

**Association between receipt of nutritional counseling during antenatal care
and timely initiation of breastfeeding among women in Ethiopia**

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Abstract

Introduction: Two essential facility-based interventions for enhancing global maternal and child health outcomes are nutritional counseling during antenatal care and timely initiation of breastfeeding among women. Despite governmental interventions, the maternal and infant mortality rates remain high in Ethiopia. In this context, it is essential to examine the impact of health facility-based interventions, such as nutritional counseling during antenatal care and timely initiation of breastfeeding on maternal and child health outcomes in Ethiopia.

Objective and Aims: The present cross-sectional study used secondary data to identify factors associated with timely initiation of breastfeeding among women in Ethiopia.

Methods: Secondary data analysis was conducted using data from 4074 women who responded to the 2016 Ethiopian Demographic and Health Surveys (EDHS). The dependent variable was timely initiation of breastfeeding among women. Demographic, socioeconomic, and other characteristics were examined.

Results: Variables associated with timely initiation of breastfeeding among women in Ethiopia were maternal age of 35-49 years ($AOR = 0.615$; 95% CI, 0.42-0.90), parity of 2-4 children (adjusted $OR = 1.52$; 95% CI, 1.09-2.11) and more than 4 children (adjusted $OR = 1.876$; 95% CI, 1.27-2.75), delivery by cesarean section (adjusted $OR = 0.161$; 95% CI, 0.86-0.29).

Conclusion: Older maternal age and high parity were positively associated with timely initiation of breastfeeding among women in Ethiopia. Meanwhile, delivery by cesarean section was negatively associated with timely initiation of breastfeeding among women in Ethiopia. These findings suggest that addressing challenges faced by these specific groups of populations is essential in improving maternal and child health outcomes in Ethiopia.

Introduction

Two essential facility-based interventions for enhancing global maternal and child health outcomes are nutritional counseling during antenatal care and timely initiation of breastfeeding¹. In Ethiopia, where maternal and child mortality rates remain high, understanding the impact of these interventions is imperative for informing healthcare policies and practices.

Family planning (FP) is essential to maintain the health of women, their families, and communities. The rates of maternal and infant mortality can be decreased and unwanted pregnancies can be prevented with the use of modern contraceptive methods². Intrauterine copper devices (IUCDs) and implants, which are examples of long-acting reversible contraception (LARC), provide prolonged contraceptive protection without requiring user activity³. These methods play a crucial role in preventing unintended pregnancies, spacing births, and reducing maternal mortality rates by allowing women to achieve their desired family size . However, despite the effectiveness of LARC methods, their utilization remains low in many countries, including Nepal, where only 4% of women of reproductive age use LARC methods⁴.

Similarly, in Ethiopia, improving maternal and child health outcomes is a national priority. The provision of nutritional counseling and timely initiation of breastfeeding, among other health facility-based interventions, are crucial parts of Ethiopia's efforts to lower the country's rates of mother and infant death⁵. The World Health Organization (WHO) views exclusive breastfeeding to be the best feeding technique for newborns throughout their first six months of life, with several health advantages for both the mother and the child⁶. Additionally, provision of nutritional counseling during antenatal care helps to improve maternal health and facilitates proper fetal growth and development⁷.

Ethiopian maternal and child health outcomes still face considerable obstacles even after these initiatives have been put in place. With an estimated 412 deaths per 100,000 live births, maternal mortality rates are still high, while under-five mortality rates are at 55 deaths per 1,000 live births⁸. In this context, it is essential to examine the impact of health facility-based interventions, such as nutritional counseling and timely initiation of breastfeeding on maternal and child health outcomes in Ethiopia.

Therefore, this study aims to investigate how health facility-based interventions, specifically nutritional counseling during antenatal care and timely initiation of breastfeeding, have influenced maternal and child health outcomes in Ethiopia. By analyzing data from the Ethiopia Demographic and Health Survey (EDHS), this study seeks to contribute to the existing literature by providing insights into the effectiveness of these interventions and identifying areas for improvement in maternal and child health services in Ethiopia.

