Addis Ababa University College of Health Sciences, School of Public Health

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COMPILED BODY OF WORKS IN FIELD EPIDEMIOLOGY

By:

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DECEMBER 2023
ADDIS ABABA, ETHIOPIA

DECLARATION

I hereby declare that, this Field Epidemiology compiled body of work is my original work and has not presented for a degree another person in this or any other university and all source material used for this compiled body work have been duly acknowledged.

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Date_____________________________

Addis Ababa University College of Health Sciences, School of Public Health, Public Health Department

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DEPARTMENT OF PUBLIC HEALTH, Addis Ababa UNIVERSITY COLLEGE OF HEALTH SCIENCES, SCHOOL OF PUBLIC HEALTH

APPROVAL BY EXAMINING BOARD

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Abbreviation and Acronym

AOR	Adjusted Odds Ratio
AAU	Addis Ababa university
ASAR	Age-specific Attack Rate
AR	Attack rate
AIDS	Acquired Immunodeficiency Syndrome
ANC	Antenatal Care
ART	Anti-Retroviral Therapy
BCG	Bacille Calmette-Guerin
BCC	Behavioral Change Communication
CDC	Center for Disease Control and Prevention
CFR	Case Fatality Rate
CI	Confidence Interval
CFR	Case fatality Rate
COVID	Corona Varies Disease
CDC	Center for Disease Control and Prevention
CBHI	Community Based Health Insurance
CSA	Central Statistics Agency
CVD	Cardiovascular Disease
DM	Debits mellitus
EPHI	Ethiopian Public Health Institute
EPI	Expanded Program of Immunization
EC	Ethiopian Calendar

EDHS	Ethiopian Demographic and Health Survey
EFY	Ethiopian Fiscal Year
EHCRIG	Ethiopian Health Center Reform Implementation Guidelines
EPI	Expanded Program on Immunization
FP	Family Planning
EFELTP	Ethiopian Field Epidemiology and Laboratory Training Program
EPHI	Ethiopian Public Health Institute
ERB	Ethical Review Board
FMOH	Federal Ministry of Health
GC	Gregorian calendar
GBV	Gender Based Violence
GRHB	Gambella Regional Health Bureau
GPNRS	Gambella People National Regional State
HSDP	Health Sector Development Plan
HEW	Health Extension Worker
HF	Health Facility
HH	Household
HIT	Health Information Technology
HIV	Human Immunodeficiency Virus
HSTP	Health Sector Transformation Plan
HTN	Hypertension
HSDP	Health Sector Development Plan

HMIS	Health Management Information System
IgM	Immune-globulin M
IDP	Internally Displaced People
IDSR	Integrated disease surveillance response
IRS	Indoor Residual Spray
ICCM	Integrated Community Case Management of Childhood Illnesses
IDSR	Integrated Disease Surveillance and Response System
IUCD	Intrauterine Contraceptive Device
IDP	Internally Displaced People
ITN	Insecticide-treated net
IOM	International Organization for Migration
LLIN	Long-lasting insecticidal net
MAM	Moderate Acute Malnutrition
MCH	Maternal and Child Health
MOP	Malaria Operational Plan
NSP	National Strategic Plan
PCV	Pneumococcal Vaccine
PHCU	Public Health Care Unit
PICT	Provider Initiated Counseling and Test
PLWHA	People Living with HIV/AIDS
PMTCT	Preventing Mother to Child Transmission
PNC	Postnatal Care

PTB	Pulmonary Tuberculosis
PW	Pregnant Women
PF	Plasmodium Falciparum
PV	Plasmodium Vivax
PV	Polio Vaccine
PHEM	Public Health Emergency Management
PMI	President's Malaria Initiative
PPS	Probability Proportional to Size
PHEM	Public Health Emergency Management
PMI	President's Malaria Initiative
PPS	Probability Proportional to Size
PCD	Passive Case Detection
PHEM	Public Health Emergency Management
PLW	Pregnant and Lactating Women
PVP	Predictive Value Positive
RDT	Rapid Diagnostic Test
RHB	Regional Health Bureau
RRT	Rapid Response Team
RBM	Roll Back Malaria
SNNPR	South Nations Nationalities and People
SSA	Sub-Saharan Africa
SPSS	Statistical Package for Social Sciences
SRS	Systematic Random Sampling
SAM	Severe Acute Malnutrition

SBA	Skilled Birth Attendance
SPR	Slide Positivity Rate
SRS	Systematic Random Sampling
SAM	Sever Acute Malnutrition
SARS	Severe Acute Respiratory Syndrome
STI	Sexual Transmitted Infections
TTC	Tetracycline
TB	Tuberculosis
TT	Tetanus Toxoid
VCT	Voluntary Counseling and Testing
UNICEF	United Nation International Children Emergency Fund
WHO	World Health Organization
WHoFs	Woreda Health Offices
WFP	World Food Program

Executive Summary

This document contains Field Epidemiology Training Program outputs, to be submitted to the school of public health for the fulfilment of the master's degree in Field Epidemiology. This Compiled Body of Work has nine chapters and eight annexes. Reports of diseases outbreak investigations, public health surveillance data analysis, surveillance system evaluation, narrative summary of disaster situation report, manuscript and abstracts as well epidemiological project proposal with that additional output is incorporated within the nine chapters

Chapter One: We conducted two outbreak investigations and we used to descriptive and analytic epidemiology for both outbreak investigations. The first measles outbreak investigation was conducted in karat Zuria Woreda, Konso zone 2022. We found that contact history with measles cases, malnutrition individual, mother's knowledge of measles transmission and being unvaccinated for measles were increased the risk of measles infection. We recommended strengthening of measles immunization coverage, well informed community about the measles infections, treat and provision supplementary for malnutrition individuals, house to house social mobilization should be established to identify and detect unimmunized children.

The second outbreak was, malaria outbreak investigation conducted in Mengeshi Woreda, Mejininig zone, Gembella region Ethiopia 2022. Unmatched case-control study was conducted to investigate this suspected outbreak and I was the leading this investigation.

Introduction: Malaria is widespread throughout tropical and subtropical regions of the world. In Ethiopia, there are about 810(77%) districts with malaria risk with an estimated at-risk population of 53.6 million people in 2021. We investigated to describe the malaria outbreak and to identify associated risk factors in Mengishi district.

Methods: A descriptive and unmatched case control study for 92 cases and 184 controls was conducted in Mengish district from September 5 to October 28, 2021. We found 748-line list and 71 were during active cases search. All cases were identified microscopy or RDT. National standard case-definition used for case control study. Interview was conducted by using structured questionnaire. We conducted bivariate and multivariable logistic regression to identify risk factor.

Results: within two-month period a total of 1207 suspected malaria cases 840 (70%) were confirmed either by RDT or microcopy and death was not reported during this study period. from 840 confirmed malaria cases 513 (61%) were male. male and age group more than fifteen more affected than others. The median age of cases was 36 years old. The attack rate (AR) was 24/1000 population and over all positivity rate was 840 (70 %). Plasmodium falciparum was the most dominant species 819 (98%).

HH who sleeping during night were 70% time less likely to develop malaria compared to those individuals who not used ITN during night: AOR = 0.3 (0.16-0.56). Individual who appropriately manage their living environment where, 80 % less like to develop malaria compared to those individuals who did.t control their environment, AOR= 0.8(0.02-0.3), HH who had knowledge on transmission, prevention, and control of malaria (AOR = 0.41, CI 0.28–0.88). Individual history of staying outdoor during night was twenty-two time to develop having malaria compared with not staying outdoor; AOR= 12, 95% CI (10.3-49.4) were also found to be important predictors of malaria infection.

Chapter two: malaria surveillance data analysis was conducted in Gambella region between 2015 -2019. A retrospective record review data analysis was conducted. Cases and deaths were described epidemiologically, and trend of cases was also seen.

Chapter three: This malaria surveillance system evaluation was conducted in Mejining zone, Gambella region from September 2022 to October 2022. Surveillance evaluation was conducted in Mejining zone, the necessary surveillance guidelines, registers form and reporting formats were available in most health facilities. The surveillance attributes: simplicity, flexibility, acceptability, representativeness, timeliness, data quality, sensitivity, cost, predictive value positive and usefulness of the surveillance system were also assessed and presented in the chapter

We found the malaria surveillance system was acceptable, useful, simple, flexible, and representative.

Chapter four: We conducted health profile assessment in Akaki Kality Woreda, Addis Ababa. Acute upper respiratory tract infection was the first leading cause of morbidity at outpatient department followed by Non bloody diarrhea in all age (adults and pediatrics). Tuberculosis detection rate, fully vaccination and PMTCT were 100%, 93.5%, and 94% respectively. Only 80%

of households had latrines and 100% were utilized. Proportion of women receiving ANC1 was 93.6% and ANC4 was 78.96%. Among suspected COVID 19 case 55 % were tested positive. In 20119/2020 more than 41451013 ETB was allocated for the health.

Chapter five: Presents Scientific Manuscript for Peer-reviewed Journals. Investigation of measles Outbreak in karat zuria woreda SSNNPR Region, Ethiopia, January 2021/22. The manuscript was prepared according to health development center manuscript guidelines.

Chapter Six: Presents Abstracts on "The first outbreak was measles karat Zuria woreda, Konso zone SNNPR case-control study September 2021", "Malaria outbreak investigation in Mengeshi woreda, Mejininig zone, Gambella region: case-control study, October 2021. Malaria Surveillance data analysis, 2016 - 2017 and "malaria system evaluation in Mejining zone, Gambella region 2021

Chapter Seven: Includes the narrative disaster situation report. Which was rapid need assessment conducted in Mekelle zone, Tigray region on an internally displaced population. It mainly focusses on health component but also it was highlighted other non-food and food item at mean times. The assessment was conducted in the IDP site. Semi-structure question and site observation were used to extract the data. A total of 68,708 with 34,894 (52% male and rest of 33,814(48%) female, 5375 (8%) were household, 1.4 % (489) pregnant mother, 698 (3 %) were lactate mother under-five 8146(11%), 655 (3) were age group greater than 65yearsand the rest 188 disability person have been displaced as result of the conflict.

