



ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCE
SCHOOL OF PUBLIC HEALTH

**COMPILED BODY OF WORK IN THE FIELD OF EPIDEMIOLOGY IN
THE BALE ZONE, THE OROMIA REGION, ETHIOPIA.**

By: Eshetu Zeben (BSc.)

Advisor's name

- 1. Primary:** Professor Negussie Deyessa (MD, PhD)
 - 2. Secondary:** Yimer Seid (MPH, -Assistant Professor)
- Programme Advisor:** Yonas Abebe (MPH)

**COMPILED BODY OF WORK SUBMITTED IN PARTIAL
FULFILLMENT OF THE DEGREE OF MASTER OF PUBLIC HEALTH
IN FIELD EPIDEMIOLOGY AT ADDIS ABABA UNIVERSITY,
COLLEGE OF HEALTH SCIENCES, SCHOOL OF PUBLIC HEALTH.**

October 6, 2024

Addis Ababa,

Ethiopia

ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCE

SCHOOL OF PUBLIC HEALTH

Compiled Body of Works in Field Epidemiology

By:Eshetu Zeben

Ethiopia Field Epidemiology Training Program

(EFETP)

Approved by Board of Examiners

Examiners	signature	Date
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Advisor	signature	Date
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Examiner	Signature	Date
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Acknowledgment

I would like to express my gratitude to my advisors, Professor Negussie Deyessa (MD, PhD-), Yimer Seid (MPH, Assistant Professor), and Program Advisor Yonas Abebe (BSc, MPH), for their valuable and constructive suggestions throughout the research thesis. Their guidance, insightful critiques, and prompt responses have been instrumental in completing this work. Additionally, I would like to acknowledge Abdulnasir Abagero (MPH), my field residency advisor, and Addis Ababa University for providing me with this opportunity. Furthermore, I thank the Oromia Regional State Health Bureau research directorate team, Bale Zone health office, and respective Woredas of Bale Zone for data collection. I also want to thank the participants from each hospital for participating in this study.

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List of Abbreviations

AAU: Addis Ababa University

AOR: Adjusted Odds Ratio

BMI: Body Mass Index

CHD: Coronary Heart Disease

CI: Confidence Interval

COR: Crude Odds Ratio

DM: Diabetes Mellitus

DSMK: Diabetes Self-Management Knowledge

EFDA: Ethiopian Food and Drug Administration

EFETP: Ethiopia Field Epidemiology Training Program

FMOH: Federal Ministry of Health

FBG: Fasting Blood Glucose

IDF: International Diabetes Federation

IRB: Institutional Review Board

MMR: Measles, mumps, and rubella vaccination

MMWR: Morbidity and Mortality Weekly Report

MoH: Ministry of Health

MPDSR: Maternal and Perinatal Death Surveillance and Response

MSDKS: Michigan Simplified Diabetes Knowledge Scale

MV: Measles Vaccination

ORHB: Oromia Regional Health Bureau

PHEM: Public Health Emergency Management

SDSCA: Summary of Diabetes Self-care Activities

SPH: School of Public Health

SPSS: Statistical Package for the Social Sciences

T2DM: Type 2 Diabetes Mellitus

WHO: World Health Organization

WDSS: Weekly Disease Surveillance System

MAM: Moderate Acute Malnutrition,

MUAC: Mid-upper arm circumference,

OTP: Outpatient Program

Executive Summary

Despite numerous interventions aimed at combating infectious diseases, they continue to pose a significant global health challenge. Prevention is a fundamental component of the Ethiopian government's policy agenda, which includes initiatives to bolster immune system strength. The Ethiopia Field Epidemiology Training Program, overseen by the U.S. Centers for Disease Control and Prevention (CDC) Epidemic Intelligence Service (EIS), endeavors to enhance the diagnostic and preventive capacities of public health professionals in relation to critical diseases. During my tenure at Addis Ababa University School of Public Health and the Oromia Regional Health Field Base (Bale Zone Health Office) from January 2023 to September 12, 2024, several notable activities were undertaken. These encompassed the analysis of severe acute malnutrition (SAM) survey data from January 3 to January 25, 2023, scrutiny of Woreda health profile data from February 13 to February 30, 2023, investigation of a cholera outbreak from January 19 to February 2023, monitoring of a measles outbreak from June 19 to September 17, 2023, and the production of a research paper on type 2 diabetes self-care practices and associated factors among patients attending public hospitals in the Bale Zone from February 5 to March 22, 2024. Additionally, we conducted various training sessions and composed essays and articles that were published in reputable journals. However, this document only includes detailed information from one weekly report, with access to others provided through hyperlinks. The measles investigation, conducted between June 27 and September 17, 2023, identified 48 cases and 2 deaths in Agarfa Woreda, Bale zone, Oromia Region. To address these issues, we suggest intensifying the utilization of the second measles vaccine and raising public awareness about its significance. Between January 2023 and February 2023, there were cholera outbreak 25 cases of *Vibrio cholera*, with no fatalities. The causes of cholera include security concerns, inadequate infrastructure, insufficient healthcare services, and lack of clean water. To combat this, we propose providing clean and adequate water, avoiding contact with infected individuals, actively identifying affected individuals, delivering emergency treatment, and developing cholera vaccines. Surveillance data analysis of severe acute malnutrition (SAM) in the Bale one health office demonstrated a gradual increase in cases over the years, particularly in 2020 G.C.; However, deaths resulting from SAM decreased during this period. The Surveillance Evaluation System on weekly disease and surveillance (WDSS) and Maternal and perinatal death (MPDSR) also assessed the comprehensiveness, reason-ability, flexibility, and effectiveness of the analysis and data management processes, although timeliness, consistency, and Representativeness were not always ensured. Maternal health services were generally commendable, but respiratory issues, diarrhea, and inadequate healthcare services were prevalent.

The findings of all these studies are incorporated in academic reports prepared for submission to peer-reviewed journals.

A research discussion was also developed, focusing on malnutrition (SAM) data analysis in the Bale zone , Oromia Region. In July 2023, a disaster assessment was undertaken to address the cholera outbreak affecting five villages in the Bale Zone district's of Oromia Region, aiming to identify people's needs and implement public health measures. The primary health concerns identified were diarrhea, malaria, and other infectious diseases. Our research study concentrates on type 2 diabetic patients admitted to public hospitals in the Bale Districts, Oromia Region, and their personal experiences with diabetes. We conduct our final thesis research on self-care practices and associated factors among type 2 diabetes mellitus patients attending public hospitals in Bale zone, Oromia region, Ethiopia. We selected 411 patients for a cross-sectional study using systematic random sampling and collected information regarding social factors, medical records, diabetes self-management, medication adherence, and self-care via the KoBotool database. The findings indicated that 59.4% of Type 2 Diabetes Mellitus patients demonstrated good self-care level, while 40.6% exhibited poor self-care behavior. Enhanced self-care was positively associated with higher income, self-employment, diabetes education, membership in a diabetes organization, knowledge about care, positive self-esteem, and absence of diabetes complications. Furthermore, We present the weekly epidemiological bulletin from the Public health emergency management (PHEM) reports of the Bale zone health office and Oromia Regional Health Directorates for weeks 1-4, 28-41, and 42-49 of 2023.

CHAPTER 1:- Investigation of the Measles Outbreak in Agarfa District, Bale Zone, South East Ethiopia(From June 27, 2023, to September 17, 2023.)

SUMMARY

Background: Measles is a highly contagious illness that can be prevented through vaccination.

Despite the availability of a safe and affordable vaccine, an estimated 164,000 people, primarily children under the age of five, die from measles each year. In the Agarfa district of the Bale Zone in the Oromia region, there has been an outbreak of measles in remote areas. The objectives of this investigation are to determine the causes of the outbreak and provide evidence-based recommendations.

Methodology: A study using unmatched case-control was conducted in the Agarfa woreda from June 27, 2023, to September 17, 2023. Epi-Info 7 and WHO standard case definitions were used to analyze cases (CI) and P. values of 0.05.

Results: The investigation identified two deaths within the community, resulting in a case fatality rate (CFR) of 0.042%. The total number of cases was 48, yielding an attack rate (AR) of 48 per 100,000(33%). Among the total participants, 78 (54.2%) were under the age of 15. According to a woreda report, 85% of children were vaccinated by 2023. Factors associated with measles at , $P < 0.000$ included Awareness of measles disease [AOR = 6.4, 95% CI (1.41-29.02)], recent contact with the patient 7-18 days ago [AOR = 1.96, 95% CI (4.15-34.49)], travel History [AOR = 4.5, 95% CI (1.52-13.84), knowledge on mode of transmission [AOR = 4.64, 95% CI (1.07-20.00] and Malnutrition [AOR = 9.75, 95% CI (2.76-34.44)].

Conclusion: Inadequate vaccination has made measles a significant cause of illness and death in the Bale Zone. Excluding community deaths, the patient mortality rate remains the same. Agarfa district had the highest number of cases among all districts. To reduce the risk of measles and associated mortality, it is crucial to assess vaccine effectiveness, expand vaccination coverage, conduct annual epidemic forecasts, and strengthen surveillance.

Keywords: measles, outbreak, Agarfa Woreda, Bale Zone, southeastern Ethiopia

Introduction

Measles is one of the most common infectious diseases caused by a virus called morbillivirus, which causes epidemics mostly in low-income countries. The measles virus (MV) belongs to the Morbillivirus genus and Paramyxoviridae family and is the cause of the disease (1). Measles causes 10 million infections and 164,000 deaths worldwide each year (1). According to the Pan American Health Organization, these deaths can be prevented with vaccination. This is followed by a maculopapular rash, which is a symptom of the respiratory disease measles and lasts for three days (1). Among the countries that faced serious epidemics in the world in 2009-2010, 4,235 cases were reported in Ethiopia (2). The incubation period lasts 8 to 12 days from initial exposure (3). The rash usually appears 14 days after exposure. The sickness is contagious for 4 days before and following the appearance of the rash (4). The measles virus has a baseline replication number (R_0) of 1, making it extremely contagious (5) in vulnerable hosts. The host's immunological state, housing situation, social interaction style, age distribution in society, birth cohort, and local weather or season all affect this figure (2). Measles outbreaks only need to affect 3–7% of susceptible individuals (4). Reports state that the prevalence of secondary infections among household contacts who are vulnerable ranges from 75% to 90% (6). The measles death rate in Ethiopia was believed to be between 3% and 5%, but during epidemics and in high-risk populations, it might increase to between 10% and 30% (1).

The measles vaccine, now available worldwide, offers 85% immunity after just one dose. Additional doses are required for the remaining 15% to produce measles antibodies (3). Vaccination rates ought to be higher than 95% in underdeveloped countries and 80% in developed ones. Because contact patterns at school age differ from those in infancy and because antibodies do not always match across age groups, age may potentially affect transmission (3).

Because of improved case-based surveillance and greater global distribution of the first and second doses of the measles vaccination, measles incidence has drastically fallen and the illness has been eradicated in the Americas (3). Measles eradication was the World Health Organization's (WHO) 2015 goal (4). Since then, there has been a significant reduction in measles, with an estimated 75% of cases and 79% of fatalities prevented between 2000 and 2015. This battle has required swift investigation and epidemic response (4).

Only one WHO region commemorated measles' eradication in 2016: the United States. It was no longer suitable to celebrate the eradication in 2017 due to the comeback of measles transmission and substantial outbreaks in America, Europe, the Eastern Mediterranean, and Southeast Asia (7). Between 2017 and 2018, there was a 48.1% increase in global measles cases and a rise in the number of reporting countries (7). WHO estimates that the global measles outbreak resulted in 10 million infections and 140,000 deaths (7). As a result, the measles outbreak research study aids in determining risk groups, the epidemiology of the illness, infection sources, and the course of preventative measures (7). In Africa, the aim is to immunize at least 95% of children in each settlement between the ages of 9 and 59 months with the measles vaccine to attain up to 92–94% community immunity (8). This will allow for the possibility of a second round of vaccination if the original dosage fails. Reduced measles fatalities have been largely attributed to increased immunization efforts (8). The measles vaccination is projected to have avoided 20.3 million deaths between 2000 and 2015. Measles mortality worldwide has dropped from an estimated 651 600 in 2000* to 134 200 in 2015, a 79% reduction (9). In Ethiopia as of May 1st, 2023, there were 6933 confirmed cases of measles in 2023, up from 1953 cases in 2021, and 9291 cases (375%) in 2022 and 2023. As a result, the number of confirmed measles cases increased by nearly five times between 2021 and 2022 (10). During the 2009–2010 outbreak, Ethiopia experienced 4235 measles cases, emphasizing the critical importance of robust public health systems, effective coordination at both national and international levels, and continuous efforts to improve preparedness for potential future health crises (11).

The district values this measles outbreak investigation since it pinpoints the outbreak's risk factors, enabling preventative measures to be taken going forward. To produce information for the prevention and control of future outbreaks in 2023, this inquiry sought to determine the scope and contributing factors of the measles outbreak in the Agarfa District of the Bale Zone.

Objective

1.1 General Objectives

To ascertain the existence and contributing factors of the measles outbreak in Agarfa Woreda, Bale zone, Oromia, Ethiopia , 2023.

1.2 Specific Objectives

- ✓ To verify whether measles cases exist in Agarfa Woreda.
- ✓ To examine the measles outbreak in Agarfa Woreda concerning time, place, and persons.
- ✓ To ascertain the causes of the measles cases in Agarfa Woreda.

2. Materials and Methodology

2.1 Research Design and Site

The study was conducted in Agarfa Woreda, located in the Bale zone in the Oromia region of Ethiopia. We conducted a case-control study to compare individuals with a specific condition (cases) to those without the condition (controls) to identify factors associated with the disease or outcome under investigation (see **Figure 1**).

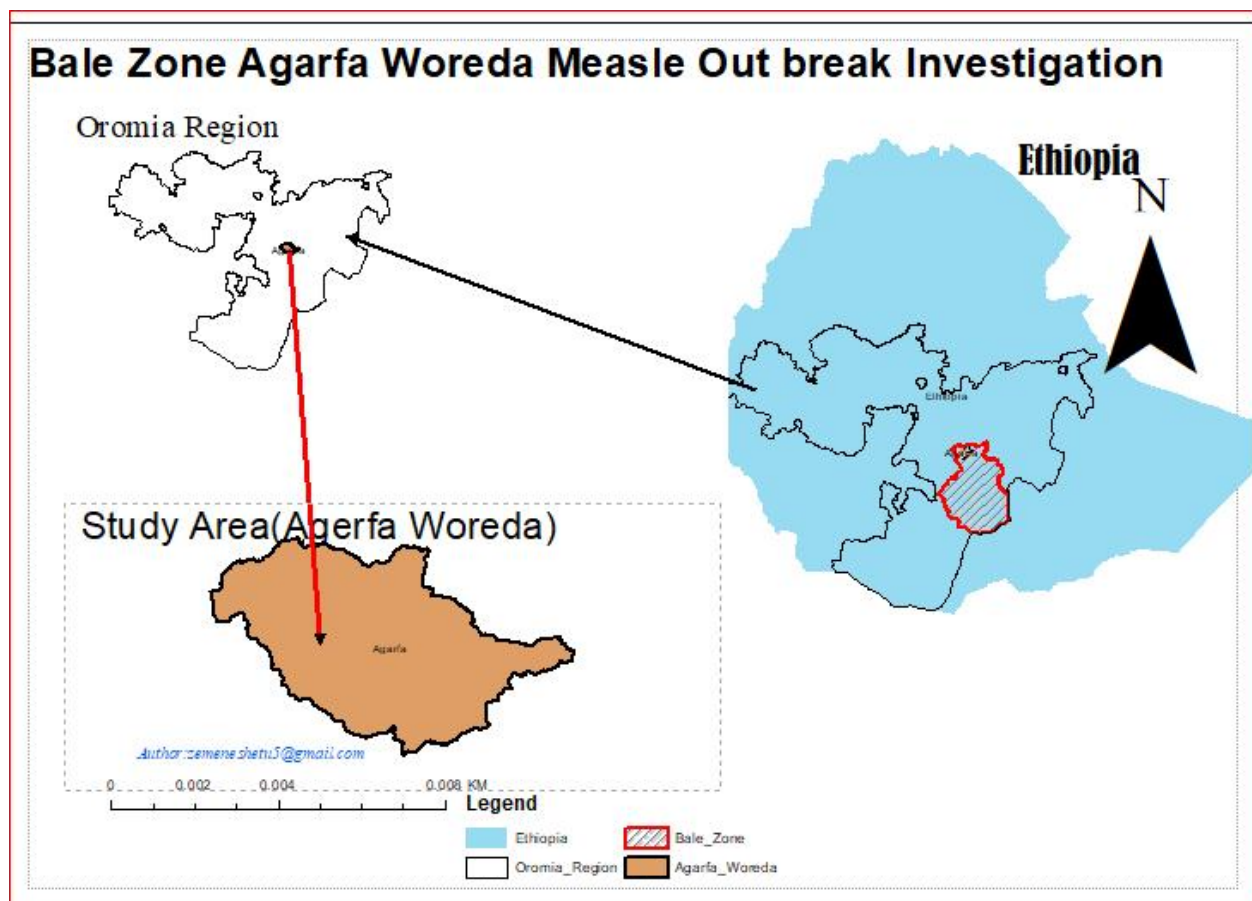


Figure 1: Measles outbreak distribution in Agarfa District, Bale Zone Oromia, Ethiopia, 2023

2.2 Data Collection Methods

We used a variety of methods for data collection. Medical records were reviewed to gather relevant information on measles cases included in the study. Interviews were also conducted with affected children or their caregivers to gain further insights into their medical history and potential risk factors.

2.3 Source Population

All residents of Oda Nagele, Mokena Chafe, Agarfa & Makala Kebele's Agarfa district

Case: All residents of the Agarfa district who, between June 27, 2023, and September 17, 2023, exhibit clinical signs and symptoms of measles based on the case definitions in the national measles guideline and either have laboratory confirmation of their illness or have been epidemiologically linked to confirmed cases.

Control:-people living in the same home or area as a case in the Agarfa district who do not meet the criteria for a measles case.

2.4 Criteria for Inclusion and Exclusion

2.4.1 Criteria for Inclusion

Cases: all measles-affected children were incorporated into the study to provide a complete picture of the illness within the targeted demographic. This allowed for a careful examination of potential risk factors and the consequences of contracting the disease.

Controls: children in the area under 15 years who did not show symptoms of measles from April 5 and the 42-day second incubation period after the prior case.

2.4.2 Conditions for Exclusion

We excluded cases that, during the active outbreak, required more than one visit to detect and control outside the area.

Measles cases meeting certain laboratory or clinical criteria were excluded from the analysis due to variations in how the diagnosis rules were interpreted.

2.5 Calculating the Sample Size

Out of 50 cases altogether, the study used a 1:2 ratio, with 48 cases and 96 controls. A total of 144 samples were obtained as a result (48 cases plus 96 controls). Given that the study was looking into an outbreak, all of the cases that were accessible were included to calculate the sample size. Two controls were chosen for each case, by national Public Health Emergency Management (PHEM) recommendations.

2.6 Sampling Technique

Data on risk factors and other details were collected using a line list and a semi-structured questionnaire. A line list organizes individual cases or events systematically in a tabular format, while a semi-structured questionnaire provides a flexible framework for interviews and qualitative data collection.

Alongside medical record reviews and interviews, a house-to-house investigation was conducted as part of the data collection process. This method involved visiting households within the community to gather additional information on living conditions, environmental factors, and potential sources of measles exposure.

Purposive control selection was used to ensure comparability in exposure, with two controls chosen for each case from the same household, nearby homes, or school. Controls were selected non-randomly based on similarities in exposure status, meaning that children who were more likely to be exposed were chosen for the control group. If there were no children under the age of 15 in the household, we chose classmates for school-age children.

2.7 Ethical Issues

The Bale Zone Public Health Emergency Department written for us a letter of support. The participants' parents and caregivers were invited to participate in the study after being made aware of its goals. To ensure anonymity, a verbal informed agreement was obtained from the parents or guardians of each participant.

The questionnaire used in our study was specifically developed for this research. We have created an English version of the questionnaire, which will be included as a supplementary file with this paper. The questionnaire was carefully designed to meet the research goals and collect relevant

data from the study participants. Since the questionnaire was custom-made for this study, there are no existing publications or references related to it. The questions in the questionnaire were formulated after a thorough review of existing literature to ensure they align with the research aims and objectives. In the main manuscript, we will refer to the English version of the customized questionnaire. The study obtained ethical approval from the Bale Zone Health Office under Reference Number FG/ 6/68541. This indicates that the research conducted during the measles outbreak underwent review and approval by the ethics committee at the health office in the Bale Zone.

Informed consent provided participants with essential information about the study before they agreed to participate. This ensured that individuals understood the purpose, risks, benefits, and procedures of the research, allowing them to make an informed decision about their involvement. For participants under the age of sixteen, informed consent was acquired from parents or other legally recognized representatives (LAR). Individuals who were 16 years of age or older gave their informed consent. Every study participant gave their informed consent, demonstrating adherence to ethical standards for participant consent.

The Zonal management committee members were involved in the measles outbreak investigation.

Active surveillance was conducted in residential homes, health centers, and areas where isolation and treatment were administered to identify additional cases. Most interviews took place at healthcare facilities, with some conducted at home. Each case had a different clinical presentation and course of therapy, but the techniques used to collect data for the control group were always the same. 42 days after the last case's incubation period, control data were collected.

2.8 Quality Validation

The validated tools were revised following a study of multiple WHO articles and guidelines for the investigation of measles outbreaks. The instruments were evaluated by two public health emergency management and advisors. Data collectors were trained in data collecting and the use of data gathering technologies before beginning data collection. The lead investigator carried out daily monitoring during the data-gathering phase. Before the interviews, parents were reassured that the purpose of the study was to reduce the informational bias of the respondents. Case and control interviews were carried out in the same way with the same tools to reduce interviewer bias.

Every day, the primary investigator verified that the data obtained was accurate and comprehensive.

2.9 Laboratory Investigation

Serum samples from five suspected cases were collected, forwarded to the national measles laboratory for an IgM test, and then subjected to a second test in compliance with national guidelines. The index cases were epidemiological linkage and 4 cases were lab-confirmed.

The "controls" were people who didn't exhibit any clinical measles symptoms and lived in the same neighborhood households as the cases. The information was gathered through a questionnaire that an interviewer administered.

We used Epi Info 7 for data entry, cleansing, and analysis. At a significance threshold of 0.05, a logistic regression analysis was performed to determine the risk factors linked to measles infection.

Analytical Statistics

Epi-info software was used to enter the data and verify that there were no errors. The statistical software SPSS version 26 was utilized for data analysis, outlier detection, and handling of missing information. Using the descriptive analysis formula $VE = (\text{unvaccinated} - \text{vaccinated}) / \text{unvaccinated}$, the impact of vaccination on death rate, morbidity rate, and vaccine efficacy was investigated. To calculate the infection rate, unvaccinated children under the age of 15 who have never had measles were deemed to be at risk. Since there have not been any recent measles outbreaks in the villages, it is thought that there is not any active immunity. 48 out of 96 (or 50%) of the vaccinated control group received the vaccine; immunization rates were calculated using this sample.

The population at risk was calculated by taking 33,872 residents of Oda Nagele (7012), Mokena Chafe (4849), Agarfa (14414) & Maqalla (7597) villages as the total population and eliminating 50% of the target population who are not at risk. Uni variate analysis was used to summarize and independently describe each variable. At a significance level of $p < 0.25$, a two-tailed logistic regression analysis was performed to identify relevant variables for multivariate analysis.

Confounding variables were taken into account while identifying independent factors linked to measles cases using multivariate binary logistic regression. Wald's inverse method was applied to

introduce the candidate variable. The independent variables associated with cases of measles were chosen to be the significant outcome variables. In addition, the Hosmer and Lemeshow model performance test was used to evaluate the overall quality of the model. At a significance level of $p < 0.05$, the adjusted odds ratio was used to establish the relationship.

3. Results

3.1 In-Detail Epidemiology

The two-year-old child who was found on April 5, 2023, was the index case. He was never immunized against the measles. The Agarfa District of the Bale Zone reported 48 cases of measles and two community fatalities between April 5 and June 23, 2023, yielding a crude case fatality rate (CFR) of 0.41%. When the outbreak was at its worst, it lasted from April 9, 2023, to June 30, 2023. Of the 47 cases, 36 (or 75%) were male. Out of 48 cases, only 19 (39.54%) received outpatient treatment, while 60.4% received inpatient treatment. Out of five sample cases sent to the national laboratory, 43 instances were handled clinically, whereas 4 cases (8%) had laboratory confirmation.

3.2 Cases by Time, Location, and Person

3.2.1 Case of measles by location

Oda Nagele had the highest number of cases (17/10,000), followed by Agarfa Kebele's (15/10,000). It is difficult to provide routine immunization in these two kebele because many of the pockets have limited access to transportation (Figure 2). The current outbreak affected Nagele, Mokena Chaffe, Agarfa, and Maqalla villages of Agarfa district, of which two (Agarfa 01 and Agarfa 06) were urban areas

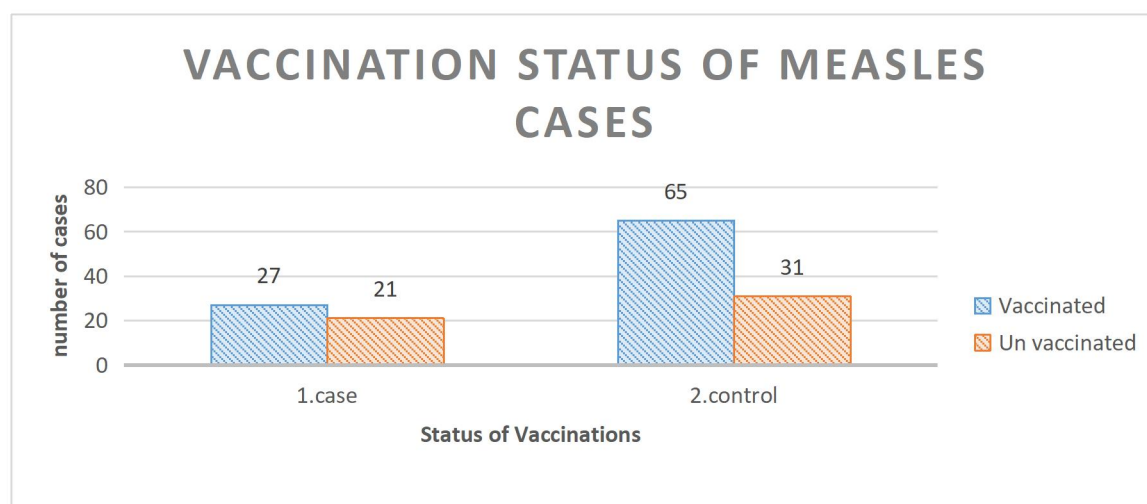


Figure 2: Measles cases' vaccination status in the Agarfa Woreda measles endemic area in Ethiopia's Bale Zone, 2023

Case by Person

Male patients make up 36 (75%) of the total 48 cases. The current outbreak of measles infected the most people in the age groups 0-59 and 60-168 months, with 15.28% and 47.92%, respectively. Figures 3 and 4 display the number of cases of measles by age group. The average AR for children between 60 and 168 months was greater (90/10,000). 48/10,000 was the overall AR, while 2 fatalities out of 50 cases accounted for the 0.41% case fatality rate.

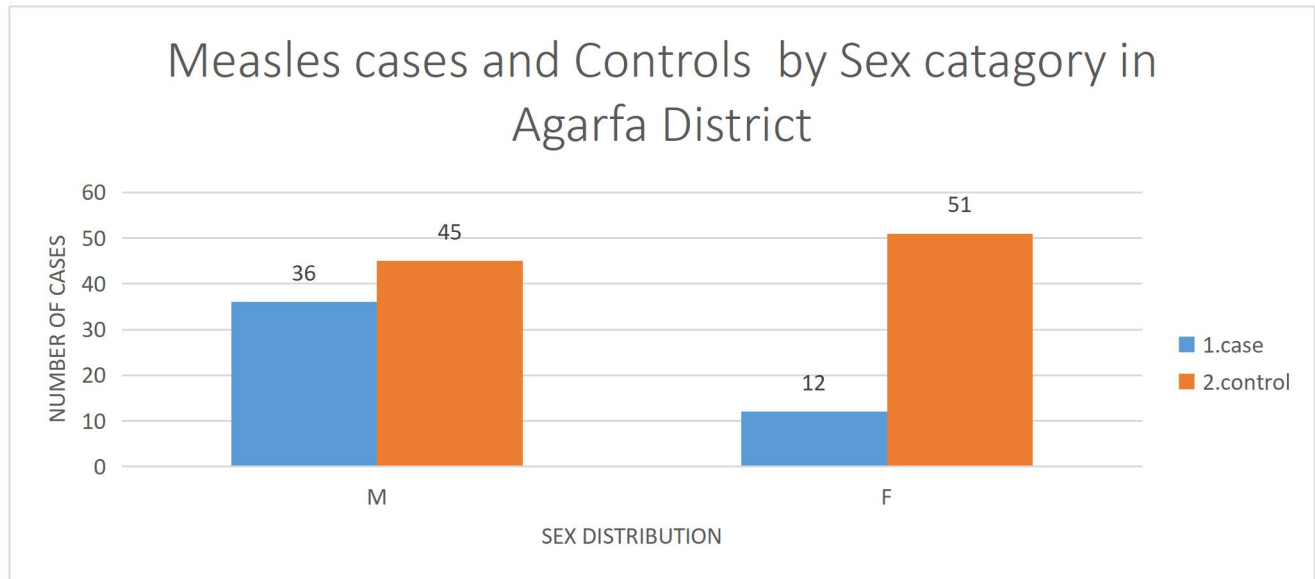


Figure 3: Cases of measles and controls by gender in the Agarfa District, 2023

Case by Time

The epidemic began on April 5, 2023, and it was contained on June 19, 2023. On April 5, 2023, Oda Nagele villages in the Agarfa District reported the first case of measles. The Epi curve has

several peaks that exhibit a propagating form of transmission.

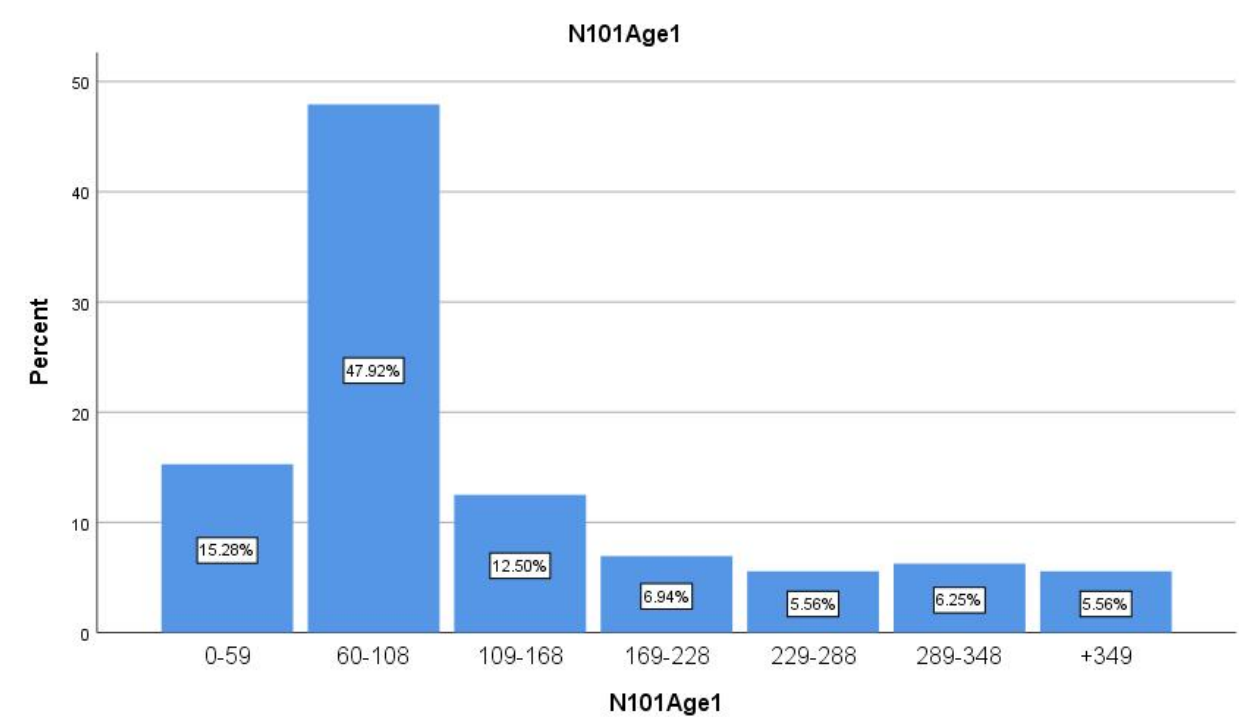


Figure 4: Measles cases by age category in Agarfa District of Bale Zone, South Ethiopia, 2023.

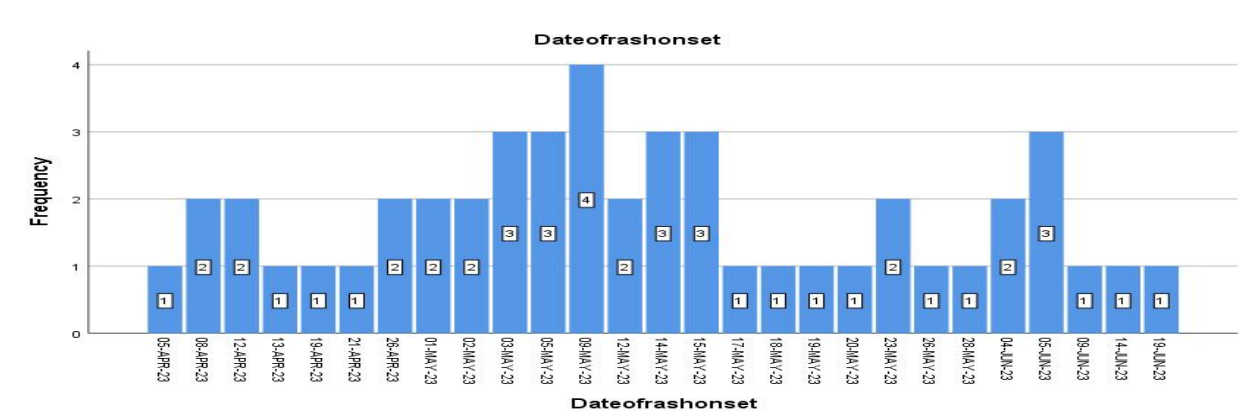


Figure 5:Epi-curve Measles Outbreak in Agarfa Woreda Bale Zone Oromia, Ethiopia, 2023

Symptom Development by Cases

The measles symptoms of pneumonia, fever, maculopapular rash, coughing, and runny nose appeared in all 48 cases. All of the cases we discovered during our active case search in the neighborhood had the disease's usual symptoms. Analyzing patient characteristics in a measles outbreak investigation involves examining demographic data, clinical presentation, vaccination

history, epidemiological links, and laboratory findings. By integrating these aspects of patient information, public health authorities can develop targeted interventions to control the spread of measles and protect vulnerable populations during outbreaks.

Table 1 shows the percentage of measles cases in Agarfa Woreda, Bale Zone, in 2023 that showed signs and symptoms.

S.No	Sign & Symptoms	#frequency	Percentage (%)
1	Pneumonia Cases	36	75
2	Cornea cases	44	92
3	Otitis Media discharge cases	10	21
4	Number of Diarrhea cases	19	40
5	Number of cases of Cough	23	48
6	Number of cases of fever	35	73
7	cases with Runny Nose	37	77
8	Number of cases with red eye (conjunctivitis)	41	85
9	Number of cases of ear discharge	2	4

Variables Significant are

The factors contributing to the measles outbreak are as follows:

According to a woreda report, by 2023, 85% of children had been vaccinated. Significant factors associated with measles, identified with a P-value of <0.000 , include the awareness of measles as a disease [AOR = 6.4, 95% CI (1.41-29.02)], recent contact with an infected patient within 7 to 18 days [AOR = 1.96, 95% CI (4.15-34.49)], travel history [AOR = 4.5, 95% CI (1.52-13.84)], mode of transmission [AOR = 4.64, 95% CI (1.07-20.00)], and malnutrition [AOR = 9.75, 95% CI (2.76-34.44)].

Table 2: Multivariable exposures using Bivariate logistic regression analysis; Agarfa Woreda, Oromia Region, Ethiopia, 2023.

Variables		Cases	Controls	COR:95% CI	AOR :95%CI	p-value
		n= 48	n=96			
Awareness of Measles Disease	Yes	23	27	5.5(2.00-15.51)	6.4(1.41-29.02)	0.01
	No	25	69	1		
Travel History	Yes	26	19	4.79	4.5(1.52-13.84)	0.00
	No	22	77	1		
Contact History	Yes	28	20	5.22(2.49-11.33)	11.96(4.15-34.49))	0.00
	No	20	76	1		
Malnutrition	yes	18	6	9.0(3.27-24.76)	9.75(2.76-34.44)	0.00
	No	30	90	1		
Knowledge Mode of transmission	Yes	17	12	3.8(1.64-8.9)	4.64(1.07-20.00)	0.01
	No	31	84	1		

4 . Discussion

A measles index case was reported in the Agarfa district on April 5, 2023. A total of 50 cases—two (4%) fatal—were reported until June 30, 2023. The following was discovered while investigating each home during the measles outbreak: Group Community Kept their child hidden from view and painted with ground coffee as per custom, believing that doing so would prevent the illness from getting worse. Thirty percent of line-list cases were zero-dose because most children had limited access to vaccinations.

The age-specific attack rate among children aged 0 to 59 months in this inquiry was 41/1000 people, in line with the findings of previous investigations conducted in Sudan, India, and Nepal, which also found a high attack rate among children under five (12,13). These findings are consistent with the findings of outbreak investigations conducted in Ethiopia (2,14).

The case death rate in this investigation is 4%, which is similar to the 7% observed in an investigation carried out in India. The outcome, however, is not as high as that of an epidemic investigation that was conducted in the Ethiopian districts of Artuma, Ginner, and Guradamole (7.2%, 0.5%, and 2.6%, respectively)(3,12,13). The current outbreak is impacting an area that is far from medical services, and as a result, the measles fatality rate has increased due to higher levels of food insecurity and widespread malnutrition among the population. This is the cause of the discrepancy.

The district's vaccination rate was low (85%) when compared to WHO recommendations, which call for routine immunization programs to achieve and maintain 95% vaccination coverage of two doses of the measles vaccine and to be augmented by supplementary immunization activities to eradicate measles (3).

Of the 48 reported cases, about 26 (or 54%) had not received an MCV vaccination. The measles-containing vaccination (MCV) was administered to 64% of cases in Nepal, according to a study; however, 69% of cases in Uganda received the vaccine, which is greater than the results of a study from Kerala, which showed that 48% of cases had not received the MCV (14). The outbreak among those who don't live close to a medical facility, lack access to basic medical services like routine immunizations, and missed the SIA vaccination is the cause of the disparity.

The estimated vaccination efficacy in cases involving children aged 9 to 59 months was 79.4%. This is higher than the results of studies conducted in Pakistan, Kerala, and Uganda, where vaccination effectiveness was 75%, 76.6%, and 78%, respectively (14). The efficiency was less than 85% because of problems with the district's cold chain management and vaccination storage. The vaccine's potency was severely damaged throughout its further 70 kilometers on a motorcycle with the vaccine carrier since there were insufficient conditions to replace the ice pack. Despite high rates of one-dose vaccination, high measles transmission has been reported in several developing countries, due to problems with the cold chain, poor seroconversion, and questionable vaccine efficacy ultimately (15,16).

Low vaccine storage, low access to electricity, and poor cold chain maintenance at district and health facilities are shown by observation and record review findings at the district (2). People of all ages were affected by the outbreak, including those over 15, which may have been caused by years of low routine immunization coverage and a buildup of susceptible individuals in the older age group. The difficulty of providing a strong vaccine in a routine immunization service, combined with the inadequate and subpar cold chain management system, perhaps also contributed to the outbreak. Although the Woreda has made some notable improvements in routine immunization, there are still pockets of hard-to-reach places that are challenging to access and provide routine immunization, even after routine immunization was introduced more than many years ago. In our findings, there were more unvaccinated children than in the research(71%) (6,13,17–20).

4.1 Study limitation

The study's drawback is recall bias, which was common in case-control studies and can show up when collecting information on variables like vaccination status and dose received, among other things. The study's drawbacks might include inaccurate data and the inclusion of non-measles cases that don't meet the case definitions because line lists were compiled by healthcare providers at a lower level. When estimating a child's age, the family may not be aware of the child's age or immunization history.

4.2 Conclusion

In summary, the community's measles outbreak has claimed two lives, with a case fatality rate (CFR) of 0.042%. There are 48 cases per 100,000 people, or the attack rate (AR). With 78 respondents under the age of fifteen, children under the age of fifteen made up a sizable part of the cases. According to the district's administrative report, 85% of children were vaccinated in 2023. The measles outbreak was found to be highly correlated with several things. These include having an infected individual living in the household, knowing the mode of transmission, and having a male household member who has been in contact history with an infected person within 7–18 days previous to beginning.

4.3 Recommendation

To address the high incidence of measles in Bale, it is essential to enhance access to vaccines. This can be achieved through various strategies, such as ;

- ✓ conducting vaccination campaigns in communities with low coverage rates, establishing mobile vaccination clinics to reach remote areas, and ensuring that vaccines are readily available at healthcare facilities.
- ✓ Ensuring proper storage and handling of vaccines is crucial to maintain their potency. It is important to maintain proper storage conditions, monitor temperature control during transportation, and conduct regular quality checks to guarantee the effectiveness of the administered vaccines.
- ✓ Given the cyclical nature of measles outbreaks, it is vital for health authorities in Bale to proactively prepare for the annual epidemic cycle. This includes forecasting potential outbreaks based on historical data, stockpiling vaccines and medical supplies in advance, and developing response plans to swiftly contain outbreaks when they occur.
- ✓ Improving case-based surveillance systems is essential for early detection and containment of measles cases. Health facilities should be equipped with the necessary tools and training to accurately diagnose and promptly report suspected cases. Additionally, strengthening collaboration between healthcare providers and public health authorities can help streamline surveillance efforts and ensure a coordinated response to outbreaks.

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CHAPTER 2: Investigation Of Cholera Outbreak In the Oromia Region of Ethiopia's Bale Zone, Meda Welabu District(January 19, 2023 - February 20, 2023)

ABSTRACT

Background: Ethiopia frequently experiences cholera outbreaks as a result of inadequate sanitation and limited access to clean water. Thousands of infections are reported each year from many epidemics that the nation has previously endured. The Meda Welabu district in the Bale Zone has experienced its fair share of cholera outbreaks. The district's isolated location and poor infrastructure contribute to the disease's spread, making it difficult to administer containment and medical care promptly.

Objectives: The goal of the study was to determine the risk variables for cholera transmission during the outbreak in the Meda Welabu district.

