

JIMMA UNIVERSITY FACULTY OF PUBLIC HEALTH, DEPARTMENT OF
EPIDEMIOLOGY



UNDIAGNOSED GESTATIONAL HYPERTENSION AND ASSOCIATED
FACTORS AMONG WOMEN LIVING IN NADI GIBE DISTRICT, JIMMA
ZONE, SOUTH WEST ETHIOPIA, 2023.

BY: LEMMA TEFERA (BSc.HO)

RESEARCH THESIS SUBMITTED TO JIMMA UNIVERSITY, FACULTY OF
PUBLIC HEALTH, DEPARTMENT OF EPIDEMIOLOGY; IN PARTIAL
FULFILMENT OF THE REQUIRMENT FOR MASTER OF PUBLIC HEALTH
IN GENERAL PUBLIC HEALTH

JANUARY, 2023

JIMMA-ETHIOPIA

JIMMA UNIVERSITY

FACULTY OF PUBLIC HEALTH,

DEPARTMENT OF EPIDEMIOLOGY

ASSESSMENT OF UNDIAGNOSED GESTATIONAL HYPERTENSION
AND ASSOCIATED FACTORS AMONG WOMEN LIVING IN NADI GIBE
DISTRICT, JIMMA ZONE, SOUTHWEST ETHIOPIA, 2023.

BY

LEMMA TEFERA (BSc.HO)

ADVISOR: Mr. SOLOMON BERHANU (BSc, MPHE, ASSISTANT
PROFESSOR)

RESEARCH THESIS SUBMITTED TO JIMMA UNIVERSITY, FACULTY OF
PUBLIC HEALTH, DEPARTMENT OF EPIDEMIOLOGY; IN PARTIAL
FULFILMENT OF THE REQUIREMENT FOR MASTER OF PUBLIC HEALTH
IN GENERAL PUBLIC HEALTH

JANUARY, 2023

JIMMA-ETHIOPIA

ABSTRACT

Background: Gestational hypertension is the most frequent cause of hypertension during pregnancy and can subsequently progress to preeclampsia.

Objective: This study aims to assess the prevalence of undiagnosed gestational hypertension and the associated factors among women living in the Nadi Gibe district, Jimma zone, Southwest Ethiopia, 2022.

Methods: A community-based cross-sectional design with mixed method was conducted from June 16–29, 2022. A systematic random sampling and purposive sampling technique were used for quantitative and qualitative study. Epi Data version 3.1 was used to enter data, and the Statistical Package for Social Science version 23 was used to analyze it. Binary logistic regression analysis with a cut-off point for statistical significance, p-value of 0.05 and adjusted odds ratio with a 95% confidence interval were used.

Result: A total of 606 pregnant women participated, with a response rate of 95.4%. The prevalence of undiagnosed gestational hypertension among women was 5.6%. Positive family history of chronic hypertension (AOR = 2.49, 95% CI = [1.19-5.22]), kidney diseases (AOR = 2.44, 95% CI = [1.22-4.86]), psychological stress (AOR = 2.19, 95% CI = [1.09-4.41]), alcohol use (AOR = 3.48, 95% CI = [1.76-6.87]), women napping at day time (AOR = 2.09, 95% CI = [1.07-4.07]), and animal fat or oil use (AOR = 1.95, 95% CI = [1.02-3.71]) were found to be associated factors with undiagnosed gestational hypertension.

Conclusion and recommendation: The prevalence of undiagnosed gestational hypertension was 5.6% among women in the study area. Family history of chronic hypertension, kidney diseases, psychological stress, napping at day time, alcohol use, and animal fat or oil use were found to be significantly associated factors for hypertension. Therefore, regular health education program to raise awareness and community-based screening program should be given priority for early detection of hypertension and prevention of complications.

Key words: Hypertension disorder, pregnant women, Risk factors, Jimma, Ethiopia.

Acknowledgement

I would like to forward my deepest gratitude and thanks to my advisor, Mr. Solomon Brehanu, for his constructive advice, support, valuable comments, and suggestions during the development of my thesis work. I would also like to acknowledge Jimma University, institute of health science, department of epidemiology, for giving me the opportunity to go through and develop this thesis work. I extended my special thanks to my intimate friends and family for their committed assistance by giving supportive ideas and unreserved encouragement in carrying out this thesis work.

Table of Contents

ABSTRACT.....	II
Acknowledgement	III
List of table	VII
List of figure	VIII
Abbreviations and Acronyms	IX
Chapter 1: Introduction.....	1
1.1 Background	1
1.2 Statement of the problem	2
1.3 Significance of the study.....	3
Chapter 2: Review of Literature	4
2.1 Overview	4
2.2 Prevalence of hypertension disorders in pregnancy.....	4
2.3 Risk Factors of hypertension disorder of pregnancy.....	5
2.3.1 Socio-Demographic Risk Factors.....	5
2.3.2 Behavioral and lifestyle factors	6
2.3.2.1 Obstetric related factors	6
2.3.2.2 Medical and family history related factors	6
2.3.2.3 Personal and lifestyle related factors	7
2.4 Conceptual framework	9
Chapter 3: Objectives.....	10
3.1 General objective.....	10
3.2 Specific objectives.....	10
Chapter 4: Methods and materials	11
4.1 Study area and period.....	11

4.2 Study design	12
4.3 Population.....	12
4.3.1 Source population.....	12
4.3.2 Study population.....	12
4.3.3 Study units	12
4.4 Eligibility criteria	12
4.4.1 Inclusion criteria.....	12
4.4.2 Exclusion criteria.....	12
4.5 Sample size and sampling technique.....	12
4.5.1 Sample size determination.....	12
4.5.2 Sampling technique and procedure.....	14
4.6 Data collection procedures (Instrument, personnel, and technique)	15
4.6.1 Data collection instruments	15
4.6.2 Data collection technique and procedures	16
4.6.3 Data collection person	17
4.7 Study variables	18
4.7.1 Dependent variable	18
4.7.2 Independent variable.....	18
4.8 Measurements.....	18
4.9 Operational (5)definitions	20
4.10 Data processing and analysis.....	20
4.11 Data quality assurance.....	21
4.12 Ethical consideration.....	21
4.13 Dissemination plan.....	22
Chapter 5: result.....	23

5.1. Socio-demographic related factors	23
5.2 Prevalence of Gestational Hypertension	24
5.3 Obstetrics related factors	24
5.4 Medical and family history related factors.....	25
5.5 Personal and lifestyle related factors.....	26
5.6 Dietary related factors:	28
5.7 Knowledge and sources of information related factors.....	28
5.8 Factors Associated with undiagnosed gestational hypertension	30
Chapter 6: Discussion	32
6.1 Strength of the study	34
6.2 Limitations of the study.....	34
Chapter 7: Conclusion.....	35
7.1 Recommendation.....	35
Reference	37
ANNEX.....	42
Annex I:-Information Sheet and Consent Form for (Facility administrative)	42
Annex II: English Version Questionnaire	44
Annex III: In-depth interview questionnaire (English version)	52
Annex VI: Gaafannoo Afaan Oromoo	54
Annex V: Gaafileewan Veerjiinii Afan Oroomoo	55
Annex VI: Gaaffiwwan gadi fageenyaan gaafataman.....	62

List of table

Table 1: Sample size determination for the prevalence of undiagnosed gestational hypertension and the associated factors among women living in Nadi Gebe district, Jimma zone, southwest Ethiopia, 2022.....	13
Table 2: Distribution of the study participants by their socio- demographic related factors among pregnant women at Nadi Gibe district, Jimma zone, south west Ethiopia, July, 2022. (n=590)..	23
Table 3:Distribution of the study participants by their obstetric related factors among pregnant women at Nadi Gibe district, Jimma zone, south west Ethiopia, July, 2022. (n=590).....	25
Table 4: Distribution of the study participants by their medical related factors among pregnant women at Nadi Gibe district, Jimma zone, south west Ethiopia, July, 2022. (n=590).....	26
Table 5:Distribution of the study participants by their personal and lifestyle related factors among pregnant women at Nadi Gibe district, Jimma zone, south west Ethiopia, July, 2022. (n=590)..	26
Table 6: Distribution of the study participants by their Dietary related factors among pregnant women at Nadi Gibe district, Jimma zone, south west Ethiopia, July, 2022. (n=590).....	28
Table 7: Distribution of the study participants by their Knowledge and sources of information of participant among pregnant women at Nadi Gibe district, Jimma zone, south west Ethiopia, July, 2022. (n=590).....	29
Table 8:- Multivariable logistic regression analysis for factors associated with undiagnosed gestational hypertension among women living in Nadi Gibe district, Jimma zone, south west Ethiopia, July, in 2022.	31

List of figure

Figure 1: Conceptual framework of the prevalence of undiagnosed gestational hypertension among women living in Nadi Gibe district, Jimma zone, Southwest Ethiopia.	9
<i>Figure 2: Map of Nadi Gibe District, Jimma Zone, Southwest Ethiopia, 2022.</i>	11
Figure3: Schematic diagram showing sampling procedure for the prevalence of undiagnosed gestational hypertensionon and associated factors among women in Nadi Gibe district, Jimma zone, Southwest Ethiopia, 2022.....	15

Abbreviations and Acronyms

ACOG	American college of obstetricians and gynecologists
ANC	Antenatal care
BMI	Body mass index
CSA	Central statistical authority
EDHS	Ethiopia Demographic and Health Survey
GDM	Gestational diabetes mellitus
GPAQ	Global Physical Activity Questionnaire
GH	Gestational hypertension
HDP	Hypertensive disorders of pregnancy
HTN	Hypertension
HELLP	Hemolysis, elevated liver enzymes, and low platelet count
LMIC	Low and middle -income countries
MD	Maternal deaths
MET	Metabolic equivalents
PIH	Pregnancy induced hypertension
PE	Pre-eclampsia
SSP	Statistical Package for Social Science
SSA	Sub-Saharan Africa
WHO	World Health Organization

Chapter 1: Introduction

1.1 Background

Hypertensive disorders of pregnancy (HDP) refer to a continuum of conditions characterized by high blood pressure or systolic blood pressure greater than or equal to 140 mmHg and/or diastolic blood pressure greater than or equal to 90 mmHg in two measurements of at least 6 hours apart(1).Hypertension disorder of pregnancy encompasses a spectrum of conditions including pre-existing hypertension, gestational hypertension, preeclampsia/eclampsia, and superimposed hypertension. These conditions range from a mild increase in blood pressure at term with no additional signs or symptoms to severe complications with potential for significant maternal, fetal and neonatal harm (2).

Gestational hypertension can be defined as a systolic blood pressure (SBP) of ≥ 140 mmHg and/or a diastolic blood pressure (DBP) of ≥ 90 mmHg on at least two occasions at least 6 h apart after the 20th week of gestation in women known to be normotensive before 20 weeks' gestation (3). It is a silent killer as very rarely any symptom can be seen in its early stages until a severe medical crisis takes place like heart attack, stroke, or chronic kidney disease. Since people are unaware of excessive blood pressure, it is only through measurements that detection can be done. Although majority of patients with hypertension remain asymptomatic, some people with HTN report headaches, lightheadedness, vertigo, altered vision, or fainting episode(4).This contributes to the death of a pregnant woman every three minutes and more than nine million deaths every year. Gestational hypertension especially preeclampsia and eclampsia are significant contributors to the global burden of maternal and perinatal mortality. It remains one of the top causes of maternal mortality and morbidity in high, middle, and low-income countries.

In Ethiopia, it is the third main direct cause of death next to hemorrhage and obstructed labor/ruptured uterus. It also increases neonatal adverse outcomes such as preterm birth, intrauterine growth restriction, low birth weight, high neonatal admissions, and intrauterine and perinatal death(5).Hypertension disorder of pregnancy cover a spectrum of conditions associated with hypertension during pregnancy and can result in many maternal and neonatal complications, including death(6).

1.2 Statement of the problem

Hypertensive disorders of pregnancy are one of the major causes of maternal morbidity and mortality leading to 10-15% of maternal deaths, especially in developing world. It may complicate about 3-10% of all pregnancies (7). Approximately 30% of hypertensive disorders in pregnancy are due to chronic hypertension, and 70% are due to gestational hypertension (3). Gestational hypertension, which affects up to 10% of pregnant women, and the risk of progression to PE is estimated as 17.1–25%. About 50% of patients with gestational hypertension continue to have high BP levels after delivery. Conversely, about 10% of the women who are normotensive during pregnancy may develop hypertension up to 6 weeks postpartum. Pregnant women have the same risk of short and long-term cardiovascular complications as women affected by hypertension during gestation(8).

Several studies have shown that null parity, multiple pregnancies, history of chronic hypertension, gestational diabetes, fetal malformation, and obesity, extreme maternal age (less than 20 or over 40 years), preexisting diseases like renal disease, diabetes mellitus, and cardiac disease, positive family history of hypertension which shows genetic susceptibility, psychological stress, alcohol use, very underweight and overweight, and low level of socioeconomic status are the risk factors for (HDP)(9). According to epidemiological studies, the prevalence of hypertension in pregnant women in Western Europe reaches 15%, whereas in the USA it appears in 5-7% of births(11). Due to the existing low level of health service utilization and poor quality of maternal and neonatal care, maternal and perinatal morbidities are much higher in low and middle-income countries (LMICs)(10).

According to a population-based study in South Africa, the incidence of hypertensive disorders of pregnancy (HDP) was 12%(12). Hypertensive disorders of pregnancy were also reported to account for 30% of maternal mortality in Ghana(10). In another study in Nigeria, the incidence of gestational hypertension was 5.9%(13). In Ethiopia, hypertensive disorders of pregnancy complicate around 6% of pregnancies and are responsible for 19% of all maternal deaths(14). Another study in Ambo, Ethiopia, maternal mortality due to hypertensive disorders of pregnancy was reported to be 12.3%(15). Consequences of hypertensive disorders of pregnancy include placental abruption, pulmonary edema, thrombocytopenia, hemolytic anemia, stroke, recurrent seizures, kidney damage, and liver injury. Women in rural areas are even surrounded by a number

of inequalities as a result of socioeconomic limitations and gender disparities. The social determinants of health such as health care access and quality, education access and quality, social and community context, economic stability, neighborhood and built environment also have a great impact on their health outcome and quality of life (16). Prevention of HDP complications reduces not only women's mortality but also their negative experiences with preeclampsia. Preeclampsia and gestational hypertension were found to have an association with increased risk of recurrence, and future CVD, and type 2 diabetes. HDP affect not only the mother's health condition (17).

In Ethiopia, there are few hospital-based reports on the maternal and fetal outcomes of (HDP), and they may not represent the larger population due to the low institutional delivery rate(3) and limited studies have been conducted in this important area so far. These limited studies indicate that the (HDP) contributes to a very significant maternal and neonatal disease burden. Understanding the burden at each segment of the continuum and identifying risk factors affecting the progression from mild morbidity to life-threatening complications is essential for designing appropriate interventions. Therefore, the objective of this study was to assess the prevalence of undiagnosed gestational hypertension and the associated factors among women living in Nadi Gibe district, Jimma zone, Southwest Ethiopia.

1.3 Significance of the study

The findings of this study may help with evidence-based communication and decision-making for different organizations at different levels by revealing the prevalence of undiagnosed gestational hypertension and the associated factors among women to pay attention to the prevention and control of hypertension disorders during pregnancy with accessible and sustainable strategies. Also, the information from this study may help to increase and update knowledge of health care providers at the health institution level regarding the prevalence and the associated factors of HDP to provide quality care to ANC attendants. The results from this study will be useful in order to guide program planning and organize care for pregnant mothers. Additionally, this study may help to understand the extent and causes of the problem and to plan an appropriate and most effective intervention. This study will be conducted at the community level, which helps in recognizing the risk factors associated with hypertension disorder of pregnancy at the household and community level.

