

# Food taboos among pregnant women and associated factors in eastern Ethiopia: A community-based cross-sectional study

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## Abstract

**Objective:** The main aim of this study was to assess food taboos and associated factors among pregnant women in eastern Ethiopia.

**Methods:** A community-based cross-sectional study was conducted among randomly selected 422 pregnant women at Haramaya Demographic Surveillance System from Haramaya District, eastern Ethiopia. Data on sociodemographic conditions, the presence of food taboos, and perceived reasons were collected using the face-to-face interview method by trained data collectors through arranged home visits. Collected data were entered into EpiData 3.1 and exported to statistical package for social sciences version 23 for cleaning and analysis. Descriptive, binary, and multiple logistic regression analyses were carried out to determine the relationship between explanatory and outcome variables. Adjusted odds ratio (AOR) with 95% confidence interval (CI) at *p* value less than 0.05 was used to declare significant association.

**Results:** Approximately half (48%, 95% CI: 43%, 52%) of the pregnant women reported the presence of pregnancy-related food taboos. Pregnant women who have heard about food taboos (AOR: 3.58; 95% CI: 1.89, 6.83), pregnant women had friends who avoided food (AOR: 1.91; 95% CI: 1.22, 2.99), women's monthly income  $\leq$ 840 ETB (AOR: 1.73; 95% CI: 1.10, 2.73), and pregnant women who had not attended formal education (AOR: 1.95; 95% CI: 1.18, 3.23) were more likely to report food taboos. The odds of pregnant women who had attended uptake of immunization services were less likely to have food taboos (AOR: 0.35; 95% CI: 0.21, 0.58).

**Conclusion:** Pregnancy-related food taboos among pregnant women are unacceptably high. Therefore, awareness creation and nutritional counseling at health service delivery points are imperative actions for pregnant women to avoid food taboos norms. Further research should be done to understand the social and cultural ground of food taboos during pregnancy.

## Keywords

Food taboos, pregnant women, Haramaya, eastern Ethiopia

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## Introduction

More than 3.5 million women in low-income countries die each year due to the underlying cause of undernutrition.<sup>1</sup> Improving the nutritional status of women before and during

pregnancy can reduce the risk of adverse birth outcomes. However, poor maternal nutrition at the earliest stages of the life course, during fetal development, can induce both short-term and longer-lasting effects.<sup>2–4</sup> Nutrition has never been as

