
| | 5-8 | 510 | 24.83 |
| | 9 and above | 304 | 1.46 |
| Birth order | First-born | 473 | 23.03 |
| | Second-fourth | 962 | 46.84 |
| | Fifth or more | 619 | 30.14 |
| Preceding birth interval | <24 months | 305 | 19.34 |
| | >=24 months | 1,272 | 80.66 |
| Child lives with whom | Respondent | 1,985 | 99.00 |
| | Lives elsewhere | 20 | 1.00 |
| Region | Tigray | 180 | 8.76 |
| | Afar | 223 | 10.86 |
| | Amhara | 200 | 9.74 |
| | Oromia | 255 | 12.41 |
| | Somali | 196 | 9.54 |
| | Benishangul | 184 | 8.96 |
| | SNNPR | 217 | 10.56 |
| | Gambella | 167 | 8.13 |
| | Harari | 156 | 7.59 |

| | Addis Ababa | 118 | 5.74 |
|---|---|---|---|
| | Dire Dawa | 158 | 7.69 |
| Place of residence | Urban | 511 | 24.88 |
| | Rural | 1,543 | 75.12 |
| Community-level women education | Low | 1,018 | 49.56 |
| | High | 1,036 | 50.44 |
| Community-level ANC utilization | Low | 1,018 | 49.56 |
| | High | 1,036 | 50.44 |
| Community-level health facility delivery | Low | 1,010 | 49.17 |
| | High | 1,044 | 50.83 |
| Community wealth level | Low | 1,069 | 52.04 |
| | High | 985 | 47.96 |

191 **Prevalence of early initiation of breastfeeding (EIBF)**

192 In the current study, the prevalence of early initiation of breastfeeding among women having

193 children aged 0-23 months in Ethiopia was 73.56% (95% CI; 71.65%-75.47%) (Fig. 2).

194 **Factors associated with early initiation of breastfeeding**

195 From both individual and community-level variables which were eligible (p-value <0.20) for

196 multivariable multilevel analysis in the final model (Model III); place of delivery, mode of delivery,

197 postnatal checkup, type of birth, birth order and geographic regions were significantly associated

198 variables with early initiation of breastfeeding among women having children aged 0-23 months

199 in Ethiopia.

200 The likelihood of early initiation of breastfeeding was nearly 2 [AOR=1.98; 95%CI: 1.39-2.79]

201 times higher among women who were delivered at health facility than their counterparts.

202 Concerning mode of delivery, mothers who were delivered through caesarean section had 79%

203 (AOR=0.21; 95%CI: 0.42-0.92] lower odds of early initiation of breastfeeding as compared to

204 their counterparts. Women who had postnatal checkup at least once had 38% [AOR = 0.62; 95%CI:

205 0.42-0.92] lower odds of early initiation of breastfeeding as compared to those who had no

206 postnatal checkup. The odds of early initiation was 65% [AOR=0.35; 95% CI: 0.13-0.92] lower

207 among mothers who gave multiple births as compared to those who gave a single birth.  The odds

208 of early initiation of breastfeeding was 1.76 [AOR=1.76; 95%CI: 1.24-2.49] times higher among

209 mothers whose children birth order was between second to fourth than first-born children. Women

210 who lived in SNNP region were 2 [AOR=2.06; 95% CI: 1.01-4.20] times more likely to practice

211 early initiation of breastfeeding than women who were from Tigray region. On the other hand,

212 women from Somali region of Ethiopia were 52% [AOR=0.48; 95% CI: 0.24-0.96] less likely tp

213 practice early initiation of breastfeeding (Table 3).

214 **Table 3: Factors associated with EIBF among women having children aged 0-23 months in**

215 **Ethiopia, 2019 EMDHS**

| Variables | Null Model | Model I AOR (95% CI) | Model II AOR (95% CI) | Model III AOR (95% CI) |
|---|---|---|---|---|
| **Respondent's current age** | | | | |
| 15-24 | | 1.00 | | 1.00 |
| 25-34 | | 1.05[0.79-1.41] | | 1.04[0.75-1.44] |
| 35-49 | | 1.12[0.73-1.73] | | 1.23[0.75-1.99] |
| **Family size** | | | | |

| | | | |
|---|---|---|---|
| 1-4 | 1.00 | | 1.00 |
| 5-8 | 1.26[0.96-1.66] | | 1.19[0.88-1.61] |
| 9 and above | 1.33[0.88-2.01] | | 1.13[0.72-1.78] |
| **ANC visit** | | | |
| No visit | 1.00 | | 1.00 |
| 1-3 visit | 1.36[1.01-1.84] | | 1.11[0.79-1.57] |
| 4 and above visits | 1.56[1.12-2.18] | | 1.21[0.83-1.77] |
| **Place of delivery** | | | |
| Health facility | 1.81[1.33-2.46] | | 1.98[1.39-2.79]*** |
| Home | 1.00 | | 1.00 |
| **Mode of delivery** | | | |
| Vaginal | 1.00 | | 1.00 |
| Caesarean section | 0.25[0.16-0.37] | | 0.21[0.13-0.33]*** |
| **Postnatal checkup** | | | |
| No | 1.00 | | 1.00 |
| Yes | 0.65[0.45-0.94] | | 0.62[0.42-0.91]* |
| **Type of birth** | | | |
| Single | 1.00 | | 1.00 |
| Multiple | 0.30[0.13-0.69]* | | 0.35[0.13-0.92]* |
| **During 1st 2 days health provider: counsel on BF** | | | |
| No | 1.00 | | 1.00 |
| Yes | 1.62[1.21-2.16] | | 1.42[0.88-1.66] |

| **Birth order** | | | |
|---|---|---|---|
| First-born | 1.00 | | 1.00 |
| Second – fourth | 1.60[1.17-2.20] | | 1.76[1.24-2.49]** |
| Fifth or more | 1.48[0.96-2.29] | | 1.56[0.96-2.53] |
| **Preceding birth order** | | | |
| <24 months | 1.00 | | 1.00 |
| >=24 months | 0.78[0.56-1.08] | | 0.71[0.49-1.03] |
| **Region** | | | |
| Tigray | | 1.00 | 1.00 |
| Afar | | 0.51[0.28-0.95] | 0.75[0.39-1.46] |
| Amhara | | 0.69[0.37-1.27] | 0.82[0.43-1.58] |
| Oromia | | 1.20[0.65-2.23] | 1.58[0.81-3.10] |
| Somali | | 0.37[0.20-0.68] | 0.48[0.24-0.96]* |
| Benishangul | | 1.05[0.54-2.04] | 1.43[0.70-2.93] |
| SNNPR | | 1.06[0.57-1.97] | 0.06[1.01-4.20]* |
| Gambella | | 0.90[0.46-1.76] | 1.03[0.50-2.11] |
| Harari | | 0.58[0.30-1.12] | 0.68[0.34-1.37] |
| Addis Ababa | | 0.87[0.43-1.78] | 1.06[0.49-2.30] |
| Dire Dawa | | 0.85[0.44-1.66] | 1.30[0.63-2.68] |

216    Note: *** = p < 0.001, ** = p $\leq$ 0.01 and * = p < 0.05

217    **Random effect analysis result**

218    The result of random effect estimates obtained after fitting the four models (Null model, Model I,

219    Model II, and Model III) were presented in the Table 4. The presence of likelihood of early

220  initiation of breastfeeding practice variation within the 9 regions and 2 city administrations of

221  Ethiopia was shown by the ICC of the null model (ICC=17.8%). This indicates that 17.8% of the

222  variation in early initiation of breastfeeding practice among mothers of children less than 2 years

223  old was attributed to the difference between the regions. Additionally, the highest PCV (43.05%)

224  in the final model (Model III) implies the majority of variations of early initiation of breastfeeding

225  practice among mothers observed in the null model was explained by both individual and

226  community-level factors. In addition, the lowest deviance in the last model showed that the model

227  III was the best-fitted model (Table 4).

228  **Table 4: Random effect analysis result and model fitness for assessing factors associated with**

229  **early initiation of breastfeeding in Ethiopia, 2019**

| Parameters | Null Model | Model I | Model II | Model III |
|---|---|---|---|---|
| Community level variance (SE) | 0.72 | 0.67 | 0.49 | 0.41 |
| ICC (%) | 17.86 | 16.89 | 13.15 | 11.14 |
| PCV (%) | Reference | 6.94 | 31.94 | 43.05 |
| Log-likelihood | -998.22 | -819.24 | -981.96 | -934.72 |
| Deviance | 1996.44 | 1638.48 | 1963.92 | 1869.44 |

230

**Discussion**

232  Early initiation of breastfeeding significantly reduces the risk of neonatal morbidity and mortality.

233  It also lessens the risk of postpartum hemorrhage of mothers by stimulating contraction of uterus

234  after delivery [19–21]. In this study, we examined the effect of individual and community-level

235  factors on early initiation of breastfeeding among women who have children 0-23 months in

236  Ethiopia. The current study result showed that 73.56% of women having children aged 0-23

237 months in Ethiopia put their child to breast within first hour of birth. The prevalence was higher

238 when compared to studies conducted in Ethiopia [11,22–27], other Sub-Saharan Africa countries

239 [28–35] and Papua New Guinea [36]. The finding was consistent with other study findings done

240 in different parts of Ethiopia [13,37,38] and Malawi [39]. Conversely, the prevalence was lower

241 than the studies conducted in South Ethiopia [12,40–42], North Ethiopia [43] and Tanzania [44].