Chapter 2: Review of Literature

2.1 Overview

Hypertension in pregnancy is a leading cause of maternal, fetal, and neonatal morbidity and mortality and affects 5–10% of pregnancies worldwide(11).HDP is comprised of a spectrum of disorders that are typically classified into categories that include chronic (preexisting) hypertension, gestational hypertension, preeclampsia (chronic hypertension with superimposed preeclampsia), and eclampsia(18).The risk factors for developing HDP include: null parity, multiple pregnancies, history of chronic hypertension, gestational diabetes, fetal malformation, and obesity, extreme maternal age (less than 20 or over 40 years), history of HTN in previous pregnancies, preexisting diseases like renal disease, diabetes mellitus, cardiac disease, and a positive family history of HTN which shows genetic susceptibility, psychological stress,alcohol use, being very underweight and overweight, and low level of socioeconomic status(12).According to a study in South Africa, the incidence of hypertensive disorders of pregnancy was 12%, and it was the commonest cause of maternal death, accounting for 20.7% of maternal deaths. (9). In Ethiopia, hypertensive disorders of pregnancy complicate around 6% of pregnancies and are responsible for 19% of all maternal deaths. Consequences of hypertensive disorders of pregnancy include placental abruption, pulmonary edema, thrombocytopenia, hemolytic anemia, stroke, recurrent seizure, kidney damage, and liver injury(1).

2.2 Prevalence of hypertension disorders in pregnancy

A cross-sectional retrospective study conducted in China showed that the prevalence of HDP was 5.22%(19). A cross-sectional study carried out in India revealed that the prevalence of hypertension in pregnancy was 6.9%(7). Studies conducted in Brazil showed that the prevalence of HDP was 48% having GH,31% chronic hypertension,14% pre-eclampsia,and 7% pre-eclampsia superimposed on chronic hypertension(20). A systematic review and meta-analysis conducted on the prevalence of different types of HDP among African mothers showed that the prevalence ranges from 9.2% for preeclampsia to 49.8% for GH(6). Various studies conducted in Ethiopia revealed that the prevalence of HDP ranged from 1.2% to 18.25%(21). A systemic review and meta-analysis done in Ethiopia showed that the pooled prevalence of HDP was estimated to be 6.25%(21). A hospital-based cross-sectional study conducted in Jimma University Specialized Hospital in Ethiopia showed that the overall HDP was 8.5%(14). Moreover, the study done in

Debre Brehan Referral Hospital indicated that hypertensive disorders have an increasing trend from 1.8% in 2011 to 5.7% in 2014(22).A retrospective study in a teaching hospital in Addis Ababa showed that HDP was found to be 25.4%(3).A meta-analysis of the pooled prevalence of HDP in Ethiopia revealed that all forms of HDP and preeclampsia were 6.82 and 4.74%, respectively(23).Another cross-sectional study conducted in Gondar town showed that 16.8% of pregnant women had HDP(24). A retrospective cross-sectional study done in Wolaita Sodo teaching and referral hospital showed that the prevalence of HDP was 2.3%(25).A retrospective study conducted in Nekemte referral Hospital, Ethiopia,revealed that HDP was 3.56%(2).A hospital-based crosssectional study conducted in Mizan-Tepi University Teaching Hospital showed that the prevalence of HDP was 7.9%, of which 15.2% was gestational hypertension, 36.4% was mild preeclampsia, 45.5% was severe preeclampsia, and 3% eclampsia(9). A prospective cohort study in northern Ethiopia showed that the incidence of GH in this study was 6%(13). Another study conducted in Nekemte referral hospital showed that 76.9% were pre-eclampsia or eclampsia, 14% were gestational hypertension, 0.7% were superimposed hypertension, and 2.9% were chronic hypertension(2).

2.3 Risk Factors of hypertension disorder of pregnancy

Although HDP has no definite cause, several studies focusing on risk factors have been conducted in different parts of the globe and identified various risk factors for hypertensive disorders of pregnancy. These risk factors include socio-demographic variables such as personal and lifestyle factors; obstetric-related factors; familial factors; and medical-related variables(15).

2.3.1 Socio-Demographic Risk Factors

A cross-sectional study in Chinese shows that lower education levels and maternal age are positively associated with the risk of HDP(26).A cross-sectional study carried out in India revealed that the prevalence of HDP in the age group of ≥ 25 years was significantly higher at 9.9% as compared to the < 25 years age group 5.9%(7). Illiteracy was associated with a two-fold risk of HDP in Maroua, Cameroon, housewives had an increased risk of HDP in pregnancy, and previous pre-eclampsia as an independent risk for super-imposed pre-eclampsia was associated with a five-fold risk of HDP(27). A review meta-analysis in Ethiopia showed that a maternal age of ≥ 35 years is almost three times more likely to develop HDP compared with a maternal age of < 35 years and the association was statistically significant(23). A study conducted in Gondar town showed that

the risk of developing HDP is higher in older women than in young pregnant women(24).Another study conducted in Nekemte referral Hospital, Ethiopia, revealed that about two-folds of cases of HDP (64.8%) were living in rural areas compared to urban areas, and rural residential areas were found to be one of the risk factors of HDP and higher in old age (greater than 35 years in comparison with the age range of 25–29 years)(2). A retrospective cross-sectional study done in Ethiopia showed a significant association of HDP with increasing age, and women aged more than 35 years old were 1.64 times more likely to develop HDP than women aged 20–34 during their pregnancy(21).A systematic and meta-analysis in sub-Saharan Africa showed that low maternal education level is significantly associated with HDP among SSA women(6).

2.3.2 Behavioral and lifestyle factors

2.3.2.1 Obstetric related factors

The study in Chinese subjects has shown that primiparous subjects had a 1.5-fold higher risk of HDP compared with subjects who were not primiparous(26). A systematic review identified that primiparity of any type of HDP is significantly associated with HDP, and women who have experienced previous HDP are more likely to experience the recurrence of HDP in consecutive pregnancies among SSA women(6).A systematic review of studies showed a statistically significant association of primigravida with HDP and a higher risk of HDP among primigravida women than multigravida(21).Studies conducted in Nekemte referral hospital indicated that twin pregnancies had more than three times the risk of developing hypertension during pregnancy as compared with having a singleton pregnancy(2).A retrospective cross-sectional study done in Wolaita Sodo teaching and referral hospital showed that regarding the ANC visit, women who had not had ANC attendance were three times more likely to have an unfavorable perinatal outcome as compared to women who did not attend antenatal care(25).A review meta-analysis in Ethiopia showed that developing HDP in primigravida was 1.27 times compared with multigravida pregnant women, and twin pregnancy increased the risk of developing HDP three times more compared to singleton pregnancy, and the association was statistically significant(23).A study conducted in Nekemte referral hospital showed that lack of ANC was more likely associated with HDP(2).

2.3.2.2 Medical and family history related factors

Studies conducted in maternity hospitals in Ireland revealed that the prevalence of HDP was higher in women with DM, GDM, and obesity(28).A study conducted in Jordan revealed that chronic

hypertension, diabetes, nulliparity, and previous history of PE were significantly associated with HDP(29).A systematic and meta-analysis in sub-Saharan Africa showed that family history of any type of HDP is significantly associated with HDP among SSA women(6).Studies were conducted in Maroua, Cameroon. A family history of hypertension was discovered to be a risk factor for hypertension in Cameroon(27).A systematic review and meta-analysis done in Ethiopia showed that family history of hypertension, family history of diabetes mellitus, and urinary tract infection were the risk factors for hypertensive disorders of pregnancy in Ethiopia(30).A study conducted in Jimma Town,South West Ethiopia revealed that positive family history of pregnancy induced hypertension and kidney diseases were statistically significant associations with HDP(12). According to a Mizan-Tepi University study, having a positive family history of pregnancy-induced hypertension, kidney diseases, and asthma were all predictors of pregnancy-induced hypertension(9).According to a study conducted in Gondar, those with a family history of hypertension are eight times more likely to develop HDP than those who do not(24). Another study conducted at Nekemte Referral Hospital discovered that positive family history of hypertension and positive history of diabetes mellitus were risk factors for hypertensive disorders during pregnancy (2). A review of meta-analysis studies in Ethiopia showed that a family history of HDP could also increase the risk of developing HDP by four-fold compared with women having no family history of hypertension. Having a history of UTI increased the risk of developing HDP by 4.55 times more compared with those women who did not have a history of UTI(23). A study done in Wolaita Zone, South Ethiopia showed that history of kidney disease, and family history of hypertension were determinants that increased the odds of suffering from hypertensive disorders of pregnancy(5).

2.3.2.3 Personal and lifestyle related factors

A cross-sectional retrospective study conducted in China revealed that the risk of HDP was 1.75 times higher in alcohol consumers compared with non-alcohol consumers(19).A cross-sectional study conducted in China has shown a positive association between alcohol intake and the risk of HDP and showed a 1.75-fold higher risk of HDP compared with subjects without alcohol intake(26).According to a study conducted in Ghana, showed that pregnant women who consumed high amounts of fatty foods were 4.42 times more likely to develop HDP as compared to those who did not, and the effect was statistically significant(31). A systematic review and meta-analysis done in Ethiopia showed that having alcohol consumption was the risk factor for hypertensive

disorder of pregnancy in Ethiopia(30). A study conducted in Jimma town, Jimma town, south west Ethiopia revealed that having psychological stress was a statistically significant association with HDP(12). Studies identified rural residence as a risk factor and taking fruit or vegetables during pregnancy was found to be protective of HDP(15). According to a study conducted in Gondar town, alcohol consumption is a predisposing factor for HDP(24).

2.4 Conceptual framework

This study assessed the direct relationship between the outcome variable and independent variables i.e. Sociodemographic related factors, Socioeconomic related factors, Obstetric related factors, Medical Disease related factors, Personal and lifestyle related factors, and Anthropometric related factors

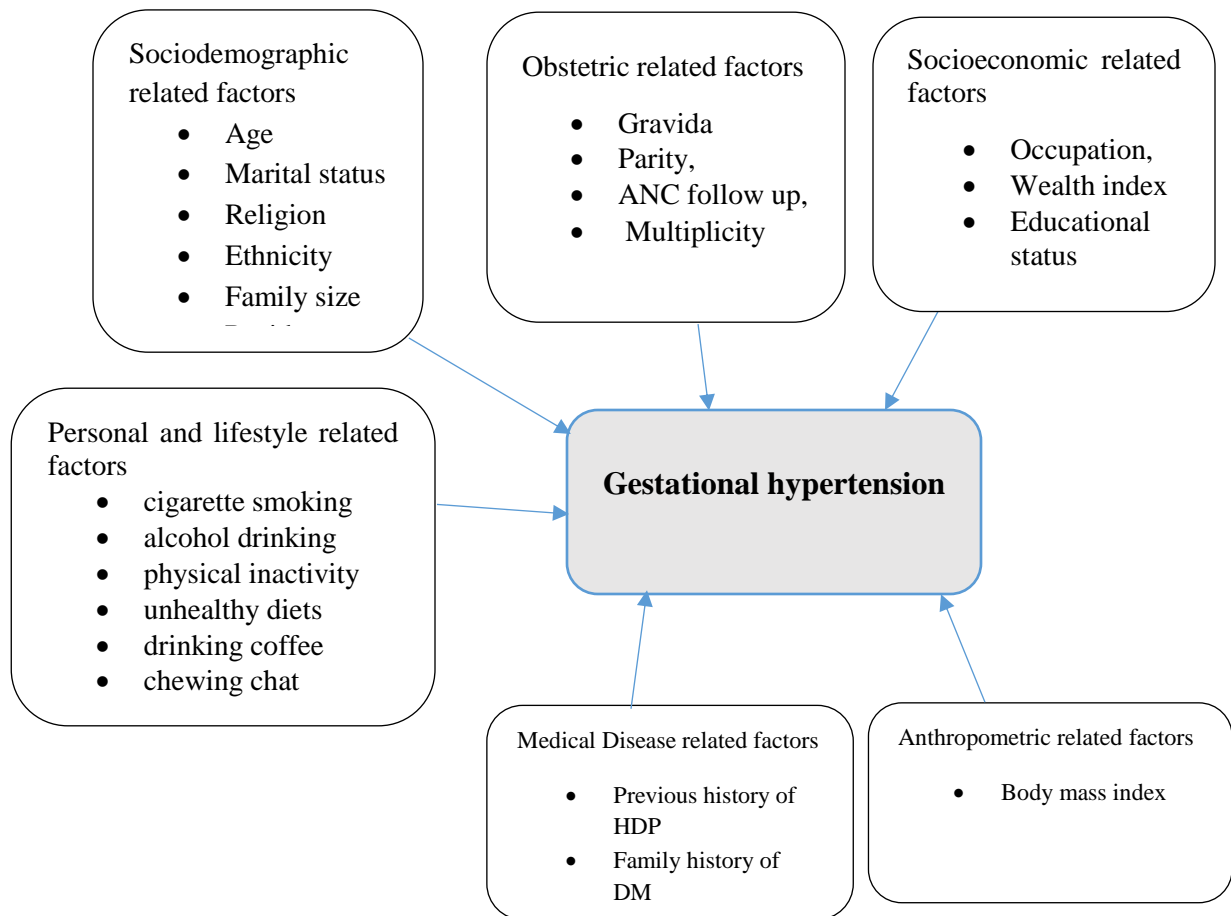


Figure 1: Conceptual framework of the prevalence of undiagnosed gestational hypertension and the associated factors (obtained from reviewing different literature) (32)(33).

Chapter 3: Objectives

3.1 General objective

To assess the prevalence of undiagnosed gestational hypertension and the associated factors among women living in Nadi Gibe district, Jimma zone, Southwest Ethiopia, in 2022.

3.2 Specific objectives

To determine the prevalence of undiagnosed gestational hypertension among women living in Nadi Gibe district, Jimma zone, Southwest Ethiopia, 2022.

To identify risk-associated factors related to undiagnosed gestational hypertension among women living in Nadi Gibe district, Jimma zone, Southwest Ethiopia, 2022.

Chapter 4: Methods and materials

4.1 Study area and period

The study was carried out in the Nadi Gibe district, which is located in the Jimma zone, Oromia regional state of Southwest Ethiopia. Nadi Gibe is 284 km away from the capital city of Ethiopia, Addis Ababa, and 64 km east of Jimma town. It is bounded by Omo Nada woreda on the south, Kersa woreda on the west, Limmu Kosa woreda on the north, and Sokoru woreda on the east. According to the woreda health office, the current total population of the woreda is estimated to be 170,641, among which 87,027 are females and 83,614 are males. Among those populations, 41,283 were estimated to be married women and 54,522 pregnant women (obtained from Nadi Gibe district health office). In the district, there is 1 primary hospital, 5 health centers, and 25 health posts. The primary hospital and all health centers provide reproductive health services. Data collection was carried out from June 16–29, 2022.