Methods: A descriptive, unmatched 1:2 case-control research was carried out. For every case, two control subjects were chosen from the homes in the neighborhood. Patients who had experienced acute watery diarrhea and were two years of age or older, with or without vomiting, were classified as cases, while those who had not experienced acute watery diarrhea in the past were classified as controls. Using a structured questionnaire, we conducted interviews with study participants to collect data on demographics and risk factors for cholera.

Results: From January 19, 2023, to February 20, 2023, a total of 25 cases of cholera with confirmed diagnoses and zero deaths were reported, with attack rates of 2.5 per 1000 populations. Males aged 15 to 44 years made up more than half of the cases. The impacted Kebeles(villages) in the district were Gura Worika, Nanawa Oborso, and Danisa Kerkero. Poor hand-washing practices were determined to be the only significant independent factor linked to the outbreak (AOR = 3.711, 95% CI: 2.249–6.124)

Conclusion: Even though there have been 25 confirmed cases, the cholera outbreak in the district was successfully confined without any fatalities. The cases' demographic distribution was biased toward men between the ages of 15 and 44. The primary independent factor linked to the outbreak in Kebeles, including Gura Worika, Nanawa Oborso, and Danisa Kerkero, was found to be inadequate hand-washing habits.

Keywords: cholera, outbreak, Meda-Welabu, Bale, Southeast Ethiopia

1.1 Overview

Intestinal infection with the gram-negative *Vibrio cholerae* bacterium, usually type O1 or O139, results in the acute enteric illness cholera (1). It is characterized by an abrupt onset of watery, painless, and frequent diarrhea, also known as rice-water diarrhea, which is frequently accompanied by vomiting and can quickly cause severe dehydration and cardiac collapse (2). There is no septicemia caused by *Vibrio cholera* because it does not pass through the intestinal tract (3). Even though *Vibrio* has several species, only the "cholera" species causes cholera outbreaks. About 20% of infected individuals experience severe, watery diarrhea; if these patients do not receive timely and appropriate treatment, the considerable fluid and salt loss can result in severe dehydration in a matter of hours (4). Patients aged 30-50 who are untreated may have a case-fatality rate of 30–50% (5). The simple treatment (re-hydration) should keep the case-fatality rate below 1% if administered correctly (6). Treatment with antibiotics can shorten the time that an infection lasts (7). The most common way for cholera to spread is orally by feces contaminating food or water (7). Cholera has an extremely short incubation period (between two hours and five days), therefore infected individuals can carry and spread the disease for up to four weeks regardless of whether they exhibit symptoms (8). The infectious dose is based on individual susceptibility, and a dosage of 10,000 is typically required for a single case of vomiting (8). When fed cold or barely heated, moist grains like rice, millet, or sorghum are frequently used as carriers of the cholera virus. *Vibrio cholera* uses humans, water, fish, and aquatic plants as reservoirs (8). Due to its high mortality rate, cholera continues to be one of the most significant public health problems in Asia and Africa (9). However, only a small percentage of cholera cases are reported to the World Health Organization (WHO), making it difficult to estimate the disease's full worldwide burden (9). The World Health Organization (WHO) officially reported 320,000 cases of cholera, with estimates ranging from 5,000 to 7,500 cases in 2009 and between 190,000 and 320,000 cases overall (10). Globally, cholera is a common disease, but its impact is primarily seen by low-income communities that have limited access to safe water and emergency medical care. worldwide health issue (11). Cholera is a disease of inequity, an ancient illness that today sickens and kills only the world's poor and most vulnerable people (12). Malnutrition, inadequate health services, and underdeveloped infrastructure are among the issues it affects. The map of poverty and marginality and the map of cholera outbreaks are virtually identical (13). It remains an issue in countries where access to hygienic conditions and clean water is not assured mostly in

Africa including Ethiopia (14). It is among the key indicators of social development (15). The two main ways that cholera spreads are through contaminated food and drink, or the fecal-oral route (15). Transporting water through a river, shallow well, or other body of surface water can contaminate it (15). It can even contaminate water at home if it is improperly treated (15). Foods that are frequently linked to the transmission of cholera include cooked rice, millet, sorghum, shellfish, milk, lentils, potatoes, beans, eggs, poultry, raw veggies, and fruits (15). The 30- to 50-percent case fatality rate may apply to patients who get no treatment. Sufficient hydration, however, can keep the CFR below 1% (15). The corpses of cholera patients and cholera treatment facilities may be a major source of infection if hygiene and isolation measures are not up to par (16). Humans are the main reservoir for *Vi-brio* cholera because asymptomatic carriers and patients have approximately 100,000,000 bacteria per milliliter of feces or vomit. Fish, water, some mollusks, and aquatic plants are other potential reservoirs (16).

Poor hygiene, insufficient washing, poor sanitation, contaminated food, underlying diseases including AIDS and starvation, as well as seasonal and environmental factors Low stomach acidity also increases the risk of infection (17). Vomit and excreta from cholera patients are among the liquid waste materials that must be carefully cleaned and disposed of to minimize contamination and the spread of secondary infections. This is because untreated cholera patient stools are the primary cause of environmental contamination. Before preparing or eating food, always wash your hands after handling anything that may have excrement on it (4).

There were 69 endemic nations where 1.3 billion people were at risk of cholera; Ethiopia had the highest estimated number of deaths (10,458 in 2008–2012) and the highest number of at-risk individuals (5). Among the cholera cases reported to the World Health Organization in Ethiopia in 2020, Africa accounted for 61%, Asia for 30%, and the Americas for 15%. Approximately half of all cholera cases and deaths worldwide are caused by children under the age of five (18).

The purpose of this study is to provide recommendations, based on its findings, for interventions and preventive actions meant to mitigate future cholera epidemics in comparable contexts.

Objectives

1.1 General Objectives

- To delineate and pinpoint the risk factors linked to the cholera outbreak that occurred in Meda Welabu Woreda, Oromia region, Ethiopia, between January and February of 2023.

1.2 Specific Goals

- To confirm that a cholera outbreak has occurred in Meda Welabu Woreda
- To provide a time, location, and personal account of the cholera outbreak in Meda Welabu District Bale Zone's rural kebele's
- To identify the factors associated to the cholera outbreak in Meda Welabu

2 . Methods

2.1 Study Setting

The Meda-Welabu District is situated in the southeast of Ethiopia in the Bale Zone, 200 kilometres from Robe Town, the center, and 630kilometress from Addis Ababa. The district is expected to have 145,288 people living there overall in 2022, based on the housing projection and the 2007 census. The Meda-Welabu District is split administratively into 20 kebele and one administration town. The district borders the Somali area of Ethiopia to the east, the Guradamole District to the west, the Guji Zone to the south, and the Delomena District to the north. There is one district hospital, six health centers, and twenty-five health posts in the district. These medical clinics have all been offering the local communities basic medical care. Gura-Worika, Nanawa-Oborso, and Danisa-Kerkero are kebeles of the Meda-Welabu district. Those kebeles have two health posts and a health center.

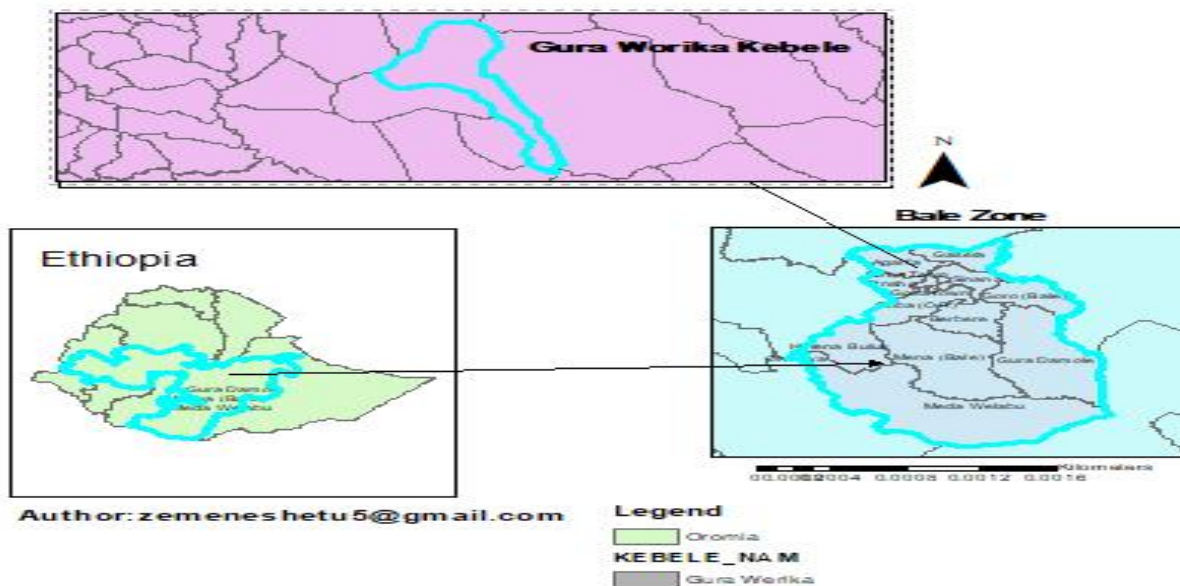


Figure 1:Map of Former Meda Welabu Woreda under Bale Zone Administration time

2.2 The duration and design of the study

A descriptive, mismatched case-control research was carried out. The investigation took place between January 19, 2023 - February 20, 2023.

2.3 Source of data and procedures

A cholera outbreak happened in Girja Woreda of Guji Zone early on November 3, 2022, and on November 24, 2022, one index case of cholera was reported to Oborso Health Center, one of Meda Welabu Woreda Health Centers in Bale Zone.

There were a total of 25 cholera cases between January 19, 2023 - February 20, 2023, G.C. Eight of those cases were reported to the district's Bale zonal health office, while the remaining 17 cases were reported to the Guji zonal health office upon their admission to the Girja CT. A female from Gura Worika Kebeles who was observed in Gura Korke HC on December 24, 2022, served as the index case for this Woreda. After seeing two more instances on the same day, the health center notified the Woreda and began making the required CTC and preparations. Six of the fourteen stool samples collected—nine by Girja Woreda and five by Made Welabu Woreda—were determined to be positive for *V. cholera*. 01.

A Rapid Response Team (RRT) from Meda Welabu was formed as soon as we learned about the epidemic, and since it was in a nearby Kebele, life-saving measures were taken.

A standardized interviewer-administered questionnaire was created and used to gather information on potential exposures to acute watery diarrhea to identify a cholera patient.

In addition to a case-control study, medical records and line lists including 25 cases of cholera were evaluated and analyzed, along with discussions with physicians at Oborso Health Center and various cholera treatment sites.

Information on any recent modifications to case definitions, reporting scenarios, laboratory diagnostic instruments, and population size was assessed. A few patients underwent in-person patient interviews. All 25 cases and 50 controls were questioned after providing written informed consent to take part in the study, and descriptive analysis was done using the line list. We are unable to use the water samples that were taken for microbiological analysis because no field kit was provided and a filter incubator may produce erroneous results after sample collection.

Samples taken A 1:2 ratio of controls and cases from 25 cases was used. The sample size was therefore calculated as 25 cases and 50 controls, yielding a total sample size of 75. Since the study examined the outbreak, the sample size was estimated using all cases, and two controls were taken for each case the national public health emergency management (PHEM) recommendations.

2.4 Source Population

Our study population comprised all residents of the Meda Welabu district, Gura-Worika, Nanawa-Oborso, and Danisa-Kerkero kebele. The study subjects included all cholera cases that met the case definition criteria as well as all non-cases who shared the same risk factors and lived in the area between January 19, 2023, and February 20, 2023.

Laboratory Result:-Five rectal swabs were taken from patients who did not get any antibiotics and sent to the EPHI laboratory in Ethiopia,

Environmental Study: for physical, chemical, and cultural sensitivity testing Even if we can't take water samples in the village, we intervene in various River stagnant water and drinking water sources to use water chemicals during the Outbreak immediately.

The impacted areas were examined and studied for their water supply, drainage, and water storage systems, as well as their kitchenware, food preparation methods, and hygienic conditions of the village's cultural beliefs.

Patients' cases and villagers' cases were questioned regarding personal hygiene routines, sanitation, and drinking water sources. Closed-ended questionnaires were employed to obtain data for the analytical study. Two health experts participated in the data collection

2.5 Definition of an Operational Case

Any Meda Welabu Kebele resident who either passes away from severe watery diarrhea or lives in an area where a cholera outbreak has not been notified is considered a suspected case.

Possible case: A patient who is two years of age or older experiences acute watery diarrhea, either with or without vomiting, in a location where cholera is an epidemic. This covers both suspected cases that were not tested in a lab and those that came back negative.

Cholera case confirmed: When *Vibrio cholerae* O1 or O139 is isolated from the patient's feces, a cholera case is considered confirmed. A patient who is at least five years old has severe

2.6 Data analysis process

After verifying the accuracy and consistency of the data, SPSS version 26 and Microsoft Excel pivot tables were used to clean and analyze the information. Calculations were made for frequency, proportion, attack rate, and percentage. The Kolmogorov-Smirnov test was used to statistically verify that the continuous variable age had a normal distribution. As a result, the study participant's age was expressed as the interquartile range and median. A summary of the results is provided by the figures, tables, and graphs.

2.7 Ethical Concerns

Before investigating the cholera outbreak, the public health emergency department of Bale Zone issued a letter of support. Parents and caregivers of the participants were invited to participate after being informed of the study's goals. To maintain confidentiality, a verbal informed agreement was obtained from the parents or guardians of each participant.

The study's questionnaire was created especially for this investigation. The questionnaire has been translated into English after an examination of many sources to make it inclusive.

The questionnaire was carefully designed to meet the research goals and collect relevant data from the study participants. Since the questionnaire was custom-made for this study, there are no existing publications or references related to it.

3. Results

In 3 months, a total of 25 cases of diarrhea were identified, which was higher than expected. The cases were reported between January 19, 2023 - February 20, 2023. The highest number of cases occurred on January 5 (Figure 1). Fortunately, there were no fatalities among the 25 identified cases, resulting in a case-fatality ratio of 0. The overall attack rate (AR) was calculated as 0.59% (25 out of 4234). Of the 25 instances, or 60% of the cases, were men. At 72% (18 out of 25), those over the age of 15 had the highest attack rate, followed by people between the ages of 5 and 15 (28%/7 out of 25). There were no cases discovered in children younger than five. Of the cases, twenty out of the twenty-five had no or mild dehydration, and five out of the twenty-five had severe dehydration, requiring IV infusion. The river was the center of the group of cases.

Table 1:Cholera cases by age group and sex in Gura Worika, Danisa Kerkero, and Nanawa Oborso Kebele's Meda Welabu District, Bale Zone, Oromia, Ethiopia, February 2023

Percentage(%)					Total
Age Groups	M	F	Case	Control	
Less than 4 years	0	0	0	2	2
5-14 years	4	3	7	15	22
15-44 years	9	3	12	26	38
+ 44 years	2	4	6	7	13
Total	15(20)	10(13.3)	25	50	75

On November 24, 2022, the first case of cholera was reported in Meda Welabu, Woreda. The outbreak started on November 24 and continued until January 23, 2023. At the peak of the outbreak on January 2, five cases were recorded, all of which were Ogawa serotypes. The Eltor bacteria was found to be present in two of the cases. The case patients' average age was 25.07 years, while the controls' ages ranged from 3 to 60 years old. In 2014, oral cholera vaccination was given in Meda Welabu Woreda in two rounds, covering all Kebeles. Gura Worika, Nanawa-Oborso, and Danisa-Kerkero Kebeles had vaccination coverage of more than 100%.

Table 2:Bivariate and Multivariable Analysis to Identify Factors Associated with Adherence to Cholera Self -Protective practice among affected kebele in Meda Welabu District Bale Zone Oromia Ethiopia 2022-2023 (n=75)

Table :1 Bivariate Vs multivariate analysis of cholera Meda Welabu Woreda, Bale Zone, Ethiopia, January 19, 2023 - February 20, 2023						
Variables	Cases N= 25	Controls N=50	COR:CI at 95%		AOR (95%CI)	p-value
Hand washing Practice	Yes	5 (20%)	32 (64%)	7.4 (3.01-18.28)	1*	0.002
	No	20 (80%)	18 (36%)		3.7 (2.25–6.12)	
Travel-history	Yes	16	22	2.26	4.07(0.84-19.74)	0.081
	No	9	28		1*	
Availability of latrine	Yes	4	8	0.64	0.43(.461-4.890)	0.520
	No	21	42		1*	

Both the cases and controls had an average age of 25.07 years, ranging from 3 to 60 years old. 33.3% of all cases received treatment at a health center.

Poor hand-washing practices were linked to cholera risk variables (OR = 3.711, 95% CI: 2.249–6.124). It was discovered that these factors were important.

The symptoms of cholera included nausea (5.3%), abdominal discomfort (6.7%), headaches (2.7%), myalgia (4%), watery diarrhea (18.7%), and bloody diarrhea (1.3%). 13.3% of cholera patients received outpatient care, while the remaining 87.7% received inpatient care.

The total number of vulnerable people with an attack rate (AR) of 2.5 was 25 out of 1,000. There were five laboratory confirmations. Rapid diagnostic tests confirmed 14 cases. There were no reported deaths. The overall administrative sanitation coverage of the district in 2022 was 97%. The kebele with the lowest hygiene, water, and sanitation coverage was Gura Worika at 85%.

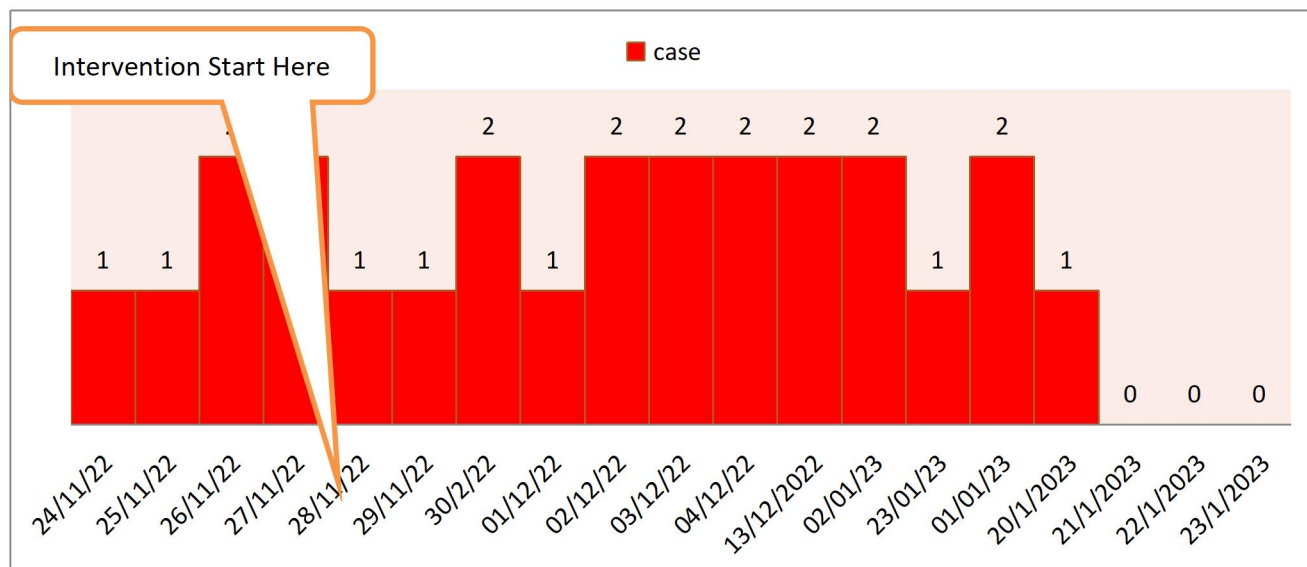


Figure 2: Date Of Cholera Onset Meda Welabu Bale Zone 2023

4 . Discussion

Cholera can be avoided with good hygiene and sanitation practices. In many low-income nations, cholera episodes have been seen to recur in both infant and adult populations (19). The *Vibrio* bacteria that cause cholera were circulating as a result of inadequate infrastructure, including a lack of clean water, poor sanitation, and poor hygiene (19).

The percentage of female cases among all cases reported during this outbreak was somewhat greater than that of male cases; this was similar to the cholera outbreak in Oromia (20), but was inverted when the outbreak happened in Pakistan (3).

The age group of 5–9 years old is the most affected among the age groups, followed by that of 15–44 years old. This study bears similarities to the South Wolo Zone study conducted in Northwest Ethiopia (21). Furthermore, the study in the Democratic Republic of the Congo was contradictory (22), in line with the research done in Pakistan (17). According to administrative data reviewed from the Woreda health management information system and house-to-house collected data, the community in the affected kebeles had high rates of inappropriate hand washing, low latrine coverage (85%), and low coverage of water (57%). These factors could be the cause of our findings. Because so many people in rural Oromia lack access to clean drinking water, they run the risk of spreading illnesses that are contracted through contaminated water (10). Despite its provision to affected areas, nongovernmental organizations expressed concern about the incorrect usage of water purification solutions (18). Unfortunately, we came upon a similar scenario when doing our research: although boiling water and employing water purification devices are temporary fixes for the ongoing issue of clean drinking water supply, the communities had not fully adopted this practice. According to MDG 6, the long-term solution is to give communities access to better water sources, like boreholes and wells (18).

A study conducted on the factors influencing cholera incidence in the home revealed several significant findings. The adjusted odds ratio (AOR) for sick cholera in the home was found to be 4.235 with a 95% confidence interval (CI) ranging from 1.215 to 14.767, and a p-value less than 0.05. This indicates a strong association between the presence of sick cholera in the home and the variables under consideration.

Furthermore, the AOR for hand washing practice was calculated to be 3.711, with a 95% CI of 2.249 to 6.124, and a p-value less than 0.05. This suggests a substantial correlation between hand washing practice and the incidence of cholera in the home.

Additionally, the availability and use of latrines demonstrated an AOR of 6.29, with a 95% CI of 3.14 to 10.93, and a p-value less than 0.05. This indicates a noteworthy relationship between the availability and use of latrines and the likelihood of cholera occurrence in the home.

These statistical findings provide valuable insights into the factors influencing cholera incidence within the home environment. The strong associations observed between sick cholera in the home, hand washing practice, and the availability and use of latrines underscore the importance of these factors in mitigating the risk of cholera transmission. Consequently, these results emphasize the critical role of hygiene and sanitation practices in preventing and controlling cholera outbreaks in domestic settings.

Almost every age group older than two is impacted by this cholera outbreak. Nonetheless, the age range of 15–44 accounted for more than half of the occurrences. In comparison to studies carried out in South Wolo (23), Northwest Ethiopia, and Lusaka, Zambia (24–26), the attack rate was higher. The case fatality rate was lower in comparable Wolo studies; this may have been due to efficient case management during the outbreak (23).

Even though Danisa Kerkero has 96 latrines, Gura Worika has 85%, Nanawa-Oborso has 94%, and Kebele has 85% latrines. Unsafe water and a lack of information about its use could be the cause of this. Following reports of community deaths, the district alerted the Bale zone of the epidemic. This could be because of the district's inadequate surveillance system, which resulted in the cholera outbreak in the kebeles being discovered and contained later than expected.

4.1 Limitation

This study is limited by the low number of cases and the unmatched case-control study, as we were relying only on a small number of controls, which may not indicate real ground status. Additionally, three significant limitations were identified for this outbreak investigation study. Miss-classifications, which happen when participants are incorrectly categorized about either control or case status, is one of the key biases that is a problem in case-control studies. Because stool samples from only five case patients were obtained for Vi-brio cholera laboratory culturing, our investigation's classification of 20 case patients as cholera case patients may have overestimated the attack rate because people with acute watery diarrhea caused by other than Vi-brio cholera may also be considered cholera case patients. However, we reasoned that this condition might not significantly skew the results because the suspected cholera patients were chosen based on the standard cholera case criteria for a region experiencing a cholera epidemic, supplemented by supplementary data.

4.2 Conclusion

Although there have been 25 confirmed cases, the district's cholera outbreak has been effectively contained without any fatalities. The cases' demographic distribution was biased toward men between the ages of 15 and 44. The primary independent factor linked to the outbreak in Kebeles, including Gura Worika, Nanawa Oborso, and Danisa Kerkero, was found to be inadequate hand-washing habits.

4.2 Recommendation

- ✓ Encourage regular hand washing with soap and clean water as a fundamental preventive measure against cholera transmission. Maintaining good hand hygiene can greatly lower the chance of infection and illness transmission.
- ✓ It is essential to have access to clean, safe drinking water to stop cholera outbreaks. To reduce the possibility that the cholera-causing bacteria would spread through the water, communities need to have consistent access to drinkable water sources.
- ✓ To lessen the environmental reservoirs of *Vibrio cholera*, the cholera-causing pathogen, improve sanitary practices and infrastructure. To stop fecal-oral transmission routes, proper sewage management and human waste disposal are crucial.
- ✓ Run educational initiatives in local communities to increase knowledge about hygienic habits and clean food handling techniques.
- ✓ Using behavior changes to encourage consistent hand washing may help reduce the risk of cholera. .

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CHAPTER 3: A Study of Five Years' Surveillance Data on Severe Acute Malnutrition in Bale Zone, Oromia, Ethiopia, 2018–2022 (From January 3, 2023, to January 25, 2023)

ABSTRACT

Background: In poor countries, malnutrition is a serious public health concern. Ethiopia has the second-highest rate of malnutrition in sub-Saharan Africa, which can be attributed to several causes including low food intake, illness, poor feeding practices, and the quality of the food given to children. Affected areas with severe acute malnutrition include the Bale zone.

Objective: A five-year surveillance data set on severe acute malnutrition in Bale Zone, Oromia, Ethiopia, from 2018 to 2022 was examined in this study. Identifying trends, patterns, and the total burden of malnutrition during this time was the aim.

Methods: From January 3, 2023, to January 25, 2023, a cross-sectional study was carried out in which records of severe acute malnutrition in the Bale zone of the Oromia region were reviewed. In this procedure, information was reviewed, pertinent stakeholders were interviewed, and Microsoft Office Excel 2007 was used for data analysis.

Results: From outpatient therapeutic (OTP) and stabilization center (SC) sites, a total of 44,299 patients were recorded during the previous five years. Of these, 5,789 cases (13%) were treated at SC locations while 38,510 cases (87%) received treatment at OTP. In children under five, the prevalence of severe acute malnutrition was 3.5% in 2018, 3.4% in 2019, 3.6% in 2020, and 6.1% in 2021. Of the cases that were admitted, 195 (0.51%) were classified as defaults, and 36 (0.13%) resulted in death.

Conclusion: Malnutrition has been a pressing public health issue in the Bale Zone, exacerbated by drought in 2021-2022. However, with interventions, the prevalence slightly decreased in 2023. Early preventive measures and effective management are crucial for the government and stakeholders to address this issue.

Keywords: Oromia, South East Ethiopia, Bale Zone, Surveillance Data Analysis, Severe Acute Malnutrition (SAM).

1. Introduction

Malnutrition is the result of the body not getting enough of the vital vitamins, minerals, and nutrients that keep the tissues and organs functioning properly. People may become undernourished or over-nourished as a result of this (1).

In the 2018 UNICEF nutrition report, stunted growth was present in 21.9% of children under five who were surveyed. However, general trends are encouraging: between 2000 and 2018, the frequency of stunting declined globally from 32.5% to 21.9%, and the number of affected children fell from 198.2 million to 149 million (1).

The worldwide context of malnutrition includes obesity and undernutrition, making this a pressing problem (2). Poor eating habits are linked to disability or early mortality on an international scale, while external factors such as air pollution also contribute. These factors, along with smoking, drinking, and drug use, are the most important risk factors for illness. Understanding the statistics causes, risk factors, and public health implications of malnutrition globally is crucial. Additionally, it's important to zoom into the national context to highlight the gaps in knowledge, justifying the need for further study. Undernutrition and obesity, which is a growing concern, are two aspects of malnutrition that have a dual effect (3). Smoking, drinking, and drug use are currently the two biggest risk factors for sickness. On a global scale, poor dietary habits are associated with early mortality or disability, and air pollution is one of the external risk factors. A lot of homes deal with different issues (3).

An estimated 16 million children worldwide suffer from severe acute malnutrition, according to a 2019 World Health Organization (WHO) research. Severe acute malnutrition is thought to be a major cause of child mortality, accounting for about one million fatalities per year (2).

In Africa, severe acute malnutrition remains a critical public health issue. Approximately 7.1 million African children under the age of five suffer from severe acute malnutrition, according to a UNICEF assessment from 2020. Due to several issues, including inadequate access to healthcare services and food instability, the region still faces difficulties addressing this problem (1).

Ethiopia has been significantly impacted by severe acute malnutrition, with a prevalence rate higher than the global average. Around 10% of children under the age of five in Ethiopia suffer from severe acute malnutrition, making it one of the countries with the worst rates of the disease worldwide, according to a 2018 study published in *The Lancet* (4). Efforts are being made by the Ethiopian government and international organizations to address this issue through nutrition programs and interventions.

The Community-Based Nutrition Program (CBN), Essential Nutrition Action (ENA), Community Health Day (CHD), Infant and Young Child Feeding Program (IYCF), Community Management of Acute Malnutrition (CMAM), and other nutritional intervention programs are currently being implemented in Ethiopia. Local and international NGOs are also involved in these programs (5,6).

Despite these initiatives, undernutrition has not decreased to a satisfactory degree, with severe acute malnutrition continuing to be the leading cause of death for children under five (4). Ethiopia is still one of the top ten nations in the world for concentrated acute malnutrition (7,8). While the frequency of severe acute malnutrition has been noted in previous research, the major factors contributing to this condition in Bale zone areas have not been determined.

Malnutrition takes various forms, such as when some family members are overweight or obese, while others are underweight or have micronutrient deficiencies. Among the 140 nations for which data are available, 123 nations (88%) experience two or more types of malnutrition simultaneously (4).

However, despite attempts to lower under-5 mortality to at least 25 per 1,000 live births, 480,000 children under the age of five continued to die every month worldwide in 2015 (4). Preventable diseases were the main cause of these deaths (4). Furthermore, undernutrition continues to be the primary cause of disability and death, accounting for 53% of deaths among young children and greatly adding to the worldwide illness burden (7). More than 28% of all under-five mortality resulting from under-nutrition is caused by acute malnutrition alone (9), leading to the deaths of nearly one million children under the age of five each year (10).

Numerous variables that affect malnutrition on multiple levels are present (11). Some factors that often contribute to an endless cycle include issues related to food consumption, diseases,

inadequate nourishment, access to sanitary facilities, and care for expectant mothers and infants. Illiteracy and poverty may also be factors (11). Roughly 47%, 11%, 38%, and 11% of Ethiopian children under the age of five had severe stunting, waste, and underweight, according to the 2005 Demographic Health Survey. Ethiopia also has one of the highest recorded incidences of low birth weight (14%), worldwide (6). The nation's agricultural output is growing at a 2.4% annual rate, but its population is growing at a 2.7% annual rate (12). However, over the past forty years, the country's agricultural performance has not kept up with population expansion, leading to a worsening disparity between the population's food needs and food supply, necessitating more food aid (13). The primary food sources in Ethiopia are livestock and crop production, and the lack of rain significantly reduces the ability of crops and livestock to produce food due to a lack of pasture and water (4).

The SPHERES standard treatment guideline indicates that a recovery rate of at least 75%, weight gain of 8 grams per day, defaulter rate of 15%, and mortality rate of 10% are adequate for treating severe acute malnutrition. This translates to a GAM of less than 15% and a CMR of less than 1/10,000/day (14). Implementing a community-based nutrition program is necessary to solve the malnutrition problem. Every nutritional status measure should be the basis for continued nutritional monitoring, with a special emphasis on children who are severely undernourished (15). According to a 2020 World Food Programme (WFP) assessment, the prevalence of severe acute malnutrition is significantly higher in the Bale Zone area at 6.5%, impacting a significant number of children under five (16).

Additionally, by identifying high-risk areas, vulnerable groups, and probable holes in healthcare systems, this research aids in their discovery. Moreover, it advances our understanding of severe acute malnutrition, promotes cooperation, and facilitates the creation of focused interventions that enhance overall malnutrition prevention and management in comparable contexts.

OBJECTIVE

1.1 Overall Goal

- ✓ To assess the prevalence, patterns, and seriousness of severe acute malnutrition from January 2018 to December 2022 in Bale Zone, Oromia Region, specifically focusing on the period of January 3, 2023, to January 25, 2023.

1.2 Specific Goals

- ✓ To Analyze the pattern of severe acute malnutrition in the Bale Zone.
- ✓ To Evaluate the changes in severe acute malnutrition in the Bale Zone over the previous five years, taking individual treatment outcomes, time, and location.
- ✓ To ascertain the extent of undernourishment in the Bale Zone.

2. Materials and Procedures

2.1 Study setting

The research was carried out in the Oromia Region's Bale Zone, which has a total population of 1.3 million. The area has been significantly affected by severe acute malnutrition, prompting the collection of specific data on this issue within the zone Figure 1.

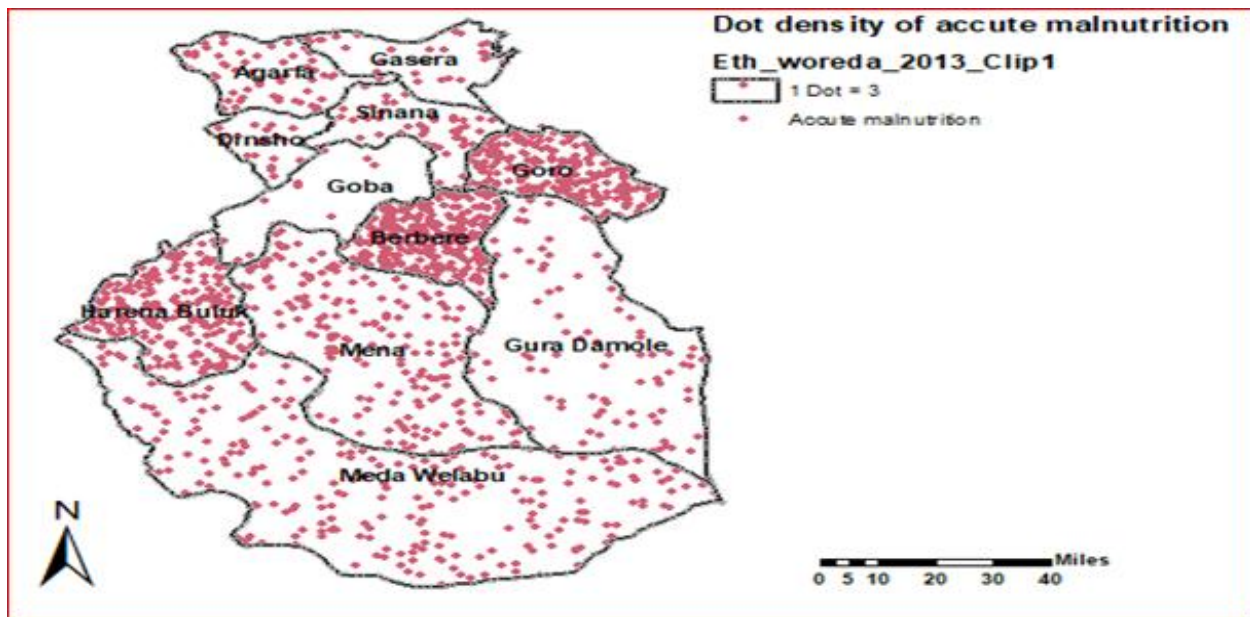


Figure 1: Map Shows malnutrition distribution among hot spot Woreda of Bale Zone

2.2 Study population

The datasets were in the Bale Zone of the Oromia area and focused on malnutrition among children under five. The secondary data analysis encompassed malnutrition data distribution sourced from the weekly reports of the Bale Zone over five years (2018-2022). This data was collected from twelve Woreda of the Bale Zone every week and documented in both hard copy and soft copy at the Bale zonal level through the surveillance system of the health information system.

2.3 Study design

A descriptive cross-sectional study was conducted as part of the secondary data analysis process, assessing individual aggregate data from the departments of performance monitoring teams and

public health emergency management (PHEM). Both hard-copy and soft-copy databases were examined for this purpose. Additionally, interviews were conducted with various relevant bodies, including the Bale Zone department working on public health emergency-related areas such as the family health department, zonal planning, and monitoring, among others.

2.4 Study time

January 3, 2023, to January 25, 2023, were the dates of collection, analysis, and interpretation of the secondary data on all cases and fatalities of malnutrition in the Bale Zone throughout five years (January 2018 to December 2022).

2.5 Case definition

Children with bilateral edema regardless of MUAC, or those under five years old who resided in the Bale zone between 2018 and 2022 and had a middle upper arm circumference (MUAC) of less than 11.5 cm were reported to the public health emergency unit in the Bale zone during this time.

2.6 Acute malnutrition

Infants under six months old or under three kilograms: less than 70% weight-for-length (WFL), a score of -3, or either if there is substantial apparent wasting or if both feet have pitting edema.

2.7 Conditions for Inclusion

Any patient that fits the severe acute malnutrition case definition qualifies.

2.8 Exclusion criteria

1. Data from individuals outside the specified age range (e.g., those over five years old).
2. Incomplete or missing data that are essential for the analysis.
3. Data from areas outside the Bale zone.
4. Data collected from sources or periods that do not align with the specified surveillance period (2018-2022).

2.9 Data Collection and Analysis

The study examined hotspots woredas and malnutrition trends using data from the Bale Zone Public Health Emergency Management (PHEM). Microsoft Excel was used for summarizing and analyzing the data, while ArcGIS 10.2 hotpot analysis was used for overlay analysis. Literature and publications were

also reviewed for comparisons of nutrition status in the Bale zone. For consistency and completeness, all data were examined using Microsoft Office. Lastly, a place, person, and time analysis was done on the data.

2.10 Source of data

The study covered the entire Bale Zone population, which is estimated to be 1,338,716 and public health emergency management weekly-based report was used to review secondary data of severe acute malnutrition.

2.10 Ethical consideration

Regarding ethical issues, permission was acquired from the Oromia Regional Health Bureau Public Health Emergency Directorate under approval number BFO/16/23 and from the Addis Ababa University Department of Field Epidemiology under approval number Ref/prev/216/23.

3. Results

Over the previous five years, 44,299 cases were recorded from sites affiliated with the outpatient therapy program (OTP) and stabilization center (SC). Of these, 5,789 (13%) received treatment at SC locations and 38,510 (87%) at OTP. In children under five, the prevalence of severe acute malnutrition was 3.5% in 2018, 3.4% in 2019, 3.6% in 2020, and 6.1% in 2021. Of the cases that were accepted, 195 (0.51%) were deemed defaults, and 36 (0.13%) of them ended in death Table 1.

Table 1:Expected Site, OTP, and SC Status Of Admission Bale Zone Oromia, 2018-2022

Name of Woreda	Service Site		OTP New Admission							SC New Admission					
	OT P	S C	2018	2019	2020	2021	2022	Total		2018	2019	2020	2021	2022	Total
Agarfa	28	6	166	201	195	167	399	1128		7	10	8	5	13	43
Gasera	26	5	1241	1376	1406	1169	1577	6769		219	242	185	101	286	1033
Sinana	30	6	1138	1052	1159	1288	2028	6665		220	168	207	160	367	1076
Goba	28	3	22	20	67	27	76	212		5	1	7	2	9	24
Harana Buluk	24	5	138	114	131	141	333	857		8	4	5	2	7	26
Delo Mena	22	5	109	78	89	90	73	439		33	12	6	10	16	50
Meda Welabu	32	7	248	259	209	372	68	1156		236	247	181	346	527	1537
Berbere	22	5	794	756	842	876	1653	4921		16	16	49	75	124	280
Gura Damole	21	3	272	232	321	371	927	2123		40	24	22	31	53	1817
Goro	30	6	997	1126	1088	1253	2094	6558		141	146	129	202	331	949
Goba Town	2	4	101	924	113	106	237	650		60	76	91	97	188	512

			4		4	2	4	8							
Dinsho	13	3	140	93	177	103	661	117 4		1	1	2	5	7	146 1
Zonal	278	58	627 9	623 1	681 8	691 9	122 63	385 10		986	947	892	103 6	192 8	578 9

3.1 Acute malnourishment severe by location

The total number of children present at the outpatient department from the outpatient therapeutic program cases in the hot spot woredas (districts) within the Bale zone is used to calculate the incidence rates expressed as cases per 1000 children. Meda Welabu 223/1000, Dalomena 137/1000, Goro 48/1000, and Guradamole 40/1000 had high incidence rates when covered by Bale zone district and hospitals, respectively, from total children malnutrition seen at the outpatient department from outpatient therapeutic program cases incidence per 1000 from hot spot woreda last year in 2022, etc.

3.2 Person-specific severe acute

Out of all the instances of severe acute malnutrition that were recorded, 37,027 (98.2%) affected children between the ages of 6 and 59 months. Infants under 6 months and children between the ages of 5 and 10 years accounted for 293 (0.8%) and 194 (0.5%) of the cases, respectively. 2.61%, 3.06%, 4.66%, and 3.10% of cases in the 6-59-month age group in 2018, 2019, 2020, 2021, and 2022, respectively, had severe acute malnutrition. The prevalence was 3.3% on average every year.

The majority of cases of severe acute malnutrition included 23,530 (62.5%) cures and 48 (0.13%) deaths in children aged 6-59 months. In infants younger than 6 months, there were 236 (0.63%) cures and 3 (0.008%) fatalities. The fatality rate was 0.1%, 0.2%, and 0.1% Table 2.