242 These discrepancies could be due to the variation of the study period, access and utilization of

243 health service, and socio-cultural conditions among the respondents. Moreover, the differences

244 might be due to poor maternal educational status, access to various sources of health information

245 and resistance to change in behavior due to traditional beliefs.

246 The study at hand revealed that women who delivered at health facility were more likely to initiate

247 breastfeeding within first one hour of birth than their counterparts. This finding is in line with

248 studies conducted in South Ethiopia [41], Northwest Ethiopia [26,38], Economic Community of

249 West African States [45], sub-Saharan Africa [33], Peru [46], and Romania [47]. As it is stated in

250 literatures, initiation of breastfeeding within the first hour of birth is an integral part of the safe

251 delivery procedure. Accordingly, qualified health professionals attending the delivery can

252 motivate, empower and assist to start breastfeeding within the first hour of birth. This might be the

253 possible explanation for the discrepancy of early initiation of breastfeeding among women who

254 delivered at health facility and home.

255 In the present study, postnatal checkup was inversely associated with early initiation of

256 breastfeeding. Women who had postnatal checkup had lower odds of early initiation of

257 breastfeeding as compared to those who had no postnatal checkup. The reason behind tis might be

258 connected with the reverse sequence of the events. it is known that women usually receive

259 postnatal service after breastfeeding was initiated. Thus, it is difficult to directly relate early

260 initiation of breastfeeding with the outcome or effect of postnatal checkup.

261 It has been reported in previous work that one of the preconditions to early initiate breastfeeding

262 is keeping the mother with the newborn and putting the infant skin-to-skin contact on mother's

263 abdomen immediately after delivery [48]. This fact was also supported by our current study.

264 Women who were delivered via caesarean section had lower odds of early initiation of

265 breastfeeding as compared to spontaneous vaginal delivery. This finding is in concordance with

266 the findings of various studies conducted inside and outside Ethiopia. As it was documented in

267 previous studies, long postoperative care delays skin-to-skin mother to baby contact for mothers

268 who gave birth through caesarean section. This separation of mother to baby for a short period due

269 to factors attributed to caesarean section results in delayed initiation of breastfeeding. Similarly,

270 production of inadequate milk because of reduced oxytocin release come after anesthesia might

271 also contribute for the delay [26,37,38,46,48,49].

272 Consistent with studies done in elsewhere [26,33,46], the odds of early initiation of breastfeeding

273 was lower among women with multiple births when compared to women who gave a single birth.

274 The reason behind this might be, in most cases, a woman with multiple pregnancy gave birth via

275 caesarean section.  As discussed earlier, delivery via caesarean section necessitate mother to baby

276 separation resulting in delayed initiation of breastfeeding. In addition, it could be due to the

277 probability of giving preterm birth was higher among women who gave multiple births than those

278 who gave single births [50]. As a result, there might be delay in initiating breastfeeding until the

279 neonate is capable of sucking breast milk.

280 In this study, birth order of children was significantly associated with early initiation of

281 breastfeeding. This finding is in agreement with studies conducted in the sub-Saharan Africa

282    [11,13,29,45,51]. The possible explanation for this might be that women who had more birth

283    experiences could have a better chance of receiving health professional's advice on early initiation

284    of breastfeeding. Since women who gave birth more than once would be more exposed for and use

285    maternal health services as compared to their counterparts.

286    Similar to reports from earlier studies [28,38] the current study found that some variations on early

287    initiation of breastfeeding existed among the geographic regions of the country. Women from

288    SNNPR had higher odds of early initiation of breastfeeding practice while women from Somali

289    region of Ethiopia had lower odds of early initiation of breastfeeding practice as compared to

290    women from Tigray region. This might be due to the socio-cultural and basic health infrastructure

291    variations among the regions. Women who live in the Somali region might not be accessible for

292    basic maternal health services as compared to women who live in the Tigray region. Moreover,

293    evidence revealed that prelacteal feeding practice is more common in Somali region than Tigray

294    region [ 52].

295    **Strengths and limitations**

296    The current study was conducted in Ethiopia and individual and community-level factors

297    associated with early initiation of breastfeeding were identified by using a multilevel analysis. As

298    a result, policy makers and other stakeholders can use the findings of this study to plan and

299    implement appropriate strategies and interventions. However, this study has some limitations. The

300    study was subjected to recall and social desirability bias since the outcome variable was assessed

301    based on the maternal report. In addition, we are unable to supplement our findings with qualitative

302    data and unable to include some quantitative variables like access to mass media, size of the child

303    at birth, obstetric and neonatal complications, early skin to skin contact, prematurity and other

304    related variables since this study was used a secondary data of a national survey. Furthermore,

305 establishing temporal relationship between early initiation of breastfeeding and its determinants

306 was impossible due to the type of the study design, cross-sectional, used for the survey.

**Conclusion**

307

308 According to the WHO infant and young child feeding rating, the overall prevalence of early

309 initiation of breastfeeding among women having children aged 0-23 months in Ethiopia was good.

310 Place of delivery, birth order and geographic region (SNNPR) were factors positively associated

311 with early initiation of breastfeeding. Whereas, mode of delivery, postnatal checkup, type of birth,

312 and geographic region (Somali) were factors negatively associated with early initiation of

313 breastfeeding. Therefore, concerned bodies need to promote institutional delivery, give special

314 care for mothers who gave multiple birth and encourage mothers of first-born infants to early

315 initiate breastfeeding.

**Abbreviation**

316

317 ANC: Antenatal care, AOR: Adjusted odds ratio, C/S: Caesarean section, CI: Confidence interval,

318 EIBF: Early initiation of breastfeeding, EMDHS: Ethiopia Mini Demographic and Health Survey,

319 WHO: World health organization

**Patient consent for publication**

325

326 Not required.

**Provenance and peer review**

328  Not commissioned; externally peer reviewed.

329  **Availability of data and materials**

330  The survey dataset used in this analysis are third party data from the demographic and health

331  survey website (http://www.dhsprogram.com/data/) and permission to access the data can be

332  granted after sending a request for registration.

333  **Authors' contribution**

334  SS was involved in conceptualization, data curation, analysis, and writing the manuscript. GG,

335  BT, and SA was equally involved in the data analysis, and writing the manuscript. All authors have

336  read and approved the final manuscript.

337  **Ethics approval and consent to participate**

338  This study was used a secondary data of the EMDHS. The authors obtained permission to access

339  the data from the MEASURE demographic and health survey repositories upon sending an abstract

340  of our study to an online request form http://www.measuredhsprogram.com. Ethical approval for

341  the study was obtained from National Ethics Committee of the Federal Democratic Republic of

342  Ethiopia, Ministry of Science and Technology and the ICF Institutional Review Board. Hence,

343  consent to participate is not applicable.

344  **Consent for publication**

345  Not applicable

346  **Competing interests**

347  The authors declare that they have no competing interests.

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505

506     **Figure Legend/Caption**

507     Fig. 1: Eligibility assessment for early initiation of breastfeeding among women having 0-23

508     month's children in Ethiopia, 2019

509     Fig. 2: Prevalence of early initiation of breastfeeding among mothers of children aged less than

510     24 months in Ethiopia, the 2019

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┌─────────────────────────────────────┐
│  Mothers of under five children      │
│  included in the survey = 5,753      │
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        │
   ┌────┴──────────────────────────────┐
   │                                   │
┌──────────────────────┐   ┌──────────────────────────┐
│ Mothers who had under │   │ Mothers who had above 2  │
│ 2 children = 2,228    │   │ children = 3,525         │
│                       │   │ (excluded)               │
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│ Mothers who had  │  │ Mothers who had          │
│ last-born        │  │ second/third-born        │
│ children = 2,159 │  │ children = 69 (excluded) │
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│ Breastfed        │  │ Never breastfed  │
│ (ever/still) and │  │ = 105            │
│ eligible for     │  │ (excluded)       │
│ EIBF = 2,054     │  │                  │
└──────────────────┘  └──────────────────┘
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**Fig. 1: Eligibility assessment for early initiation of breastfeeding among women having 0-23 month's children in Ethiopia, 2019**

Fig. 2: Prevalence of early initiation of breastfeeding among mothers of children aged less than 24 months in Ethiopia, the 2019