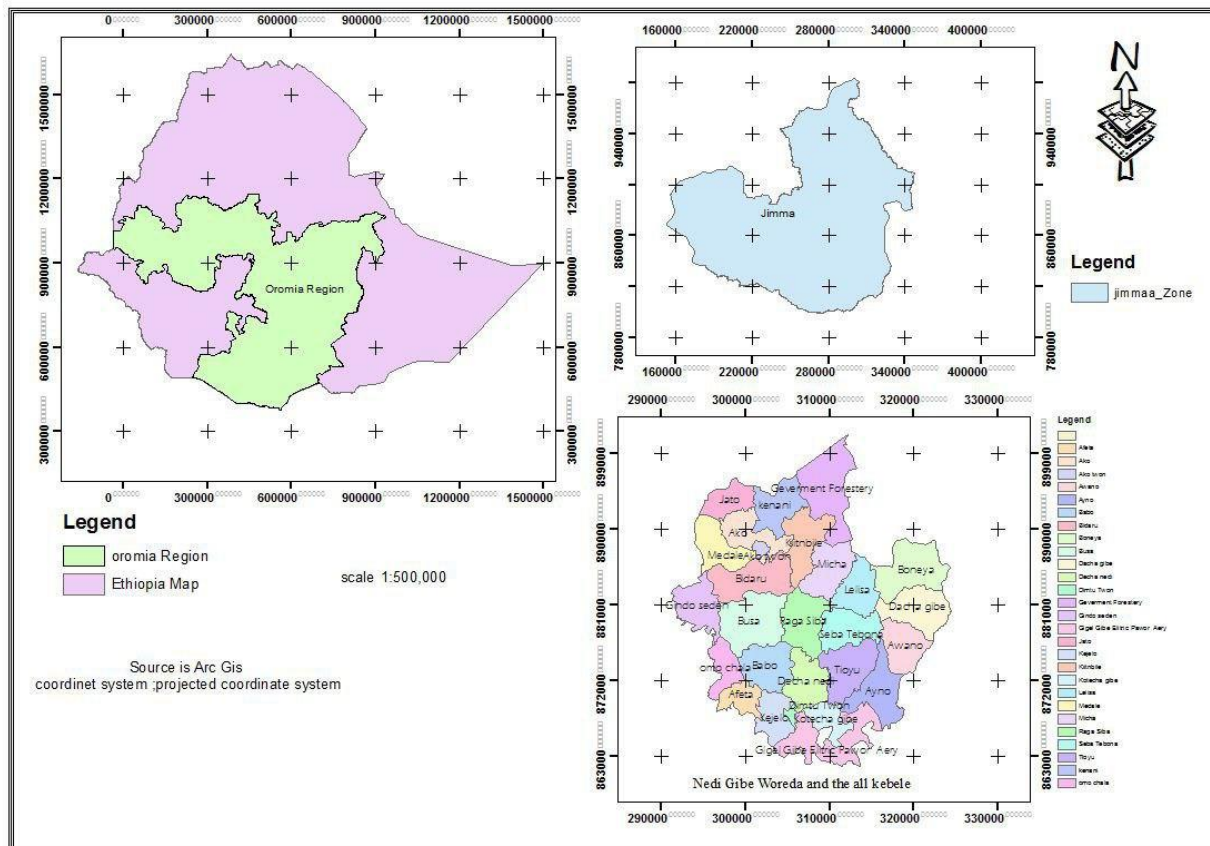


Figure 2: Map of Nadi Gibe District, Jimma Zone, Southwest Ethiopia, 2022 (obtained from Nadi Gibe district health office).

4.2 Study design

A community-based cross-sectional design with a mixed method was conducted.

4.3 Population

4.3.1 Source population

All pregnant women living in the Nadi Gibe district

4.3.2 Study population

All pregnant women in randomly selected Kebles of Nadi Gibe district during the study period.

4.3.3 Study units

Pregnant women

4.4 Eligibility criteria

4.4.1 Inclusion criteria

All pregnant women who had lived in selected kebles for at least six months were included.

4.4.2 Exclusion criteria

Mothers with a history of confirmed chronic hypertension were excluded.

4.5 Sample size and sampling technique

4.5.1 Sample size determination

For the quantitative study: The sample size was determined for both specific objectives separately by using the STATCALC application of Epi Info version 7.2.5 software. Accordingly, the considered assumptions were indicated in the following **table 1**.

For this qualitative study: Twelve participants were selected by purposive sampling techniques for an in-depth interview. The selection was done with the collaboration of HEW and women's affairs in the Keble. The selection criteria were having a role in the community, the ability to express their ideas, and those who had good experience to express their ideas. A total of four group were made for each category group and from each member three participant were selected purposively for the in-depth interviews from women hypertensive patients on Anti-hypertension treatment, community health agents, health developmental army, and midwifery Nurses. Finally, a total of 12 study participants were obtained for in-depth interview.

Table 1: Sample size determination for the prevalence of undiagnosed gestational hypertension and the associated factors among women living in Nadi Gebe district, Jimma zone, southwest Ethiopia, 2022.

Single population proportion (for the first objective)									
Variables	Proportion	Confidence level	Margin of error (d)	Population size (N)	Sample size (n)	5%NRR	design effect	Final sample size	Ref.
Prevalence of undiagnosed GH	14	95%	4%	874	289	14	2	606	(2)
Double population proportion (for the second objective)									
Variables	Proportion	Power	Ratio	Confidence level	Odds Ratio	Sample size	5% NRR	Final sample size	Ref.
Alcohol consumption		80	1:1	95%	3.80	145	7.25	152.3	(5)
Yes (P1)	37.9								
No (P0)	62.1								
Chewing chat		80	1:1	95%	2.03	9	1	10	(5)
Yes (P1)	5.3								
No (P0)	94.7								
Drinking coffee		80	1:1	95%	1.99	13	1	14	(5)
Yes (P1)	88.4								
No (P0)	11.6								
Age of categories		80	1:1	95%	3.24	18	1	19	(34)
30-34 (P1)	16.5								
25-29(P0)	83.5								

P₁: the proportion of exposed **P₀**: the proportion of unexposed NRR: non-response rate

Therefore, the maximum final sample size obtained was 606.

4.5.2 Sampling technique and procedure

For quantitative study: The district had 25 kebles. Sample kebles were selected using a simple random sampling method. Accordingly, 8 sample Kebles were selected by lottery method: Ako, Keneni, Dach Nadi, Kejelo, Afeta, Bussa, R/Siba, and Tiyo. The sample was distributed to selected Kebles by proportional allocation to size, and the participants of the study were selected using a systematic random sampling method from a family folder of the Kebles as a sample frame of pregnant women.

For qualitative study: A purposive sampling method was used to obtain each category group for the in-depth interviews with women hypertensive patients on Anti-hypertension treatment, community health agents, health developmental army, and midwifery Nurses. The selected participants represented a variety of characteristics and the potential to provide rich, relevant, and valid information.

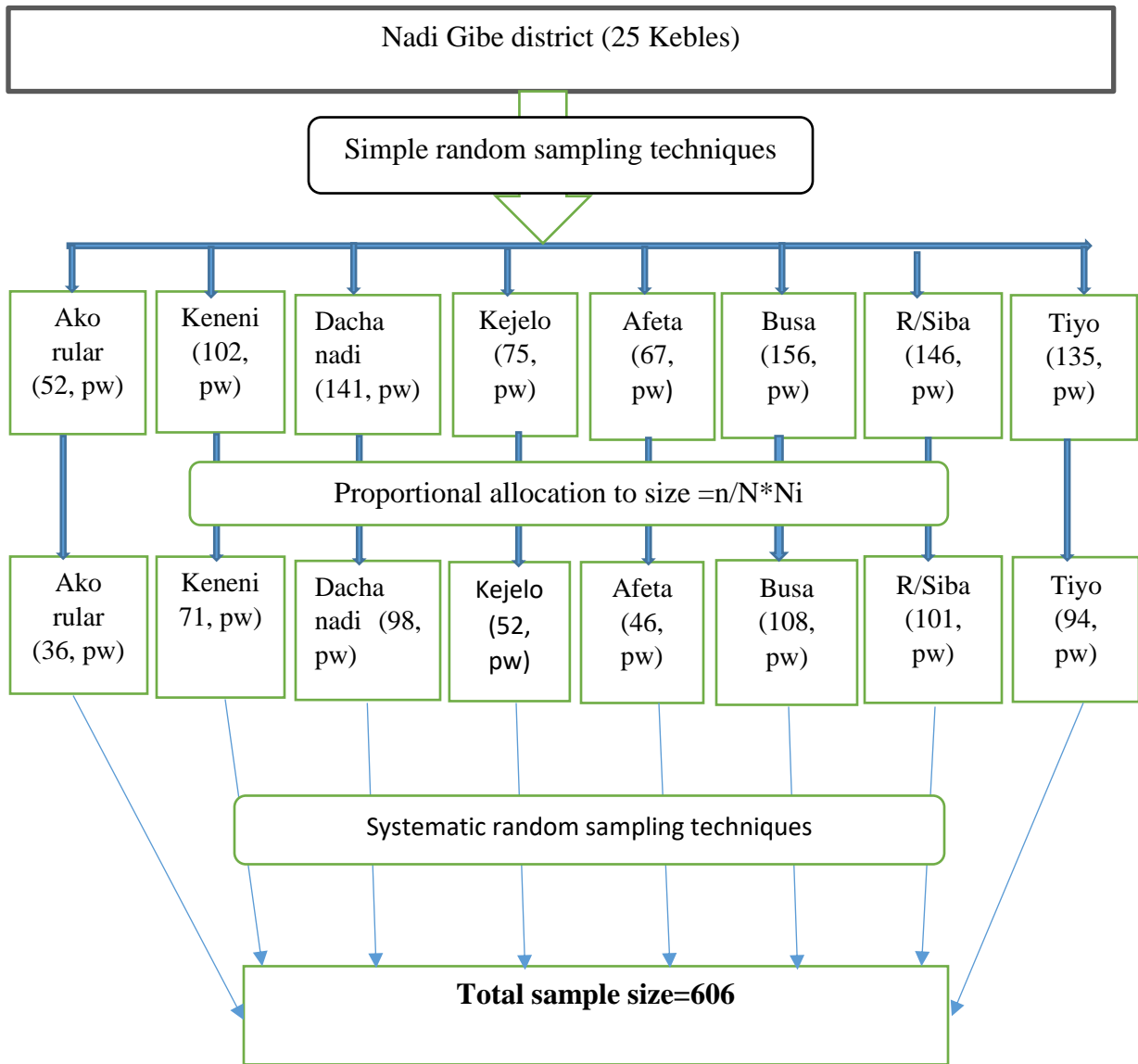


Table 3: Schematic diagram showing sampling procedure for the prevalence of undiagnosed gestational hypertension and associated factors among women in Nadi Gibe district, Jimma zone, Southwest Ethiopia, 2022.

4.6 Data collection procedures (Instrument, personnel, and technique)

4.6.1 Data collection instruments

For quantitative study: Data was collected using a pretested, structured questionnaire, and anthropometric measurement was performed. The data collection instrument was adopted from the

WHO stepwise surveillance for non-communicable diseases. The tool was modified to fit the current study and had five parts: socio-demographic information, knowledge and source of information, medical and obstetric information, behavioral measurements, and physical measurements (weight, height, body mass index (BMI) (35)). The questionnaire was initially adapted in English and translated into the local language (Afan Oromo) to minimize information bias, then back to English by another person having skills in both of the languages to realize validity of the questionnaire to assure its consistency and accuracy. Weight was measured using a digital weight scale to the nearest 0.1 kg with the subjects wearing light clothing, and shoes were taken off. The validity of the scale was checked by using an object of a known weight every morning and between the measurements (36). The height of the study participants was measured to the nearest 0.1 cm using a stadiometer (seca Germany), with the subjects positioned at the Frankfurt Plane and the four points (heel, calf, buttocks, and shoulder) touching the vertical stand and their shoes taken off (37). Mid-upper arm circumference was measured on a straight left arm (in right-handed people) midway between the tip of the shoulder and the tip of the elbow (36). Blood pressure was measured in triplicate using an Aneroid Sphygmomanometer with small, medium, and large cuff sizes (38). After 5 minutes of rest, the subsequent measurements were taken five minutes apart. Each individual patient's BP was taken while the patient was in a sitting position, from the right arm after the patient rested for at least 5 minutes before the measurement. Physical activity was measured using the Global Physical Activity Questionnaire (GPAQ) section of the STEPS instrument (39).

For qualitative study: An interview guide was developed from the literature review (16) and developed in English and translated into the local language, Afan Oromo by another person having skills in both of the languages to realize validity of the questionnaire. This interview guide was discussed, and the contents were evaluated by the research team. The research questions were designed with open-ended questions.

4.6.2 Data collection technique and procedures

For quantitative study: Data was collected through face-to-face interviews, and measurements of the mother were taken using a pretested, structured questionnaire by those who were trained for two days in other kebele (Babo) on the method of data collection, the tool used for data collection,

the importance of informed consent, and ethical issues regarding participants' confidentiality, privacy, and right to give or not give an answer.

The questionnaire included socio-demographic factors, medical and obstetrical factors, knowledge and sources of information, and behavioral and physical measurements, which were adapted from different literature. Questionnaires were prepared in close-ended forms, including the list of alternatives from different studies. "An alternative other" was used to write responses to closed-ended questions. A face-to-face interview was conducted on study participants, and then anthropometric measurements of weight and height were measured. A Body Mass Index (BMI) was computed at the end of the interview for each study participant. The pregnant women whose age greater than or equal to 18 years old were used in the study. To minimize inter-observer and intra-observer variation, detailed training on tools, measurement procedures supported by demonstration of measurements before actual data collection, and discussing and commenting the instruments.

For qualitative study: The in-depth interviews were all done face-to-face in an isolated room in the health post in collaboration with HEW and women affairs. The confidentiality of the interviews was ensured. All the interviews were conducted in Afan Oromo by the primary investigator due to all study participants were speak the language fluently, with each interview lasting between 45 and 90 minutes. A demographic questionnaire was also administered verbally at the beginning of the interview. Each interview was audio tape recorded so as to capture all issues discussed, and finally the principal investigator transcribed the tape recorded after each section, translated and preliminary coding of transcripts was done, and consistent themes that were directly related to the objectives of this study were identified.

4.6.3 Data collection person

For quantitative study: The data was collected by using a pre-tested, structured questionnaire via face-to-face interview by four trained female BSc Nurses were used to recruit for the collection of the data and perform the clinical examinations under the supervision of two senior health officers and the primary investigator. They were experienced individuals who were familiar with the area and spoke the local language.

For qualitative study: Each in-depth interview was audio-taped recorded, and the primary investigator note-takers transcribed and independently translated each four session. One Midwifery

nurse was the moderator. She then reviewed the transcripts to ensure accuracy and translate interview records was used by primary investigator.

4.7 Study variables

4.7.1 Dependent variable

Gestational hypertension

4.7.2 Independent variable

Socio-demographic related factors: Age, marital status, religion, ethnicity, family size, and place of residence are all factors to consider.

Personal and lifestyle-related factors: Cigarette smoking, alcohol consumption, animal fat or oil meals, inactivity, psychological stress, unhealthy diets, coffee consumption, chewing chat.

Antropometric related factors: BMI

Obstetric-related factors: Age at menarche, pregnancy status, gravida, parity, oral contraception before pregnancy, ANC follow-up, and pregnancy multiplicity

Medical disease and family-related factors: Previous history of hypertension, family history of diabetes mellitus, history of kidney disease, current history of asthma, and family history of hypertension

Socio-economic related factors: Occupation, monthly income, and education status.

Knowledge and sources of information related factors

4.8 Measurements

Anthropometric measurements: The height of the study participants was measured to the nearest 0.1 cm using a stadiometer (seca Germany), with the subjects positioned at the Frankfurt Plane and the four points (heel, calf, buttocks, and shoulder) touching the vertical stand and their shoes taken off(37).Before starting the measurements, the stadiometer was checked using calibration rods. Weight was measured using a digital weight scale to the nearest 0.1 kg with the subjects wearing light clothing, and shoes were taken off (35).The validity of the scale was checked by using an object of a known weight every morning and between the measurements.Mid-upper arm circumference was measured on a straight left arm (in right-handed people) midway between the

tip of the shoulder and the tip of the elbow (36). All anthropometric measurements were done in triplicate, and the average value was used for further analyses. A standardization exercise was done to reduce inter-observer error. The body mass index (BMI) was calculated by dividing the weight in kilograms by the height in meters squared (kg/m^2) (36) (40). The body mass index (BMI) was classified as follows: under-weight ($\text{BMI} < 18.5$); normal weight ($\text{BMI} = 18.5\text{--}24.9$); overweight ($\text{BMI} = 25\text{--}29.9$); and obese ($\text{BMI} \geq 30$) (15) (41).