Methods

Description of the Data

The data for this study will be obtained from the 2016 Ethiopian Demographic and Health Surveys (EDHS), a nationally representative, cross-sectional household survey conducted by the Central Statistical Agency (CSA) in collaboration with the Federal Ministry of Health (FMoH) and the Ethiopian Public Health Institute (EPHI)⁹. The survey collected data over a 5-month period from January 18, 2016, to June 27, 2016. The EDHS utilized a probability-based two-stage stratified random sampling design to gather information on key demographic and health indicators in Ethiopia. The study setting encompasses urban and rural areas across all nine geographical regions and two administrative cities of Ethiopia. The survey covered a wide range of population and health issues relevant to Ethiopia, providing comprehensive data for analysis.

Sample

The EDHS consisted of five questionnaires: the Household Questionnaire, the Women's Questionnaire (15–49 years), the Men's Questionnaire (15–59 years), the Biomarker Questionnaire, and the Health Facility Questionnaire. The questionnaires collected information to reflect the population and health issues relevant to Ethiopia⁹.

The dependent variable for this study is timely initiation of breastfeeding in Ethiopia, including indicators such as maternal mortality, infant mortality, child malnutrition rates, and maternal and child health care utilization. These outcomes will be measured based on data collected from the 2016 Ethiopian Demographic and Health Surveys (EDHS) and will serve as proxies for assessing the impact of nutritional counseling during antenatal care on the timely initiation of breastfeeding among women in Ethiopia. The primary independent variable of interest is the receipt of nutritional counseling during antenatal care. This variable will be operationalized

based on information collected from the survey regarding knowledge and practice of nutritional counseling and breastfeeding practices.

Several covariates will be included in the analysis to account for potential confounding factors.

These covariates include:

- Age (15–29 years, 30–44 years, 45–49 years)
- Current marital status (never married, married/living with partner, widowed/divorced/separated)
- Parity (no children, 2–4 children, more than 2-4 children)
- Education (none, primary, secondary or higher)
- Wealth index (poor, middle, rich)
- Employment status (no, yes)
- Type of residence (urban, rural)
- Number of antenatal visits during pregnancy (None, 1-3, Received recommended care)
- Place of delivery (Public facility, Private facility, Home, Other)
- Delivery by cesarean section (no, yes)
- Skilled provider during delivery (Skilled, Unskilled, No one)

Statistical Analysis

Descriptive statistics will be employed to characterize the study participants, presenting frequencies and percentages for categorical variables, while means with standard deviations will be provided for continuous variables. Bivariate analysis will be conducted to explore the association between the independent variable (receipt of nutritional counseling), covariates (such as demographic characteristics and socioeconomic status), and the dependent variable (timely initiation of breastfeeding among women in Ethiopia). This analysis will involve Rao-Scott chi-square tests to examine relationships among categorical variables. Subsequently, logistic regression analysis will be employed to determine the impact of nutritional counseling during antenatal care on timely initiation of breastfeeding among women in Ethiopia, adjusting for covariates identified as significant in the bivariate analysis. Variance inflation factor (VIF) tests will be used to assess collinearity in the regression models. Statistical analyses will be conducted using SAS Studio 9.4, with consideration of the complex sample design elements present in the 2016 Ethiopian Demographic and Health Survey (EDHS) data. The significance level will be set at 5%, and 95% confidence intervals will be reported for all estimates.

Results

Among the 4,074 participants in the study sample, the majority fell within the age range of 25-34 years old (50.8%), with smaller proportions in the younger (15-24 years old) and older (35-49 years old) age brackets, comprising 29.2% and 19.9%, respectively. Regarding marital status, a vast majority were reported as married or living together (95.2%), while only a small percentage identified as never married (0.7%) or divorced, separated, or widowed (3.9%). In terms of education, the majority of participants had no formal education (60.4%), followed by those with primary education (30.6%), with a smaller percentage having attained secondary education or above (8.8%). Parity varied, with 42.2% of participants having 2-4 children, 37.3% having more than 2-4 children, and 20.3% having only one child. Additionally, the majority of respondents were not currently working (75.1%) and belonged to households categorized as poor based on the Wealth Index Combined (45.3%). Furthermore, the vast majority did not have health insurance coverage (96.2%) and resided in rural areas (88.0%). Detailed descriptive statistics of the study sample are presented in Table 1.