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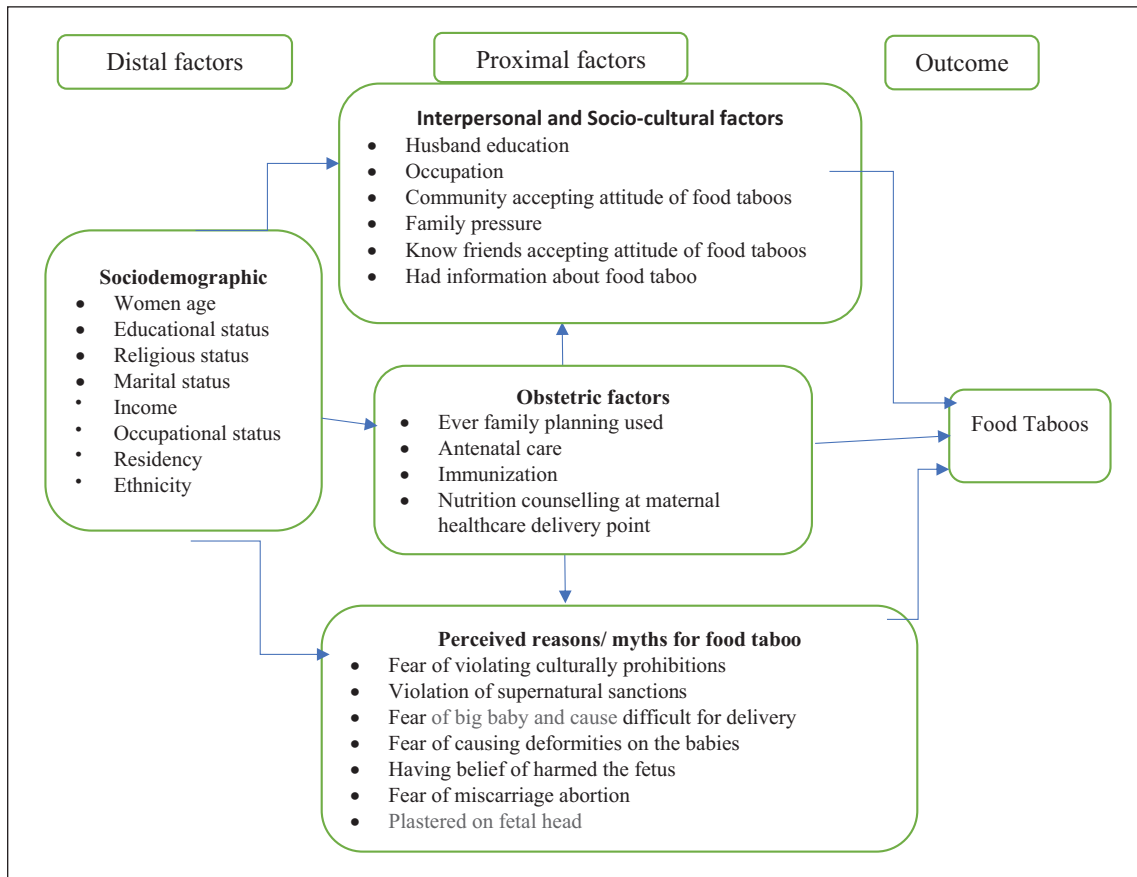
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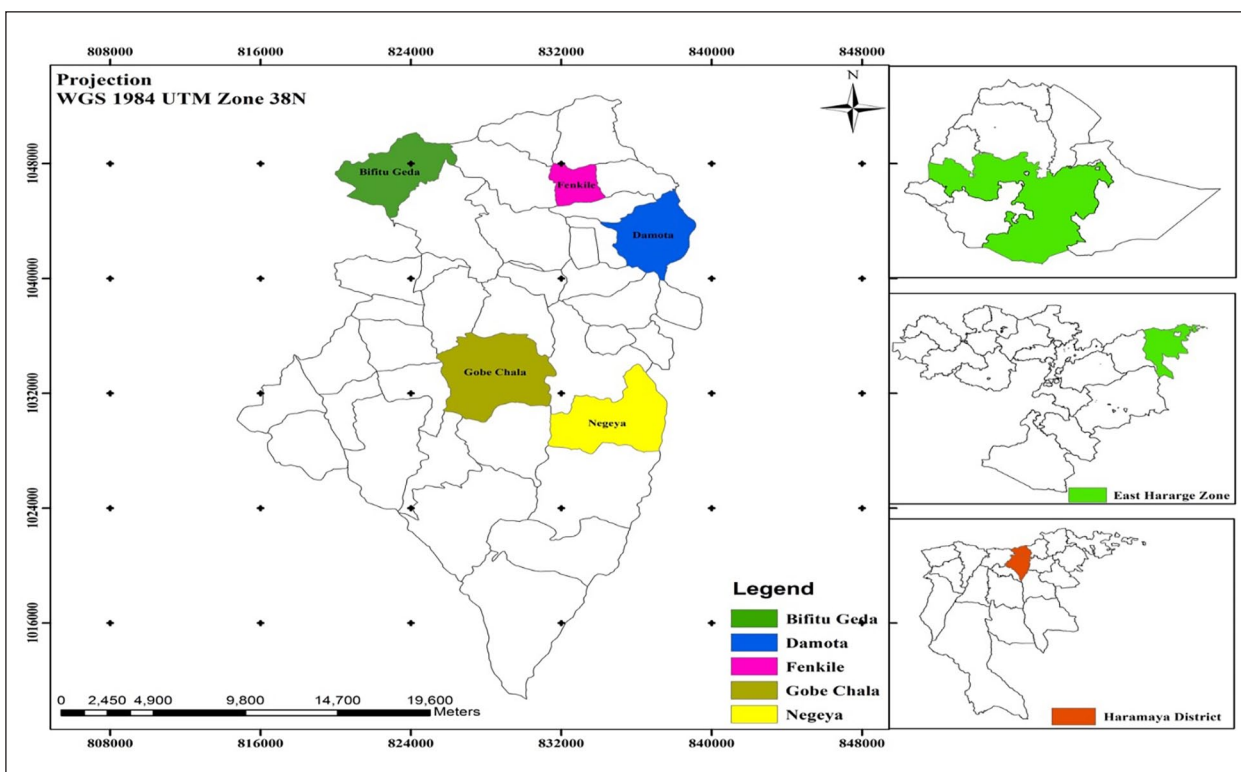
**Figure 1.** Adapted conceptual framework to illustrate the relationship between explanatory and outcome variables.

high on the international public health agenda as it is today. The adoption of the Sustainable Development Goals (SDGs) and the United Nations' proclamation of a Decade of Action on Nutrition (2016–2030) are signals that indicate strong action is required relating to food and nutrition of pregnant women.<sup>4</sup>

Women's nutritional need increases during pregnancy and lactation. Micronutrient supplements, adequate energy intake, diversified diet, using fruit, vegetables, and animal products throughout the life cycle help to ensure the women enter pregnancy and lactation without deficiencies.<sup>5</sup> Micronutrient supplementations can improve maternal nutritional status to achieve fetal and postnatal growth and development.<sup>6,7</sup> In addition to the increased demand for nutrition due to pregnancy itself, pregnancy-related food restrictions (taboos) of some essential nutrients due to cultural reasons affect the nutritional status of pregnant women.<sup>8</sup> Women who had food taboos during pregnancy would have an increased likelihood of developing a range of adverse pregnancy outcomes, which have a range of influence on maternal health and fetal growth and development.<sup>9,10</sup> The effect of maternal undernutrition on fetal growth retardation, low birth weight, poor pregnancy outcomes, premature birth, and other micronutrients deficiency disorders is well established.<sup>11,12</sup> In addition, avoiding food items during pregnancy

might have long-term impacts on the mother and fetus, which put the baby easily susceptible to disease during childhood.<sup>13</sup>