Table 2: OTP & SC Recovered within the last five years in Bale Woreda Zone, Oromia 2018-2022

Woreda	OTP Cured						SC Recovered					
Name of Woreda	2018	2019	2020	2021	2022	Total	2018	2019	2020	2021	2022	Total
Agarfa	167	205	267	56	262	957	6	4	5	2	10	27
Gasera	820	1252	1102	1099	1362	5635	195	189	187	125	37	733
Sinana	910	839	983	1031	1547	5310	215	135	184	137	81	752
Goba	18	18	28	34	46	144	0	0	0	0	3	3
Harana Buluk	117	108	112	93	321	751	4	1	3	2	0	10
Delo Mena	71	45	76	63	84	339	26	12	10	9	0	57
Meda Welabu	20	10	28	12	122	192	207	206	153	323	42	931
Berbere	739	562	639	693	1304	3937	7	4	13	44	54	122
Gura Damole	263	186	265	379	486	1579	43	29	15	19	6	112
Goro	728	915	910	921	1767	5241	143	132	142	174	56	647
Goba Town	1129	729	912	941	1697	5408	36	20	28	70	91	245
Disho	149	87	138	119	477	970	3	1	0	1	8	13
Zonal	5131	4956	5460	5441	9475	30463	885	733	740	906	388	3652

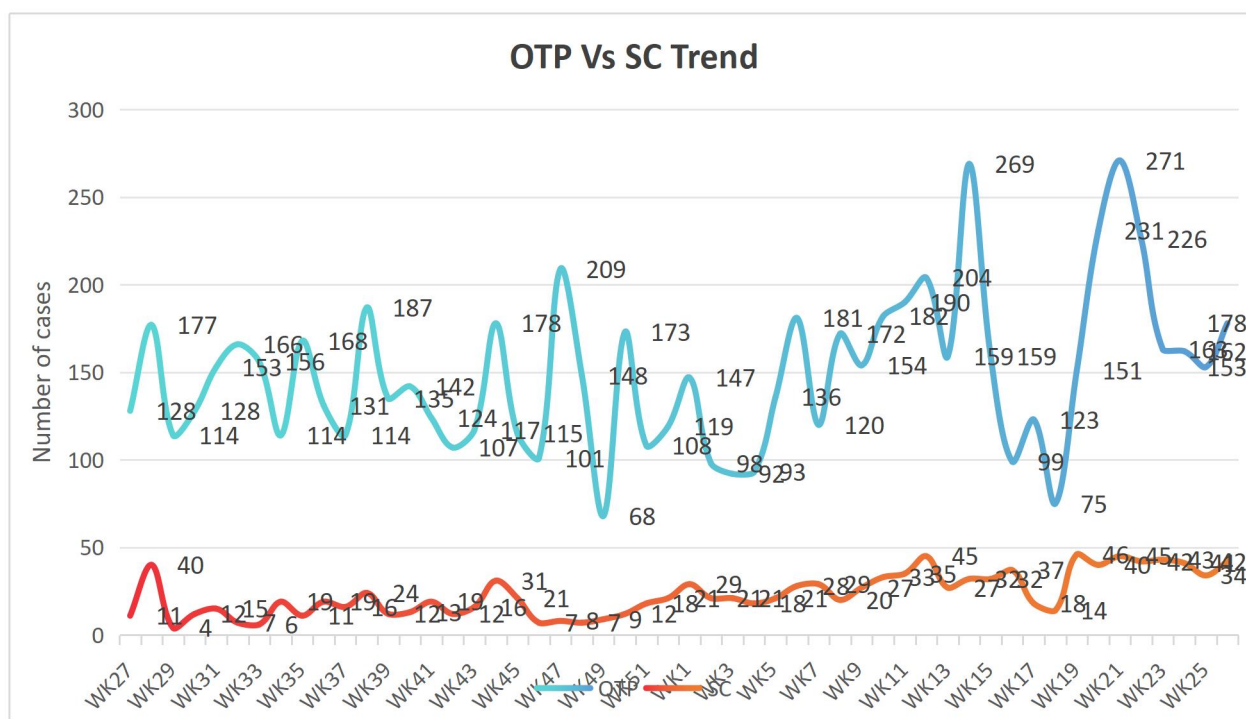


Figure 2: Trend of OTP and SC Admission, Bale Zone, 2022 Source: From Bale Zone Public health emergency management Weekly aggregation Report of five years (2018-2022)

Nutritional Interventions

Efficient nutritional interventions are essential in addressing severe acute malnutrition.

Surveillance data analysis can provide insights into the reach and effectiveness of interventions like therapeutic feeding programs, micronutrient supplementation, and nutrition education efforts. Evaluating the impact of these interventions is key to enhancing outcomes for children suffering from SAM. The "defaulter rate" refers to the percentage of individuals who, after starting treatment, fail to complete the prescribed course of treatment. Data from 2018 to 2022 shows rates per 100 children aged 6-59 months.

Agarfa Woreda: 2018 - 0.8%, 2019 - 0.9%, 2020 - 0.9%, 2021 - 0.7%, 2022 - 1.7%

Berbere Woreda: 2018 - 6.8%, 2019 - 7.3%, 2020 - 7.3%, 2021 - 5.9%, 2022 - 8.9%

Delo Mena Woreda: 2018 - 6.2%, 2019 - 5.6%, 2020 - 6.5%, 2021 - 7.7%

Disho Woreda: 2018 - 0.3%, 2019 - 0.2%, 2020 - 0.8%, 2021 - 0.3%, 2022 - 0.8%

Gasera Woreda: 2018 - 0.9%, 2019 - 0.7%, 2020 - 0.8%, 2021 - 0.8%, 2022 - 1.8%

Goba Town: 2018 - 1.4%, 2019 - 1.1%, 2020 - 1.1%, 2021 - 0.4%

Goba Woreda: 2018 - 3%, subsequent years less

Goro Woreda: 2018 - 4%, stable

Gura Damole Woreda: 2018 - 5%, a significant increase from last year

Harana Buluk Woreda: 2018 - 6%, a substantial increase over the years

Malnutrition remains a concern in woredas, showing varied trends over time.

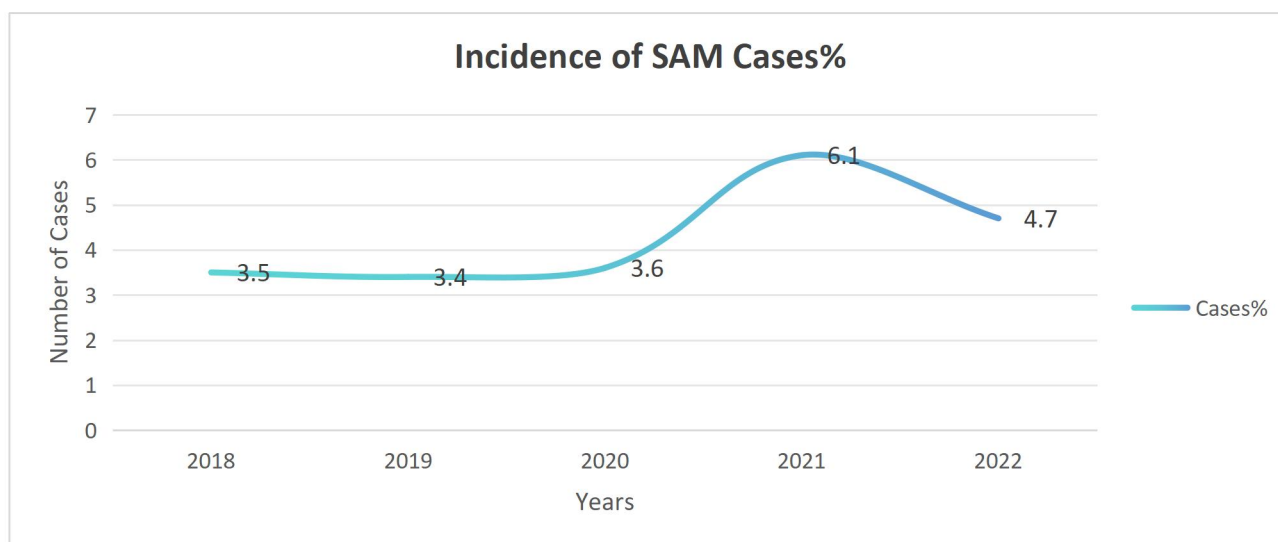


Figure 3:Severe Acute Malnutrition Trends in Ethiopia's Bale Zone, 2018–2022

Table 3:Incidence trend per Woreda in Bale zone last five years from 2018-2022

Name Of Woreda	Incidence rate per 100 under five children aged 6-59 months				
	2018	2019	2020	2021	2022
Agarfa	0.8	0.9	0.9	0.7	1.7
Berbere	6.8	7.3	7.3	5.9	8.9
Delo Mena	6.2	5.6	6	6.5	7.7
Disho	0.3	0.2	0.8	0.3	0.8
Gasera	0.9	0.7	0.8	0.8	1.8
Goba Town	1.4	1	1.1	1.1	0.4
Goba	3	3.1	2.4	4.2	0.3
Goro	4.7	4.3	4.7	4.8	8.1
Gura Damole	4.7	3.9	5.2	5.9	14.3
Harana Buluk	6	6.6	6.3	7	11.1

4. Discussion

The frequency of severe acute malnutrition (SAM) in children under five varies throughout the Bale Zone between 2018 and 2022, according to surveillance data on the condition.

The data likely reflects seasonal variations and broader trends related to factors like food insecurity, healthcare access, and Socioeconomic conditions.

Severe acute malnutrition can have devastating consequences for children's health and development. Children with SAM are at a significantly higher risk of mortality, as well as long-term health issues like stunted growth, cognitive impairments, and weakened immune systems. The surveillance data underscores the urgent need for targeted interventions to tackle SAM in Bale Zone (17).

A serious public health issue in many regions of the world, including Ethiopia, is severe acute malnutrition (SAM) (4). Over the last five years, from 2018 to 2022, this condition has had a significant negative influence on the Bale Zone, which is situated in Ethiopia's Oromia region. Surveillance data analysis conducted during this period has provided valuable insights into the prevalence, trends, and impact of SAM in the area (18).

According to the data, the prevalence of severe acute malnutrition in children under five has ranged from 3.4% to 6.1% during the past five years, with a significant increase observed in 2021. Furthermore, a minor proportion of accepted cases had a death (0.13%) or default (0.51%) outcome. The results of the study showed that while 85% of children received treatment at an outpatient OTP program, 15% of children received therapy at an inpatient treatment center (SC). The CMAM program's monthly early screening of kids at the health post level may be the cause of this. The zone's OTP sites have grown in comparison to previous years. This may be due to the Community-Based Nutrition Program (CBN), Essential Nutrition Action (ENA), Community Health Day (CHD), Infant and Young Child Feeding Program (IYCF), Community Management of Acute Malnutrition (CMAM), and other nutritional intervention programs are currently being implemented in Ethiopia. Local and international NGOs are also involved in these programs (4,6,8,13).

According to this analysis, the years 2020 and 2022 saw the greatest number of SAM cases. This could be a result of climate change, as there has been a drop in short and long rainfall, which has

led to a lack of agricultural produce yield supplies and can foretell hunger. This result was consistent with research conducted throughout Ethiopia (11).

Children with severe acute malnutrition who had anthropometric measurements of MUAC <11.5cm, Weight for Height (WFH) less than 3SD, bilateral pitting edema, failed appetite, and medical complications should be brought to a stabilization center. To handle this, children were admitted. 15% of cases over four years were admitted. Acute malnutrition-related admissions of children varied from 391 in 2020 to 1036 in 2021 (15%) (12). The results of this study indicate that the overall death rate following SAM admission is 0.4%, which is within the permissible threshold of 10% (12).

This study's recovery rate, which was 98.2%, was higher than the lower permissible limit of the worldwide norm, which was greater than 75% (15). This might be the result of OTP programs being strengthened and thorough community-level screening being done.

In this analysis, the defaulter rate was found to be 1.4%, which falls within the acceptable benchmark of 15% recognized worldwide. This indicates that a relatively low percentage of individuals failed to complete their prescribed treatment during the period under review (10).

4.1 Limitation

Surveillance data analysis uncovers challenges in addressing severe acute malnutrition in the Bale Zone, such as limited healthcare access, insufficient resources for nutrition programs, and Socio-cultural barriers to seeking treatment for malnourished children. Identifying these challenges offers opportunities for targeted interventions and policy changes to enhance the situation.

The Public Health Emergency Management and Demographic Health Information System two reporting units' data were found to be inconsistent.

Weekly reporting formats are not adequately covered because the sex category variable is absent from the existing report format.

While Bale Zone is a nutrition hot spot, further study is hindered by missing factors like sex and entry requirements in the reporting formats.

There is a lack of comparable studies in facility-level surveillance data analysis.

4.2 Conclusion

Over the previous five years, there has been an erratic trend in the prevalence of severe acute malnutrition in children under five. While it remained relatively stable between 2018 and 2020, there was a significant increase in 2021, with the prevalence spiking to 6.1%. This sudden rise in 2021 indicates a potential exacerbation of the malnutrition situation among children in the region.

The majority of malnourished cases received treatment at outpatient therapeutic (OTP) sites, comprising 87% of all reported cases. Conversely, only 13% of cases underwent treatment at stabilized center (SC) sites. This distribution implies that OTP sites are more accessible or favored by individuals seeking treatment for malnutrition, underscoring the importance of ensuring sufficient resources and support at these facilities.

Despite receiving treatment, a small fraction of admitted cases resulted in death (0.13%) or were classified as defaults (0.51%). While these rates are relatively low, they underscore the imperative need for continual monitoring and enhancement of the quality of care provided at OTP and SC sites to avert adverse outcomes among malnourished children.

In summary, the data emphasizes both positive aspects, such as the high treatment coverage at OTP sites, and areas necessitating attention, including the escalating prevalence of severe acute malnutrition and the imperative to diminish mortality and default rates through enhanced healthcare interventions.

4.3 Recommendation

- ✓ **Strengthen Community-Based Nutrition Programs:** Given that a significant number of malnutrition cases were treated at outpatient therapeutic sites, it is crucial to enhance community-based nutrition programs. These programs can focus on early detection, prevention, and treatment of malnutrition in children under five years old. By increasing access to nutritional services at the community level, more children can receive timely interventions to prevent severe acute malnutrition.
- ✓ **Improve Monitoring and Evaluation Systems:** The data shows a concerning increase in the prevalence of severe acute malnutrition in 2021 compared to previous years. To address this trend effectively, it is essential to strengthen monitoring and evaluation systems. Regular monitoring of nutritional status, treatment outcomes, and mortality rates can help identify areas that require immediate attention and enable program managers to make informed decisions for improving malnutrition management strategies.
- ✓ **Enhance Health Education and Awareness Campaigns:** Reducing the prevalence of severe acute malnutrition in children under five years old requires raising awareness of the significance of appropriate nutrition and early malnutrition identification. Health education campaigns targeting caregivers, communities, and healthcare providers can help promote optimal feeding practices, encourage early healthcare-seeking behavior, and improve overall nutrition-related knowledge. By empowering individuals with information on malnutrition prevention and management, the community can play a more active role in combating this public health issue.
- ✓ **To improve food security in Ethiopia,** the focus is on boosting agricultural productivity and implementing asset-building programs like the PSNP to address regional vulnerabilities and enhance per capita incomes while reducing the food gap.

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CHAPTER 4:- Evaluation Of Surveillance System And Response For Maternal And Perinatal Mortalities In Meda Welabu District, Ethiopia, 2023 (From August 14 to September 30/2023)

ABSTRACT

Background:The Weekly Disease Surveillance System (WDSS) serves as a vital tool to anticipate potential public health emergencies. The Meda Welabu Woreda Bale Zone in Ethiopia exhibited an 87% overall timeliness rate and 88% completeness rate in 2023, slightly below the target of 100%. Lower reporting rates may delay the detection of epidemics within the region.

Objectives:The study in the Meda Welabu Woreda Bale Zone of Ethiopia aimed to evaluate the WDSS maternal and perinatal death surveillance response (MPDSR). By employing the latest criteria from the Centers for Disease Control for assessing public health monitoring systems, a descriptive cross-sectional analysis was conducted. Data was collected from healthcare workers through key informant interviews and questionnaires. Resource availability was assessed using checklists.

Methodology:Twenty-two health personnel and twelve Health Extension Workers participated in the study, with 44% being female. Nurses accounted for 53% of the health personnel. Only 47% of respondents were familiar with the WDSS objectives, while 53% knew the deadlines for data submission. Training in WDSS usage was received by 24% of responders. Most respondents (76%) expressed willingness to continue participating in the WDSS.

Results:Out of the health facilities surveyed, 50% reported issues with the district public health emergency officer. Notably, immediate reports of maternal and perinatal deaths received insufficient attention (42.9%).

Conclusion:The study concluded that the WDSS is user-friendly and adaptable, though improvements are necessary. It is recommended that healthcare professionals in the region undergo training in maternal and perinatal death surveillance response. The WDSS, initiated in 1998 to monitor disease trends weekly for early public health warnings, expanded its scope to include maternal and perinatal death surveillance in 2013. In 2023, the overall completeness and timeliness stood at 88%, below the desired 100%. Delayed reporting may lead to late identification of outbreaks and service quality issues in the province. The study utilized current Centers for Disease Control criteria and interviewer-administered data for its analysis.

Keyword:-Surveillance system evaluation, Maternal and perinatal death surveillance,meda welabu woreda, Oromia, Ethiopia

1.1 Introduction

The Maternal Death Surveillance and Response System (MDSR) was introduced in 2013 to provide valuable insights into the causes and contributing factors of maternal deaths. This system aims to support both programmatic and individual-level decision-making. Including MDSR in a country's health strategy is considered a crucial element in efforts to reduce maternal mortality(2). A notable initiative aimed at improving the quality of care in maternal and neonatal health (MNH) is the Maternal and Perinatal Death Surveillance and Response (MPDSR) program. This program focuses on the systematic monitoring and evaluation of maternal and perinatal deaths to implement effective responses and enhance health outcomes.(3). To identify maternal fatalities, it's essential to assess all deaths among women of reproductive age (WRA), focusing on those occurring during pregnancy or within 42 days postpartum (suspected maternal deaths). In cases where a WRA dies in a healthcare facility, a review of her medical records should determine if she was pregnant. Community health workers, traditional birth attendants, and community leaders can report suspected maternal deaths, followed by verbal autopsies to determine the cause. Health facility deaths must be reported to authorities within 24 hours, while community deaths should be reported within 48 hours(4). Public health surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding health events for use in public health action to reduce morbidity and mortality and improve health. A well-functioning disease surveillance system is critical to the health system, providing evidence-based information for the planning, implementation, monitoring, and evaluation of public health intervention programs(5). Since 2008, the Ministry of Health has initiated a reform and restructuring of the health sector, focusing on core processes such as disease surveillance and response through Business Process Re-engineering (BPR). This approach aims to establish a reliable system for monitoring priority diseases, functioning as a Public Health Emergency Management (PHEM) center. Currently, there are 22 diseases and events classified as high-priority due to their public health significance, potential for epidemics, international concern, or status as diseases targeted for eradication or elimination. Among these, maternal deaths are categorized as immediately reportable priority events (**Table 1**) (5).

Table 1:-List of weekly immediate and weekly re-reportable diseases in Ethiopia.

Immediately reportable disease/events	Weekly reportable disease/events
Avian Influenza in Humans	Acute Flaccid Paralysis
	Anthrax
Cholera Infection	Dysentery
	Malaria
Dracunculiasis (Guinea Worm Disease)	Meningitis
	Relapsing
Measles Virus	Typhoid Fever
	Typhus
Neonatal Tetanus	Severe Acute Malnutrition
	Others with new guidelines 11
Pandemic Influenza A(H1N1) Virus	
Rabies Infection	
Smallpox Disease	
Severe Acute Respiratory Syndrome (SARS)	
Viral Hemorrhagic Fevers (VHFs)	
Yellow Fever Virus	
Maternal Mortality	
Perinatal Mortality	

Maternal death is the death of a woman while pregnant or within 42 days of terminating the pregnancy, regardless of duration and site, from any cause related to or aggravated by the pregnancy or its management, excluding accidental or incidental causes. The Maternal Death

Surveillance and Response (MDSR) system is a continuous cycle of identifying, notifying, and reviewing maternal deaths, followed by interpreting findings and implementing responses and actions to prevent future deaths (4).

Between 2016 and 2020, the WHO report indicates that most regions globally experienced stagnation or a decline in maternal mortality rates (MMR), with the exceptions being Australia and New Zealand, where MMR decreased by 34.6%, and Central and Southern Asia, which saw a reduction of 15.7% (6). The 2016 Ethiopian Demographic and Health Survey indicates that the maternal mortality ratio (MMR) is approximately 412 deaths per 100,000 live births (7). Ethiopia has achieved notable decreases in maternal mortality rates over the past few decades; however, the country still experiences a considerable number of maternal fatalities. Many of these deaths are considered preventable through the implementation of effective, evidence-based interventions before and during pregnancy, as well as during labor and in the critical hours and days following childbirth (7). Despite a global decline in perinatal mortality rates, it remains a significant public health issue in sub-Saharan Africa. Ethiopia, in particular, is among the countries with the highest rates of perinatal mortality, with some regions experiencing exceptionally high figures. This study seeks to explore the factors contributing to perinatal mortality in the regions of Ethiopia that have the highest mortality rates (8).

Enhancing maternal health is a key target among the thirteen established for Sustainable Development Goal 3 (SDG-3) regarding health, which was adopted globally in 2015. Addressing maternal mortality and enhancing overall maternal health are top priorities for the Ethiopian Federal Ministry of Health (FMOH), as highlighted in its Health Sector Transformation Plan. The FMOH is committed to eradicating preventable maternal deaths and has been implementing a maternal death surveillance and response system since 2013. This system is integrated within the national Public Health Emergency Management (PHEM) framework, functioning at both health facilities and in the community to track and document maternal deaths occurring in various settings. However, there are challenges, as the reporting of maternal deaths through weekly surveillance is lagging compared to other conditions monitored within the surveillance system (9). Surveillance data typically flows from local reporting sites to higher levels, ultimately reaching the national level and the WHO. Community health facilities, especially health posts, play a crucial role as primary sources of information regarding health-related events. **Fig.1**

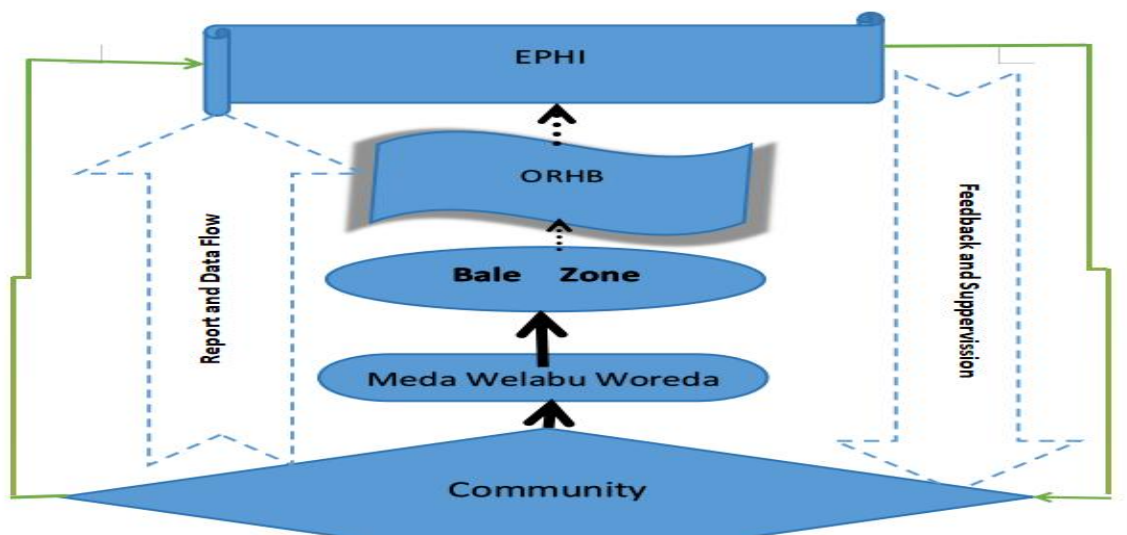


Figure 1: shows the data flow framework structure Meda Welabu Woreda, Bale Zone, Ethiopia,2023(10)

Data gathered from this site is organized into standardized formats, analyzed, and subsequently sent to the district health office by health centers. At the district level, the information is compiled, analyzed, and forwarded to the zonal level using a standard form. The zonal level then compiles and analyzes the reports before transmitting the consolidated data to the regional level, again using a standard form. Finally, the national level receives the summarized data from the region. Feedback and information flow back in the opposite direction, following the same channels (10).

Maternal deaths are monitored through weekly notifications, with an additional 8% documented via case-based reports, according to the 2016 Ethiopian Demographic and Health Survey (EDHS) estimates. There are notable regional variations in reporting rates compared to the estimated maternal mortality figures. For instance, Dire Dawa city administration and Harari regions reported 52% and 42% of the anticipated maternal deaths, respectively. In contrast, the reporting rates from the Somali region and the Southern Nations, Nationalities, and Peoples (SNNP) region were significantly lower, at just 0.1% and 4%. In the Oromia region, 13.3% of estimated maternal deaths were reported; however, only 6.9% of those were reviewed and documented through case-based methods. Within the reviewed cases, the Bale zone contributed to 10.1% of the regional total and 3% of the national figures (4).

This study aims to assess the maternal death surveillance and response (MDSR) system in the Meda Welabu district, as no prior evaluations have been conducted in this area. The evaluation seeks to monitor the implementation progress and overall effectiveness of the MDSR system. To achieve this, specific indicators derived from WHO guidelines will be utilized to evaluate the structure, core functions, support functions, and quality of the MDSR system. The outcomes of this evaluation will provide valuable insights to enhance the district's overall surveillance activities, helping to achieve its goals. Maternal mortality remains a critical public health challenge in Ethiopia, making it essential to understand the preparedness of the Meda Welabu health system to utilize the MDSR system for informed decision-making. This study, conducted on September 30, 2023, focuses on the maternal and perinatal death surveillance and response system in Meda Welabu Woreda, Bale zone, Oromia.

Objectives

1.1 General Objective

To assess the monitoring system and response strategies related to maternal and perinatal deaths in the Meda Welabu District of Ethiopia for the year 2023.

1.2 Specific Objectives

- Analyzing the overall structure of the system.
- Examining its core activities.
- Assessing supportive functions.
- Evaluating key attributes of the system.

2. Methods

2.1 Study area

The research was conducted across eighteen rural and two urban villages within the Meda Welabu Woreda in the Bale Zone of Ethiopia. The region's economy primarily relies on pastoralism. It is situated in southeastern Ethiopia, bordered by the East Borana and Guji zones, as well as the Dalomena and Harena Buluk districts to the northeast, and the Somali region to the southeast. This area has experienced considerable poverty stemming from droughts and limited economic opportunities, often leading to internal displacement due to conflicts with the nearby Somali region. According to the 2008 national population census data, the province has a population of approximately 186,000. There are six health centers, one government hospital, and twenty-five health posts available in the province. The high risk of epidemics in the area underscores the importance of a robust surveillance system for public health. (Fig.2).

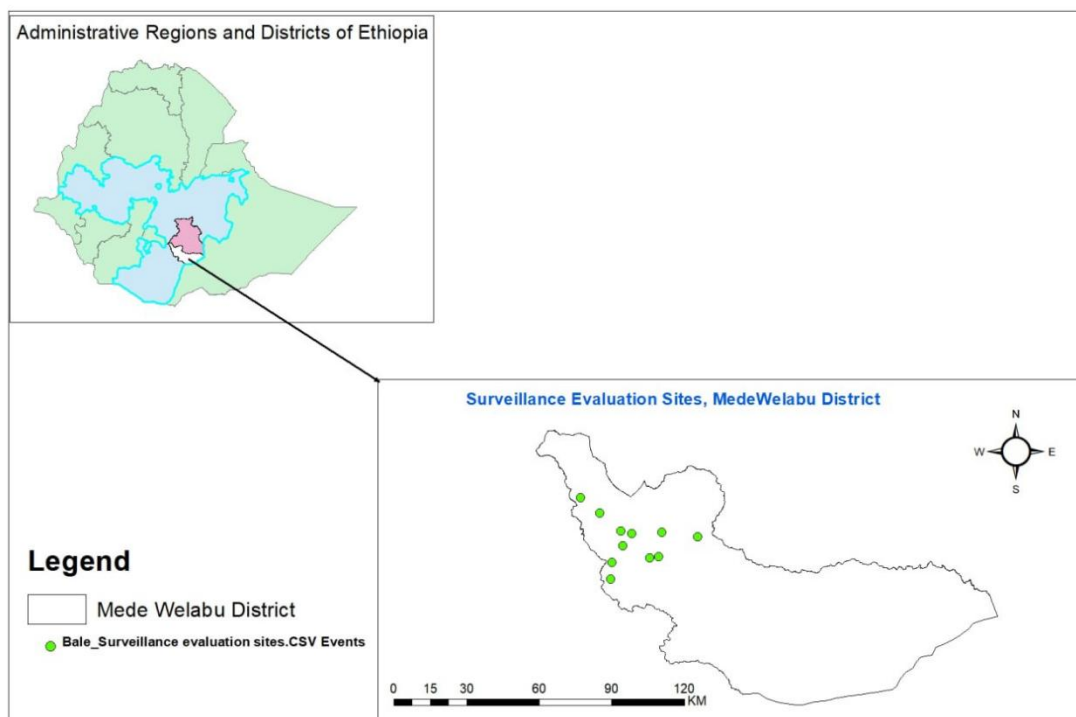


Figure 2:Administrative map of Meda Welabu Woreda showing the Area Surveillance System Evaluation done Bale Zone, Ethiopia,2023

2.2 Study Population

The study involved public health emergency management (PHEM) focal points, health center directors, maternal and child health (MCH) coordinators from all health centers in the district, and health extension workers (HEWs) from selected health posts.

The WDSS reporting period starts on Monday at 8:30 AM and concludes on Sunday at midnight. Each day, nurses and Health Extension staff at the rural health center fill out an illness registration form. This information is compiled by Monday and sent to the district health public health emergency management unit through mail, phone, or physical copies. The district then consolidates all the reports and submits them to the zonal public health emergency management officer by Tuesday.

2.3 Study Design and Period

The research carried out was a retrospective descriptive analysis, based on weekly surveillance data. It took place from August 1 to September 30, 2023..

2.4 Data Collecting Tools and Procedures

The evaluation of the maternal and perinatal death surveillance and response system was conducted using the WHO and CDC frameworks for public health surveillance systems. Data collection involved document review, record examination, and face-to-face interviews with key stakeholders.

Quantitative data were sourced from surveillance reporting formats and health facility records. For the qualitative aspect, interviews were conducted with key informants, including health center staff, PHEM focal persons, MNCH coordinators, health center heads, and health extension workers, using a semi-structured interview guide that allowed for flexible probing.

The assessment of surveillance guidelines, reporting formats, documentation, case registration, and the completeness and timeliness of reports was carried out through a quantitative survey of relevant documents.

Qualitative data focused on the structure and functioning of the surveillance and reporting systems, case detection, and system attributes such as simplicity, flexibility, predictive value, Representativeness, and stability, as explored through interviews with key informants.

Additionally, aspects such as data analysis and interpretation, epidemic preparedness and management, supportive supervision and feedback, and the acceptability of the surveillance systems were evaluated through both document analysis and key informant interviews. In the Meda Welabu district, the Primary Health Care Unit (PHCU) is actively monitoring the population, utilizing data from the 2007 census to track the total population and estimate the percentage of pregnant women. The expected maternal and perinatal death rates from the EDHS 2016 data are also incorporated for surveillance and investigation purposes (**Table 2**).

Table 2 The population under surveillance in Meda Welabu district by PHCU, 2023

S.N	Name of PHCU	Projected total population from the 2007 census	Estimated to be pregnant (3.47%)	Expected maternal death from EDHS 2016 (412/100,000)	Expected perinatal death from EDHS 2016 (41/1000)
1	Bidire	28,821	1000	4	41
2	Mada	24,838	862	3	35
3	Gobble	23,997	833	3	34
4	Waduma	32,789	1138	5	47
5	Oborso	49,664	1723	7	71
6	Ware	26,587	926	4	38
7	Meda Welabu Hospital	186,000	6478	26	266
8	Meda Welabu Woreda	186,000	6478	26	266

Table 3: Socio-Demographic Characteristics of Health Professional and Health Extension

2.5 Data processing and analysis

The quantitative data were inputted and examined using Microsoft Excel 2013. The results were summarized in terms of frequency and proportion.

For qualitative data, a manual thematic analysis approach was employed. Prior to the analysis, the data underwent a cleaning process. The qualitative findings were then organized and summarized according to thematic topics to enhance the understanding of the quantitative results.

2.6 Operational Definition:

Reporting: The process through which surveillance data is transmitted from its source within the surveillance system. The evaluation will focus on the availability of reporting channels and a report rate of 1-30 weeks in 2023.

Stakeholders: Individuals or organizations that generate or utilize surveillance data to promote health and manage disease prevention and control.

Usefulness: The effectiveness of surveillance in preventing and controlling adverse health events, assessed by the actions prompted by data analysis and the system's ability to detect diseases, outbreaks, and estimate morbidity and mortality.

Simplicity: Refers to the clarity and ease of operation of the surveillance system. This includes straightforward case definitions, data flow routes, ease of completing data, and the time taken to finalize reports.

Completeness: The proportion of health facilities submitting weekly reports to the higher level, relative to the expected number in the catchment area.

Timeliness: Evaluated at two levels: first, by the prompt submission of expected reports (e.g., weekly reports from health facilities to district offices by mid-day Monday); second, by the duration from the onset of a health event to reporting and initiation of control measures.

Flexibility: The system's capability to adapt to evolving information needs and conditions, assessed by its responsiveness to changes in procedures, case definitions, additional data sources, personnel, case detection, and reporting formats.

Data Quality: Assesses the completeness and validity of recorded data, including case numbers, report dates, and any missing responses. Validity is compared between health posts and health centers.

Acceptability: Measures the willingness of individuals and organizations to participate, gauged by the completeness and timeliness of report forms and adherence to standard case definitions.

Positive Predictive Value: The proportion of cases defined by surveillance that are confirmed to have the disease.

Sensitivity: The system's ability to detect true events and outbreaks.

Representativeness: The capacity to characterize events over time and across demographics, assessed by the distribution of health-related events and data reporting from all health facilities.

Stability: The system's reliability and availability, measured by the presence of surveillance personnel at all levels and the integration of the system into routine healthcare delivery.

2.6.1 Community case definition

Probable maternal deaths : to the death of women aged 15-49 due to pregnancy-related causes.

Suspected maternal deaths : include cases where a woman died during pregnancy, within 42 days post-pregnancy, or had missed her period before death.

Confirmed maternal deaths : any death of a woman during pregnancy or within 42 days after pregnancy termination, related to the pregnancy or its management, excluding accidental causes.

Positive knowledge:- Respondents who score at the median level or above on knowledge questions about the MPDSR are deemed to possess satisfactory knowledge (11).

Positive attitude: Respondents who scored higher than the median on the questions assessing their attitudes regarding the MPDSR(11).

3. Results

In 2023, 31 reporting units (24 health posts, 6 health centers, and 1 district hospital) submitted surveillance reports to the Meda Welabu district health office. Of these, 14 sites were evaluated, including all six health centers, one hospital, and six (25%) health posts.

A total of 34 healthcare workers participated in the evaluation, primarily composed of men among health professionals and all women among health extension workers. The groups varied in age range and median age, with nurses representing the majority and diverse levels of experience. During the evaluation, the facility reported 13 perinatal deaths and 16 maternal deaths (Table 3).

Figure 3: Socio-Demographic Characteristics of Health Professional and Health Extension Workers in Selected Health Facilities for Surveillance Evaluation Facilities, 2023

Name of Health facility	Respondent's Characteristics		Frequency
Meda Welabu Hospitals	Sex	Male	12
		Female	3
	Professional	Health Officer	0
		Nurse	2
		Midwifery	13
	Education level	Degree	15
		Diploma	0
Meda Welabu Woreda Health office	Sex	Male	2
		Female	0
	Professional	Health Officer	0
		Nurse	2
		Midwifery	0
	Education level	Degree	2
		Diploma	0
Health Center	Sex	Male	15
		Female	15
	Professional	Health Officer	6
		Nurse	12
		Midwifery	12

	Education level	Degree	27
		Diploma	3

The study's findings indicate that in 2023, the weekly surveillance report completion rates for health centers and health posts would be 88% and 87%, respectively. The district's overall completion rate for reports was 88%. The district's average percentage of timely surveillance reports was 82%. The normal healthcare delivery system is fully linked with the surveillance system, which has been put into place all year. The primary hospital report from Meda Welabu also scored 96% for timeliness and completion. However, there are notable gaps in the timeliness, accuracy, and completeness of the data, according to the surveillance system study carried out on the maternal and perinatal death surveillance system(MPDSR) in Meda Welabu Woreda, Bale zone. The results are summed up as follows:

1. **Completeness:** Of the 14 health facilities visited, only 6 (42.9%) supplied all the information needed for the surveillance system. Regrettably, most of the eight health facilities (57.1%) did not provide all of the requested data, which raises questions regarding the accuracy and completeness of the surveillance data gathered.
2. **Timeliness:** Of the 14 health facilities, only 5 (35.7%) met the deadlines for providing data to the surveillance system. Nonetheless, a troubling majority of 9 healthcare facilities (64.3%) failed to achieve the necessary timeliness requirements (Fig.3).

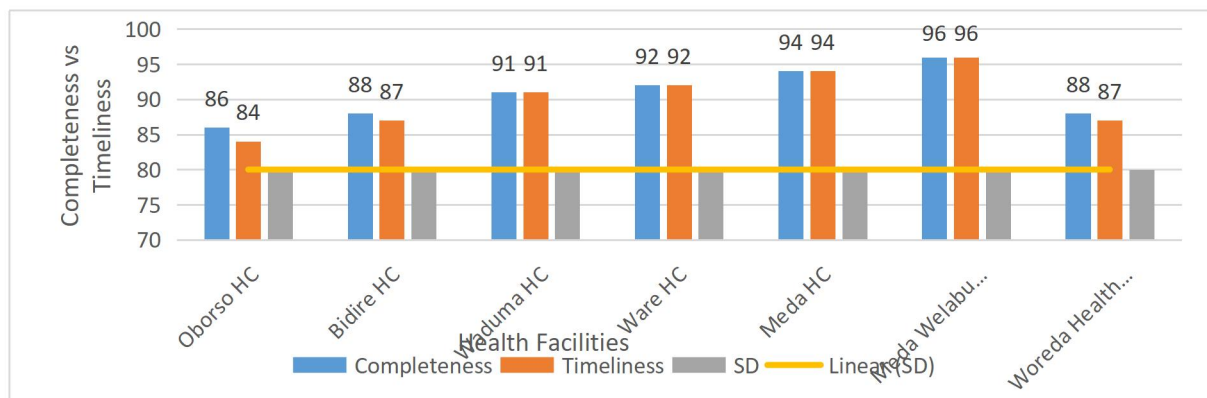


Figure 4 shows Surveillance data Completeness and Timeliness, Meda Welabu Woreda Bale Zone,2023

3. Accuracy: According to the investigation, six (42.9%) of the 14 health facilities showed good accuracy in the data they collected for surveillance. However, a worrying majority of 8 health facilities (57.1%) had low accuracy, indicating a significant need for process improvement in the data gathering. The authenticity and dependability of the surveillance data gathered from these sites are called into doubt by this disparity in accuracy levels.

4. Surveillance Utilization: The results show that only one health institution (7.1%) made effective use of the surveillance data when making decisions and taking action. On the other hand, 92.9% of the 13 health facilities surveyed did not effectively utilize the surveillance information that was gathered. The surveillance system's potential benefits are hampered by its under-utilization, which prevents it from informing and directing public health actions and programs.

In this evaluation, 22 healthcare professionals and 12 health extension workers took part. Nineteen (86%) of the 22 health professionals were male, while all the health extension workers were females. The interquartile range (IQR) for health professionals' ages was 25–35 years, with 26 being the median. Health Extension Workers had an average age of 25 years (interquartile range: 22–28 years). Regarding the background of the health workers, 7 (32%) were health officers, and 15 (68%) were nurses. Health professionals and health extension personnel had an average of 5 and 8 years of experience, respectively. The frequency of perinatal deaths documented per expected estimation is modest, with 13 reported in the facility examined during system evaluation where whereas maternal deaths were sixteen. Health facilities, hospitals, and health posts stored weekly surveillance reports in file cabinets. While hospitals and facilities had the Maternal and Perinatal Death Surveillance and Response manual, not all health posts did. Among the 14 visited health facilities, only one (17%) had a maternal death notification form. Additionally, one health center (40%), one hospital (100%), and one health post (17%) reported cases of maternal death verbal autopsy (Table 4).

Table 4: Availability of reporting and recording of Surveillance System in Meda Welabu Woreda Bale Zone, 2023

S. N	Variables		Hospital (n=1)	Woreda Health office (n=1)	Health Center (n=6)		Health Post (n=6)		Total (n=14)	
			Frequency	Frequency	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
1	PHEM National Guideline	Yes	1	1	6	100	3	50	11	79
		No	0	0	0	0	3	60	3	21
2	MPDSR Implementation Manual	Yes	1	1	6	100	0	0	8	57
		No	0	0	0	0	6	100	6	43
3	Weekly Report formats	Yes	1	1	6	100	3	60	11	79
		No	0	0	0	0	3	40	3	21
4	Maternal death notification forms	Yes	1	NA	3	40	0	0	4	29
		No	0	0	3	60	6	100	9	64
5	Maternal verbal autopsy	Yes	0	1	1	40	1	20	3	21
		No	0	0	5	60	5	80	10	71
6	Facility-	Y	1	0	2	40	NA	NA	3	21

	based maternal death abstraction form	es								
		N o	0	0	4	60	NA	NA	4	29
7	Case- based maternal death reporting formats	Y es	1	1	2	20	NA	NA	4	29
		N o	0	0	4	80	NA	NA	4	29
8	Rumor logbook	Y es	0	1	0	0	0	0	1	7
		N o	0	0	6	100	6	100	12	86
9	Line list	Y es	1	1	3	60	0	0	5	36
		N o	0	0	3	40	6	100	9	64
10	PHEM case- based reporting format	Y es	1	1	3	60	NA	NA		0
		N o	0	0	3	40	NA	NA		0

The evaluation gathered feedback from both healthcare professionals and health extension workers on various aspects of a surveillance system. The results indicated differing opinions on simplicity, flexibility, acceptance, sensitivity, positive predictive value, Representativeness, timeliness, cost, and usefulness. While some expressed satisfaction, others were dissatisfied with

different aspects of the system. The findings suggest a need for further research to address specific areas of improvement based on the varying opinions expressed in Table 5.

Table 5: Shows Over the surveillance system among Health Extension Workers & Health Professionals, 2023

Variables		Health Professionals		Health Extension Workers	
		Frequency	Percentage %	Frequency	Percentage %
simplicity	positive	9	41	8	67
	Negative	13	59	4	33
Flexibility	positive	13	59	6	50
	Negative	9	41	6	50
Acceptability	positive	13	59	8	67
	Negative	9	41	4	33
Sensitivity	positive	13	59	9	75
	Negative	9	41	3	25
Predictive Value Positive	positive	7	32	4	33
	Negative	15	68	8	67
Representativeness	positive	12	55	9	75
	Negative	10	45	3	25
Timeliness	positive	13	59	4	33
	Negative	9	41	8	67
Cost	positive	12	55	3	25
	Negative	10	45	9	75
Usefulness	positive	11	50	8	67
	Negative	11	50	4	33

4. Discussion

Simplicity -Health Professionals: - Nine of the 22 health professionals surveyed gave the system a positive rating for simplicity, while 12 gave it a poor rating. Out of twelve health extension workers, eight expressed satisfaction with its simplicity, while four expressed dissatisfaction. These findings imply that the professionals surveyed had differing opinions about what constitutes

simplicity. Additional research may be able to pinpoint particular areas where simplicity could be improved.

Flexibility-Health Workers: Nine health professionals disagreed with the perception held by 13 health professionals that the system was flexible.

Health Extension Workers: Six of these workers gave favorable input regarding system flexibility, while the other six had conflicting views. These findings suggest that, depending on the reactions, the system might be somewhat flexible. Attempts could be undertaken to tackle the issues brought up and enhance system adaptability even more.

Acceptance -Health Workers: Of them, nine expressed doubts about the system, while thirteen deemed it to be acceptable.