Chapter Eighty: Contain an epidemiological project protocol entitled, assessment ownership, utilization, and associated factors of Long-lasting insecticidal nets in the rural district of Gambella, Zuria, Gambella region, Ethiopia: a community based cross-sectional study. A multi-stage sampling approach will used to obtain the estimated sample size of 843 households for the study. A combination of sampling technique will be implemented to select the sampling units.

Chapter Nine: This chapter is the final chapter of the compiled body of work contain additional outputs, which are weekly epidemiological bulletin supposed to address the all-region from Week 5: January 31 – February 6, 2022, according to WHO week format. It enables them to act according to respective analysis.

Annex: In this Document, there are eight annexes containing different questionnaires and useful documents used during accomplishing the two years' residency outputs

CHAPTER I- OUTBREAK INVESTIGATIONS

1. Investigation of Measles Outbreak in Karat Zuria District, Konso Zone, SNNPR region, Ethiopia, January 2021

Abstract

Measles is a serious respiratory disease that is easily transmitted through the coughing and sneezing of the measles virus, of which humans are the only reservoir. Measles outbreaks are still very common in Ethiopia. In 2018, 16,028 cases were reported from the nine regional states and two administrative cities. This study aimed to identify factors associated with measles outbreak in the Karat Zuria district Konso zones.

Methods: We conducted a descriptive and 1:2 unmatched case-control study in Karat Zuria district from December 7/2020- January 2021. A total seventy-seven cases and 154 controls were included in this study. Standardized questionnaires adopted from WHO and employed to collect the data. We conducted bivariate and multivariable logistic regression using SPSS version 23 software.

Results: A total of 77 Measles cases were epidemiological linked to five laboratory confirmed cases. The overall attack rate was 9/10,000 population and case fatality rate were 4 %. Contact with measles case-patient (AOR= 6.4, 95% CI: 2.99-14.07), malnourished individual ;(AOR=5, 95% CI (2.29 -12.25), mother's knowledge of measles transmission (AOR= 0.29, 95%CI, and 0.57-0.92), being unvaccinated against measles (AOR =0.16, 95% CI: 0.54-0.97), were also found to be important predictors of measles outbreak (P-value <0.05 and 95% CI).

Conclusion: the measles was confirmed, and attack rate and case fatality rate were high in age group less five. Contact with measles case and malnourished individual were risk factors for contracting measles outbreak and being unvaccinated against measles and mother with good knowledge of measles transmission were identified as protective factors for this outbreak.

Key words: Measles, outbreak, Karat Zuria district, case control, Ethiopia.

Background

Measles is an acute viral illness caused by a single-stranded RNA virus belongs to the genus Morbillivirus (1). Measles is one of the most contagious of all infectious diseases with > 90% attack rates among susceptible close contacts (2). Primarily it is transmitted by respiratory droplet or airborne spray to mucous membranes in the upper respiratory tract or conjunctiva. Measles cases are infectious starting from the prodromal period (when the first symptom appears) to four days after the appearance of the rash. Measles is characterized by a generalized maculo papular rash, fever, cough, Coryza (running nose), conjunctivitis, and photophobia. The incubation period from exposure to the onset of fever is approximately 10–12 days and from the exposure to the onset of rash is 7–18 days. Though many children experience uncomplicated measles, nearly 30% of cases may develop one or more complications that are more common in young children with immune deficiency disorders, malnutrition, vitamin "A" deficiency, and inadequate vaccination (1).

Being unvaccinated against measles is a risk factor for contracting the disease. Other factors responsible for measles outbreak and transmissions in developing countries are lack of parental awareness of vaccination importance and compliance with routine immunization schedule, household overcrowding with easy contact with someone with measles, acquired or inherited immunodeficiency states and malnutrition. During outbreaks, measles case fatality rate (CFR) in developing countries are normally estimated to be 3-5%, but may reach 10-30% compared with 0.1% reported from industrialized countries. Malnutrition, poor supportive case management and complications like pneumonia, diarrhea, croup and central nervous system involvement are responsible for high measles (3).

Vaccination has reduced a global measles morbidity and mortality over the last 30 years. Despite these acknowledged sign of progress in morbidity reduction, measles is still not controlled in many parts of the Immunity against measles is acquired by infection and usually lasts throughout life (4). The World Health Organization (WHO) recommended a two-dose vaccination policy, with the first dose administered during the first year of life and the coverage to be maintained at a level of at least 90–95% to interrupt the disease transmission. In many countries, measles vaccine is included in the country's immunization program and is freely available to all. Measles is considered as potentially eliminable disease because the reservoir is exclusively human, and sensitive and specific diagnostic tests, as well as safe effective vaccines, are available. Globally,

the annual incidence of measles decreased by 75.0% from 146 to 36 cases per million population during 2000–2015 (5) (6).

Till August 2019, a total of 8,202 suspected measles cases were reported from four region: Oromia (4611 cases), Amara (703 cases), Afar (548 cases) and Somali region (2,340 cases). Southern Nations, Nationalities, and Peoples' Region (SNNPR) most of zone which is extensively affected by measles outbreak and more than third (16/21) of Woredas under this zone is affected. Measles is one of the leading causes of death among children globally, particularly in developing countries. Approximately 110,000 measles death occurred globally in 2017-mostly children under the age of 5 years.

Economic impact studies of measles outbreaks in high-income countries illustrate a high cost of measles outbreaks and response activities. According to evaluation of economic costs of a measles outbreak and response activities in Keffa Zone of Ethiopia, the economic cost of the outbreak and response was 758,869 United States dollars (US$) and household economic cost was US$29.18/case (3). Outbreak preparedness and response is one of the five core strategies in the 2012-2020 WHO strategic plans for global measles and rubella. The Africa Region as well as Ethiopia is working towards measles elimination by 2020. Ethiopia adopted these regional goals and strategies and has been taking important steps to control and ultimately to eliminate measles by 2020.

Measles outbreaks occur when the accumulated number of susceptible individuals is greater than the critical number of susceptible individuals, or epidemic threshold for a given population [3](7). Various literature on outbreak investigation showed that the possible factors for measles infections were being unvaccinated for measles, low immunization coverage, malnutrition, poor cold chain management and travel history to measles area, presence of measles case in neighbor or in the household and having contact with person with measles case Despite the increase in immunization coverage (administrative) of measles in the country, there was a widespread measles outbreak(1)

SNNPR was requested to assist the EPHI region in investigating, controlling, and preventing a measles outbreak in the Karat Zuria woreda, Konso zone. We carried out this investigation with the aim of identifying the risk factors and control and preventive measures to contain this outbreak. The investigation also helped the health office and concerned stakeholders and partners make evidence-based actions ported from different zones of SSPRN region in 2020.

Statement of the Problem

Measles is contributing for five percent of under-five mortality and one of the major causes of death and sickness of children in Ethiopia (4). In 2018, a total of 3 062 suspected measles cases have been reported across the country. From the total suspected cases reported, 857 were confirmed cases (137 laboratory confirmed, no new suspected or confirmed cases were reported. So far, the outbreaks reported are from the regions of Amara, SNNPR, Somali, and Tigray. Between January and December 2017, a cumulative total of 4 011 suspected measles cases have been reported across the country (4).

Due to the conflict between Konso and Derashe especial district health post 3 completely damaged (health post burned, materials broken and looted) and other three health posts were partially damaged. Because of the damage on crops and food stock; the food security situation is expected to deteriorate, and children are at higher risk of becoming malnourished. The occurrence of confirmed measles cases in Konso can be the other potential factor that could exacerbate the malnutrition situation both for the host and IDP communities (8).

In one of conflict affected Kebelle which in the border of Konso and Derashe, Gato, it was reported that, there was no routine immunization program as well as SIA conducted for a longer period of time which makes the displaced people at risk of outbreaks for vaccine preventable diseases (8). Due to the low immunization coverage in the host community as well as in IDP's, there is a greater risk of having outbreaks of different vaccine preventable diseases like Measles, Pertussis and others.

Objective

General objective

To investigate and identify factors associated with measles outbreak in Karat Zuria district, Konso zone, SNNR region, South Ethiopia, 2021

Specific objectives

- To confirm/verify the existence of measles outbreak
- To describe the outbreak by person, place, and time
- To identify potential risk factors of measles outbreak.

Methods

Study area

Study was conducted in Karat Zuria district, Konso zone, SNNPR, Ethiopia. Karat Zuria Woreda in Konso zone which is located 595 Kms from Addis Ababa (capital of the country) and 365Kms from Hawassa, the capital city of SNNPR. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), this Woreda has a total population of 84562, of whom 40711 are male and 44385 were female.

Study design and study period: We used descriptive cross-sectional study to describe magnitude of measles outbreak and a 1:2 unmatched case-control study design to identify the risk factors associated with measles infection.

in Karat Zuria district from December 7/2020- January 2021

Source population

All the population of Karat Zuria district were included as a source of the population.

The study population was selected from source population. All eleven-measles affected Kebelles were selected.