Communities' traditionally held beliefs, sociocultural factors, and family pressure contribute to food taboos.<sup>8,14,15</sup> Pregnancy-related food taboos are barriers to the first 1000 days of essential nutrition actions for improving adequate maternal and child nutrition.<sup>2,3</sup> In Ethiopia, one of the nutrition-associated maternal health problems is iron deficiency anemia, which has shown a very sluggish decline from 27% in 2005<sup>16</sup> to 24% in 2016.<sup>17</sup> Pregnancy-related food taboos have been contributing to the burden of poor maternal health in Ethiopia. Iron deficiency anemia was high among women who had pregnancy-related food taboos.<sup>15</sup> Although maternal malnutrition might be jeopardized by sociocultural restrictions of some food items during pregnancy, evidence on the level of food taboos is limited in Ethiopia in the general and the eastern part in particular. Therefore, this study was conducted to assess the level of food taboos and its associated factors among pregnant women in the Haramaya Health and Demographic Surveillance System (HDSS), Eastern Ethiopia. The link of explanatory variables with outcome variable (food taboos) is illustrated using an adapted conceptual framework (Figure 1).



**Figure 2.** Geographic location of study area.

## Methods

### Study setting and design

A community-based cross-sectional study was conducted among pregnant women participating in the ongoing Health and Demographic Surveillance System (HDSS) found in Haramaya District, East Hararge Zone, Oromia Regional State, Eastern Ethiopia, located 500km away from Addis Ababa. The HDSS was established in 2018 and covers 12 rural sub-districts/ “kebeles” (smallest administrative unit in Ethiopia) out of the total 36 sub-districts (which is the smallest functional administrative unit in Ethiopia) in Haramaya District (see map of the study area in Figure 2). Every 6 months, HDSS enumerators visit all residents in the selected sub-districts and collect data on key demographic events: births, deaths, pregnancy, and migration. The HDSS updates its dataset every 6 months to accommodate demographic and health changes among the residents. Pregnancy status has been registered by the HDSS since its inception, and a total of 994 women were registered in HDSS during the study period. The study was conducted from 1 to 31 July 2020.

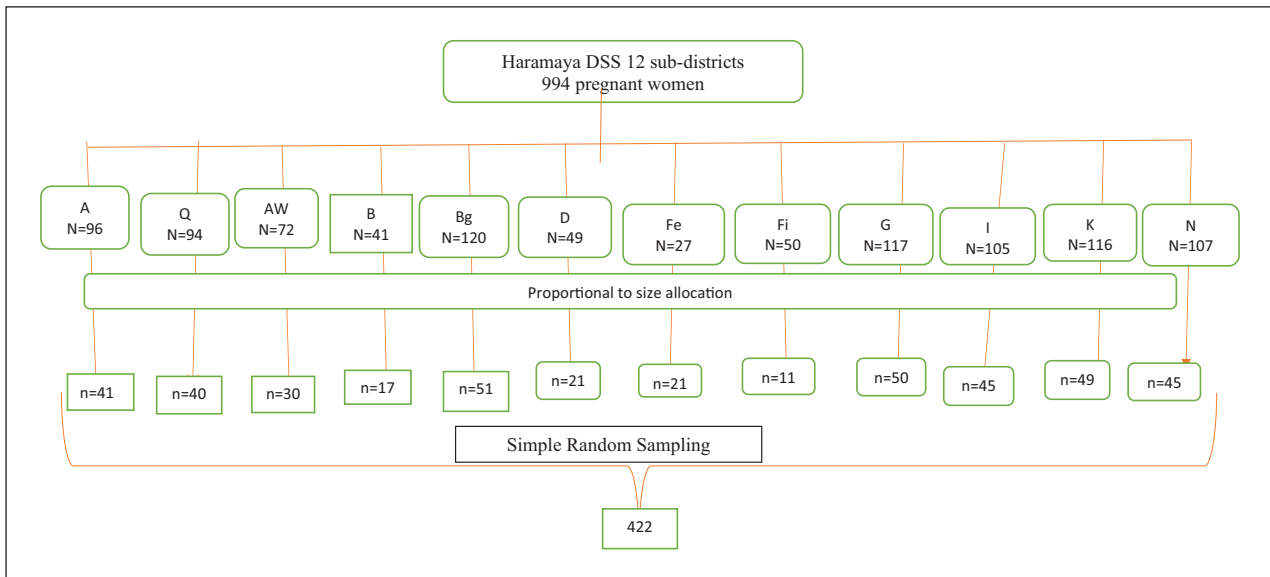
### Inclusion and exclusion criteria

Pregnant women who have lived in the district and under the Hararge HDSS follow-up were eligible and included in the

study. However, seriously ill pregnant woman during data collection and unable to communicate were excused from the study.

### Population and sampling procedure

All pregnant women living in Haramaya District constituted the source population. The study population included all pregnant women ( $n=994$ ) residing in the Haramaya HDSS sub-districts during the study period. The sample size was calculated using single proportion formula by considering 95% significance level, 5% marginal error, and pregnancy-related food taboos (49.8%).<sup>9</sup> Then 10% of the calculated sample was considered for potential non-responses compensation. Finally, the calculated sample size was 422. The location of the pregnant woman was obtained from the Haramaya HDSS household registry and updated in collaboration with the community health extension workers (HEWs) and HDSS site supervisors. A total of 12 sub-districts in Haramaya HDSS were included in this study. The calculated sample size was proportionally allocated to each selected sub-district. The details of the sampling procedure are illustrated using Figure 3. The sampling frame was constructed for each sub-district using the HDSS household registration number after separating households with pregnant women only. Then, study participants were recruited using simple random sampling-applied lottery method.



