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Prevalence of harmful traditional practices during pregnancy and associated factors in Southwest Ethiopia: A community based cross sectional study

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Prevalence of harmful traditional practices during pregnancy and associated factors in Southwest Ethiopia: A community based cross sectional study

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Abstract

Objective: To assess the prevalence of harmful traditional practices during pregnancy and associated factors in Southwest Ethiopia.

Design: A community based cross sectional study

Setting: Southwest Ethiopia

Participants: Women who are currently pregnant or gave birth two years prior to the study **Outcome of the study:** Harmful traditional practices during pregnancy (Yes/no). Harmful traditional practices during pregnancy include abdominal massage, herbal intake or food taboos done on/by pregnant women without health professional's instruction.

Results: The prevalence of harmful traditional practices in the study area was 37%. Women with monthly income of < 1000ETB were 3.13 [AOR=3.13, 95% CI (1.83, 5.37)] times more likely to engage in harmful traditional practices than women with monthly income of more than 2000 ETB. Women who had a history of child death were 2.74 [AOR= 2.74, 95% CI (1.75, 4.29)] times more likely practice harmful traditional practices than women who had no history of child death. The odds of practicing harmful traditional practices among women with no formal education was 4.81 [AOR= 4.81, 95% CI (2.50, 9.23)] times higher than women with tertiary education. Multipara women were 53% [AOR= 0.47, 95% CI (0.27, 0.80)] less likely to practice harmful traditional practices than primiaras.

Conclusion: Our study showed that traditional malpractices during pregnancy are common in the study area. The practices are more common among primiparas, women had lower educational and financial status, and with a history of child death. Harmful traditional practices during pregnancy should not be neglected and should be included in health promotion activities.

Key words: harmful traditional practices, pregnancy, malpractices, Southwest Ethiopia

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Article summary

Strengths and limitations of the study

- The current study is highly generalizable since a community based cross-sectional study was conducted.
- Due to the limitations of a cross-sectional study design, it was impossible to develop temporal relationship between the outcome and independent variables
- Recall bias might be introduced in the study as women who gave birth two years prior to the study were included in the study

Introduction

Annually, around 358,000 women die worldwide due pregnancy and childbirth related complications. Most of these maternal deaths occur in developing countries; specifically in sub-Saharan Africa (1). Childbearing age women are at a risk of a wide range of traditional beliefs and practices during pregnancy (2). These traditional beliefs and practices highly determine the health care services that women receive during pregnancy and childbirth(3).

Globally, different types of traditional beliefs and practices are distributed in different rates, depending on cultural, social, political and economic structures. However, the modern medicine failed to give emphasis for these practices (4). The common traditional practice during pregnancy includes; Abdominal massage, food taboo practices, and herbes usage.

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Abdominal massage during pregnancy and labour is an age long practice in many cultures and regions of the world (5). Beside its discomfort and sever pain, abdominal manipulation may lead to placenta previa, excessive bleeding, uterine rupture, incomplete placental separation, and threatened abortions (6,7).

Maternal under nutrition is one of the factors which leads to poor pregnany and birth outcomes(8). It is not uncommon for pregnant women to be deprived of nutritious foods during different trimesters pregnancy(3)(9)(10)(11)(12). Studies conducted in Asia, Turkey, and Africa showed that there are certain foods that pregnant women restricted or encouraged to eat during pregnancy(4). In Ethiopia, the stude conducted in Amhara and Oromia regions showed that the magnitude of nutritional taboos among pregnant women ranges from 19.1%

to 49.8% (2)(13) (14). A study from Shashemene of Oromia regional state reported that 49.8% of women avoid one or more food items during pregnancy. These includes linseed, honey and milk/ yoghurt were commonly avoided food items. Moreover, more than one third (38.3%) of pregnant women practice fasting during pregnancy which resirict meat and diary products (20).

Pregnant women use herbs believing it will make them strong and healthy. Additionally, studies showed that pregnant women use herbs due to lack of effectiveness in the conventional treatments and perceiving that they are safer (15). A study conducted in Gonder showed that 48.6% of women used herbal medicine during pregnancy. The most commonly used herbs were ginger (*Zingiber officinale*) (40.7%) and damakasse (*Ocimum lamiifolium*) (38.4%). Unfortunately, most of the women (89.8%) used these herbals without consulting their doctors(16).

Previously conducted studies showed that various factors could be associated with harmful traditional practice during pregnancy. These factors includes educational status of the mother (17), place of delivery (6), maternal age (13), parity (18), antenatal care(ANC) utilization (14), marital status (15), place of resident (17), age at marriage (19).

Harmful traditional practices vary from region to region, depending on the culture of the inhabitants. However, such data is lacking in the study area. Therefore, the aim of this study was to assess the prevalence of harmful traditional practices during pregnancy and associated factors in southwest Ethiopia.

Methods

Study area and design

A community-based cross-sectional study was conducted in four zones of Southwest Ethiopia, namely Bench-Shako, West-Omo, Sheka and Kafa, Zones in 2019. A total population of around 2 million dowels in this zone, with nearly half of the population were

female. Regarding the health infrastructure there are about five hospitals; 1 teaching and referral, 1 zonal level and others are primary district hospital, more than 80 health centers.

Source population

All reproductive age group women who live in the study area and had at least one pregnancy.

Study population

All reproductive age group women who live in the study area who were pregnant at the time of data collection or were pregnant at least once within two years prior to the study.

Exclusion criteria

Women who live in the study area for less than 6 months were excluded.

Sample size determination

The required sample size was calculated by using single population proportion formula, considering the following assumption: 95% confidence internal (CI), 4% margin of error, 1.5 design effect, a non-response rate of 10%, and prevalence of traditional harmful practice during pregnancy was 22 % (13). Accordingly, a total of 680 women were selected for this study.

Sampling procedure

A multi-stage sampling technique was used to select the study participants. First, 4 Woredas were selected using of lottery method. Then, 8 kebeles from the 4 Woredas were selected randomly. After this, the sample size was proportionally allocated based on their population size. Then, households with currently or previously pregnant women were identified from a family folder with the help of health extension workers and a sampling frame was prepared. Finally, the study participant were selected randomly by using computer generated random number.

Measurement Variables

Harmful traditional practices: Harmful traditional practices include abdominal massage, food taboos, and intake of herbs done on/by pregnant women without a health professional's instruction.

Independent Variables

Socio-demographic Variables: Age, religion, maternal education, marital status, partner's educational status, residence.

Obstetric Variables: Parity, ANC utilization, place of delivery for the most recent birth, history of abortion, history of stillbirth, history of child death.

Data collection procedures and instruments

The data collection was conducted by BSc nurses, midwives and health extension workers using of a semi-structured questionnaire which was prepared in Amharic language. It was administered using of face to face interview. The questionnaires contain three parts; sociodemographic characteristics of participants, previous obstetric history, and harmful traditional practices during pregnancy.

Data Quality Control

The Questionnaire was first developed in English, then translated to Amharic language and again translated back to English language to maintain its consistency. Pretest was also done on 5% of the sample size. Training was given for data collectors and supervisors regarding the objectives of the study, data collection method and tools. During data collection time each data collector was closely supervised and the completeness of the questionnaires was checked.

Data analysis

Data were coded, entered, cleaned and checked by Epi Data entry manager version 4.0.2 and analysis was done by using SPSS version 22. Following a descriptive analysis, binary

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 logistic regression was conducted to identify the association between dependent and independent variables at significance level of P \leq 0.25. All variables with P-value \leq 0.25 were entered into a multiple logistic regression model. Variables with P-value of < 0.05 in the multiple logistic regression were considered as determinants of the outcome variable.

Patient and public involvement

It was not possible to involve patients or the public in the design, or conduct, or reporting, or dissemination plans of our research.

Results

Socio Demographic characteristics of the study participants

Out of 680 women, 667 (98% response rate) women participated in this study. Nearly half (48.3%) of the respondents were between the age group of 25-29 years. Majority (95.7%) were married, and 45.6% of the respondents were housewives. Regarding education, 57.4% of the participants did not attained formal education. Two hundred and seventy (40.5%) women were Orthodox Christians. The husbands of 393(58.9%) women attained primary education. About 480 (72%) women were residents of rural areas (Table 1).

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Variables		Frequency	Percentage %
Age	15-19 years	2	0.3
	20-24 years	104	15.6
	25-29 years	322	48.3
	30-44 years	158	23.7
	35-39 years	63	9.4
	40-44 years	18	2.7
Religion	Orthodox	270	40.5
	Muslim	35	5.2
	Protestant	357	53.5
	Others	5	0.7
Maternal Education	No formal education	383	57.4
	Primary (1-8)	176	26.4
	Secondary (9-12)	44	6.6
	Above Secondary	64	9.6
Marital status	Married	638	95.7
	Single	14	2.1
	Divorced	10	1.5
	Widowed	5	0.7
Husband Education	No formal education	130	19.5
	Primary (1-8)	393	58.9
	Secondary (9-12)	86	12.9
	Above Secondary	58	8.7
Residence	Urban	187	28
	Rural	480	72
Monthly income	<1000ETB	304	45.6
	1001-2000ETB	240	36.0
	>2000ETB	123	18.4

Table 1: Socio demographic characteristics of the respondents (n =667)

Obstetric related characteristics of the respondents

From the total 667 study participants; 550(82.5%) of them were multiparas, 637(95.5%) of them used ANC services. Regarding place of birth, 613 (91.9%) women gave birth to their last child

in health institutions. Sixty four (9.6%) mothers had history of abortion, 132 (19.8%) mothers had history of child death and 25 (3.7%) had history of still birth (Table 2).