Sample size

Sample size was calculated by Stat Calc Epi Info version 7 by the following assumption. Based on measles outbreak investigation conducted in Sekota Zuria district (9)

Individual who contacts with measles;

- ✓ Proportion of Exposed controls = 75.5
- ✓ Proportion of exposed cases = 91.3%
- ✓ AOR= 3.4
- ✓ Confidence level=95 %
- ✓ Power =80%
- ✓ Cases=77
- ✓ Control =154
- ✓ Hence, the final adjusted sample size was 231 samples, which is assumed to be sufficient for this study

Dependent and independent variable

Dependent variable -Measles infection

Independent Variables

- Sex,
- Age,
- Occupation
- Marital status
- Knowledge of caregiver
- Vaccination status
- Nutritional status
- Contact history
- Previous exposure to Measles infection.

Case definitions

Suspected measles case: any person with fever and maculopapular (non-vesicular) generalized rash and cough, coryza or conjunctivitis (red eyes).

Confirmed measles case: a suspected case with laboratory confirmation (positive IgM antibody)

Operational Definition

Measles death: any death from an illness that occurs in a confirmed case or epidemiologically linked case of measles within one month of the onset of rash.

Good Knowledge: Sufficient knowledge: six knowledge questions were asked, and correct answers were given a score one and Incorrect answers scored zero. Those scores which are greater than the mean were classified as good knowledge(6)

The Mid-Upper Arm Circumference (MUAC) is the circumference of the left upper arm, measured at the mid-point between the tip of the shoulder and the tip of the elbow (10). According to WHO guidelines, MUAC is used to assess nutritional status and is classified as normal, moderate and sever (11)

Normal; mid upper arm circumference (muck) >13 .5 moderate (green color).

Moderate acute malnutrition (MAM), mid-upper arm circumference (MUAC) between 11.5-13.5 centimeter. (Yellow)

Severe acute malnutrition *(SAM)*; MUAC < 11.5 centimeter. (Red color)

Inclusion and exclusion criteria

Inclusion criteria

- **Cases**: residents of Karat Zuria district that had clinical signs and symptoms of measles based on the case definitions in the national measles guideline that were either laboratory confirmed or epidemiologically linked to confirmed cases.
- **Controls**: residents of Karat Zuria district who reside in the same household or neighborhood to a case and who did not fulfill measles case definitions.

  - **Exclusion criteria**

- Cases -those who were unconscious or not willing to participate in the study.
- Control -those who were not willing to participate in the study were excluded

Case and control selection technique

A total of 231 samples (77 cases and 154 controls) were included in this study. We found 55 cases that who full fill of above case definition was registered on a line-list. Then, we searched for their house for an interview, and we found 22 additional new cases during our active case search based on case definition. Two controls of the same household for one case or neighborhood who reside in the same village with cases were employed for each selected case.

Data collection

Face to face interview were conducted by using a standardized structured questionnaire to collect data for cases and control. The data collection tool was prepared by reviewing national guideline.

Five health workers (3 Health officer, 2 BScs nurse) were deployed to collect relevant data from cases and control. The questionnaire included socio-demographic characteristics, epidemiologic and, date of onsets, sign and symptoms, vaccination status, travel history, contact history, history of measles infection, care giver knowledge about measles infection. Nutritional status was measured using MUAC and interpretation based on the WHO.

Laboratory Investigation

For the purpose of the outbreak verification, seven samples were collected from measles suspects who developed typical measles signs and symptoms at begging outbreak occurred. On November 5, 2020, five (71.4%) samples were positive for IGM. The remaining 70 cases were selected for epidemiologically linked and clinical compatibility based on case definition. Based on national measles guidelines, a measles outbreak is declared when three laboratory confirmed cases and five suspected cases within one month in a defined geographic area reported.

Data Quality Control

Data quality was cheeked during data collection, coding, entry and analysis. Two days training was given for data collector. Principal investigators were close follow up data completeness and consistency and any missing variable during data collection and entering.

Data processing and analysis

For descriptive study; cleaned line list data and analyzed by Microsoft Excel 2016. Summarized data descriptive analysis presented by person, time and by using table and graph. For cases and

control. Statistical analyses were performed using SPSS version 25.0. A binary logistic regression was computed model to evaluate risk of measles infection. A multivariate followed regression model was employed to evaluate the association between risk factors and risk of measles infection. Variables significant at a p-value of 0.25 in the bivariate analysis were selected for the multivariate regression analysis. Adjusted odds ratio with a 95% confidence interval was used to declare statistically significant variables based on p-value 0.05.

Ethical Clearance

Permission to conduct the outbreak investigation was obtained from EPHI and Konzo zone health bureau and Karat Zuria district health office respectively after an official permission request letter was submitted to both health bureau and health office.

Dissemination of the result

The final result of the investigation was disseminated to Addis Ababa university school of public health, Ethiopian Public Health Institute (EPHI)/PHEM directorate, Konso zone health bureau and Karat Zuria district health office.

Results

Socio-demographic characteristics of cases and control

From total 77 measles cases, 5 cases were laboratory confirmed and 72 cases were epidemiologically linked with confirmed cases and clinical compatible with measles case. Of these, 45 (58 %) cases were males and 59 (77% were age group less than five. Of these 59 (77%) were children born from farmer family, 67 (87%) cases had no formal education, regarding to control 154 were included in this study. Of them 144(94%) were age group less than five, and most of the cases were no formal educations accounted for 120(78%).

Table 1 Socio-demographic characteristics of cases Karat Zuria district, SNNPR region, 2021

Characteristics	Case %	Controls %
Sex		
Male	45 (58%)	85(55%)
Female	32 (42%)	69(45%)
Age group		
<5 year	59 (77%)	144(94%)
6-14 year	15 (19%)	32(21%)
15-24 year	2 (3%)	4(3%)
> 25	1 (1%)	4(3%)
Marital status of caregiver		
Married	68 (88%)	142(92%)
Single	5 (6%)	6(4%)
Divorce	3 (4%)	3(2%)
Windowed	1 (1%)	3(2%)
Educational status of caregiver		
No formal education	67 (87%)	120(78%)
Primary	9 (12%)	34(22%)
secondary and above	0	1
Occupation		
Farmer	56 (73%)	132(86%)
daily labor	14 (18%)	10(6%)
merchant	2 (3%)	2(1%)
Employed	5 (6%)	8(5%)
Family size		
<5	10 (13%)	79(51%)
> 5	67 (87%)	75(49%)

Description of measles cases by person

A total of 77 were included in the investigation and the deaths were reported. Of cases, 45(58 %) were males. The overall attack rate was 9/10000 population and age specific attack rate were high in age group less than five (114/10000) population. The lowest AR were reported age group greater than 25 (0.7/10000 AR). Crude case fatality rate (CFR) was 4 % in karat Zuria district. Case fatality were high in age group less than five (AR= 5.5) and no deaths reported in age greater than five.

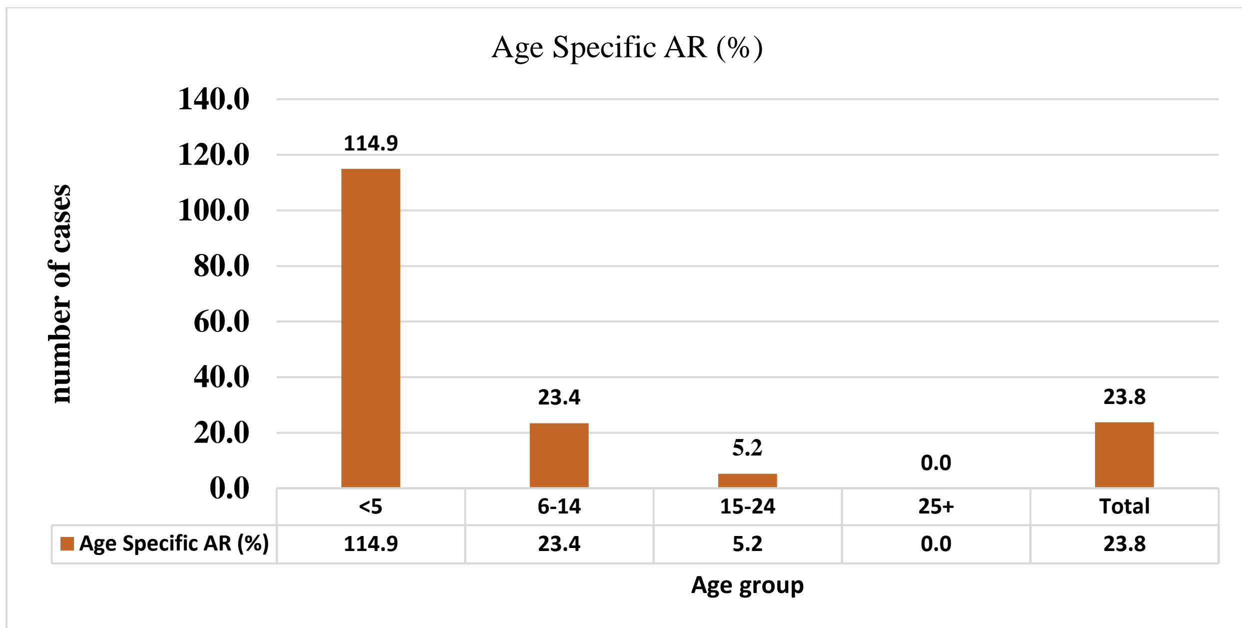

Figure 1 age specific attack rate in Karat Zuria district, Konso Zone, SNNPR in 2021

Table 2 : case fatality by age group in Karat Zuria Woreda, Konso Zone, SNNPR in 2021/ 2021

Age group	Number of deaths	Number of cases	CFR (%)
<5	3	54	5.5
6-14	0	15	0
15-24	0	6	0
25+	0	2	0
Total	3		

Clinical manifestations

All the cases had a history of having a rash and fever. The rest had developed coughs, conjunctivitis, diarrhea, coryza, and ear discharge. Of all the cases, 27 (35%) developed complications, and 18 (67%) were hospitalized. From all the complicated cases, 25 (96 %) had developed severe and moderate malnutrition.