**Figure 3.** Schematic presentation of the sampling procedure.

### Data collection tools, methods, and procedures

A structured questionnaire (tool) was adapted from different studies on food taboos or restrictions during pregnancy,<sup>9,18–23</sup> which comprised women’s sociodemographic variables, obstetric history, maternal health service utilization (specifically, antenatal care (ANC), Tetanus Toxoid (TT) vaccination, and nutritional counseling), and pregnancy related food taboos (restrictions), types of food items avoided and perceived reason for pregnancy-related food taboos. The questionnaire was initially prepared in English then translated to “Afaan Oromo” and backtranslated to English by individuals with good command of both languages. The adapted data collection tool was reviewed and pretested in local context prior to main data collection. The pretest was carried out at nearby HDSS before the actual data collection period on 21 (5%) women participating in Harar HDSS to ensure clarity, wordings, logical sequence, and skip patterns. Five data collectors and two supervisors were recruited from Haramaya HDSS considering their experience. A daylong training was given to both the data collectors and supervisors. Then data were collected through face-to-face interviews at the women’s home in a quiet and private place. In addition, supportive supervision was provided throughout the data collection period by trained supervisors. The filled questionnaires were checked for completeness and consistency. Then proper coding, entry into EpiData, and data cleaning were performed to ensure the quality of the study finding.

### Statistical analysis

All checked data were coded, entered into EpiData 3.1, and exported to Statistical Package for Social Science (SPSS) 23 for cleaning and analysis. Food taboo was considered when a pregnant woman reported restrictions (avoided) of at least

one previously usual food item due to being pregnant.<sup>24</sup> Food taboo was dichotomized as restricted for at least one usual food item (*yes*=1) and not restricted to any usual food item (*no*=0) (Figure 4). Likewise, perceived reasons were assessed using open questions with multiple responses possible (Figure 5). Descriptive statistical analysis was performed to determine frequencies, proportion, mean, and standard deviation. Binary logistic regression was carried out to examine the association between 20 explanatory variables with women’s food taboos. Of these, variables with a *p* value less than 0.25 were entered into the multiple logistic regression model to control for possible confounders after checking for multicollinearity between independent variables. Model fitness was checked using Hosmer–Lemeshow test to show the goodness-of-fit.<sup>25</sup> Multiple logistic regression model was fitted to determine adjusted odds ratios (AOR) at 95% CI to identify factors associated with food taboos. Finally, significant association was declared using AOR at 95% CI and *p* value <0.05.

## Results

### Sociodemographic characteristics

From a total of 422 pregnant women approached, 416 (98.6%) were included in the study. The mean age of the pregnant women was 28.6 ( $\pm$  9.7) years. The median monthly income was 840 ETB. Likewise, the mean family size of the women was 5.8 ( $\pm$  5.2) members (Table 1).

### Obstetric history of the pregnant women

Approximately half (47.1%) of the pregnant women had booked ANC follow-up. Of these, 76.6% of the women received nutritional counseling during ANC (Table 2).

**Table 1.** Sociodemographic characteristics of pregnant women in Haramaya HDSS, July 2020.

Variables	Categories	n=416	%
Mean age		28.6 ( $\pm$ 9.7) years	
Age (years)	<20	18	4.4
	20–34	325	79.1
	35–49	68	16.5
Marital status	Single	19	4.6
	Married	397	95.4
Religion	Muslim	413	99.3
	Orthodox	3	0.7
Residence	Rural	412	99.0
	Urban	4	1.0
Women education	No formal education	303	72.8
	Grade 1–6	94	22.6
	Grade 7–12	19	4.6
Ethnicity	Oromo	411	98.8
	Others*	5	1.2
Woman occupation	Housewife	379	91.1
	Private business	37	8.9
Husband's education	Illiterate	282	67.8
	Read and write	10	2.4
	Grade 11–6	79	19.0
	Grade 7–12	44	10.6
	>12	1	0.2
Husband occupation	Farmer	407	97.8
	Others*	9	2.2
Family size	$\leq$ 5	216	52.4
	$\geq$ 6	196	47.6
Estimated monthly household income (ETB)	$\leq$ 840	211	50.8
	$\geq$ 841	204	49.2

Others\* husband occupation: Private employee (7), government employee (1), and NGOs employee (1); ethnicity: Amhara (2) and Somali (3).