Variables		Frequency	Percentage %
Parity	Primipara	117	17.5
	Multiparas	550	82.5
ANC utiliztion	Yes	637	95.5
	No	30	4.5
History of Abortion	Yes	64	9.6
	No	603	90.4
Place of birth for the most	Health facility	613	91.9
recent birth	Home	54	8.1
History of child death	Yes	132	19.8
	No	535	80.2
History of still Birth	Yes	25	3.7
	No	642	96.3

Table 2: Obstetric relate	l characteristics	of the respondents ((n=667)
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Prevalence and types of harmful traditional practices during pregnancy

Two hundred and forty seven (37%) mothers practiced harmful traditional practices at some point of their pregnancy. The most commonly practiced activities were abdominal massage (72.9%), intake of herbs (63.9%), and food taboos (48.6%). All of the women exposed to abdominal massage stated that the procedure was performed by untrained personnel. Additionally, 112 (62.2%) of them mentioned that the abdominal massage was conducted during the third trimester of their pregnancy. Women experienced food prohibition mentioned that honey (46.6%) and milk (43.3%) were the most commonly averted food items during pregnancy. Seventy three (46.2%) of the respondents responded that they take herbs to enhance labour while 57 (36.1%) used herbs to relive pain (Table 3).

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Variables		Frequency	Percentage %
HTPs performed during	Yes	247	37
pregnancy (n=667)	No	420	63
HTPs performed during	Abdominal Massage	180	72.9
pregnancy(n=247)*	Food taboo	120	48.6
	Drinking herbs	158	63.9
Time of abdominal	First trimester	17	9.4
massage was performed	Second trimester	51	28.4
(n=180)	Third trimester	112	62.2
Personnel performed	Untrained traditional birth attendants	88	48.9
abdominal massage	Neighbours	57	31.7
(n=180)	Family	35	19.4
Food items avoided	Milk/ yoghurt	52	43.3
during pregnancy	Egg	32	26.6
(n=120)	Meat	26	21.6
	Honey	56	46.6
	Casava	35	29.2
	Other (fruits, Honey Linseed and	17	14.2
	Vegetables)		
Reasons for intake of	To enhance labour	73	46.2
herbs (n=158)	To keep the fetus healthy	24	15.2
	To relive pain	57	36.1
	Other(Prevent constipation	4	2.5
	&Vomiting)		
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Table 3: Prevalence and types of harmful traditional practices during pregnancy

[*Multiple responses were possible, HTP= Harmful traditional practice]

Factors associated with harmful traditional practices during pregnancy

Binary and multiple logistic regression was conducted to identify factors associated with harmful traditional practices during pregnancy. In the binary regression parity, ANC utilization, history of child death, monthly income, history of stillbirth, place of delivery and maternal educational status were found to be significantly associated with the outcome variable. These variables were entered into multiple logistic regression model for further analysis. In the final

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model, monthly income of less than 1000 ETB, lack of formal education, being multipara, and having no history of child death were significantly associated with harmful traditional practices during pregnancy.

Multipara women were 53% (AOR = 0.47, 95% CI [0.27, 0.80]) less likely practice harmful traditional practices than primipara women. Women with no history of child death were 2.74, (AOR= 2.74, 95% CI [1.75, 4.29]) times more likely engaged in harmful traditional practices during pregnancy than women with history of child death. Women with no formal education were 4.81 (AOR = 4.81, 95% CI [2.50, 9.23]) more likely conduct harmful traditional practices that women with tertiary education. Mothers with monthly income of less than 1000 ETB were 3.13 (AOR= 3.13, 95% CI [1.83, 5.37]) times more likely exercise harmful traditional practices than women with monthly income of greater than 2000.ETB (Table 4).

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Table 4: Factors associated with harmful traditional	practices during pregnancy
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Variable		COR (95%CI)	AOR (95%CI)
Parity	Multipara	0.40(0.25, 0.64)	0.47(0.27,0.80)
	Primipara	1	1
Residence	Rural	0.62(0.43, 0.89)	0.72(0.46,1.12)
	Urban	1	1
ANC utilization	Yes	1	1
	No	2.67 (1.26, 5.64)	0.24(0.10,0.59)
History of child death	No	3.99(2.67, 5.95)	2.74(1.75,4.29)
ucath	Yes	1	1
Monthly income	<1000ETB	3.19(2.04, 5.04)	3.13(1.83,5.37)
	1001-2000ETB	1.30(0.91, 1.87)	1.37(0.91,2.07)
	>2000ETB	1	1
History of still	Yes	0.21(0.89, 0.52)	0.39(0.14,1.05)
on th	No	1	1
Place delivery	Home	0.56(0.32,0.97)	0.60(0.30,1.20)
	Institution	1	1
Maternal educational	No education	2.30 (1.34,3.95)	4.81(2.50,9.23)
status	Primary education	0.84(0.47,1.49)	1.44(0.73,2.81)
	Secondary education	0.96(0.44,2.08)	1.26(0.53,3.002)
	Tertiary education	1	1

Discussion

Our study showed that 37% of women in Southwest Ethiopia practiced harmful traditional practices while they were pregnant. Abdominal massage, intake of herbs and food taboos were the most commonly identified harmful traditional practices during pregnancy. A multiple

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logistic regression analysis showed that monthly income of less than 1000ETB, lack of formal education, having no history of child death and multiparous women were significantly associated with being involved in traditional practices during pregnancy. Abdominal massage during pregnancy is considered as a "silent killer" which can result in maternal and perinatal mortality in addition to various obstetric complications(20). Unfortunately, abdominal massage was performed on 27% of our participants by untrained personnel. 62.2% of them mentioned that the procedure was performed during third semester of their pregnancy which could have resulted in placenta previa, abruption placenta, retained placenta, uterine rupture on the top of maternal and perinatal mortalities (20). The nutritional need of pregnant women is higher than that of non-pregnant women due to the numerous changes required to ensure healthier maternal and fetal development (21). Moreover, interventions designed to optimize pregnancy outcomes and promote healthy infant growth and development during the first 1000 days (from conception until the child reaches age 2 years) optimizing maternal nutrition will also reduce chronic disease risk (22). Therefore, it is recommended for pregnant women to eat balanced diets including vitamins, minerals and omega-3 fatty acids (21). In contrast to this, our study showed that 48.6% of women avoided nutritious foods (dairy products, meat, egg, honey, vegetables and fruits) during their pregnancy. This could result in preterm birth and low birth weight(23) (24). Women use herbs during pregnancy to treat various health conditions. These includes nausea, vomiting, common cold, urinary tract infection, and to shorten labor(25). However, pregnant women can be vulnerable to the adverse effects of these substances as their dosage and safety are not well established. Additionally, pregnant women may not inform their physicians about their use of herb since most of them belief that they are safe(15). Evidences showed that herbal medications may cause heart burn, premature labor, miscarriage, increased in blood flow and

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allergic reaction during pregnancy(25). Therefore, pregnant women should be cautious while using of herbs to avoid these consequences.

Our study showed that mothers who did not attained formal school were more likely engaged in harmful practices than mothers with tertiary education. This could be resulted from the fact that education enables pregnant women to abide with healthy practices (17)(26).

Pregnant women with lower economic status (monthly income of <1000ETB) were more likely to practice harmful traditional practices than women with monthly income of greater than 2000ETB. These could be explained by the fact that women with lower economic status might not attain formal education. This might hinder them from exercising healthy lifestyle during pregnancy (17)(26). Additionally, these group of women might not get health education as a result of poor health care access(27).

Women who had a history of child death were less likely to practice harmful traditional practices during pregnancy than women who had no history of child death. This could due to the fact that women who had history of child death would be more cautious during their subsequent pregnancies and avoid harmful practices.

Multipara women were less likely to practice harmful traditional practice than primipara women. This could be explained by the fact that the social pressure to practice malpractices during pregnancy is higher on primipara women as they are a new mothers. They also do not have the experience to identify the consequence of harmful traditional practices on themselves as well as on their newborns.

Conclusions

Despite the advancements in medical science in the past decades, a significant proportion of pregnant women continues to practice harmful traditional practices in Southwest Ethiopia. Abdominal massage, intake of herbs and food taboos were the most commonly practiced harmful traditional practices in the area. However, health information for pregnant women does

not highlight these practices. The harmful traditional practices were more prevalent among primiparas, pregnant women with no formal education, pregnant women with no history of child death and pregnant women with lower monthly income. Community health programs and ANC visits should be used to educate mothers about the negative consequences of harmful traditional practices.