Table 3: common symptoms encountered by persons affected of Measles outbreak in of Karat Zuria Woreda, SNNPR region, 2021.

Symptoms	Frequency	%
Fever	77	100
Rash	77	100
Coryza	61	79
Conjunctivitis	57	74
Cough	45	58
Diarrhea	25	32
Ear discharge	8	10

Nutritional status of the cases

Among total cases 25 (32%) cases had malnutrition (16 were severe malnutrition and 9 were moderate) identified by MUAC. Age group less than five years had developed malnutrition more than other age group 23 (92%), the following to age group 6-14 accounted 2 (8% cases). There was no reported malnourished cases age group greater than fifteen.

Table 4 : malnutrition status among affected of Measles cases in Karat Zuria Woreda, SNNPR region, 2021

Age group	Normal (MUAC =>13.5)	Moderate (MUAC=12.5-13.5)	Severely (MUAC< 11.5)
<5	35 (67.3)	7(77%)	16(100%)
6-14	9(17)	2 (23)	0(0%)
15-24	6(11%)	0(%)	0(0%)
25+	2(3%)	0(%)	0(0%)
Total	52	9	16

Vaccination status of the cases and control

Among total 77 cases; 63 (81 %) unvaccinated and 10% had unknown or undocumented vaccination status. The remaining 14 (19%) were reported as having history of vaccination previously, which is obtained from their vaccination card. Among vaccinated cases 30 (73%) were received first doses of vaccine and the 23 % received more than one doses during campaign. Regarding to control 89 (62%) were vaccinated and 55(38%) were not vaccinated.

Description of measles cases by place

Among total 24 Kebeles, measles cases reported in 17 Kebeles, the distribution of cases were varied Keble to Keble. The Outbreak was started in Baide Kebele and gradually spread to another nearest neighbor Keble. Among 88% cases were occurred in Baide and Gato Kebeles, which are hard to reach Kebele due to ethnic conflict it is very difficult to provide routine immunization. The

highest attack rate was reported Baide Kebele (142/10000 population followed by Gato Kebele (4.1/10000 population).

Table 5 : Description of measles cases by place in Baide Kebele, Karat Zuria Woreda, SNNPR region, 2020/2021

NO	KABALE NAME	NO cases	total population	attack rate	%
1	Baide	68	4767	142.6	88
2	Gato	2	4909	4.1	3
3	A/dera	1	3167	3.2	1
4	Jarso	1	11510	0.9	1
5	Lehayte	0	5921	0.0	0
6	Gelabo	1	1257	8.0	1
7	Masoya	0	4469	0.0	0
8	Ketama	1	2442	4.1	1
9	Mechalo	0	3701	0.0	0
10	Kolmale	1	3288	3.0	1
11	Ramole	1	3256	2.0	1
12	Tashimale	1	6362	1.6	1
13	Sorbo	0	4264	0.0	0
14	Arfaide	0	4909	0.0	0
15	Buso	0	4469	0.0	0
Total		77	68691	172.3	100

Descriptions of measles cases by time

The index case was a 20-year-old female, unvaccinated, reported from the in Bayide Kebele, Karat Zuria Woreda. She had contact with a known measles patient in Derashe Woreda. She had developed a fever and rash on December 5, 2021, and was seen at Bayide health center on December 7, 2021. The outbreak was reach peaks level in September/8/2021 and decreased after intervention started in September / 8/2021. The outbreak was controlled after October 10/10/2021.

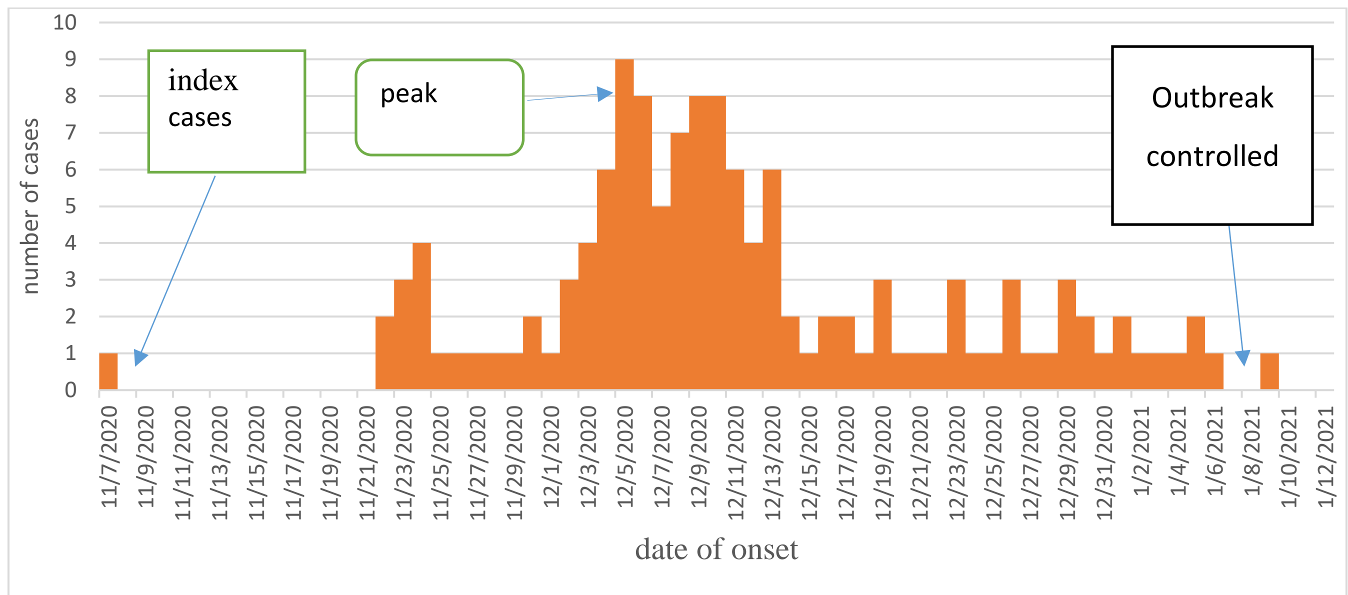

***Figure 2**: Epi-curve of the measles outbreak by date of onset, karat Zaria Woreda, and Konso zone SPPR in 2021*

Laboratory results

On November 7/2020 sample results were collected and sent to EPHI. From a total of seven samples, 5 (71.4 %) tested positive for measles IgM antibody tests. This result confirmed the existence of the measles outbreak in karat Zuria woreda.

Analytical analysis

Bivariate analysis

A bivariate logistic regression reveled that Vaccination status, Travel history, contact history, Nutritional status and Knowledge regarding measles vaccine importance had p-value less than or equal to 0.25 and selected for multivariate analysis

Table 6 : Risk factors for the outbreak of the measles, bivariate analysis in karat Zuria Woreda, Konso, SNNPR Ethiopia, and January 2021

Variables	Characteristics	Case %	Controls %	COR (95%CI)	95% CI
Sex	Female	32 (42%)	69(45%)		1
	Male	45 (58%)	85(55%)	0.87(0.65-1.98)	0.63
age group	<5 year	59 (77%)	144(94%)	1	
	6-14 year	15 (19%)	32(21%)	1.8(0.19-18.2	0.62
	15-24 year	2 (3%)	4(3%)	2(0.12-31)	0.68
	> 25	1 (1%)	4(3%)	2.07(0.22-18.9)	0.67
marital status of cases	Married	68 (88%)	142(92%)	1	
	Single	5 (6%)	6(4%)	1.43(0.14-14.0)	0.75
	Divorce	3 (4%)	3(2%)	2.5(0.19-32.94	0.48
	Windowed	1 (1%)	3(2%)	0.33(0.02-5.3)	0.43
Educational level car giver	No formal	67 (87%)	120(78%)	1	
	Primary	9 (12%)	34(22%)	1.47(0.76-2.8)	0.251
	seconder and above	0	1	6.4(1.63-25)	0.08
	Farmer	56 (73%)	132(86%)	1	

Occupation	daily labor	14 (18%)	10(6%)	3,3(1.38-7.8)	0.07
	merchant	2 (3%)	2(1%)	0.1(0.20-6.6)	0.83
	Employed	5 (6%)	8(5%)	1.4(0.46-4.70)	0.51
Contact history	Yes	46(59.7)	34(22%)	5.2 (2.8-9.4)	
	No	31(40.3%)	120 (77.9%)	1	
Know mode of	Yes	22(28%)	79(51.30%)	0.38(0.21-0.68)	
	No	55(71.4%)	75(48.7%)	1	
Malnutrition	Yes	25(32.46%)	7(4.5%)	10.09(4.012-	
	No	52(67.5%)	147(95.4%)	1	
Vaccination status	Vaccinated	14(18.18)	103 (66.9%)	0.11(0.56-0.215)	
	Not vaccinated	63(81.9%)	51(33.12%)	1	
Travel history	Yes	41(53.2%)	34(22%)	4.2(2.3-7.6)	
	No	36(47%)	120(78%)	1	

Multivariate regression analysis

Multivariate analysis indicated being vaccinated against measles and mother with good knowledge of measles transmission were identified as protective factors for this outbreak and contact with measles case and malnourished individual were risk factors for contracting measles outbreak.

Individuals who had contact history with the measles case were 6 times more risk to get measles infection than those did not have (AOR=6.4 95%, CI 2.99-14.07). Those who had malnutrition were five times more likely to be infected with measles that did not have the malnutrition (AOR= 5 95%, CI 2.29 -12.25).