Health Extension Workers: Of these, 8 said they thought the system was acceptable, and 4 said they didn't. This suggests that while a sizable portion of experts find the system generally acceptable, there is still a need for improvement to allay the worries voiced by certain individuals.

Sensitivity -Health Workers: Of the health professionals surveyed, nine disagreed with the idea that the system is sensitive, while thirteen said it was.

Health Extension Workers: Three of the workers disagreed that the system is sensitive, whereas nine felt it is. These findings show that the professionals who were interviewed had differing opinions about how sensitive the system should be. To increase the system's sensitivity and comprehend the causes of the disagreements, more research may be necessary.

Positive Predictive Value, or PPV-Health Workers: Of the professionals surveyed, 7 expressed satisfaction with the PPV, while 15 expressed dissatisfaction.

Health Extension Workers: Only 4 out of 80 health extension workers expressed good opinions about the PPV, with the rest (78 out of 80) having negative feedback. These findings imply that the majority of the professionals surveyed believe the surveillance system's PPV to be poor. Improving the system's performance in this area would require addressing the causes of this perception.

Representativeness-Healthcare Professionals - Of the 22 healthcare professionals surveyed, 12 thought the system was representative, while 10 didn't.

Twelve health extension workers were interviewed; nine of them thought the system was representative, and three did not. These findings point to a varied opinion of Representativeness among the experts surveyed. To determine the places where the system might not be able to obtain a representative sample, more research may be necessary.

Timeliness: Health Workers: Of the health professionals surveyed, nine disagreed and 13 said the system delivered information promptly.

Health Extension Workers: Conversely, of the health extension workers, four gave favorable comments on timeliness and eight did not. These findings show some disagreement about how timely the system is thought to be. Gaining an understanding of the elements causing the variations may help improve the timeliness of the system.

Cost-Health Workers: Ten health professionals thought the system's cost was negative, while 12 thought it was appropriate.

Health Extension Employees: Of the health extension employees, three thought the system's cost was reasonable, while nine felt otherwise. These findings imply that opinions on the expense of the surveillance system are divided. To identify potential cost improvements, it would be beneficial to investigate the reasons influencing the negative opinions.

Usefulness- Health Professionals: Usefulness Of the health experts surveyed, 11 thought the method was useful, while the remaining 11 had mixed feelings.

Health Extension Workers: Eight of these workers thought the system was helpful, whereas four did not share this opinion. These findings show that the professionals who were interviewed had

differing opinions about its value. The areas where the system fails to provide healthcare practitioners with relevant information could be found with more research.

The evaluation of a population's general health and well-being depends heavily on its maternal and perinatal mortality rates (8,12,13). To gather and analyze data about maternal and perinatal fatalities, surveillance systems are essential(12). With an emphasis on the accuracy of the data gathered and its application, we shall assess the results of the surveillance evaluation carried out in Meda Welabu Woreda health facilities in this discussion.

The findings of the surveillance evaluation performance indicate that eight cases (57%) with inadequate accuracy in the monitoring system's data collection on maternal and perinatal mortality indicated a poor level of precision, according to the study. Addressing this issue is critical because precise statistics are needed to pinpoint problem regions and carry out efficient treatments.

The review also indicated that 6 cases (42.9%) had good data collection accuracy. It's critical to acknowledge these instances of accuracy and pinpoint the elements that made them successful.

According to the review, the monitoring system successfully and promptly delivered data in 5 cases (35%). Because timely intervention is essential to preventing maternal and perinatal fatalities, This result is positive. However, the data supplied by the surveillance system was delayed in the majority of cases (64.3%). This suggests that the system's ability to transmit data quickly has to be improved.

The study indicates completeness, six cases (42.9%) had complete data in the surveillance system. Accurate data is necessary to recognize trends, and risk factors, and to put the right measures in place. In contrast, the data in eight cases (57.1%) were incomplete. Inaccurate analysis and limited monitoring effectiveness in reducing maternal and perinatal death can result from incomplete data. The assessment revealed that good data quality was present in 57.1% of the data gathered, suggesting some degree of validity and consistency in the surveillance system. But in terms of validity, reliability, and consistency, 40.9% of the data were of low quality. This result emphasizes how procedures for documenting and gathering data need to be improved.

Encounter Utilization: In the Surveillance System, data analysis and Utilization are important issues however, there was just one instance (7.1%) where the surveillance data was used efficiently. Policymakers and healthcare providers may make well-informed decisions, carry out

focused interventions, and protect the health of expectant mothers and perinatal when surveillance data is used extensively.

In contrast, there was no indication of surveillance use in the vast majority of cases (92.9%). This poor utilization rate necessitates raising awareness, developing capability, and enhancing surveillance integration.

Health professionals and health extension Workers' overall MPDSR knowledge was 43% and 41%, respectively. This is less than the 50% seen in the Zimbabwe study(14). This discrepancy may be the result of the availability of training so that the healthcare professionals of the individuals in the prior study could receive a lot of training. The increase in internet availability could serve as yet another defense. Now that we have internet access, we might read more, which might force health professionals and health extension workers to learn more about MPDSR.

The woreda weekly report form had an average completion rate of 88%. This is higher than the studies done in Mutare district, Zimbabwe, 76%, and Zimbabwe, 79% (15).

Only 7 reports of maternal deaths from hospitals and Zero reports of health facilities were delivered to Woreda among 16 maternal fatalities, demonstrating the low timeliness of this surveillance system. In contrast to the normal FMOH report, which is due within 48 hours, and another study carried out in Ethiopia, the case-based type of maternal mortality reported from the hospital was reported after 2 months for 9 MDSR(2).

4.3 Limitation/Data Quality

The majority of the fields in the surveillance reporting format were filled in correctly, but the following data quality gaps were found: blank spaces that should have been filled in with zero (0) numbers were not recorded, and the beginning and ending dates of the week were also not filled in. Additionally, the date the report was received and transmitted is a crucial factor in determining how timely the reporting was, yet it is frequently overlooked at all healthcare facilities

4.4 Conclusion

The Surveillance Evaluation System of maternal and perinatal mortality uncovered both Limitations and strengths. Significant opportunities for improvement were found, despite good timeliness, completeness, Accuracy, quality of data, and use. Prioritizing expanded use of the surveillance system's data should go hand in hand with improving the quality, timeliness, accuracy, and completeness of the information gathered. In the end, this will improve the general health outcomes of the people in Meda Welabu Woreda by enabling more efficient interventions and methods to lower maternal and perinatal mortality.

In summary, the finding of the Maternal and Perinatal Death System Evaluation surveillance system at Meda Welabu Woreda health institutions in the Bale zone reveals notable deficiencies in the data's timeliness, accuracy, completeness, and usage. These results show that to raise the overall caliber and efficacy of the surveillance system, Monitoring, feedback, Weekly Bulletin, Strong Committee, and improvement are required.

4.5 Recommendation

The following suggestions are put out in light of the findings:

Strengthen data collection procedures: At the health facilities, efforts should be made to raise the precision, thoroughness, and promptness of data gathering. Programs for capacity-building and training can be used to improve the abilities and expertise of those working in data collection.

Improve the use of surveillance data: Resources and assistance should be given to health facilities so they can make the most use of the surveillance data that has been gathered. In addition to making sure that decision-makers have access to and comprehend the significance of surveillance data for well-informed decision-making, this can involve providing training on data analysis and interpretation.

Regular monitoring and assessment: The surveillance system should undergo periodic monitoring and assessment to determine its efficacy and pinpoint any

Frequent monitoring and assessment: To determine the effectiveness of the surveillance system and spot any weaknesses or potential areas for improvement, periodic monitoring and

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CHAPTER 5:A Woreda Health Profile Analysis Of Meda Welabu Woreda In The Bale Zone, Oromia, Ethiopia: A 2023 Study (From February 13 - 30, 2023)

ABSTRACT

ABSTRACT

Background: A health profile is an efficient tool for gathering and organizing various health-related information. Its primary goal is to depict overall health and associated factors, aiding in strategic planning, implementation, and evaluation of interventions.

Objectives: Disseminate crucial messages to Woreda and residents of Bale District to enhance information sharing and collaboration among different departments. Efficient execution of Meda Welabu Community.

Method: Data collection took place from 13-30 February 2023, utilizing information from Woreda Health Office and other health facilities. Upon collecting and organizing the data, thorough processing was done using Microsoft Excel, and the findings were showcased through tables, comprehensive percentages, and visual graphs.

Results:As of 2022, there are 90 schools with an enrollment rate of 42% female students. The health services infrastructure consists of 25 health posts, 6 health centers, one primary hospital, and 10 private health facilities. However, human resources only serve 56% of the population. Common diseases treated in the area include respiratory infections, fever, diarrhea, pneumonia, malaria, and notable cases of T2DM and positive HIV tests that require attention to improve. A study identified ten common causes of disease, with urinary tract infections being the most prevalent at 18%, followed by pneumonia (15%), stomach pain (14%), and diarrhea (12%). The district healthcare coverage has reached 90%, providing easy access to primary care for over 87% of residents.

Conclusion: The analysis revealed that urinary tract infections are the most prevalent disease, representing 18% of all cases. Additionally, pneumonia, indigestion, and diarrhea were also identified. Water coverage in Woreda stands at 56.7%, primarily sourced from groundwater, rivers, and public taps. The region boasts an impressive 90% health coverage, ensuring over 87% of the population have convenient access to basic medical services. Priority should be given to combating infectious diseases, enhancing access to clean water, and sustaining or enhancing health standards.

Key Word: Health Profile, Meda Welabu, Bale Zone, Oromia, South East Ethiopia

INTRODUCTION

The process of systematically analyzing and evaluating different health indicators within a particular geographic area—usually a district or locality—is known as the assessment of a health and health-related district health profile (1). A community health profile is an all-inclusive compilation of health and health-related information, health indicators, and the overall health status of a community over a given time frame and region (2).

A community health profile is a comprehensive collection of health and health-related data, health indicators, and the state of a community's health over a specific period and geographic area. WHO emphasizes the importance of HIS in ensuring the availability of accurate, timely, and reliable health data for effective decision-making at all levels of healthcare organizations (3). HIS can help improve the quality of healthcare services by enabling evidence-based diagnosis, treatment, and follow-up care. Moreover, HIS can support public health initiatives by facilitating disease surveillance, outbreak response, and monitoring health trends over time. A community health profile is an essential component of the problem identification and prioritization cycle in the process of improving community health (1,2). Health profile assessment is the process of obtaining and evaluating information from a variety of sources to have a thorough knowledge of the health of a community or area under study. It is also a process that uses these findings to devise solutions to improve the community's health (4,5). This health profile assessment is both a procedure and an outcome clue indicator of Socio-demographic traits, health status and quality of life, health risk factors, and health resources that are relevant to most communities (6); these indicators provide basic descriptive information that can be used to guide priority setting and data interpretation on specific health issues (7).file should include information on factors influencing people's quality of life, such as economic growth, income distribution, geographic differences, gender differences in education, food and nutrition habits, lifestyle-related factors, environmental factors affecting water and sanitation, waste management, and other factors affecting their ability to support themselves (8). Numerous variables, including physical and social settings, climate fluctuations, socioeconomic status, access to healthcare services and facilities, living situations, and other factors, can all have an impact on community health (9). The availability of information about the health status of the populations they serve and the frequency of important health factors is often lacking in less developed countries, which has an impact on the organization and administration of health services. Health services and information

systems have generally lagged at the district level, which makes this especially true (10,11). Two newly established health management training programs in Ethiopia are recognition-based, meaning that participants must complete a district health profile (HP) and be assigned to the role of district health manager upon identification of the district inadequacies (12). In less developed nations, there is frequently a lack of information available regarding the health state of the populations they serve and the prevalence of significant health determinants, which affects the planning and management of health services. This is especially true at the district level, where information systems and health services have historically lagged. Ethiopia's two recently formed health management training programs training based programs are recognition based on the recognition of these district deficiencies and demand completion of a district health profile (HP) and assignment as a district health manager.

developed nations, there is frequently a lack of information available regarding the health state of the populations they serve and the prevalence of significant health determinants, which affects the planning and management of health services. Health profiles are essential in understanding the health status of a community and identifying areas that need improvement (13). The Red Cross has highlighted a significant issue surrounding the availability of information and evidence in several studies on food shortages conducted in the Meda Welabu woreda. The studies have revealed that the handling of crucial data and information at the woreda level is insufficient and requires attention to improve the situation (7). Woreda health profiles provide crucial information on the health status, healthcare services, and challenges faced by specific regions. These profiles help identify priority areas for intervention, allocate resources, and monitor progress toward improving public health outcomes. By analyzing them, policymakers and healthcare providers can tailor interventions to address the specific needs of communities, ultimately contributing to the overall improvement of population health. As a result, it is critical to periodically update and compile a health profile to identify and prioritize the community's health and health-related issues. It serves as the foundation for operational public health research, planning, and implementing appropriate public health interventions.

The health profile description helps to describe current healthcare coverage, developmental activities, social services, and the ability to identify and prioritize major health issues. It also identifies risk factors and areas that require immediate attention to improve the community's health status. Furthermore, it demonstrates how fairly health facilities and resources are

distributed throughout the community, assists in assessing how well health service activities are performing, and provides data for decision-making.

A community can maintain a broad strategic picture of its population's health status and the factors that influence community health by compiling and analyzing a health profile regularly.

However, our nation's health profile is poorly managed, particularly at the district level. Information is frequently incomplete and difficult to obtain when customers require it.

To assess and implement interventions for unmet health needs, a regional, zonal, or district-level health profile must be developed, described, and evaluated.

Meda Welabu district, located in Oromia's captivating Bale Zone, has enormous potential. However, it has also faced challenges as a result of its favorable meteorological conditions, which have unfortunately made it a malaria hot spot. Furthermore, the district has seen recurring outbreaks of various emergency diseases in its diverse villages. We conducted a health profile analysis of Meda Welabu district in Ethiopia to evaluate its health condition and identify critical indicators for healthcare planning. Our investigation examined factors like disease prevalence, healthcare infrastructure, and community resources, providing policymakers and healthcare providers with the knowledge they need to develop targeted interventions and allocate resources strategically.

Objectives

1.2.1 General Objectives

To assess, characterize, and compile data on health and health-related matters, health conditions, and significant health indicators to determine the Meda Welabu district's top health priorities in 2022.

1.2.2 Specific Objectives

- ✓ To Identify population size, demographics, and trends in Meda Welabu district.
- ✓ To Evaluate disease prevalence and mortality rates.
- ✓ To Investigate healthcare facilities and utilization rates.
- ✓ To Assess environmental conditions affecting public health.
- ✓ To Identify health outcome disparities and equity in healthcare access.
- ✓ To Establish a surveillance system for disease outbreaks and develop response strategies.

2. Methods

2.1 The Study Setting

The study was conducted in the Bale Zone of Oromia, Ethiopia, in Meda Welabu Woreda (Fig. 1).

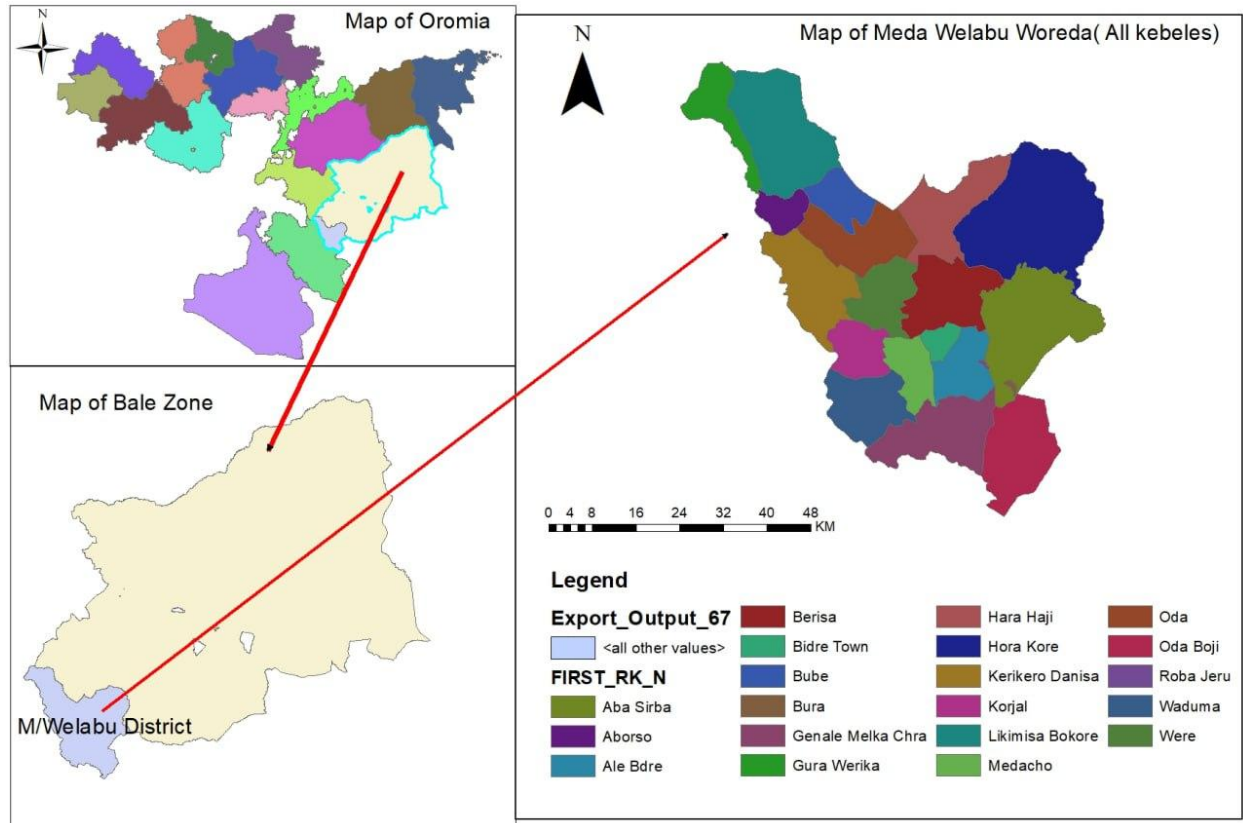


Figure 1:Maps illustrating the Meda Welabu Woreda Bale Zone Oromia health profile description area as of February 2023

2.2 Study design

From February 13 to 30, 2023, a descriptive cross-sectional study design was employed in this investigation.

2.3 Participant

The study encompassed 9 sectors, with 18 participants from various sectors age groups, and genders.

2.4 Variables

The analysis considered various health-related variables, including demographic information, health status, and access to healthcare services

2.5 Data Sources/M Measurement:

Data were gathered from various sources, using structured questionnaires, to collect information on health indicators such as Factors affecting the health system, infant mortality rate, maternal mortality rate, prevalence of infectious diseases, healthcare access, and health behaviors. The information was gathered from government reports, the Woreda Health Office, and pertinent health sectors. After collecting the data, we analyzed the health indicators of Meda Welabu Woreda and compared them to national and regional averages to identify areas that require immediate attention.

2.4 Bias

The study took steps to reduce bias through random sampling and ensuring data accuracy and reliability. However, there are several potential sources of bias in the study:

- Incomplete data could affect the accuracy of the health profile analysis.
- Participant's inability to reliably recall previous health information may bias the clinical profile assessment.
- Individuals may provide socially acceptable answers instead of accurate ones, compromising the accuracy of the health profile information.
- Failure to include health profiles from all woreda sectors may introduce bias in the results.

2.5 Study Size

By using purposive sampling approaches, we made sure that the knowledge and perspective of each sector were sufficiently recorded, which allowed for a thorough study. A district investigator collected and reviewed health and other health-related data from the following nine sectors: the Health Office, Education Office, Water & Energy Office, Administrative Office, Culture and Tourism Office, Transport Office, and Finance Office.

2.6 Statistical Methods

Microsoft Office Excel was used to evaluate the data, and tables, graphs, and percentages were used to display the findings. We also attempted to analyze some indicators of health data from four years ago. The majority of the data used in the health office was from an aggregated District Health Health System (DHIS) report.

2.7 Ethical Consideration

Written consent was given by the Meda Welabu District Health Office, the Bale Zonal Health Department, the Oromia Regional Health Bureau, and other pertinent offices.

3. Results (Outcomes)

3.1. The Person (Participant)

The percentage of participants from various sectors; each of the four Woreda Health Office officials engaged fully in the key informant interviews by way of active participation.

The three representatives from the water and energy industry all contributed to the debate on the health profile, indicating a 100% participation rate.

Two of the two members in the agriculture industry contributed fully, offering their insights for the health profile analysis.

There was 100% involvement from the road/transport and Woreda Finance sectors, with both of their two representatives actively participating in the interviews. Representatives from the education sector also fully participated, with both of their contributions going into the thorough information-gathering procedure. One delegate from the trade and industry sector participated completely in the important

3.2 Descriptive data

Various health indicators and demographic characteristics were presented in the descriptive data.

Analysis of woreda health profile overview of history Comprehending the historical background of the woreda is essential for evaluating health trends and obstacles. Health outcomes and disease prevalence are significantly influenced by the geographical location and climate of the woreda. Also, the assessment of demographic data yields information on the health needs of the populace and the distribution of resources for healthcare services. On the other hand, the woreda infrastructure is crucial to comprehending how to get to health services and amenities. Education level the community's health-seeking behaviors are influenced by health literacy and awareness, which are impacted by educational attainment. Disasters in times of emergency or natural disaster, health risks must be reduced as much as possible with the help of preparedness measures. Indicators of mother and child health evaluating the efficacy of mother and child health interventions involves keeping an eye on performance indicators.

3.3 Outcome data

The study outcomes provided insights into the health profile of the population in Meda Welabu Woreda. Targeted initiatives for healthcare services are necessary in the Woreda due to the significant disparities and dispersed population.

Understanding health risks and disease trends requires consideration of geographic and climatic conditions, even in the face of limited infrastructure.

Plans for disaster preparation should take into account recurrent outbreaks, droughts, border IDPs, and inadequate data processing from sector to sector to adequately handle health issues in Woreda.

The terrain and climate of the woreda should be taken into consideration when developing prevention and control strategies, particularly for diseases like malaria, cholera, and measles which are sensitive to changes in the weather.

3.4 Main results

Key findings regarding health issues, healthcare access, and other relevant community factors were highlighted in the main results. After conducting our analysis, we discovered several crucial findings. Firstly, the infant mortality rate in Meda Welabu Woreda was higher than the national average, which showcases the need for improved maternal and child healthcare services. Secondly, the prevalence of infectious diseases such as malaria and tuberculosis was more widespread in Meda Welabu Woreda than in other regions, indicating the need for targeted interventions. Finally, access to healthcare services was limited in Meda Welabu Woreda, with many residents having to travel long distances to obtain basic healthcare.

Historical Aspects of the Meda Welabu Woreda

The district was founded in 1937. The district's capital was called Bidire, and the town was named after a man named Dumal Boru, who settled on this land. He discovered a source of water on an island or cave used by his family and dug a large well there to water his cattle. He cut wood and carved it into the shape of a boat. The town was established in 1937 and was named after Mr. Dumal Boru's boat. The site is 630 kilometers from Addis Ababa, the capital city, and 200 kilometers (141 miles) southeast of the zonal town of Bale Robe. Since the sixteenth century, the Oromo people of Ethiopia and Kenya have been governed democratically by the Gadaa

System. They have acted in Meda Welabu woreda, and several historical Renaissance construction projects are currently underway.

The Meda Welabu district is home to an estimated 145,517 people, with 71,303 (51.8%) women. Males constitute 74,214 (48.2%) of the total population. The district had 30,316 households, each with an average of 4.5 people. Children under the age of five accounted for 23,908 (16.43%) of the total population. 35,215 (24.2%) of the population is made up of productively active women aged 15 to 49. The district's estimated population of 145,517 in 2022 was used for micro-planning. This projection was made after converting regional and national data. However, the actual population of the district exceeds the count of 197,571 people, which was used only for vaccination purposes. Hence, different population numbers are used to tackle various challenges in each sector (Table 1).

Table 1: Meda Welabu Woreda Population Profile by Primary Health Care Unit (PHCU) 2023

S. N	Name of Kebele	Total Population	Total H.H	Male Population 49%	Female Population 51%	# of live birth(3.47%)	# of< 1 year children(3.22%)	# of< 5years children (16.43%)	# of 6 to 59 months children(15%)	# of 24 to 59 months children (10.71%)
1	Bidre PHCU	24383	5080	11948	12435	846	785	4006	3657	2611
2	Meda PHCU	21014	4378	10297	10717	729	677	3453	3152	2251
3	Gobble PHCU	28339	5904	13886	14453	983	913	4656	4251	3035
4	Waduma PHCU	27740	5779	13592	14147	963	893	4558	4161	2971
5	Were PHCU	17669	3681	8658	9011	613	569	2903	2650	1892
6	Oborso	26154	5449	12815	13338	908	842	4297	3923	2801

	PHCU									
	Woreda Total	14529 8	3027 0	71196	74102	5042	4679	2387 2	21795	1556 1

Factors Affecting the Health Status of the Community

3.5 Geography and Climate

Meda Welabu shares borders with the Guji zone to the south, Dolo Mena and Harena Buluk to the north, West Arsi Zone Nansabo Woreda to the north, Gura Damole and Ethiopia Sumale Region Kersa Dula district to the north. Situated at 50°46'59"N, 390°40'59"E, Woreda is home to 145,289 people. Located approximately 630 kilometers away from Addis Ababa, the woreda is home to 145,517 people as of right now.

The woreda is divided into 22 kebele, with 20 being rural and two being urban. The woreda has a total land area of 843,334 hectares, with 36,350 hectares used for agriculture and 115,000 hectares forested. Other land totaled 92734, uncultivated land 13734 (1.6%), and pasture land 214870 (25.5%).

The woreda topography consisted of 15% high terrain, 10% lowland, and 75% desert.

3.6 Political and Administrative Organizations

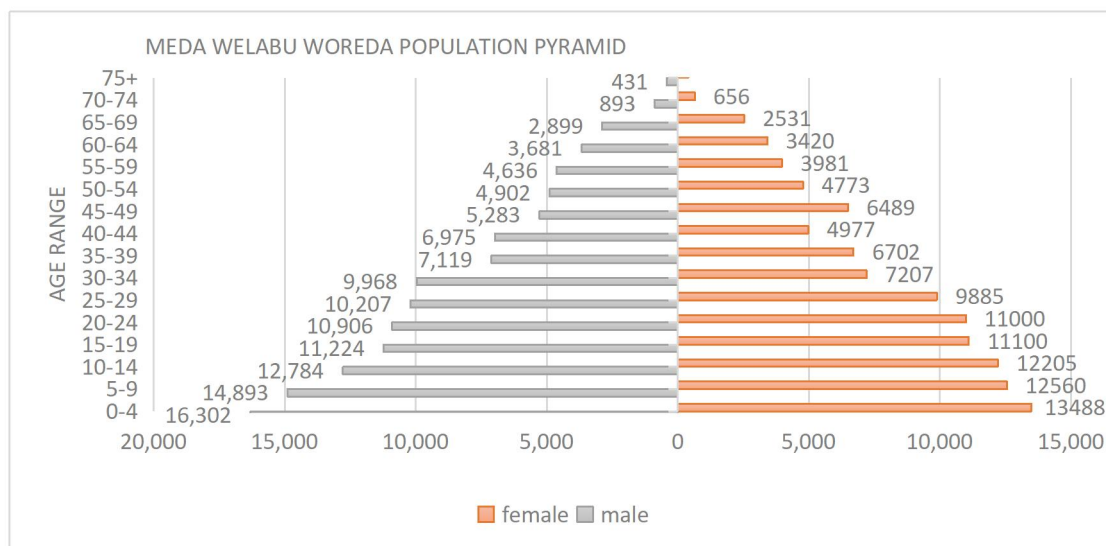
According to an interview, a century ago, the Meda Welabu district was entirely Oromo. Currently, more than 97% of the population is Oromo, with 3% being Somali and other ethnicity.

A little more than a century (hundred years) ago, residents of the Meda Welabu district shared the Oromo people's belief in a single God. Nowadays, 90% of people follow Islam, with 10% practicing Christianity or another faith. Meda Welabu is 98% Oromo, with 2% Somali, Amharic, and Sidaminga. Although there are many different types of personalities in the community, the most significant are the Oromo, the region's dominant ethnicity, and numerous Community Cultures that have existed for a century.

For example, it discusses marriage, daily life in the neighborhood, animal evil rituals, hill and water rituals, wells and lakes, children and women, and even the sacrifice of human lives.

3.7 The Population Structure

When we look at the district's population age distribution, the youngest age group is between 5 and 9 years old, accounting for 9% of the total population, followed by children under the age of five, who account for 8%. In the woreda population, 51.8% were female, with the remaining 48.2% male. See Meda Welabu population by age category (Figure 2 depicts the population pyramid).



Age group from the total population

Figure 2:Meda Welabu Population Pyramid of Age Category by Sex and Age Category, 2023

Production and Economy.

The local economy is both visible and hidden. Agriculture and cattle raising are the people's most visible economic resources, but there are also other industries such as trade. Farmers: 10%; horticulturists: 76%, dealers: 8%, and employees: 6%.Farmland 214870%
25.5, pastureland 214870%
23.9, develop able land 26770%
3.1, coffee-producing land 230%
0.3, uncultivated land 13734%
1.6, and other land 92734. They include soybeans, wheat, bisinga, bobe, potato/adore/macho, bloke, and sensing. Rainfall occurs twice a year in the Meda Welabu district, resulting in two harvests per year.

3.8 Education

In the Meda Welabu district, there were 16 pee-schools, 78 primary schools, 4 secondary schools, and 5 secondary schools. The district had 44,848 students in 2022–2023, including those who had just registered. In the district, there was just one private/alternative kindergarten school.

Today, 42% of the 44,848 students registered as Meda welabu woreda were female, and 52% were male students. Only 2% of all female registered students withdraw from school, compared

to 98% of male students, whose dropout rate is 2.5% greater than that of female students. In all grades, teachers' distribution to students was only 70%, with preschool accounting for 80%.

Only eight (or ten percent) of the district's ninety elementary and secondary schools had access to water, and only 83 (or 92 percent) had functioning male and female restrooms. Every school in the woreda has a Menstrual Health and Hygiene (MHH) WASH and anti-HIV/AIDS club. Estimates place the district's literacy ratio between illiteracy and literacy at 1 to 0.40 (Table 2).

3.9 Facility (infrastructure, telecommute, power supply)

Meda Welabu Woreda, public Clans are also constantly affected by infectious diseases such as cholera, as the Ministry of Water, Energy and Minerals' target of providing clean water has not been achieved. outbreaks and interest. Only 56.7% of the Woreda population has access to safe drinking water, which is dug into 22 non-functional wells and 3 boreholes.

By reducing the frequency and prevalence of waterborne infections, they are unable to improve public health.

The Meda Welabu woreda has a 237.59 km gravel road, which is 96 km ERA, 59 km ORA, and 82 km URRAP. According to an interview with a road authority officer from the Meda Welabu woreda, four kebele—Gura Worika, Likimsa bokore, and Genale Melka chira—do not have any complete roads. This is due to the challenging geography of the kebele. Only 14 (63%) of the twenty village kebele have access roads. In terms of electricity, one urban kebele, six rural kebele, and thirteen kebele are completely without it. They use fuel and solar energy to provide light and electricity, particularly in remote health facilities. The network services include four health centers, one hospital, and fifteen health posts from a total of 32 government health facilities

3.10 Disaster Risk and Public Health Emergency Management

Acute watery diarrhea (AWD), malaria, anthrax, and rabies are the most common diseases in the area we visited. Except for malaria, all diseases are under control; however, confirmed malaria cases continue to be reported. There were no reported malaria-related deaths in the districts.

According to the supporting documentation for the report, zoonotic and human epidemic diseases are common in Meda Welabu Woreda. Anthrax was one of the zoonotic diseases reported in the 2014 fiscal year, with 38 cases. 109 cases of rabies, 7 cases of brucellosis, 98 cholera cases, and 25 IDP cases this year as a result of border conflict, as well as a high number of cases of severe acute malnutrition, are explained below.

3.10.1 Cholera outbreak.

Ethiopia is one of the nations most vulnerable to climate change and fluctuations. Climate-related risks are common there, particularly droughts, floods, and disease outbreaks. Variable rainfall and rising temperatures exacerbated recurring hunger and drought, severely limiting people's ability to support themselves. Limited water supplies, poor sanitation practices, flooding, significant population mobility, and internal population relocation due to conflicts all contributed to the country's epidemic recurrence risk.

Several cholera epidemics in Meda Welabu-Woreda resulted in a large number of deaths and illnesses. The rainy season, religious and cultural gatherings, the migration of farm workers and day laborers, the refugee influx, the ongoing drought, a lack of water, and other factors all contributed to an increase in epidemic risk.

According to data, approximately 8 Kebeles have recorded 98 cases of cholera since outbreaks began in FY 2020. Despite the disease trend declining for the last two years in a row, significant outbreaks occurred in three kebeles, with 77 cases reported during the 2022 G.C. fiscal year. The disease's prevalence gradually decreased after the community received oral cholera vaccinations, but 25 cases of cholera were reported in 2023 in three kebeles with limited access to healthcare services and infrastructure.

3.10.2 Malnutrition

Recent acute nutrition epidemics have led to severe death and morbidity across the country. The rainy season, religious and cultural gatherings, the migration of farm workers and day laborers, the influx of refugees, ongoing drought conditions, a lack of water, and other factors have all contributed to the increased likelihood of such epidemics occurring. such epidemics occurring.

One of the nations with the greatest susceptibility to climate change and fluctuation is Ethiopia. Climate-related risks are frequently encountered there, most notably droughts, floods, and disease outbreaks. Variable rainfall and rising temperatures contributed to recurrent hunger and drought, which had a severe effect on people's capacity to support themselves. Limited water availability, poor sanitation practices, flooding, and significant population movement were some of the risk factors for the outbreaks' recurrent occurrence in the country. There have been 1132 cases recorded across 13 Kebeles in Meda Welabu since the epidemics of acute malnutrition began. Significant outbreaks occurred in all of the kebele's 1132 cases during the 2021 G.C fiscal year, despite the disease pattern trending downward for the previous three years in a row. But, recently, malnutrition has increased and grown more conducive to cholera outbreaks in Woreda, according to survey data indicated ;

1,574 children suffering from severe acute malnutrition will be treated at OTP in 2022.

Ø267 SAM cases with medical complications are referred to the SC and get proper treatment

Ø267 Food provides for caregivers

9,590 MAM children are treated at TSFP

7,591 MAM PLW are treated at TSFP

1841 beneficiaries receive IYCF education

3.10.3 Malaria

There are 17 malarious kebele in the Meda Welabu woreda, and 129,162 people are at risk. The district health office carried out a variety of tasks, including case management, indoor residual spray (Exposure chemical spray), health promotion regarding preventative measures, and environmental management regarding mosquito breeding sites. However, according to the 2022 annual parasite incidence of woreda report, because less than 50% of parasites were found, the

woreda entered the malaria elimination objective and no indoor residual spraying was conducted outside of Ganale Dawa Dam. For 26,885 households, more than 154,901 LLIN were supplied in 2023. Nonetheless, this year's malaria cases increased from those of the preceding two years.

3.11 Vital Statistics and Health Indicators

Maternal Health Service

Immunization Coverage

Penta 1 to 3 dropout rates are high health indicators that fall short of the desired outcome (Table 2).

Table 2: Immunization coverage by antigen, Meda Welabu Bale Zone Oromia, Ethiopia, 2019-2023

SN		2019 target	%	2020 target	%	2021 Target	%	Target	2022	%	2023	%
1	BCG	4663	130	3940	100	4819	100	4930	6821	138	3216	64
2	Penta1	4327	135	3641	100	4472	100	4575	7240	158	3980	85
3	Penta3	4327	132	3641	100	4472	100	4575	6976	152	3925	84
4	OPV0	4327		3641		4472		4575			0	
5	OPV1	4327	125	3641	100	4472	100	4575	6381	139	2544	54
6	OPV3	4327	124	3641	100	4472	100	4575	6191	135	2115	45
7	PCV1	4327	129	3641	100	4472	100	4575	6997	153	3672	78
9	PCV3	4327	1245	3641	100	4472	100	4575	6772	148	3601	77
10	Measles1	4327	135%	3641	100	4472	100	4575	7290	159	3609	77
11	Measeles2	4327	0	3641	100	4472	100	4575	6074	133	2954	63
12	Fully immunization	4327	112%	3641	100	4472	100	4575	6640	145	2813	60
14	Penta1/ Penta3 DOR	<5%	1.9%	<5%	- 1.3%	<5%	0	<5%	3.6		1.4	
15	Penta1/ Measles DO	<5%	6.9%	<5%	-2	<5%	0	<5%	0		9.3	

Forecasting the growth of a country or an area depends heavily on health indicators and vital data. Meda Welabu district lacks important statistical data such as infant mortality rate, under-five mortality rate, female mortality rate, malnutrition rate, and other relevant data. However, this data wasn't available to measure the health facility in the meda welabu district. In Meda Welabu Woreda, health services like ANC, PNC, and delivery services were extensively used Fig.3 and (Table 4).

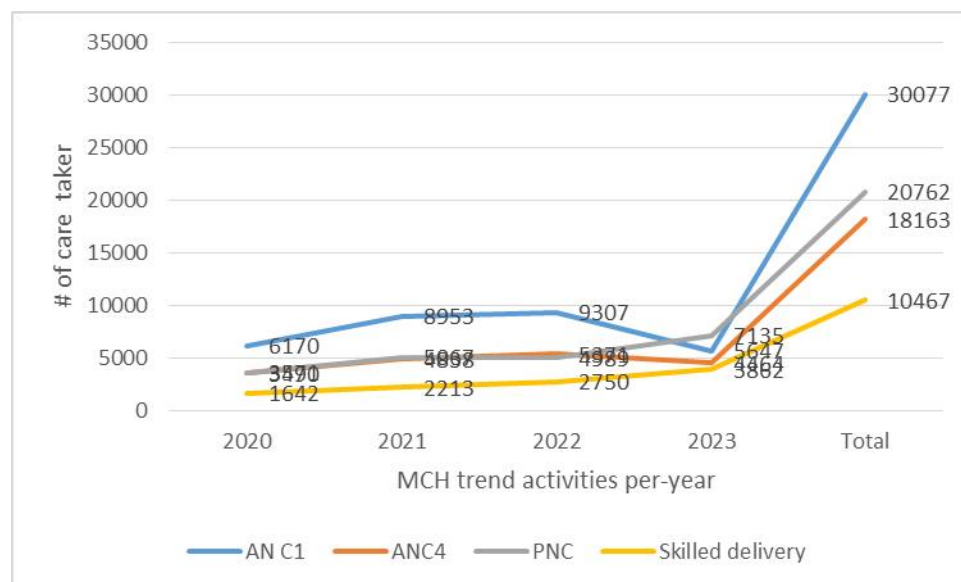


Figure3: Child care, skilled labor deployment, and postnatal care in Meda Welabu Bale district, Oromia Region, Ethiopia, 2023

Table 3: Maternal and Child Health Indicators at Meda Welabu Woreda Health Office, Bale District, Oromia Region, February 2023

S.N	Activity	2020	2021	2022
1	CAR	41%	68%	86%
2	Long Acting Family Planning	29%	21%	29%
3	ANC1	100%	100%	100%
4	ANC4	103%	100%	88%
5	Syphilis test	68%	72%	97%

6	HIV test for pregnant Women	100%	100%	100
7	Skilled birth delivery(SBD)	47%	57%	76%
8	PNC within 24 hrs	45%	52%	76%
9	BCG Coverage	100%	100%	100%
10	Penta1 coverage	100%	100%	100%
11	Penta3 Coverage	100%	100%	100%
12	Measles1 coverage	100%	100%	100%
13	Fully vaccinated Coverage	100%	100%	100%
14	Penta dropout rate(DOR)	-1.3%	0	21%
15	Penta to Measles DOR	-2%	0	4%
16	Under five-year children screening coverage	102%	100%	100%
17	GMP Coverage	20%	21%	83%
18	6 to 59 months children Vit A supplementation coverage	100%	100%	100%
19	24 to 59 months children Deworming coverage	100%	100%	100%
20	IFA/MMS supplementation for pregnant women	100%	100%	100%

HIV/AIDS

The EFY 2014 Meda Welabu Woreda yielded 5 (0.060) positive cases and 0.059 VCT out of 8299 planned tests and procedures out of 7284 total. The ART site is linked to all cases. Bidire HC, which serves as the site's center for ART, has 29 ART cases enrolled currently.

All six health centers provide VCT, PICT, PMTCT services, health education, condom distribution, and other community services as part of HIV prevention and control programs. A total of 144 (9.8%) VCT tests, 8,299 (100%) PICT tests, and 5,194 (100%) PMTCT tests were conducted in the VCT room, OPD, ANC, and other service areas in 2022. Among 2930 STI plans, 2451 (84%) were carried out, and 778 (17%), condoms were distributed to both the general public and important individuals.

Also, there was food provided, care and assistance for OVC 3176(100%), PLHIV 36(money supported), and support for education. Risk groups including Vulnerable Women 10(63%) were also supported by IGA funding.

Resource mobilization carried out by community care coalitions (3C) and other community structures like "Edir" and various Associations now plays a significant role in the woreda.

TB and Leprosy

In 2022, 37 smear-positive patients were identified and all 37 were treated with anti-TB medication, resulting in a 100% detection rate. All TB patients with HIV tested negative. In 2022, Meda Welabu Woreda yielded 5 positive cases out of 192 planned tests and 102 actual tests. Bidire HC, the site's ART center, currently has 29 ART cases enrolled. 37 out of 102 total tuberculosis infections were caused by the community. 29 (37.7%) and 42 (54.5%) of the 77 patients in the most recent TB cohort had pulmonary tuberculosis and were followed up on, treated for, and tested for TB-HIV.

Non-Communicable Disease (NCD)

Noncommunicable diseases have increased over time as a result of unhealthy lifestyles and behavioral changes. As Meda Welabu Woreda said, many people suffer from high blood pressure. 2.3%, cataracts: 3% and 2.7 Many people have high blood pressure. A significant number of people suffer from high blood pressure. Diabetes: 137 people applied to the polyclinic.

Sanitation, environmental health, and water supply

In 2022, the Meda Welabu woreda had a total of 30,316 households. 29,406 (97%) of them had restrooms with hand washing stations. Solid waste disposal pits are used by 25,465 (84%) of all households, and 16 kebele practice open defecation free (ODF). Some kebele located far from the woreda, such as gura work, bube, madicho, meda, waltai bura, and ganale melka chira, have less latrine coverage than the woreda and frequently experience outbreaks and only 56% of the woreda's residents have access to safe drinking water (Fig.4).