Declarations

Funding

This work was supported by Mizan-Tepi University

Conflict of interests

None declared

Contribution statement

Melkamsew Tesfaye came up with the research idea and was involved in all stages of the research. Yemisrach Belete Biru prepared the manuscript while Nahom Solomon and Dawit Getachew were responsible for conducting of the analysis and interpretation of the findings. All authors read and approved the final manuscript. Enseignement Superieur (ABES) . Protected by copyright, including for uses related to text and data mining, Al training, and similar technologies.

Ethics statement

This study was approved by the Research Ethics Review Committee (RERC) of Mizan Tepi University with a reference number of RCSD/023/18. A written informed consent was obtained from all study participants after the data collectors discussed the objectives of the study. The confidentiality of the data was maintained by using of codes during storing and analysing of the data. Additionally, no personal identification information were collected.

Data sharing statement

The dataset supporting the conclusion of this study is available upon reasonable request from the corresponding author.

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TRODE Statement—	-CHECKIIS	st of nems that should be included in reports of <i>cross-sectional studies</i>	
	Item No	Recommendation	Pa N
Title and abstract	1	(<i>a</i>) Indicate the study's design with a commonly used term in the title or the abstract: Yes	1
		(b) Provide in the abstract an informative and balanced summary of what	2
		was done and what was found: Yes	-
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported: Yes	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses: Yes	5
Methods			
Study design	4	Present key elements of study design early in the paper: Yes	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of	6
Southing		recruitment, exposure, follow-up, and data collection: Yes	
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection	6
		of participants: Yes	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders,	7
		and effect modifiers. Give diagnostic criteria, if applicable: Yes	
Data sources/	8*	For each variable of interest, give sources of data and details of methods	7
measurement		of assessment (measurement). Describe comparability of assessment	
		methods if there is more than one group: Yes	
Bias	9	Describe any efforts to address potential sources of bias: Yes	7
Study size	10	Explain how the study size was arrived at: Yes	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If	N/.
		applicable, describe which groupings were chosen and why: N/A	
Statistical methods	12	(<i>a</i>) Describe all statistical methods, including those used to control for confounding: Yes	7
		(b) Describe any methods used to examine subgroups and interactions: N/A	N/A
		(c) Explain how missing data were addressed: N/A	N/2
		(<i>d</i>) If applicable, describe analytical methods taking account of sampling strategy: N/A	N/2
		(<u>e</u>) Describe any sensitivity analyses: N/A	N/.
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers	8
T atterpants		potentially eligible, examined for eligibility, confirmed eligible, included	
		in the study, completing follow-up, and analysed: Yes	
		(b) Give reasons for non-participation at each stage: N/A	N/2
		(c) Consider use of a flow diagram: N/A	N/2
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical,	8-1
		social) and information on exposures and potential confounders: Yes	
		(b) Indicate number of participants with missing data for each variable of interest: N/A	N/.
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Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted	11
		estimates and their precision (eg, 95% confidence interval). Make clear	
		which confounders were adjusted for and why they were included: Yes	
		(b) Report category boundaries when continuous variables were	9
		categorized: Yes	
		(c) If relevant, consider translating estimates of relative risk into absolute	N/A
		risk for a meaningful time period: N/A	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions,	N/A
		and sensitivity analyses: N/A	
Discussion			•
Key results	18	Summarise key results with reference to study objectives: Yes	13-
			14
Limitations	19	Discuss limitations of the study, taking into account sources of potential	3
		bias or imprecision. Discuss both direction and magnitude of any potential	
		bias: Yes	
Interpretation	20	Give a cautious overall interpretation of results considering objectives,	13-
		limitations, multiplicity of analyses, results from similar studies, and other	15
		relevant evidence: Yes	
Generalisability	21	Discuss the generalisability (external validity) of the study results: Yes	13-
			15
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study	16
		and, if applicable, for the original study on which the present article is	
		based	

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Prevalence of harmful traditional practices during pregnancy and associated factors in Southwest Ethiopia: A community-based cross-sectional study

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Abstract

Objective: To assess the prevalence of harmful traditional practices during pregnancy and associated factors in Southwest Ethiopia.

Design: A community-based cross-sectional study

Setting: Southwest Ethiopia

Participants: 667 women who were pregnant at the time of the study or gave birth two years prior to the study have participated

Outcome of the study: Harmful traditional practices during pregnancy (Yes/no). Harmful traditional practices during pregnancy include abdominal massage, herbal intake, or food taboos done on/by pregnant women without health professionals' instruction.

Results: The prevalence of harmful traditional practices in the study area was 37%, 95% CI (33.4, 40.8). The most commonly practiced activities were abdominal massage (72.9), intake

of herbs (63.9%), and food taboos (48.6%). Monthly income [AOR=3.13, 95% CI (1.83,

5.37), P< 0.001], having had no history of child death [AOR= 2.74, 95% CI (1.75, 4.29), P<

0.001], women with no formal education [AOR= 4.81, 95% CI (2.50, 9.23), P< 0.001],

women who had antenatal care (ANC) visits during their last pregnancy [AOR = 0.24, 95% CI (0.10, 0.59), P=0.002], and being multipara [AOR=0.47, 95% CI (0.27, 0.80), P=0.003] were significantly associated with harmful traditional practices during pregnancy.

Conclusion: Our study showed that more than one-third of women in Southwest Ethiopia practiced harmful traditional practices while they were pregnant. The practices were more common among primiparas, women who had lower educational and financial status, women with no ANC visits, and women with no history of child death. Health education should be given to the community about the complications of harmful traditional practices during pregnancy.

Keywords: harmful traditional practices, pregnancy, malpractices, Southwest Ethiopia

Article summary

Strengths and limitations of the study

- The current study is highly generalizable since a community-based cross-sectional study was conducted.
- Due to the limitations of a cross-sectional study design, it was impossible to develop a temporal relationship between the outcome and independent variables
- Recall bias might be introduced in the study as women who gave birth two years prior to the study were included in the study

Introduction

Annually, around 358,000 women die worldwide due to pregnancy and childbirth-related complications. Most of these maternal deaths occur in developing countries; specifically in sub-Saharan Africa (1). Childbearing- age women are at risk of a wide range of traditional beliefs and practices during pregnancy (2). These traditional beliefs and practices highly determine the health care services that women receive during pregnancy and childbirth(3).

Globally, different types of traditional beliefs and practices are distributed at different rates, depending on cultural, social, political, and economic structures. However, modern medicine failed to emphasize these practices (4). The common traditional practice during pregnancy includes; Abdominal massage, food taboo practices, and herbs usage.

Abdominal massage during pregnancy and labor is an age-long practice in many cultures and regions of the world (5). Besides its discomfort and severe pain, abdominal manipulation may lead to placenta previa, excessive bleeding, uterine rupture, incomplete placental separation, and threatened abortions (6,7).

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Maternal undernutrition is one of the factors which leads to poor pregnancy and birth outcomes(8). It is not uncommon for pregnant women to be deprived of nutritious foods during different trimesters of pregnancy(3)(9)(10)(11)(12). Studies conducted in Asia, Turkey, and Africa showed that there are certain foods that pregnant women are restricted or encouraged to eat during pregnancy(4). In Ethiopia, studies conducted in Amhara and Oromia regions showed that the magnitude of nutritional taboos among pregnant women ranges from 19.1% to 49.8% (2)(13) (14). A study from Shashemene of Oromia regional state reported that 49.8% of women avoid one or more food items during pregnancy. These include linseed, honey, and milk/ yogurt were commonly avoided food items. Moreover, more than one-third

(38.3%) of pregnant women practice fasting during pregnancy which restricts meat and dairy products (14).

Pregnant women use herbs believing it will make them strong and healthy. Additionally, studies showed that pregnant women use herbs due to lack of effectiveness in the conventional treatments and perceiving that they are safer (15). A study conducted in Gonder showed that 48.6% of women used herbal medicines during pregnancy. The most commonly used herbs were ginger (*Zingiber officinale*) (40.7%) and damakasse (*Ocimum lamiifolium*) (38.4%). Unfortunately, most of the women (89.8%) used these herbals without consulting their doctors(16).

Previously conducted studies showed that various factors could be associated with harmful traditional practices during pregnancy. These factors include the educational status of the mother (17), place of delivery (6), maternal age (13), parity (18), antenatal care(ANC) utilization (14), marital status (15), place of residence (17), and age at marriage (19). Ethiopia, especially the Southern region, is one of the countries with various traditional practices around the World. These traditional practices could be useful or harmful. Though different studies were conducted previously on the topic, it is obvious that harmful traditional practices vary from region to region. However, such data is lacking in the study area. Identifying the existing harmful traditional practices and their determinants in the area is critical to designing appropriate interventions in the future. Therefore, this study aimed to assess the prevalence of harmful traditional practices during pregnancy and associated factors in southwest Ethiopia.