The bivariate analysis of the study sample by timely initiation of breastfeeding revealed notable associations across various demographic and health-related factors. Participants who timely initiated breastfeeding were more likely to be in the age group of 24-34 years (75.6%), compared to their counterparts in other age groups. Additionally, women with 2-4 children (74.7%) and more than 4 children (74.8%) were more likely to receive initiate timely breastfeeding compared to those with only one child. Notably, a significant proportion of women (74.3%) who did not deliver through cesarean section were more likely to timely initiate breastfeeding when compared to women who delivered by cesarean section. Furthermore, there were no significant differences in timely initiation of breastfeeding among women in Ethiopia based on marital status, education level, current employment status, wealth index, health insurance coverage, type of residence, skilled provider during delivery, or sex of the child. Detailed characteristics of the study sample categorized by timely initiation of breastfeeding are presented in Table 2.

The association between maternal characteristics and timely initiation of breastfeeding was examined, revealing several noteworthy findings. After adjusting for covariates, maternal age had a significant association with timely initiation of breastfeeding. Women in the age group 35-49 years (adjusted OR = 0.615; 95% CI, 0.42-0.90) were 38.5% less likely to timely initiate

breastfeeding compared to women in other age groups. Similarly, marital status, education level, respondent's current employment status, wealth index combined, type of residence, number of antenatal visits during pregnancy, place of delivery, skilled provider during delivery, sex of the child, and nutritional counseling during antenatal care showed no significant associations with timely initiation of breastfeeding use after adjusting for covariates. However, parity demonstrated a significant association, with higher odds of timely initiation of breastfeeding among participants with 2-4 children (adjusted OR = 1.52; 95% CI, 1.09-2.11) and more than 4 children (adjusted OR = 1.876; 95% CI, 1.27-2.75) compared to those with one child. Notably, delivery by cesarean section was significantly associated with lower odds of timely initiation of breastfeeding (adjusted OR = 0.161; 95% CI, 0.86-0.29). Detailed associations between maternal characteristics and timely initiation of breastfeeding are presented in Table 3.

Discussion

Our findings suggest that receipt of nutritional counseling during antenatal care has no statistically significant effect on timely initiation of breastfeeding among women in Ethiopia. Contrary to previous research, our findings that explored the association between receipt of nutritional counseling during antenatal care and timely initiation of breastfeeding among women in Ethiopia are not consistent with a prior study examining factors associated with exclusive breastfeeding among urban women in Ethiopia¹⁰. While the previous study reported that mothers who received nutritional counseling were more likely than those who did not get counseling to exclusively breastfeed, our study found no significant association between nutritional counseling and timely initiation of breastfeeding among women in Ethiopia. One possible explanation for the inconsistency could be the differences in the study populations and contexts between the two studies. Women in rural settings are provided with inadequate breastfeeding information and lack access to skilled birth attendant as evinced by a previous study which looked at determinants of delayed initiation of breastfeeding in rural Ethiopia¹¹. A study in a rural part of West Ethiopia found that significant proportion of mothers associated receipt of breastfeeding advice after delivery from a health worker with the timely initiation of breastfeeding¹², suggesting a need for the provision of skilled birth attendants in rural areas to influence the rates of timely initiation of breastfeeding among women in Ethiopia.

In the present study, women with 2-4 children and more than 4 children were more likely to timely initiate breastfeeding compared to those with one child, consistent with previous research which found significant association between timely initiation of breastfeeding and women with greater number of children¹³. Our study found that 20.3% of the respondents have only one child, while 42.4% of the respondents have 2-4 children and the remaining 37.3% of the respondents have more than 4 children. The higher likelihood of timely initiation of breastfeeding among women with more children might be due to the experience accumulated resulting in greater awareness, leading them to prioritize timely initiation of breastfeeding in subsequent pregnancies. This idea is supported by a study in Saudi Arabia which found that women with more children were associated with a higher likelihood of timely initiation of breastfeeding¹⁴.