Physical measurements: Blood pressure was measured in triplicate using an Aneroid Sphygmomanometer with small, medium, and large cuff sizes (38). After 5 minutes of rest, the subsequent measurements were taken five minutes apart. Each individual patient's BP was taken while the patient was in a sitting position, from the right arm after the patient rested for at least 5 minutes before the measurement. Consumption of caffeinated products such as coffee, Coca-Cola, or tea was assessed carefully and BP was taken by considering the time effect (after 30 min of initial consumption). Additionally, activities such as smoking and exercising were also avoided 30 minutes prior to the measure of BP. The three measurements of BP on a single visit were taken at least 5 minutes apart, and the average of the three records was used for the computation of the results. Those who had hypertension during pregnancy were referred to a nearby health center or hospital (36). In accordance with the WHO recommendation, the mean systolic and diastolic blood pressures were considered for analysis (36) (40). Physical activity was assessed based on the self-reported performance of their activities; walking; time spent in minutes to carry out each activity; and the value of the respective activity (36) (40) (42).

The Household wealth index was assessed using 15 simplified household asset questions. The questionnaire includes a household's possession of fixed assets such as electricity, radio, television, refrigerator, electric 'mitad', table, chair, bed with cotton sponge or spring mattress, and housing conditions. Accordingly, the wealth index of the household was classified into five quintiles (quintiles 1–5). The questionnaire was reported to be reliable with 84.2% agreement with the original 37 questions of the 2016 Ethiopian Demographic Health Survey wealth index questionnaire and a reported kappa of 0.755 (43) (44). Fruits and vegetables were assessed based on (44) self-reported consumption.

4.9 Operational definitions

Hypertension in pregnancy is defined as a systolic blood pressure ≥ 140 OR diastolic blood pressure ≥ 90 mmHg or both. Undiagnosed gestational hypertension is defined as new hypertension (systolic blood pressure ≥ 140 mmHg or diastolic blood pressure ≥ 90 mmHg or both) presenting at or after 20 weeks gestation(3)(18). Chronic (preexisting) hypertension is defined as hypertension (systolic blood pressure ≥ 140 mmHg or diastolic blood pressure ≥ 90 mmHg or both) that is present before 20 weeks of gestation or prior to pregnancy. Elevated readings should be documented on more than one occasion(5).

4.10 Data processing and analysis

Quantitative data: The collected data was checked for completeness, coded, and entered into Epidata version 3.1 and exported to the Statistical Package for Social Science (SPSS) version 23.0 for analysis. Further cleaning was done by running frequencies and cross-tabulation between each independent and dependent variable to identify and manage outliers and missing values. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to describe the findings. Bivariable logistic regression analysis was done for each variable with the outcome variable to select candidate variables. Then, multivariable logistic regression analysis was done, to control for possible confounding variables and to determine presences of statically significant association between the predictors and the outcome variable at p-value <0.05 and AOR with 95% CI. Multicollinearity and model fitness were checked and reported that the maximum variance inflation factor (VIF) = 1.265. Model fitness with Hosmer and Lemeshow's goodness of fit was adequately fit with reported chi-square ($X^2= 11.634$, with a degree of freedom (df) =8 and significance (P-value) =0.168. A table and narration were used to present the result. A factor analysis was conducted to determine the wealth status of pregnant women. A total of 15 items were analyzed using principal component analysis methods for factor analysis. The fulfillment of the assumption for principal component analysis was evaluated using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy =0.830 (> 0.5), case to variable ratio of 63.3to1 (greater than the standard 5 to 1), and the significance of Bartlett's Test of Sphericity at P-value 0.00 (correlation). No variable had ≥ 0.9 with an anti-image correlation matrix (no multicollinearity). In each step, variables with commonalities of less than 0.5 and those having a loading (≥ 0.4) in more than one component (having a complex structure) were removed. The total variance explained by four component was 55.6%. A factor score of this component was used

to classify women's wealth status into five groups. A reliability analysis was conducted and had a Cronbach's alpha of 0.606.

Qualitative data:The qualitative data were manually analyzed using thematic analysis.The analysis was started by transcribing notes and audio records and then translated to the English language by the principal investigator.The qualitative data was compiled and summarized into themes manually.Finally, the findings were presented in narrative ways by triangulating with quantitative data.

4.11 Data quality assurance

The questionnaire was prepared originally in English and translated into the Afan Oromo languages by a person with experience of translation.To check the consistency, the question was further translated from Afan Oromo to English by another person.The instrument was pretested with 30(5%) in Babo kebele, which had similar characteristics to the study population before the actual data collection. Findings were discussed among data collectors, supervisors and the investigator in order to ensure a better understanding of the data collection process. Based on the pretest, questions were revised and edited, and those found to be unclear or confusing were modified. Data was collected by those who were trained for two days on the method of data collection, the tool used for data collection, the importance of informed consent, and ethical issues regarding participants' confidentiality, privacy, and right to give or not give an answer. Also, the supervisors visited each data collector in the field every day, and at the end of the day, they checked filled questioners for completeness and consistency.In the same way, the principal investigator randomly checked the activities of both the data collector and supervisor every day, and feedback and corrections for the next day were given. To reduce the non-response rate, three trials per house were done for those not available at home during data collection.Finally, a structured Afan Oromo version questionnaire was used for data collection.Each pregnant woman was interviewed in a separate private place to avoid social desirability bias.

4.12 Ethical consideration

Ethical clearance was given by the Institution Review Board of the Institute of Health of Jimma University.Written permission was obtained from the Nadi Gibe district health office. Selected Keble's leaders were informed by a formal letter and face-to-face communication with the principal investigator, data collectors, and supervisors.Regarding the study participants, the

objectives of the study were informed and verbal consent was taken before data collection was started. Participants were informed that they had the full right to discontinue or refuse to participate in the study. The answer to any question was made confidential. Blood pressure was measured in triplicate and the average of the three records was used for the computation of results. Those who had hypertension during measurement were referred to a nearby health center or hospital. The COVID-19 prevention protocol was ensured during each days of data collection.

4.13 Dissemination plan

The result of this study will be presented to Jimma University, the population, and the epidemiology department. The study results will be given to the Nadi Gibe district health office. Efforts will be made to present the results at scientific conferences. Finally, attempts will be made to publish the work in scientific journal to make it accessible to all individuals who may want to use it.

Chapter 5: result

5.1. Socio-demographic related factors

Data were collected from 590 pregnant women who were randomly selected from the eight kebele in Nadi Gibe district with a response rate of 97.4%. The mean age of participants was 28.14 ± 6.118 with a range of 18 and 42 years. The majority of the participants were Muslim in religion and 562 (95.3%) of them were married (Table 2).

Table 2: Distribution of the study participants by their socio- demographic related factors among pregnant women at Nadi Gibe district, Jimma zone, south west Ethiopia, July, 2022. (n=590)

Variable	Category	Frequency (N)	Percent (%)
Age category	18-20	46	7.8
	20-24	119	20.2
	25-29	185	31
	30-34	128	21.7
	≥ 35	114	19.3
Educational status	Unable to read and Write	303	51.4
	1-8th grade	193	32.7
	9-12th grade	54	9.2
	college and above	40	6.8
Marital status	Single	14	2.4
	Married	562	95.3
	Divorced	11	1.9
	Widowed	3	0.5
Religion	Muslim	457	77.5
	Orthodox	70	11.9
	Protestant	57	9.7
	Catholic	6	1.0
Ethnicity	Oromo	531	90.0
	Amhara	14	2.4
	Yem	32	5.4
	Kefa	9	1.5
	Dawro	2	0.3
	Other	2	0.3
Occupation Status	Farmer	386	65.4
	Merchant	61	10.3

	Government employee	50	8.5
	Student	19	3.2
	Unemployed	66	11.2
	Daily laborer	8	1.4
Family size	1-2	101	17.1
	3-4	280	47.5
	>=5	209	35.4
wealth index	First quintile	119	20.2
	Second quintile	118	20.0
	Third quintile	117	19.8
	Fourth quintile	113	19.2
	Fifth quintile	123	20.8

5.2 Prevalence of Gestational Hypertension

The prevalence of undiagnosed gestational hypertension among women in this study was 33(5.6%). The mean systolic blood pressure was 112.79 ± 15.383 with a range of 82 mmHg to 163 mmHg, and the mean diastolic blood pressure was 75.14 ± 9.124 with a range of 50 mmHg to 103 mmHg. The majority of hypertensive participants were found 183 (31%) to be in the age group of 25-29 years.

A 29-year-old BSc midwife said, "Sometimes it is confusing. After having complete follow-up in the ANC with stable blood pressure, they develop convulsions during labor... this is really unusual. Investigations are normal but they convulse." For example, one woman was under ANC follow-up here without any findings, but during labor she became eclamptic (BSc midwives).

5.3 Obstetrics related factors

According to this study, 456(77.3%) of the pregnant mothers utilized health facilities for ANC follow-up and 327(55.4) of them had a previous history of oral contraceptive use. Three-quarters of the study participants, 442 (74.9%), had menarche between the ages of 13 and 15 years, with 57 (9.7%) beginning before their thirteenth birthday (**Table 3**).

A 37-year-old respondent said, "I used to attend antenatal care follow up in the health centers in my previous pregnancy, but I did not know the danger signs... I felt a headache around my forehead and did not seek medical attention because I thought that it was minor, but after a few hours I lost consciousness and was taken to the hospital."

Table 3: Distribution of the study participants by their obstetric related factors among pregnant women at Nadi Gibe district, Jimma zone, south west Ethiopia, July, 2022. (n=590)

Variable	Category	Frequency (N)	Percent (%)
Age at menarche (in years)	<=12	57	9.7
	13-15	442	74.9
	>=16	91	15.4
Pregnancy status	Wanted	519	88.0
	Unwanted	71	12.0
Parity	0	81	13.7
	1-4	377	63.9
	>=5	132	22.4
Gravidity	Primigravida	79	13.4
	Multigravida	511	86.6
Have you pre-pregnancy oral contraceptive use	Yes	327	55.4
	No	263	44.6
Gestational age (in weeks)	<20wks	269	45.6
	>=20wks	321	54.4
Gestational hypertension	No	557	94.4
	Yes	33	5.6
Previous history of HTN	Yes	40	6.8
	No	550	93.2
ANC follow up	Yes	456	77.3
	No	134	22.7
SBP	>=140	44	7.5
	<140	546	92.5
DBP	>=90	42	7.1
	<90	548	92.9

5.4 Medical and family history related factors

Among the study participants, 69 (11.7%) had a family history of chronic hypertension and 122 (20.7%) of them had a history of kidney disease during the current pregnancy (**Table 4**).

"A 27-year-old woman said that I had seen a person in my neighborhood affected by hypertension and diabetic mellitus that was referred from the health center and admitted to the hospital. Upon return, he was paralyzed in the right hand and leg." It can be caused by eating too much salt, not doing enough exercise and sleep disorders" and "I heard from the radio that hypertension is

caused by food that we eat, such as salt, fat, too much diet at a time and sitting for a long time without work."

Table 1: Distribution of the study participants by their medical related factors among pregnant women at Nadi Gibe district, Jimma zone, south west Ethiopia, July, 2022. (n=590)

Variable	Category	Frequency (N)	Percent (%)
Family history of HTN	Yes	69	11.7
	No	521	88.3
Family history of DM	Yes	29	4.9
	No	561	95.1
History of kidney diseases	Yes	121	20.5
	No	469	79.5
Currently history of asthma.	Yes	28	4.7
	No	562	95.3

5.5 Personal and lifestyle related factors

From the total study participants, 4(0.7%) had a history of ever smoking a cigarette and 81(13.7%) had ever consumed alcohol. In this study, 509(86.3%) participants had habits of coffee consumption (Table 5).

"I think if it is possible, eating a diet rich in plant-based food, whole grains, low salt, and low intake of salt lowers blood pressure and prevents the development of hypertension," said a 34-year-old participant".

Table 5: Distribution of the study participants by their personal and lifestyle related factors among pregnant women at Nadi Gibe district, Jimma zone, south west Ethiopia, July, 2022. (n=590)

Variable	Category	Frequency (N)	Percent (%)
Have you ever smoked cigarette	Yes	4	0.7
	No	586	99.3
Status of smoking	current smoker	1	0.2
	former smoker	3	0.5
How frequent, do you smoke cigarettes	Daily	1	0.2
	1-2 days per week	3	0.5
	Yes	54	9.2

Any family members who smoke cigarette	No	536	90.8
Whom family members smoke cigarette	Husband	37	6.3
	Other	17	2.9
Have you ever consumed an alcoholic drink	Yes	81	13.7
	No	509	86.3
Status of alcohol drinking	current alcohol drinker	42	7.1
	former alcohol drinker	39	6.6
How frequent do you drink alcohol	Daily	3	0.5
	5-6 days per week	12	2.0
	3-4 days per week	41	6.9
	1-2 days per week	25	4.2
Have you ever chewed chat	Yes	135	22.9
	No	455	77.1
Status of Chat chewing	current chat chewer	94	15.9
	former chat chewer	41	6.9
frequent of chat chewing	Daily	26	4.4
	5-6 days per week	11	1.9
	3-4 days per week	34	5.8
	1-2 days per week	64	10.8
Do you drink Coffee	Yes	509	86.3
	No	81	13.7
frequent of drinking coffee	>=once a day	273	46.3
	<once a day	236	40.0
How many cups of coffee do you drink	<3 cups	371	62.9
	>=3 cups	138	23.4
Psychological stress	Not stressed	451	76.4
	Stressed	139	23.6
Sleep pattern in hours per night	<=6	83	14.1
	7-8	353	59.8
	>=9	154	26.1
Mothers took nap per day	Yes	253	42.9
	No	337	57.1
Perform scheduled physical exercise	Yes	422	71.5
	No	168	28.5
MUAC	<21	52	8.8
	>=21	538	91.2
BMI	<18.5	29	4.9
	18.5-24.9	503	85.3
	25-29.9	55	9.3
	>=30	3	0.5

5.6 Dietary related factors

Out of the pregnant women who participated in the study, 332 (56.3%) of them had a history of fruit consumption, while 408(69.2) of them had a history of vegetable consumption (**Table 6**).

Table 6: Distribution of the study participants by their Dietary related factors among pregnant women at Nadi Gibe district, Jimma zone, south west Ethiopia, July, 2022. (n=590)

Variable	Category	Frequency (N)	Percent (%)
Do you eat Fruit	Yes	332	56.3
	No	258	43.7
How many days do you eat fruit in a week	Daily	29	4.9
	5-6 days per week	26	4.4
	3-4 days per week	115	19.5
	1-2 days per week	162	27.5
Do you eat Vegetable	Yes	408	69.2
	No	182	30.8
How many days do you eat vegetables in a week	Daily	50	8.5
	5-6 days per week	71	12.0
	3-4 days per week	150	25.4
	1-2 days per week	137	23.2
Do you eat Animal fat or oil meal	Yes	276	46.8
	No	314	53.2
How many days do you eat animal fat or oil in a week	Daily	18	3.1
	5-6 days per week	39	6.6
	3-4 days per week	72	12.2
	1-2 days per week	147	24.9

5.7 Knowledge and sources of information related factors

From the total study participants, 516(87.5%) had heard about hypertension and 373(63.2%) believed poor diet could cause hypertension. The most cited source of information about hypertension was the media (388, 65.8%), followed by health staff at 94(15.9%) (**Table 7**).

39 year old participants said that, “As I think even if I hadn’t enough knowledge about hypertension, it is a disease that affects older and rich people that causes fainting and brain problems. In my opinion, this disease occurs when people become older and very large in stature.”

A 31-year old participant said that... "If it is possible and if health facilities are available, I will have regular blood pressure checks because it is important to know about the health of my body."