Those caregivers knew about measles mode of transmission were 71 % less likely to infect with measles than those lacked knowledge about mode of transmission (AOR= 0.29 95% CI, 0.57-0.92) and individual who received vaccinate against measles were 84 % less likely to have measles that did not vaccinate (AOR= 0.16 95% CI 0.54-0.97)

Table 7 : factors independently associated with measles infection in karat Zuria, Konso zone, SNNPR region, Ethiopia, January 2021.

Variables	Category	Case	Control	(COR, 95% C.I.)	Adjusted odd ratio (95%CI)	P-value
Contact history	Yes	46(59.7)	34(22%)	5.2 (2.8-9.4)	6.4(2.99-14.07)	0.00*
	No	31(40.3%)	120 (77.9%)	1	1	
Know mode of transmission	Yes	22(28%)	79(51.30%)	0.38(0.21-0.68)	0.29 (0.57-0.92)	0.02*
	No	55(71.4%)	75(48.7%)	1	1	
Malnutrition	Yes	25(32.46%)	7(4.5%)	10.09(4.012-24.7)	5 (2.29 -12.251)	0.00*
	No	52(67.5%)	147(95.4%)	1		
Vaccination status	Vaccinated	14(18.18)	103 (66.9%)	0.11(0.56-0.215)	0.16 (0.54-0.97	0.001*
	Not vaccinated	63(81.9%)	51(33.12%)	1	1	
Travel history	Yes	41(53.2%)	34(22%)	4.2(2.3-7.6)	9 (3.53-22.97)	0.81
	No	36(47%)	120(78%)	1	1	

Discussion

Our measles outbreak investigation in the Karat Zuria Woreda revealed, measles infection was confirmed after five serum samples were positive for measles specific-IgM antibodies. That more than 57% measles cases were male and age group less than five years were predominantly affected by this outbreak. Most affected people were children born from farmer family (61 %) and age group less than five years (84%) more affected than other age group.

Based on our finding, proportion of unvaccinated children (81%) were affected in this outbreak. This was lower than study conducted, Yeman and measles outbreak investigation in Oromia Zone, Amara Region, Ethiopia, and all study participants had not vaccination history. Our study higher than study conducted measles outbreak in Western Uganda and Cameron; proportion of unvaccinated patient were 69.8 %, 35% respectively. This is because measles vaccination is critical for preventing measles infection (12).

In this outbreak investigation, all age groups affected by this outbreak, despite 59 (76 %) cases were mainly children aged group less than 5 year. Similarly, to other study conducted in measles outbreak Madagascar in, Bale zone ginner district (68.5% were <5 years), most of cases occurred among children under 5 years. Other study conducted in; Mizan Tep University reveled age group 15-24 more affected than others. This study was quite difference with our study, measles disease more affected age group less than five. Under five children were more affected in our investigation. this might be due to poor vaccination coverage in three consecutive years in the Woreda related to ongoing conflict which was left large pockets of children with unvaccinated and shortage of food (13)(14) .

In this outbreak investigation, the overall attack rate was 9/100,000, this was lower than study conducted measles outbreak investigation in Nigeria (15) ; over all attack was 50.1 / 100,000. another study conducted in Yemen overall AR was 82/ 100,000 (all cases not vaccinated)(16) but higher than measles Outbreak in Thailand 1.4 %(17) and measles outbreak in Myanmar , AR in vaccinated population was zero and not vaccinated population was 4.9 per 1000 population .

This difference might be due to income level and routine immunization capacity of health facility and weakness of the surveillance system, level of community health seeking behavior and delayed outbreak response.

Based on our study finding, over all case fatality rate were demonstrate 3.8% this were same concept line with WHO reports which case fatality rate of measles is estimated to be 3-6% in developing countries, may reach more than 10% when occurred in nutritionally and epidemic areas. Similar study conducted to Oromiya ,CFT was 3.07% ,But upper than study conducted Democratic Republic of the Congo, case fatality rate ware 1.9 and Central African Republic case fatality rate were 0.7 and lower than study conducted South Gonder zone, Ethiopia (CFR=13.4(18) . This variety could be; due to all community death not registered, early respond of outbreak and early treatment to prevent complication and effective case management following an early detection of the outbreak .(19)(20).

Multivariate analysis indicated being vaccinated against measles and mother with good knowledge of measles transmission were identified as protective factors for this outbreak and contact with measles case and malnourished individual were risk factors for contracting measles outbreak.

The result from multivariable logistic regression of case-control study showed that, individual who received vaccinate against measles were 84 % less likely to have measles that did not vaccinate. This result is supported with many study conducted in Ethiopia, Bale ginner zone, Boso bila district Amara region demonstrated which vaccinated individuals had less risk to acquire a measles infection. In other hand WHO strongly recommended vaccine is very effective at protecting people against measles and preventing the complications caused by measles diseases, People who receive one dose of measles vaccine is 93% effective against measles and two doses of vaccine are 97% effective against measles. Global measles deaths have decreased by 73% from an estimated in 2000 in 2018 (21).

Other important factor that Individuals who had contact history with the measles case were 6 times more risk to get measles infection than those did not have. This finding is supported with a study conducted in Yamane in, DR Congo, new work city and, Mizan Tep University, reveled measles occurred including the close contact , through contact with immediate and extended family members, friends, and neighbors), schools, and childcare programs. This is due to fact of nature of measles disease transmission strongly shows, respiratory droplets direct or indirect contact with nasal and throat secretions of infected persons and the secondary attack rate of measles is above 90% in the presence of susceptible individuals. When measles virus is introduced to a non-immune population, nearly 100% (22).

Those caregivers knew about measles mode of transmission were 71 % less likely to infect with measles than those lacked knowledge about mode of transmission (AOR= 0.29 95% CI, 0.57-0.92) This is in congruent with a study conducted in North Ethiopia, Bale zone, Giggii zone Bale zone Ginnir district. Many previous studies conducted in various countries were in line with knowledge level of mothers to be among the most important determinants for acquiring Measles infection, especially in under five children. This could be because mothers who are aware of the measles are more likely to feed their children and take their children to a vaccination site as soon as possible (23).

Those who had malnutrition were five times more likely to be infected with measles that did not have the malnutrition. This was agree with outbreak study in Yemen reveled; malnourished children are at risk of measles infection 24 times than normal children(16) and measles outbreak conducted in Afar , malnourished children were 3.21 times more likely to be affected by measles than children who were not malnourished. Based on need assessments in the Konso zone, due to ongoing conflict in 2020, a high influx of IDPs in Bayide Kebelle (more than five thousand IDPs). This also contributed to the burden of malnutrition in the woreda. This was consistent with other studies and guidelines that found malnutrition to be a risk factor for measles infection (12)(24).

Prevention and control measures taken

Case management: to prevent further spread and complications of measles, we treated medications with antibiotics, oral rehydration salt, tetracycline eye ointment, vitamin A).

Active case search: Despite hard-to-reach areas that required a lot of effort, active measles case search and management were conducted in all affected Kebelles of the district. Among total 77 cases, 22 were found during active cases searches.

Health information: Health education and community mobilization activities were given on measles prevention and control measures.

Vaccine campaign. After the occurrence of outbreak 15-kebeles were targeted for the mass vaccination. From total targeted (2240) under five population, 2202 (98%) of them were vaccinated during campaign.

Gaps/Challenges

The sample size was small; hard to reach Gots in the Kebelle due to ethnic conflict and due to cultural influence, some mothers/care givers might hide some measles cases. Recall bias was occurred due to absence of vaccination card that was difficult to determine the vaccination status and exact date of vaccination. There might be recall bias on the date of rash onset by the participant and their caregivers.

Conclusion: Majority of cases were male and age group less than five predominated affected by this outbreak. Attack rate and case fatality rate was high in age group less five. Contact with measles case and malnourished individual were risk factors for contracting measles outbreak and being unvaccinated against measles and mother with good knowledge of measles transmission were identified as protective factors for this outbreak

Recommendation

SNNPR region, Woreda office and health centers should improve and strengthen routine measles vaccine immunization coverage and under five years age groups should be targeted for supplementary immunization programmed for measles.

Woreda health office and health center; establish strong district surveillance system and advocate childhood vaccination/immunization by undertaking regular community-based health education campaigns.

More than one third of cases affected sever malnourished, Hence RHB should work together with other sectors and partners like save the children and UNICEF to solve the prevalence of malnutrition in the Woreda.

Woreda health office should focus to reboot the hard-to-reach immunization services and strengthen surveillance and response system.

Woreda health office should be well informed community about the ongoing measles outbreak, and house-to-house social mobilization should be established to identify and detect unimmunized children and to connect health facilities within the community

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Investigation of Malaria Outbreak in Mengeshi Woreda of Mejining Zone, Gembella Region, Ethiopia, October 2021

Abstract

Introduction: Malaria is widespread throughout tropical and subtropical regions of the world. In Ethiopia, there are about 810(77%) districts with malaria risk with an estimated at-risk population of 53.6 million people in 2021. We investigated to describe the malaria outbreak and to identify associated risk factors in Mengishi district.

Methods: A descriptive and unmatched case control study for 92 cases and 184 controls was conducted in Mengish district from September 5 to October 28, 2021. We found 748-line list and 71 were during active cases search. All cases were identified microscopy. National standard case-definition used for case control study. Interview was conducted by using structured questionnaire. We conducted bivariate and multivariable logistic regression to identify risk factor.

Results: within two month period a total of 1207 suspected malaria cases 840 (70%) were confirmed either by RDT or microcopy and death was not reported during this study period. from 840 confirmed malaria cases 513 (61%) were male. male and age group more than fifteen more affected than others. The median age of cases was 36 years old. The attack rate (AR) was 24/1000 population and over all positivity rate was 840 (70 %). Plasmodium falciparum was the most dominant species 819 (98%).