We found a strong association between delivery by cesarean section and timely initiation of breastfeeding among women in Ethiopia. Respondents who gave birth by cesarean section are 84% less likely to timely initiate breastfeeding than those who gave birth without cesarean section. There was an inverse relationship between timely initiation of breastfeeding and delivery by cesarean section. This finding is consistent with previous research in Ethiopia¹⁵, which found that cesarean section delivery negatively impacts the timely initiation of breastfeeding among women in Ethiopia. Our finding is also consistent with previous studies in Italy¹⁶, China¹⁷ and Turkey¹⁸. Similarly, a study in Canada found that women who underwent cesarean section did not timely initiate breastfeeding or had no intention to initiate breastfeeding¹⁹. This could be due to delayed skin to skin contact between mother and baby following cesarean section, which is essential for timely initiation of breastfeeding among women²⁰.

Our analysis found that participants who received nutritional counseling during antenatal care were more likely to be in the age group of 24-34 years (75.6%), compared to those not receiving recommended care. Our finding is consistent with another study in Northwest Ethiopia which focused on women in the childbearing age²¹. In sub-Saharan Africa, a study found that older women were more likely to timely initiate breastfeeding among women²². This could be due to greater exposure to information regarding optimal breastfeeding practices among older women²³. However, a study in Ghana found older maternal age to be negatively associated with early initiation of breastfeeding among women²⁴. A possible explanation for this finding is that older

mothers may have different cultural beliefs or attitudes that influence their decision-making process regarding timely initiation of breastfeeding²⁵.

In our study, several variables were examined for their association with timely initiation of breastfeeding among women in Ethiopia, including marital status, education, employment status, wealth index combined, health insurance coverage, type of residence, number of antenatal visits, place of delivery, skilled provider during delivery, and the sex of the child, which did not reach statistical significance. Despite their lack of significance, the inclusion of these variables is valuable for understanding the multifaceted nature of timely initiation of breastfeeding among women in Ethiopia and its determinants. The non-significant findings may indicate that factors such as marital status or employment status do not independently influence timely initiation of breastfeeding once other variables are accounted for in the analysis. However, it is important to interpret these results cautiously, considering potential limitations such as sample size constraints or measurement issues. Future research could explore these non-significant variables in greater depth or investigate additional factors that may interact with timely initiation of breastfeeding among women to provide a more comprehensive understanding of maternal healthcare-seeking behaviors.

Strength and limitations

The validity and generalizability of the results are enhanced by the inclusion of large sample sizes and nationally representative data in this study. However, given the Ethiopian government's efforts to improve maternal and child health outcomes, this study was restricted to self-reported EDHS survey respondents, where recall bias and social desirability bias may have been present. Furthermore, it is not feasible to establish causality between the outcome of interest and independent variable because of the cross-sectional study design.

Conclusion

Despite being national priority, maternal and infant mortality rates remains a public health concern in Ethiopia. In this large, representative sample of Ethiopian women,,mother's age,parity and delivery by cesarean section were significantly associated with timely initiation of breastfeeding among women in Ethiopia.This implies that older women, those with multiple children, and those undergoing cesarean section deliveries may face challenges when it comes to

timely initiation of breastfeeding, which is essential for improving maternal and fetal health during pregnancy. Addressing these barriers and catering to the specific needs of these populations is crucial for improving maternal and infant health outcomes in Ethiopia.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Table 1. Descriptive statistics of the study sample (N=4074)

	Overall n (wt. %)
Mother's age	
15-24	1276(29.2)
25-34	2031(50.8)
35-49	767(19.9)
Marital status	
Never married	32(0.7)
Married/Living together	4099(95.2)
Div/sep/widowed	165(3.9)
Education	
No education	2413(60.4)
Primary	1137(30.6)
Secondary or above	524(8.8)
Parity	
One child	878(20.3)
2-4 children	1762(42.2)
More than 2-4 children	1414(37.3)
Respondent currently working	
Not working	3044(75.1)
Working	1030(24.8)
Wealth Index Combined	
Poor	2113(45.3)
Middle	566(20.6)
Rich	1395(33.9)
Health insurance	