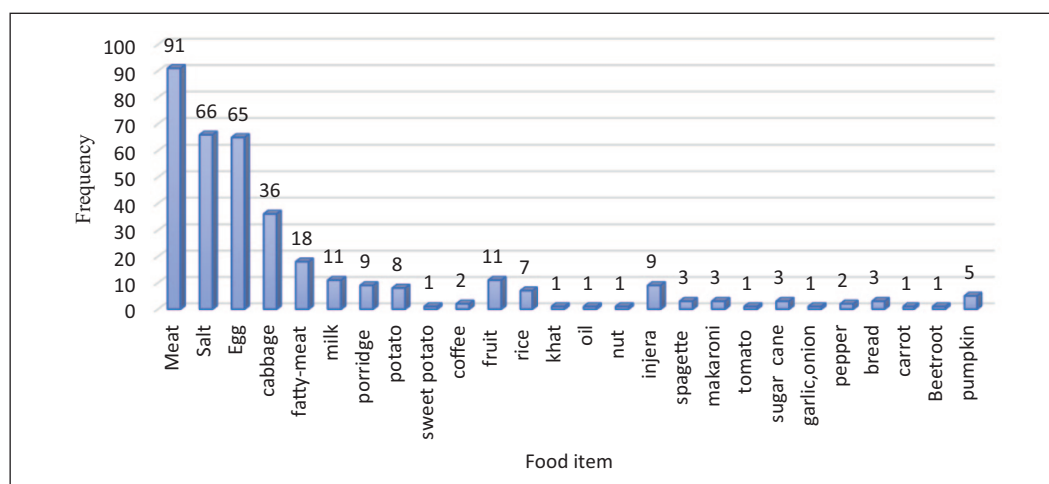
**Table 2.** Obstetric history of the pregnant women in Haramaya HDSS, July 2020 (n=416).

Variables	Categories	n	%
Had ANC booked?	Yes	196	47.1
	No	220	52.9
Number of ANC visits	1	78	40.2
	2	74	38.1
	3	36	18.6
	4	6	3.1
Received nutrition counseling during ANC visit	Yes	151	76.6
	No	45	22.8
Received nutrition counseling at previous family planning	Yes	79	75.2
	No	25	24.8
Received TT immunization service	Yes	189	45.4
	No	227	54.6
Received nutrition counseling during visits for immunization	Yes	110	57.6
	No	79	42.4

**Table 3.** Food taboos among pregnant women in Haramaya HDSS, July 2020 ( $n=416$ ).

Variables	Categories	<i>n</i>	%
Ever heard about food taboos	Yes	278	66.8
	No	138	33.2
Source of information <sup>a</sup>	TV/radio	19	6.8
	Health personnel	84	30.2
	Community HEWs	56	20.1
	Neighbors	141	50.7
	Family (mother-in-law)	70	25.2
	Not reported	5	1.2
Knew community member with food taboos	Yes	208	50.0
	No	203	48.8
	Not reported	5	1.2
Women had known friends who avoided foods during pregnancy	Yes	163	39.2
	No	239	57.5
	Not reported	14	3.4
	Early pregnancy	68	16.4
	Mid pregnancy	212	51.0
Had food taboos during pregnancy	Late pregnancy	178	42.8
	Yes	200	48.0
	No	216	52.0

<sup>a</sup>Multiple responses were possible.

**Figure 4.** Commonest tabooed food items reported by women during pregnancy in HDSS, 2020 (*Multiple responses were possible*).

### *The magnitude of food taboos and perceived reasons*

A total of 200 (48%; 95% CI: 43%, 52%) women reported the presence of food taboos during pregnancy period. Furthermore, two-thirds (66.8%) of the respondents had heard about food taboos, mainly from other pregnant women (50.7%). Of these, 50.5% listed some food items that should be avoided during pregnancy (Table 3).

The commonest food items that were avoided include meat, salt, egg, cabbage, milk, and oil (Figure 4).

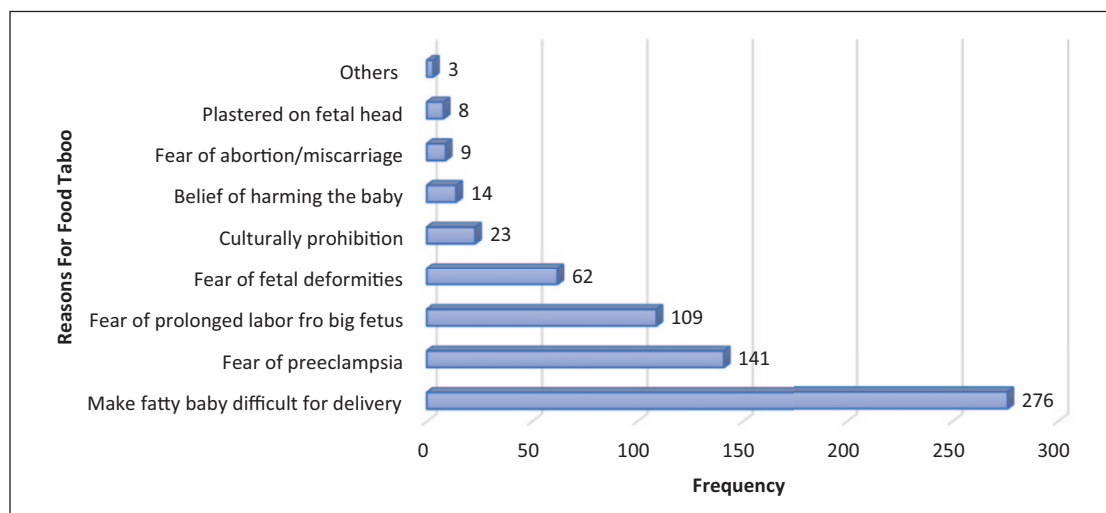
Major reasons for food taboos were fear of having big baby that may cause difficulty during delivery, fear of increasing blood pressure, fear of prolonged labor, fear of fetal body deformities, and adherence to cultural

prohibitions (Figure 5). Furthermore, pregnant women reported different reasons for different food item restrictions during pregnancy. Pregnant women had food taboos from eating egg, meat, milk, fruits (mainly mango), and vegetables (mainly cabbage) due to fear of violating sociocultural norms in their community. Likewise, pregnant women were not eating meat during pregnancy due to fear of fetal deformities. Table 4 demonstrates the match of the communities' perceived reason, and tabooed food is presented in detail.