HH who sleeping during night were 70%% time less likely to develop malaria compared to those individuals who not used ITN during night; AOR = 0.3(0.16-0.56). Individual who appropriately manage their living environment where, 80 % less like to develop malaria compared to those individuals who did.t control their environment, AOR= 0.8(0.02-0.3), knowledge on transmission, prevention, and control of malaria (AOR = 0.41, CI 0.28–0.88). Individual history of staying outdoor during night was twenty-two time to develop having malaria compared with not staying outdoor; AOR= 12, 95% CI (10.3-49.4) were also found to be important predictors of malaria infection

Consolation; adult male more affected than female**.** Individual who appropriately manage their living environment, HH who sleeping under bed net during night, knowledge on transmission were

prevention factor, a. However individual history of staying outdoor during night and Individual who had mosquito breeding site risk factor malaria disease.

Introduction

Malaria is widespread throughout tropical and subtropical regions of the worlds (1) . It is a leading cause of death and disease in many developing countries, where young children and pregnant women are the groups most affected. Globally in 2018, there were approximately 228 million malaria cases and 405000 deaths. About 200 million (93%) of malaria cases and 94% malaria deaths were in the sub-Saharan Africa region. The incidence rate of malaria declined globally between 2010 and 2018, from 71 to 57 cases per 1000 population at risk (2).

In Ethiopia, there are about 810(77%) districts with malaria risk with an estimated at-risk population of 53.6 million people (3). Altitude and climate (rainfall and temperature) are the most important determinants of malaria transmission. Malaria is highly seasonal, unstable with epidemic-prone transmission pattern in many parts of the country. Major malaria transmission occurs between September and December following the main rainy season (June to September) and a second minor malaria transmission period from April to May, following a short rainy season from (February to March) (4).

Ethiopia has seen a significant decline in malaria morbidity and Mortality between 2016 and 2019.(5) Accordingly, death due to malaria has declined by 67% from 0.9 to 0.3 per 100, 000 population at risk. Similarly, the annual parasite incidence (API) has declined by 37% from 19 to 12/1000 population. This reduction is in line with the NMSP target that aims at reducing malaria cases by 40% by the end of 2020 from baseline of 2016.(5) But, according to FMOH report the number of total malaria cases in 2020 shows an increment by 515,183 cases (increased by 52%) from the 2019 malaria cases (6).

Plasmodium falciparum (70%) and P. vivax (30) are the major malaria parasites in Ethiopia. In most cases, malaria is transmitted through the bites of female Anopheles mosquitoes. Because of the nocturnal feeding habits of Anopheles mosquitoes, malaria transmission occurs primarily between dusk and dawn. The intensity of transmission depends on factors related to the parasite,

the vector, the human host, and the environment whereas, transmission is more intense in places where the mosquito lifespan is longer (7) (8).

Anopheles arabiensis is the primary malaria vector in Ethiopia, with An. funestus, An. pharoensis, and A nili as secondary vectors Malaria interventions have been intensified represented by the increased insecticide treated net (ITN) and indoor residual spraying (IRS) coverage, improved health services and improved malaria diagnosis. Main vector control activities implemented in Ethiopia include Indoor residual spraying, Long Lasting Insecticidal nets, and Larva source Reduction. However, countrywide the net coverage of HHs with at least one net was found to be 85% coverage and IRS coverage was 93% in 2019 (9).

According to Gamble region reports malaria is a major public health problem in Megeshi woreda is one malaria endemic districts of the region. There could be epidemics in high transmission areas if there is deterioration of health system, interruption of anti-malarial measures or migration of non-immune individuals, such as population movement in search of labor to these areas.

Therefore, this study aimed at investigating the causes of the outbreak in Mengish District and identifying factors associated with contracting malaria. Besides, it also tried to describe outbreak trends by person place and time and thus providing feasible recommendations of the finding to control and preventive measures towards malaria Outbreak.

Objective

General objective

- To investigate malaria outbreak in Mengish Woreda, Mejining Zone, Gembella region Ethiopia, 2021

Specific objectives

- ✓ To verify existence of malaria outbreak
- ✓ To describe malaria cases by persons, place, and time
- ✓ To determine associated risk factors with malaria outbreak in Mengish Woreda

Methods

Study areas.

Mengesh; is one of the districts in the Gambella region, Ethiopia. Part of the Mezhenger Zone, Mengesh is bordered on the south and east by the Southern Nations, Nationalities and Peoples

Region (SNNPR), on the west by Anuak Zone, on the north by the Oromiya, and on the southeast by Godere district. Based on the 2007 census conducted by the central statistical agency (CSA), this district has a total population of 20,467, of whom 10,639 are men and 9,828 women.

Study design and study period

Descriptive and unmatched 1:2 case control study was conducted in Mengesh woreda, Gambella region Ethiopia on December 23/2021- November 24/ 2021

Source population

All the populations of Mengesh district were included as a source of the population.

Study population

All the population who was malaria positive in all 11 Kebelles during the study period in Mengesh

Inclusion &Exclusion criteria

Inclusion criteria

Case: - The residents of Mengesh Woreda, those who a history of malaria symptoms and had a microscopy confirmed diagnosis of malaria from August 24/2021-October 24, 2021

Control: - The residents of Mengesh Woreda in all Kebelles during the time of the outbreak and neighbors of selected cases who did not develop signs and symptoms of malaria infection as confirmed by RDT tests

Exclusion criteria

Cases: Those who refused to participate

Control: Those who refused to participate and didn.t fulfill inclusion criteria Woreda.

Sample size determination

Using Stat-Cal embedded in Epi Info version and assuming that living within a 2 km radius of a river was a significant risk factor for contracting malaria with an odds ratio (OR) of 0.47 and 64% of controls having been exposed, using a power of 80% and a 95% confidence interval (CI) gave the minimum required sample size of 92 cases and 184 controls, Obtained from the Bena Tsemay District, Southern Ethiopia(10)

Variables

Dependent variable- Malaria confirmed cases

Independent variables

Gender, age, marital status, educational status, ethnicity, occupation, family size, ITN , IRS, housing condition, stagnant water, irrigation, intermittent river, sleeping outdoors at night, travel history to other malaria endemic areas, knowledge about malaria

Operational definition

Good Knowledge: When one answers greater or equals the mean of the questions asked, on malaria signs and symptoms, transmission, and prevention method

Poor Knowledge: When one answers less the mean of the questions asked, on malaria signs and symptoms, transmission, and prevention method.

Confirmed: Any suspected case that is confirmed by microscopy or RDT for plasmodium and p. vivax parasites.

Controls: a participant/respondent without history of malaria and had negative malaria result by RDT/Microscopy.

Malaria outbreak: increment of malaria cases in a specific week comparing to the 2nd largest of 5 years of the same weeks.

Threshold: Critical number of malaria cases that is used to confirm the emergence of malaria epidemic to step-up appropriate control measures.

Laboratory Method: Rapid Diagnostic Test (RDT) was used in the health center. Health extension workers also used RDT to identify confirmed malaria cases at health post and Community level during outbreak investigation case searching

Case and control selection technique

For case-control study, a total of 276 samples (92 cases and 184 controls) were involving in this study. We found 748 confirmed malaria cases from line list and 71 were found during active cases search. We searched two controls from the neighbor for one case and all control selected after RDT negative tastes results, who did not malaria sign and symptoms in the last two weeks. We used national standard case-definition to select cases and control from community.

Data collection technique

Data collection tool were customized from previously published in similar study. Then data was collected by using face to face interviewer administered structured questionnaire consisted of demographic data (age, sex, religion, ethnic group, marital Status, educational level and occupation, family size), clinical bases (history of treatment, sign, and Symptoms), risk factors of the disease, Environmental assessment, awareness assessment about the disease sign and symptoms, mode of transmission and prevention method was included.

Data analysis procedures

Descriptive data was analyzed by Microsoft Excel and presented by tables and graphs and figure. Description of the cases by place, person and time was done. Data were entered into EPI info 7 and exports to SPSS version 23. In the bivariate logistic regression, all variables that had $p< 0.25$ were entered into multivariable logistic regression. Adjusted odds ratio (AORs) with their corresponding confidence intervals (CIs) were used to assess the strength of associations between the outcome and predictor variables at P-value <0.05.

Data quality

Two days of training was given for data collectors on the data collection tool and process of data collection. Investigator supervised and supported data collectors during the period data collection. Investigators checked the collected data clarity, completeness and coded in every day of a period of data collections. We used laboratory registration for describing malaria cases in terms of time, place, and person

Laboratory

Suspected malaria parasites were examined by microscopic of thick for parasite density and thin blood films for identify species of parasites in the health center and RDT tastes used in health posts. During this outbreak investigation 92 malaria positive tested for RDT and 184 individual malarias tested negative for RDT were registered as control.

Environmental Assessment

More data collecting tools focused environmental and selected case-patients and controls were interviewed about stagnate water, presence container used mosquito breeding sites in their

compound and near to home within 1 radius or less than it. In addition, availability of uncovered plastic water container, old tires, and broken glasses in the home or outside the home were also critically assessed. Observation conducted on ITN and IRS operation at household level were also visited in the Kebele (village).

Ethical considerations

We obtained formal letters from EPHI to get permission from the region and the Woreda to carry out the study. Verbal consent was obtained from study participants after providing a clear information about the overall objectives of the study. Confidentiality was assured and maintained throughout the stud

Results

Description malaria by person

A total 1207 suspected malaria cases, 840 were confirmed and death was not reported. Among total confirmed malaria cases 513 (61%) were male and the rest 317 (39 %) were female. The overall attack rate was 24%. The age group greater than fifteen was the most affected group with AR of 30/1000 population. Males were more affected than females with AR of 26/1000.