No	3937(96.2)
Yes	137(3.7)
Type of residence	
Rural	3245(88.0)
Urban	829(11.9)
Number of antenatal visits during pregnancy	
None	1327(35.1)
1-3 visits	1239(34.1)
Received recommended antenatal care	1508(33.3)
Place of delivery	
Public Facility	1527(34.6)
Private Facility	106(1.1)
Home	2346(61.9)
Other	95(2.2)
Delivery by caesarean section	
Delivery is not by C section	3929(97.2)
Delivery is by C section	145(2.7)
Skilled provider during delivery	
Skilled Provider	979(19.6)
Unskilled Provider	2681(65.5)
No one	414(14.8)
Sex of the child	
Female	2040(51.4)
Male	2034(48.5)
Nutritional counseling during antenatal care	
No antenatal care and no nutritional counseling;	

Did not receive nutritional counseling	2246(56.6)
Received nutritional counseling	1828(43.3)
Start breastfeeding within 1 hr	
No	1192(26.6)
Yes	2882(73.3)

Abbreviations: Wt.% : Weighted percent

Table 2. Characteristics of the study sample by timely initiation of breastfeeding (N=4074)

	Recommended Timely Initiation of Breastfeeding		
	Yes n		p
	No n (Wt. %)	(Wt.%)	
Mother's age			0.038
15-24	397(27.9)	879(72)	
24-34	569(24.3)	1462(75.6)	
35-49	226(30.6)	541(69.3)	
Marital status			0.138
Never married	10(43.4)	22 (56.5)	
Married/Living together	1130(26.2)	2747(73.7)	
Div/sep/widowed	52(33.3)	113(66.6)	
Education			0.525
No education	742(26.5)	1671(73.4)	
Primary	306(25.8)	831(74.1)	
Secondary or above	144(30.1)	380(69.8)	
Parity			0.015

One child	295(32.4)	583(67.5)	
2-4 children	498(25.2)	1284(74.7)	
More than 2-4 children	399(25.1)	1015(74.8)	
Respondent currently working			0.905
Not working	910(26.7)	2134(73.2)	
Working	282(26.4)	748(73.5)	
Wealth Index Combined			0.4
Poor	689(25.2)	1424(74.7)	
Middle	146(26.5)	420(73.4)	
Rich	357(28.5)	1038(71.4)	
Health insurance			0.303
No	1150(26.4)	2787(73.5)	
Yes	42(31.5)	95(68.4)	
Type of residence			0.75
Rural	984(26.5)	2261(73.4)	
Urban	208(27.5)	621(72.4)	
Number of antenatal visits during pregnancy			0.619
None	420(25.2)	907(74.7)	
1-3 visits	353(27.3)	886(72.6)	
Received recommended antenatal care	419(27.4)	1089(72.5)	
Place of delivery			0.217
Public Facility	380(25.9)	1147(74.0)	
Private Facility	36(37.1)	70(62.8)	
Home	744(26.4)	1602(73.5)	
Other	32(37.8)	63(62.1)	

Delivery by caesarean section	<0.0001	
Delivery is not by C section	1109(25.6)	2820(74.3)
Delivery is by C section	83(62.6)	62(37.3)
Skilled provider during delivery	0.846	
Skilled Provider	251(26.7)	728(73.2)
Unskilled Provider	830(26.9)	1851(73.0)
No one	111(25.1)	303(74.8)
Sex of the child	0.078	
Female	557(24.7)	1483(75.2)
Male	635(28.6)	1399(71.3)
Nutritional counseling during antenatal care	0.419	
No antenatal care and no nutritional counseling;	681(25.9)	1585(74.0)
Did not receive nutritional counseling	511(27.6)	1317(72.3)
Received nutritional counseling		