Methods

Study area and design

A community-based cross-sectional study was conducted in four zones of Southwest Ethiopia, namely Bench-Shako, West-Omo, Sheka, and Kafa Zones in 2019. A total

 population of around 2 million dowels in this zone, with nearly half of the population, being female. Regarding the health infrastructure, there are about five hospitals; 1 teaching and referral, 1 zonal level, and another primary district hospital, with more than 80 health centers.

Source population

All reproductive age group women who live in the study area and had at least one pregnancy.

Study population

All reproductive age group women who live in the study area who were pregnant at the time of data collection or were pregnant at least once within two years prior to the study.

Exclusion criteria

Women who lived in the study area for less than 6 months were excluded.

Sample size determination

The required sample size was calculated by using a single population proportion formula, considering the following assumption: 95% confidence interval (CI), 4% margin of error, 1.5 design effect, a non-response rate of 10%, and prevalence of traditional harmful practice during pregnancy was 22 % (13). Accordingly, a total of 680 women were selected for this study.

Sampling procedure

A multi-stage sampling technique was used to select the study participants. First, 4 Woredas were selected using a lottery method. Then, 8 kebeles from the 4 Woredas were selected randomly. After this, the sample size was proportionally allocated based on their population size. Then, households with currently or previously pregnant women were identified from a family folder with the help of health extension workers and a sampling frame was prepared. Finally, the study participants were selected randomly by using computer-generated random numbers.

Measurement Variables

Harmful traditional practices: Harmful traditional practices include abdominal massage, food taboos, and intake of herbs done on/by pregnant women without a health professional's instruction.

Independent Variables

Socio-demographic Variables: Age, religion, maternal education, marital status, partner's educational status, residence.

Obstetric Variables: Parity, ANC utilization, place of delivery for the most recent birth, history of abortion, history of stillbirth, history of child death.

Data collection procedures and instruments

The data collection was conducted by BSc nurses, midwives, and health extension workers using a semi-structured questionnaire that was prepared in the Amharic language. It was administered using of face to face interview. The questionnaires were prepared after reviewing related literature. They contain three parts; socio-demographic characteristics of participants, previous obstetric history, and harmful traditional practices during pregnancy. After the questionnaires were prepared, their reliability was checked using Cronbach's alpha. The result showed that Cronbach's alpha for the questionnaires was 0.87. Therefore, the questionnaires had acceptable reliability.

Data Quality Control

The Questionnaire was first developed in English, then translated to Amharic language, and again translated back to the English language to maintain its consistency. A pretest was also done on 5% of the sample size. Training was given to data collectors and supervisors regarding the objectives of the study, data collection method, and tools. During data collection time each data collector was closely supervised and the completeness of the questionnaires was checked.

Data analysis

Data were coded, entered, cleaned, and checked by Epi Data entry manager version 4.0.2, and analysis was done by using SPSS version 22. Following descriptive analysis, binary logistic regression was conducted to identify the association between dependent and independent variables at a significance level of P \leq 0.25. All variables with P-value \leq 0.25 were entered into a multiple logistic regression model. Variables with a P-value of < 0.05 in the multiple logistic regression were considered as the determinants of the outcome variable. The model fitness was checked using Hosmer and Lemeshow test (P= 0.774). The independent variables were checked for multicolinearity using tolerance and variance inflation factor (VIF). None of the variables had a tolerance value of <0.1 or a VIF value of \geq 10.

Patient and public involvement

It was not possible to involve patients or the public in the design, or conduct, or reporting, or dissemination plans of our research.

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Results

Socio-Demographic characteristics of the study participants

Out of 680 women, 667 (98% response rate) women participated in this study. Nearly half (48.3%) of the respondents were between 25-29 years old. A majority (95.7%) of the study participants were married, and 45.6% of the respondents were housewives. Regarding education, 57.4% of the participants did not attain formal education. Two hundred and seventy (40.5%) women were Orthodox Christians. The husbands of 393(58.9%) women attained primary education. About 480 (72%) women were residents of rural areas (Table 1).
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Variables		Frequency	Percentage %
Age	15-19 years 2		0.3
	20-24 years	104	15.6
	25-29 years	322	48.3
	30-44 years	158	23.7
	35-39 years	63	9.4
	40-44 years	0-44 years 18	
Religion	Orthodox 270		40.5
	Muslim 35		5.2
	Protestant 357		53.5
	Traditional religion	5	0.7
Maternal Education	No formal education	383	57.4
	Primary (1-8)	176	26.4
	Secondary (9-12)	44	6.6
	Above Secondary	64	9.6
Marital status	Married	638	95.7
	Single	14	2.1
	Divorced	10	1.5
	Widowed	5	0.7
Husband Education	No formal education	130	19.5
	Primary (1-8)	393	58.9
	Secondary (9-12)	86	12.9
	Above Secondary	58	8.7
Residence	Urban	187	28
	Rural	480	72
Monthly income	<1000ETB	304	45.6
	1001-2000ETB	240	36.0
	>2000ETB	123	18.4

Table 1: Socio-demographic characteristics of the respondents (n =667)

Obstetric-related characteristics of the respondents

Of the total 667 of study participants; 550(82.5%) of them were multiparas, and 637(95.5%) of them used ANC services during their last pregnancy. Regarding the place of birth, 613 (91.9%)

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women gave birth to their last child in health institutions. Sixty-four (9.6%) mothers had a history of abortion, 132 (19.8%) mothers had a history of child death, and 25 (3.7%) had a history of stillbirth (Table 2).

Variables		Frequency	Percentage %
Parity	Primipara	117	17.5
	Multiparas	550	82.5
ANC utilization	Yes	637	95.5
	No	30	4.5
History of Abortion	Yes	64	9.6
	No	603	90.4
Place of birth for the most recent birth	Health facility	613	91.9
	Home	54	8.1
History of child death	Yes	132	19.8
	No	535	80.2
History of stillbirth	Yes	25	3.7
	No	642	96.3

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Table 2: Obstetric-rela	d characteristics of	the respondents	(n=667)
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Prevalence and types of harmful traditional practices during pregnancy

Two hundred and forty-seven [37%, 95% CI (33.4, 40.8)] mothers practiced harmful traditional practices at some point in their pregnancy. The most commonly practiced activities were abdominal massage (72.9%), intake of herbs (63.9%), and food taboos (48.6%). All of the women exposed to abdominal massage stated that the procedure was performed by untrained personnel. Additionally, 112 (62.2%) of them mentioned that the abdominal massage was conducted during the third trimester of their pregnancy. Women who experienced food prohibition mentioned that honey (46.6%) and milk (43.3%) were the most commonly averted food items during pregnancy. Seventy-three (46.2%) of the respondents responded that they take herbs to enhance labor while 57 (36.1%) used herbs to relieve pain (Table 3).

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Variables		Frequency	Percentage %
HTPs performed during	Yes	247	37
pregnancy (n=667)	No	420	63
HTPs performed during	Abdominal Massage	180	72.9
pregnancy(n=247)*	Food taboo	120	48.6
	Drinking herbs	158	63.9
Time of abdominal massage	First trimester	17	9.4
was performed (n=180)	Second trimester	51	28.4
	Third trimester	112	62.2
Personnel performed	Untrained traditional birth attendants	88	48.9
abdominal massage (n=180)	Neighbors	57	31.7
	Family	35	19.4
Food items avoided during	Milk/ yogurt	52	43.3
pregnancy (n=120)	Egg	32	26.6
	Meat	26	21.6
	Honey	56	46.6
	Casava	35	29.2
	Other (fruits, Honey Linseed, and	17	14.2
	Vegetables)		
Reasons for intake of herbs	To enhance labor	73	46.2
(n=158)	To keep the fetus healthy	24	15.2
	To relieve pain	57	36.1
	Other(Prevent constipation	4	2.5
	&Vomiting)		

Table 3: Prevalence and types of harmful traditional practices during pregnancy

[*Multiple responses were possible, HTP= Harmful traditional practice]

Factors associated with harmful traditional practices during pregnancy

Binary and multiple logistic regression was conducted to identify factors associated with harmful traditional practices during pregnancy. In the binary regression parity, ANC utilization during last pregnancy, history of child death, monthly income, history of stillbirth, place of delivery, and maternal educational status were found to be significantly associated with the outcome variable. These variables were entered into a multiple logistic regression model for Page 13 of 24

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further analysis. In the final model, monthly income of less than 1000 ETB, lack of formal education, being multipara, having of ANC visits, and having no history of child death were significantly associated with harmful traditional practices during pregnancy.

Multipara women were 53% [AOR = 0.47, 95% CI (0.27, 0.80), P=0.003] less likely practice harmful traditional practices than primipara women. Women with no history of child death were 2.74, [AOR= 2.74, 95% CI (1.75, 4.29), P< 0.001] times more likely to engage in harmful traditional practices during pregnancy than women with a history of child death. Women with no formal education were 4.81 [AOR = 4.81, 95% CI (2.50, 9.23), P< 0.001] more likely to conduct harmful traditional practices than women with tertiary education. Women who had ANC visits during their last pregnancy were 76% [AOR = 0.24, 95% CI (0.10, 0.59), P=0.002] less likely to practice harmful traditional practices than women with no ANC visits. Mothers with a monthly income of less than 1000 ETB were 3.13 [AOR= 3.13, 95% CI (1.83, 5.37), P < 0.001] times more likely to exercise harmful traditional practices than women with a monthly income of J.e.zoni greater than 2000ETB (Table 4).