Table 7: Distribution of the study participants by their Knowledge and sources of information of participant among pregnant women at Nadi Gibe district, Jimma zone, south west Ethiopia, July, 2022. (n=590)

Variable	Category	Frequency (N)	Percent (%)
Have you ever heard about BP	Yes	516	87.5
	No	74	12.5
Risk factors of HTN	Dieting	373	63.2
	Inactivity	88	14.9
	weight gain	31	5.3
	Genetics	13	2.2
	drug related	11	1.9
Is hypertension a preventable disease	Yes	428	72.5
	No	88	14.9
Prevention methods of hypertension	Exercise	39	6.6
	checking diet	332	56.3
	check BP	35	5.9
	taking rest	15	2.5
	reducing stress	7	1.2
Symptoms of high BP	Dizziness	105	17.8
	Palpitation	370	62.7
	Fatigue	41	6.9
Have you been told by health staff BP is high	Yes	97	16.4
	No	419	71.0
People is seek care when BP is high	health facility	426	72.2
	Herbalist	59	10.0
	prayer camp	13	2.2
	Pharmacy	18	3.1
How often did you visit healthcare facilities	once a while	368	62.4
	very often	36	6.1
	Often	29	4.9
	Rare	83	14.1
Sources of information on HTN	Media	388	65.8
	health staff	94	15.9
	Friends	23	3.9
	Herbalist	7	1.2
	Church/mosque	3	0.5
	Other	1	0.2

5.8 Factors Associated with undiagnosed gestational hypertension

The bivariable logistic regression analysis nominates 12 variables for multivariable logistic regression analysis, which were age, pregnancy status, family history of chronic hypertension, kidney disease during pregnancy, sleep pattern, psychological stress during pregnancy, alcohol consumption, coffee use, women's napping at daytime, animal fat or oil use, previous history of HTN and antenatal care follow up were found to be significantly associated with undiagnosed gestational hypertension at *P*-value of 0.25. However, in the multivariable logistic regression analysis, only six variables showed a significant association with the undiagnosed gestational hypertension at *p*-value <0.05 and AOR with 95% CI.

Pregnant women who had a family history of hypertension had 2.5 times higher odds of developing undiagnosed gestational hypertension than those women who hadn't had a family history of hypertension (AOR = 2.49, 95% CI = [1.19-5.23]). The odds of developing undiagnosed gestational hypertension among pregnant women with kidney disease during pregnancy were 2.4 times higher as compared to pregnant women without kidney disease during pregnancy (AOR = 2.44, 95% CI = [1.22-4.86]).

Pregnant women who had psychological stress during pregnancy had 2.2 times higher odds of developing undiagnosed gestational hypertension than those women who didn't have psychological stress during pregnancy (AOR = 2.19, 95% CI = [1.09-4.41]). The odds of developing undiagnosed gestational hypertension during pregnancy among pregnant women who had the habit of napping at day time were 2 times less likely to develop hypertension disorder compared to pregnant women who didn't nap at day time (AOR = 2.09, 95% CI = [1.07-4.07]).

Similarly, pregnant women who consumed alcohol had 3.5 times higher odds of developing undiagnosed gestational hypertension than those who had not consumed alcohol (AOR = 3.48, 95% CI = [1.76-6.87]). The odds of developing hypertension disorder of pregnancy among pregnant women who had consumed animal fat or oil were 2 times more likely to develop undiagnosed gestational hypertension than those who hadn't used animal fat or oil (AOR = 1.95, 95% CI = [1.02-7.1]) (**Table 8**).

Table 8:- *Multivariable* logistic regression analysis for factors associated with undiagnosed gestational hypertension among women living in Nadi Gibe district, Jimma zone, south west Ethiopia, July, in 2022.

Variable	Undiagnosed GH		Crude OR (95% CI)	Adjusted OR (95%CI)	P. value	
	Yes	No				
Age in years	18-20	39	7	1	1	0.607
	20-24	109	10	0.511 (0.182, 1.436)	0.732(0.223- 2.403)	
	25-29	165	18	0.608 (0.237, 1.556)	0.758(0.252-2.286)	
	30-34	119	9	0.421 (0.147, 1.206)	0.478(0.142-1.605)	
	>=35	99	15	0.844 (0.320,2.228)	1.092(0.348-3.434)	
ANC follows up	Yes	416	115	1	1	0.223
	No	40	19	1.718(0.958-3.081)	1.539(0.770-3.076)	
Pregnancy status	Wanted	476	55	1	1	0.143
	Unwanted	43	16	3.220(1.701,6.096)	1.803(0.819-3.969)	
Family history of hypertension	Yes	15	44	3.011(1.572,5.769)	2.491(1.186-5.233)**	0.016
	No	54	477	1	1	
History Kidney diseases	Yes	20	39	2.183(1.221,3.903)	2.438(1.224- 4.857)**	0.011
	No	101	430	1	1	
Had a nap at day time	Yes	236	17	1.976(1.097, 3.561)	2.088(1.072-4.068)**	0.030
	No	295	42	1	1	
Psychological Stress	stressed	418	33	2.914(1.674,5.074)	2.193(1.090-4.410)**	0.028
	Not stressed	113	26	1	1	
Sleep pattern in hours	<=6 hrs.	13	70	2.414(1.030,5.662)	0.622(0.212-1.824)	0.387
	7-8 hrs.	35	318	1.431(0.707,2.898)	0.806(0.361-1.800)	
	>=9 hrs.	11	143	1	1	
High amount animal fat or oil use per week	Yes	39	20	2.419(1.374,4.258)	1.948(1.024-3.706)**	0.042
	No	237	294	1	1	
Coffee use	Yes	464	45	1	1	0.053
	No	67	14	2.155(1.122, 4.136)	2.152(0.990-4.678)	
Alcohol consumption	Yes	22	37	4.757(2.629, 8.607)	3.475(1.758-6.870)**	0.000
	No	59	472	1	1	
Previous history of HTN	Yes	8	51	2.446(1.070,5.591)	1.125(0.406-3.117)	0.821
	No	32	499	1	1	

** showed that p-value less than 0.05 or statistically significant

Chapter 6: Discussion

The aim of this study was to determine the prevalence of undiagnosed gestational hypertension and the factors associated among women. The prevalence of undiagnosed gestational hypertension in this study was 5.6%. This finding was consistent with the global prevalence of hypertension in pregnancy, which was estimated to be between 5 and 10%. However, the prevalence of undiagnosed gestational hypertension in this study was lower than the studies conducted in India (6.9%)(7), Gondar town 16.8%(24), Jimma University specialized hospital 8.5% (14), Jimma Town 10.3%(12), Brazil 31.4%(20), and teaching hospital in Addis Ababa 25.4% (3). This discrepancy might be because this study was conducted in a community living in a rural setting, whereas the studies conducted at Gondar town, Jimma University specialized hospital, Brazil, and Addis Ababa teaching hospital were conducted in urban settings. The other possible explanation for the difference between the present finding and other studies might be the difference in study period, the geographic differences, the lifestyle, and the culture of PW. On the other hand, the prevalence of undiagnosed gestational hypertension in this study was higher than the studies conducted in Debre Brehan Referral Hospital (3.9%)(22), China 5.22%(19), and Wolaita Sodo referral hospital 2.3%(25). This difference might be because of differences in the study period, health seeking behaviors of pregnant women, differences in the study population, and differences in the accessibility of antenatal care services.

This study also discovered that factors associated with undiagnosed gestational hypertension include a family history of chronic hypertension, kidney disease during pregnancy, psychological stress during pregnancy, women napping during the day while pregnant, the use of animal fat or oil, and alcohol consumption were statistically significant with undiagnosed gestational hypertension. According to this study, pregnant women who had a positive family history of chronic hypertension had about 2.5 times greater odds of developing undiagnosed gestational hypertension as compared to those who didn't have a family history of chronic hypertension. This finding was congruent with the study conducted in Cameroon(27), Gondar(24), Mizan-Tepi University research done(9), Jimma Town public health facilities(12), and Nekemte(2). This might have occurred due to genetic factors that contribute to the physiologic predisposition and the existence of non-modifiable risk factors for gestational hypertension.

As this study showed, having kidney disease during pregnancy increases the likelihood of undiagnosed gestational hypertension by 2.4 times when compared to pregnant women without kidney disease during pregnancy. This finding was similar to the study conducted in Jimma Town (12), Wolaita Zone(5), and Mizan-Tepi University(9). The possible explanation might be that preexisting renal disease had a significant association with hypertension in pregnancy, and other theories support that renal physiological function had a direct relationship with the cardiovascular system(12). On the other hand, this might be due to the fact that renal disease interferes with salt excretion, leading to volume overload and subsequent hypertension(5). According to this study, being psychologically stressed during pregnancy increases the likelihood of undiagnosed gestational hypertension by 2.2 times when compared with women who didn't have psychological stress during pregnancy. This result was consistent with a study conducted in Jimma Town Public Health Facilities(12). The reason could be that stress activates the hypothalamus-pituitary-adrenal cortex system, which in turn increases levels of corticosteroids and catecholamine. Stress also activates the sympathetic nervous system and affects the immune system, resulting in increased levels of corticotrophin-releasing hormone and increased sympathetic activity, which increase the risk of undiagnosed gestational hypertension(12). The odds of developing undiagnosed gestational hypertension were lower among pregnant women who had the habit of napping during the day, as they were 2 times less likely to develop the disorder compared to pregnant women who didn't nap during the day. This may be due to several mechanisms, including sympathetic activation and hypothalamic-pituitary-adrenal (HPA) axis disturbance during pregnancy(45).

As this study showed, those women who consumed alcohol had 3.7 times higher odds of developing undiagnosed gestational hypertension than those who hadn't. This finding is similar to the study conducted in China(19), and Gondor(24). The reason might be because of alcohol use may have effect on renal function and systemic blood vessels that may expose the person to secondary hypertension(24) This might be due to alcohol consumption being associated with cardiovascular diseases, including hypertension. The other possible reason might be that the relationship between alcohol consumption and hypertensive disorders of pregnancy is of paramount importance, especially in areas like Ethiopia where awareness of and practice of self-consumption are high. This study also showed that mothers who had the habit of high animal fat or oil consumption per week had a twofold greater risk of developing undiagnosed gestational hypertension as compared to mothers who had the habit of low animal fat or oil consumption per

week. This study's findings were also consistent with previous research in Ghana(31). The possible explanation has shown that fatty acids increase the low-density lipoprotein (LDL) cholesterol in the blood, which predisposes them to cardiovascular diseases such as hypertension.

6.1 Strength of the study

The study has a number of strengths, including being a community-based study, which can describe the general population in contrast to the many reports from hospital-based studies. Additionally, a mixed approach, which is a qualitative survey was used to complement or triangulate the findings from the quantitative survey.

6.2 Limitations of the study

The main limitation of this study is that it didn't include variables such as biochemical measurements.

Chapter 7: Conclusion

The prevalence of undiagnosed gestational hypertension among women living in Nadi Gibe districts was 5.6%. The findings of this study showed that there were different associated and preventive factors for undiagnosed gestational hypertension during pregnancy. Mothers who took one nap per day were found to be significant preventive factors for the development of undiagnosed gestational hypertension during pregnancy. Furthermore, a family history of chronic hypertension, kidney disease during the current pregnancy, psychological stress during pregnancy, alcohol consumption, and use of animal fat or oil were identified as associated factors for undiagnosed gestational hypertension. Risk-associated factors identified in this study can be used as a screening mechanism for undiagnosed gestational hypertension.

7.1 Recommendation

The following recommendations are forwarded based on the findings of this study, which provide an opportunity for prevention, early diagnosis, and management of undiagnosed gestational hypertension

Federal Ministry of Health and regional health bureaus

- Have worked together to increase awareness of the importance of prenatal screening for the prevention and control of undiagnosed gestational hypertension.
- Encourage donors, bilateral organizations, and international NGOs to work on interventions for the prevention of risk associated factors of undiagnosed gestational hypertension.
- Health extension package includes the prevention of risk factors for undiagnosed gestational hypertension.
- Community-based approaches to diagnose and treat the problem are recommended.

.Zonal health department and District health office

- We should give attention to early detection and prevention of undiagnosed gestational hypertension in the community.
- They should focus on psychological treatment during pregnancy, and the pregnant mother must be free from psychological stress.
- Those pregnant mothers who have a family history of chronic hypertension should be closely monitored during their pregnancy by strengthening the NCD control strategy.

- Should concentrate on early detection and treatment of renal diseases to reduce the probability of developing undiagnosed gestational hypertension.
- Particular attention should be given to the type and amount of fat or oil that pregnant women commonly consume.
- It should facilitate blood pressure screening programs at the community level to identify and treat undiagnosed gestational hypertension.
- Strengthen the surveillance and screening of risk-associated factors for undiagnosed gestational hypertension.

Health Professionals and Health Extension Workers

- Primary care should reach all pregnant women to educate and make them aware of the associated factors for undiagnosed gestational hypertension.
- Community-based prevention and control strategies such as mass screening of community at certain intervals would contribute to the reduction and control of the growing prevalence of hypertension.
- A sound screening strategy for detecting hypertension in pregnancy cases, as well as a comprehensive strategy for managing undiagnosed gestational hypertension in pregnancy and maternal and child complications.
- Healthcare providers at ANC should intensify counselling and continuous education on the choice of food during pregnancy.
- Strengthen health education and promotion at the health facility and community level.
- Healthcare providers at ANC should intensify counseling and continuous education on the choice of food during pregnancy.
- Religious leaders, kebele leaders, and the community at large should all actively participate in the prevention strategies.

Researchers

Further studies with quantitative and qualitative design are needed to address the effect of biochemical and other related factors on gestational hypertension.

Reference

1. Kidane R. Dietary Patterns and Hypertensive Disorders Among Pregnant Women Attending Antenatal and Delivery Care in Public Hospitals of Jimma Zone , Southwest Ethiopia. 2022;(July):1645–56.
2. Hinkosa L, Tamene A, Gebeyehu N. Risk factors associated with hypertensive disorders in pregnancy in Nekemte referral hospital , from July 2015 to June 2017 , Ethiopia : case-control study. 2020;9:1–9.
3. Mengistu MD, Kuma T. Feto-maternal outcomes of hypertensive disorders of pregnancy in Yekatit-12 Teaching Hospital , Addis Ababa : a retrospective study. 2020;1–10.
4. Singh S, Shankar R, Singh GP. Prevalence and Associated Risk Factors of Hypertension : A Cross-Sectional Study in Urban Varanasi. 2017;2017.
5. Belayhun Y, Kassa Y, Mekonnen N, Binu W, Tenga M, Duko B. Determinants of Pregnancy-Induced Hypertension among Mothers Attending Public Hospitals in Wolaita Zone, South Ethiopia: Findings from Unmatched Case-Control Study. *Int J Hypertens*. 2021;2021.
6. Wagnew M, Id M, Chojenta C, Muluneh MD, Loxton D. Factors associated with hypertensive disorders of pregnancy in sub-Saharan Africa : A systematic and meta-analysis. 2020;1–20. Available from: <http://dx.doi.org/10.1371/journal.pone.0237476>
7. Mehta B, Kumar V, Chawla S, Sachdeva S, Mahopatra D. Short Communication Hypertension in Pregnancy : A Community-Based Study. 2015;40(4):2–7.
8. Longhitano E, Siligato R, Torreggiani M, Attini R, Masturzo B, Casula V, et al. The Hypertensive Disorders of Pregnancy: A Focus on Definitions for Clinical Nephrologists. *J Clin Med*. 2022;11(12).
9. Tesfaye A, Gudeta TA, Regassa TM. Pregnancy Induced Hypertension and Associated Factors among Women Attending Delivery Service at Mizan-Tepi University Teaching Hospital , Tepi General Hospital and Gebretsadik Shawo Hospital , Southwest , Ethiopia.
10. Mersha AG, Abegaz TM, Seid MA. Maternal and perinatal outcomes of hypertensive disorders of pregnancy in Ethiopia : systematic review and meta- analysis. 2019;8:1–12.
11. Katsiki N, Godosis D, Komaitis S, Hatzitolios A. Hypertension in pregnancy : classification , diagnosis and treatment .
12. Gudeta TA, Lema TB KS. Pregnancy Induced Hypertension and Associated Factors among