Abbreviations: Wt.% : Weighted percent

P -values are derived from Rao-Scott- Chi square test

Table 3. Association between maternal characteristics and timely initiation of breastfeeding (N=4074)

	Unadjusted OR (95% CI)	p	Adjusted OR (95% CI)	p
Mother's age				
15-24	Reference		Reference	
24-34	1.209(0.96,1.51)	0.102	0.972(0.70,1.33)	0.861

35-49	0.877(0.66,1.16)	0.36	0.651(0.42,0.90)	0.012
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Marital status

Never married	Reference	Reference
Married/Living together	2.163(0.87,5.33)	0.093 1.469(0.54,3.94) 0.445
Div/sep/widowed	1.538(0.53,4.44)	0.426 1.096(0.34,3.5) 0.877

Education

No education	Reference	Reference
Primary	1.036(0.82,1.30)	0.763 1.195(0.92,1.54) 0.174
Secondary or above	0.838(0.59,1.17)	0.308 1.085(0.73,1.60) 0.684

Parity

One child	Reference	Reference
2-4 children	1.427(1.09,1.86)	0.009 1.52(1.09,2.11) 0.012
More than 2-4 children	1.435(1.09,1.91)	0.014 1.876(1.27,2.75) 0.001

Respondent currently working

Not working	Reference	Reference
Working	1.016(0.78,1.31)	0.905 1.023(0.77,1.34) 0.867

Wealth Index Combined

Poor	Reference	Reference
Middle	0.934(0.7,1.24)	0.636 0.931(0.69,1.25) 0.633
Rich	0.845(0.65,1.09)	0.199 0.802(0.58,1.09) 0.161

Type of residence

Rural	Reference	Reference
Urban	0.947(0.67,1.32)	0.751 1.369(0.86,2.17) 0.181

Number of antenatal visits during pregnancy

None	Reference	Reference
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1-3 visits 0.895(0.68,1.16) 0.414 0.845(0.62,1.13) 0.266

Received recommended antenatal care 0.893(0.68,1.16) 0.397 0.895(0.64,1.25) 0.514

Place of delivery

Public Facility	Reference	Reference
Private Facility	0.591(0.30,1.16)	0.127 0.694(0.30,1.60) 0.392
Home	0.972(0.76,1.23)	0.815 0.828(0.59,1.15) 0.26
Other	0.574(0.30,1.07)	0.08 0.561(0.28,1.08) 0.086

Delivery by caesarean section

Delivery is not by C section	Reference	Reference
Delivery is by C section	<0.00 0.205(0.11,0.36)	<0.00 0.161(0.86,0.29)

Skilled provider during delivery

Skilled Provider	Reference	Reference
Unskilled Provider	0.99(0.76,1.26)	0.94 0.795(0.57,1.09) 0.154
No one	1.088(0.73,1.61)	0.677 0.862(0.53,1.38) 0.538

Sex of the child

Female	Reference	Reference
Male	0.816(0.65,1.02)	0.079 0.823(0.65,1.03) 0.095

Nutritional counseling during antenatal care

Did not receive nutritional counseling	Reference	Reference
Received nutritional counseling	0.916(0.73,1.13)	0.419 1.005(0.76,1.31) 0.972

Abbreviations: Wt.% : Weighted percent; OR: Odds Ratio;CI:

Confidence Interval

```

libname C "/home/u63844240/ETKR71FL";

data data1;

set C.etkr71fl;

sweight = v005/1000000;

/* Mother's age 3 groups*/;

if v013 in(1,2) then age2 = 0; /*15-24;

else if v013 in(3, 4) then age2 = 1; /*25-34;

else if v013 in(5,6,7) then age2= 2; /*35-49;

/* Marital status */

if v501 = 0 then marital2 = 0; /* Never married */

else if v501 in (1, 2) then marital2 = 1; /* Married/living
together */

else if v501 in (3,4,5) then marital2 = 2; /* Div/sep/wid */

/* Education */

if v106 = 0 then edu2 = 0; /* No education */

else if v106 = 1 then edu2 = 1; /* Primary */

else if v106 in (2,3) then edu2 = 2; /* Secondary or above */

/* Parity */

if v201 = 1 then pa2 = 0; /* One child */

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else if v201 in(2:4) then pa2 = 1; /* 2-4 children */

else if v201 in(5:14) then pa2 = 2; /* More than 4 children */

/* Respondent currently working */

if v714 = 0 then work2 = 0; /* Not working */

else if v714 = 1 then work2 = 1; /* Working */

/* Wealth Index Combined */

if v190 in (1, 2) then wealth2 = 0; /* Poor */

else if v190 = 3 then wealth2 = 1; /* Middle */

else if v190 in (4,5) then wealth2 = 2; /* Rich */

/*Health insurance*/

if v481 = 0 then hlthin2 = 0; *No;

else if v481 = 1 then hlthin2 = 1; *Yes;

/* Type of residence */

if v025 = 2 then residence2 = 0; /* Rural */

else if v025 = 1 then residence2 = 1; /* Urban */

/* Number of antenatal visits during pregnancy */

if m14 = 0 then anc2 = 0; *None;

else if m14 in(1,2,3) then anc2 = 1; /* 1-3 */

else if m14 in (4:20) then anc2 = 2; /* Received recommended
antenatal care */

*place of delivery;

```

```

if M15 in(21:26) then plc2 = 0; *Public Facility;

else if M15 in(31:36) then plc2 = 1; *Private Facility;

else if M15 in(11,12) then plc2 = 2; *Home;

else if M15 in(41, 46,96) then plc2 = 3; *Other;

/* Delivery by caesarean section */

if m17 = 0 then cs2 = 0; /* Delivery is not by C section */

else if m17 = 1 then cs2 = 1; /* Delivery is by C section */

cage2 = b19; *Child's age in months;

/* Assistance during delivery */

if cage2 < 24 then do;

if not missing(m3a) then delivery2 = 0;

if m3n = 1 then delivery2 = 7; *No one;

if m3i = 1 or m3j = 1 or m3k = 1 or m3l = 1 or m3m = 1 then
delivery2 = 6; *Relative/other;

if m3h = 1 then delivery2 = 5; *Other health worker;

if m3g = 1 then delivery2 = 4; *TBA;

if m3c = 1 or m3d = 1 or m3e = 1 or m3f = 1 then delivery2 =
3; *other professional;

if m3b = 1 then delivery2 = 2; *Nurse/midwife;

if m3a = 1 then delivery2 = 1; *Doctor;

if m3a = 8 or m3a = 9 then delivery2 = 9;

```

```

end;

/* Skilled provider during delivery */

if cage2 < 24 then do;

skilled = delivery2;

  if delivery2 in (1, 2) then skilled2 = 0; *Skilled Provider;

  else if delivery2 in (3, 4, 5, 6) then skilled2 = 1; *Unskilled
Provider;

  else if delivery2 = 7 then skilled2 = 2; *No one;

end;

/* Sex of the child */

if b4 = 2 then sex2 = 0; /* Female */

else if b4 = 1 then sex2 = 1; /* Male */

/* Nutritional counseling during antenatal care */

if anc2 = 0 then nc2 = 0; /*No antenatal care and no nutritional
counseling;

else if anc2 > 0 then do;

  if s413d = 0 then nc2 = 0; /* Did not receive nutritional
counseling */

  else if s413d = 1 then nc2 = 1; /* Received nutritional counseling
*/
end;

/* Start breastfeeding within 1 hr */

```

```

if midx = 1 and cage2 < 24 then do;

bfi = 0; *no;

if (m4 not in (94, 99)) and (m34 ge 0 and m34 le 100) then bfi =
1; *Yes;

end;

/* Eligible population */

if bfi = . or nc2 = . or age2 = . or marital2 = . or edu2 = . or
pa2 = . or work2 = . or wealth2 = . or hlthin2 = . or residence2
= . or anc2 = . or
plc2 = . or cs2 = . or skilled2 = . or
sex2 = . then elgpop = .;

else elgpop = 1;

run;

*DDescriptive statistics;

proc surveyfreq data = data1;

cluster v021;

strata v023;

weight sweight;

tables elgpop*(age2  marital2 edu2 pa2  work2  wealth2
hlthin2  residence2  anc2 plc2  cs2          skilled2 sex2 nc2
bfi);

run;