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Table 4: Factors associated v	with harmful traditional	practices during pregnancy
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Variable		COR (95%CI)	AOR (95%CI)	P-Value
Parity	Multipara	0.40(0.25, 0.64)	0.47(0.27,0.80)	0.003
	Primipara	1	1	
Residence	Rural	0.62(0.43, 0.89)	0.72(0.46,1.12)	0.055
	Urban	1	1	
ANC visits during	No	1	1	
lust prognancy	Yes	2.67 (1.26, 5.64)	0.24(0.10,0.59)	0.002
History of child death	No	3.93(2.67, 5.95)	2.74(1.75,4.29)	< 0.001
doum	Yes	1	1	
Monthly income	<1000ETB	3.19(2.04, 5.04)	3.13(1.83,5.37)	< 0.001
	1001-2000ETB	1.30(0.91, 1.87)	1.37(0.91,2.07)	0.240
	>2000ETB	1	1	
History of stillbirth	Yes	0.21(0.89, 0.52)	0.39(0.14,1.05)	0.081
	No	1	1	
Place delivery	Home	0.56(0.32,0.97)	0.60(0.30,1.20)	0.180
	Institution	1	1	
Maternal educational status	No education	2.30 (1.34,3.95)	4.81(2.50,9.23)	< 0.001
	Primary education	0.84(0.47,1.49)	1.44(0.73,2.81)	0.347
	Secondary education	0.96(0.44,2.08)	1.26(0.53,3.002)	0.724
	Tertiary education	1	1	

Discussion

Our study showed that 37% of women in Southwest Ethiopia practiced harmful traditional practices while they were pregnant. Abdominal massage, intake of herbs, and food taboos were the most commonly identified harmful traditional practices during pregnancy. Multiple logistic

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regression analysis showed that monthly income of less than 1000ETB, lack of formal education, having of no ANC visits, having no history of child death, and multiparous women were significantly associated with being involved in traditional practices during pregnancy. In the current study more than one-third of mothers who participated in the study reported practicing harmful traditional practices while they were pregnant. This finding was lower than the studies conducted in a Gurage zone (17) and Meshenti Town (3) while higher than a study conducted in Wonago town(20). This difference could be explained by the fact that there was a difference in the definition of harmful traditional practice between the studies. The difference in the study population could also result in a variation in the estimation of harmful traditional practices.

Abdominal massage during pregnancy is considered as a "silent killer" which can result in maternal and perinatal mortality in addition to various obstetric complications(21). Unfortunately, abdominal massage was performed on 72.9% of our participants by untrained personnel. This finding was higher than the findings of the studies conducted in Amhara and Afar regions (3), (22) (23). About 62.2% of them mentioned that the procedure was performed during the third semester of their pregnancy which could have resulted in placenta previa, abruption placenta, retained placenta, uterine rupture on the top of maternal and perinatal mortalities (21).

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The nutritional need of pregnant women is higher than that of non-pregnant women due to the numerous changes required to ensure healthier maternal and fetal development (24). Moreover, interventions designed to optimize pregnancy outcomes and promote healthy infant growth and development during the first 1000 days (from conception until the child reaches age 2 years) will also reduce chronic disease risk (25). Therefore, it is recommended for pregnant women to eat balanced diets including vitamins, minerals, and omega-3 fatty acids (24). In contrast to this, our study showed that 48.6% of women avoided nutritious foods (dairy products, meat,

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> egg, honey, vegetables, and fruits) during their pregnancy. This could result in preterm birth and low birth weight(26) (27). This finding was higher than the findings of the studies conducted in a Gurage zone, Amhara and Afar regions (17), (3)(22) (23) while lower than a study conducted in Wonago town(20).

One hundred and fifty-eight (63.97%) women reported that they have used herbs during their pregnancy. This finding was higher than the findings of a study conducted in a Gurage zone which showed that 46.7% and 47.9% of women drink "Koso" and "Telba" respectively during the perinatal period (17). Women may use herbs during pregnancy to treat various health conditions. These include nausea, vomiting, common cold, urinary tract infection, and shortening labor (28). However, pregnant women can be vulnerable to the adverse effects of these substances as their dosage and safety are not well established. Additionally, pregnant women may not inform their physicians about their use of herbs since most of them believe that they are safe(15). Evidence showed that herbal medications may cause heartburn, premature labor, miscarriage, increased blood flow, and allergic reactions during pregnancy(28). Therefore, pregnant women should be cautious while using herbs to avoid these consequences. The difference between the current and other studies in terms of the prevalence of abdominal massage, food taboos, and the use of herbs could be explained by the fact that different traditional practices might be practiced in different areas.

Our study showed that mothers who did not attained formal school were more likely to engage in harmful practices than mothers with tertiary education. Previously conducted studies also showed that a lack of formal education increases the probability of practicing harmful traditional practices (17)(20)(22). This could have resulted from the fact that education enables pregnant women to abide by healthy practices (17)(20). Additionally, educated women might also have higher income which in turn increases their exposure to health-related information.

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Pregnant women with lower economic status (monthly income of <1000ETB) were more likely to practice harmful traditional practices than women with a monthly income of greater than 2000ETB. These could be explained by the fact that women with lower economic status might not attain formal education. This might hinder them from exercising healthy lifestyles during pregnancy (17)(20). Additionally, this group of women might not get health education as a result of poor health care access(29).

Women who had ANC visits were less likely to practice harmful traditional practices than women who had no ANC visits. This finding was comparable with a finding of a study conducted in a Gurage zone(17). A study conducted in Amhara region also showed that women who had no ANC follow-ups were up to two times more likely to practice cultural malpractices during labor and delivery(22). These findings indicated that ANC visits have a positive impact on reducing harmful traditional practices during pregnancy. The possible justification could be women who had ANC visits could get aware of the risks of harmful traditional practices during pregnancy.

Women who had a history of child death were less likely to practice harmful traditional practices during pregnancy than women who had no history of child death. This could be due to the fact that women who had a history of child death would be more cautious during their subsequent pregnancies and avoid harmful practices.

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Multipara women were less likely to practice harmful traditional practices than primipara women. This could be explained by the fact that the social pressure to practice malpractices during pregnancy is higher on primipara women as they are new mothers. They also do not have the experience to identify the consequence of harmful traditional practices on themselves as well as on their newborns.

The findings of this study should be interpreted with precaution due to its limitations. Due to the nature of the study design (cross-sectional), it was impossible to establish a temporal

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relationship between the independent and dependent variables. The study might be subjected to recall bias since women who gave birth two years before the study were included.

Conclusions

Despite the advancements in medical science in the past decades, a significant proportion of pregnant women continue to practice harmful traditional practices in Southwest Ethiopia. Abdominal massage, intake of herbs, and food taboos were the most commonly practiced harmful traditional practices in the area. The harmful traditional practices were more prevalent among primiparas, women with no formal education, women with no history of child death, women with no ANC follow-ups, and women with lower monthly income. Our study showed that more than one-third of women in the study area were exposed to some forms of harmful traditional practices while they were pregnant. This indicated that different measures need to be taken to avert these practices. Therefore, health professionals should use community health programs and ANC visits to educate mothers about the negative consequences of harmful traditional practices. They should also work with community members, such as community and religious leaders, to change the community's attitude toward harmful traditional practices during pregnancy. Researchers should explore further harmful traditional practices during pregnancy and recommend possible areas of intervention. They should also determine the short and long-term impacts of harmful traditional practices on mothers and their newborns.

Declarations

Funding

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Conflict of interests

None declared

Melkamsew Tesfaye came up with the research idea and was involved in all stages of the research. Yemisrach Belete Biru prepared the manuscript while Nahom Solomon and Dawit Getachew were responsible for conducting of the analysis and interpretation of the findings. All authors read and approved the final manuscript.

Ethics statement

This study was approved by the Research Ethics Review Committee (RERC) of Mizan Tepi University with a reference number of RCSD/023/18. Written informed consent was obtained from all study participants after the data collectors discussed the objectives of the study. The confidentiality of the data was maintained by using codes during storing and analysis of the data. Additionally, no personal identification information was collected.

Data sharing statement

Data are available upon reasonable request.