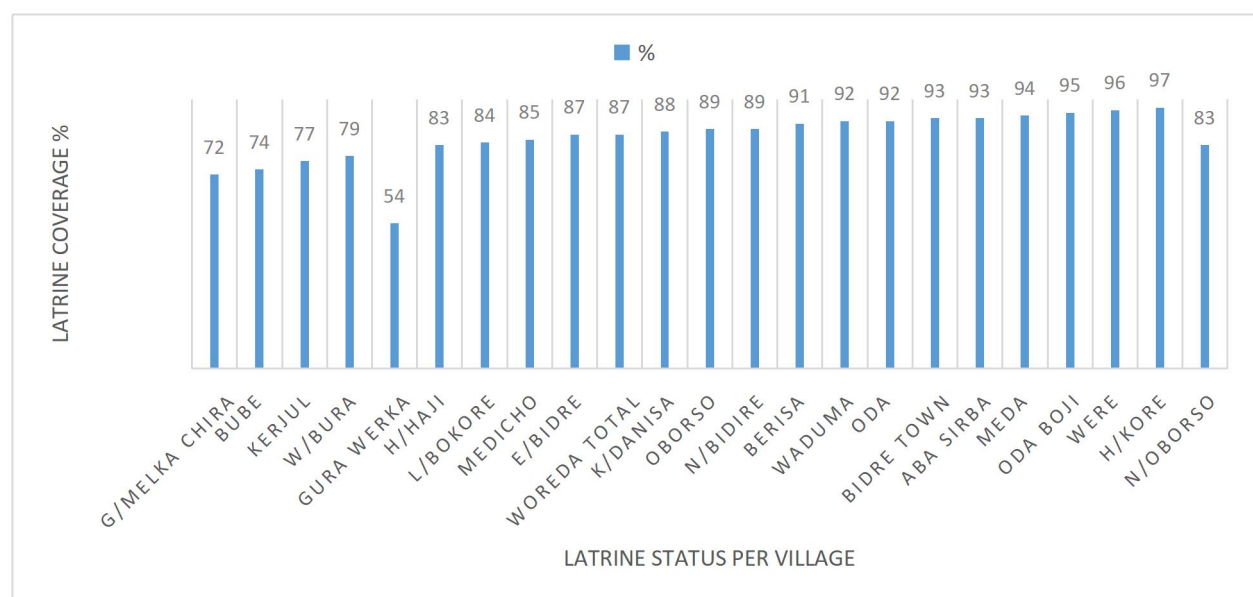


Figure 4:Trend of all types of latrine Coverage by years in Meda Welabu Woreda Health Office, 2023

Woreda Budget

The Woreda Budget allotted for the health sector means an average of 12.8% which seems to be stable from year to year, and according to interviews the Woreda health sector only depends on a few donor funds allocated for the program to carry out their regular duties.

Morbidity (Out-Patient and In-Patient)

Only 75,873 people (52% of the total population) went to the health facility in 2022, while only 24% of people in the overall population saw an OPD physician in 2023. This shows that the population-to-health institution coverage ratio is low (Table 4)

Table 4: Top 10 causes of OPD in the elderly in Meda Welabu Woreda, Ethiopia

SN	Disease Type	Number of Patients	Per cent
1	Pneumonia	1058	30
2.	Functional diarrhoea	703	20
3	Acute malnutrition in infants, children, or adolescents	677	19
4	Diarrhea	525	15
5	Helminthiasis, unspecified	173	5
6	Upper respiratory tract disorders, unspecified	124	3
7	Dehydration	86	2
8	Other specified protozoal intestinal infections	78	2
9	Urinary tract infection, site not specified	71	2
10	Common warts	56	2
Total		3551	

The ratio of Health Workers to Population

Based on the ratio of doctors to the general population, all professionals working in private medical facilities were included in the analysis. In Meda Welabu Woreda, Based on the standard set before, the ratio of health workers to the community was initially calculated at 0.66% of the total population. However, upon further analysis in the Meda Welabu woreda, the following service ratios were identified: one healthcare worker treated 8,560 people, one nurse treated 2,853 people, one midwife treated 219 people, and one doctor treated 1,966 people. Additionally, one pharmacist employee served 36,379 customers, while one laboratory worker served 18,189 individuals. To improve these ratios in a more scientific way, we can conduct a thorough assessment of the local population's health needs and then adjust the number of health workers accordingly to ensure a more balanced and effective distribution of services (Table 5).

Table 5: Number of doctors and other administrative staff working in Meda Welabu Woreda, Bale Zone, Oromia Region, Ethiopia, 2023

Health Facility	Different Health Professional			Administrative Staff			Total Human Resources		
Name Of Health Facility	The structure of the Health profession need	Performance	%	human resource structure needed	Performance	%	human resource structure needed	Performance	%
Woreda Health Office	32	21	66	18	14	78	50	35	70
Bidire Health Center	48	16	33	27	13	48	75	29	39
Waduma Health Center	33	9	27	21	8	38	54	17	31
Madda Health Center	33	7	21	21	3	14	54	10	19
Gobble Health Center	33	11	33	21	5	24	54	16	30
Ware Health Center	33	10	30	21	6	29	54	16	30

Oborso Health Center	33	7	21	11	52	54	18	33
Urban Health Extension	4	2	50			4	2	50
Rural Health Extension	100	64	64			100	64	64
Total	349	147	42	150	60	40	499	41

Note: Number of health workers = Total population $\times$ 0.66 / Average number of people served by each health worker

4. Discussion

The results of this study highlight the importance of addressing the healthcare needs of the population in Meda Welabu Woreda. By comparing the health indicators of Woreda with national and regional averages, we have identified areas that require improvement and have developed targeted interventions. Policymakers and healthcare providers must prioritize the health needs of the population in Meda Welabu Woreda. They should focus on improving access to healthcare services, reducing infectious disease prevalence, and lowering infant and maternal mortality rates.

The assessment of woreda health profiles is crucial for decision-making on service provision and requires integrated data, mentoring, supportive supervision, and collaboration across sectors. When analyzing woredas in Ethiopia, various healthcare challenges are revealed. In the Meda Welabu and demographic surveillance system, data on morbidity, mortality, and pregnancy surveillance are collected. A study in Meda Welabu Woreda investigates factors influencing women's choice of health facilities, focusing on socio-cultural, perceived benefit, and accessibility factors. This study aligns with an assessment of health information systems in the East Wollega Zone in the Oromia region of Ethiopia, which shows challenges in data quality affecting care and management (14). Furthermore, a study in Misrak Badawacho Woreda highlights farmers' inadequate pesticide handling practices, indicating the need for training programs. These findings improve understanding and enhance the health profile of woredas in Ethiopia (12,14–18).

The overall well-being of a community is influenced by factors such as education, economics, infrastructure, population density, climate, availability of health care, distance to health facilities, environmental concerns, and other similar factors.

In Meda Welabu Woreda, the majority of people (96.3%) reside in rural areas. The population is primarily involved in pastoralism, resulting in a lower population density of 582 people per km² compared to the bale zone average of 27.8 people per km². This indicates that the population is scattered across various locations. Only 14 out of 22 kebele (63%) have access to roads. Despite the woreda biannual crop cultivation, there is a high prevalence of malnutrition, especially among children under five years of age and pregnant and lactating women.

The plan stated that 92.5% of primary, secondary, and preparatory school students were enrolled, with 98% of them being female. Male dropout rates (1–12 grades) were 2.5%, while female dropout rates were 8%. The dropout rate in grades 9–10 was higher two years ago, with males accounting for 2.6% and females for 8%.

The main reasons for dropout were a lack of family support and a lack of knowledge about menstrual health and hygiene.

However, thanks to UNICEF support, the woreda education office has now integrated menstrual hygiene and health practices with the woreda health office in ten selected schools. As a result, education quality has improved, and dropout rates have decreased, particularly among female students.

Only one hospital, four health centers, and four health posts had access to electricity, while three health centers and two health posts had access to water.

The community receives water from a source 10–15 km away at a rate of 3 liters per person per day, which is less than the recommended daily requirement of 40 liters per person. The water coverage in the woreda, including all sources of water regardless of their safety, was 56.7%.

The majority of immunization coverage exceeded the plan, with over 100% of antigens administered. However, 21% of children who received the Penta 1 to Penta 1 vaccine dropped out, compared to 4% of children who dropped out due to measles after receiving the Penta 1 vaccine. Unfortunately, most children do not have access to vaccinations because the woreda's population exceeds that of the region.

The health profile of Meda Welabu in line with Dabat woreda focuses on the health status, healthcare services, infrastructure, and various health indicators within Ethiopia. This comprehensive study analyzes the population's health needs, existing healthcare facilities, disease prevalence, access to healthcare services, and overall health outcomes in the region.

Researchers collected data on various aspects, including understanding age distribution, gender breakdown, and other demographic factors that influence health outcomes. They also looked at key health indicators like infant mortality rate, life expectancy, prevalence of diseases such as malaria or HIV/AIDS, vaccination coverage, and maternal mortality rate.

The study assessed the availability and quality of healthcare facilities, such as hospitals, clinics, pharmacies, medical personnel, equipment, and accessibility to these services. Common diseases prevalent in the area, their causes, risk factors, and impact on the population's health were also studied. Additionally, lifestyle factors like diet, exercise habits, smoking rates, and alcohol consumption patterns, which can affect overall health, were analyzed. The ease of access to healthcare services, including transportation options, affordability of care, and distance to healthcare facilities, was evaluated. Furthermore, any ongoing public health programs or interventions aimed at improving community health in Dabat were reviewed (19). A study in the Dabat district revealed that childhood immunization remains a highly cost-effective public health measure to reduce children's mortality and morbidity from infectious diseases. However, the COVID-19 pandemic and its disruptions have strained health systems, resulting in 25 million children globally missing out on vaccinations in 2021. Over 60% of these children reside in 10 countries, including Ethiopia (19). Consequently, this study has similar full childhood vaccination coverage and related factors, reflecting the current study profile of the Meda Welabu Woreda health profile

Contraceptives had an acceptability rate of 86% for short-acting methods and 29% for long-acting methods. In 2014, qualified health personnel attended 76% of hospital deliveries, with 87% of mothers receiving postpartum care.

According to the preceding discussion, the Woreda Health profession serves communities at a very low ratio, and the district is extremely vulnerable to various outbreaks and zoonotic diseases. Six kebele (26 cases) experienced an increase in malaria cases over the previous year, raising concerns. Road and telephone infrastructure, in particular, have hampered the Woreda healthcare system. This study is similar to the study that evaluated the health of Hetosa areda in Arsi district of Oromia region of Ethiopia in March 2013 and showed upper respiratory tract disease, a health problem of Hetosa areda. Research shows that health services and the number of personnel are below WHO standards. Although maternal and child health services are easily accessible, usage rates are low. In addition to prevention of mother-to-child transmission and vaccination services, disease control services are also quite comprehensive (20). Similarly, Meda Welabu Woreda also does not have adequate infrastructure to provide the above services to the society.

3.2 Limitation

In Meda Welabu Woreda, major public health issues are identified and prioritized based on their seriousness, feasibility, community concerns, and government concerns. The limitations in the health profile analysis of Meda Welabu Woreda include low human resource coverage, infrastructure problems, lack of public transport supply, low water coverage, road connectivity issues, network coverage challenges, inconsistency in population size census, low access to vaccination, low coverage of anti-malarial chemicals, and inadequate budget allocation to the health sector.

3.3 Conclusion

This study provides detailed information on health in Meda Welabu Woreda, Bale District, Oromia Region, Ethiopia. We compared key health indicators with national and regional averages to identify areas needing improvement. Based on the findings, targeted interventions were developed to address issues such as high dropout rates between penta 1 and penta 3, malaria cases, poor IRS, and insufficient reagents for case testing and screening. Other major issues include a lack of long-acting family planning, low VCT, low health worker-to-population ratio, low budget allocation to the health sector, and various challenges exacerbated by internal displacement (IDP) and border security issues.

3.4 Recommendation

- ✓ The Regional Health Bureau should consider demographic diversity, the number of unvaccinated children, and their lack of access to healthcare.
- ✓ The Zonal Health Office needs to hire more health professionals to provide equal and equitable healthcare to the community. Global healthcare must be improved for kebele like Gura Worika to benefit from a full-service healthcare system. The Woreda Health Office should also pay attention to potential malaria breeding sites and project corridors to prevent outbreaks.
- ✓ The Woreda government should improve connectivity, roads, and water in every kebele. Improve public health monitoring and maintain accurate information. Funds should be allocated in response to emergencies. Major diseases such as malnutrition, malaria, anthrax, and diarrhea (especially AWD/cholera) are the most common causes of infection in the Meda welabu and Woreda Bale areas. Emphasis should be on preventive and control measures for these diseases to reduce the risk factors for epidemic diseases in the public health sector. The regular screening and National Nutrition Approach program are intended to address the management of severely acute malnourished (SAM) patients. Infrastructure includes roads, telephones, and safe drinking water. Measures should be taken to return internally displaced persons (IDPs) to a safe place.

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CHAPTER 6: Assessment Of Post-Cholera Disease Outbreak In Five Districts In Ethiopia: Addressing The Immediate Needs Of The Affected Population (From July 13-20, 2023).

ABSTRACT

Background: Post-disaster emergency response is critical to providing aid and support to those most at risk, including children, women, the elderly, and people with disabilities. By following these principles, response efforts can effectively address the immediate needs of disaster-affected communities and promote long-term recovery. This evaluation played a significant role in preventing the further spread of cholera and minimizing its adverse effects on the communities in Goro, Gura Damole, Berbere, Harena Buluk, and Dalomena woreda of Bale Zone, which were selected for assessment.

Purpose: aims to determine the vulnerability to cholera, conduct cholera risk assessment and disaster risk assessment in Goro, Gurada Molle, Berber, Harenabruk and Dalomena, which are the urgent needs of the Bale region.

Methods: The assessment was conducted through document review, direct observation, and face-to-face interviews.

Results: After the cholera outbreak, related emergency activities like an assessment of environmental factors such as water sources, and sanitation facilities, as well as Socio-economic factors including poverty levels and access to healthcare services were not conducted. Post-cholera transplant monitoring was not done promptly, and most countries did not demobilize cholera treatment centers even though the number of cases was reported to be zero for two consecutive months. The cholera and measles emergency preparedness plan was not well prepared in all areas. Nutritional assessment status and readiness also require attention in all woredas because, the assessment revealed gaps in screening malnourished children, it's important to address nutritional deficiencies promptly after a cholera outbreak to prevent further health issues and promote faster recovery.

Conclusion: After the cholera outbreak, there were significant shortcomings in the related emergency activities. Environmental factors such as water sources and sanitation facilities, as well as Socioeconomic factors like poverty levels and access to healthcare services, were not

adequately assessed. The post-cholera outbreak logistic auditing was not promptly implemented, leading to delays in necessary actions. Many woredas failed to demobilize cholera treatment centers even when no new cases were reported for an extended period. The preparedness plan for cholera and measles emergencies was found lacking in various areas. Nutritional assessment status and readiness also need improvement across all woredas, with gaps identified in screening malnourished children. Addressing nutritional deficiencies promptly after a cholera outbreak is crucial to prevent further health issues and promote faster recovery.

Keywords: Disaster, Assessment, Post-Cholera, Emergency, Ethiopia

1.1 Introduction

After a disaster, emergency assessment is vital to identify and meet the immediate health needs of those affected. In Ethiopia, where natural disasters like droughts, floods, and conflicts can lead to disease outbreaks such as cholera, measles, and malnutrition, an integrated approach to disease surveillance and response is crucial (1).

Cholera is a waterborne disease that can spread rapidly in post-disaster settings where access to clean water and sanitation is compromised. In Ethiopia, organizations such as the World Health Organization (WHO) and the Ethiopian Ministry of Health are working together to respond to cholera, provide treatment for mouths, make water safe, implement vaccination programs, and promote hygiene (2,3).

Measles is a highly contagious disease that can cause serious illness, especially in people who are poorly nourished. In Ethiopia, UNICEF and other partners work together to carry out mass vaccination campaigns targeting children in disaster-affected areas. Rapid identification of cases, isolation of infected individuals, contact tracing, and provision of vitamin A supplements are crucial components of measles outbreak response efforts (4).

Malnutrition often worsens the impact of disasters on vulnerable populations, particularly children and pregnant women. Nutrition assessments conducted by organizations like the World Food Programme (WFP) help identify individuals at risk of malnutrition and provide therapeutic feeding programs, supplementary food rations, micronutrient supplements, and nutrition education to prevent further deterioration of nutritional status (5).

It is important to establish a comprehensive disease surveillance system for early detection and response to post-disaster epidemics. The Ethiopian Public Health Institute (EPHI) plays a key role in coordinating surveillance activities, collecting data on disease trends, monitoring health indicators, and disseminating information to guide public health interventions.

Effective coordination among government agencies, non-governmental organizations (NGOs), UN agencies, donors, and other stakeholders is essential for a successful post-disaster emergency assessment response. Regular coordination meetings, joint planning exercises, information-

sharing mechanisms, and resource mobilization efforts help ensure a unified approach to addressing integrated diseases in Ethiopia (6).

The harm caused by natural and man-made disasters has grown in scope as human populations rise and civilizations become more linked and complicated (1,7). The impact of disasters on human health has grown due to society's vulnerability(1). The interaction of health, politics, culture, geography, and other factors expands the impact of disasters (7). During disaster response, public health professionals and emergency management

must be prepared to meet and respond to the needs of affected communities. Actions to reduce adverse impacts require timely and accurate information (8).

In addition to their effects on human health, epidemics, disasters, and emergencies pose threats to public health, human life, and global security (8,9). Natural disasters have an impact on the ecology of diseases, mostly by making people more susceptible to infection (10).

The risk of cholera is higher in populated areas and among refugees; This is mainly because the population is affected by Vibrio bacteria that occur in aquatic ecosystems, unsanitary areas, and lack of access to safe drinking water (10).

Climate change in 47 countries in the WHO African Region (1,4).

Infectious diseases with the potential to spread globally continue to pose a threat to existing

Healthcare systems in rich and developing countries, cause great harm to both people and money (3).

The purpose of this Assessment is to provide an overview of the Woreda & Primary Health Care Unit for "Post Cholera Disease Outbreak Activities and Lesson Learn and to identify risk factors in Bale Zone, as observed from July 12, 2023-20/2023. The Assessment focuses on various areas such as WASH activities, food/drink establishment inspection and regulatory establishment, surveillance of priority diseases, logistics of post-cholera outbreak management, monitoring and evaluation, and action plan. We more focus on 5 Woreda and health facilities and those kebeles affected under this Catchment area. In the year 2023, an assessment was conducted in Bale Zone, Oromia, Ethiopia to evaluate the outbreak of cholera following a disaster. This evaluation aimed

to gather information on the extent of the outbreak and its impact on the affected population. The assessment involved various stakeholders such as health professionals, government officials, and humanitarian organizations who worked together to collect data and analyze it. The results of this assessment were critical in informing that it is crucial to have a systematic approach to managing response efforts and identifying areas that need urgent intervention. This can be achieved through proper coordination and communication among stakeholders, including government agencies, non-government organizations, and the affected communities themselves. Additionally, regular assessments must be conducted to determine the needs of the affected population and ensure that resources are allocated accordingly. It is also essential to prioritize the most vulnerable groups, such as children, women, the elderly, and persons with disabilities, in providing aid and support. By following these principles, response efforts can be more effective in addressing the immediate needs of disaster-affected communities and promoting their long-term recovery. this evaluation played a significant role in preventing the further spread of cholera and minimizing its adverse effects on the community.

As we commenced our evaluation of the aftermath of the cholera catastrophe in Bale Zone, we adopted a strategic approach and bifurcated it into two factions. Each group consists of three members, including the coordinator of the public health committee. Early Warning, Alert, and Action (EWARS) are recommended to improve early detection of outbreaks and control diseases in emergencies (4).

Community-based surveillance (CBS) is frequently used to discover occurrences of significance to public health during emergencies, where routine surveillance is only partially functional, is non-functional, or does not cover the entire population (4).

According to the World Health Organization Inter-agency Working Group, GIS is the detection and reporting of important health events in the community by members of the community (9). Thus, we assiduously endeavored to a mass as much information as possible so that we could contrive an efficacious response plan for those who had been impacted by this calamitous event. The Woreda involved were Dolomena, Harena Buluk, Goro, Berebere and Guradamole.

Objectives

1.1 General Objectives

- We conducted a comprehensive analysis of cholera outbreaks in five districts of Ethiopia to fully understand the impact of the epidemic on the affected population.

- **1.2 Specific Objectives**

- To assess the current status of cholera in each region, including the number of cases, the population affected, and the most prevalent region.
- To Provide prompt medical assistance and treatment to individuals infected with cholera, ensuring access to clean water, sanitation facilities, and hygiene education to prevent the disease from spreading.

2. Method

2.1 Research area

The Bale zone, located 430 kilometers south of Addis Ababa in the Oromia region of Ethiopia, is the target of this study. The special region governs 10 districts, covers an area of 6,981.8 square kilometers, and has a population of approximately 1.4 million. Its medical system consists of 1 general hospital, 2 municipal hospitals, 1 referral hospital, 48 health centers, 201 health clinics, and 26 private hospitals. The region faces major problems such as floods, disease outbreaks, and flash floods. This Assessment aims to delve into the impact of these crises on the zone's population and healthcare system (Figure 1).

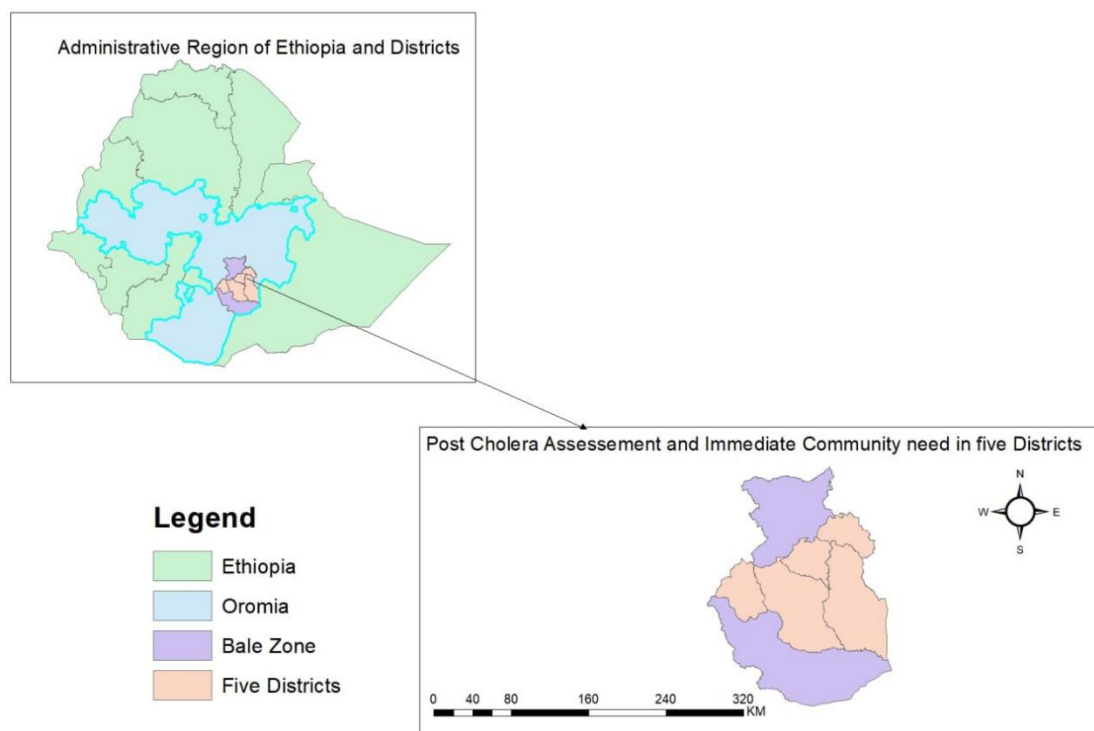


Figure 1: Woreda affected by the cholera outbreak in the Bale Zone, Ethiopia, July 2023.

2.2 Study design and period

A thorough procedure of data gathering and analysis was used in the study design for the post-cholera epidemic evaluation with integrated emergency response in the Bale zone. A combination of quantitative and qualitative data collection techniques was used in the study. Observations and evaluations were used to provide quantitative data, and focus groups and interviews were used to collect qualitative data. The combination of these strategies ensures a good understanding of the problem and an immediate response will be effective between July 12 and July 20, 2023.

2.3 Source and Study Population

The five woredas of the Bale zone (Goro, Guradamole, Berbere, Harena-Buluk, and Delomena district) comprise the source population for the assessment. This population includes homes, medical facilities, and health posts, with an emphasis on individuals affected by the cholera outbreak and the associated emergency scenarios. This included important members of the affected woreda, personnel from the medical facility, and members of the kebele who had been devastated by the crisis.

2.4 Sample size

To ensure reliable and accurate data, this study includes representatives of all Woreda and health centers in the affected area. A comprehensive assessment was conducted to improve post-disaster understanding, with a representative sample from five woredas (Dolomena, Harena Buluk, Goro, Berebere, and Guradamole) and ten health facilities.

These areas were selected to provide a representative picture of the overall disaster situation, ensuring a diverse range of data collection locations. The study aimed to accurately depict the impact of the disaster on different communities. Focusing on health facilities allowed for an evaluation of the resilience of healthcare infrastructure during disasters and its role in providing essential services.

Data analysis was performed using Microsoft Excel 7 due to its robust capabilities and widespread use in statistical analysis. This software facilitated the efficient processing of large

datasets, complex calculations, and insightful visualizations to enhance data understanding. Excel's compatibility with various file formats allowed for seamless integration of data from multiple sources.

This methodology aimed to provide reliable information about the post-disaster situation, enabling effective resource allocation and prioritization of recovery efforts. It not only assessed immediate needs but also provided insights into long-term recovery strategies and measures to reduce disaster risks.

2.3 Sample Design and Sampling Technique

A stratified random sampling strategy was used to select participants from the community. The Bale zone was divided into different strata using the kebeles affected by the tragedy, the areas affected, and the catchment areas for medical facilities. To ensure an equitable representation of the affected community, participants were selected at random within each stratum. This sampling technique decreased selection bias and increased evaluation accuracy.

Regional epidemiologists and zonal epidemiologists interviewed community members, health professionals, and community leaders and examined gaps in cholera treatment center (CTC) facilities and transportation, including appropriate demobilization of CTC facilities and collection of information from CTC registries.

2.5 Ethics

This study was approved by the Institutional Review Board at the College of Health Sciences at Addis Ababa University (Ref. no.: IHRERC/prev/216/23). Permission letters were obtained from the Oromia Regional Health Bureau (Ref. no: BFO/BJFH/1-6/70027) and Bale Zone Health Office (Ref. no.: Bale Zone FG/63966). Written consent was acquired before the questionnaire was administered. The objective of the study, its purpose, and the respondents' right to discontinue participation at any time were all explained to them, and each respondent gave their informed permission. The investigation results were shared with the following entities: Oromia Public Health Research and Emergency Management Directorate, Oromia Regional Health Bureau, Bale Zone Health Office, and the corresponding district where the assessment took place.

2.6 Operational Definition

Diseases occur after a major disaster, affect health, and require outside help. WHO defines disasters and emphasizes collecting data to raise awareness, identify risks, and develop future strategies. It measures health relative to the goal of eradicating infectious diseases, reducing deaths, and improving prevention. Many disasters can lead to epidemics, especially in certain regions. Understanding risk is critical to an effective response (87).

- ✓ **Disaster:** a serious disruption of the functioning of society or community; causes serious damage to people, property, income, or the environment beyond what the society or community must resolve on its own (79).

3. Results

During the assessment, the primary focus was on 10 health institutions and five districts affected by cholera.

According to the poll, practically every area has made every effort to be prepared, and the majority of the supplies that were previously supplied to offices and medical facilities to prevent the cholera outbreak were not put together in tents or warehouse space. As a result, an action plan was created with each location taken into account, and the results were arranged and given to the district health offices and zone management committee. The key findings are found that in Goro District 537 cases, Berbere District 246 cases, Gasera districts with 169 cases, Harena Buluk District 71 cases, Guradamole District 23 cases, and in Dolo Mena District 22 cases of Cholera outbreak (Table 1).

Table 1: A cumulative frequency of cholera outbreak emergency diseases per woreda Bale Zone Oromia Ethiopia, 2023

Total cases: 1068	Affected Districts	# of cases
Total Deaths: 20	Goro	537
Case fatality rate: 1.9%	Berbere	246
Date of outbreak onset: August 27, 2022	Gasera	169
Date of last reported case: September 28, 2023	Harena Buluk	71
Total Cholera cases in 2022: 429 (40.2%)	Gura Damole	23
Total Cholera cases in 2023: 639 (59.8%)	Delo Mena	22
Inpatient cases: 896 (84%)	Total affected districts: 6	
Outpatient cases: 172 (16%)	Total contained districts: 5	
	Total affected Kebeles: 29	

A 537 total Cholera Cases with 6 deaths, in Goro woreda, and the following issues were identified as gaps.

Establishing a sustainable advocacy program to raise awareness about cholera prevention and control is crucial to avert future outbreaks and lessen the disease's impact.

Attention is required to combat the high drop rate of measles in these areas. Prioritize vaccination campaigns and enhance healthcare services to curb the disease's further spread.

Efficient documentation and cold chain management are crucial for the safe storage and distribution of vaccines and medications. Enhancing this system is imperative to ensure quality control and prevent resource wastage.

Closely monitoring and maintaining the semi-permanent latrines in the area is essential. Regular inspections and proper maintenance protocols must be in place to keep them functional and hygienic.

In the Berbere district, 234 total cases with four community deaths occurred during the outbreak.

Similar to Guradamole Woreda, 23 cases with no death of cholera were identified, as well as effective cold chain management is crucial for storing vaccines and medications. Improving this system is recommended to maintain the potency and safety of supplies.

With a population exceeding 19,000, Ambala Kebele requires an increased focus on hygiene and sanitation practices. Implement awareness campaigns, provide necessary resources, and enhance healthcare services to tackle these issues effectively given the limited health facilities serving the entire population.

The absence of a refrigerator at Ambala Health Center may impede the storage of temperature-sensitive medications. Acquiring a functional fridge is advised to ensure the availability and efficacy of medical supplies.

Goro Hospital CTC managed the majority of 541 cases and 6 deaths. Despite 44 days without cholera outbreaks, there is a delay in demobilizing treatment centers. Prompt demobilization is essential to reallocate resources and focus on other healthcare priorities.

There is no preparedness plan for future cholera outbreaks or safety plans for awareness raising, especially outside the Woreda Health Office. It is important to create an emergency plan that outlines prevention and response strategies. Continued advocacy is needed to increase public awareness

ess of disease prevention and control. Goro Woreda faces a significant challenge with a high measles vaccination dropout rate. Targeted vaccination campaigns and strengthened healthcare systems are needed to improve coverage and completion rates.

Latrine coverage in Herbert and Melka Buta Primary Health Care Units (PHCUs) is only 45%, posing a risk to public health. Efforts should focus on increasing latrine coverage and promoting proper hygiene and sanitation practices.

A major concern is that 89% of households in the three woredas consume unsafe river water. Access to safe drinking water is vital in preventing waterborne diseases, including cholera. Implement improved infrastructure and water treatment measures for safe drinking water.

The post-cholera assessment highlights various challenges and areas that need immediate attention in Goro Woreda and Ambella in the Berbere district. It is essential to demobilize cholera treatment centers, develop preparedness and sustainability plans, address the high measles dropout rate, improve latrine coverage, and ensure access to safe drinking water sources for enhanced public health outcomes and reduced disease outbreak risks.

Enhancing stakeholder collaboration involved in post-cholera disease outbreak activities was also identified as the main gap.

Prioritize WASH activities and promote hygiene education to prevent future outbreaks not given focus in all districts.

Boost health personnel capacity in disease surveillance and early detection also need major action.

- Absence of a sustained advocacy program following the cholera outbreak: To increase public understanding of cholera prevention and control methods, a sustained advocacy program must be established. This can lessen the effects of the illness and help stop further outbreaks.

High measles drop rate at Hokoltu and Habrona kebele: The high measles drop rate in both kebeles requires attention. Prioritizing vaccination campaigns and bettering healthcare services will stop the disease from spreading further.

Inadequate cold chain management and documentation: Proper cold chain management and documentation are crucial for the distribution and storage of vaccines and other pharmaceuticals in a safe manner. There were 234 instances overall from Berbere, with four community deaths during the outage.

The evaluation draws attention to the following worries about the most recent cholera outbreak. Haro Dimal's inadequate cold chain management system, Like Gura Dhamole Woreda, vaccinations and pharmaceuticals must be stored with proper cold chain management. To guarantee the effectiveness and security of these materials, it is advised to make improvements to this system.

Ambala Kebele requires immediate attention.

More attention needs to be paid to health and hygiene as there is only 1 health center and one health post in Ambala Kebele, whose population exceeds 19,000. Drinking water service is provided to the entire region. To effectively address these concerns, it is imperative to put awareness campaigns into action, provide the resources that are needed, and enhance healthcare services. In conclusion, the post-cholera assessment has highlighted areas needing immediate attention and intervention. It is crucial to implement sustainable advocacy programs, enhance cold chain management, address vaccination drop rates, sustain latrine maintenance, and provide essential resources to healthcare facilities in both Guradamole and Berbere Woredas. By addressing these concerns, future cholera outbreak risks can be significantly reduced.

4. Discussion

The importance of disaster management in today's world reflects the global interest in natural disasters. Discuss the disaster management cycle that includes mitigation, planning, response, and recovery to reduce the impact of disasters on people and infrastructure. Many problem-solving strategies have been developed, including rapid disaster analysis tools such as Ninja Disaster and Trouble Spot. Introduce Next Generation Systems (NICS) as a high-level incident management system to improve disaster recovery and coordination (8,11).

After the cholera outbreak, there was a lack of advocacy and sustainability, resulting in an elevated dropout rate for Measles. Vulnerabilities related to routine services in all woredas (Goro, Guradamole, Berbere, Dalomena, and Harena bulk) were not given special attention. This could be attributed to limited resources or ignorance of the health center's requirements. Additionally, a robust rapid response team (RRT), task force, and emergency readiness were lacking. Inadequate records were also identified, and it was noted that the health center in Amballa does not have a refrigerator. The semi-permanent latrine in the health center collapsed and stopped working in Ambala. Accordingly, different studies have shown that many factors contribute to the spread of cholera during disasters, including access to safe water and sanitation, which play important roles in promoting infection. However, the integration of various stakeholders such as government health institutions, municipal health authorities, and political officials, and the use of appropriate resources are still important to reduce disaster risk (12).

To effectively respond to such problems, it is important to obtain better epidemiological data on the causes of death and the types of injuries and illnesses caused by disasters. Due to delays in detection and a lack of public health resources, diseases emerge rapidly in epidemic-related problems. Community surveillance can play an important role in early detection and response to outbreaks, especially when surveillance systems are not working properly. This is an important part of the International Health Regulations. We review literature discussing how community-based surveillance can help identify infectious diseases, transmission, and deaths in crisis populations (4,5,7,13).

The overall goal of disaster analysis is to evaluate the science and explain the health impacts of disasters and their associated characteristics. This helps identify the needs of affected people, allocate resources effectively, prevent health problems, measure productivity, and prepare for future crises. Test results provide important information (5). They show that the integrated emergency response had a significant impact on managing the overall emergency and reducing the spread of cholera. The cooperation of the woreda, health facilities, and stakeholders was crucial for an effective response. However, some difficulties were noted, including a lack of resources and problems with logistics and coordination. Further discussion of these findings sheds light on the effectiveness of the emergency response. Epidemiologists also play a significant role in setting priorities for action, providing informed advice on potential future health implications, and emphasizing the importance of reliable information.

While public health research has traditionally been conducted in clinical settings, there is increasing concern that it reflects only partial and untimely health. Population-based surveillance (CBS) enables early warning, encourages early intervention, and responds to epidemics (5). However, in the case of Bale zone, the CBS system varies from one woreda to another, possibly due to insufficient attention given to this issue. The Ethiopia Public Health Emergency rules require collaboration among multiple committees during and after a disaster to reduce risk and learn from past mistakes. Regular meetings are also mandated to address logistical issues and keep records of the discussions (14). But in the Bale zone, this task of electoral collaboration is not exercised appropriately, and most time health sector exercises alone.

The evaluation identified issues with cold chain management in Haro Dumal, impacting the storage of vaccines and medications. It was stressed that enhancing this system is vital for ensuring the safety and effectiveness of these crucial items.

Ambala Kebele, with around 19,000 residents, needs immediate attention to improve sanitation and hygiene standards, especially considering the limited healthcare facilities in the area. The evaluation highlighted the importance of awareness campaigns to effectively tackle these issues.

Harena Buluk and five health Centers were found to lack an emergency preparedness plan and post-cholera advocacy. Recommendations included prioritizing Water, Sanitation, and Hygiene (WASH) projects and offering hygiene education in Delomena woreda to prevent future outbreaks.

Overall, the evaluation highlights the importance of addressing all aspects that affect communities during emergencies while following established protocols (14).

Strengthen the ability of medical staff to monitor and identify priority diseases early.

Maintaining and updating the logistics required for managing the post-cholera outbreak regularly were the main issues similarly, a study conducted on cholera outbreaks in Ethiopia from 2015 to 2021 revealed the recurring nature of these epidemics and their significant impact on public health in the nation. Comprehensive knowledge of cholera's epidemiology and transmission patterns is vital for formulating efficient prevention, readiness, and response measures to manage upcoming outbreaks (5,12).

4.1 Limitations

Cholera Treatment Centers (CTCs) and surrounding areas suffer from many deficiencies, including inadequate equipment, inadequate hygiene, inadequate rapid response teams (RRTs), lack of emergency preparedness, and lack of aftercare. review. Only four of the seven homes examined had a water purification system, but none were in use. All seven families interviewed found that waste management in health centers (HCs) was poor, machines were not working properly and hand washing was not being done. In addition, after the cholera epidemic, differences arise in the coordination of various activities and there is no plan to prevent measles.

4.2 Conclusion and Recommendation

The assessment's findings indicate that the coordinated emergency response in the Bale zone woreda was largely successful in controlling the associated issues and lessening the effects of the cholera outbreak. In conclusion, the assessment conducted after the cholera outbreak has identified specific areas that require immediate attention and intervention. It is crucial to implement sustainable advocacy programs, improve cold chain management, address the issue of declining vaccination rates, maintain proper sanitation facilities, and provide essential resources to healthcare facilities in Guradamole and Berbere Woredas. By addressing these concerns, the future risk of cholera outbreaks can be significantly reduced. Ensure regular updates and maintenance of necessary logistics for post-cholera outbreak management.

Consistently employ monitoring and evaluation systems to enhance intervention effectiveness.

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CHAPTER 7: Scientific Manuscript Writing For Peer Review Journals

We developed a manuscript and submitted it to a reputable journal the following manuscript

Analyzed five-year surveillance data from 2018-2022 Severe Acute Malnutrition at the Bale Zone Health office

Conducted two outbreak investigations (cholera and Measles Out break)

Disaster Epidemic Assessment on Post-Cholera outbreak in five woredas of Bale zone,

Evaluated the Surveillance System on weekly disease and Maternal and Perinatal Death Surveillance and Response (already published).

Woreda Health profile Analysis Meda Welabu Woreda

Finally, we developed Manuscript on self-care practices and associated factors among type 2 diabetes mellitus patients attending public hospitals in bale zone, oromia region, Ethiopia

CHAPTER 8: Abstract Development of the Selected Manuscript

Two abstract developed during field residency

1. Measles Out break Investigation
2. Five years Surveillance data Analysis

CHAPTER 9: Weekly Bulletin Of Bale Zone Weekly Public Health Emergency Management

Weekly bulletins were created three times based on the weekly situational analysis. This report provides information on one of these analyses, while the others can be accessed through hyperlinks. It includes a brief overview of the public health emergency management situation in Bale Zone during Week 1-4/2023, Week 28-41/2023, Week 43/2023, Week 10/2023, and Week 49/2023. Disease trends were examined during these weeks...[\Bale Zone Weekly Bulletin Summery,2023.pdf](#),..[\Bale zone PHEM weekly bulletin 42,2023.pdf](#),..[\Bale Zone Weekly Bulletin Summery,2023.pdf](#),..[\Bale -Weekly situation update - Week 10, 2024- zone .pdf](#)

[Situation Report as of WHO week 42,2023](#)

[28 October 2023](#)

Introduction: This bulletin provides a weekly summary of the surveillance data and the performance of PHEM on diseases under Public Health Emergency Management (PHEM) and other public health emergencies. It includes the timeliness and completeness of reports, trends of priority diseases, and the activities undertaken in response.

[Highlights](#)

Report completeness and timeliness: The zonal report completeness and timeliness was 100% for this week.

Cholera: From August 27, 2022, to October 22, 2023, there were 1068 cases and 20 fatalities reported, resulting in a case fatality rate (CFR) of 1.9%. Furthermore, there have been no new cases reported since September 28, 2023, which accounts for around 29 days.

Measles: From July to October 22, 2023, a total of 102 cases were reported with no fatalities. This week, the Harena district reported 4 new measles cases. Over the past two weeks, Harena Buluk has reported a cumulative total of 41 cases. Out of these, 5 samples have been sent to the national laboratory and are currently awaiting results.

Severe Acute Malnutrition (SAM): From WHO week 28, 2023, there have been 2,833 cases of Severe Acute Malnutrition (SAM) reported from 10 districts. Of these cases, 2,377 were treated on an outpatient basis, while 456 were treated in inpatient care with a cumulative of 6 deaths. In this week alone, the zone reported 189 new SAM cases, with no fatalities.

Epidemiological Situation

Background: The zone has been severely impacted by a variety of crises, including inter-communal conflict, drought, epidemics, and flash floods. The main causes of humanitarian needs in the Bale zone are drought and public health epidemics. At present, coordination platforms such as the Health and Nutrition Cluster Meeting and the Partner Coordination Meeting have been initiated at the zonal level.

Summary of events/ conditions

Out of the 6 reported malnutrition-related deaths, 4 occurred in the Goro district and each death was from the Harena Buluk and Berbere districts. The districts of Harena Buluk and Dolo Mena reported the most cases of malaria.

Table 1: A cumulative frequency of drought-related emergency diseases from WHO week 28 to 42,2023

Conditions/ diseases	WHO Weeks 28 to 42,2023		This week	
	Cases	Deaths	Cases	Deaths
Malaria	663	0	10	0
Measles	102	0	4	0
Dysentery	1411	0	107	0
Scabies	433	0	9	0
RF	2	0	0	0
Malnutrition	2,833	6	189	0
Chemical poisoning	2	0	0	0
Rabies suspect	2	0	0	0

Cholera	170	6	0	0
Maternal death		1		0
Perinatal death		1		0

Cholera: Outbreaks of cholera pose a significant threat due to their rapid spread and potential fatality if not promptly treated. The cholera outbreak in Bale originated in the Harena Buluk district of the Bale Zone, with the index case identified on August 27, 2022. The initial outbreak was laboratory-confirmed on September 9, 2022, with 4 out of 5 samples culture positive. At present, the cholera outbreak has been contained in 5 districts, while in one district, it has been 29 days since a case was reported in the zone. Summary of the cholera outbreak distribution in the Bale zone from August 27, 2022, to October 22, 2023.