# BMJ Open

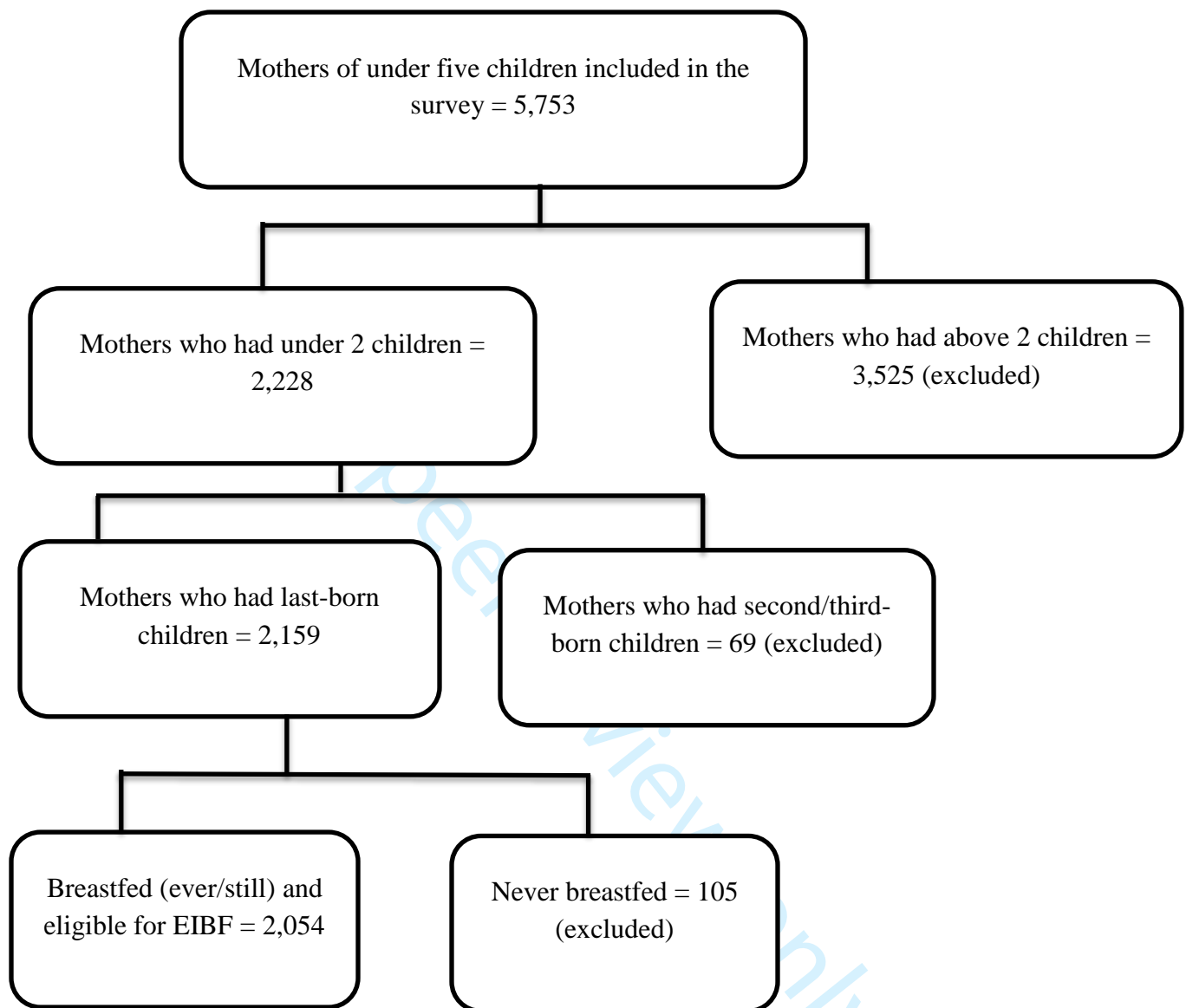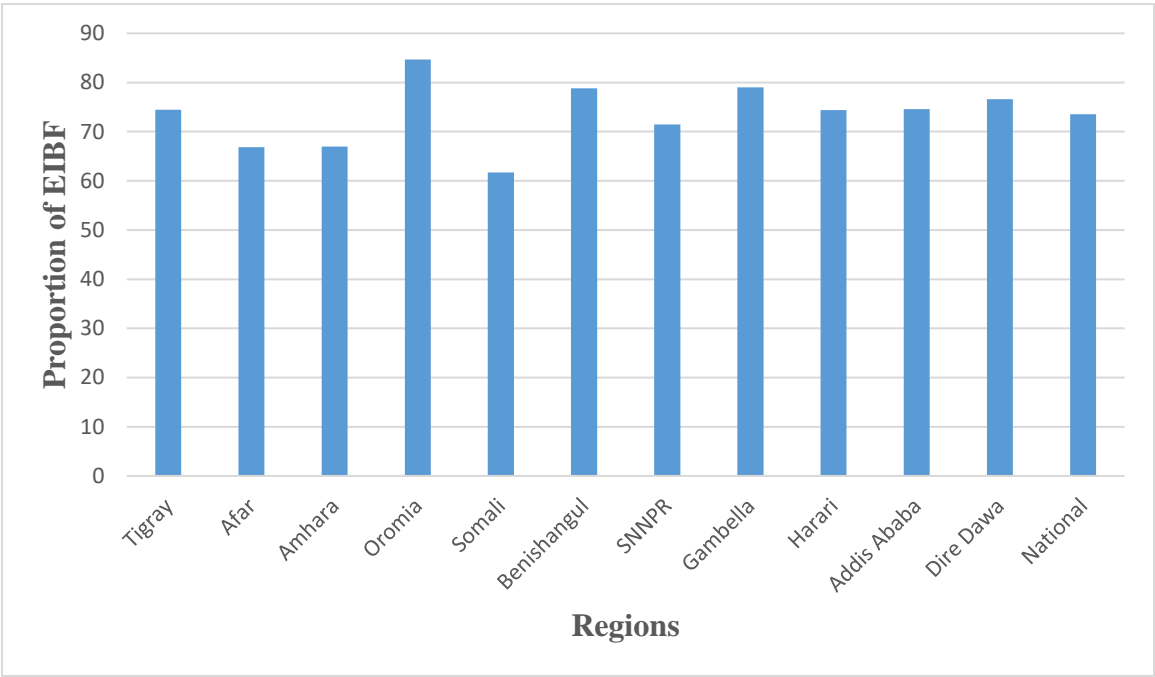## Determinants of early initiation of breastfeeding among mothers of children aged less than 24 months in Ethiopia: A community based cross-sectional study

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1    **Determinants of early initiation of breastfeeding among mothers of children aged less than**

2    **24 months in Ethiopia: A community based cross-sectional study**

3

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14    Word count: 4363

**Abstract**

15

16 **Objective**: This study aims to assess the prevalence of early initiation of breast feeding and

17 associated factors among mothers having children less than 2 years of age in Ethiopia.

18 **Design:** Community based cross-sectional study

19 **Setting**: In this analysis, data from 2019 Ethiopia Mini Demographic and Health Survey (EMDHS)

20 were used. The survey included all the nine regional states and two city administrations of Ethiopia.

21 **Participants**: We extracted data of 2,054 mothers who had last-born children and those mothers

22 who ever breastfed or still breastfeeding during the survey from the 2019 EMDHS datasets.

23 **Main outcome measures**: We performed a two-stage multilevel mixed-effects logistic regression

24 to identify individual and community-level determinants of early initiation of breastfeeding (EIBF).

25 In the final model, variables with a p-value less than 5% and an adjusted odds ratio with a 95%

26 confidence interval were reported as statistically significant variables with EIBF.

27 **Result**: The prevalence of EIBF among mothers having children aged 0-23 months was 73.56%

28 (95% CI; 71.65%-75.47%). Women who delivered at health facility [AOR=1.98; 95% CI: 1.39-

29 2.79] and have children with birth order second-fourth [AOR=1.76; 95% CI: 1.24-2.49] were more

30 likely to early initiate breastfeeding than their counterparts. Whereas, women who gave birth by

31 caesarean section [AOR=0.21; 95% CI: 0.13-0.33], had multiple births [AOR=0.35; 95% CI: 0.13-

32 0.92], and had postnatal checkup [AOR=0.62; 95% CI: 0.44-0.91] were less likely to practice EIBF

33 as compared to their counterparts. Region of residence of women was also significantly associated

34 with EIBF.

35 **Conclusion**: In this study, the overall prevalence of early initiation of breastfeeding was good.

36 Place of delivery, mode of delivery, postnatal checkup, type of birth, birth order and region were

37  factors significantly associated with EIBF. Therefore, concerned bodies have to improve access to

38  and utilization of basic maternal health services to advance the practice of early initiation of

39  breastfeeding.

40  **Keywords**: Breastfeeding, Early initiation, Newborn, Ethiopia

41  **Strengths and limitations of this study**

42  - The current study used most recent nationwide secondary data that shows proportion of

43    EIBF practice among women of children aged less than 24 months in Ethiopia.

44  - We extracted data of 2,054 mothers of under 24 months' children from the 2019 Ethiopia

45    mini demographic and health survey (EMDHS) dataset for this analysis.

46  - Multilevel mixed effect model was performed to overcome the hierarchical nature of

47    EMDHS data and to identify both individual and community-level factors of EIBF.

48  - Recall bias is the most relevant limitation of the study.

49

50

**Introduction**

51

52 Early breastfeeding refers to the percentage of infants who have been breastfed, began

53 breastfeeding within one hour after birth, began breastfeeding within one day after birth, and

54 received breast milk pre-feeding [1]. WHO recommends that breastfeeding be started as early as

55 one hour after birth. Although it is one of the core indicators for assessing infant and young child

56 feeding [1,2], it is a far from universal practice. Data from 2002 to 2005 show that 46 low- and

57 middle-income countries (LMIC) have included early initiation of breastfeeding in their population

58 health surveys. Among them, 54% of the records indicate that less than half of newborns are

59 breastfed within one hour after birth. In addition, no country has a baby breastfeeding rate of more

60 than 80% within one hour after birth. Globally, it is estimated that less than half (42%) of newborns

61 are breastfed within the first hour of life [3] .

62 Recent evidence showed that late initiation of breastfeeding (2-23 hours) increases the

63 probability of a baby dying in its first month by 40% and the risk doubles if delay exceeds a

64 day or more. Unfortunately, recent global statistics show that 3 in 5 newborns not breastfed

65 within the first hour after birth, which increases the negative impact on the baby [4,5]. Other

66 evidence suggests that starting breastfeeding as early as one hour after birth can reduce neonatal

67 and early infant mortality by increasing exclusive breastfeeding rates and other mechanisms

68 [6]. The survival of infants and children, especially children under 5 years of age, is an urgent

69 issue that requires attention and has been on the global agenda since the 1978 Almaty

70 Declaration.

71 Therefore, breastfeeding has been globally accepted as the easiest, cost effective and the role of

72 breastfeeding has been successful intervention for the satisfactory physical and mental health

73 of children [7,8]. Based on the recent studies in Ethiopia, Ghana, Bolivia and Madagascar found

74    that breastfeeding could prevent 20% to 22% of neonatal deaths [9,10]. Additionally, late

75    initiation of breastfeeding increases the risk of morbidity and mortality such as diarrhea by

76    fivefold [7,9].