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STROBE Statement-	-Checklist of items t	hat should be included in	n reports of <i>cross-sectional studies</i>
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	Item No	Recommendation	Page No
Title and abstract	1	(<i>a</i>) Indicate the study's design with a commonly used term in the title or the abstract: Yes	1
		(b) Provide in the abstract an informative and balanced summary of what	2
		was done and what was found: Yes	
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported: Yes	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses: Yes	5
Methods			
Study design	4	Present key elements of study design early in the paper: Yes	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection: Yes	6
Participants	6	(<i>a</i>) Give the eligibility criteria, and the sources and methods of selection of participants: Yes	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable: Yes	7
Data sources/	8*	For each variable of interest, give sources of data and details of methods	7
measurement		of assessment (measurement). Describe comparability of assessment	
		methods if there is more than one group: Yes	
Bias	9	Describe any efforts to address potential sources of bias: Yes	7
Study size	10	Explain how the study size was arrived at: Yes	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why: N/A	N/A
Statistical methods	12	(<i>a</i>) Describe all statistical methods, including those used to control for confounding: Yes	7
		(<i>b</i>) Describe any methods used to examine subgroups and interactions: N/A	N/A
		(c) Explain how missing data were addressed: N/A	N/A
		(<i>d</i>) If applicable, describe analytical methods taking account of sampling strategy: N/A	N/A
		(e) Describe any sensitivity analyses: N/A	N/A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed: Yes	8
		(b) Give reasons for non-participation at each stage: N/A	N/A
		(c) Consider use of a flow diagram: N/A	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders: Yes	8-10
		(b) Indicate number of participants with missing data for each variable of interest: N/A	N/A
Outcome data	15*	Report numbers of outcome events or summary measures: Yes	10

Main results	16	(<i>a</i>) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear	11
		which confounders were adjusted for and why they were included: Yes	
		(<i>b</i>) Report category boundaries when continuous variables were categorized: Yes	9
		(<i>c</i>) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period: N/A	N
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses: N/A	N
Discussion			
Key results	18	Summarise key results with reference to study objectives: Yes	13
			14
Limitations	19	Discuss limitations of the study, taking into account sources of potential	3
		bias or imprecision. Discuss both direction and magnitude of any potential bias: Yes	
Interpretation	20	Give a cautious overall interpretation of results considering objectives,	13
		limitations, multiplicity of analyses, results from similar studies, and other relevant evidence: Yes	15
Generalisability	21	Discuss the generalisability (external validity) of the study results: Yes	13
			15
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	10

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Prevalence of harmful traditional practices during pregnancy and associated factors in Southwest Ethiopia: A community-based cross-sectional study

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Primary Subject Heading :	Public health
Secondary Subject Heading:	Public health
Keywords:	PRIMARY CARE, PUBLIC HEALTH, Herbal medicine < THERAPEUTICS





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Prevalence of harmful traditional practices during pregnancy and associated factors in Southwest Ethiopia: A community-based cross-sectional study

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Word count: 3693

Abstract

Objective: To assess the prevalence of harmful traditional practices during pregnancy and associated factors in Southwest Ethiopia.

Design: A community-based cross-sectional study

Setting: Southwest Ethiopia

Participants: 667 women who were pregnant at the time of the study or gave birth two years prior to the study have participated

Outcome of the study: Harmful traditional practices during pregnancy (Yes/no). Harmful traditional practices during pregnancy include abdominal massage, herbal intake, or food taboos done on/by pregnant women without health professionals' instruction.

Results: The prevalence of harmful traditional practices in the study area was 37%, 95% CI (33.4, 40.8). The most commonly practiced activities were abdominal massage (72.9%),

intake of herbs (63.9%), and food taboos (48.6%). Monthly income [AOR=3.13, 95% CI

(1.83, 5.37), P< 0.001], having had no history of child death [AOR= 2.74, 95% CI (1.75,

4.29), P< 0.001], women with no formal education [AOR= 4.81, 95% CI (2.50, 9.23), P<

0.001], women who had antenatal care (ANC) visits during their last pregnancy [AOR = 0.24,

95% CI (0.10, 0.59), P=0.002], and being multipara [AOR= 0.47, 95% CI (0.27, 0.80),

P=0.003] were significantly associated with harmful traditional practices during pregnancy. **Conclusion:** Our study showed that more than one-third of women in Southwest Ethiopia practiced harmful traditional practices while they were pregnant. The practices were more common among primiparas, women who had lower educational and financial status, women with no ANC visits, and women with no history of child death. Health education should be given to the community about the complications of harmful traditional practices during pregnancy.

Keywords: harmful traditional practices, pregnancy, malpractices, Southwest Ethiopia

Article summary

Strengths and limitations of the study

- The current study is highly generalizable since a community-based cross-sectional study was conducted.
- Due to the limitations of a cross-sectional study design, it was impossible to develop a temporal relationship between the outcome and independent variables
- Recall bias might be introduced in the study as women who gave birth two years prior to the study were included in the study

Introduction

Annually, around 358,000 women die worldwide due to pregnancy and childbirth-related complications. Most of these maternal deaths occur in developing countries; specifically in sub-Saharan Africa (1). Childbearing- age women are at risk of a wide range of traditional beliefs and practices during pregnancy (2). These traditional beliefs and practices highly determine the health care services that women receive during pregnancy and childbirth(3).

Globally, different types of traditional beliefs and practices are distributed at different rates, depending on cultural, social, political, and economic structures. However, modern medicine failed to emphasize these practices (4). The common traditional practice during pregnancy includes; Abdominal massage, food taboo practices, and herbs usage.

Abdominal massage during pregnancy and labor is an age-long practice in many cultures and regions of the world (5). Besides its discomfort and severe pain, abdominal manipulation may lead to placenta previa, excessive bleeding, uterine rupture, incomplete placental separation, and threatened abortions (6,7).

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Maternal undernutrition is one of the factors which leads to poor pregnancy and birth outcomes(8). It is not uncommon for pregnant women to be deprived of nutritious foods during different trimesters of pregnancy(3)(9)(10)(11)(12). Studies conducted in Asia, Turkey, and Africa showed that there are certain foods that pregnant women are restricted or encouraged to eat during pregnancy(4). In Ethiopia, studies conducted in Amhara and Oromia regions showed that the magnitude of nutritional taboos among pregnant women ranges from 19.1% to 49.8% (2)(13) (14). A study from Shashemene of Oromia regional state reported that 49.8% of women avoid one or more food items during pregnancy. These include linseed, honey, and milk/ yogurt were commonly avoided food items. Moreover, more than one-third

(38.3%) of pregnant women practice fasting during pregnancy which restricts meat and dairy products (14).

Pregnant women use herbs believing it will make them strong and healthy. Additionally, studies showed that pregnant women use herbs due to lack of effectiveness in the conventional treatments and perceiving that they are safer (15). A study conducted in Gonder showed that 48.6% of women used herbal medicines during pregnancy. The most commonly used herbs were ginger (*Zingiber officinale*) (40.7%) and damakasse (*Ocimum lamiifolium*) (38.4%). Unfortunately, most of the women (89.8%) used these herbals without consulting their doctors(16).

Previously conducted studies showed that various factors could be associated with harmful traditional practices during pregnancy. These factors include the educational status of the mother (17), place of delivery (6), maternal age (13), parity (18), antenatal care(ANC) utilization (14), marital status (15), place of residence (17), and age at marriage (19). Ethiopia, especially the Southern region, is one of the countries with various traditional practices around the World. These traditional practices could be useful or harmful. Though different studies were conducted previously on the topic, it is obvious that harmful traditional practices vary from region to region. However, such data is lacking in the study area. Identifying the existing harmful traditional practices and their determinants in the area is critical to designing appropriate interventions in the future. Therefore, this study aimed to assess the prevalence of harmful traditional practices during pregnancy and associated factors in southwest Ethiopia.

Methods

Study area and design

A community-based cross-sectional study was conducted in four zones of Southwest Ethiopia, namely Bench-Shako, West-Omo, Sheka, and Kafa Zones in 2019. A total

 population of around 2 million dowels in this zone, with nearly half of the population, being female. Regarding the health infrastructure, there are about five hospitals; 1 teaching and referral, 1 zonal level, and another primary district hospital, with more than 80 health centers.

Source population

All reproductive age group women who live in the study area and had at least one pregnancy.

Study population

All reproductive age group women who live in the study area who were pregnant at the time of data collection or were pregnant at least once within two years prior to the study.

Exclusion criteria

Women who lived in the study area for less than 6 months were excluded.

Sample size determination

The required sample size was calculated by using a single population proportion formula, considering the following assumption: 95% confidence interval (CI), 4% margin of error, 1.5 design effect, a non-response rate of 10%, and prevalence of traditional harmful practice during pregnancy was 22 % (13). Accordingly, a total of 680 women were selected for this study.

Sampling procedure

A multi-stage sampling technique was used to select the study participants. First, 4 Woredas were selected using a lottery method. Then, 8 kebeles from the 4 Woredas were selected randomly. After this, the sample size was proportionally allocated based on their population size. Then, households with currently or previously pregnant women were identified from a family folder with the help of health extension workers and a sampling frame was prepared. Finally, the study participants were selected randomly by using computer-generated random numbers.

Measurement Variables

Harmful traditional practices: Harmful traditional practices include abdominal massage, food taboos, and intake of herbs done on/by pregnant women without a health professional's instruction.

Independent Variables

Socio-demographic Variables: Age, religion, maternal education, marital status, partner's educational status, residence.

Obstetric Variables: Parity, ANC utilization, place of delivery for the most recent birth, history of abortion, history of stillbirth, history of child death.