### *Factors associated with pregnancy-related food taboos*

Of a total of 20 explanatory variables considered in the binary logistic regression, 9 of them were found to be a candidate





**Figure 5.** Perceived reasons for pregnancy-related food taboo in HDSS, 2020 (*multiple responses were possible*).

NB: Others: women's fear of being fatty (1), fear violating social norm (1), and to ease process of births (1).

( $p < 0.25$ ) for the multiple logistic regression analysis. In the multiple logistic regression, five variables remained statistically significant association: ever heard about food taboos, having friends who avoided food, women had not attended formal education, monthly income, and had immunization service. Women who have ever heard about food taboos were 3.58 times more likely to report food taboos than women who had not heard about food taboos (AOR: 3.58, 95% CI: 1.89, 6.83). Likewise, women who had friends with food taboos were 1.91 times more likely to have food taboos than their counterparts (AOR: 1.91, 95% CI: 1.22, 2.99). Women who had not attended formal education were 1.95 times more likely to report food taboos than those who had attended formal education (AOR: 1.95, 95% CI: 1.18, 3.23). Furthermore, women with monthly income below the median (840 ETB) were 1.73 times more likely to report food taboos than their counterparts (AOR: 1.73, 95% CI: 1.10, 2.73). However, the odds of food taboos among women who had immunization service was 65% less likely to occur compared to women with no history of attending immunization service (AOR: 0.35, 95% CI: 0.21, 0.58) (Table 5).

## Discussion

This study determined the prevalence of food taboos and its associated factors among pregnant women in women participating in an ongoing HDSS Haramaya District, Eastern Ethiopia. Almost half of the women in this study reported avoiding some foods because of their pregnancy. Pregnancy-related food taboos were more likely among women who heard about food taboos, who had friends avoiding food, low monthly income, and women who had not attended formal education. However, women who reported attending an immunization service during their pregnancy were less likely to have food taboos. Fear of delivering a big baby, fear of causing fetal anomaly/deformities or harming the newborns,

and cultural prohibition were some of the most frequently reported perceived reasons by pregnant women for their food taboos.

Our finding is similar with the studies conducted in Ethiopia that ranged from 42% to 49%<sup>9,13,26</sup> and a study in Sudan (44%).<sup>27</sup> Nevertheless, our finding is much higher than the finding from some other studies conducted in Ethiopia, in which the prevalence of food taboos ranged from 12% to 27%,<sup>15,21,22,28</sup> a study in Nigeria,<sup>29,30</sup> Sudan,<sup>31</sup> and South Africa,<sup>32</sup> which reported a prevalence of food taboos ranging from 13% to 37%. This difference might be due to the study settings, where almost all respondents in our study were rural residents who had not attended formal education, which may affect their awareness level and had misconceptions or perceived reasons for food taboos. Nevertheless, this finding is lower as compared with studies conducted in Ethiopia that reported pregnancy-related food taboos ranged 55%–68%,<sup>20,33</sup> 57% in Ghana,<sup>34</sup> 64% in South Africa (64%),<sup>35</sup> 70% in Malaysia (70%),<sup>19</sup> and 65% in India.<sup>36</sup> Congruent with similar studies, the most frequently mentioned reason for food taboos was fear of delivering a big baby, and cultural prohibitions of eating tabooed food during pregnancy.<sup>13,20,22</sup> In addition, pregnant women in this study raised similar reason for food taboos with a study conducted in Sudan,<sup>31</sup> South Africa,<sup>32</sup> and Ghana reported cultural compassion,<sup>34</sup> and in Malaysia,<sup>19</sup> revealed that the most common perceived reasons for avoiding foods were fear of born a baby with deformities and fear of difficult of delivering big baby.