77    In some developing countries other than Ethiopia, the prevalence of early initiation of

78    breastfeeding has been recorded in Ghana (41%), Sudan (54.2%), Zambia and other countries;

79    (70%), Jordan (49.5%), North Jordan (86.6%), Nepal (72.2%), Bolivia; (74%).In Ethiopia, a

80    third of babies are not breastfed for the first hour after birth. According to the records, the

81    prevalence of breastfeeding is low throughout the country and there are large regional

82    differences [2,7–9]. Moreover, the coverage of early initiation of breastfeeding in Ethiopia

83    ranges from 47.3% to 81.8% [11–15]. According to the DHS report, there was progress in the

84    practice of early initiation of breastfeeding in the country from 2011 (52%) to 2019 (72%) [16].

85    The Ethiopian government is aware of the importance of starting breastfeeding in a timely

86    manner and developed guidelines for infant and young child feeding in 2004, adequately

87    emphasizing key information to begin breastfeeding in a timely manner [17].

88    Even though previously conducted studies examined different determinants of early initiation

89    of breastfeeding in the country, the coverage is still below the national target indicating the need

90    for further investigation. Therefore, this study aims to assess the prevalence and determinants

91    of early initiation of breastfeeding among mothers who had 0-23 month's old children in

92    Ethiopia using secondary data from the 2019 EMDHS.

93    **Methods**

94    **Study design**

95   The current study used a secondary data of the Ethiopian mini demographic and health survey

96   (EMDHS) 2019. Originally, the survey sample was stratified and selected in two stages. The

97   country is stratified into 9 regions and 2 city administrations. Then, each region was stratified into

98   urban and rural areas. In the first stage of selection, 305 enumeration areas (EA) were selected

99   using probability proportional to EA size according to the sampling frame created for the

100  upcoming Ethiopian population and housing census. Consecutively, a list-containing household in

101  all selected EAs was developed. In the second stage, a fixed number of households (30) per cluster

102  were selected from the newly created household listing using an equal probability systematic

103  selection. Additional data on survey sampling strategies are provided in the DHS handbook [18].

104  **Participants**

105  Generally, all women in childbearing age (15-49) who were either permanent residents of the

106  selected households or visitors who slept in the household the night before the survey were eligible

107  for the survey. The source population for the present study were mothers who breastfed and had

108  children less than 2 years of age.

109  **Eligibility criteria**

110  All mothers of last-born children born in the 2 years preceding the survey (both surviving and

111  dead) were included in the analysis. Whereas, mothers who had never breastfed their children were

112  excluded from the study. hence, 2054 mothers who had last-born children and those mothers who

113  ever breastfed or still breastfeeding data were extracted from the 2019 EMDHS datasets for this

114  analysis. Fig. 1 depicts the method of selection of study participants that we followed to identify

115  eligible mothers for this study (Fig. 1).

116  **Study setting**

117  The data for this study comes from a standardized community survey of the 2019 EMDHS data,

118  which was conducted in Ethiopia from March 2019 to June 2019. It was included all the nine

119  regional states and two city administrations of Ethiopia.

120  **Measurements of variables of the Study**

121  **Dependent variable**: Early initiation of breastfeeding (EIBF) is the outcome variable of the study.

122  It is defined as giving breast milk within the first hour of birth to the last child born in the last 2

123  years preceding the survey [18]. During the survey, all women were asked how long after their

124  babies were born to breastfeed for the first time. According to the self-report of the child's mother,

125  it is coded as 1"if the child is breastfed within the first hour after birth" and 0 "otherwise".

126  **Independent variables**: The covariates in this study include variables at the individual and

127  community level. The selection of explanatory variables is based on data from previous similar

128  studies and the availability of variables in the 2019 EMDHS data set. Maternal age, the mother's

129  highest education level, marital status, religion, family size, wealth index, Television/radio owned,

130  were individual level socio-demographic and economic characteristics of the mothers included in

131  the analysis.

132  Obstetric and those related to the use of health services included in the study were parity, number

133  of antenatal care (ANC) visits, place of delivery, mode of delivery, type of delivery assistance,

134  Postnatal checkup, type of birth, and counsel on breastfeeding during first 2 days of delivery.

135  Other individual level factors included in the analysis were child related characteristics. These

136  were age of child in months, sex of child, number of living children, birth order, preceding birth

137  interval, and child lives with whom.

138   Place of residence, region, community-level women education, community-level health facility

139   delivery, community-level ANC utilization, and community poverty level were community-level

140   variables included in the analysis. Community-level factors, which were not directly obtained from

141   the survey dataset, were derived by aggregating individual-level factors (Table 1).

142   **Table 1: Description of individual and community-level variables of early initiation of**

143   **breastfeeding among mothers of under 2 years' children in Ethiopia, 2019**

| Variables | Description |
|---|---|
| Maternal age | It is the current age of respondents in years and categorized as 15-24, 25-34 and 35-49. |
| Marital status | This variable indicates the current marital status of the women. It is recoded as "married" if a woman responds as "married" or "living with partner" otherwise "unmarried" |
| Religion | It is a religious group to which the woman associates herself and it was categorized as Orthodox, Protestant, Muslim and Other. Other category includes those women who were traditional or other religious followers. |
| Wealth index | In DHS, the wealth index is constructed using HH asset data via PCA following the three steps. National level wealth quintles are obtained by assigning the HH score to each de jure HH member, ranking each person in the population by their score and then dividing the ranking into five equal parts as poorest, poorer, middle, richer and richest. In this study, the variable was recoded as poor, middle and rich. |

| Parity | It measures the number of deliveries where pregnancies reached viable gestational age. Parity was recoded as primiparous, multiparous, and grand multiparous. |
|---|---|
| Number of ANC visits | DHS guideline categorizes number of ANC visits in groups of none, 1-3, and 4 and or more. In addition, WHO recommends a minimum of four ANC visits based on a review of the effectiveness of different models of antenatal care. Hence, we used the same |
| Type of delivery assistance | We categorized delivery assistance in groups of health professionals, traditional birth attendants, others, and no one |
| Region | Region of residence is typically the first administrative level within the country, or a grouping of the first administrative level. It includes Tigray, Afar, Amara, Oromia, Somali, Benshangul Gumuz, SNNPR, Gambela, Harari, Addis Ababa, and Dire Dawa. |
| Community-level women education | We measured it based on the education level of the respondents. We categorized it as "high" if more than 50% of the women in the cluster had at least attended primary school otherwise "low". |
| Community-level health facility delivery | This factor was generated using the proportion of women who gave birth in the health facilities. It was recoded as "high" if more than 50% women of the cluster gave birth in the health facilities otherwise "low". |
| Community-level ANC utilization. | The variable was categorized as "high" if more than 50% women of the cluster had utilized four and above ANC visits otherwise "low". |

| Community wealth level | This community level factor was derived from HH wealth index data and recoded as "high" if more than 50% of the cluster women were in the middle and above wealth quintiles otherwise "low" |
|---|---|

144 **Where**: PCA – Principal Component Analysis, HH - Household

145 **Data management and statistical analysis**

146 STATA version 14 was used to clean, recode and analyze the 2019 EMDHS kid's data. Sample

147 weight was applied to adjust for sampling error and for non-responses. Descriptive statistics were

148 used to present the distribution of background characteristics among the study participants. We

149 employed a two level multilevel mixed-effects logistic regression analysis so as to account for the

150 hierarchical nature of the EMDHS data and to identify the true association between the individual

151 and community-level factors and early initiation of breastfeeding. Consequently, four models

152 containing variables of interest were fitted: null model (without any explanatory variables), model

153 I (with only individual level variables), model II (with only community level variables) and model

154 III (with both level variables). Intra-class correlation coefficient (ICC) and a proportional change

155 in variance (PCV) were tested to determine the clustering effect and the degree to which

156 community-level factors explain the unexplained variance of the null model. Moreover, goodness

157 of fit of the model was assessed by the deviance and the model with the lowest deviance was used

158 as the best-fitted model. Finally, multicollinearity between explanatory variables were checked by

159 variance inflation factor (VIF) and a mean value of VIF <10 indicates absence of multicollinearity.

160 Both individual and community-level factors having a p-value of less than 0.2 in the bivariable

161 analysis were selected as candidate variables for the multivariable multilevel mixed-effects logistic

162 regression analysis. Likewise, variables with a p-value less than 5% and an adjusted odds ratio

163 (AOR) with a 95% confidence interval were reported as statistically significant variables with

164 early initiation of breastfeeding in the final model.

165 **Patient and public involvement**

166 Patients and/or the public were not involved in the design, or conduct, or reporting, or

167 dissemination plans of this research.

168 **Result**

169 **Socio-demographic characteristics of women and children**

170 A total of 2,054 women who had children aged 0-23 months at the time of survey were included

171 in this analysis. Out of the total respondents, nearly half (51.70%) were aged 25-34 years, 992

172 (48.30%) were not attended formal education, vast majority (94.69%) were married and slightly

173 greater than half (55.01%) respondents had 5-8 family members. Nearly two third (63.88%)

174 households of the respondents did not own radio or television and almost half (48.30%) were from

175 low-income family. In the current study, relatively one quarter of the respondents (24.88%) were

176 urban residents, 12.41% were from Oromia regional state, and 49.22% were Muslim religion

177 followers (Table 2).