Data collection procedures and instruments

The data collection was conducted by BSc nurses, midwives, and health extension workers using a semi-structured questionnaire that was prepared in the Amharic language. It was administered using of face to face interview. The questionnaires were prepared after reviewing related literature. They contain three parts; socio-demographic characteristics of participants, previous obstetric history, and harmful traditional practices during pregnancy. After the questionnaires were prepared, their reliability was checked using Cronbach's alpha. The result showed that Cronbach's alpha for the questionnaires was 0.87. Therefore, the questionnaires had acceptable reliability.

Data Quality Control

The Questionnaire was first developed in English, then translated to Amharic language, and again translated back to the English language to maintain its consistency. A pretest was also done on 5% of the sample size. Training was given to data collectors and supervisors regarding the objectives of the study, data collection method, and tools. During data collection time each data collector was closely supervised and the completeness of the questionnaires was checked.

Data analysis

Data were coded, entered, cleaned, and checked by Epi Data entry manager version 4.0.2, and analysis was done by using SPSS version 22. Following descriptive analysis, binary logistic regression was conducted to identify the association between dependent and independent variables at a significance level of P \leq 0.25. All variables with P-value \leq 0.25 were entered into a multiple logistic regression model. Variables with a P-value of < 0.05 in the multiple logistic regression were considered as the determinants of the outcome variable. The model fitness was checked using Hosmer and Lemeshow test (P= 0.774). The independent variables were checked for multicolinearity using tolerance and variance inflation factor (VIF). None of the variables had a tolerance value of <0.1 or a VIF value of \geq 10.

Patient and public involvement

It was not possible to involve patients or the public in the design, or conduct, or reporting, or dissemination plans of our research.

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Results

Socio-Demographic characteristics of the study participants

Out of 680 women, 667 (98% response rate) women participated in this study. Nearly half (48.3%) of the respondents were between 25-29 years old. A majority (95.7%) of the study participants were married, and 45.6% of the respondents were housewives. Regarding education, 57.4% of the participants did not attain formal education. Two hundred and seventy (40.5%) women were Orthodox Christians. The husbands of 393(58.9%) women attained primary education. About 480 (72%) women were residents of rural areas (Table 1).

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Variables		Frequency	Percentage %
Age	15-19 years	2	0.3
	20-24 years	104	15.6
	25-29 years	322	48.3
	30-44 years	158	23.7
	35-39 years	63	9.4
	40-44 years	18	2.7
Religion	Orthodox	270	40.5
	Muslim 35		5.2
	Protestant 357		53.5
	Traditional religion	5	0.7
Maternal Education	No formal education	383	57.4
	Primary (1-8)	176	26.4
	Secondary (9-12)	44	6.6
	Above Secondary	64	9.6
Marital status	Married	638	95.7
	Single	14	2.1
	Divorced	10	1.5
	Widowed	5	0.7
Husband Education	No formal education	130	19.5
	Primary (1-8)	393	58.9
	Secondary (9-12)	86	12.9
	Above Secondary	58	8.7
Residence	Urban	187	28
	Rural	480	72
Monthly income	<1000ETB	304	45.6
	1001-2000ETB	240	36.0
	>2000ETB	123	18.4

Table 1: Socio-demographic characteristics of the respondents (n =667)

Obstetric-related characteristics of the respondents

Of the total 667 of study participants; 550(82.5%) of them were multiparas, and 637(95.5%) of them used ANC services during their last pregnancy. Regarding the place of birth, 613 (91.9%)

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women gave birth to their last child in health institutions. Sixty-four (9.6%) mothers had a history of abortion, 132 (19.8%) mothers had a history of child death, and 25 (3.7%) had a history of stillbirth (Table 2).

Variables		Frequency	Percentage %
Parity	Primipara	117	17.5
	Multiparas	550	82.5
ANC utilization	Yes	637	95.5
	No	30	4.5
History of Abortion	Yes	64	9.6
	No	603	90.4
Place of birth for the most recent birth	Health facility	613	91.9
	Home	54	8.1
History of child death	Yes	132	19.8
	No	535	80.2
History of stillbirth	Yes	25	3.7
	No	642	96.3

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Table 2: Obstetric-related	characteristics of th	e respondents (n=667)
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Prevalence and types of harmful traditional practices during pregnancy

Two hundred and forty-seven [37%, 95% CI (33.4, 40.8)] mothers practiced harmful traditional practices at some point in their pregnancy. The most commonly practiced activities were abdominal massage (72.9%), intake of herbs (63.9%), and food taboos (48.6%). All of the women exposed to abdominal massage stated that the procedure was performed by untrained personnel. Additionally, 112 (62.2%) of them mentioned that the abdominal massage was conducted during the third trimester of their pregnancy. Women who experienced food prohibition mentioned that honey (46.6%) and milk (43.3%) were the most commonly averted food items during pregnancy. Seventy-three (46.2%) of the respondents responded that they take herbs to enhance labor while 57 (36.1%) used herbs to relieve pain (Table 3).

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Variables		Frequency	Percentage %
HTPs performed during	Yes	247	37
pregnancy (n=667)	No	420	63
HTPs performed during	Abdominal Massage	180	72.9
pregnancy(n=247)*	Food taboo	120	48.6
	Drinking herbs	158	63.9
Time of abdominal massage	First trimester	17	9.4
was performed (n=180)	Second trimester	51	28.4
	Third trimester	112	62.2
Personnel performed	Untrained traditional birth attendants	88	48.9
abdominal massage (n=180)	Neighbors	57	31.7
	Family	35	19.4
Food items avoided during	Milk/ yogurt	52	43.3
pregnancy (n=120)	Egg	32	26.6
	Meat	26	21.6
	Honey	56	46.6
	Casava	35	29.2
	Other (fruits, Honey Linseed, and	17	14.2
	Vegetables)		
Reasons for intake of herbs	To enhance labor	73	46.2
(n=158)	To keep the fetus healthy	24	15.2
	To relieve pain	57	36.1
	Other(Prevent constipation	4	2.5
	&Vomiting)		
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Table 3: Prevalence and types of harmful traditional practices during pregnancy

[*Multiple responses were possible, HTP= Harmful traditional practice]

Factors associated with harmful traditional practices during pregnancy

Binary and multiple logistic regression was conducted to identify factors associated with harmful traditional practices during pregnancy. In the binary regression parity, ANC utilization during last pregnancy, history of child death, monthly income, history of stillbirth, place of delivery, and maternal educational status were found to be significantly associated with the outcome variable. These variables were entered into a multiple logistic regression model for Page 13 of 25

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further analysis. In the final model, monthly income of less than 1000 ETB, lack of formal education, being multipara, having of ANC visits, and having no history of child death were significantly associated with harmful traditional practices during pregnancy.

Multipara women were 53% [AOR = 0.47, 95% CI (0.27, 0.80), P=0.003] less likely practice harmful traditional practices than primipara women. Women with no history of child death were 2.74, [AOR= 2.74, 95% CI (1.75, 4.29), P< 0.001] times more likely to engage in harmful traditional practices during pregnancy than women with a history of child death. Women with no formal education were 4.81 [AOR = 4.81, 95% CI (2.50, 9.23), P< 0.001] more likely to conduct harmful traditional practices than women with tertiary education. Women who had ANC visits during their last pregnancy were 76% [AOR = 0.24, 95% CI (0.10, 0.59), P=0.002] less likely to practice harmful traditional practices than women with no ANC visits. Mothers with a monthly income of less than 1000 ETB were 3.13 [AOR= 3.13, 95% CI (1.83, 5.37), P < 0.001] times more likely to exercise harmful traditional practices than women with a monthly income of J.e.zoni greater than 2000ETB (Table 4).

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Table 4: Factors	associated w	ith harmful	traditional	practices	during pregnancy
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Variable		COR (95%CI)	AOR (95%CI)	P-Value
Parity	Multipara	0.40(0.25, 0.64)	0.47(0.27,0.80)	0.003
	Primipara	1	1	
Residence	Rural	0.62(0.43, 0.89)	0.72(0.46,1.12)	0.055
	Urban	1	1	
ANC visits during	No	1	1	
lust prognancy	Yes	2.67 (1.26, 5.64)	0.24(0.10,0.59)	0.002
History of child death	No	3.93(2.67, 5.95)	2.74(1.75,4.29)	< 0.001
doum	Yes	1	1	
Monthly income	<1000ETB	3.19(2.04, 5.04)	3.13(1.83,5.37)	< 0.001
	1001-2000ETB	1.30(0.91, 1.87)	1.37(0.91,2.07)	0.240
	>2000ETB	1	1	
History of stillbirth	Yes	0.21(0.89, 0.52)	0.39(0.14,1.05)	0.081
	No	1	1	
Place delivery	Home	0.56(0.32,0.97)	0.60(0.30,1.20)	0.180
	Institution	1	1	
Maternal educational status	No education	2.30 (1.34,3.95)	4.81(2.50,9.23)	< 0.001
	Primary education	0.84(0.47,1.49)	1.44(0.73,2.81)	0.347
	Secondary education	0.96(0.44,2.08)	1.26(0.53,3.002)	0.724
	Tertiary education	1	1	

Discussion

Our study showed that 37% of women in Southwest Ethiopia practiced harmful traditional practices while they were pregnant. Abdominal massage, intake of herbs, and food taboos were the most commonly identified harmful traditional practices during pregnancy. Multiple logistic

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regression analysis showed that monthly income of less than 1000ETB, lack of formal education, having of no ANC visits, having no history of child death, and multiparous women were significantly associated with being involved in traditional practices during pregnancy. In the current study more than one-third of mothers who participated in the study reported practicing harmful traditional practices while they were pregnant. This finding was lower than the studies conducted in a Gurage zone (17) and Meshenti Town (3) while higher than a study conducted in Wonago town(20). This difference could be explained by the fact that there was a difference in the definition of harmful traditional practice between the studies. The difference in the study population could also result in a variation in the estimation of harmful traditional practices.