Total cases as of WHO Week 42, 2023: 1068	Affected Districts	# of cases
Total Deaths: 20	Goro	537
Case fatality rate: 1.9%	Berbere	246
Date of outbreak onset: August 27, 2022	Gasera	169
Date of last reported case: September 28, 2023	Harena Buluk	71
Total Cholera cases in 2022: 429 (40.2%)	Gura Damole	23
Total Cholera cases in 2023: 639 (59.8%)	Delo Mena	22
Inpatient cases: 896 (84%)	Total affected districts: 6	
Outpatient cases: 172 (16%)	Total contained districts: 5	
	Total affected Kebeles: 29	

Since the onset of the outbreak in the Bale zone, Goro and Berbere districts have reported the highest number of cases. Recently, a district named Gasera also reported cases, with the most recent one dating back to 28 September 2023. A significant 67 percent, or 710 cases, were found

in households that use river water for domestic purposes. Conversely, 498 cases, which constitute 47 percent, were reported from households without a latrine (Figure 1).

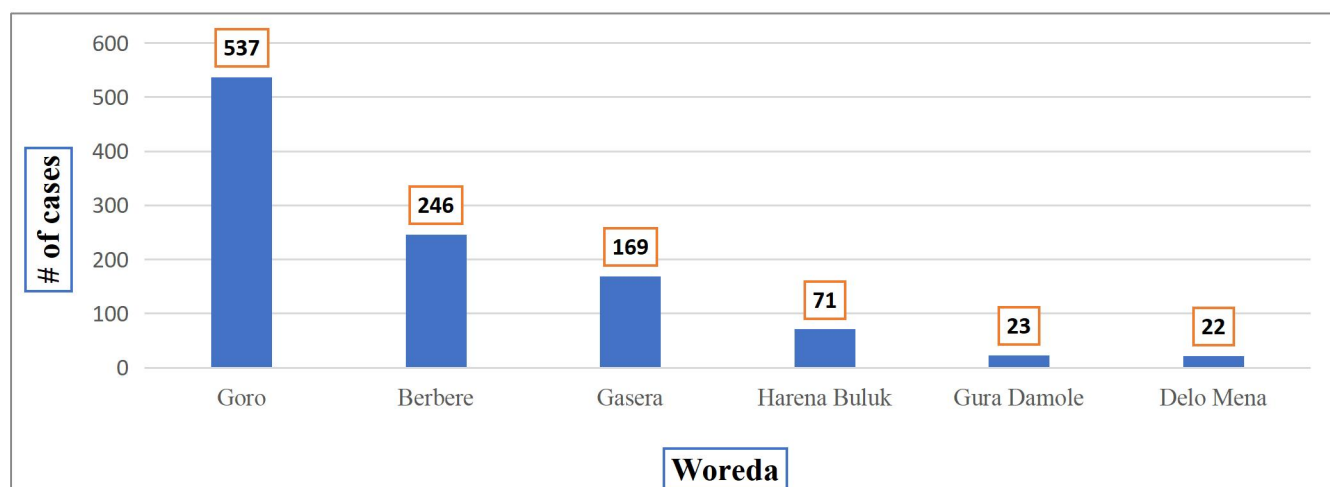


Figure 1: Distribution of Cholera outbreak by districts of Bale zone as of 22 October 2023

Measles: Between July and October 22, 2023, a total of seven districts across the zone were affected, with a cumulative case count of 102, accounting for 6/ 10 (70%) of the districts in the zone. The outbreak is currently active in one district. Of all the cases, 69% were identified in two districts: 35% in Gasera and 34% in Harena Buluk. Out of all reported cases, 30 were confirmed by laboratory testing, while the remaining were epidemiologically linked to confirmed cases. Approximately 54% of the total cases had not received any measles vaccination. About 66% of the total cases were children under five years old, of which 47% had not been vaccinated for measles.

Severe Acute Malnutrition (SAM): During WHO Epidemiological Week 42, there were 189 reported cases of malnutrition. Of these, 153 (81%) were new admissions to the Outpatient Therapeutic Program (OTP), while the remaining cases were admitted to a Stabilization Center (SC). Compared to the previous week's reports, there were a 29 (15%) decrease in Severe Acute Malnutrition (SAM) cases in the zone. The districts of Harena Buluk and Dolo Mena reported

the highest number of cases, with 49 and 41 respectively. A total of 189 cases were discharged, with 177 recoveries and 12 discharges falling under other categories. No deaths were reported in this week.

Table 2: Distribution of SAM cases by districts of Bale zone as WHO week 42, 2023

Districts	Malnutrition_total Cases	Malnutrition_Out Patient_Cases	Malnutrition_In Patient_Cases
Harena Buluk	49	37	12
Dolo Mena	41	28	13
Goro	35	30	5
Berbere	29	26	3
Guraa Damole	22	19	3
Agarfa	7	7	0
Sinana	4	4	0
Danish	1	1	0
Gasera	1	1	0
Goba rural	0	0	0
Zonal Total	189	153	36

Dysentery: During the 42nd Epidemiological Week as per the World Health Organization, all districts collectively reported 107 cases of dysentery. The districts of Goro, Harena Buluk, and Dolo Mena were particularly affected with a high number of cases. All these cases were managed in outpatient departments and fortunately, no fatalities were reported. The districts with the highest number of cases also indicated poor sanitation and hygiene practices, making them susceptible to recurring Cholera outbreaks.

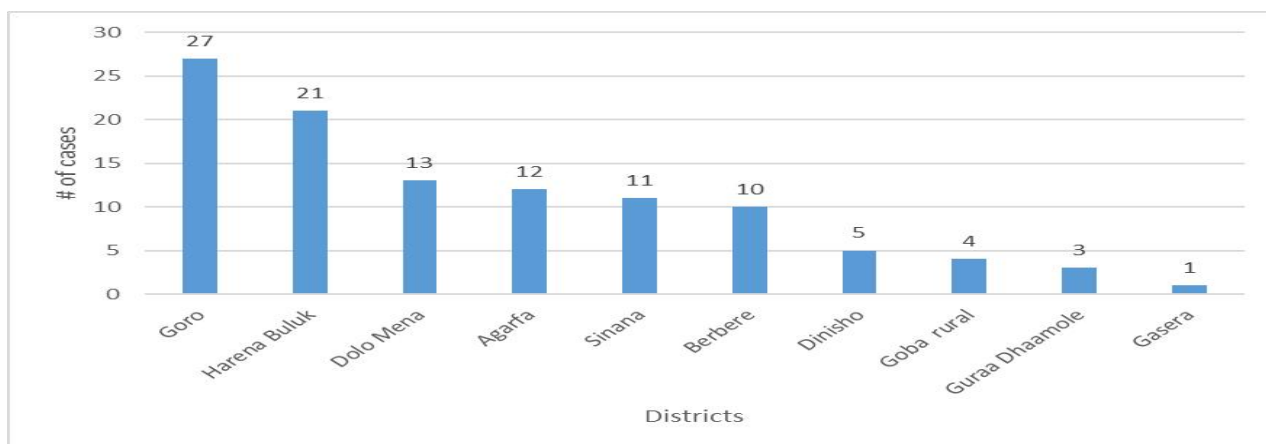


Figure 2: Distribution of dysentery cases by districts of Bale zone as of WHO Week 42,2023

Malaria: During this reporting week, 112 suspected cases of Malaria were examined, with 10 cases confirmed, resulting in a slide positivity rate of 8.9% for the zone. The cases were reported from various districts: Dolo Mena (5 cases), Gasera (3 cases), and one case each from Gura Damole and Berbere districts. Of these, all of the cases were Plasmodium falciparum (P.F). All cases were managed on an outpatient basis. Since week 28, 2023 a total of 663 malaria cases have been reported to the zone with the highest cases reported in the weeks of 31 and 32(Figure).

Table 3: Cumulative confirmed malaria cases WHO week 28 to 42, 2023

Districts	Total Malaria Suspected Fever Examined	Total Malaria Confirmed by RDT and microscopy
Dolo Mena	3023	393
Gasera	572	118
Agarfa	105	41
Goro	178	36
Berbere	152	34
Harena Buluk	184	25

Gura Damole	244	15
Goba rural	1	1
Dinsho	0	0
Sinana	0	0
Grand Total	4459	663

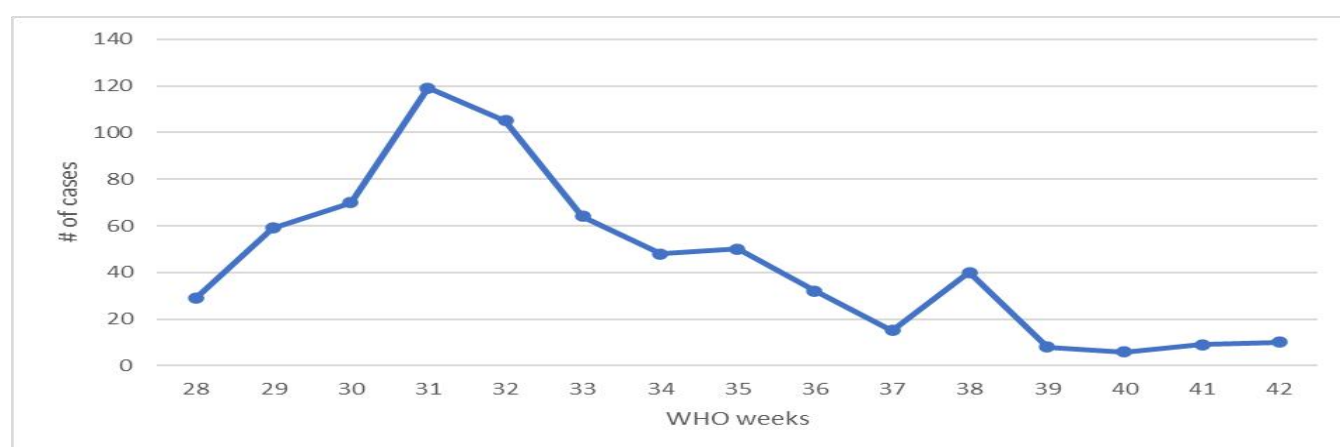


Figure 3: Trends of malaria cases by WHO week of Bale zone 2023

Scabies: During this reporting week, 9 scabies cases were reported. The cases were reported from various districts: Sinana (4 cases) Goro (2 cases), and Agarfa (3 cases).

Acute Flaccid Paralysis (AFP): The detection of Non-Polio AFP cases is a key international indicator of the functionality of surveillance systems and a crucial measure of polio eradication initiatives. However, in the past 42 weeks of 2023, only 11 out of the expected 14 AFP cases were reported. Notably, two districts, Dinsho and Gasera, have not reported any cases this year.

Table 4: Key AFP indicators for the Bale zone as of Week 42, 2023

Indicators	Frequency	Remarks
Total number of Woredas	10	

# of Woredas with High NP-AFP and High Stool Adq	6	
# of Woredas with High NP-AFP and Low Stool Adq	0	
#of Woredas with Low NP-AFP and High Stool Adq	1	
# of Woredas with Low NP-AFP and Low Stool Adq	0	
# of Silent Woredas	2	Disho and Gasera
# of Woredas with currently Low U15 PopulationPop(<25,000)	1	Gura Damole
NP- AFP rate	1.9	Below standard
Proportion of woredas at least report one AFP cases	80%	
Stool adequacy rate	100%	Above standard

Zero Reports: In this reporting week, there were no suspected cases of conditions/diseases such as Meningitis, Maternal and Perinatal deaths, Acute Flaccid Paralysis (AFP), Anthrax, and Relapsing fever reported. Furthermore, the notification rate for maternal and perinatal deaths has been very low this year.

Gaps: Despite a lot of efforts gaps were inevitable. Surveillance activities are sub-optimal and not uniformly conducted across the affected districts.

The line listing of suspected measles cases in Harena Buluk has not been submitted.

The monitoring of maternal and perinatal deaths is significantly weak, with only one suspected death reported since the 28th week of 2023.

The Acute Flaccid Paralysis (AFP) surveillance indicator fell below the standard, with only 11 out of the expected 14 AFP cases reported resulting in a 1.9 Non-polio AFP rate.

Recommendations

Cholera Prevention Health promotion

Wash your hands with soap and water.

Use and drink safe water.

Cook food well and wash fruits and vegetables thoroughly

Clean and disinfect toilets with household bleach.

If you have profuse watery diarrhoea visit your nearest health facility

Measles Prevention and Management promotion

Ensure your child receives the measles vaccination at the ages of 9 and 15 months.

Seek medical attention promptly if any household member develops a fever and rash.

Malnutrition

If you notice visible signs of wasting and bilateral pitting edema, it is recommended to visit a nearby health facility.

Regular health screenings should be conducted for children under five, as well as for lactating and pregnant women.

General recommendations

Conducting supportive supervision and evaluating risks for future planning

Identifying potential malaria breeding sites (Larva Source) and implementing measures such as filling or draining

Actively searching for cases and improving case detection methods

Screening children under five, as well as pregnant and lactating women

Coordinating with partners and mobilizing resources

CHAPTER 10:–SELF–CARE PRACTICES AND ASSOCIATED FACTORS AMONGTYPE 2 DIABETES MELLITUS PATIENTS ATTENDING PUBLIC HOSPITALS IN BALE ZONE, OROMIA REGION, ETHIOPIA.

ABSTRACT

Background: Type 2 diabetes is a chronic disease of high blood sugar level. Diabetes self-care practice include medication, dietary changes, physical activity, and regular blood sugar testing, is important for managing type 2 diabetes .

Objective: To investigate diabetes identity and associated factors among type 2 diabetic patients hospitalized in public hospitals in Bale District, Oromia Region, Ethiopia, in 2024.

Methods: A cross_sectional hospital study was conducted in public hospitals in the Bale zone of Ethiopia between February 5 and March 22, 2024. Through Systematic_random sampling, a total of 411 patients with type 2 diabetes over the age of 18 were selected. Data were collected

using interviewer_administered questionnaires, entered into Kobotoolbox, and analyzed using SPSS version 26.

Results: In this research, 59.4% of the participants exhibited satisfactory diabetes self care practice, while 40.6% showed inadequate diabetes self care practice out of a total of 411 respondents. Factors such as **higher income** (AOR:2.39,95% CI:1.19–4.80, $P < 0.014$), being **employed** in the **private** sector (AOR: 2.09,95% CI: 1.06–4.13, $P < 0.033$), receiving **diabetic education** (AOR:2.85,95% CI: 1.33–6.12, $P < 0.007$), possessing good self-care knowledge (AOR:2.04,95% CI: 1.24–3.34, $P < 0.004$), and **having no diabetic complications** (AOR:2.68,95% CI: 1.64–4.36, $P < 0.000$) were found to have a significant impact on self-care practices.

Conclusion: Diabetes self-care practices among type 2 diabetes patients in Bale, Ethiopia are inadequate, influenced by factors like socioeconomic status, access to diabetic education, membership in diabetic associations, and self-care knowledge. **Targeted support** and education are necessary for those with lower incomes and non-private jobs. Improved access to diabetic education and association membership can enhance self-care. **Knowledge enhancement** and **preventive care for complications** are essential in public hospital follow-ups in Bale Zone.

Keywords: Self-care Practice, type 2 diabetes, Bale Zone, South Eastern Ethiopia.

INTRODUCTION

1.1 Study Background

Diabetes Mellitus is a chronic disease that occurs when the pancreas cannot produce enough insulin or the body cannot use insulin effectively. The incidence and consequences of diabetes have increased steadily over the past decade (1). Type 1, type 2, gestational diabetes and other medical conditions (2). Type 1 refers to the process of beta cell degeneration that can lead to diabetes, where insulin is required for survival to avoid ketoacidosis, coma, and death. Pregnancy is the period when diabetes occurs (3,4). Type 2 diabetes is caused by a progressive increase in the amount of insulin released by B cells, often accompanied by insulin resistance (4). Type 2 diabetes can be caused by many factors. Urbanization, change in diet, decrease in physical activity, obesity, ageing, family history of diabetes, belonging to certain groups, and lifestyle changes are some of these factors (5,6).

The main goal in diabetes treatment is to keep the blood sugar level between 70_120 mg/dl before meals and below 140 mg/dl two hours after meals (7).

The American Diabetes Association recommends self_monitoring of blood sugar (SMBG)

for people with diabetes (4). Diabetes should be treated primarily with non-drug treatments, including lifestyle changes. People with type 2 diabetes can achieve and maintain adequate blood sugar levels through a healthy lifestyle that includes a healthy diet and regular exercise (8). Dietary patterns represent the best way to measure dietary intake (9,10).

They have played an important role in helping to clarify the relationship between diet and chronic diseases in recent years (11–13). The number of patients continues to increase in Ethiopia (10,14,15). Therefore, in this study, we aimed to evaluate diabetes self-care and changes in patients with type 2 diabetes in a public hospital in Bale Region,

Ethiopia.

1.2 Statement of the problem

Regarding the non-communicable disease (NCD) targets linked to diet, Ethiopia has achieved a little headway (16). According to estimates, diabetes affects 5.8% of men and 5.0% of adult women (17). Diabetes is evolving into a severe public health issue, necessitating ongoing medical attention, patient self-management, education, and adherence to recommended medication (18). Statistics on diabetes-related medical problems are equally alarming (2). In the sub-Saharan region, the percentage of patients with diabetes sequelae varied, with retinopathy accounting for 7–63%, neuropathy for 27–66%, and nephropathy for 10–83% (19). Diabetes may raise the risk of sepsis, pneumonia, and tuberculosis (19).

One of the critical factors determining the evolution of diabetes and its associated consequences, which is primarily preventable, is patients' lack of knowledge of self-management tasks (19). Since diabetes education enhances knowledge, attitudes, and skills that lead to better disease control, it is widely recognized as a crucial part of comprehensive diabetes self-management (20). Ineffective diabetes self-management continues to be a severe issue that affects communities and healthcare professionals everywhere. A patient's morbidity and mortality rate, the price of their prescription and laboratory tests, and the time and effort it takes to provide them with care all rise as a result of poor self-management. On the other hand, those who take good care of themselves live longer, get better results, experience fewer symptoms, and face positive outcomes (19). Finding out how T2DM patients currently practice self-care is necessary, including medication adherence, dietary habits, physical activity, and compliance with blood glucose monitoring, to identify potential gaps and areas for improvement. Effective self-care habits, such as medication adherence, dietary adjustments, physical activity, and routine blood glucose monitoring, are essential for the management of type 2 diabetes mellitus (T2DM) (21). Although self-care practices are known to be crucial in managing diabetes, there is limited research on the extent and factors related to these practices at the zonal level. Accordingly, the purpose of this study is to evaluate the degree of self-care behaviours and the variables linked to them among patients with Type 2 diabetes mellitus (T2DM) who visit public hospitals in the Bale zone in the Oromia region of Ethiopia.

1.3.Rationale and Relevance of the Research

According to the research, there are differences in the knowledge and practices of people with type 2 diabetes in the field of individual and other treatment. To promote effective self-care for type 2 diabetes in the general population, health managers must be able to develop comprehensive and appropriate health promotion programs in the population. These studies will increase knowledge in this area and encourage others to assist in the self-care of people with diabetes. Additionally, the results of this research can form the basis for further research.

2. LITERATURE REVIEW

2.1 Diabetes Mellitus Types 2 Prevalence and Burden

As per the IDF 10th edition of 2021, there are 537 million individuals with diabetes globally (18). This figure is projected to increase to 643 million by 2030 and 783 million by 2045 (18). The predicted number of deaths from diabetes-related causes in 2021 was approximately 6.7 million in people aged 20 to 79 (18). Every year, there are more children and teenagers diagnosed with diabetes (18). In 2021, type 1 diabetes affected about 1.2 million children and teenagers (18).

By 2030, diabetes is expected to result in direct health costs that will have surpassed one trillion USD (18).

The World Health Organization estimates that at least 422 million people worldwide have diabetes mellitus, which directly causes 1.5 million deaths annually (1). This figure will increase by 70% in developed countries and 42% in poor countries by 2030 (1).

In 2021, around 24 million individuals are projected to have diabetes in Africa, with expectations of this number rising by 129% to 55 million by 2045. Africa recorded the second smallest expenditure on diabetes (US\$ 13 billion), representing 1% of the global diabetes-related spending. Diabetes expenses in Africa encompass healthcare costs linked to medications, diagnostic procedures, medical equipment, and consultations. As per a 2019 WHO survey, just 36% of countries in the African Region stock essential medications for chronic conditions in public healthcare facilities (22). The prevalence of diabetes, along with its related mortality and disability, is rising in Africa (18). The prevalence of diabetes mellitus is expected to triple in the next 25 years as a result of changing dietary habits, sedentary lifestyles, and rapidly growing metropolitan cultures (18).

In 2019, the Ethiopian Diabetes Association (EDA) projected a prevalence of 3% (23). Nearly equal numbers of Ethiopians with diabetes were reported in 2015 by the Ethiopian Diabetes Association (EDA) at 1.33 million and the International Diabetes Federation (IDF) at 1.30 million (24). The prevalence and incidence of diabetes are not well documented nationally in Ethiopia. Major hospital medical admissions and patient attendance rates are, nevertheless, increasing. Adults aged 20 to 79 are expected to have a 4.3% higher prevalence of diabetes (24).

According to a study at the Ayder Referral Hospital, 1.3% of participants had diabetes mellitus. 82% of individuals had type 2 diabetes, whereas 18% had type 1 diabetes (25).

2.2. Diabetes self-management knowledge

A study on chronic diabetic patients carried out in India revealed that 58% of participants knew that diabetes can affect the eyes, 54% knew that the disease can cause renal complications, 44% knew that diabetes is a cardiovascular risk factor, and 44% knew that yearly eye exams are essential for early diagnosis and treatment (26). Merely 30% of people had their lipids evaluated annually, and only 14% knew that annual urine protein checks were available. 40% have a target blood sugar level in mind. 5% of people knew about the HbA1C test, and 84% of patients knew hypoglycemia and how to handle it (27). Surveys and interviews were used by the researchers to get information from individuals. This study provides significant new insights into the knowledge of diabetes self-management among long-term diabetics in India (28).

A study carried out in the Chinese province of Anhui revealed that 65% of participants were aware of blood glucose levels (26). Of those surveyed, almost half (61.4%) believed their diets were correct, 19.5% were aware of insulin, and 37.7% were aware of potential consequences (26). The Author considers age, education, and clinical factors as effective in predicting diabetes knowledge even if they accounted for approximately 29% of the variation (27).

According to a study conducted in Pakistan, the average proportion of accurate answers for glycemic control, risk factors, and complications were 39%, 69%, and 33.5%, respectively (26). Merely 25% of the patients exhibited precision in answering inquiries related to nutrition (26). The correct responses for hyperlipidemia, cigarette smoking, sedentary lifestyle, and body weight were 42%, 70%, 76%, and 66% respectively, whereas 92% recognized blood pressure as a risk factor (26). There was also little knowledge about renal and ocular problems (26).

The Author considers age, education, and clinical factors as effective in predicting diabetes knowledge even if they accounted for approximately 29% of the variation (26).

A study in Pakistan found that the average percentage of correct responses for complications, risk factors, and glycemic control were 33.5%, 69%, and 39%, respectively. Only one-sixth of all the patients could accurately respond to nutrition questions. The correct responses for hyperlipidemia, cigarette smoking, sedentary lifestyle, and body weight were 42%, 70%, 76%,

and 66% respectively, whereas 92% recognized blood pressure as a risk factor. There was also little knowledge about renal and ocular problems (29).

According to a study conducted in two locations in Nigeria, even though type 2 DM patients performed well overall on the self-care knowledge items(79.5%), they performed poorly on the items relating to glycosylated haemoglobin (HbA1C), physical activity, hypoglycemia symptoms, and medications (29).

In a research conducted in Harari, Eastern Ethiopia, to evaluate the self-care practices of diabetes patients, 208 (93.7%) had both general and particular knowledge about diabetes self-care, and 207 (93.2%) had additional information suggesting that simple sugar and honey had a high glycemic index (28). Furthermore, four of the six food categories—vegetables, cereals, rice, wheat and its products, potatoes, sweet potatoes, and fruits—were reported to have a high glycemic index by 39.6% of respondents (28). Compared to 6.8% of respondents who stated that all six of the suggested foods raised blood glucose levels, only 2.3% of respondents agreed that the foods do not raise blood glucose levels (28).

In an additional investigation conducted at Felege Hospital 10% of survey participants knew that losing weight is a lifestyle modification for preventing complications associated with diabetes. 31% of the survey participants understood what a healthy diet should consist of. According to their recommendations, the optimal diets for those with diabetes consist of 10–20% carbs (grains and fruits), 40–60% proteins (meat, eggs, and fish), 20–30% fat, and trace amounts of vitamins and minerals (30). The relevance of blood glucose control in reducing complications from diabetes was understood by roughly 82% of study participants. 62.7% of people were aware of how crucial blood pressure control is for preventing complications from diabetes (31).

In a poll conducted by Jimma University Specialized Hospital, the majority of participants (70%) recognized the warning signs and symptoms of hypoglycemia and 68.4% knew how to handle it; However, only 48% of respondents knew the proper procedures to prevent hypoglycemia (31).

2.3. Self-care techniques for diabetes

Exercise, healthy food, foot care, self-monitoring blood glucose levels, and medication compliance are all aspects of diabetes self-care (29). Since patients and their families are the ones who manage the majority of diabetic disease, self-care practices remain the cornerstone of diabetes management (32). Care for people with diabetes must be complex and challenging, requiring knowledge beyond simple blood glucose monitoring (33). Therefore, maintaining a healthy lifestyle that includes regular exercise, a balanced diet, quitting smoking, and maintaining a healthy body weight is essential for managing type 2 diabetes mellitus (T2DM) (33,34).

A survey was conducted in Benin City, Nigeria, to identify the variables influencing diabetes' self-monitoring of glycemic control. Using urine testing, blood glucose testing, and urine testing, 72 out of the studied respondents (72%), or 63% of them, self-monitored their blood sugar levels. Depending on the method utilized and the level of education (35), the testing frequency varied, with the majority taking exams once a week.

2.3.1 Factors Affecting self-care practices

According to a study conducted on diabetic patients visiting government health clinics in Negeri Sembilan, Malaysia, the majority of self-monitoring participants (83.5%) did so less frequently than once a day, and just 16.5% did it more frequently than once a day (36). Thirty per cent of patients modified their prescription regimens in response to their SMBG results (36). The patient's educational attainment, the income of the entire family, the length of their diabetes, and their treatment plan are important indicators of SMBG practice (37). First, with a p-value of 0.024, a higher education level was discovered to be a significant predictor. Second, with a p-value of 0.041, a greater overall family income was also found to be a significant predictor (36).

Additionally, it was discovered that the length of diabetes significantly affected SMBG practice, with a p-value of 0.01 and a confidence interval of 2.22 - 7.29. Longer-term diabetic patients are more likely to participate in SMBG, presumably because they recognize the value of routine monitoring and are more aware of it (37). Furthermore, a significant predictor of SMBG practice was found to be the insulin-containing treatment regimen, with a $p < 0.001$ and a confidence interval of 2.05 - 9.24. This suggests that individuals who are taking insulin as part of their

treatment are more likely to follow SMBG, perhaps because insulin requires constant monitoring of blood glucose levels (37).

In summary, the practice of SMBG is impacted by the patient's educational background, family income, length of diabetes, and course of treatment, specifically insulin use (37). When creating plans to encourage and support SMBG use among diabetic patients, healthcare providers should take these things into account. Only a small number of diabetes patients used SMBG, even though it is known to help improve diabetes control, according to this study (37). Hence, to effectively promote SMBG among diabetic patients and increase awareness of its importance, healthcare providers must (36).

Merely 121 individuals (35%) in an Indian study claimed that they checked their urine sugar levels regularly (38). Only, 31% of the participants, or 227 (66%) in total, were cognizant of the significance of self-blood sugar testing (39). A different Malaysian study's findings revealed that just 15% of the participants used SMBG (37). According to an American study, 78% of participants self-monitored their blood sugar (40). In an Egyptian study, the percentage of participants who had good, poor, or no adherence to blood glucose measurement was just 21.4%, 26%, and 53%, respectively (41). The results of this study likewise did not indicate a gender difference in diabetes self-care (41). The younger age group had better glycemic control than the older age group; the longer the diabetes had been present, the worse the glycemic control (38).

Early onset of diabetes, younger ages, educational attainment, attendance at diabetes education, rural living, male gender, lack of family support, possession of goods, insufficient knowledge about diabetes, and absence of a self-monitoring glucometer were among the variables that were found to affect diabetes self-care practices in earlier research (42,43).

In research done in Ethiopia's Tigray regional state's public hospitals, less than half (46.7%) of the participants had effective diabetes self-care routines (43). Another study with 328 type 2 diabetes patients at a referral hospital in northern Ethiopia found that 50.3% of them practised good self-care (42).

A little research has been done in Ethiopia on the practice of diabetes self-care and related variables. In light of this, the prevalence of excellent DSC practices in Ethiopia varies significantly across research, ranging from 25.5% to 76.8% (41,44).

2.3.1. Adherence condition for blood and urine sugar tests

According to a survey done in medical facilities chosen based in Ethiopia, only 21 per cent of patients had access to blood glucose monitoring. Surprisingly, just 24% of respondents gave diabetes education priority (45). Merely 11% of 11 patients with diabetes were able to perform self-blood glucose monitoring at home (45). In the preceding one to two years, 51% of patients had no urine analysis, BUN, creatinine, or lipid profiles (45). The haemoglobin A1c (HbA1c) level was not determined for any of the diabetes patients. In their hospitals and health centres, 87% of the diabetic patients received routine follow-up care (46).

2.3.2 The requirement for medication adherence

According to the findings of a study on the medication adherence of diabetic people in Malaysia, 46% of respondents did not take their medications as prescribed, and they also tended to have higher fasting blood glucose levels (40). There was a correlation between oral anti-hypoglycemic medicine and inadequate self-care practices ($P < 0.001$) (38). A different study conducted in Egypt found that, respectively, 9%, 37%, and 54% of participants adhered to diabetic medication prescriptions poorly, fairly, and well (38).

According to an Iranian cross-sectional survey, respondents' adherence to prescribed medication was poor in 30% of cases, moderate in 18% of cases, 45% of cases in 54% of cases, and 25% of cases in 28% of cases (47). In another study, type-2 diabetics in Nigeria were asked to rate their dedication to anti-diabetic medication therapy and self-management techniques (47). The study's findings revealed that just 44% of participants in the study (48) Oral hypoglycemic agent combinations, such as glibenclamide and metformin, are used to treat the majority of type 2 diabetes patients in Nigeria (48). Unfortunately, due to inadequate adherence to the suggested medication regimen and a lack of understanding about effective self-management, many patients are not hitting the necessary blood glucose objectives (48). A study conducted in Finland found that while most participants completed their insulin dose on time, they struggled more with other areas of self-care (45).

The findings of a study on the evaluation of dietary practices among diabetic patients in the United Arab Emirates indicated that only 24% of people read food labels (49). No one mentioned tracking calorie consumption, and 76% of respondents indicated they were unable to tell dietary items with a high or low carbohydrate index apart (49). Of those who said they had never seen a

nutritionist since being diagnosed, 46% said they had (49). Their total risk profile was quite unfavourable; the majority of the study population was overweight (45%) or obese (36%), and more than half had uncontrolled lipid profiles and hypertension (49). Other notable risk factors included blood pressure, body weight, and lipid profile (49). There was a high prevalence of abdominal obesity (59%) (49). HbA1c values of less than 7% were seen in just 31% of cases (50).

2.3.4. Adherence to Physical Activity

A cross-sectional study was done on Physical Activity and Reported Barriers to Activity Among Type 2 Diabetic Patients in the United Arab Emirates. The result of the study showed that Of the 390 patients recruited, only 25% reported an increase in their physical activity levels following the diagnosis of diabetes (48). Only 3% reported physical activity levels that meet the recommended guidelines. Only 32% had an acceptable glycemic control (48).

2.3.5. Adherence to diet management techniques

In the United Arab Emirates, a study on the eating habits of diabetic patients found that no one tracked calories consumed, only 24% of participants read food labels, and 76% of participants were unable to distinguish between items high in or low in carbohydrates (51). Furthermore, 46% of participants stated that they had not seen a dietitian since their diagnosis, and a large number of them had high HbA1c values, uncontrolled hypertension, lipid profiles, and were overweight or obese (52).

2.3.6. Adherence to Physical Activity

Merely 25% of the 390 patients in a cross-sectional study on physical activity and reported barriers to activity among type 2 diabetic patients in the United Arab Emirates reported increasing their physical activity levels after receiving their diabetes diagnosis; only 3% of them met the recommended physical activity guidelines, and only 32% of them had acceptable glycemic control (45). According to research conducted in Iran, 66% of men and 46% of women adhered to physical activity well, compared to 34% of men and 54% of women who felt that way (47). According to a study conducted in India, 82% of the participants understood the benefits of regular physical activity, but only 9% of men and 4% of women took this advice to heart (53). According to a Malaysian study, 54% of participants had higher mean fasting blood glucose levels and were not active in their daily lives ($P < 0.004$) (37). Research findings from the United States and the Islands revealed that many people did not consistently adhere to dietary and physical activity recommendations (40).

2.3.5. Adherence to diabetic foot care

A cross-sectional study in Nigeria found that 30.1% of diabetes patients had good knowledge of foot care, but only 10.2% had good foot care practices. The majority of patients with poor practices had poor knowledge. Many patients were unaware of basic foot-care steps, and poor practices were associated with illiteracy and low socioeconomic status (54). Only 14% of diabetes patients at Jinnah Hospital in Lahore, Pakistan, had good foot care habits, compared to 54% who had satisfactory practices and 32% who had bad practices, according to a cross-sectional study conducted there (49). The results of the study showed that, although sex and per capita income did not substantially correlate with knowledge and habits for foot care, education level did ($p < 0.001$) (49). It was shown that only a small percentage of diabetic patients practised proper foot care, and that literacy was strongly correlated with both knowledge and practice (49). Approximately one-third of diabetic patients had inadequate knowledge (49). The results of the Indian study showed that diabetics had relatively little understanding of, and practised much less, foot, skin, and eye care. Just 15%, for example, knew about foot care (17%), skin care (11%), eye care (7%), and dental care (55). Furthermore, only 3% of people routinely saw a dentist (52). After controlling for age and sex, the odds ratios (OR) for insulin use were as follows: self-monitoring (OR [95% CI]; 4.0 [2.6-6.1]); hearing of HbA1c or receiving a dilated eye examination (1.9 [1.4-2.5]); at least one visit to a provider (3.4 [1.9-7.2]); and having their feet

inspected at least once (2.1 [1.5-2.9]) (56). Among the U.S. participants in the study, 61% had their feet examined by healthcare providers at least once within a year, and 61% had a dilated eye examination (37).

2.4 Factors Associated with diabetic self-care practice

In an urban community survey in the Chinese province of Anhui, researchers found a significant relationship between the subjects' awareness of self-management activities and their education level (OR 2.096, 95% CI 1.578) and the severity of the disease (OR 1.307, 95% CI 1.016-1.681). They also found that higher knowledge (R 2.057, 95% CI 1.228-3.445), strong self-efficacy (OR 1.899, CI 1.253-2.878) in managing diabetes, and knowledge had an impact on physical activity in individuals with good self-management ($P < 0.01$) (57). Furthermore, there was no significant relationship between any variables and adopting a healthy diet (57).

An institutional study on hypoglycemia prevention in South Gondar revealed that type 2 diabetes patients' awareness of hypoglycemia prevention was related to their age (60–69 years and ≥ 70 years), having other comorbidity conditions, and DM-related complications. Low levels of Diabetes Self-Care (DSC) practice were associated with these factors. Increased levels of DSC practice were related to receiving DM education (51).

2.5 Conceptual Frame-Work

Diabetes self-care involves daily activities like monitoring blood glucose, taking medications, following a healthy diet, exercising, and managing stress. Demographic and socioeconomic factors, clinical factors, healthcare system factors, individual characteristics, behavioural activities, and social and environmental factors are interconnected and can influence each other. Understanding them is essential for developing comprehensive interventions to improve type 2 diabetes self-care practices.

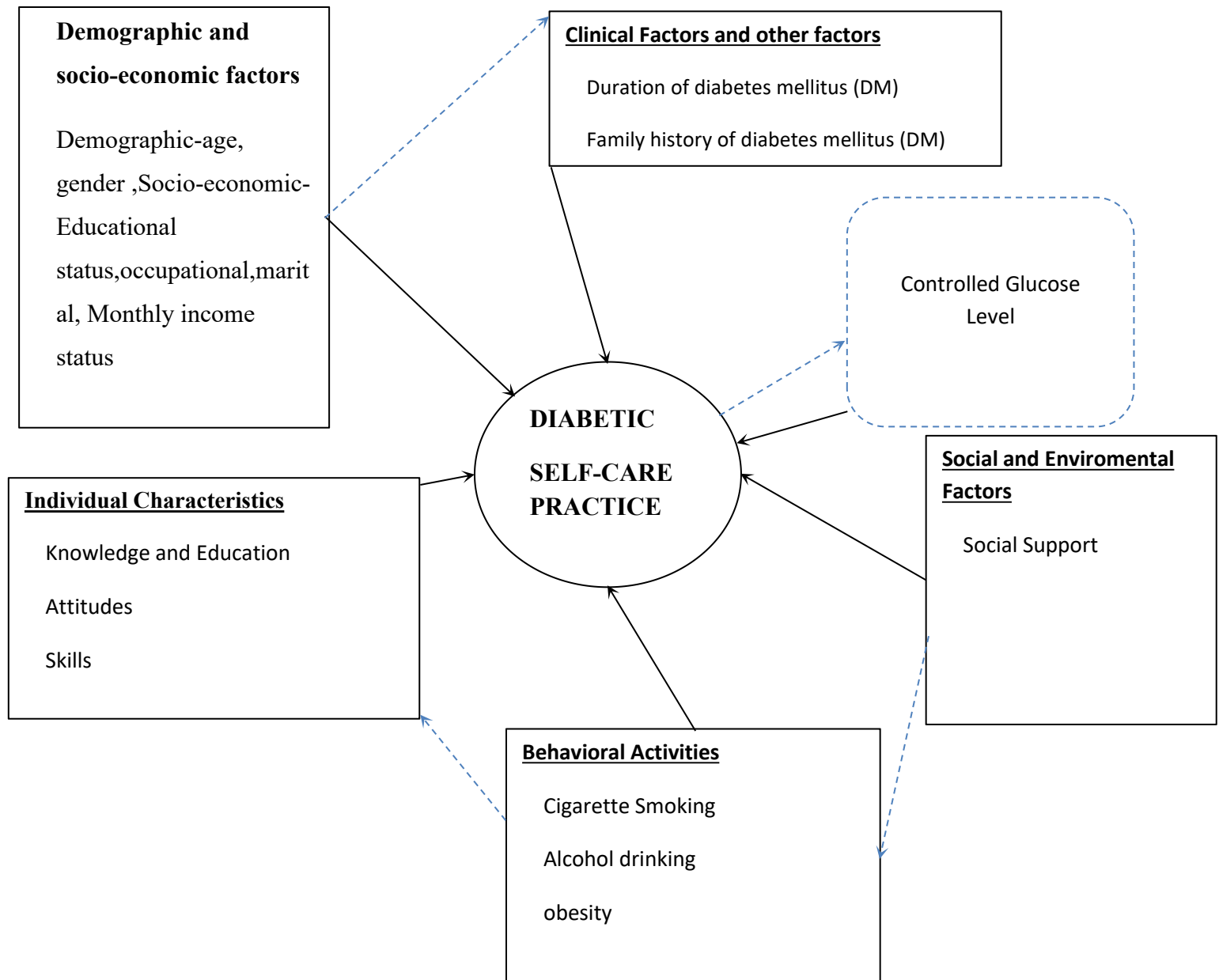


Figure 1: Conceptual framework for the study to assess diabetes self-care practice and associated factors among type 2 diabetes patients attending public hospitals, in Bale zone, Oromia region, Ethiopia (17,57–59,64–66,68)

3.1 OBJECTIVES

3.1.1 General objective

- ✓ To assess diabetes self-care practice and associated factors among type 2 diabetes patients attending public hospitals in Bale zone, Oromia region, Ethiopia, 2024

3.1.2. Specific objectives

- To evaluate the level of type 2 diabetes self-care practised by patients in government hospitals in the Bale Zone, Oromia Region, Ethiopia.
- To identify the diabetes-related factors of self-care routines among T2DM patients of the study area.
- To identify the impact of various factors on glucose level control in individuals among Patients with type-2 diabetes mellitus in the research region.

4. METHODS AND MATERIALS

4.1. Study Area

Bale Zone is located in the Oromia Region in southeast Ethiopia, 430 kilometres from Addis Ababa. It comprises ten districts, covering a total area of 6981.8 square kilometres, and is home to an estimated population of 1.4 million people. One general hospital, two district hospitals, a teaching hospital for referrals, 48 health centres, 201 health posts, and 26 private clinics make up the zone's healthcare system. The zone has been significantly affected by various crises, such as drought, epidemics, and flash floods.

During the Woreda health profile analysis, a total of 5,136 cases of diabetes mellitus were identified from the zonal hospitals' patient screenings, as reported in the Administration Zonal report.

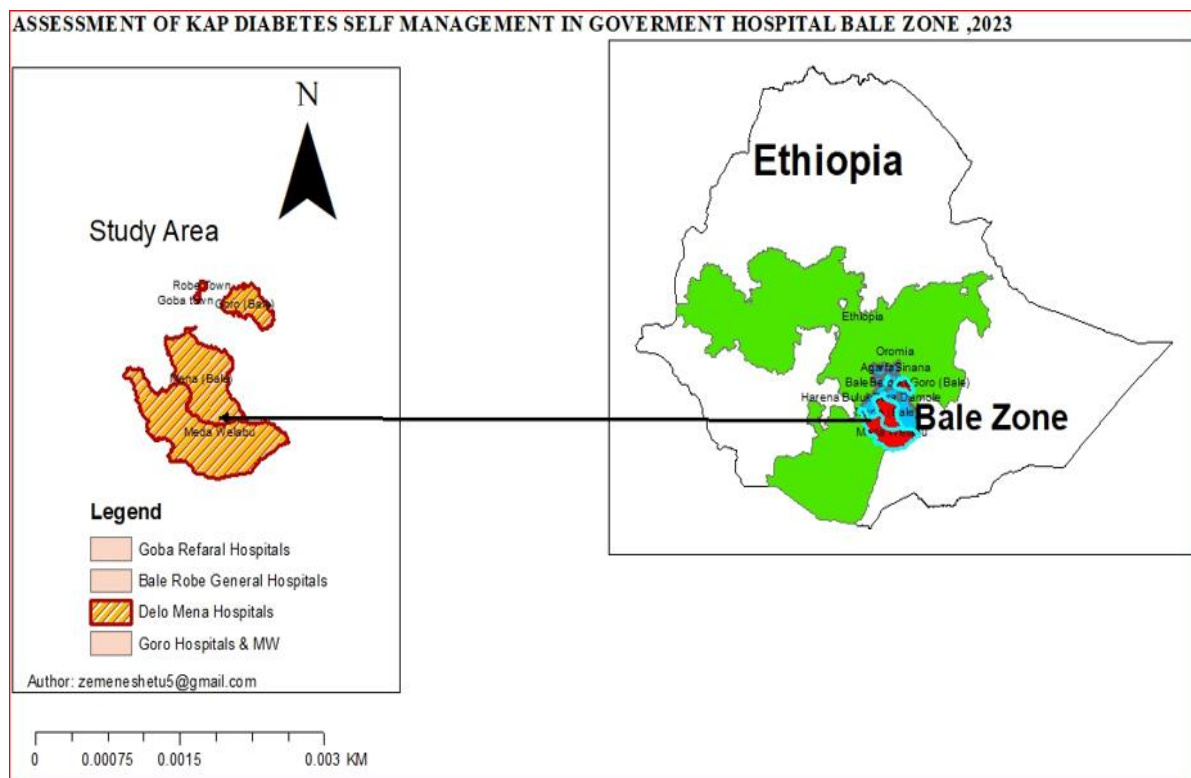


Figure 1:Maps shows the distribution of hospitals in the study area Bale Zone Oromia, Ethiopia,2024

4.2. Study design and period

A hospital-based cross-sectional study design was conducted in government Hospitals in Bale Zone, Ethiopia, from February 05/2024- March 22/2024.