178 **Table 2: Socio-demographic characteristics of women with children aged 0-23 months in**

179 **Ethiopia, 2019**

| Variables | Category | Weighted Frequency (n) | Percent (%) |
|---|---|---|---|
| Respondent's current age (in years) | 15-24 | 665 | 32.38 |
| | 25-34 | 1,062 | 51.70 |
| | 35-49 | 327 | 15.92 |

| | | | |
|---|---|---|---|
| Maternal highest educational level | No education | 992 | 48.30 |
| | Primary | 725 | 35.30 |
| | Secondary | 202 | 9.83 |
| | Higher | 135 | 6.57 |
| Current marital status | Married | 1,945 | 94.69 |
| | Unmarried | 109 | 5.31 |
| Religion | Orthodox | 627 | 30.53 |
| | Catholic | 13 | 0.63 |
| | Protestant | 379 | 18.45 |
| | Muslim | 1,011 | 49.22 |
| | Others | 24 | 1.17 |
| Family size | 1-4 | 657 | 31.99 |
| | 5-8 | 1,130 | 55.01 |
| | 9 and above | 267 | 13.00 |
| Possession of radio or TV | No | 1,312 | 63.88 |
| | Yes | 742 | 36.12 |
| Wealth index | Poor | 992 | 48.30 |
| | Medium | 286 | 13.92 |
| | Rich | 776 | 37.78 |
| Region | Tigray | 180 | 8.76 |
| | Afar | 223 | 10.86 |
| | Amhara | 200 | 9.74 |
| | Oromia | 255 | 12.41 |

| | | | |
|---|---|---|---|
| | Somali | 196 | 9.54 |
| | Benishangul | 184 | 8.96 |
| | SNNPR | 217 | 10.56 |
| | Gambella | 167 | 8.13 |
| | Harari | 156 | 7.59 |
| | Addis Ababa | 118 | 5.74 |
| | Dire Dawa | 158 | 7.69 |
| Place of residence | Urban | 511 | 24.88 |
| | Rural | 1,543 | 75.12 |
| Community-level women education | Low | 1,018 | 49.56 |
| | High | 1,036 | 50.44 |
| Community-level ANC utilization | Low | 1,018 | 49.56 |
| | High | 1,036 | 50.44 |
| Community-level health facility delivery | Low | 1,010 | 49.17 |
| | High | 1,044 | 50.83 |
| Community wealth level | Low | 1,069 | 52.04 |
| | High | 985 | 47.96 |

180 **Obstetric and maternal healthcare service utilization related characteristics of the**

181 **respondents**

182 Of the participants, one quarter has no ANC visits, 44.84% gave birth at home, 92.89% gave birth

183 through vagina and almost all women (98.83%) gave multiple births. In addition, nearly one-tenth

184 women (12.37%) received postnatal care at least once and healthcare provider counseled

185  healthcare provider counseled four in ten (40.21%) women on breastfeeding within the first two

186  days of delivery.

187  Majority of the respondents (73.03%) had 1-4 numbers of living children and about half of the

188  children (49.81%) were male. Out of the total children, nearly one quarter was first-born, almost

189  all (99.00%) lived with the respondents and 28.14% children were in the age group of 0-5 months

190  at the time of the survey (Table 3).

191  **Table 3: Obstetric and maternal healthcare service utilization related characteristics of**

192  **women with children aged 0-23 months in Ethiopia, 2019**

| Variables | Category | Weighted Frequency (n) | Percent (%) |
|---|---|---|---|
| Parity | Primiparous | 477 | 23.22 |
| | Multiparous | 1,019 | 49.61 |
| | Grand multiparous | 558 | 27.17 |
| ANC visits | No visit | 522 | 25.41 |
| | 1-3 visit/s | 667 | 329.47 |
| | 4 and more visits | 865 | 42.11 |
| Place of delivery | Health facility | 1,133 | 55.16 |
| | Home | 921 | 44.84 |
| Mode of delivery | Vaginal | 1,908 | 92.89 |
| | Caesarean section | 146 | 7.11 |
| Type of delivery assistance | Health professionals | 1,166 | 56.77 |
| | Traditional birth attendants | 612 | 29.80 |
| | Untrained individuals | 113 | 5.50 |

|  | No one | 163 | 7.94 |
|---|---|---|---|
| PNC checkup | No | 1,800 | 87.63 |
|  | Yes | 254 | 12.37 |
| Type of birth | Single | 2.030 | 98.83 |
|  | Multiple | 24 | 1.17 |
| During 1st 2 days health provider counsel on BF | No | 1,228 | 59.79 |
|  | Yes | 826 | 40.21 |
| Current age of child in months | 0-5 months | 578 | 28.14 |
|  | 6-11 months | 509 | 24.78 |
|  | 12-17 moths | 547 | 26.63 |
|  | 18-23 months | 420 | 20.45 |
| Sex of child | Male | 1,023 | 49.81 |
|  | Female | 1,031 | 50.19 |
| Number of living children | No child | 14 | 0.68 |
|  | 1-4 | 1,500 | 73.03 |
|  | 5-8 | 510 | 24.83 |
|  | 9 and above | 304 | 1.46 |
| Birth order | First-born | 473 | 23.03 |
|  | Second-fourth | 962 | 46.84 |
|  | Fifth or more | 619 | 30.14 |
| Preceding birth interval | <24 months | 305 | 19.34 |
|  | >=24 months | 1,272 | 80.66 |
| Child lives with whom | Respondent | 1,985 | 99.00 |

| | | | |
|---|---|---|---|
| | Lives elsewhere | 20 | 1.00 |

**Prevalence of early initiation of breastfeeding (EIBF)**

193

194    In the current study, the prevalence of early initiation of breastfeeding among women having

195    children aged 0-23 months in Ethiopia was 73.56% (95% CI; 71.65%-75.47%) (Fig. 2).

**Factors associated with early initiation of breastfeeding**

196

197    From both individual and community-level variables which were eligible (p-value <0.20) for

198    multivariable multilevel analysis in the final model (Model III); place of delivery, mode of delivery,

199    postnatal checkup, type of birth, birth order and geographic regions were significantly associated

200    variables with early initiation of breastfeeding among women having children aged 0-23 months

201    in Ethiopia.

202    The likelihood of early initiation of breastfeeding was nearly 2 [AOR=1.98; 95%CI: 1.39-2.79]

203    times higher among women who were delivered at health facility than their counterparts.

204    Concerning mode of delivery, mothers who were delivered through caesarean section had 79%

205    (AOR=0.21; 95%CI: 0.42-0.92] lower odds of early initiation of breastfeeding as compared to

206    their counterparts. Women who had postnatal checkup at least once had 38% [AOR = 0.62; 95%CI:

207    0.42-0.92] lower odds of early initiation of breastfeeding as compared to those who had no

208    postnatal checkup. The odds of early initiation was 65% [AOR=0.35; 95% CI: 0.13-0.92] lower

209    among mothers who gave multiple births as compared to those who gave a single birth.  The odds

210    of early initiation of breastfeeding was 1.76 [AOR=1.76; 95%CI: 1.24-2.49] times higher among

211    mothers whose children birth order was between second to fourth than first-born children. Women

212    who lived in SNNP region were 2 [AOR=2.06; 95% CI: 1.01-4.20] times more likely to practice

213    early initiation of breastfeeding than women who were from Tigray region. On the other hand,

214 women from Somali region of Ethiopia were 52% [AOR=0.48; 95% CI: 0.24-0.96] less likely to

215 practice early initiation of breastfeeding (Table 4).

216 **Table 4: Factors associated with EIBF among women having children aged 0-23 months in**

217 **Ethiopia, 2019 EMDHS**

| Variables | Null Model | Model I AOR (95% CI) | Model II AOR (95% CI) | Model III AOR (95% CI) |
|---|---|---|---|---|
| **Respondent's current age** | | | | |
| 15-24 | | 1.00 | | 1.00 |
| 25-34 | | 1.05[0.79-1.41] | | 1.04[0.75-1.44] |
| 35-49 | | 1.12[0.73-1.73] | | 1.23[0.75-1.99] |
| **Family size** | | | | |
| 1-4 | | 1.00 | | 1.00 |
| 5-8 | | 1.26[0.96-1.66] | | 1.19[0.88-1.61] |
| 9 and above | | 1.33[0.88-2.01] | | 1.13[0.72-1.78] |
| **ANC visit** | | | | |
| No visit | | 1.00 | | 1.00 |
| 1-3 visit | | 1.36[1.01-1.84] | | 1.11[0.79-1.57] |
| 4 and above visits | | 1.56[1.12-2.18] | | 1.21[0.83-1.77] |
| **Place of delivery** | | | | |
| Health facility | | 1.81[1.33-2.46] | | 1.98[1.39-2.79]*** |
| Home | | 1.00 | | 1.00 |
| **Mode of delivery** | | | | |