Women who had not attended formal education, heard about food taboos, and income was more likely to report food taboos. The fact that women who had no formal education reported having food taboos compared to their counterparts. This indicates the deep-rooted nature of the condition and how strong cultural beliefs affect food taboos which is quite consistent with the findings of studies conducted in Ethiopia,<sup>9,22,23,35</sup> Nigeria,<sup>29,30,37</sup> Ghana,<sup>34</sup> South Africa,<sup>35</sup> and India,<sup>38</sup> which

**Table 4.** Match of tabooed food and perceived consequences among pregnant women at Haramaya HDSS, July 2020.

	To ease birth process	The belief of harming the baby	Cultural prohibition	Culturally prohibition baby	Fear of miscarriage	Fear of being fatty	Fear of fetal deformities	Fear of preeclampsia	Fear of prolonged labor	Fear of violating social culture	Make big baby and difficult for delivery	Plastered on fetal head	Total
Banana	0	0	0	0	0	0	0	0	0	2	0	0	2
Cabbage	0	0	0	0	0	0	0	4	0	25	0	0	29
Cabbage	0	0	0	0	0	0	0	0	0	1	0	0	1
Chickpea	0	0	0	0	0	0	0	0	0	1	0	0	1
Coffee	1	1	1	1	0	0	0	2	0	0	0	0	4
Egg	2	3	1	1	0	55	4	7	0	41	0	1	115
Egg, fruit	0	0	0	0	0	0	0	0	0	1	0	0	1
Fatty meat	1	2	2	1	1	0	1	1	0	7	1	0	14
Fish	0	0	0	0	0	0	0	0	0	2	0	0	2
Fruit	2	0	0	0	0	0	1	9	0	67	1	0	80
Fruits (mango, banana, and papaya)	0	0	0	1	0	0	0	2	0	16	0	0	9
Honey	0	0	0	1	0	0	11	6	0	1	0	0	19
Lentil	0	0	0	0	0	0	0	1	0	0	0	0	1
Meat	1	3	2	2	0	5	65	7	0	67	1	1	152
Milk	0	1	4	2	0	0	5	0	0	13	0	0	25
Oil	0	0	1	0	0	0	0	1	0	0	0	0	2
Onion	0	0	0	0	0	0	0	0	0	1	0	0	1
Papaya	0	1	1	0	0	0	0	0	0	0	0	0	1
Porridge	2	0	1	1	0	0	11	21	0	7	0	1	43
Potato	1	1	0	0	0	0	8	4	0	5	1	1	21
Pumpkin	0	0	0	0	0	0	0	3	0	3	0	0	6
Salt	2	2	1	1	0	0	21	29	1	7	1	0	64
Sugarcane	0	0	0	0	0	0	12	11	0	6	0	0	29
Vegetables	0	1	1	1	0	2	2	0	0	8	0	0	14
Yogurt	2	2	0	0	0	0	0	1	0	3	0	0	8

Multiple responses were possible. Different colors are given to indicate the match between food items with different reasons for food taboos during pregnancy, and label with numbers to show frequencies. Zero "0" is given for no-responses and shaded with same color.



**Table 5.** Factors associated with food taboos among pregnant women in Haramaya DSS, July 2020 (n=416).

Variables	Categories	Food taboo		COR 95% CI	AOR 95% CI
		Yes (%)	No (%)		
Age (years)	<20	4 (22.2)	14 (77.8)	0.43 (0.13, 1.46)	0.31 (0.08, 1.15)
	20–34	164 (50.5)	161 (49.5)	1.55 (0.91, 2.63)	1.26 (0.70, 2.27)
	35–49	27 (39.7)	41 (60.3)	1.00	1.00
Women's education status	No formal education	60 (53.1)	53 (46.9)	1.35 (0.88, 2.09)*	1.95 (1.18, 3.23)*
	Formal education	138 (45.5)	165 (54.5)	1.00	1.00
Women's occupation	Housewife	181 (47.8)	198 (52.2)	1.00	1.00
	Private business	17 (45.9)	20 (54.1)	0.93 (0.47, 1.83)	
Husband education status	No formal education	138 (47.3)	154 (52.7)	1.00	
	Formal education	60 (48.4)	64 (51.6)	1.05 (0.69, 1.59)	
Family size	≤5	100 (46.3)	116 (53.7)	0.88 (0.60, 1.30)	
	≥6	97 (49.5)	99 (50.5)	1.00	
Monthly income (ETB)	≤840	107 (50.7)	104 (49.3)	1.30 (0.89, 1.92)*	1.73 (1.10, 2.72)*
	≥841	90 (44.1)	114 (55.9)	1.00	1.00
Gravida	≤4	105 (46.7)	120 (53.3)	0.92 (0.63, 1.36)	
	≥5	93 (48.7)	98 (51.3)	1.00	
Para	≤4	128 (46.9)	145 (53.1)	0.92 (0.61, 1.38)	
	≥5	70 (49.0)	73 (51.0)	1.00	
ANC follow	Yes	101 (51.5)	95 (48.5)	1.35 (0.92, 1.98)	
	No	97 (44.1)	122 (55.5)	1.00	
No. of ANC	Once	47 (60.3)	31 (39.7)	1.00	
	Twice	35 (47.3)	39 (52.7)	0.59 (0.31, 1.13)	
	Three times	15 (41.7)	21 (58.3)	0.47 (0.21, 1.05)	
	Four times	3 (50.0)	3 (50.0)	0.66 (0.13, 3.48)	
Nut counseling at ANC	Yes	77 (51.0)	74 (49.0)	0.95 (0.49, 1.85)	
	No	24 (52.2)	22 (47.8)	1.00	
FP service used	Yes	39 (37.5)	65 (62.5)	0.58 (0.37, 0.91)*	0.65 (0.37, 1.14)
	No	159 (51.0)	153 (49.0)	1.00	1.00
Nut counseling at FP	Yes	29 (36.7)	50 (63.3)	1.00	
	No	10 (38.5)	16 (61.5)	1.08 (0.43, 2.69)	
Immunization service	Yes	73 (38.6)	116 (61.4)	0.51 (0.35, 0.76)*	0.35 (0.21, 0.58)*
	No	125 (55.1)	102 (44.9)	1.00	1.00
Nut counseling at immunization	Yes	43 (39.1)	67 (60.9)	0.98 (0.55, 1.77)	
	No	32 (39.5)	49 (60.5)	1.00	
Heard about the food taboo	Yes	155 (55.8)	123 (44.2)	2.78 (1.81, 4.28)*	3.59 (1.89, 6.83)*
	No	43 (31.2)	95 (68.8)	1.00	1.00
Knew a food item to be avoided	Yes	114 (54.3)	96 (45.7)	1.73 (1.17, 2.54)*	1.18 (0.64, 2.18)
	No	84 (40.8)	122 (59.2)	1.00	1.00
The community has food taboos	Yes	102 (49.0)	106 (51.0)	1.12 (0.76, 1.65)	
	No	96 (46.2)	112 (53.8)	1.00	
Women had friends who avoided food	Yes	97 (59.5)	66 (40.5)	2.21 (1.48, 3.30)*	1.91 (1.22, 2.99)*
	No	101 (39.9)	152 (60.1)	1.00	1.00