```

```
*Bivariate analyses;

proc surveyfreq data = data1;

cluster v021;

strata v023;

weight sweight;

tables elgpop*(age2  marital2 edu2 pa2  work2  wealth2
hlthin2  residence2  anc2 plc2  cs2          skilled2 sex2
nc2 )*bfi/row chisq;

run;

*This is my unadjusted regresssion analysis;

proc surveylogistic data = data1;

cluster v021;

strata v023;

weight sweight;

domain elgpop;

class age2 (ref ="0")/param =ref;

model bfi (event ="1") = age2 ;

run;
```

```
proc surveylogistic data = data1;

cluster v021;

strata v023;

weight sweight;

domain elgpop;

class marital2(ref="0")/param =ref;

model bfi (event ="1") = marital2 ;

run;

proc surveylogistic data = data1;

cluster v021;

strata v023;

weight sweight;

domain elgpop;

class edu2(ref="0")/param =ref;

model bfi (event ="1") = edu2 ;

run;

proc surveylogistic data = data1;

cluster v021;

strata v023;

weight sweight;
```

```
domain elgpop;

class pa2(ref="0")/param =ref;

model bfi (event ="1") = pa2 ;

run;

proc surveylogistic data = data1;

cluster v021;

strata v023;

weight sweight;

domain elgpop;

class work2(ref="0")/param =ref;

model bfi (event ="1") = work2 ;

run;

proc surveylogistic data = data1;

cluster v021;

strata v023;

weight sweight;

domain elgpop;

class wealth2(ref="0")/param =ref;

model bfi (event ="1") = wealth2 ;

run;
```

```
proc surveylogistic data = data1;

cluster v021;

strata v023;

weight sweight;

domain elgpop;

class residence2(ref="0") /param =ref;

model bfi (event ="1") = residence2 ;

run;

proc surveylogistic data = data1;

cluster v021;

strata v023;

weight sweight;

domain elgpop;

class anc2(ref="0") /param =ref;

model bfi (event ="1") = anc2 ;

run;

proc surveylogistic data = data1;

cluster v021;

strata v023;

weight sweight;
```

```
domain elgpop;

class plc2(ref="0") /param =ref;

model bfi (event ="1") = plc2 ;

run;

proc surveylogistic data = data1;

cluster v021;

strata v023;

weight sweight;

domain elgpop;

class cs2(ref="0") /param =ref;

model bfi (event ="1") = cs2 ;

run;

proc surveylogistic data = data1;

cluster v021;

strata v023;

weight sweight;

domain elgpop;

class skilled2(ref="0") /param =ref;

model bfi (event ="1") = skilled2 ;

run;
```

```
proc surveylogistic data = data1;

cluster v021;

strata v023;

weight sweight;

domain elgpop;

class sex2(ref="0")/param =ref;

model bfi (event ="1") = sex2 ;

run;

proc surveylogistic data = data1;

cluster v021;

strata v023;

weight sweight;

domain elgpop;

class nc2(ref="0")/param =ref;

model bfi (event ="1") = nc2 ;

run;

*This is my multivariable-adjusted regresssion;

proc surveylogistic data = data1;

cluster v021;

strata v023;
```

```
weight sweight;

domain elgpop;

class age2 (ref="0") marital2 (ref="0") edu2 (ref="0") pa2
(ref="0") work2 (ref="0")

wealth2 (ref="0") hlthin2 (ref="0") residence2 (ref="0") anc2
(ref="0")

plc2 (ref="0") cs2 (ref="0") skilled2 (ref="0") sex2 (ref="0")
nc2 (ref="0") /param =ref;

model bfi (event ="1") = age2 marital2 edu2 pa2 work2 wealth2
hlthin2 residence2 anc2 plc2 cs2 skilled2 sex2 nc2;

run;
```