Table 8 attack rate by age and sex, Mengesh Woreda, Mejining zone, Gambella region, Ethiopia 2021

Variable		Total population	total confirmed	AR/1000 population	CFR%
Sex	Male	19954	523	26	0
	Female	15237	317	21	0
	Total	35191	840	23.9	
Age	< 5	5599	84	15.0	0
	6-14	8099	108	13.3	0

	> 15	21493	648	30.1	0
	Total	35191	840	23.9	

Clinical presentation of malaria parasite

The main clinical presentation of malaria parasite among cases were fever, headache, sweating, chilling, weakens, vomiting, anorexia, cough, joint pain and rigor. More than 90% cases had history of headache and fever. Rigor and cough were less reported symptoms with 11% and 7 respectively.

Table 9 : clinical manifestation among Malaria cases in Mengesh Woreda, Mejining zone, Gambella region, Ethiopia2021

Sign and symptoms	**percentage (value)**
Headache	87 (95%)
Fever	85 (92%)
Sweating	84 (91%)
Chilling and shivering	78 (85%)
Weakness	78 (85%)
Vomiting	73 (79%)
Anorexia	72 (78 %)
Cough	23 (25%)
Muscle pain	7 (8%)
Rigor	6 (7 %)

Malaria distribution by species and positivity rate

A total 1207 suspected malaria cases, 840 were confirmed. Of them 460 (55 %) examined by RDT and 380 (45%) were confirmed by microscopy. Plasmodium falciparum was the most dominant species 819 (98%) and the rest was plasmodium Vivix. Overall positivity rate was 840 (70 %). No clinical suspected malaria cases and mixed malaria was reported.

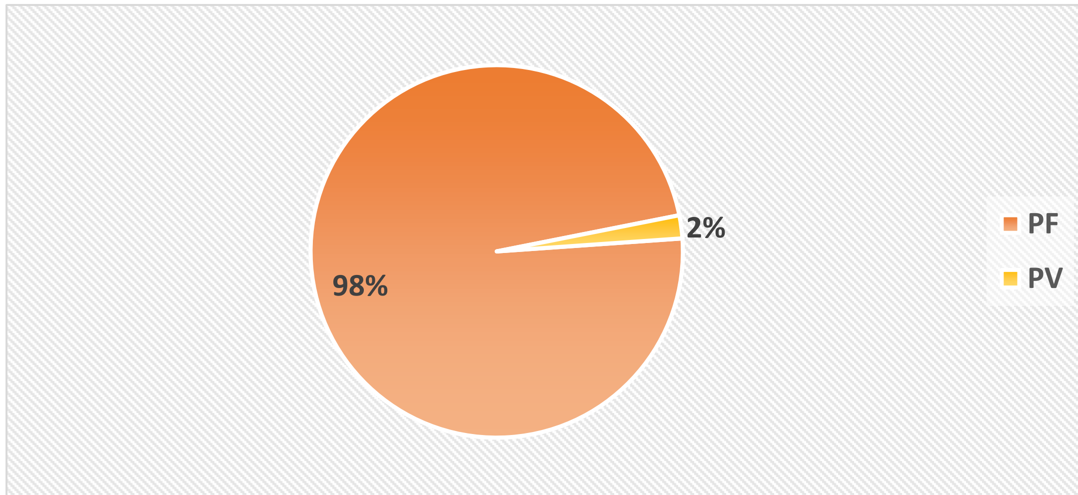

Figure 3, malaria cases by plasmodium species Mengesh Woreda, Mejining zone, Gambella region Ethiopia 2021.

Table 10 shows malaria tasted in Mengesh Woreda, Mejining zone, Gambella region, Ethiopia, 2021

Total tested			Total positive	Positivity rate
	RDT	Microcopy		
1207	460(55%)	380(45%)	840	69. 5

Descriptive epidemiology by place

The attack rate was varied with Kebeles. The highest and lowest attack rate reported in Kebele; Kokoris, Dushi, Baya, Goshine, Shone and Dope which was 5.6/100, 5/1000, 3.5/1000, 3.4/1000, 3.1/1000 respectively. Plasmodium falciparum was the most dominant species followed to PV in all Kebele. Positive rate was high in kooris Kebele which was 82% but mixed malaria was not reported.

Table 11. plasmodium species by place in Mengeshi Woreda, Mejining zone, Gambella region, Ethiopia 2020/2021.

No	Kebelles name	Total population	Plasmodium SPPS			AR /1000population
			PF	PV	Total cases	
1	Shone	2853	120 (14%)	2 (18%)	122 (15%)	43
2	Goshine	2452	113(14%)	3 (27%)	115 (14%)	40
3	Baya	1611	67(8%)	2 (18%)	69 (8%)	24
4	Dophe	3561	216 (26%)	1 (9%)	218 (26%)	76
5	Kokori	2340	77 (9%)	1 (9%)	79 (10%)	28
6	Dushi	3214	49 (6%)	0 (0%)	51 (6%)	18
7	Godare mission	2820	56 (7%)	1 (9%)	58 (7%)	20
8	Newi	3105	39 (5%)	1 (9%)	41 (5%)	14
9	Gubuti	2210	26 (3%)	0	28 (3%)	10
10	Yen	3870	29(3%)	0	31 (4%)	11
11	Ashani	3152	27 (3%)	0	29 (3%)	10
12	Kumi	3214	10 (1%)	0	12 (1%)	4

	Total		829	11	831	291

Malaria distribution by time

Malaria outbreak was verified by comparing the current year data with threshold (2nd largest number) during the previous 5 years (2017-2021.The Outbreak was started on WHO week 31/ 2021-October 10/2021. However, the Mengashi health department was notified in October 7/2021. The outbreak was peak on week 34 and decreased after intervention was conducted on weeks 36.

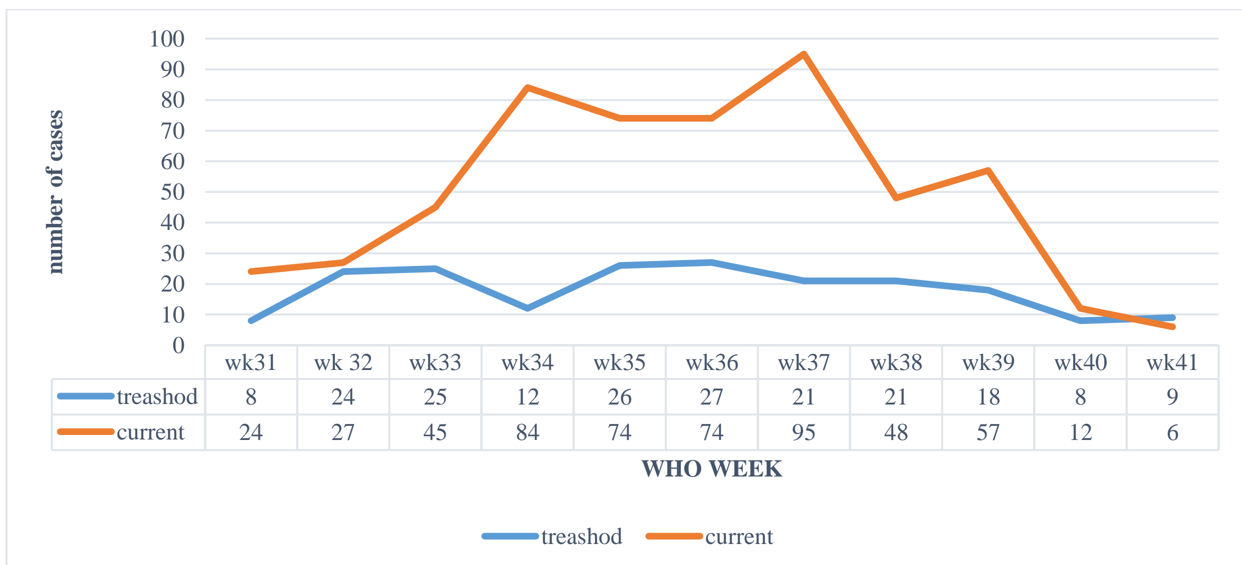

Figure 4 : Trends of malaria cases and threshold by WHO week's Mengashi Woreda, Mejininig zone, Gambella region, Ethiopia, 2021.

The malaria outbreak started on August 6, 2021, then continued until on October 10, 2021 (38 days). Epi curve shows propagated with several peak September /7/2021 and September 9/11/2021. Multi-disciplinary team reach in September 15/2021 in Mengesh Woreda. However, the outbreak has decreased after public health intervention against malaria disease started on September 22, 2021, particularly avoiding stagnant nearby houses.

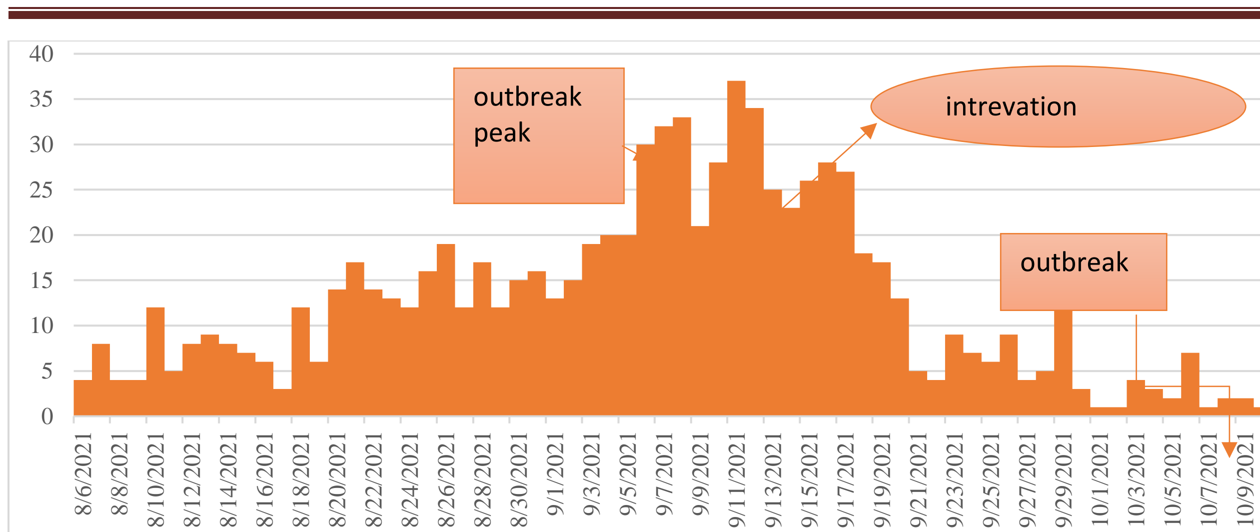

Figure 5 : Shows, Epi-curve showing confirmed malaria cases by date of onset in Mengesh district, Gambella-Ethiopia, from august 5- October 7, 2020.