- Pregnant Women Receiving Antenatal Care Service at Jimma Town Public Health Facilities, South West Ethiopia. *J Gynecol Womens Heal.* 2018;10(4):1–9.
13. Yemane A, Teka H, Ahmed S, Temesgen H, Langen E. Gestational hypertension and progression towards preeclampsia in Northern Ethiopia: prospective cohort study. *BMC Pregnancy Childbirth.* 2021;21(1):1–8.
 14. Z Wolde, H Segni MW. hypertensive disorders of pregnancy in jimma university specialized hospital. 2011;
 15. Kahsay HB, Gashe FE, Ayele WM. Risk factors for hypertensive disorders of pregnancy among mothers in Tigray region , Ethiopia : matched case-control study. 2018;5:1–10.
 16. Bushra A, Naher S, Pervez S, Anam M. Heliyon Patients ’ understanding , management practices , and challenges regarding hypertension : A qualitative study among hypertensive women in a rural Bangladesh. *Heliyon [Internet].* 2021;7(August 2020):e07679. Available from: <https://doi.org/10.1016/j.heliyon.2021.e07679>
 17. Sakurai S, Shishido E, Horiuchi S. Experiences of women with hypertensive disorders of pregnancy: a scoping review. *BMC Pregnancy Childbirth [Internet].* 2022;22(1):1–10. Available from: <https://doi.org/10.1186/s12884-022-04463-y>
 18. Summary G. Hypertensive Disorders in Pregnancy. 2013;(May).
 19. Ye C, Ruan Y, Zou L, Li G, Li C, Chen Y, et al. The 2011 Survey on Hypertensive Disorders of Pregnancy (HDP) in China : Prevalence , Risk Factors , Complications , Pregnancy and Perinatal Outcomes. 2014;9(6).
 20. Leal LF, Grandi SM, Iribarrem V, Miranda A, Dal S, Platt RW. Hypertensive Disorders of Pregnancy and Medication Use in the 2015 Pelotas (Brazil) Birth Cohort Study. 2015;1–14.
 21. Berhe AK, Kassa GM, Fekadu GA, Muche AA. Prevalence of hypertensive disorders of pregnancy in Ethiopia : a systemic review and meta-analysis. 2018;1–11.
 22. Terefe W, Getachew Y, Hiruye A, Derbew M, Mariam DH, Mammo D, et al. patterns of hypertensive disorders of pregnancy and associated factors at debre berhan referral hospital, north shoa, amhara region. *ethiop med J.* 2015 Jul;Suppl 2:57–65.
 23. Title T. PRISMA Checklist for the Review PRISMA Checklist for the Review. 94.
 24. Walle TA. Hypertensive disorder of pregnancy prevalence and associated factors among pregnant women attending ante natal care at Gondar town health. *Pregnancy Hypertens*

- [Internet].2019;16(March):79–84.Availablefrom:
<https://doi.org/10.1016/j.preghy.2019.03.007>
25. Abera N, Id A, Demissie BW. Perinatal outcomes of hypertensive disorders in pregnancy at a referral hospital , Southern. 2019;1–10.
 26. Umesawa M, Kobashi G. Epidemiology of hypertensive disorders in pregnancy : prevalence , risk factors , predictors and prognosis. *Nat Publ Gr.* 2017;(June 2016):213–20.
 27. Tebeu PM, Foumane P, Mbu R, Fosso G, Biyaga PT, Nelson J, et al. Risk Factors for Hypertensive Disorders in Pregnancy : A Report from the Maroua Regional Hospital , Cameroon. 2011;12(3):227–34.
 28. Corrigan L, Farrell AO, Moran P, Daly D. Pregnancy Hypertension : An International Journal of Women ’ s Cardiovascular Health Hypertension in pregnancy : Prevalence , risk factors and outcomes for women birthing in Ireland. *Pregnancy Hypertens An Int J Women’s Cardiovasc Heal* [Internet]. 2021;24(November 2020):1–6. Available from: <https://doi.org/10.1016/j.preghy.2021.02.005>
 29. Suleiman AK, Arabia S. Risk Factors on Hypertensive Disorders among Jordanian Pregnant Women. 2014;6(2).
 30. Tesfa E, Nibret E, Gizaw ST, Zenebe Y, Mekonnen Z, Assefa S, et al. Prevalence and determinants of hypertensive disorders of pregnancy in Ethiopia: A systematic review and meta-analysis. *PLoS One* [Internet]. 2020;15(9 September):1–21. Available from: <http://dx.doi.org/10.1371/journal.pone.0239048>
 31. Jones L, Takramah W, Axame WK, Owusu R, Parbey PA, Tarkang E, et al. Risk Factors Associated with Pregnancy Induced Hypertension in the Hohoe Municipality of Ghana. *J Prev Med Healthc Orig.* 2017;1(3):1–8.
 32. Brathwaite R, Hutchinson E, McKee M, Palafox B, Balabanova D. The Long and Winding Road: A Systematic Literature Review Conceptualising Pathways for Hypertension Care and Control in Low- and Middle-Income Countries. *Int J Heal Policy Manag* [Internet]. 2020;11(3):257–68. Available from: <https://doi.org/10.34172/ijhpm.2020.105>
 33. Cecilia Gallani M, Cecília Bueno Jayme Gallani M, Estevam Cornélio M, de Freitas Agondi R, Cunha Matheus Rodrigues R. Conceptual framework for research and clinical practice concerning cardiovascular health-related behaviors 1 Estrutura conceitual para pesquisa e prática clínica na mudança de comportamentos em saúde cardiovascular. *Enferm Jan-Feb*

- [Internet]. 2013;21(Spec):207–15. Available from: www.eerp.usp.br/rlae
34. Tessema GA, Tekeste A, Ayele TA. Preeclampsia and associated factors among pregnant women attending antenatal care in Dessie referral hospital , Northeast Ethiopia : a hospital-based study. 2015;1–7.
 35. World Health Organization. WHO STEPS Instrument for Chronic Disease. 2009;12. Available from: http://www.who.int/chp/steps/STEPS_Instrument_v2.1.pdf
 36. Adair L, Agarwal KN, Anderson MA, Atalah E, Berggren G, Caplan P, et al. Maternal anthropometry for prediction of pregnancy outcomes: Memorandum from a USAID/WHO/PAHO/MotherCare meeting. Bull World Health Organ. 1991;69(5):523–32.
 37. Riley L, Guthold R, Cowan M, Savin S, Bhatti L, Armstrong T, et al. The world health organization STEPwise approach to noncommunicable disease risk-factor surveillance: Methods, challenges, and opportunities. Am J Public Health. 2016;106(1):74–8.
 38. Tadesse M. Validity of Anthropometric Cut-Offs for Early Diagnosis of Dyslipidemia Among Ethiopian Adults. 2020;3831–7.
 39. Adigüzel I, Onmuş İRD, Mandiracıoğlu A, Öcek ZA. Adaptation of the global physical activity questionnaire (GPAQ) into Turkish: A validation and reliability study. Turkish J Phys Med Rehabil. 2021;67(2):175–86.
 40. Paulos W, Id K, Lindtj B, Loha E. Prevalence of hypertension , and related factors among adults in Wolaita , southern Ethiopia : A community-based cross-sectional study. 2021;1–14.
 41. Olack B, Wabwire-Mangen F, Smeeth L, Montgomery JM, Kiwanuka N, Breiman RF. Risk factors of hypertension among adults aged 35-64 years living in an urban slum Nairobi, Kenya. BMC Public Health [Internet]. 2015;15(1):1–9. Available from: <http://dx.doi.org/10.1186/s12889-015-2610-8>
 42. Chasan-Taber L. PPAQ_instructions. Dapa [Internet]. 2004;36(10):1750–60. Available from: https://dapa-toolkit.mrc.ac.uk/pdf/pa/PPAQ_instructions_1.pdf
 43. Chakraborty NM, Fry K, Behl R, Longfield K. Simplified asset indices to measure wealth and equity in health programs: A reliability and validity analysis using survey data from 16 countries. Glob Heal Sci Pract. 2016;4(1):141–54.
 44. Central Statistical Agency (CSA) [Ethiopia] and ICF. 2016. Ethiopia Demographic and Health Survey 2016: Key Indicators Report. Addis Ababa, Ethiopia, and Rockville,

Maryland, USA.CSA and ICF.

45. HaneyA,Buysse DJ, OkunM,PhD.Sleepand Pregnancy-Induced Hypertension : 2013;9(12).

ANNEX

Annex I:-Information Sheet and Consent Form for (Facility administrative)

My name is _____. I am working as a data collector for the research being conducted to assess the prevalence of undiagnosed gestational hypertension and the associated factors among women living in Nadi Gibe district, Jimma zone, Southwest Ethiopia by **Lemna Tefera** who is an MPH in GPH student in the Faculty of Public Health, Jimma University.

I kindly request you to lend me your attention to explain to you the study and study participants.

The study Topic: To assess the prevalence of undiagnosed gestational hypertension and the associated factors among women living in Nadi Gibe district, Jimma zone, Southwest Ethiopia, May 1-20/2022 G.c

Purpose of the study: The main aim of this study is to write a thesis as a partial requirement for the fulfillment of a master's degree in GPH for the principal investigator. The result of the study will be used as evidence and input for Nadi Gibe district health Office, Zonal health department, RHB and other governmental and non-governmental organizations working in the area. Moreover, it is important to fill the information gap and provide empirical evidence for program planners, and decision-makers at different levels by enabling them to access baseline data on undiagnosed gestational hypertension prevention and control strategies.

Procedure and duration: The data collectors will collect the necessary information from pregnant womens using structured data extraction tools to have pertinent data that is helpful for the study. The duration of data collection was 20 days.

Risk: By participating in this research project, no risk comes to the pregnant women reside in general.

Benefit: The research has direct benefit to those who have participated in this project. And also, the indirect benefit of the research for the all-other community in the program is great. As identifying areas of improvement and taking appropriate decisions helps to improve the service, increase access and overall effectiveness of the program and reduce undiagnosed gestational hypertension during pregnancy.

Confidentiality: The information acquired from the participant will be confidential. There will be no information that will identify in particular. The findings of the study will be general for the study community and will not reflect anything, particularly of individual persons.

The data extraction tools will be coded to exclude showing names and other personal information. No reference will be made in oral or written reports that could link participants to the study.

Rights to refusal or Withdrawal: Giving permission for this study is fully voluntary. You have the right to permit or not for this study. If you decide to permit the study, you have the right to terminate the study at any time if you consider something related to the study is wrong.

Contact address: This research project will be reviewed and approved by the IRB of the institute of health, Jimma University. If in any case, you want to know more information about the research and its undertakings, you can contact the committee through the address of the principal investigator.

Principal investigator: Lemma Tefera (BSc), Mobile phone: +251-911-955-458

E-mail: ltefera32@gmail.com

Declaration of Informed Voluntary Consent:

I have read/was read the participant information sheet. I have clearly understood the purpose of the research, the procedures, the risks and benefits, issues of confidentiality, the right of participation, and the contact address for any queries. I have been allowed to ask any questions about things that may have been unclear. I was informed that I can terminate the study at any time. Therefore, I declare my voluntary consent to permit this study to be conducted in this community/ institution with my signature as indicated below.

Signature of health office head/department: _____

Name: _____ Date: _____

Signature of Principal Investigator: _____

Name: **Lemma Tefera** Date: _____

Thank you for your cooperation!

Assurance of Principal Investigator

The undersigned agrees to accept responsibility for the scientific, ethical, and technical conduct of the research project and for the provision of required progress reports as per terms and conditions of the Faculty of Public Health in effect at the time of grant is forwarded as the result of this application. Name of the student: **Lemma Tefera Yimer**

Date: 08/05/2022 Signature: _____

APPROVAL OF ADVISOR

Mr. Solomon Berhanu (BSc, MHP/E, Asst. Professor)

Date: _____ Signature: _____

Questionnaires on study of the prevalence of undiagnosed gestational hypertension and the associated factors among women living in Nadi Gibe district, Jimma zone, Southwest Ethiopia, 2022.

001. Questionnaire identification number _____

002. Interviewer code _____ Name _____

003. Date of interview _____

004. Name of the Residence area _____

Checked by supervisor; Name _____, Signature _____

Annex II: English Version Questionnaire

Instructions: The questionnaire is divided into five parts. So, circle the letter of choice for multiple questions and write the answer for others in the space provided for it.

Guidelines for the Interviewer

Collect information from pregnant women check for the completeness of the questionnaire before ending the interview with the respondent. Perform an anthropometric measurement after you have completed the interview. Adhere to the standard procedures.

Data collector's name: _____ Date __/__/__ Sign _____

Step 1 Demographic related factors

S.no	Questions	Response	Skip
01	Age of respondent	_____years	
02	Date of interview	_____	
03	Educational status	<ol style="list-style-type: none"> 1. Illiterate 2. 1_8th grade 3. 9_12th grade 4. college and above 	
04	What is your marital status?	<ol style="list-style-type: none"> 1. Single 2. Married 3. Divorced 4. Widowed 	
05	What is your religion?	<ol style="list-style-type: none"> 1. Muslim 2. Orthodox 3. Protestant 4. Catholic 5. Others, specify 	
06	What is your ethnicity?	<ol style="list-style-type: none"> 1. Oromo 2. Amhara 3. Yem 4. Kefa 5. Dawro 6. other specify___ 	
07	What is your Occupation status	<ol style="list-style-type: none"> 1. Farmer- 2. Merchant 3. Government Employee 4. Student 5. Unemployed 6. Daily laborers 7. other/specify----- 	
08	What is your family size?	<ol style="list-style-type: none"> 1. 1-2 2. 2.3-4 3. 3..≥5 	
09	Wealth index	<ol style="list-style-type: none"> 1. 1st quintiles 2. 2nd quintiles 3. 3rd quintiles 4. 4st quintiles 5. 5th quintiles 	

Step 2 Questions related to household wealth index			
10	Does your household have electricity?	1. Yes 2. No	
11	Does your household have a radio?	1. Yes 2. No	
12	Does your household have a television?	1. Yes 2. No	
13	Does your household have refrigerator?	1. Yes 2. No	
14	Does your household have electric 'mitad'?	1. Yes 2. No	
15	Does your household have a table?	1. Yes 2. No	
16	Does your household have a chair?	1. Yes 2. No	
17	Does your household have a bed with cotton sponge/spring mattress?	1. Yes 2. No	
18	Does any member of this household have a bank account?	1. Yes 2. No	
19	What is the main source of drinking water for the members of households?	1. Piped to yard/plot 2. Other	
20	What kind of toilet facility do members of your households usually use?	1. Pit latrine without slab/open pit 2. No facility/bush/open 3. Other	
21	What types of fuel does your household use for cooking?	1. Electricity 2. Wood 3. Other	
22	What is the main material of the floor in your household?	1. Earth 2. Other	
23	What is the main material of the exterior walls in your household?	1. Bamboo with mud 2. Other	
24	What is the main material of the roof in your household?	1. Corrugated iron/metal 2. Other	

Step 2 Knowledge and sources of information related factors

S.no	Questions	Response	Skip to/Remark
25	Have you ever heard about blood pressure?	1. yes 2. No	If no,skip to 35
26	What is the risk factors of hypertension?	1. Dieting 2. Inactivity 3. Weight gain 4. Genetics 5. Drugs related 6. Other	
27	Is hypertension a preventable disease?	1. yes 2. no	If no,skip to 30
28	What is Prevention methods of hypertension?	1. Exercise 2. Checking diet 3. Check BP regularly 4. Taking enough rest 5. Reducing stress 6. Others	
29	What is Symptoms of high BP?	1. Dizziness 2. Palpitation 3. Fatigue 4. Others	
30	Have you Been told by health staff BP is high?	1. yes 2. no	
31	Where the place people is seek care when BP is high?	1. Health facility 2. Herbalist 3. Prayer camp 4. Pharmacy 5. Others	
32	How often did you visit healthcare facilities?	1. Once a while 2. Very often 3. Often 4. Rare	
33	From where do you get Sources of information on hypertension?	1. Media 2. Health staff 3. Friends 4. Herbalist 5. Church or mosque 6. Others	