NB: \*COR (crude odds ratio):  $p < 0.25$ , and \*AOR (adjusted odds ratio):  $p < 0.05$ ; CI: confidence interval.

have reported that women's low education attainment was one of the significantly associated factors with food taboos.

In addition, this study finding is consistent with another study in Ethiopia<sup>21</sup> and Ghana,<sup>34</sup> indicated that monthly income has associated with food taboo. Similarly, this study finding is consistent with the finding of previous study from South Africa women who have heard about food taboos more likely to have food taboos.<sup>32</sup> Furthermore, in this study,

pregnant women who had been vaccinated for TT were less likely to experience food taboos. This might be linked with counseling service (literacy service) at immunization point by health care providers, and also mostly women who have awareness may utilize such type of service. This finding is consistent with a study done in India, which has indicated that literacy status at antenatal, parity, and postnatal has been associated with special food consumption.<sup>36</sup> Several myths,

misconceptions, and cultural prohibitions for food taboo during pregnancy are identified in this study which have high implication maternal malnutrition and birth outcome in Ethiopia. Therefore, further research should be conducted to explore the reasons for food taboos and its effect on maternal and fetal nutritional status and birth outcomes. Hence, clinicians and public health programmers should exert efforts to provide nutritional counseling at any maternal health care delivery points to reduce myths and misconceptions

Being a community-based study and covering all the 12 sub-districts in the HDSS; applied probability sampling method with scientifically determined sample size; and potential confounders were controlled using multiple logistic regression analysis that could be considered as a strength of this study. Nevertheless, the study was not conducted without limitation. As a result of homogeneity within the population (e.g. ethnicity, religion, and residency), this study could not appreciate the influence of sociodemographic variation on food taboos. In addition, it was a cross-sectional study design that may not be strong enough to declare the causal effect relationship, and data relied on pregnant women's self-report which are prone to social desirability bias may limit women's disclosure of food taboos due to cultural prohibition. Therefore, the authors recommend a further study to assess the cultural factors that influence pregnant women's food restriction using robust design.

## Conclusion

Approximately half of the study participants reported having pregnancy-related food taboos. Meat, salt, sugarcane, porridge, honey, and several fruits and vegetables were the most avoided food items. Pregnancy-related food taboo was more likely among pregnant women who had heard about food taboo, had friends with food taboo, had formal education, and women from low socioeconomic status. Pregnancy-related food taboos were less likely among women who had attended immunization services. We suggest comprehensive and contextualized interventions should be designed by concerned stakeholders to address common reasons (myths and misconceptions) for pregnancy-related food taboos and encourage them to take essential nutrients for their health and beyond. In addition, further research is needed to understand the sociocultural factors in the context that leads to pregnancy-related food restrictions.

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## Author's contribution

W.A., A.K.T., A.S., and K.T.R. had been involved since the conceptualization of the research question, design, data acquisition, analysis, and interpretation. W.A. and A.S. drafted the article. All

authors reviewed and contributed intellectual inputs, and approved the article for submission.

## Availability of data and materials

The raw data in EpiData and SPSS are available; we can make it available to share participants' de-identified dataset on official requests.

## Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Ethical approval

Ethical clearance was obtained from the Institutional Health Research Ethics Review Committee of College of Health and Medical Sciences, Haramaya University, Ethiopia. (Ref\_No. IHRERC/119/2020).

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## Informed consent

Informed voluntary verbal and written consent was obtained from all participants. Written informed consent from parents/legal guardian and assent from them were obtained from study participants whose age are younger than 18 years, and also not attended formal education. The study was conducted on adult pregnant women who can give consent to participate. Participants' information was kept confidential using anonymous questionnaires and use of codes. Personal privacy and cultural norms were respected. The respondents were informed of their right not to participate in the study or withdraw from the study at any time without affecting their participation in the HDSS.

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## Supplemental material

Supplemental material for this article is available online.

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