4.3. Source and Study Population

4.3.1. Source population

The source population of the study included all type 2 diabetic patients who visit the DM clinics in the government hospitals located in Bale Zone.

4.3.2. Study population

The study population were all type 2 diabetic patients who were on treatment follow-up at the outpatient department during the study period from February 05/2024, up to March 22/2024.

4.4. Inclusion and Exclusion Criteria

4.4.1. Inclusion criteria

Every patient with type 2 diabetes who saw a physician during a data collection period between February 5, 2024, and March 22, 2024, and who had at least one follow-up before that date.

4.4.2. Criteria for exclusion

- ✓ Patients in critical condition who are unable to give consent
- ✓ women with gestational diabetes
- ✓ Type 1 DM
- ✓ Children < 18 years

4.5. Determining the sample size

With a 95% confidence level, a 5% margin of error, and a 58% diabetes self-care practice (58) among diabetes patients, the sample size was determined using the single population proportion calculation.

Number of samples (n) = $\frac{d^2}{p \cdot q}$

Whereas: p = proportion of diabetes self-care practice or expected proportion = 0.58

q = 1 - p; q = 1 - 0.58 = 0.42

n = the required sample size

The margin of error = 5% (0.05) times d.

$$n = (z.\alpha/2)^2 p (1-p)/d^2$$

$n = (1.96)^2 0.58(1-0.58)/ (0.05)^2 = 0.935/0.0025 = 374$ Accordingly, total sample size was determined to be =411.

4.5.2. Sample size of Objective Two

Using important associated factors from several studies, the sample size for the second particular purpose was calculated using the EPI info software version 7.2.1.0 (63,64). (**Table 1**)

$$\text{Equation } n = (OR^2) / (Z^2 * (P1 * (1 - P1) + P2 * (1 - P2)))(65)$$

When the sample size is n.

Z is the Z-score that represents the intended level of confidence; P1 = percentage of the group not exposed P2= percentage of the group that was exposed odds ratio, or OR

To calculate the P2 proportion, examine Table 1 data for power (P), confidence interval (CI), odds ratio, P1 to P2 ratio, and sample size in three categories: monthly income, family support, and educational status. The P2 proportion calculations for each category are:

1. Monthly Income: P1 Proportion = 1/16, P2 Proportion = 15/16
2. Family Support: P1 Proportion = 1/14, P2 Proportion = 13/14
3. Educational Status: P1 Proportion = 1/14, P2 Proportion = 13/14

Therefore, the P2 proportions for each category are:

A. Monthly Income: $15/16 = 93.7\%$

B. Family Support: $13/14 = 92.8\%$

C. Educational Status: $13/14 = 92.8\%$

So, the calculated sample sizes for the factors are as follows:

- Monthly income: 321,- Family support: 213,- Educational status: 257

Table 1: Evaluation of diabetes self-care practices and associated factors among patients with type 2 diabetes mellitus in government hospitals in the Bale zone of Ethiopia in 2023, utilizing EPI Info version 7.2.1.0 for sample size determination

S. N	Variable	Power(P)	CI	OR	Ratio	P1	P2	Sample size	reference
1	Monthly income	80%	95%	2.31	1:1	53.6%	93.75%	321	(18)
2	Family support	80%	95%	2.90	1:1	35.34%	92.8%	213	(59)
3	Educational status	80%	95%	2.65	1:1	34.48%	92.8%	257	(60)

Note:- P1=proportion of exposure among patients with controlled blood glucose- those with a high income, high family support & literacy (59–61).

Next, out of the two objectives, the greatest sample size was chosen. Thus, 411 was the study's sample size.

4.6. Sampling Technique and Sampling Procedures

A systematic sampling strategy was used in the study to choose patients with type 2 diabetes, taking into account the patient flow in the month before data collection. The names of patients registered for hospital follow-up are listed in the DM ward registration book, which is where the patient list (sample frame) was sourced from. The sampling proportion in a month (N) was divided by the total number of samples (n) at the data collecting location (n') to establish the sampling interval 'k', or $k = N' / n'$. Based on this interval, each Kth patient was then chosen for data collection. In the month before data collection, there were 1287 cases of type 2 diabetes, and the sampling interval "k" was calculated as...1287/411 ~ 3.

During the study period, there were four hospitals with a total of follow-up type 2 diabetes patients that were similar to the 5,149 cases from the previous year. The patient list was taken from each follow-up clinic's registration records within the medical institutions. Using the following formula, samples were distributed proportionately to the total population of each stratum:

Since N is the total population, $n_i = n/N * N_i$.

N_i = total number of people in each stratum

n_i is the sample size for every stratum.

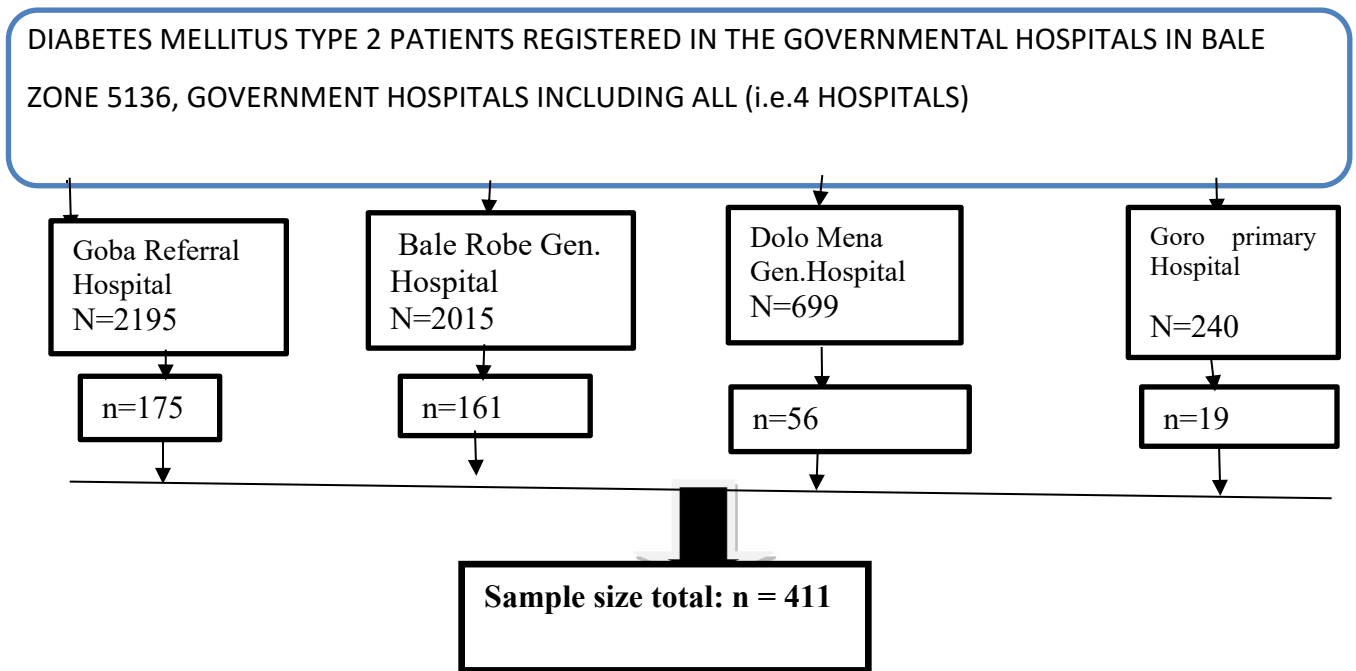


Figure 2:public hospitals in the Bale Zone of Ethiopia in 2024, a diagrammatic depiction of sampling techniques was used to evaluate type 2 diabetes mellitus patients' diabetes self-management practices and related parameters.

4.7. Methods for Collecting Data

4.7.1. Data Gathering Tool

A systematic interviewer-administered questionnaire was used to gather the data. Before being distributed, the questionnaire was translated into Afan Oromo, the native tongue. Socio-demographic information, clinical features of the respondents, diabetes knowledge, medication adherence, and diabetes self-care behaviours were all included in the questionnaire.

A tool Adobe and colleagues validated a thirty-item measure called Diabetes Self-Management Knowledge (DSCK-30) to assess type 2 diabetes self-care knowledge. The tool consists of yes/no response choices and factor analysis revealed three scales of self-care proficiency (62).

The Summary of Diabetes Self-Care Activities (SDSCA) measure is a brief self-report questionnaire on diabetes self-management that can be used as an additional self-care tool. It addresses many facets of diabetic self-management, including physical activity, blood glucose testing, good eating, foot care, and smoking (41).

4.7.2. Supervisors and Data Collectors

A training session lasting one day was conducted at Robe General Hospital for supervisors and five data collectors. The principal investigator also provided ongoing awareness to ensure clarity during data collection.

A pre-test was carried out at Meda Welabu Primary Hospital to identify 20 diabetes patients and areas needing improvement. Necessary adjustments were made based on feedback received during the pre-testing to ensure clarity and accuracy.

Before patients could leave the facility, five BSc nurses proficient in Afan Oromo conducted face-to-face exit interviews to gather data. Data collectors cycled to different facilities during the collecting period to lessen bias. To protect patient anonymity, interviews were placed in a secluded, apart from the main building. The lead investigator and two public health officers oversaw the data collection process.

4.8. Variables

Dependent variable

Diabetes Self-Care Practice

Independent Variables

- ✓ **Socio-demographic factors include** age, sex, marital status, level of education, employment, and monthly income.
- ✓ **clinical factors:** like DM-related problems, comorbidity, length of diabetes, and family history of the disease.
- ✓ **Behavioral factors:** like diabetes knowledge, social support, self-efficacy, alcohol consumption, smoking, and diabetes health literacy.

4.9. Operational definitions

Operational_Definitions

Self-Care Practice: these are the daily tasks individuals undertake to manage their diabetes effectively. These tasks include monitoring blood glucose levels, following dietary recommendations, engaging in physical activity, taking prescribed medications, and seeking medical advice when necessary. The Summary of Diabetes Self-Care Activities (SDSCA) was expanded, and 18 questions including six items were utilized to measure self-care behavior (63). Those who scored ≥ 3 on the mean score were categorized as having a good level of self-care-behaviour by computing the overall level of self-care behaviour. Individuals who had an overall mean score of less than three were classified as practising poor self-care.

Good vs poor diabetes self-management knowledge: This refers to individuals' knowledge about managing diabetes. According to the DSCK-30 surveys, study participants who correctly answer 70% or more of the questions about self-care knowledge are deemed to have a good grasp, while those who answer less than 70% are deemed to have a poor understanding of diabetes self-management (17,64).

Glycemic management in diabetes: The level of glycemic control was indicated as 'good glycemic control' when FBS results were less than 130 mg/dl (7 mm/L) (i.e. an average of four visits), 'poor glycemic control' takes place when a parameter is beyond the criteria of adequate glycemic control (65). It is ascertained from the patient's medical record in consultation with a physician in a chronic outpatient department during follow-up.

Diet: It is the type and quantity of food to be consumed each day, calorie intake, distribution of micronutrient, consumption of fruits and vegetables, and adherence to dietary recommendations for managing diabetes. After calculating the overall level of the self-care diet, Scores above 1.4901 indicate high adherence to the recommended diet, and lower scores indicate poor adherence to the recommended diet (65).

Physical Activities: The level and frequency of physical exercise individuals engage in, such as walking, jogging, cycling, or other forms of exercise. In this study, Physical Activities were measured in terms of duration, intensity, and consistency. Those who scored above the mean of

1.4954 had a good level of DSCP, and those who scored below the mean had a poor level of DSCP (66).

Adherence to Medication: is the degree to which the patient takes the medication as directed. In this survey, a sum score of more than two denotes low medication adherence, a score between one and two denotes medium medication adherence, and 0 denotes great medication adherence (58).

Social Support refers to the presence and effectiveness of support systems that individuals have access to, such as family members, friends, healthcare professionals, or community resources, to maintain their diabetes self-care routine. A score above 1.15 indicates good social connectivity, while a score below 1.15 indicates poor social support (59).

Diabetic comorbidity and complications present: If a participant has previously, diabetic complications like nephropathy, neuropathy, retinopathy, foot ulcers, heart disease, or other known issues, monitoring their health is crucial. It is ascertained from the patient's medical record in consultation with a physician in a chronic outpatient department during follow-up (67).

Foot Care: regular maintenance of foot health practices customized to prevent complications from nerve damage and poor circulation. This includes foot examinations, daily care, proper footwear, and professional consultations. Individuals were asked about their daily foot care practices, such as using warm, soapy water, examining their feet for sores or redness, drying their feet thoroughly, and applying moisturizer. Those with a score higher than the average of 1.1956 demonstrated good-foot-care practices (68).

Current tobacco smokers: The habit of tobacco smoking, measured in terms of frequency (number of cigarettes per day), duration of smoking history, attempts at quitting smoking, and awareness of the detrimental effects of smoking on diabetes control those who used tobacco products within the previous (69).

4.10. Quality control of data

To ensure the quality of translation to Afan Oromo, the questionnaire was pretested on twenty type-2 diabetic patients at a follow-up visit at Meda Welabu district hospital before data collection. The required adjustments were made, and supervisors were paired with particular patients to track down and fix any issues with the quality of the data.

Following the gathering of data, an initial frequency was run to find any missing variables, and the raw data were adjusted. The information was backed up by email, removable flash drives, and computer folders.

The lead investigator pre-coded the questions and created the data entry form before gathering all required data. To enter data, Kobotoolbox was used.

4.11: Analyzing Data

The KoBotool box was used to gather the data, which was then exported to SPSS version 26. Tables, frequencies, and graphs were used to summarize the descriptive statistics that were calculated for each variable. Utilizing binary logistic regression, variables related to the result variable were found. It was calculated to get the crude odds ratio (COR) and 95% confidence interval (CI). The multivariable logistic regression analysis was then applied to the variables whose p-value was less than 0.25. In the context of multivariable logistic regression models, a p-value of less than 0.05 was deemed statistically significant. A 95% confidence interval was computed for the adjusted odds ratio (AOR).

Data cleaning and transformation were performed for medication adherence (mean 1.6624), diet (mean 1.4901), physical activities (mean 1.4954), SMBG (mean 1.4964), foot care (mean 1.4672), diabetes self-management knowledge (1.1598), and smoking (1.2701) variables using the mean value as cut off. High values were recorded as (1) indicating a good level of DSCP, and lower mean scores were recorded as (2) representing a poor level of DSCP.

4.12. A concern for ethics

Protocol number SPH/296/2024 was used to get ethical approval for the study from the Addis Ababa University School of Public Health IRB. Additionally, letters of support were sent to ORHB and the Oromia Health Bureau for each of the public hospitals in the Bale Zone. Furthermore, the Oromia Public Health Research and Emergency Management Directorate, reference number BFO/116/1314, provided ethical clearance. After informing the respondents about the aim and purpose of the study, verbal consent was obtained before delivering the questionnaire. Each participant gave their informed consent after being made aware of their right to withdraw from the activity and their freedom to stop at any moment. To maintain confidentiality and privacy, the study subject's name was not included in the questionnaire.

4.13. Dissemination the outcome

The Oromia Public Health Research and Emergency Management Directorate, Oromia Regional Health Bureau, and Addis Ababa University received the study's results. The findings will be published in internationally peer-reviewed journals and presented at national conferences.

5.1 Results

5.1. Features related to Socio-demographic

411 questionnaires were distributed as part of the study, yielding a 100% response rate. 99 (24.1%) of the patients with diabetes were between the ages of 50 and 59, 85 (20.7%) were between the ages of 60 and 69, 84 (20.4%) were between the ages of 40 and 49, and 78 (19%) were older than 70. The patient's average age was 54.28 (SD±15.4). The participants were between the ages of 18 and 108. The educational status of the participants followed this pattern: 129 (31.4%) had attended primary education, 97 (26.5%) were not able to read and write, 66 (16.1%) had participated in secondary education, and 53 (20.6%) had attended grade 12 or higher. Regarding marital status, 341 (83%) respondents were currently married, while 27 (6.6%), 25 (6.1%), and 18 (4.4%) were widowed, single, and divorced, respectively. Out of the total respondents, 209 (50.9%) were unemployed. The results on the level of monthly income of the respondents revealed that 289 (70.3%) earned more than 1000 birr, followed by 65 (15.8%) who earned between 501 and 1000 birr. The study participants' average monthly income was 5411.84 (SD±12037.455), as shown in Table 2.

Table 2: shows the Socio-demographic details of patients with type 2 diabetes mellitus who are treated at government hospitals in the Bale zone, Oromia region, Ethiopia in 2024 (n = 411).

Characteristics	Category	Frequency	Per cent	Mean and SD
Age	<30	28	6.8	54.28 (SD±15.4)
	31-39	37	9	
	40-49	84	20.4	
	50-59	99	24.1	
	60-69	85	20.7	
	>69	78	19	
Sex	Male	245	59.6	
	Female	166	40.4	
Status of Marriage	Single	25	6.1	
	Married	341	83	
	Divorced	18	4.4	
	Widowed	27	6.6	
Educational Status	Unable to write and read	97	23.6	
	Only able to read and write	66	16.1	
	Elementary School (1-8)	129	31.4	
	(9-12) secondary school	66	16.1	
	Higher than grade 12	53	12.9	
Occupation	Employed	133	32.4	
	Unemployed	209	50.9	
	*Other Specify	69	16.8	
Economic status(monthly income)	<500	65	15.8	5411.84 (SD±12037.4)
	501-1000	57	13.9	
	>1001	289	70.3	

*Others (specify)----- merchant, housewife, daily labourer and Student

5.2 Clinical and other factors related to diabetes

Most of the respondents, 188 (45.7%) had a duration of the disease less than five years, whereas 144 (35%) of the people had a duration between 5 and 10 years. With a minimum of 1 year and a maximum of 35 years, the mean duration of diabetes was 7.34 (SD±15.4) years. About 220 (53.5%) of the total respondents reported long-term diabetes problems that were verified by a doctor. Most of the 356 respondents had at least once been educated about diabetic self-care. The majority of people who got diabetic self-care instruction (82%) named their healthcare providers, with the media coming in second (11.5%). Table 3 shows that the majority of participants (84.9%) did not belong to the local chapter of the diabetes association Table 3.

Table 3: Clinical characteristics and additional diabetes-related variables of patients with type 2 diabetes mellitus visiting public hospitals in the Bale zone, Oromia region, Ethiopia in 2024 (n = 411)

Characteristics	Category	Frequency	Per cent
Diabetic duration	Less than five years	188	45.7
	Five to ten years	144	35
	More than ten years	79	19.2
Complications associated with diabetes	Yes	220	53.5
	No	191	46.5
Type of complications	Nephropathy	29	7.1
	Neuropathy	17	4.1
	Retinopathy	23	5.6
	Footsore	9	2.2
	Heart disease	29	7.1
	Other disease (blood pressure, gastroparesis, diabetic dermopathy, macular oedema, and cardiomyopathy)	116	28.2
Health education regarding diabetes	Yes	356	86.6
	No	55	13.4
From where did you get health education	Doctors(others health personal)	292	82
	Mass media	41	11.5
	Friends or family	18	5
	**Others(specify)	5	1.4
Membership of the diabetic association	Yes	62	15.1
	No	349	84.9

**Others (specify): many platforms, professional associations, educational institutions, and internet channels, among others

5.3 Type 2 diabetes mellitus patients' overall degree of diabetes self-care practice (DSCP)

5.3.1.Diabetes_Self-Management_Knowledge

Among the study participants, 158 (38.4%) demonstrated a high level of overall knowledge, while the remaining 253 (61.6%) exhibited a lower understanding of self-care practices. The correct responses regarding self-care knowledge for modifiable lifestyles, adherence, and consequences of uncontrolled blood glucose levels were 38.2%, 61.3%, and 29.7%, respectively. The majority, 353 (85.9%), acknowledged that the fasting blood sugar (FBS) test is suitable for monitoring blood sugar control over 2–3 months. Additionally, 89.9% of participants agreed that only qualified medical professionals in hospitals should be responsible for checking a diabetic patient's blood sugar and blood pressure. A significant number of participants (81.6%) believed that regular exercise can decrease the reliance on insulin or other diabetic medications.

5.3.2 Medication Adherence

Adhering to medication guidelines is crucial for effective diabetes management as it significantly influences treatment outcomes. This aspect evaluates how well individuals comply with their prescribed medication regimen, including dosage schedules, intake frequency, and adherence to medical instructions. Poor medication adherence may result in uncontrolled blood sugar levels and an elevated risk of complications.

5.3.3 Diabetes Self-Care Practice

A majority of respondents (60.8%) demonstrated proper self-monitoring of blood glucose practices among the 250 surveyed. 252 (61.3%) respondents adhered to anti-diabetic medication guidelines, while more than half, 222 (54%), did not comply with recommended dietary management practices. 188 people (45.7%) said they participated in physical activities that complied with recommendations. The majority (73%) followed advice for smoking cessation. The overall self-care practices (SDSCA) rating was 244 (59.4%). Additionally, 81% of respondents said they had never received advice on managing their nutrition, 81.8% said they had never received direction on exercising, and 77.1% said they had never received expert advice or instruction on monitoring their blood or urine glucose levels (Figure 2 ,3 and Table 4).

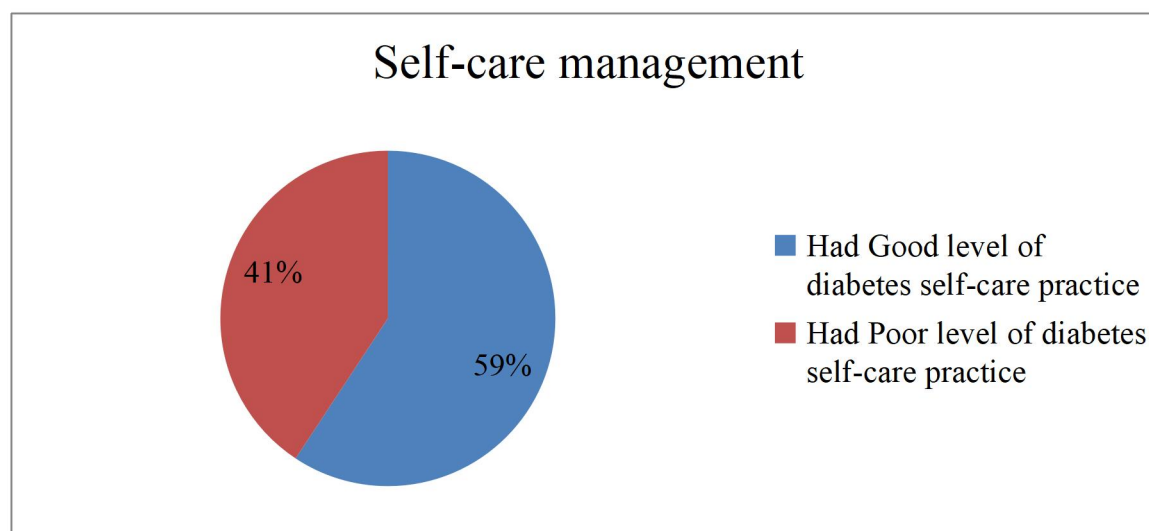


Figure 3: Pie chart showing diabetic self-care behaviours among patients with type 2 diabetes mellitus in public hospitals in the Bale zone, Oromia region, Ethiopia, in 2024 (n = 411)

Table 4:Overall performance of respondents in evaluating the level of medication adherence, knowledge, and self-care advice among patients with type 2 diabetes mellitus attending government hospitals in the Bale zone, Oromia region, Ethiopia, in 2024 (n = 411)

Characteristics	Yes	No
Reduced thirst, less frequent urination, and higher energy are common in those whose blood sugar levels are near normal.	267(65%)	144(35%)
Extended hyperglycemia can cause visual impairments or possibly blindness.	335(81.5%)	76(18.5%)
Extended periods of uncontrolled blood sugar can lead to heart attacks, strokes, and kidney problems.	333(81%)	78(19%)
Signs of elevated blood sugar include shaking, disorientation, altered behaviour, and perspiration.	288(70.1%)	123(29.9%)
Before and after any physical activity, one should check their blood glucose level.	369(89.8%)	42(10.2%)
Blood sugar control during a two to three-month period can be monitored with a fasting blood sugar (FBS) test.	353(85.9%)	58(14.1%)
A diabetic needs to perform daily oral hygiene measures, such as brushing and flossing.	369(89.8%)	42(10.2%)
One with diabetes can benefit from wearing a tight elastic hose or socks.	342(83.2%)	69(16.8%)
A diabetic can monitor and respond to changes in their blood sugar levels with the use of self-blood glucose monitoring (SBGM).	334(81.3%)	77(18.7%)
Making plans for a diabetic patient to reach their objectives should only be done by doctors.	362(88.1%)	49(11.9%)
It is not crucial to maintain a healthy weight when managing diabetes.	354(86.1%)	57(13.9%)
Physicians and other medical professionals can collect information for treatment planning with the use of self-blood glucose monitoring (SBGM).	360(89.8%)	51(12.4%)
Only a licensed medical practitioner and other hospital health professionals should check the blood pressure and blood sugar of a diabetic patient.	369(89.8%)	42(10.2%)
It is necessary to engage in physical activity for 20-30 minutes a day, a minimum of three days a week. (A few examples of physical activities are brisk walking, housework, and stair climbing.)	375(91.2%)	36(8.8%)
Any changes in a diabetic patient's vision should be reported to their physician.	283(68.9%)	128(31.1%)
When a diabetic is unable to alter a certain lifestyle, they and their physician should come to a mutually agreed upon decision.	378(92%)	33(8%)
Particularly when trimming their toenails, a diabetic should take additional care of their feet.	281(68.4%)	130(31.6%)
Frequent exercise doesn't make insulin or other diabetic medications less necessary.	336(81.8%)	75(18.2%)

A diabetic patient should only seek assistance from their medical team when they become ill.			351(85.4%)	60(14.6%)
When starting insulin therapy for a diabetic who may need it, the patient should receive the proper guidance on meals and Self Blood Glucose Monitoring (SBGM).			338(82.2%)	73(17.8%)
Cigarette smoking can aggravate diabetes			344(83.7%)	67(16.3%)
In a diabetic, blood glucose monitoring is more crucial than blood pressure monitoring.			317(77.1%)	94(22.9%)
Do you remember to take your diabetes medication regularly?			152(37%)	259 (63%)
Other than simple forgetfulness, people occasionally fail to take their prescriptions as prescribed. During the last two weeks, can you recall any days when you neglected to take your medication?			92(22.4%)	319(77.6%)
Have you ever reduced or discontinued taking your medication without consulting your physician because you had worsening symptoms while using it?			56(13.6%)	355(86.4%)
Are you sometimes, when you travel or leave home, in a hurry and forget to take your diabetes medication?			129(31.4%)	282(68.6%)
Have you taken all of your medication yesterday?			348, or 84.7%	63(15.3%)
Do you ever stop taking your medication when you think your symptoms are under control?			73(17.8%)	338(82.2%)
For some people, taking medication daily can be a real inconvenience. Do you sometimes find it difficult to follow your treatment plan?			135—or 32.8%	276, or 67.2%
How often does it get hard for you to remember to take all of your medications?			125(30.4%)	286(69.6%)
1	DIET MANAGEMENT	Maintain a low-fat diet	310(75.4%)	101(24.6%)
		Follow a complex carbohydrate diet	218(53%)	193(47%)
		Cut back on your calorie intake to help you lose weight	234(56.9%)	177(43.1%)
		Consume a lot of foods high in dietary fibre.	314(76.4%)	97(23.6%)
		Consume a large amount of fruits and vegetables—at least five servings each day.	154(37.5%)	257(62.5%)
		Consume very little sugar-filled foods (such as desserts, regular soda, and candy bars)	158(38.4%)	253(61.6%)
		My healthcare team has not given me any advice about my diet	79(19.2%)	332(80.8%)
2	PHYSICAL	Engage in light activity daily basis, such	337(82%)	74(18%)

	EXERCISE	as walking		
		At least three times a week, engage in continuous exercise for at least 20 minutes.	193(47%)	218(53%)
		Include exercise in your everyday schedule by, for instance, parking a block away and walking, or using the stairs rather than the elevator	275(66.9%)	136(33.1%)
		Exercise to a set quantity, kind, length, and intensity	157(38.2%)	254(61.8%)
		I have not been given any recommendations about exercising by my healthcare team	75(18.2%)	336(8.8%)
3	SUGAR LEVEL	Using a colour chart and a drop of blood from your finger, check your blood sugar	287(69.8%)	124(30.2%)
		Use the machine to measure your blood sugar and interpret the findings	188(45.7%)	223(54.2%)
		Test your urine for sugar	259(63%)	152(37%)
		I have not received any guidance regarding my blood or urine sugar level from my medical staff.	94(22.9%)	317(77.1%)
4	SMOKING	Did anyone inquire about your smoking status during your most recent medical visit?	173(42.1%)	238(57.9%)
		If you smoke, did someone advise you to give up at your most recent appointment with a doctor?	145(35.3%)	266(64.7%)
		Do not smoke (Never Smoke)	309(75.2%)	102(24.8%)
		When was the last time you had a cigarette? never used tobacco products	209(50.9%)	202(49.1%)
		When was the last time you had a cigarette? Over two years prior	21(5.1%)	390(94.9%)
		When was the last time you smoked a cigarette? Two to three years prior	14(3.4%)	397(96.6%)
		When was the last time you had a cigarette? Between four and twelve	15(3.6%)	396(96.4%)

		months ago		
		When was the last time you had a cigarette? Between one and three months prior	14(3.4%)	397(96.6%)
		When was the last time you had a cigarette? In the previous month	12(2.9%)	399(97.1%)
		When was the last time you had a cigarette? Now	11(2.7%)	400(97.3%)

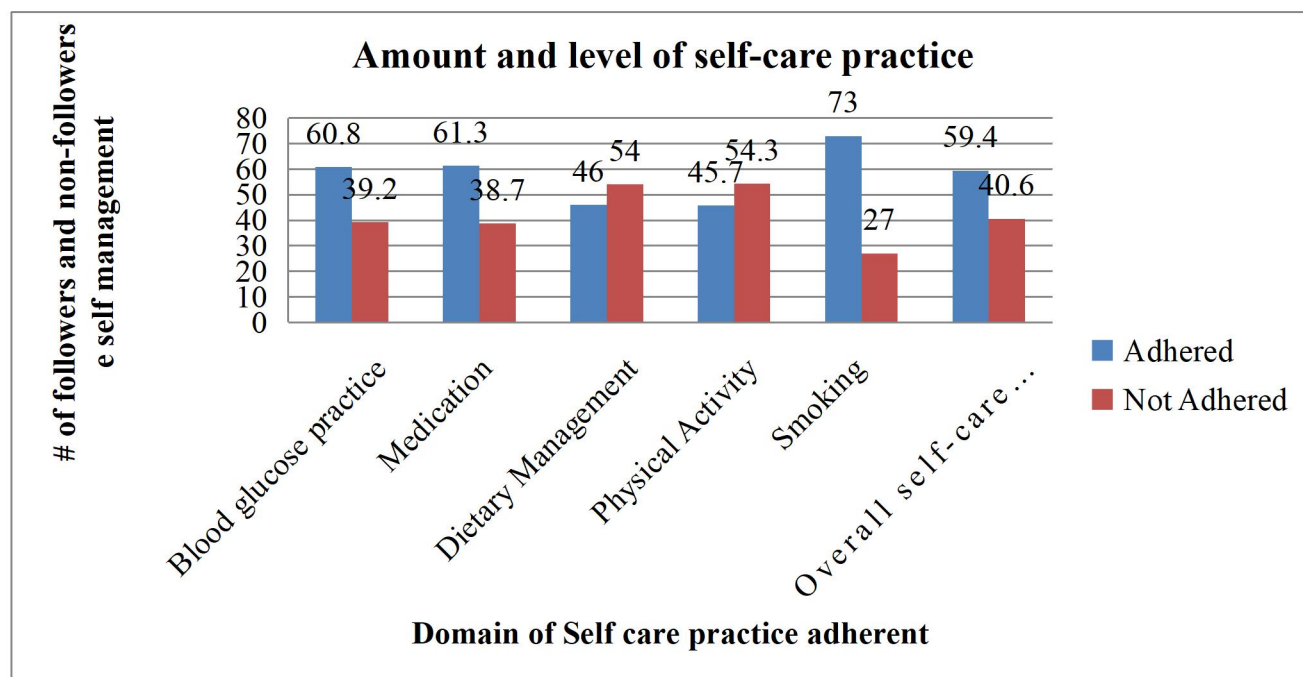


Figure 4: Bar graph illustrating the degree of self-care used by patients with type 2 diabetes mellitus who visit public hospitals in the Bale zone, Oromia region, Ethiopia, in 2024 (n = 411)

5.6. Components related to overall self-care behaviours (SDSCA)

Of the individuals, 167 (40.6%) did not practice self-care, whereas 244 (59.4%) reported doing so. A p-value of 0.2 or less in the bivariate analysis of the nine variables examined in the binary regression model indicated which variables should be included in the multivariable regression. The following variables satisfied this criterion: sex, length of diabetes, education and employment status, diabetic health education, membership in the diabetic association, monthly income, and understanding of self-care. The extent of self-care routines (SDSCA) was significantly associated with monthly income, occupational status, diabetic complications, diabetic health education, membership in the diabetic association, and self-care knowledge. Individuals who made over 1001 birr a month had a 2.39-fold higher likelihood of maintaining self-care routines compared to those who made less than 500 birr (AOR = 2.39, 95% CI: 1.19–4.80, $P < 0.014$).

Compared to people in other occupations, private employees had a 2.09-fold higher likelihood of practising self-care (AOR, 95% CI, 2.09, 1.06-4.13, $P < 0.033$). Adherence to self-care practices was consistently linked to receiving diabetes health education. The likelihood of adhering to self-care behaviours was 2.85 times higher for those who received such education (AOR, 95% CI, 2.85, 1.33-6.12, $P < 0.007$). Individuals who belonged to the diabetic association had a 1.85-fold higher likelihood of following through on self-care routines compared to those who did not (AOR = 1.85, 0.93–3.67, $p < 0.077$). Self-care practices were adhered to 2.04 times more frequently by individuals with excellent knowledge of self-care than by those with low knowledge (AOR, 95% CI, 2.04, 1.24–3.34, $P < 0.004$). Self-care behaviours were 2.68 times more common among participants without diabetes problems (AOR = 2.68, 95% CI: 1.64–4.36, $P < 0.000$). The distribution of self-care behaviours among patients in public hospitals in the Bale zone of the Oromia region, Ethiopia, is shown in Table 5 and 6.

Table 5:Improving patients' diabetic self-care habits in public hospitals in the Bale zone of Oromia region, Ethiopia (N=411)

the domain of self-care practices	Good percentage (95% CI)	Low percentage (95% CI)
Diet	46(39.4-52.5)	54(46.8-61.1)
Exercise	45.7(39.1-52.2)	54.3(47.1-61.4)
Sugar Level	60.8(53.2-68.3)	39.2(33.1-45.2)
Smoke	73(64.7-81.2)	27(21.9-32)
Medication	59.4(51.5-66.4)	40.6(34.4-46.7)
Foot care	Good 53.3%(46.2_60.3)	Poor 46.7%(40.0_53.3)
Overall Self-care practice	61.4(57.5-65.2)	38.7932.6-44.7)

A mean score of >3.6 on the SDSCA indicates good performance, while a score of less than 3.6 indicates poor performance.

$$CI = P \pm Z * \sqrt{p/n}$$

It covers aspects like diet, exercise, sugar levels, smoking, medication usage, and foot care, with percentages for favourable and unfavourable practices and their corresponding 95% confidence intervals. This data aims to offer a comprehensive understanding of self-care practices in this population across various domains.

Table 6: Variables linked to an overall self-care practices (SDSCA) level among patients with type 2 diabetes who visit government hospitals in the Bale zone, Oromia region, Ethiopia in 2024 (n = 411)

Variable	Categories	Level of SDSCA		The crude OR (95%CI))	The AOR(95%CI)
		Practicing good self-care	Ineffective self-care habits		
Gender	Men	139	106	1.31 (0.82-1.96)	1.26 (0.76-2.07)
	Women	105	61	1.	1.
Educational Status	Illiterate	58	39	1.	1.
	only able to read and write	27	39	1.30(0.65-2.62)	1.75(0.72-4.23)
	Primary	81	48	2.80(1.32-5.95)*	2.24(0.94-5.36)
	Secondary	43	23	1.15(1.00-3.56)*	1.24(0.58-2.66)
	Above grade 12	35	18	1.04(0.48-2.22)	0.99(0.43-2.27)
Monthly income	≤500 Birr	49	16	1	1
	501-1000 Birr	44	13	0.90(0.39-2.09)	0.73(0.29-1.85)
	≥ 1001 Birr	151	138	2.79(1.52-5.15)*	2.39(1.19-4.80)*
Occupation	Government	87	46	1.34(0.85-2.11)	1.25(0.71-2.19)
	Private	122	87	1.83(1.01-3.32)*	2.09(1.06-4.13)*
	*Others	35	34	1	1
Being a member of the diabetic association	Yes	45	17	1.99(1.09-3.62)*	1.85(0.93-3.67)*
	No	199	150	1	1
Duration of diabetes	<5	129	59	1	1
	5-10	65	79	0.78(0.45-1.36)	0.96(0.52-1.79)
	>10	50	29	2.09(1.19-3.68)*	1.82(0.97-3.42)*
Diabetic health education about diabetes self-care	Yes	200	156	3.12(1.56-6.24)*	2.85(1.33-6.12)**
	No	44	11	1	1
Self-care knowledge	Yes	78	80	1.95(1.30-2.93)*	2.04(1.24-3.34)*
	No	166	87	1	1
Diabetic- related long- term	Yes	112	108	1	1
	No	132	59	2.15(1.43-3.23)**	2.68(1.64-4.36)**

complications					
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*** $p < 0.001$ and $p < 0.05$ indicate statistical significance, 1- Reference categories*

*Others-----merchant, housewife, daily laborer and Student

- To adjust the model for AOR, we used techniques such as variable selection, transformation, interaction terms, and handling missing data.
- The significant candidate variables for the multivariable model at a 0.25 level are: monthly income, education, occupational status, diabetic health education, membership in the diabetic association, sex, diabetic complications, duration of diabetes, diabetes self-management knowledge

6.1: DISCUSSION

The self-care routines of individuals with type II diabetes mellitus are not well documented in Ethiopia. As a result, the goal of this study was to evaluate type 2 diabetes patients receiving care at government hospitals in Ethiopia's Bale Zone, Oromia Region for their level of self-management and related characteristics. In this survey, the age range of 50 to 59 years was found to include the majority of participants (24.1%), while the age range of 60 to 69 years comprised 20.7% of the respondents. Likewise, research conducted in Egypt revealed 66% and 44%, respectively (70).

Of the 250 responders in this survey, the majority (60.8%) followed the recommended guidelines for self-monitoring blood glucose. This result is higher than earlier research in Ethiopia (5%), India (3%), Malaysia (15%), and Nigeria (8%) but lower than the U.S.A. (78%) rate (34,46,71–73)

A Malaysian study found that SMBG practice was significantly predicted by education level, monthly income, long-term issues connected to diabetes, and marital status (70). Similarly, this study found a significant correlation between SMBG practices and education level, marital status, monthly income, and long-term issues associated with diabetes. Even though self-monitoring of blood glucose, or SMBG, is acknowledged as helpful and efficient in achieving diabetes management, this study discovered that only a small percentage of respondents with diabetes were engaging in SMBG activities. Financial obstacles preventing the acquisition of the gadget and its strips and a lack of knowledge about its significance in diabetes treatment are probably the causes of this lack of training (73).

38.7% of participants in this study were unable to take their prescribed medication as directed, which was less than the results of studies conducted in Malaysia (46%) and Nigeria (46%) (34,37). The study found a strong correlation between monthly income, adequate self-care knowledge, long-term issues connected to diabetes, and medication adherence. However, a Nigerian study found that non-adherence was substantially correlated with elements including pharmacological side effects, perceived inefficacy of prescribed drugs, and lack of financial means (34,37). According to the study, more individuals followed their medication regimen than there were non-adherents, which may have been caused by their knowledgeable attitude and favourable opinion of prescribed medications, especially insulin injections (34,37).

Merely 46% of the subjects in the study adhered to the suggested dietary guidelines (74). This is less than the rates in other nations, such as Iran (96% for males and 100% for women), Egypt (81%), and India (52% for women and 32% for men). According to the study, there could be several reasons for the lower adherence rate, including financial constraints, a skewed understanding of the value of fruits and vegetables, a lack of knowledge about healthy eating programs, and cultural and lifestyle disparities. A large number of respondents also said they were unable to create or adhere to a healthy food plan (38,45,47,72).

A study conducted in Egypt found a statistically significant correlation between married status and adherence to dietary management of diabetes; of those who were married, nearly a quarter (26%) adhered to dietary management. The study also found that longer disease duration and the 40–49 age group had a positive effect on adherence to dietary management practices(74). Similar to the previous study, this one also revealed that there was no significant correlation between people without diabetic problems and high levels of education, which may have been because of the small sample size.

Compared to studies conducted in the United Arab Emirates, where only 3% of males and 4% of females adhered to the recommended guidelines, 45.7% of respondents in this study followed the recommended guidelines for physical activity. There is a possibility that this difference in results stems from the fact that most patients do not lead sedentary lives and instead engage in physical activity daily, even if it is just taking a short walk for 30 minutes a day (45,75). That is comparable, though, to research from Malaysia (46%), and the United States (52%), where 52% of participants reported exercising once a week or more (76,77).

A study conducted in Malaysia found a substantial correlation between age, self-care behaviours, anti-hyperglycemic medication type, and education level (70). Nonetheless, this research demonstrated a strong correlation between diabetes health and monthly income, educational attainment, and employment position, instruction on diabetic self-management (70).