Step 3 Medical and obstetric related factors

S.no	Questions	Response	Skip to/Remark
34	What is your age at menarche (in years)?.	1. ≤ 12 2. 13 – 15 3. ≥ 16	
35	What is your pregnancy status?	1. Wanted 2. Unwanted	
36	What is your parity?	1. 0 2. 1-4 3. ≥ 5	
37	What is your Gravity?	1. primigravida 2. Multigravida	
38	Have you pre-pregnancy oral contraceptive use?	1. Yes 2. No	
39	Do you have previous history of hypertension?	1. yes 2. no	
40	How many fetus do you conceived?	1. Single 2. Multiple 99.Do not know/not sure	
41	What is your gestational age (in weeks)	1. < 20 wks 2. ≥ 20 wks	
42	Previous history of HDP?	1. yes 2. no	
43	Do you have family history of Hypertension?	1. yes 2. no 99.Do not know/not sure	
44	Do you have family history of DM?	1. yes 2. no 99.Do not know/not sure	
45	Do you have history of kidney diseases?	1. yes 2. no	
46	Do you have currently history of asthma?	1. yes 2. no	
47	Do you have ANC follow up?	1. yes 2. no	

Personal and Lifestye related factors

S.no	Questions	Response	Skip
48	Have you ever smoked cigarettes?	1. Yes 2. No	If no,skipto 52
49	What is your status of smoking?	1. current smoker 2. former smoker	
50	How frequent, do you smoke cigarettes?	1. daily 2. 5-6 days per week 3. 3-4 days per week 4. 1-2 days per week	
51	Do Any family members who smoke cigarette	1. Yes 2. No	If no,skipto 54
52	Whom family members smoke cigarette	1. Husband 2. Other	
53	Have you ever consumed an alcoholic drink?	1. Yes 2. No	If no,skipto 57
54	What is your Status of alcohol drinking?	1. current alcohol drinker 2. former alcohol drinker	
55	How frequent do you drink alcoholic Drink?	1. daily 2. 5-6 days per week 3. 3-4 days per week 4. 1-2 days per week	
56	Psychological stress during current pregnancy	1. stressed 2. not Stressed	
57	Sleep pattern in hours per night	1. ≤ 6 2. 7-8 3. ≥ 9	
58	Do the Mothers took nap per day?	1. yes 2. no	
59	Do you perform scheduled physical exercise during current pregnancy?(daily house work)	1. yes 2. no	
60	Do you eat fruit?	1. yes 2. no	If no,skipto 63
61	How many days do you eat fruit in a week?	1. daily 2. 5-6 days per week 3. 3-4 days per week 4. 1-2 days per week	

62	Do you eat vegetables?	1. yes 2. no	If no,skipto 65
63	How many days do you eat vegetables in a week?	1. daily 2. 5-6 days per week 3. 3-4 days per week 4. 1-2 days per week	
64	Do you eat animal fat or oil (saturated/unsaturated oil, butter, fatty meat)?	1. yes 2. no	If no,skipto 67
65	How many days do you eat animal fat or in a week?	1. daily 2. 5-6 days per week 3. 3-4 days per week 4. 1-2 days per week	
66	Do you drink Coffee?	1. yes 2. no	If no,skipto 70
67	How frequent do you drink coffee?	1. \geq once a day 2. $<$ once a day	
68	How many cups of coffee do you drink?	1. $<$ 3 cups 2. \geq 3 cups	
69	Have you ever chewed chat?	1. yes 2. no	If no,skipto 73
70	What are your status of Chat chewing?	1. current khat chewer 2. former khat chewer	
71	How frequent do you chew chat?	1. daily 2. 5-6 days per week 3. 3-4 days per week 4. 1-2 days per week	

Step 5 Physical measurement related factors

Blood pressure measurement			
S.no	Questions	Response	Skip to/Remark
72	Reading 1	Systolic (mmHg)----- Diastolic (mmHg)-----	
73	Reading 2	Systolic (mmHg)----- Diastolic (mmHg)-----	
74	Reading 3	Systolic (mmHg)----- Diastolic (mmHg)-----	
75	Average reading	Systolic (mmHg)----- Diastolic (mmHg)-----	
76	Height	_____cm	
77	Weight	_____Kg	
78	BMI of mothers	1. < 18.5 2. 18.5–24.9 3. 25-29.5 4. ≥30	
79	Mid upper arm circumference in centimeter	1. <21cm 2. ≥21cm	
Heart Rate			
80	Reading 1	Beats per minute-----	
81	Reading 2	Beats per minute-----	
82	Reading 3	Beats per minute-----	
83	Average reading	Beats per minute-----	

Thank you very much for your precious time and ideas!!

Annex III: In-depth interview questionnaire (English version)

Interview guide for questionnaires of the prevalence of undiagnosed gestational hypertension and the associated factors among women living in Nadi Gibe district, Jimma zone, Southwest Ethiopia, 2022.

Interview guide for in-depth interviews

I hereby grant permission for the researcher, Lemma Tefera, to use the information I share during the interview for research purposes. I am aware that the interview discussions will be audio recorded and grant consent for these recordings, provided that my privacy will be protected. In order to maintain confidentiality, I undertake not to divulge any information that is shared in the interview discussions to any person outside the group.

Participant's Name _____

Date _____

Signature _____

The name of the researcher _____

Date _____

Signature _____

_____ is the start time.

_____ is the end time.

In-depth Interview Guide

Background Information for Expert Discussion

Co de	Ag e	Se x	Reli gio n	Mari tal statu s	occu patio n	Mont hly inco me	NO of famil y	educ ation	Resi denc e	Ethnic ity	Keb ele	BP	Hx of HTN

Questions

1. Can you briefly describe what you know about hypertension, also known as high blood pressure? How does this disease occur?
2. Do you think hypertension as a major disease? Please explain your thoughts.
3. Can you please describe the symptoms during hypertension?
4. Do you think hypertension can be prevented? What are the preventive measures?
5. Do you know about the predisposing factors? Can you describe it?
6. What do you know about the importance of having regular blood pressure checkups?
7. How often and when you monitor your blood pressure?
8. What is the importance of a healthy diet for controlling blood pressure?

9. Is there any relation between obesity and high blood pressure? Can you explain your thoughts?
10. What is your Sources of information on hypertension?

Thank you very much for your precious time and idea!!

Annex VI: Gaafannoo Afaan Oromoo

Unka waliigaltee qorannoo Facaatii fi Sababoota dhukkuba Dhibbaa Dhigaatiif Nama saaxilan irratti jiraattoota Anaa Nadi Gibee Dimtu, Godiina Jimmaa, Kibba dhihaa Itiyooophiyaa, 2014

Guuca Waligalte

Akkaataa Faayidaa fi Kaayyoo Qo’annoo armaan olii irraa ibsameetti, akka qo’annoo kana keessatti hiirmaattan carraadhaan filatamtanii jiirtu. Ragaan isiin laattan iccitidhaan Kan qabamuu ta’uu isaatiif qaama sadaffaatiif Kan hin dabarfamnee dha .Maqaan kessan Senaan jirenya dhuunfaa kessanii sagaledhaan Kan hiin waraabamnee fi Faayidaa biroof Kan hiin olle dha.Hiirmaannaan Qorannoo kana keessatti gootan fedhiif heyyama kessaniin qofa dha. Gaaffi gaafatamtan kamiinuu ykn huunduuma deebisuu ykn deebisuu dhisuu Ni dandeessu, garuu ragaan fuunaanamuu immoo baay’ee muurtessaa dha qoo’annoo kanaaf. Yoo illee ragaa nuu kennuu dhiiftan wantii isiin irra gahuu ykn qaqqabuu tokko illee hiin jiru. Karaa birootiin, waan Qorannoo kana irratti hiirmaachuukessaniif Faayidaan addaa isiin argattan hiin jiru jechuu dha. Gaaffiwwan kana deebisanii xummuruuf yoo baay’atee Daqiiqaa 20 nii fuudhataa. Odeffannoo kennuuf fedhii qabduu ragaan kessan qorannoo kanaaf akka ooluu fedhii qabduu?

1. Eyyeen, Feedhan qabaa qorannoo kana keessatti hiirmaachuuff (Gara fuula itti anutti)

Mallattoo-----

2. Miti, Qorannoo kana irrattii hiirmaachuu hiin barbaaduu. (Galatteffadhutii xummurii)

Sheetti Odeffannoo qoranno Dhibbaa dhigaaf Sababoota Balaa ta’an jiraattoota Anaa Nadhi Gibe, Goodina Jimmaa, Kibba Dhihaa Ethiopia 2024.

Shittii Odeffannoo

Akkam Jiirtu? Ani Maqaan kiyyaa_____jeedhamaa. Ogessa fayya dha. Facaatii fi Sababoota dhukkuba Dhibbaa dhigaa irratti balaa ta’an Jiraattota Anaa Nadhii Gibee adda baasuuf xinxaluf itti ademaa jirra. Ragaa funaanuuf kakan itti adema jiiru Ummata anaa kana kessa jiraatan irraayyi. Qorannoon kuun gaggeffamuu Dhibba dhigaa

Sababoota Saaxilan irratti Obbo Lammaa Tafarraa, Barataa Digrii 2ffaa Universitii Jimmaa Garee Fayyaa Hawaasaa Waligalaa irraati. Qorannoochii Kan tajaajilu Facaatii Dhibbaa dhiigaa fi Sababa balaa ta'an Jiraattoota Anaa Nadhii Gibee kessaa Xinxaluufi .Akkasuumas Qorannoon kuun Maloota ittisaa irratti karoorsuuf fi yaalii barbaachisu gochuuf fayyadaa. Qorannoo kuun Ragaa Ka'uumsaa ykn Ragaa Polisii haaraa boocaniif dhaabbiile Kan biroo dhimma kana irratti hojjataniif fayyadaa. Kanaafuu ragaa Qorannoo kana kennuuf Fedhiin isiin agarsiistan baay'ee murtessaa dha. Waa'ee qorannoo kanaa gaaffi kaminuu yoo qabaattan, Qorataa qo'annoo kanaa gaafachuun nii dandeessu, Lamma Tafarraa .Mobile No: 0911955458 or email address: ltefera32@gmail.com.

Fedhii qabdu gaaffif deebii Kenya itti fufuf? Eyye_____ Miti_____

Mallatto gaaffi gaafataa waliigaltee gaaffi deebisaan afaaniin deebisuuf Kan ittiin jechaan deebisuuf miirkanesse _____.

Gaaffi qorannoo Facaatii fi Wantoota dhukkuba Dhibbaa Dhigaa irratti jiraattoota Anaa Nadi Gibee, Godiina Jimmaa, Kibba Bahaa Itiyooophiyaa, 2014

Adda baasii Gaaffi _____

Koodii Gaaffi_____ Maqaa_____

Guuyyaa Gaaffi _____

Maqaa Bakka jireenyaa_____

Maqaa Supervaayzara Mirkanesse_____

Mallatto_____

Annex V: Gaaffilewan Veerjiinii Afan Oroomoo

Qajeelfama: Qabiyyeen gaaffi bakka sadiitti qoodama. Kanaafuu, Gaaffilee Filannoo qabaniif Qubee filattan irratti Maruu fi Baaka duuwwaa kennamee irrattimmo deebii kessan barreessaa.

Qajeelfama Gaafataa

- 1 Ragaan Kan funaanamuu hirmaattoota umuriin isaanii waggaa ≥ 18 'f ta'e irraayyi (Mana Sana kessaa Namnii gaafatamuu umuriin 18'f isaal ol ta'ee tokko ol yoo jiraatee carraadhaan tokko kessaa filachuun gaafadhu.)
- 2 Gaaffiif deebii jalqabuukeendura ykn gaafachuukeetiin duura guutummaa gaaffichaa irratti miirkaneffadhuu

3 Gaaffii kee erga xummurteen booda Safarrii ykn madaalli Namoonaa itti kennii
(Perform Anthropometric measurement after you completed the interview)

4 Adeemsa Tartiba isaa eggateen hordofii raawwadhuu

Maqaa Nama Ragaa Sassaabee _____ Guyyaa __/__/__ Malt

Kutaa Iffaa Odeffannoo waligalaa

Lakk.	Gaaffilee	Deebii	Ce'ii/Yaad
01	Umuurii Gaafatamaa	_____Waggaadhaan	
02	Guyyaa gafatame	_____	
03	Sadarkaa Baruumsaa	1. Kan hin baranne 2. 1-8 ^{ffaa} kutaa 3. 9-12ffaa kutaa 4. Collejiif isa ol	
04	Haala gaayiilaa?	1. Hin herumnee 2. Heeruumte 3. Kan wal hiikan 4. Kan jalaa Du'ee	
05	Amantaa?	1. Muuslima 2. Orthodoxsii 3. Protestaanti 4. Catoolikii 5. Kan biraa, ibsi__	
06	Qoomoo sanyii dhalootaa?	1. Oromo 2. Amhaaraa 3. Yemii 4. Kefaa 5. Dawuroo 6. Kan biraa,ibsi_____	
07	Haala Hojii	1. Qonnaan buula 2. Daldalaa 3. Hojjattu Motummaa 4. Barattu 5. Kan hojii hiin qabnee 6. Hojjataa guyyaa 7.Kan biraa/ibsi-----	
08	Mana kana kessaa namni umuriin isaa waggaa 18'f oll sii dabalatee meeqa?	Baay'ina namaa.....	
09	Baay'innii maatii waligalaa mana kana kessa?	1. 1-2 2. 3-4 3. ≥5	

Kutaa 2ffaaGaffiiwwaan Haala mana Jireenyaa			
10	Eletrikiin jiraa?	1. Eeyyee 2. Lakki	
11	Radion ni jiraa?	1. Eeyyee 2. Lakki	
12	Televijiinin ni jira?	1. Eeyyee 2. Lakki	
13	Frijiin ni jira?	1. Eeyyee 2. Lakki	
14	Eeleen eletriikii ni jira?	1. Eeyyee 2. Lakki	
15	Minjaala mana keessaa ni qabdu?	1. Eeyyee 2. Lakki	
16	Teessoon ni jira?	1. Eeyyee 2. Lakki	
17	Sireen firaash spoonjii qabu ni jiraa?	1. Eeyyee 2. Lakki	
18	Namni dabtara mana baankii qabu ni jira?	1. Eeyyee 2. Lakki	
19	Bishaan dhugaatii qulqulluu eessaa waraabbattuu?	1. BishaanTuubboo 2. Kan biroo _____	
20	Maatiin mana fincaanii akkamii fayyadamuu?	1. Kanbishaaniindeemu /Keedoo kan hin qabne 2. Mana fincaanii kan hinqabne fi bakkeetti fayyadamanu 3. Kan biroo _____	
21	Nyaata maaliin bilcheeffattuu?	1. Elektiriikii 2. Qoraan 3. Kan biroo _____	
22	Lafti mana jireenyaa irra jireessaan maalirra hojjetamee? laaluun	1. Lafa uumamaa 2. Kanneen biroo____	
23	Walleen manaa bakkeen isaa maal irraa hojjetame? laaluun	1. Kan uumamaa (dagalee/ marga dhedheeraa / wallee dhabuu) 2. Kan biroo _____	
24	Irra keessi mana jireenyaa/xaaraa/ irra jireessaan maalirraa ijaarame? laaluun	1. Xaaraa sirriitti ijaarame(sibiila / qorqorroo / simmintoo) 2. Kan biroo _____	