| | | | |
|---|---|---|---|
| Vaginal | 1.00 | | 1.00 |
| Caesarean section | 0.25[0.16-0.37] | | 0.21[0.13-0.33]*** |
| **Postnatal checkup** | | | |
| No | 1.00 | | 1.00 |
| Yes | 0.65[0.45-0.94] | | 0.62[0.42-0.91]* |
| **Type of birth** | | | |
| Single | 1.00 | | 1.00 |
| Multiple | 0.30[0.13-0.69]* | | 0.35[0.13-0.92]* |
| **During 1st 2 days health provider: counsel on BF** | | | |
| No | 1.00 | | 1.00 |
| Yes | 1.62[1.21-2.16] | | 1.42[0.88-1.66] |
| **Birth order** | | | |
| First-born | 1.00 | | 1.00 |
| Second – fourth | 1.60[1.17-2.20] | | 1.76[1.24-2.49]** |
| Fifth or more | 1.48[0.96-2.29] | | 1.56[0.96-2.53] |
| **Preceding birth order** | | | |
| <24 months | 1.00 | | 1.00 |
| >=24 months | 0.78[0.56-1.08] | | 0.71[0.49-1.03] |
| **Region** | | | |
| Tigray | | 1.00 | 1.00 |
| Afar | | 0.51[0.28-0.95] | 0.75[0.39-1.46] |
| Amhara | | 0.69[0.37-1.27] | 0.82[0.43-1.58] |

| | | | | |
|---|---|---|---|---|
| Oromia | | | 1.20[0.65-2.23] | 1.58[0.81-3.10] |
| Somali | | | 0.37[0.20-0.68] | 0.48[0.24-0.96]* |
| Benishangul | | | 1.05[0.54-2.04] | 1.43[0.70-2.93] |
| SNNPR | | | 1.06[0.57-1.97] | 0.06[1.01-4.20]* |
| Gambella | | | 0.90[0.46-1.76] | 1.03[0.50-2.11] |
| Harari | | | 0.58[0.30-1.12] | 0.68[0.34-1.37] |
| Addis Ababa | | | 0.87[0.43-1.78] | 1.06[0.49-2.30] |
| Dire Dawa | | | 0.85[0.44-1.66] | 1.30[0.63-2.68] |

218    Note: *** = p < 0.001, ** = p ≤ 0.01 and * = p < 0.05

219    **Random effect analysis result**

220    The result of random effect estimates obtained after fitting the four models (Null model, Model I,

221    Model II, and Model III) were presented in the Table 4. The presence of likelihood of early

222    initiation of breastfeeding practice variation within the 9 regions and 2 city administrations of

223    Ethiopia was shown by the ICC of the null model (ICC=17.8%). This indicates that 17.8% of the

224    variation in early initiation of breastfeeding practice among mothers of children less than 2 years

225    old was attributed to the difference between the regions. Additionally, the highest PCV (43.05%)

226    in the final model (Model III) implies the majority of variations of early initiation of breastfeeding

227    practice among mothers observed in the null model was explained by both individual and

228    community-level factors. In addition, the lowest deviance in the last model showed that the model

229    III was the best-fitted model (Table 5).

230    **Table 5: Random effect analysis result and model fitness for assessing factors associated with**

231    **early initiation of breastfeeding in Ethiopia, 2019**

| Parameters | Null Model | Model I | Model II | Model III |
|---|---|---|---|---|
| Community level variance (SE) | 0.72 | 0.67 | 0.49 | 0.41 |
| ICC (%) | 17.86 | 16.89 | 13.15 | 11.14 |
| PCV (%) | Reference | 6.94 | 31.94 | 43.05 |
| Log-likelihood | -998.22 | -819.24 | -981.96 | -934.72 |
| Deviance | 1996.44 | 1638.48 | 1963.92 | 1869.44 |

232

**Discussion**

234 Early initiation of breastfeeding significantly reduces the risk of neonatal morbidity and mortality.

235 It also lessens the risk of postpartum hemorrhage of mothers by stimulating contraction of uterus

236 after delivery [19–21]. In this study, we examined the effect of individual and community-level

237 factors on early initiation of breastfeeding among women who have children 0-23 months in

238 Ethiopia. The current study result showed that 73.56% of women having children aged 0-23

239 months in Ethiopia put their child to breast within first hour of birth. The prevalence was higher

240 when compared to studies conducted in Ethiopia [11,22–27], other Sub-Saharan Africa countries

241 [28–35] and Papua New Guinea [36]. The finding was consistent with other study findings done

242 in different parts of Ethiopia [13,37,38] and Malawi [39]. Conversely, the prevalence was lower

243 than the studies conducted in South Ethiopia [12,40–42], North Ethiopia [43] and Tanzania [44].

244 These discrepancies could be due to the variation of the study period, access and utilization of

245 health service, and socio-cultural conditions among the respondents. Moreover, the differences

246  might be due to poor maternal educational status, access to various sources of health information

247  and resistance to change in behavior due to traditional beliefs.

248  The study at hand revealed that women who delivered at health facility were more likely to initiate

249  breastfeeding within first one hour of birth than their counterparts. This finding is in line with

250  studies conducted in South Ethiopia [41], Northwest Ethiopia [26,38], Economic Community of

251  West African States [45], sub-Saharan Africa [33], Peru [46], and Romania [47]. As it is stated in

252  literatures, initiation of breastfeeding within the first hour of birth is an integral part of the safe

253  delivery procedure. Accordingly, qualified health professionals attending the delivery can

254  motivate, empower and assist to start breastfeeding within the first hour of birth. This might be the

255  possible explanation for the discrepancy of early initiation of breastfeeding among women who

256  delivered at health facility and home.

257  In the present study, postnatal checkup was inversely associated with early initiation of

258  breastfeeding. Women who had postnatal checkup had lower odds of early initiation of

259  breastfeeding as compared to those who had no postnatal checkup. The reason behind tis might be

260  connected with the reverse sequence of the events. it is known that women usually receive

261  postnatal service after breastfeeding was initiated. Thus, it is difficult to directly relate early

262  initiation of breastfeeding with the outcome or effect of postnatal checkup.

263  It has been reported in previous work that one of the preconditions to early initiate breastfeeding

264  is keeping the mother with the newborn and putting the infant skin-to-skin contact on mother's

265  abdomen immediately after delivery [48]. This fact was also supported by our current study.

266  Women who were delivered via caesarean section had lower odds of early initiation of

267  breastfeeding as compared to spontaneous vaginal delivery. This finding is in concordance with

268  the findings of various studies conducted inside and outside Ethiopia. As it was documented in

269 previous studies, long postoperative care delays skin-to-skin mother to baby contact for mothers

270 who gave birth through caesarean section. This separation of mother to baby for a short period due

271 to factors attributed to caesarean section results in delayed initiation of breastfeeding. Similarly,

272 production of inadequate milk because of reduced oxytocin release come after anesthesia might

273 also contribute for the delay [26,37,38,46,48,49].

274 Consistent with studies done in elsewhere [26,33,46], the odds of early initiation of breastfeeding

275 was lower among women with multiple births when compared to women who gave a single birth.

276 The reason behind this might be, in most cases, a woman with multiple pregnancy gave birth via

277 caesarean section. As discussed earlier, delivery via caesarean section necessitate mother to baby

278 separation resulting in delayed initiation of breastfeeding. In addition, it could be due to the

279 probability of giving preterm birth was higher among women who gave multiple births than those

280 who gave single births [50]. As a result, there might be delay in initiating breastfeeding until the

281 neonate is capable of sucking breast milk.

282 In this study, birth order of children was significantly associated with early initiation of

283 breastfeeding. This finding is in agreement with studies conducted in the sub-Saharan Africa

284 [11,13,29,45,51]. The possible explanation for this might be that women who had more birth

285 experiences could have a better chance of receiving health professional's advice on early initiation

286 of breastfeeding. Since women who gave birth more than once would be more exposed for and use

287 maternal health services as compared to their counterparts.

288 Similar to reports from earlier studies [28,38] the current study found that some variations on early

289 initiation of breastfeeding existed among the geographic regions of the country. Women from

290 SNNPR had higher odds of early initiation of breastfeeding practice while women from Somali

291 region of Ethiopia had lower odds of early initiation of breastfeeding practice as compared to

292 women from Tigray region. This might be due to the socio-cultural and basic health infrastructure

293 variations among the regions. Women who live in the Somali region might not be accessible for

294 basic maternal health services as compared to women who live in the Tigray region. Moreover,

295 evidence revealed that prelacteal feeding practice is more common in Somali region than Tigray

296 region [ 52].

**Strengths and limitations**

298 The current study was conducted in Ethiopia and individual and community-level factors

299 associated with early initiation of breastfeeding were identified by using a multilevel analysis. As

300 a result, policy makers and other stakeholders can use the findings of this study to plan and

301 implement appropriate strategies and interventions. However, this study has some limitations. The

302 study was subjected to recall and social desirability bias since the outcome variable was assessed

303 based on the maternal report. In addition, we are unable to supplement our findings with qualitative

304 data and unable to include some quantitative variables like access to mass media, size of the child

305 at birth, obstetric and neonatal complications, early skin to skin contact, prematurity and other

306 related variables since this study was used a secondary data of a national survey. Furthermore,

307 establishing temporal relationship between early initiation of breastfeeding and its determinants

308 was impossible due to the type of the study design, cross-sectional, used for the survey.

**Conclusion**

310 According to the WHO infant and young child feeding rating, the overall prevalence of early

311 initiation of breastfeeding among women having children aged 0-23 months in Ethiopia was good.

312 Place of delivery, birth order and geographic region (SNNPR) were factors positively associated

313 with early initiation of breastfeeding. Whereas, mode of delivery, postnatal checkup, type of birth,

314 and geographic region (Somali) were factors negatively associated with early initiation of

315  breastfeeding. Therefore, concerned bodies need to promote institutional delivery, give special

316  care for mothers who gave multiple birth and encourage mothers of first-born infants to early

317  initiate breastfeeding.