59.4% of participants in this research have good overall self-care routines across all dimensions. Compared to studies conducted in Finland (81%), and Iran (74%), where participants adhered to the overall self-care practice dimensions, this outcome is lower. This study's finding is lower than that of the other research; possible explanations include financial constraints, a lack of

understanding of the significance of the activities, societal variance, and lifestyle disparities (78,79). An Iranian study found that the length of diabetes, monthly income, and diabetic complications all positively correlated with the degree of self-care practice (47,79). Additionally, it was discovered that participation in the diabetic association, monthly income, employment status, diabetic problems, and diabetic health education regarding diabetes self-care is crucial for enhancing the practice of self-care. According to a Finland study, adherence to self-care behaviours was not substantially correlated with diabetic complications (80,81).

7.1 The study's strength

- The study employed KoBotool data collection software, allowing daily validity checks and prompt corrections.
- A structured interview questionnaire, adapted from a standard form after modifications and pre-testing, was used.
- This study provides essential foundational data for future research as it is the first of its kind in the study area (Bale Zone Public Hospitals).
- Ethical aspects like informed consent, confidentiality, and participant safety could have been better addressed.
- Collaboration with healthcare professionals for deeper insights into diabetes self-care practicalities and influencing factors could have been beneficial.

7.2.Limitation

- The study's use of a cross-sectional design hampers the clarity of causal relationships, as it only captures data at a single time point, hindering the establishment of cause-and-effect relations between variables.
- The narrow focus on public hospitals restricts the generalizability of findings, as variations in self-care practices across different healthcare settings may not be adequately captured.
- Data accuracy may be compromised by recall bias, as participants' ability to recall and report their self-care behaviours could introduce bias, impacting the reliability of study results.
- Socially desirable responses may skew outcomes, with respondents providing answers that align with social norms rather than their actual behaviours and challenges in managing diabetes self-care.
- The causality between behaviours and factors remains uncertain, given the absence of longitudinal data or experimental designs to establish clear links between specific self-care actions and health outcomes.
- Potential bias arises from the inadequate representation of diverse groups, as findings may not apply to populations with varying levels of diabetes management experience as the study sample lacks demographic diversity like private health and Community Health Centers.
- Long-term trends in self-care practices and their impact on health outcomes may be overlooked due to the lack of extended follow-up periods in the study.

8.1 Conclusion

It has been determined that Bale, Ethiopia T2D patients' diabetes self-care habits are insufficient. There is a substantial correlation between the overall diabetic self-care behaviours among diabetes patients at Bale Zone public hospitals and factors like socioeconomic status, access to diabetic education, membership in diabetic associations, and knowledge of self-care. These results demonstrate how people with lower salaries and non-private work need specific support and education. Encouraging membership in diabetic associations and expanding access to diabetic education are critical to promoting improved self-care behaviours. Promoting improved self-care behaviours among people with diabetes in public hospital follow-ups in Bale Zone public hospitals also requires improving self-care knowledge and offering preventative care for diabetic complications.

8.2 Recommendation

These strategies should be effectively coordinated and monitored to ensure successful outcomes among T2DM patients at Bale zone hospitals to enhance diabetic self-care practices.

- ✓ Increase access to health education by applying a multidisciplinary strategy and making use of the Information, Education, and Communication (IEC) program. This involves collaboration between healthcare professionals, public health authorities, academic institutions, and community health workers.
- ✓ Raise patients' awareness about the significance of various self-care practices and actively promote them by reinforcing the IEC. Healthcare providers, patient advocacy organizations, pharmaceutical firms, and government health agencies can do this.
- ✓ Prioritize providing diabetic education and assistance to patients, especially those with limited financial resources. Critical stakeholders for this include non-profit groups, governmental health bodies, community health centres, and social workers.
- ✓ Promote involvement in diabetic associations and enhance self-care knowledge to improve self-care behaviours among individuals with diabetes. This involves collaboration between diabetes associations, healthcare providers specializing in diabetic care, and patient support networks.
- ✓ Timely detection and management of diabetic complications are vital for encouraging adherence to self-care practices. This requires collaboration between healthcare providers such as general practitioners, endocrinologists, diagnostic facilities, and insurers offering coverage for preventive screenings.

- ✓ Future studies should use longitudinal designs to understand the relationship between self-care practices and associated factors.
- ✓ It's essential to address social desirability bias and ensure confidentiality during data collection.
- ✓ Healthcare providers can use these findings to develop interventions for T2DM patients in Bale Zone.

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Annexes

Annex I: Questionnaire

Unique Number _____

Questionnaire (English Version)

PART I:- Socio-Demographic Characteristics

S.no	Questions	Possible response	Remark
Q101	Age (in years)	_____ years	
Q102	Sex	Male 2. Female	
Q103	Marital Status	Single 2. Married 3. Divorced 4. Widowed	
Q104	Educational Status	1. Not able to read and write 2. Able to read and write only 3. Primary education /1-8/ 4. Secondary education /9-12/ 5. Above grade 12	
Q105	Occupation	1. Governmental employee 2. Private employee 3. Merchant 4. Housewife 5. Farmer 6. Daily laborer 7. Student 8. Other Specify	
Q106	Economic status(monthly income)	----- birr	

PART II –Clinical and other factors related to diabetes			
No	Questions	Possible responses	Remark
Q201	How long you have been diagnosed with diabetes Mellitus	-----years	
Q202	Do you have any diabetic-related long-term complications?	Yes No	
Q203	If your answer is yes Q202 which type of complications do have? (multiple answers are possible)	Diabetic nephropathy Diabetic neuropathy Diabetic retinopathy Diabetic foot ulcer Diabetic-related heart disease Others(specify)	
Q204	Have you ever diabetic health education about diabetes self-care	Yes No	
Q205	If your answer is yes to Q204 from where did you set health education	Doctors(others health personal) Mass media Friends or family Others(specify)	
Q206	Are you a member of the diabetic association	Yes No	

PART III – Self-care Knowledge Questionnaire				
Modifiable lifestyle (standard..Diabetes knowledge test questionnaire 18 items)				
No	Questions	Possible responses		Remark
		Yes	No	
Q301	Are you aware of the importance of maintaining a balanced diet for overall health and wellness?			
Q302	Do you understand the significance of regular physical activity in improving your lifestyle?			
Q303	Are you knowledgeable about the adverse effects of smoking and the benefits of quitting?			
Q304	Do you know the recommended guidelines for alcohol consumption and the potential risks of excessive drinking?			
Q305	Are you aware of the impact of stress on your health and the importance of stress management techniques?			
Q306	Do you understand the importance of adequate sleep for your overall well-being?			
Q307	Are you knowledgeable about the benefits of maintaining a healthy body weight?			
Q308	Do you understand the risks associated with excessive sedentary behaviour and the importance of regular movement throughout the day?			
Q309	Are you aware of the significance of maintaining good oral hygiene for overall health?			
Q310	Do you understand the importance of regular health check-ups and screenings for early detection of potential health issues?			
Q311	Are you knowledgeable about the harmful effects of prolonged exposure to the sun and the importance of using sun protection?			
Q312	Do you understand the benefits of drinking an adequate amount of water and staying hydrated?			
Q313	Are you aware of the potential risks of excessive consumption of processed foods and the benefits of choosing whole, unprocessed foods?			

Q314	Do you understand the impact of excessive caffeine intake on your health and the importance of moderation?			
Q315	Are you knowledgeable about the benefits of maintaining social connections and engaging in positive relationships?			
Q316	Do you know the importance of allocating time for relaxation and engaging in hobbies or activities you enjoy?			
Q317	Are you aware of the impact of excessive screen time on your physical and mental well-being?			
Q318	Do you understand the benefits of practising mindfulness and incorporating stress-reduction techniques into your daily life?			

Medication Adherence (8 risky item tool)

No	Questions	Possible responses		Remark
		Yes	No	
Q319	Do you sometimes forget to take your diabetes pills?			
Q320	People sometimes miss taking their medications for reasons other than forgetting. Thinking over the past two weeks, were there any days when you did not take your medicine?			
Q321	Have you ever cut back or stopped taking your medicine without telling your doctor because you felt worse when you took it?			
Q322	Are you sometimes when you travel or leave home, in a hurry and forget to take your diabetes medication?			
Q323	. Did you take all your medicine yesterday?			
Q324	When you feel like your symptoms are under control do you sometimes stop taking your medicine?			
Q325	Taking medicine every day is a real inconvenience for some people, do you ever feel hassled about sticking to your treatment plan?			
Q326	How often do you have difficulty remembering to take all your medicine?			
A consequence of uncontrolled blood sugar level (4 items)				
Q327	If blood sugar is close to normal, a person with diabetes is likely to have more energy, feel less thirsty, and urinate less often			

Q328	Prolonged high blood sugar levels can cause eye problems or even blindness			
Q329	Prolonged uncontrolled blood sugar levels can cause heart attack, stroke, and kidney problem			
Q330	Shaking, confusion, behavioural change, and sweating are signs of high blood sugar			

PART IV: SUMMARY OF DIABETES SELF-CARE ACTIVITIES QUESTIONNAIRE

The questions below ask you about your diabetes self-care activities during the past 7 days. If you were sick during the past 7 days, please think back to the last 7 days that you were not sick.

Diet

S.no	Questions	Possible response	Remark
Q401	How many of the last seven days have you followed a healthy day's eating plan?	-----Number of Days	
Q402	On average, over the past month, how many DAYS PER WEEK have you followed you're eating plan?	-----Number of Days	
Q403	On how many of the last SEVEN DAYS did you eat five or more servings of fruits and vegetables?	-----Number of Days	
Q404	On how many of the last seven days did you eat high-fat foods, such as red meat or full-fat dairy products?	-----Number of Days	
Q405	On how many of the last SEVEN DAYS did you space carbohydrates evenly through the day?	-----Number of Days	

Physical Activity

S.no	Questions	Possible response	Remark
Q406	On how many of the last seven days did you participate in at least 30 minutes of physical activity (total minutes of continuous activity, including walking)?	-----Number of Days	
Q407	On how many of the last seven days did you participate in a specific exercise session (such as swimming, walking, or working) other than what you do around the house or as part of your work?	-----Number of Days	

Blood Sugar Testing

S.no	Questions	Possible response	Remark
Q408	On how many of the last seven days did you test your blood sugar?	-----Number of Days	
Q409	On how many of the last seven days did you test your blood sugar the number of times recommended by your healthcare provider?	-----Number of Days	

Foot Care

S.no	Questions	Possible response	Remark
Q410	On how many of the last SEVEN DAYS did you check your feet?	-----Number of Days	
Q411	On how many of the last seven days did you inspect the inside of your shoes?	-----Number of Days	
Q412	On how many of the last seven days did you wash your feet?	-----Number of Days	
Q413	On how many of the last seven days did you soak your feet?	-----Number of Days	
Q414	On how many of the last seven days did you dry between your toes after washing?	-----Number of Days	

Medication

S.no	Questions	Possible response	Remark
Q415	On how many of the last seven days did you take your recommended diabetes medication?		
Q416	On how many of the last seven days did you take your recommended insulin injections?		
Q417	On how many of the last seven days did you take your recommended number of diabetes pills?		

Smoking

S.no	Questions	Possible response	Remark
Q418	Have you smoked a cigarette, even a puff, in the past seven days?	Yes No	

PART V: Self-Care Recommendations (Health Professionals Advice)**DIET MANAGEMENT seven**

Which of the following has your healthcare team (doctor, nurse, dietitian, or diabetes educator) advised you to do? Please check all that apply.

S.no	Recommendations (HQuestions	Possible response	Remark
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		Yes	No	
1.1	Follow a low-fat eating plan			
1.2	Follow a complex carbohydrate diet			
1.3	Reduce the number of calories you eat to lose weight			
1.4	Eat lots of food high in dietary fibre			
1.5	Eat lots (at least 5 servings per day) of fruits and vegetables			
1.6	Eat very few sweets (for example, desserts, non-diet sodas, and candy bars)			
1.7	I have not been given any advice about my diet by my healthcare team			

PHYSICAL EXERCISE: Which of the following has your healthcare team (doctor, nurse, dietitian, or diabetes educator) advised you to do? Please check all that apply.

S.no	Questions	Possible response		Remark
		Yes	No	
2.1	Get low-level exercise (such as walking) daily			
2.2	Exercise continuously for at least 20 minutes, at least 3 times a week			
2.3	Fit exercise into your daily routine (for example, take stairs instead of elevators, park a block away and walk, etc.)			
2.4	Engage in a specific amount, type, duration, and level of exercise			
2.5	I have not been given any advice about exercise by my healthcare team			

SUGAR LEVEL: Which of the following has your healthcare team (doctor, nurse, dietitian, or diabetes educator) advised you to do? Please check all that apply

S.no	Questions	Possible response		Remark
		Yes	No	
3.1	Test your blood sugar using a drop of blood from your finger and a color chart			

3.2	Test your blood sugar using a machine to read the results			
3.3	Test your urine for sugar			
3.4	I have not been given any advice about my blood or urine sugar level by my healthcare team			

SMOKING I have

S.no	Questions	Possible response		Remark
		Yes	No	
4.1	At your last doctor's visit, did anyone ask about your smoking status?			
4.2	If you smoke, at your last doctor's visit, did anyone counsel you about stopping smoking?			
4.3	Do not smoke. (Never smoke.)			
4.4	When did you last smoke a cigarette? never smoked			
4.5	smoke. When did you last smoke a cigarette? More than two years ago			
4.6	When did you last smoke a cigarette? One to two years ago			
4.7	When did you last smoke a cigarette? Four to twelve months ago			
4.8	When did you last smoke a cigarette? One to three months ago			
4.9	When did you last smoke a cigarette? Within the last month			
4.10	When did you last smoke a cigarette? Today			

I have completed the questions. Thank you very much!!!

Annex 2: Gaafannoo (Afan Oromo Version)

lakk.Addaa _____

KUTAA I-Socio-Demographic Characteristics

T.L	Gaafannoo	Deebii kennamuu dandaú	Yaada
Q101	Umrii (in years)	_____ Waggaan	
Q102	Saala	Dhi Du	
Q103	Haala Gaaílaa	1. Qeenxee 2. Kan fuudhe/te 3. kan hiik/te 4. ‘Dubartii haadha Warraa taate	
Q104	Haala Barnootaa	1. Kan Barreessuu fi dubbisuu hin dandeenye 2. Barreessuu fi dubbisuu kan dandahu 3. Barnoota sadarkaa duraa /1-8/ 4. Barnoota Sadarkaa 2ffaa /9-12/ 5. Daree 12 ol kan barate	
Q105	Hojii	1. Hojjataa Mootummaa 2. Hojii Dhuuunfaa 3. Daldaalaa 4. Haadha Mana 5. Qote Bulaa 6. Dafqaan Bulaa 7. Barataa 8. Kan biroo ibsi	
Q106	Haala Galii(monthly income)	----- birr	

KUTAA II –Wantoota Dhibee Sukkaaraa Wajjiin Walqabatee Fi Sababoota Biroo				
No	Gaafannoo	Deebii tahuu kan dandahu		Yaada
Q201	Qorannoo dhibee Sukkaaraa erga jalqabdanii yeroo hagamii taha?	-----Waggaadhaan		
Q202	Dhibee Sukkaaratiin walqabatee wanti isinitti dabalatan dhufe jiraa?	Eeyyee Lakkii		
Q203	Yoo gaaffii Q202 deebii isaa eeyyee jettan, kanneen keessaa 1. Sababa Dhibee Sukkaaraan kan dhufe kamtu isinirratti muldhate? (Deebii filannoo heddu deebisuun ni danda’ama)	kalee Dhukkuba Sukkaaraa Narvii Dhukkuba Sukkaaraa Dhibee ijaa Madaa’uu Miilaa Dhibee onnee Kan biroo(ibsaa)		
Q204	Waa’ee dhibee sukkaaraa fi haala fayyaa keessanii irratti barnootni fayyaa isiniif kennamee beekaa?	Eeyyee Lakkii		
Q205	Gaaffii Q204 deebiin keessan eeyyee yoo tahe,barnoota fayyaa eessatti argattan?	Doctors(Ogeeyyii fayyaa biroo) Miidiyarraa Hiriyaa ykn Maatii irraa Kan Biroo(Ibsi)		
Q206	Ati Waldaa Miseensota Dhibee Sukkaaraa keessa jirtuu?	Eeyyee Lakkii		
KUTAA III – Gaafannoo Beekumsa Hubannoo Fayyaa ofii eeggachuu irratti Qaban Akkaataa Haala jireenyaa Fooyyessuu dandahamu irratti (18 items)				
T.L	Gaafannoo	Deebii kan tahuu dandahu		Yaada
		Eeyyee	Lakkii	
Q301	Sochii Qaamaa hundi taasifamu jalqabaa fi booda irratti sadarkaan gulukosii dhiigaa safaramuu qaba			

Q302	Qorannoo Sukkaara dhiigaa ariitii(FBT) fayyadamuun tooánnoo sukkaara dhiigaa jiá 2-3 hordofuun ni dandaáma.			
Q303	Namni dhukkuba sukkaaraa qabu ilkaan isaa buruushiin dhiqachuu fi ilkaan isaa/floos gochuu qaba.			
Q304	Hoosii cimaan ykn kaalsiin nama dhukkuba sukkaaraa qabuuf hamaa miti.			
Q305	Namni dhukkuba sukkaaraa qabu jijjiirama sadarkaa sukkaara dhiiga isaa hordofuu fi deebii akka kennu isa dandeessisa			
Q306	Namni dhukkuba sukkaaraa qbu tokko akkamitti galma kaayyeffate galmaan gahuu akka dandahu karoora baasuu kan qabu hakiima qofa			
Q307	Ulfaatina qaama fayya qabeessa qabaachuun bulchiinsa dhukkuba sukkaaraa keessatti barbaachisaa miti			
Q308	Hordoffiigilukoosii dhiigaa ofumaan(SBGM)Doktoroonnii fi gareewwan eegumsa fayyaa biroo yaalaaf raga akka walitti qaban taasisa			
Q309	Doktoroota fayyaa gahumsa qabanii fi hojjetoota fayyaa biroo hospitaala keessa jiran malee Namni kamiyyuu Sukkaara dhiigaa fi dhiibbaa dhiigaa ilaaluu hin qabu.			
Q310	Sagantaa tokkotti daqiiqaa 20-30f sochii qaamaa yoo xiqqaate torbanitti guyyaa sadi qabaachuun fakkeenya barbaachisaa sochii qaamati.fkn:Deemsa Ariifata,Sochii manaa,Saayikilii oofuu,sadarkaa ol bahuu			
Q311	Namni dhukkuba sukkaaraa qabu jijjiirama ija isaa hunda doktora isaaf gabaasuu qaba.			
Q312	Namni dhukkuba sukkaaraa qabuu fi hakiimota gidduutti waliigaltee waliinii jiraachuu qaba/yoo inni ykn isheen akka akkaataa jireenya murtaaé jijjiiruu hin dandeenye			
Q313	Namni dhukkuba Sukkaaraa qabu keessumaa yeroo cirrachi miila isaa muru ,miila isaa/ishee kunuunsuu			

	dabalu qaba.			
Q314	Sochii Qaamaa yeroo hunda gochuun barbaachisummaa insulinii ykn Qoricha dhukkuba sukkaara biroo hirisa			
Q315	Namni dhukkuba sukkaaraa qabu tokko garee eegumsa fayyaa isaa irraa yeroo dhukkubni itti dhagahamu qofa gargaarsa gaafachuu qaba.			
Q316	Jalqaba yaala insuliinii nama dhukkuba sukkaraa qabuuf gorsa sirrii ykn hordoffii gilukoosii dhiiga ofii(SBGM) fi nyata nama sanaaf kennamuu qaba..			
Q317	Sigaaraa xuuxuun dhukkuba sukkaaraa hammeessuu dandaha			
Q318	Dhiibbaa dhiigaa hordofuun akka nama dhukkuba sukkaaraa qabu keessatti gilukoosii dhiigaa hordofuu barbaachisaa miti..			

Abboomamuu (8 items)

lakk	Gaaffilee	Deebii kennamuu danda'u		Yaada
		Eeyyee	Lakki	
Q319	Yeroo tokko tokko kiniinii dhukkuba sukkaaraa fudhachuu ni dagattaa?			
Q320	Namoonni yeroo tokko tokko qoricha isaanii fudhachuu irraanfatamuu malee sababa biraatiin ni hafu .Torban lamaan darban keessa yaaduun ,guyyoonni qoricha kee hin fudhanne jiraa?			
Q321	Qoricha kee yeroo fudhattu sitti hammaate waan ta'eef osoo hakiima keetti hin himiin fudhachuu kee hir'istee ykn dhiiftee beektaa?			
Q322	Yeroo tokko tokko yeroo imala ykn manaa baatu , ariifattee qoricha dhukkuba sukkaaraa fudhachuu dagattu?			
Q323	Kaleessa qoricha kee hunda fudhattee?			
Q324	Mallattoon kee to'annaa jala akka jiru yeroo sitti dhaga'amu yeroo tokko tokko qoricha kee fudhachuu ni dhiistaa ?			

Q325	Guyyaa guyyaan qoricha fudhachuun namoota tokko tokkoof rakkina dhugaati,karoora wal'aansa kee irratti maxxanuu irratti rakkinni sitti dhaga'amee beekaa?			
Q326	Yeroo meeqa qoricha kee hunda fudhachuu yaadachuu sitti ulfaata?			
Bu'aa Sadarkaa Sukkaarri Dhiigaa too'annoon ala ta'uu (4 items)				
Q327	Sukkaarri dhiigaa yeroo idileetti yoo dhiyaate namni dhukkuba sukkaaraa qabu human guddaa qabaachuu,dheebuun isaa xiqqaachuu fi fincaan baayisuun isaa yeroo xiqqaadhaf			
Q328	Yeroo dheeraaf hammi sukkaara dhiigaa olka'uu rakkoo ykn ija jaamsuu ille fiduu danda'a.			
Q329	Yeroo dheeraaf hammi sukkaara dhiigaa too'annaa ala ta'uu dhukkuba onnee ,dhiigni sammuu keessatti dhangala'uu fi rakkoo tiruu fiduu danda'a.			
Q330	Mallattooleen Sukkaara dhiigaa olka'uu Raafamni,burjaajja'uu,Jijjiiramni amalaa fi 'dafqaa			

KUTAA IV: Cuunfaa Gaaffilee Hojii Of Eeggannoo Dhukkuba Sukkaaraa

Gaaffiiwwan Armaan gadii waa'ee sochii of kunuunsuu dhukkuba sukkaaraa guyyoota 7 darban keessatti goote si gaafatu.Guyyoota 7 darban keessa yoo dhukkubsattee turte ,mee guyyoota 7 darban kan hin dhukkubsanne sanatti deebi'ii yaadi.

Nyaata

T.lakk	Gaaffilee	Deebii tahuu dandahu	Yaada
Q401	Guyyoota 7 darban keessattikaroora nyaata fayya qabeessa guyyaa meeqaaf hordofte?	-----lakkoofsa guyyootaa	
Q402	Giddugaleessaan,ji'a darbe keessa,torban keessatti guyyaa meeqa karoora nyaata nyaachaa jirtu hordofteetta?	-----lakkoofsa guyyootaa	
Q403	Guyyoota torban darban keessaa,guyyoota meeqaaf kuduraa fi muduraa shanii fi isaa ol nyaatte?	-----lakkoofsa guyyootaa	
Q404	Guyyoota torban darban keessaa guyyaa meeqaaf ,nyaata cooma baay'ee qabu kan akka foon diimaa yookiin oomishaalee aannanii cooma guutuu qaban nyaatte?	-----lakkoofsa guyyootaa	
Q405	Guyyoota torban darban keessaa guyyaa meeqaaf,nyaata kaata kaarboohydreetii walqixa addaan baafatte?	-----lakkoofsa guyyootaa	

Sochii Qaamaa

T.lakk	Gaaffilee	Deebii tahuu dandahu	Yaada
Q406	Guyyoota torban darban keessaa guyyaa meeqaaf yoo xiqqaate daqiiqaa 30'f sochii qaamaa(fkn sochii walitti fufiinsa qabu,deemsadabalatee) irratti hirmaatte?	-----lakkoofsa guyyootaa	
Q407	Guyyoota torban darban keessaa guyyaa meeqaaf waan naannoo mana keetti yookiin akka qaama hojii keetti hojjattu malee (kan akka deemsa,biskileetii oofuu) irratti hirmaatte?	-----lakkoofsa guyyootaa	

Qorannoo Sukkaara Dhiigaa

T.lakk	Gaaffilee	Deebii tahuu dandahu	Yaada
Q408	Guyyoota torban darban keessaa guyyaa meeqaaf,sukkaara dhiiga kee qoratte?	-----lakkoofsa guyyootaa	
Q409	Guyyoota torban darban keessaa guyyaa meeqaaf,sukkaara dhiiga kee yeroo ogeessi si gorse qoratte?	-----lakkoofsa guyyootaa	

Kunuunsa Miilaa

T.lakk	Gaaffilee	Deebii tahuu dandahu	Yaada
Q410	Guyyoota torban darban keessaa guyyaa meeqaaf miila kee ilaalte?	-----lakkoofsa guyyootaa	
Q411	Guyyoota torban darban keessaa guyyaa meeqaaf keessoo kophee keetii sakattaate?	-----lakkoofsa guyyootaa	
Q412	Guyyoota torban darban keessaa guyyaa meeqaaf miila kee dhiqatte?	-----lakkoofsa guyyootaa	
Q413	Guyyoota torban darban keessaa guyyaa meeqaaf miila kee jiiste?	-----lakkoofsa guyyootaa	
Q414	Guyyoota torban darban keessaa guyyaa meeqaaf,erga dhiqattee booda quba miila kee gidduu gogsite?	-----lakkoofsa guyyootaa	

Qoricha

T.lakk	Gaaffilee	Deebii tahuu dandahu	Yaada
Q415	Guyyoota torban darban keessaa guyyaa meeqaaf qoricha dhukkuba sukkaaraa si gorfame fudhatte?		
Q416	Guyyoota torban darban keessaa guyyaa meeqaaf qoricha insulini si gorfame fudhatte?		

Q417	Guyyoota torban darban keessaa guyyaa meeqaaf kiniinii dhukkuba sukkaaraa lakkoofsa si gorfame fudhatte?		
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F. Tamboo Xuuxuu

T.lakk	Gaaffilee	Deebii tahuu dandahu	Yaada
Q418	Guyyoota torban darban keessaa guyyaa meeqaaf sigaaraa,paff illee xuuxxe?	Eeyyee Lakki	

KUTAA V: Of-kunuunsuu(Gorsa ogeessa fayyaa)

Bulchiinsa Nyaataa

kanneen armaan gadii keessaa gareen eegumsa fayyaa keessanii (Doctora,Nursii,)akka wantoota armaan gadii gootan isin gorsee jiraa?.

T.Lakk	Gaaffilee	Deebii tahuu dandahu		Yaada
		Eeyyee	lakki	
1.1	Karoora nyaata cooma xiqqaa qabu hordofaa			
1.2	Nyaata kaarbohydreetii walxaxaa hordofaa			
1.3	Ulfaatina qaamaa hir'isuuf baay'ina kaalorii nyaattu hir'isi			
1.4	Nyaata Fiberii baay'ee qabu nyaadhaa			
1.5	Fuduraalee fi muduraalee yoo xiqqaate guyyaatti si'a shan nyaadhaa			
1.6	Mi'eessituu baay'ee muraasa nyaadhu(fkn nyaata mi'aawaa,karameellaa...)			
1.7	Gareen kunuunsa ogeessa fayyaa kee waa'ee nyaata kee irratti gorsa tokkollee siif hin kennine.			

SHAAKALA QAAMAA

Which of the following has your health-care team (doctor, nurse, dietitian, or diabetes educator) advised you

to do? Please check all that apply.

T.lakk	Gaaffilee	Deebii tahuu kan dandahu		yaada
		Eeyyee	lakki	
2.1	Sochii qaamaa sadarkaa gad aanaa (kan akka deemsa guyyaa guyyaan gochuu)			
2.2	Sochii qaamaa walitti fufiinsa qabu daqiiqaa 20'f torbanitti si'a sadi taasisuu			
2.3	Sochii qaamaa ,hojii guyyaa guyyaa keessanitti karoorsaa(fkn karaa dheeraa deemuu,hojii humnaa hojjachuu ,liiftii osoo hin taane miila ofiin sadarkaa bahuu)			
2.4	Hamma,gosa,yeroo fi sadarkaa sochii qaamaa murtaa'e irratti bobba'uu			
2.5	Garee kunuunsa fayyaa kootiin waa'ee sochii qaamaa gorsi tokkollee hin kennamne			

Sadarkaa Sukkaaraa

Kanneen armaan gadii keessaa gareen eegumsa fayyaa keessan (doktorri,narsii,ogeessa nyaataa,kam akka gootan isin gorse?Kan isin ilaallatu hundaa Ilaalaa

T.Lakk	Gaaffilee	Deebii tahuu dandahu		Yaada
		Eeyyee	Lakki	
3.1	Dhiiga quba keessanii fi chaartii halluu fayyadadamuun sukkaara dhiiga keessanii qoradhaa			
3.2	Bu'aa isaa dubbisuuf maashinii fayyadamuun sukkaara dhiiga keessanii qoradhaa			
3.3	Fincaan keessan sukkaara qabaachuu isaa qoradhaa			
3.4	Garee kunuunsa Fayyaa kootiin waa'ee hamma sukkaara dhiiga koo ykn fincaan koo gorsi tokko illee hin kennamne			

Tamboo Xuuxuu

T.Lakk	Gaaffilee	Deebii tahuu dandahu		Yaada
		Eeyyee	Lakki	
4.1	Daawwannaa doktora yeroo dhumaaf goote irratti,haala tamboo xuuxuu kee namni gaafate jiraa?			
4.2	Yoo tamboo xuuxxe ,daawwannaa hakiima kee isa dhumaa irratti,waa'ee tamboo xuuxuu dhiisuu namni si gorse jiraa?			
4.3	Tamboo hin xuuxinaa (Gonkumaa).			
4.4	yeroo dhumaaf yoom sigaaraa xuuxxe?			
4.5	yeroo dhumaaf yoom sigaaraa xuuxxe?(waggaa lamaan dura.			
4.6	yeroo dhumaaf yoom sigaaraa xuuxxe?(Waggaa tokkoo hanga lamaa dura)			
4.7	yeroo dhumaaf yoom sigaaraa xuuxxe?(Ji'a Afurii hanga kudha lamaa dura)			
4.8	yeroo dhumaaf yoom sigaaraa xuuxxe?(Ji'a tokkoo hanga sadii dura)			
4.9	Yeroo dhumaaf yoom sigaaraa xuuxxe?Ji'a tokkoo hanga sadii			
4.10	yeroo dhumaaf yoom sigaaraa xuuxxe?(har'a)			

Information sheet and consent form
Addis Ababa University

Participant's Information Sheet

Title of the study: DIABETES PRACTICE AND ASSOCIATED FACTORS AMONG TYPE 2 DIABETES PATIENTS ATTENDING PUBLIC HOSPITALS, IN BALE ZONE, OROMIA REGION, ETHIOPIA.

Introduction

My Name is Eshetu Zemen I came from Addis Ababa University. I am a student of Master of Field epidemiology in Addis Ababa University. I would like to inform you that you and I would have a short discussion concerning this study. Before we go to our discussion, I will request you to listen carefully to what I am going to read to you about the purpose and general condition of the study and tell me whether you agree or disagree to participate in this study.

Purpose of the study

The purpose of this study is to assess practice towards diabetes mellitus self-management and associated factors among type 2 diabetes mellitus patients at all government hospitals , Bale zone, Oromia region ,Ethiopia. This research undertaking is a postgraduate Master of field epidemiology partial fulfillment research thesis.

Procedures and participation

You are selected to be one of the participants in the study. The study will be conducted through self-administered. We are asking you for a little of your time, about 30 to 45 min, to help us in this study. Your cooperation and willingness for the interview are very helpful in identifying the problem related to the issue.

Confidentiality and Privacy

Interviewing will take place in a private. We would like to assure you that this privacy will strictly be maintained throughout. A code will be used to identify your participation and no name will be used for your responses to any of the questions that will not be given to anyone else. No reports of the study will ever identify you. If a report of results is published, only information about the total group will appear. The original data will be locked in cabinets until the data analysis carryout and no person shall access it except the PI and the advisor for data checking and cleaning purpose. It will then be destroyed securely after the research defense and final work are approved by the School of public health and academic commission and the University Senate.

Freedom to withdraw

If you want to participate in the study, you have full right to withdraw from the study any time you wish our participation/non-participation, or refusal to respond to the questions will have no effect now or in the future.

Benefits, risks, and incentives

The study does not incur any risks because of your involvement. Please be informed that there is no direct benefit in the form of incentives or money attached to your participation in this study.

Your response is essential to generate information for designing effective knowledge and practice toward diabetes self-management.

Contact persons

For any other additional information about the study, please contact the principal investigator and his advisor at the following address:

Name, address, and Tel number of PI: Name: Eshetu Zemen Tel: +251 920381723

Primary advisor: Professor Negussie Deyessa (MD, Ph.D.) Tel: +251911400059

Yimer Seid (MPH, Assistant Professor) Tel: +251911730505

Program-advisor: Mr. Yonas A. (MPH,) Tel: +251944162181

Should you be willing to agree to participate in this study, I would like to thank you for your time and for the information you are willing to share with me. If you have any questions about your rights as a study participant or questions or concerns about any aspect of the study, you may freely ask.

Addis Ababa University

Informed Consent Form

Title: DIABETES PRACTICE AND ASSOCIATED FACTORS AMONG TYPE 2 DIABETES PATIENTS ATTENDING PUBLIC HOSPITALS, IN BALE ZONE, OROMIA REGION, ETHIOPIA.

I have understood this research undertaking is a postgraduate degree partial fulfillment of a research thesis which is fully supported and coordinated by Addis Ababa University and the designated principal investigator is Eshetu Zemen. I have been fully informed in the language I understand about the research project an objective is to assess self care practice toward diabetes self-management and associated factors among type 2 diabetes mellitus patients in government Hospitals, Bale zone, Ethiopia, 2023. I have been informed that all the information I shall provide to the interviewer will be kept confidential. I understood that the research has no risk and no composition. I also knew that I have the right to withhold information, skip questions to answer, or withdraw from the study any time I have acquainted nobody will impose me to explain the reason for withdrawal. It is also enlightening there would have no effect at all on my health benefit or other administrative effect that I get from the refuge.

I have assured that the right to ask for information that is not clear about the research before and or during the research work and to contact:

- Eshetu Zemen Tel: +251 920381723

I have read this form, or it has been read to me in the language I comprehend and understood the condition stated above, therefore, I am willing and confirm my participation.

Are you willing to participate in this study? 1, Yes 2, NO

Name of data collector: _____

Signature _____ Date _____

**Annex II: Waraqaa Odeeffannoo fi Uunkaa Hayyamaa
(Consent form- Afan Oromo Version)**

UNIVERSITY ADDIS ABABAA

Mata duree Qorannichaa: Madaallii Beekumsa fi Hojii Dhukkuba Sukkaaraa Of bulchuu fi Wantoota walqabatan Dhukkubsattoota dhukkuba Sukkaaraa Gosa 2ffaa Fayyaa Uummataa Hospitaala Mootummaa Keessatti, Godina Baalee, Oromiyaa, Itoophiyaa, 2023

Hojiin qorannoo kun digrii 2^{ffaa} (Postgraduate degree) gartokkoon raawwii barruu qorannoo (Research proposal) kan guutumaan guututti kan deeggaramee fi qindoomina University Addis Ababaa ta'ee fi qorataan muummee obbo Eshetu Zaman Badaadhaa akka ta'e sirriitti beekaan ture. Waa'ee projektii qorannoo kanaa afaan hubadheen odeeffannoo guutuu argadheera. Kaayyoon tokko dhukkubsattoota dhukkuba sukkaaraa gosa 2^{ffaa} hospitaala mootummaa godina Baalee keessatti argaman beekumsaa fi shaakala akkasumas wantoota kanaan walqabatan madaaludhaa odeeffannoon ani nama gaaffii fi deebii ani godhuuf kennu hundi iccitii akka ta'u naaf himameera. Qorannoon kun balaas tahee dhiibba tokko akka hin qabne hubadheera. Akkasumas qorannoo kanaaf debii, gaaffii fi qorannicha keessaas bahuuf mirga guutuu akka qabu hubadheera.

Mirga hojii qorannoo duraa ykn yeroo qorannoo kanaa odeeffannoo ifa hin taane gaafachuuf Isheetuu Zaman lakk. Bilb. +251920381723

Uunkaa kana guutummaa isaa naaf dubbifameera ykn hubadheera, kanaaf fedhii qaba hirmaanna kootis fedhii kootiin nan mirkaneessa.

Qo'annaa kana irratti hirmaachuuf fedhiin qaba 1. Eeyyee 2. Lakki

Maqaa nama raga funaanuu _____

Mallattoo _____ Guyyaa _____

Annex III: A manual for Training data Collector and Supervisor Field Training Manual

Data Collectors and Supervisor Training Manuals

1. Introduction

I provide an overview of the purpose of the assessment and its significance in improving diabetes care in the study area. This assessment aims to identify the current gaps and challenges in diabetes care, as well as to evaluate the effectiveness of existing interventions. By understanding these factors, we can develop targeted strategies to enhance diabetes management and ultimately improve patient outcomes. The findings from this assessment will not only benefit healthcare providers and policymakers but also have a direct impact on the lives of individuals living with diabetes in the study area.

2. Objective

I clearly outline the specific goals and objectives of the data collection and assessment process. This includes identifying the key areas of focus, such as understanding the current state of diabetes care, evaluating the impact of existing interventions, and identifying areas for improvement. By clearly defining these goals and objectives, we can ensure that the data collection and assessment process is targeted and effective in addressing the needs of the study area. This will ultimately lead to more meaningful and impact outcomes for diabetes care in the community..

3. Method of the Training

I describe the training methodology, including any theoretical and practical components, as well as the expected duration of the training. This includes outlining the specific training modules, the learning objectives for each module, and the methods of delivery, such as in-person sessions, online modules, or hands-on workshops. Additionally, I provide an overview of the expected duration of the training, including the timeline for completion and any ongoing support or follow-up sessions. By clearly outlining the training methodology, we can ensure that participants have a comprehensive understanding of the learning process and are equipped to effectively apply their knowledge in diabetes care.

4. Training Schedule

I present a detailed schedule of the training sessions, including dates, times, and topics to be covered. This comprehensive schedule outlines the specific dates and times for each training session, ensuring clarity and study area for all participants. Additionally, the schedule includes a breakdown of the topics to be covered during each session, providing a clear road map for the training program. By presenting this detailed schedule, participants can effectively plan their participation and gain a thorough understanding of the content and learning objectives to be addressed throughout the training process. This level of detail contributes to a structured and well-prepared training experience, ultimately enhancing the effectiveness of the program.

5. Tools for Data Collection and Procedure

I explain the tools and techniques that will be used for data collection, as well as the step-by-step procedures for conducting the assessments. This includes a thorough overview of the specific data collection methods, such as surveys, interviews, or medical record reviews, and the rationale behind their selection. Additionally, I provide detailed explanations of the procedures involved in conducting the assessments, including how data will be gathered, recorded, and analyzed. By outlining these tools, techniques, and procedures, participants gain a clear understanding of the methodology and can effectively apply these practices in the assessment process. This level of detail ensures that the data collection and assessment activities are conducted with precision and adherence to best practices, ultimately leading to reliable and valuable findings for improving diabetes care in the study area.

6. Payment

I clarify the payment structure for data collectors and supervisors, including any incentives or bonuses based on performance. This involves outlining the specific compensation plan, including the payment rates, frequency of payment, and any additional incentives for exemplary performance. By providing clarity on the payment structure, participants can understand the financial aspects of their involvement in the data collection process, ensuring transparency and fairness. Additionally, by incorporating incentives or bonuses based on performance, we can motivate and reward individuals who demonstrate exceptional dedication and effectiveness in their roles. This approach not only fosters a sense of accountability and commitment but also contributes to the overall success of the data collection efforts.

7. Responsibilities for Participants in Data Collection Process

a) Data Collector Responsibility

- I outline the specific duties and expectations for data collectors, including ethical considerations and data quality assurance. This involves providing a comprehensive overview of the responsibilities and tasks that data collectors are expected to fulfill, such as obtaining informed consent, ensuring confidentiality, and accurately documenting data. Additionally, ethical considerations, such as respecting participant autonomy and privacy, are emphasized to uphold the ethical standards of data collection. Furthermore, I detail the measures for data quality assurance, including the importance of accuracy, completeness, and consistency in data collection processes. By clearly outlining these duties, expectations, and ethical considerations, data collectors are equipped with a clear understanding of their role and the standards that must be upheld, ultimately contributing to the integrity and reliability of the collected data.

B) Supervisor Responsibility

I define the role and responsibilities of supervisors, including oversight of data collection activities and support for data collectors. This involves outlining the specific duties of supervisors, such as monitoring the progress of data collection, ensuring adherence to protocols and ethical standards, and providing guidance and support to data collectors. Additionally, the importance of regular communication, feedback, and troubleshooting support is emphasized to facilitate a smooth and effective data collection process. By clearly defining the role and responsibilities of supervisors, we establish a framework for effective leadership and support, ultimately contributing to the success and quality of the data collection activities.

8. Description of Questionnaire

-I provide a detailed description of the questionnaire to be used, including its contents, format, and any specific instructions for administration. This includes a comprehensive overview of the questionnaire's structure, covering the specific questions, response options, and any skip patterns or branching logic. Additionally, I outline the format of the questionnaire, such as whether it will be administered in person, via phone, or through online surveys, along with any specific instructions for its administration to ensure consistency and accuracy in data collection. By offering this detailed description, participants gain a clear understanding of the questionnaire's content and administration procedures, ensuring that data collection activities are carried out effectively and in alignment with the study's objectives.

9. Data Collection Procedure

I explain the use of Kobotoolbox for data collection, including how to access, input, and manage the collected data. This involves providing a detailed demonstration of the Kobotoolbox platform, including the process of accessing the system, inputting data, and managing the collected information. I also cover how to design forms, set up data collection projects, and utilize the platform's features for data validation and quality control. Additionally, I explain the steps for accessing and exporting the collected data for analysis. By offering this comprehensive guidance, participants gain the necessary skills and knowledge to effectively utilize Kobotoolbox for data collection, management, and ultimately contributing to the success of the research study.

Annex -IV Assurance Of Principal Investigator

I, the undersigned agree to accept all responsibilities for the scientific and ethical conduct of the research project. I will provide a timely progress report to my advisor and seek the necessary advice and approval from my primary advisors in the course of the research. I will communicate timely to my advisors all stakeholders involved in the study including any source of funding for this research.

Name of the student: Eshetu Zemen

Date: January 15, 2024

Signature: 

Approval of the primary Advisor

Name of the primary advisor: Prof. Negussie Deyessa

Date: _____

Signature: _____