Kutaa 3^{ffaa} Bekkumsa fi maddaa Odeffannoo ittiin argaatan

Lakk.	Gaaffilee	Deebii	Ce'ii/Yaad
25	Yommuu haa ta'uu wa'ee dhiibaa dhiggaa dhageese beekataa? (Have you ever heard about blood pressure?)	<ol style="list-style-type: none"> 1. Eyye 2. Miti 	Yoo miti ta'e Lak.35 ti Ce'ii
26	Wantii dhiibaa dhiggaaf nama saxiiluu maaliini? (What is the risk factors of hypertension?)	<ol style="list-style-type: none"> 1. Nyaataa 2. Sochi iqama goochu dhiisu. 3. Ulfaatiina fabaluu 4. Sanyiidhaan 5. Qoriichaa walqabata 6. Kan biiroo 	
27	Dhukkuba dhiibaa dhiggaa ittiisuun hindanda'ma? (Is hypertension a preventable disease?)	<ol style="list-style-type: none"> 1. Eyye 2. Miti 	Yoo miti ta'e Lak.30 ti Ce'ii
28	Maloota Dhukkuba dhiibaa dhiggaa ittiisuun danda'maan maalfa'ii? (What is Prevention methods of hypertension?)	<ol style="list-style-type: none"> 1. Sochii qamaa goochu 2. Nyataa mirkaneesu 3. Dhiibaa dhiggaa yeroo hunda illalamu 4. Boqoonnaa gahaa ta'e gochu 5. Dhiiphachu sammuu hirriisuu 6. Others 	
29	Malatoolee dhukkuba dhiibaa dhiggaa maalfa'ii? (What is Symptoms of high BP?)	<ol style="list-style-type: none"> 1. Dizziness 2. Dhahaana Onnee 3. Mirra-dadhabii dhagahaamu 4. Kan biro 	
30	Yommuu haa ta'uu wa'ee dhiibaa dhiggaa Oggessa irra dhageese beekataa (Have you Been told by health staff BP is high?)	<ol style="list-style-type: none"> 1. Eyye 2. Miti 	
31	Yeroo dhiibaa dhiggaa kee dabaluu maalgotaa? (Where the place people is seek care when BP is high?)	<ol style="list-style-type: none"> 1. Bufataa fayyaa 2. Qoricha aadaa fayadamu 3. Mana amantaa dhaqu 4. Mana qorich dhaqu 	
32	Wa'ee fayyaa kee illalamuuf mana yallaa yeroo haamama demtee beekta? (How often visit source of healthcare?)	<ol style="list-style-type: none"> 1. Yeroo tokko qofa 2. Yeroo hunda 3. yeroo bayyee 4. Darbe darbee 	

33	Wa'ee dhukkuba dhiibaa dhigga oddeeffannoo essaa argataa (From where do you get Sources of information on hypertension?)	<ol style="list-style-type: none"> 1. Miidiyya irra 2. Oggeessa fayyaa irra 3. Hirriyyoota koo irra 4. Oggeessa qoricha aadaa 5. Mana ammaantaa irra 	
----	--	---	--

Kutaa 4ffaa Odeeffannoo Mediikaala fi Yaalii da'umsa

Lakk	Gaaffilee	Deebii	Ce'ii/Yaad
34	Laguu yeroo jalqabaaf argitee?(What is your age at menarche (in years))	<ol style="list-style-type: none"> 1. Waggaa ≤ 12 2. Waggaa 13 – 15 3. Waggaa ≥ 16 	
35	Kan Ulfoofte? (What is your pregnancy status?)	<ol style="list-style-type: none"> 1. Barbaadeeti moo 2. Osoo hinbarbadiini 	
36	Meeqa deesse? (What is your parity?)	<ol style="list-style-type: none"> 1. 0 2. 1-4 3. ≥ 5 	
37	Ijjoollee meeqa qabda? (What is your Gravidity?)	<ol style="list-style-type: none"> 1. Tokko kan deese 2. Tokko ol kan deese 	
38	Ulfaa'u kettin dura qussannoo maatii fayyaadamtee bekta? (Have you pre-	<ol style="list-style-type: none"> 1. Eyye 2. Miti 	
39	Kanaan dura senaa dhiiba dhiigga qabdaa? (Do you have previous history of hypertension?)	<ol style="list-style-type: none"> 1. Eyye 2. Miti 	
40	Meeqa Ulfoofte? (How many fetus do you conceived?)	<ol style="list-style-type: none"> 1. Tokko 2. Lakuu 	
41	Kanaan dura dhukuba dhiiba dhiggaan qabdaa?	<ol style="list-style-type: none"> 1. Eyye 2. Miti 	
42	Kanaan dura maatii kee keessa Ulfaan waal qabate dhukuba Sukkaaran kan qabame jira? (Do you have previous family history	<ol style="list-style-type: none"> 3. Eyye 4. Miti 	
43	Maatii kee keessa dhukuba dhiiba dhiggaan kan qabame jira? Do you have family history of hypertension?)	<ol style="list-style-type: none"> 1. Eyye 2. Miti 	
44	Maatii kee keessa dhukuba Sukkaaran kan qabame jira? (Do you have family history of DM?)	<ol style="list-style-type: none"> 1. Eyye 2. Miti 	
45	Senaa dhukuba kalee qabdaa? (Do you have history of kidney diseases?)	<ol style="list-style-type: none"> 1. Eyye 2. Miti 	
46	Yeroo hammaa dhukuba Asmmii qabdaa? (Do you have currently history of asthma?)	<ol style="list-style-type: none"> 1. Eyye 2. Miti 	
47	Yeroo hamma hordafii Ulfaa tasissaa jirta? (Do you have ANC follow up attendance?)	<ol style="list-style-type: none"> 1. Eyye 2. Miti 	

Kutaa 5^{ffaa} Madaallii Amalaa

Lakk	Gaaffile	Deebii	Cee'i gara/Yaada
48	Amma yonaatti Tamboo xuxxee betaa? (Have you ever smoked cigarettes?)	1. Eyye 2. Miti	Yoo miti ta'e Lak.52ti Ce'ii
49	Tamboo hamma xuxxaa jirta moo kanaan dura xuxxa turte? (What is your status of smoking?)	1. Hamma 2. Kanaan dura	
50	Yeroo hammamiif tamboo xuxxaa? (How frequent, do you smoke cigarettes?)	1. Guyyaa guyyaan 2. Torbeeti guyyaa 5-6 3. Torbeeti guyyaa 3-4 4. Torbeeti guyyaa 1-2	
51	Maatii kee keessa nama tanboo xuxxuu jira? (Any family members who smoke cigarette?)	1. Eyye 2. Miti	Yoo miti ta'e Lak.54ti Ce'ii
52	Maatii kee keessa namnii tanboo xuxxuu enyu? (Whom family members smoke)	1. abbaa warraa 2. nama biro	
53	Yomuu haa ta'uu Dhugaatii Alkoolii kunneen fayyadamtee beektaa? (Have you ever consumed an alcoholic drink?)	1. Eyye 2. Miti	Yoo miti ta'e Lak.57ti Ce'ii
54	Dhuggaatti hamma dhugaa jirta moo Kanaan dura dhugdaa? (What is your status of drinking alcohol?)	1. Hamma 2. Kanaan dura	
55	Yeroo hammamiif dhuggaatti dhugdaa? (How frequent do you drink alcohol?)	1. Guyyaa guyyaan 2. Torbeeti guyyaa 5-6 3. Torbeeti guyyaa 3-4 4. Torbeeti guyyaa 1-2	
56	Yeroo ulfa kee kana irratti hin dhiphaata?(Psychological stress during current pregnancy)	1. Hin dhiphaadhu 2. nan dhiphaadha	
57	Guyyaa tokko keessatti sa'aatti meqaaf raftaa? (What is your sleep pattern in hours per night?)	1. ≤6 2. 7-8 3. ≥9	
58	Guyyaa keessa siiliimi jate (raftee) kataa? (Do the Mothers took nap per day?)	1. Eyye 2. Miti	
59	Yeroo ulfa kee kanatti sochii qaamaa sagantaadhan ni hoojeta? (Do you perform scheduled physical exercise during current pregnancy?)	1. Eyye 2. Miti	
60	Yeroo ulfa kee kanatti Muduraa hin soorata? Do you eat fruit?	1. Eyye 2. Miti	Yoo miti ta'e Lak.63ti Ce'ii

61	Torbanitti sii'a meeqa Muduraa soorata? (How many days do you eat fruit in a week?)	1. Guyyaa guyyaan 2. Torbeeti guyyaa 5-6 3. Torbeeti guyyaa 3-4 4. Torbeeti guyyaa 1-2	
62	Yeroo ulfa kee kanatti kuduraa hin soorata? (Do you eat vegetables?)	1. Eyye 2. Miti	Yoo miti ta'e Lak.65 ti Ce'ii
63	Torbanitti sii'a meeqa kuduraa soorata? (How many days do you eat vegetables in a week?)	1. Guyyaa guyyaan 2. Torbeeti guyyaa 5-6 3. Torbeeti guyyaa 3-4 4. Torbeeti guyyaa 1-2	
64	Yeroo ulfa kee kanatti foon cooma ykn zeeyitti gossa aadaa aadaa hin soorata? (Do you eat animal fat or oil (saturated/unsaturated oil, butter, fatty meat?)	1. Eyye 2. Miti	Yoo miti ta'e Lak.67 ti Ce'ii
65	Torbanitti sii'a meeqa foon cooma ykn zeeyitti gossa aadaa aadaa soorata? (How many days do you eat animal fat or in a week?)	1. Guyyaa guyyaan 2. Torbeeti guyyaa 5-6 3. Torbeeti guyyaa 3-4 4. Torbeeti guyyaa 1-2	
66	Buuna hin dhugdaa? (Do you drink Coffee?)	1. Eyye 2. Miti	Yoo miti ta'e Lak.70 ti Ce'ii
67	Guyyaati sii'a meeqa buuna dhugdaa? (How frequent do you drink coffee?)	1. Guyyaati tokko ol 2. Guyyaati tokko	
68	Buuna siini meeqa dhugdaa? (How many cups of coffee do you drink?)	1. Siini 3 gadii 2. Siini 3 ol	
69	Amma yonaatti Caatii (Jimaa) Qaamtee bektaa? (Have you ever chewed chat?)	1. Eyye 2. Miti	Yoo miti ta'e Lak.73 ti Ce'ii
70	Caatii (Jimaa) hamma qamaa jirta moo kanaan dura qamaa turte? (What are your status of khat chewing?)	1. Hamma 2. Kanaan dura	
71	Yeroo hammamiif Caatii (Jimaa) qamtaa? (How frequent do you chew chat?)	1. Guyyaa guyyaan 2. Torbeeti guyyaa 5-6 3. Torbeeti guyyaa 3-4 4. Torbeeti guyyaa 1-2	

Safarii Qaamaa

	Dhibbaa dhigaa		
Lakk	Gaaffile	Deebii	Cee'i gara/Yaada
72	Duubbisa 1ffaa	Systolic (mmHg)----- Diastolic (mmHg)-----	
73	Duubbisa 2ffaa Reading 2	Systolic (mmHg)----- Diastolic (mmHg)-----	
74	Duubbisa 3ffaa	Systolic (mmHg)----- Diastolic (mmHg)-----	
75	Avreegi Duubbisa	Systolic (mmHg)----- Diastolic (mmHg)-----	
76	Hojjaa/Dheerina	_____cm	
77	Ukfaatina	_____Kg	
78	BMI Hadhaa	1. < 18.5 2. 18.5–24.9 3. 25-29.5 4. ≥30	
79	MUAC Hadhaa seentiimeetriidhaan	1. <21cm 2. ≥21cm	
	Dhahaanna Onne		
80	Duubbisa 1ffaa	Beats per minute-----	
81	Duubbisa 2ffaa	Beats per minute-----	
82	Duubbisa 3ffaa	Beats per minute-----	
83	Avreegi Duubbisa	Beats per minute-----	

Yaadaa fi yeroo keessan guddaa kana waan naa kennitaniif galatoomaa!!

Annex VI: Gaaffiwwan gadi fageenyaan gaafataman

Akkam Jiirtu? Ani Maqaan kiyya _____jeedhamaa. Ogessa fayya dha. Facaatii fi Sababoota dhukkuba Dhibbaa dhigaa hadhooli ulfa irratti balaa ta’an Jiraattota Anaa Nadhii Gibee adda baasuuf xinxaluf itti adamaa jirra. Ragaa funaanuuf Kan itti adema jiiru Ummata anaa kana kessa jiraatan irraayyi. Qorannoon kuun gaggeffamuu Dhibba dhigaa Sababoota Saaxilan irratti Obbo Lammaa Tafarraa, Barataa Digrii 2ffaa Universitii Jimmaa

Garee Fayyaa Hawaasaa Waligalaa irraati. Qorannoochii Kan tajaajilu Facaatii Dhibbaa dhiigaa fi Sababa balaa ta’an Jiraattoota Anaa Nadhii Gibee kessaa Xinxaluufi .Akkasumas Qorannoon kuun Maloota ittisaa irratti karoorsuuf fi yaalii barbaachisu gochuuf fayyadaa. Qorannoo kuun Ragaa Ka’uumsaa ykn Ragaa Polisii haaraa boocaniif dhaabbiile Kan biroo dhimma kana irratti hojjataniif fayyadaa. Kanaafuu ragaa Qorannoo kana kennuuf Fedhiin isiin agarsiistan baay’ee murtessaa dha. Waa’ee qorannoo kanaa gaaffi kaminuu yoo qabaattan, Qorataa qo’annoo kanaa gaafachuun nii dandeessu,

Maqaa gafatamma_____

Guyyaa_____

Malattoo_____

Maqaa qoorataa_____

Guyyaa_____

Malattoo_____

Yeroo itti jalqabame_____

Yeroo itti xummurame_____

Oddeefannoo Gafatamma

Co dii	U mu uri	Ga nd a	Am anta a	H/ga ayiil aa	H/H ojii	Mont hly inco me	B/ma atii	S/Ba ruu msaa	B/Jir eeny aa	sanyii	BP	Hx of HTN

Gaafilee

1. Wa’ee Dhukkuba dhiibaa dhiigaa waan atti beektu siiritti Na ibsu dandeessa? Sabaaba maalittin dhukkubani Kun dhufuu danda’aa?
2. Dhukkubanii dhiibaa dhiigaa dhukkuba ciimadha jate yadaa? Mee yaada kee Na ibsi?
3. Maalatoolee dhukkubanii dhiibaa dhiigaa Na erruu dandeessa?
4. Dhukkubanii dhiibaa dhiigaa ittiissun Ni danda’aama jate yadaa? Maaliin ittissamu danda’aa?
5. Waantoota Dhukkubanii dhiibaa dhiigaaf Nama saxiilaan beekta? Naaf ibsu dandeessa?
6. Yeroo yeroon dhiibaa dhiigaa safaaramun fayyiida qaba jate yadaa?
7. Yoomii fi yeroo hammaamin dhiibaa dhiigaa safaaramuu qaba jate yadaa?

8. Dhukkubanii dhiibaa dhiigaa to'aachuf nyataa fayyaa keenyaaf barbachiissu sorachuun fayiida qaba jate yadaa?
9. Ulfaatini qamaa fi dhukkubanii dhiibaa dhiigaa walittii dhufenya qabu jate yadaa? Yoo jira jate siiritti Na ibsu dandeessa?
10. Wa'ee Dhukkuba dhiibaa dhiigaa madii oddeefannoo kee maali?

Yeroo keessan aarsaa gootanii yaada keessan waan naaf kennitaniif galatoomaa!!

Declaration

I, the undersigned, Master of Public Health in General Public Health student declare that this proposal is my original work in partial fulfillment of the requirement for the degree of Master of Public Health in General Public Health.

Name: Lemma Tefera Yimer

Signature: _____

Place of submission: Department of Epidemiology, Faculty of Public Health, Institute of Health, Jimma University.

Date of Submission: _____

This proposal work has been submitted for examination with our approval as university advisor(s).

Approval of advisors

Advisors name

Signature

Solomon Berhanu (BSc, MPH/E, Assistant professor)