318  **Abbreviation**

319  ANC: Antenatal care, AOR: Adjusted odds ratio, C/S: Caesarean section, CI: Confidence interval,

320  EIBF: Early initiation of breastfeeding, EMDHS: Ethiopia Mini Demographic and Health Survey,

321  WHO: World health organization

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325  **Funding**

326  Not applicable

327  **Patient consent for publication**

328  Not required.

329  **Provenance and peer review**

330  Not commissioned; externally peer reviewed.

331  **Availability of data and materials**

332  The survey dataset used in this analysis are third party data from the demographic and health

333  survey website (http://www.dhsprogram.com/data/) and permission to access the data can be

334  granted after sending a request for registration.

335  **Authors' contribution**

336 SS was involved in conceptualization, data curation, analysis, and writing the manuscript. GG,

337 BT, and SA was equally involved in the data analysis, and writing the manuscript. All authors have

338 read and approved the final manuscript.

**Ethics approval and consent to participate**

340 This study was used a secondary data of the EMDHS. The authors obtained permission to access

341 the data from the MEASURE demographic and health survey repositories upon sending an abstract

342 of our study to an online request form http://www.measuredhsprogram.com. Ethical approval for

343 the study was obtained from National Ethics Committee of the Federal Democratic Republic of

344 Ethiopia, Ministry of Science and Technology and the ICF Institutional Review Board. Hence,

345 consent to participate is not applicable.

**Consent for publication**

347 Not applicable

**Competing interests**

349 The authors declare that they have no competing interests.

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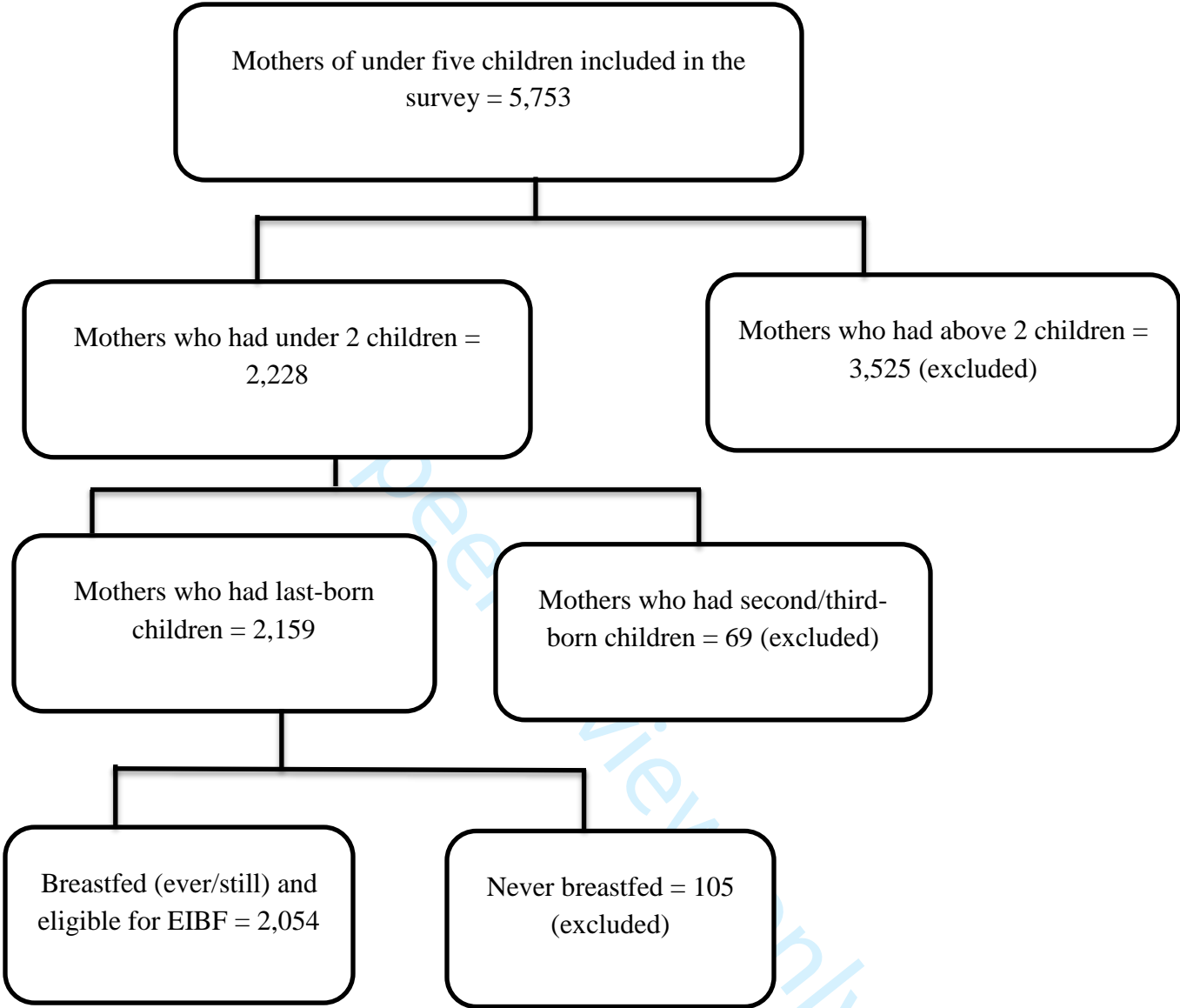506

507

508 **Figure Legend/Caption**

509 Fig. 1: Eligibility assessment for early initiation of breastfeeding among women having 0-23

510 month's children in Ethiopia, 2019

511 Fig. 2: Prevalence of early initiation of breastfeeding among mothers of children aged less than

512 24 months in Ethiopia, the 2019

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┌─────────────────────────────────────┐
│  Mothers of under five children      │
│  included in the survey = 5,753      │
└─────────────────────────────────────┘
        │
   ┌────┴──────────────────────┐
┌──────────────────────┐   ┌──────────────────────────┐
│ Mothers who had      │   │ Mothers who had above 2  │
│ under 2 children =   │   │ children = 3,525         │
│ 2,228                │   │ (excluded)               │
└──────────────────────┘   └──────────────────────────┘
        │
   ┌────┴──────────────────────┐
┌──────────────────────┐   ┌──────────────────────────┐
│ Mothers who had      │   │ Mothers who had          │
│ last-born children = │   │ second/third-born        │
│ 2,159                │   │ children = 69 (excluded) │
└──────────────────────┘   └──────────────────────────┘
        │
   ┌────┴──────────────────────┐
┌──────────────────────┐   ┌──────────────────────────┐
│ Breastfed (ever/still)│  │ Never breastfed = 105    │
│ and eligible for EIBF │  │ (excluded)               │
│ = 2,054               │  │                          │
└──────────────────────┘   └──────────────────────────┘
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**Fig. 1: Eligibility assessment for early initiation of breastfeeding among women having 0-23 month's children in Ethiopia, 2019**
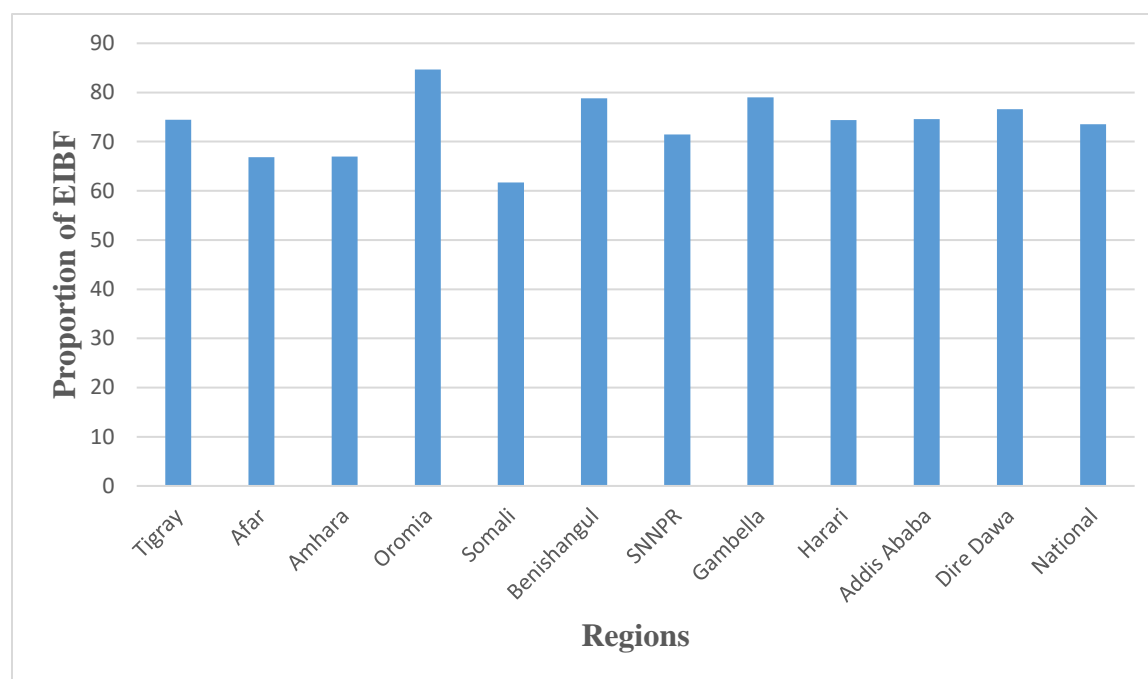
Fig. 2: Prevalence of early initiation of breastfeeding among mothers of children aged less than