Abdominal massage during pregnancy is considered as a "silent killer" which can result in maternal and perinatal mortality in addition to various obstetric complications(21). Unfortunately, abdominal massage was performed on 72.9% of our participants by untrained personnel. This finding was higher than the findings of the studies conducted in Amhara and Afar regions (3), (22) (23). About 62.2% of them mentioned that the procedure was performed during the third semester of their pregnancy which could have resulted in placenta previa, abruption placenta, retained placenta, uterine rupture on the top of maternal and perinatal mortalities (21).

The nutritional need of pregnant women is higher than that of non-pregnant women due to the numerous changes required to ensure healthier maternal and fetal development (24). Moreover, interventions designed to optimize pregnancy outcomes and promote healthy infant growth and development during the first 1000 days (from conception until the child reaches age 2 years) will also reduce chronic disease risk (25). Therefore, it is recommended for pregnant women to eat balanced diets including vitamins, minerals, and omega-3 fatty acids (24). In contrast to this, our study showed that 48.6% of women avoided nutritious foods (dairy products, meat,

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> egg, honey, vegetables, and fruits) during their pregnancy. This could result in preterm birth and low birth weight(26) (27). This finding was higher than the findings of the studies conducted in a Gurage zone, Amhara and Afar regions (17), (3)(22) (23) while lower than a study conducted in Wonago town(20).

One hundred and fifty-eight (63.97%) women reported that they have used herbs during their pregnancy. This finding was higher than the findings of a study conducted in a Gurage zone which showed that 46.7% and 47.9% of women drink "Koso" and "Telba" respectively during the perinatal period (17). Women may use herbs during pregnancy to treat various health conditions. These include nausea, vomiting, common cold, urinary tract infection, and shortening labor (28). However, pregnant women can be vulnerable to the adverse effects of these substances as their dosage and safety are not well established. Additionally, pregnant women may not inform their physicians about their use of herbs since most of them believe that they are safe(15). Evidence showed that herbal medications may cause heartburn, premature labor, miscarriage, increased blood flow, and allergic reactions during pregnancy(28). Therefore, pregnant women should be cautious while using herbs to avoid these consequences. The difference between the current and other studies in terms of the prevalence of abdominal massage, food taboos, and the use of herbs could be explained by the fact that different traditional practices might be practiced in different areas.

Our study showed that mothers who did not attained formal school were more likely to engage in harmful practices than mothers with tertiary education. Previously conducted studies also showed that a lack of formal education increases the probability of practicing harmful traditional practices (17)(20)(22). This could have resulted from the fact that education enables pregnant women to abide by healthy practices (17)(20). Additionally, educated women might also have higher income which in turn increases their exposure to health-related information.

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Pregnant women with lower economic status (monthly income of <1000ETB) were more likely to practice harmful traditional practices than women with a monthly income of greater than 2000ETB. These could be explained by the fact that women with lower economic status might not attain formal education. This might hinder them from exercising healthy lifestyles during pregnancy (17)(20). Additionally, this group of women might not get health education as a result of poor health care access(29).

Women who had ANC visits were less likely to practice harmful traditional practices than women who had no ANC visits. This finding was comparable with a finding of a study conducted in a Gurage zone(17). A study conducted in Amhara region also showed that women who had no ANC follow-ups were up to two times more likely to practice cultural malpractices during labor and delivery(22). These findings indicated that ANC visits have a positive impact on reducing harmful traditional practices during pregnancy. The possible justification could be women who had ANC visits could get aware of the risks of harmful traditional practices during pregnancy.

Women who had a history of child death were less likely to practice harmful traditional practices during pregnancy than women who had no history of child death. This might be due to the fact that women with adverse pregnancy outcomes, including a child death, are more likely to seek maternal health services, which might reduce harmful traditional practices(30).

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Multipara women were less likely to practice harmful traditional practices than primipara women. This could be explained by the fact that multipara women might avoid traditional practices during pregnancy due to repeated exposure to health information(31).

The findings of this study should be interpreted with precaution due to its limitations. Due to the nature of the study design (cross-sectional), it was impossible to establish a temporal relationship between the independent and dependent variables. The study might be subjected to recall bias since women who gave birth two years before the study were included.

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Conclusions

Despite the advancements in medical science in the past decades, a significant proportion of pregnant women continue to practice harmful traditional practices in Southwest Ethiopia. Abdominal massage, intake of herbs, and food taboos were the most commonly practiced harmful traditional practices in the area. The harmful traditional practices were more prevalent among primiparas, women with no formal education, women with no history of child death, women with no ANC follow-ups, and women with lower monthly income. Our study showed that more than one-third of women in the study area were exposed to some forms of harmful traditional practices while they were pregnant. This indicated that different measures need to be taken to avert these practices. Therefore, health professionals should use community health programs and ANC visits to educate mothers about the negative consequences of harmful traditional practices. They should also work with community members, such as community and religious leaders, to change the community's attitude toward harmful traditional practices during pregnancy. Researchers should explore further harmful traditional practices during pregnancy and recommend possible areas of intervention. They should also determine the short and long-term impacts of harmful traditional practices on mothers and their newborns.

Declarations

Funding

This work was supported by Mizan-Tepi University

Conflict of interests

None declared

Contribution statement

Melkamsew Tesfaye came up with the research idea and was involved in all stages of the research. Yemisrach Belete Biru prepared the manuscript while Nahom Solomon and Dawit

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Getachew were responsible for conducting of the analysis and interpretation of the findings. All authors read and approved the final manuscript.

Ethics statement

This study was approved by the Research Ethics Review Committee (RERC) of Mizan Tepi University with a reference number of RCSD/023/18. Written informed consent was obtained from all study participants after the data collectors discussed the objectives of the study. The confidentiality of the data was maintained by using codes during storing and analysis of the data. Additionally, no personal identification information was collected.

Data sharing statement

Data are available upon reasonable request.

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STRUDE Statement—	-CHECKHS	a of items that should be included in reports of cross-sectional statues	1
	Item No	Recommendation	P
Title and abstract	1	(<i>a</i>) Indicate the study's design with a commonly used term in the title or the abstract: Yes	1
		(b) Provide in the abstract an informative and balanced summary of what	2
		was done and what was found: Yes	
Introduction			1
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported: Yes	4-
Objectives	3	State specific objectives, including any prespecified hypotheses: Yes	5
Methods			
Study design	4	Present key elements of study design early in the paper: Yes	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of	6
0		recruitment, exposure, follow-up, and data collection: Yes	
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants: Yes	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders,	7
		and effect modifiers. Give diagnostic criteria, if applicable: Yes	
Data sources/	8*	For each variable of interest, give sources of data and details of methods	7
measurement		of assessment (measurement). Describe comparability of assessment	
		methods if there is more than one group: Yes	
Bias	9	Describe any efforts to address potential sources of bias: Yes	7
Study size	10	Explain how the study size was arrived at: Yes	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If	N
		applicable, describe which groupings were chosen and why: N/A	
Statistical methods	12	(<i>a</i>) Describe all statistical methods, including those used to control for confounding: Yes	7
		(<i>b</i>) Describe any methods used to examine subgroups and interactions: N/A	N
		(c) Explain how missing data were addressed: N/A	N
		(<i>d</i>) If applicable, describe analytical methods taking account of sampling strategy: N/A	N
		(e) Describe any sensitivity analyses: N/A	N
Results			_
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included	8
		in the study, completing follow-up, and analysed: Yes	
		(b) Give reasons for non-participation at each stage: N/A	N
		(c) Consider use of a flow diagram: N/A	N
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders: Yes	8-
		(b) Indicate number of participants with missing data for each variable of interest: N/A	N
0 / 1 /	1.5*		10

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Main results	16	(<i>a</i>) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included: Yes	11
		(<i>b</i>) Report category boundaries when continuous variables were categorized: Yes	9
		(<i>c</i>) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period: N/A	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses: N/A	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives: Yes	13- 14
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias: Yes	3
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence: Yes	13- 15
Generalisability	21	Discuss the generalisability (external validity) of the study results: Yes	13- 15
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	16

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.