24 months in Ethiopia, the 2019

**STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies***

| | Item No | Recommendation |
|---|---|---|
| **Title and abstract** | 1 | a) Determinants of early initiation of breastfeeding among mothers of children aged less than 24 months in Ethiopia: A community based cross-sectional study (Page 1). |
| | | b) In this analysis, data from 2019 Ethiopia Mini Demographic and Health Survey (EMDHS) were used. We extracted data of 2,054 mothers who had last-born children and those mothers who ever breastfed or still breastfeeding during the survey from the 2019 EMDHS datasets. We performed a two-stage multilevel mixed-effects logistic regression to identify individual and community-level determinants of early initiation of breastfeeding (EIBF). In the final model, variables with a p-value less than 5% and an adjusted odds ratio with a 95% confidence interval were reported as statistically significant variables with EIBF. The prevalence of EIBF among mothers having children aged 0-23 months was 73.56% (95% CI; 71.65%-75.47%). Women who delivered at health facility [AOR=1.98; 95% CI: 1.39-2.79] and have children with birth order second-fourth [AOR=1.76; 95% CI: 1.24-2.49] were more likely to early initiate breastfeeding than their counterparts. Whereas, women who gave birth by caesarean section [AOR=0.21; 95% CI: 0.13-0.33], had multiple births [AOR=0.35; 95% CI: 0.13-0.92], and had postnatal checkup [AOR=0.62; 95% CI: 0.44-0.91] were less likely to practice EIBF as compared to their counterparts. Region of residence of women was also significantly associated with EIBF (Page 2 – under Abstract section). |

**Introduction**

| Background/rationale | 2 | Early breastfeeding refers to the percentage of infants who have been breastfed, began breastfeeding within one hour after birth, began breastfeeding within one day after birth, and received breast milk pre-feeding. WHO recommends that breastfeeding be started as early as one hour after birth. Although it is one of the core indicators for assessing infant and young child feeding, it is a far from universal practice. Data from 2002 to 2005 show that 46 low- and middle-income countries (LMIC) have included |

early initiation of breastfeeding in their population health surveys. Among them, 54% of the records indicate that less than half of newborns are breastfed within one hour after birth. In addition, no country has a baby breastfeeding rate of more than 80% within one hour after birth. Globally, it is estimated that less than half (42%) of newborns are breastfed within the first hour of life (first paragraph – under Introduction).

| | | |
|---|---|---|
| **Objectives** | | |
| | 3 | 1. To determine magnitude of early initiation of breastfeeding among mothers of children aged less than 24 months in Ethiopia<br>2. To identify factors associated with early initiation of breastfeeding (Page 5 - Last paragraph of Introduction section) |
| **Methods** | | |
| Study design | 4 | First paragraph – under Methods section |
| Setting | 5 | The country is stratified into 9 regions and 2 city administrations. Then, each region was stratified into urban and rural areas. In the first stage of selection, 305 enumeration areas (EA) were selected using probability proportional to EA size according to the sampling frame created for the upcoming Ethiopian population and housing census. Consecutively, a list-containing household in all selected EAs was developed. In the second stage, a fixed number of households per cluster were selected from the newly created household listing using an equal probability systematic selection (Page 6 – 1st paragraph). |
| Participants | 6 | Women in childbearing age (15-49) who had last-born children and those who ever breastfed or still breastfeeding data were extracted from the 2019 EMDHS datasets (Page 6 – under Methods section) |
| Variables | 7 | EIBF is the outcome variable of the study. It is defined as giving breast milk within the first hour of birth to the last child born in the last 2 years preceding the survey. According to the self-report of the child's mother, it is coded as 1"if the child is breastfed within the first hour after birth" and 0 "otherwise".<br>Whereas, independent variables include maternal age, the mother's highest education level, marital status, religion, family size, wealth index, Television/radio owned, |

parity, number of antenatal care (ANC) visits, place of delivery, mode of delivery, type of delivery assistance, Postnatal checkup, type of birth, counsel on breastfeeding during first 2 days of delivery, age of child in months, sex of child, number of living children, birth order, preceding birth interval, child lives with whom, place of residence, region, community-level women education, community-level health facility delivery, community-level ANC utilization, and community poverty level (Page 7 – under Methods section).

| Data sources/measurement | 8 | The data for this study comes from a standardized community survey of the 2019 EMDHS data, which was conducted in Ethiopia from March 2019 to June 2019. |
|---|---|---|
| Bias | 9 | To minimize recall bias, only mothers who had last child born in the last 2 years preceding the survey were included in the study (Page 7 – under Methods section). |
| Study size | 10 | Data of 2,054 women in childbearing age were included in this analysis (Page 6 – under Methods section). |
| Quantitative variables | 11 | We employed a two level multilevel mixed-effects logistic regression analysis so as to account for the hierarchical nature of the EMDHS data and to identify the true association between the individual and community-level factors and early initiation of breastfeeding. Consequently, four models containing variables of interest were fitted: null model (without any explanatory variables), model I (with only individual level variables), model II (with only community level variables) and model III (with both level variables) (Page 10 – under Methods section). |
| Statistical methods | 12 | a) STATA version 14 was used to clean, recode and analyze the 2019 EMDHS kid's data (Page 9 – under Methods section). |
| | | b) Since our data has groups, we applied multilevel logistic regression to handle among cluster variation. Intra-class correlation coefficient and a proportional change in deviance were tested to determine the clustering effect and the degree to which community-level factors explain the unexplained variance of the null model (Page 10 - under methods) |
| | | c) We dropped variables with missing information |
| | | d) Not applicable |
| | | e) Not applicable |

**Results**

| Participants | 13 | a) Not applicable |
| | | b) We used secondary data, so non-participation was not the problem |
| | | c) Figure 1 |
| Descriptive data | 14 | a) Both individual and community-level characteristics of study participants were displayed in Table 1 (Page 11 – under Result section). |
| | | b) No missing data |
| | | c) Not applicable |
| Outcome data | 15 | The prevalence of early initiation of breastfeeding among women having children aged 0-23 months in Ethiopia was 73.56% (95% CI; 71.65%-75.47%) – Page 15 under Result section |
| Main results | 16 | a) We presented both unadjusted and adjusted estimates using Table 3 (Page 16 – under Result section) |
| | | b) In this study, we categorized the following continuous variables as: *Maternal age*: 15-24, 25-34, and 35-49, *Family size*: 1-4, 5-8, and 9 and above, *Parity*: primiparous, multiparous, and grand multiparous, *Age of child*: 0-5, 6-11, 12-17, and 18-23 months *Number of living children*: no child, 1-4, 5-8, and 9 and above, *Birth order*: first-born, second – fourth, and fifth or more and *Preceding birth interval*: $< 24$ months and $\geq 24$ months |
| | | c) Not applicable |
| Other analyses | 17 | We fitted intra-class correlation coefficient, proportional change in variance, deviance and variance inflation factor, on top of multilevel logistic regression and the result was presented on Table 4 (Page 19). |

**Discussion**

| Key results | 18 | In this study, the likelihood of early initiation of breastfeeding was nearly 2 [AOR=1.98; 95%CI: 1.39-2.79] times higher among women who were delivered at health facility than their counterparts. Concerning mode of delivery, mothers who were delivered through caesarean section had 79% (AOR=0.21; 95%CI: 0.42-0.92] |

lower odds of early initiation of breastfeeding as compared to their counterparts. Women who had postnatal checkup at least once had 38% [AOR = 0.62; 95%CI: 0.42-0.92] lower odds of early initiation of breastfeeding as compared to those who had no postnatal checkup. The odds of early initiation was 65% [AOR=0.35; 95% CI: 0.13-0.92] lower among mothers who gave multiple births as compared to those who gave a single birth.  The odds of early initiation of breastfeeding was 1.76 [AOR=1.76; 95%CI: 1.24-2.49] times higher among mothers whose children birth order was between second to fourth than first-born children. Women who lived in SNNP region were 2 [AOR=2.06; 95% CI: 1.01-4.20] times more likely to practice early initiation of breastfeeding than women who were from Tigray region. On the other hand, women from Somali region of Ethiopia were 52% [AOR=0.48; 95% CI: 0.24-0.96] less likely to practice early initiation of breastfeeding (Page 15 – under Result section).

| | | |
|---|---|---|
| Limitations | 19 | The present study is not out of limitations. The study was subjected to recall and social desirability bias since the outcome variable was assessed based on the maternal report. In addition, we are unable to supplement our findings with qualitative data and unable to include some quantitative variables like access to mass media, size of the child at birth, obstetric and neonatal complications, early skin to skin contact, prematurity and other related variables since this study was used a secondary data of a national survey. Furthermore, establishing temporal relationship between early initiation of breastfeeding and its determinants was impossible due to the type of the study design, cross-sectional, used for the survey (Page 22 - last paragraph of Discussion section). |
| Interpretation | 20 | In this study, we examined the effect of individual and community-level factors on EIBF among women who have children 0-23 months in Ethiopia. The prevalence of EIBF was higher when compared to studies conducted in Ethiopia, other Sub-Saharan Africa countries and Papua New Guinea. The finding was consistent with other study findings done in different parts of Ethiopia and Malawi. Conversely, the prevalence was lower than the studies conducted in South Ethiopia, North Ethiopia and Tanzania. These discrepancies could be due to the variation of the study period, access and utilization of health service, and socio-cultural conditions among the respondents. |

| | | Moreover, the differences might be due to poor maternal educational status, access to various sources of health information and resistance to change in behavior due to traditional beliefs (Page 19 – 1st paragraph of Discussion section). |
|---|---|---|
| Generalizability | 21 | EMDHS data is a nationally representative sample that provided estimates at the national and regional levels and for urban and rural areas. Accordingly, the findings of this study was generalized to the whole country, considering all the limitation in our mind (Page 6 – under Method section). |
| **Other information** | | |
| Funding | 22 | This study did not receive any funding from any organization. |