Laboratory results

Microscopy and RDT laboratory tests were done for (1207) suspected malaria cases in all health center and Health posted. Of the total tested cases, 840 (70%) were positive for malaria. Among the positive cases, 819 (98 %) were *PF* and 11 (2%) *PV*. RDT used in health post and microcopy used health center level.

Environmental Assessment

ITN distribution was conducted in Woreda in 2019 to all house HHs (family's members, one bed, two people). Among our study participants, 72 percent of HHs had ITN. Of those, 67% of the HHs had at least one ITN, and 5% had two ITNs. The remaining 28% of HHs had no ITNs. Among the HHs with ITN, 36% of houses held intact ITN, 95% HH used tern or torn, 45% HH regular hanging bed net, 20% HH used only during the rainy season, and 42 % HH washed ITN per month. More than 67% of study participants reported stagnant water being available nearby.

Figure 6 : Photo of stagnant water, Larvae of mosquito, misuse of LLITN, and wrong hanging of bed net in Mengesh District, Gambella, Ethiopia, 2021

Public Health Interventions

IRS and anti-larva chemicals spraying were conducted; a total of 1384 households IRS were sprayed with Propoxur and Bendiocarb chemical and Abate chemical was sprayed as anti-larval on selected stagnant water with an estimated area of 49 m.

ITN utilization; health education was given for all people more focused on ITN utilization and malaria control and privation.

Remove of the mosquito breeding sites; all mosquito breeding sites were drained and filled by Community participation. Health professionals were mobilized and assigned to the affected village for active case search and early case management in the community.

Community mobilization and engagement; A Communities were mobilized and taught on prevention and control measures of malaria disease.

Case and control study

Socio demographic characteristics

A total of 92 cases and 184 selected controls were participated in the study to identify the risk factors for malaria disease. A total of study participants 76(82%) of cases and 105 (57 %) of controls were males. The median age (IQR) of the cases and controls were 30 years (IQR=3-68 years. 64(70%) cases and 154 (84 %) control were farmer. More than 80% cases and control were unable to read and write. Of the 61 (66%) cases and 150 (82%) were married, all 92 (100%) and 134 (72%) control were Mejining.

Table 12 : Socio demographic characteristics of cases and control

Variable		Ill	
		Case N (%)	Control N (%)
Sex	Male	76(83%)	105(57%)
	Female	16(17%)	79(42%)
Age	<5	15(16.3)	28(15.2)
	5-14	14(15.2)	28(15.2)
	>=15	63(68.4)	128(69.5)
Ethnicity	Mejenger	92(100.0%)	165(97.4%)
	Others	0(0.0%)	19(11%)
Religion	Protestant	73(79%)	130(70%)
	Others	19(21 %)	56(30%)
Marital status	Married	61(66 %%)	151(82%)
	Others	31(44%)	33(18%)
Educational status	None	60(65%)	89(48%)
	Primary	19(20%)	55(30%)

	Secondary and above	13(14%)	40(21%)
Family size	<=6	44(47%)	95(52.0%)
	>6	48 (53	89(48%)
Occupation	Farmer	64(70 %)	154(84%)
	Student	19(21%)	19(10%)
	Government	9(10%)	5(3%)
	Others	0(%)	6(3 %)

Risk factor analysis

Bivariate analysis

In bivariate analysis, Occupation, sex, history malaria infection, use of ITN, stay outdoor during night, environmental management or avoid and stagnant water and knowledge on transmission, prevention and control of malaria had less p value < 0.05 selected for multivariate analysis.

Table 13 : Bivariate analysis of factors for malaria parasite in Mengashi Woreda, Mejininig zone, Gambella region, Ethiopia, 2021.

Factor	Classification	Case N (%)	Control N (%)	COR (95%CI)	P value
Age (in year)	<5	15(16.3 %)	28(15.2%)	1	
	14-May	14(15.2%)	28(15.2%)	1.0(0.4-2.6%)	0.88
	≥15	63(68.4%)	128(69.5%)	1.1(0.5-2.1%)	0.811
Educational level	Primary	25(27.1%)	36(19.5%)	0.8(0.3-1.8%)	0.658
	Secondary	28(30.4%)	53(28.8%)	0.5(0.2-1.1%)	0.119
	College or above	14(15.2%)	38(20.6%)	0.6(0.3-1.4%)	0.356
	Illiterate	25(27.1%)	57(30.9%)	1	

Availability of mosquito breeding site	Yes	44(47.8%)	25(13.6%)	5.8 (3.2-10.4%)	0.001*
	No	48(52.2%)	159(86.4%)	1	
Using insecticide bed net	Yes	15(16%)	72(39%)	0.3(0.16-0.56%)	001*
	No	77(84%)	112(61%)	1	
Environmental control	Yes	54(58%)	158(85%)	0.23(0.13-0.4)	0.00*
	No	38(42%)	26(15%)	1	
Stay outdoor at night	Yes	80(87%)	.52(26%)	16(8.5-33.6%)	0.00*
	No	12(13%	132(74%)	1	
Knowledge	Yes	44(48%)	122(66%)	0.46(0.28-0.77%)	
	NO	48(52%)	62(34%)	1	0.01*
Sex	Male	76(82%	105(57%)	3.5(1.9-6.5)	0.04*
	Female	16(18%)	79(43%)	1	

A multivariate logistic regression

The multivariate regression analysis found that HH who sleeping during night were 70%% time likely develop to malaria compared to those individuals who not used ITN during night AOR = 0.3(0.16-0.56). Individual who did appropriately controlled their living environment where, 66% less like to develop malaria compared to those individuals who did.t control their environment, AOR= 0.8(0.02-0.3), knowledge on transmission, prevention, and control of malaria (AOR = 0.41, CI 0.28–0.88). Individual who had mosquito breeding site were five time odd of having malaria parasite with compeer who hadn.t (AOR= 4.5 95%CI 2.1-9.4), Individual history of staying outdoor during night were twelve time more to develop having malaria compared with not staying outdoor; AOR= 12, 95% CI (10.3-49.4) were also found to be important predictors of malaria infection (P-value <0.05 and 95% CI).

Table 14: multivariate analysis of factors for malaria parasite in Mengashi Woreda, Mejining zone, Gambella region, Ethiopia, 2021

Factor	Classification	Case N (%)	Control N (%)	COR (95%CI)	AOR	P value
Availability of mosquito breeding site	Yes	44(47.8%)	25(13.6%)	5.8 (3.2-10.4%)	4.5 (2.1-9.4)	0.001*
	No	48(52.2%)	159(86.4%)	1	1	
Using insecticide bed net	Yes	15(16%)	72(39%)	0.3(0.16-0.56%)	0.3(0.16-0.56)	001*
	No	77(84%)	112(61%)	1	1	
Environmental control	Yes	54(58%)	158(85%)	0.23(0.13-0.4%)	0.34(0.14-0.81)	0.00*
	No	38(42%)	26(15%)	1	1	
Stay outdoor at night	Yes	80(87%)	.52(26%)	16(8.5-33.6%)	12.6(10.3-49.4)	0.00*
	No	12(13%	132(74%)	1	1	
Knowledge	Yes	44(48%)	122(66%)	0.46(0.28-0.77%)	0.416(0.20-0.86)	0.01*
	NO	48(52%)	62(34%)	1		
Sex	Male	76(82%	105(57%)	3.5(1.9-6.5)	1.5(0.67-3.47)	0.08
	Female	16(18%)	79(43%)	1		

Discussion

This malaria outbreak was investigated in Mengesh Woreda, more focused on describing of the magnitude of malarias outbreak and identify risk factors in district. In this study, malaria outbreak verified after current year weekly malaria reported data with compered with thresh hold of previous the same weeks of five year from 2017-20221.

The overall attack rate of this district was 24/1000 population, this study lower outbreak than outbreak investigation in Uganda, overall attack rate was [AR] = 65/1000) and malaria attack rate of the catchment population was 33.1 per 1000 population (11). This study higher than Laelay Adyabo district northern Ethiopia AR was 12/1000 (12) . The high attack rate in this study might be the area is known high burden of malaria, outbreak occurred in two concoctive year (2020, 2021) and area difference in the burden of malaria and duration of the illness. This area is known as high transmission area for malaria and the duration of illness was long compared to other studies.

In this study male sex more affected than female with AR of 30 per 100 population (13) . This study different to Simada Amara region, Zimbabwe, Ungand female more affected than male. Similar our study conducted Adebayo district northern Ethiopia male more affected than female (14)(15). This study might be due to majority of the male were more speeding outdoors for agriculture, coffee farming keeping of cattle and traditional hunting wild animals than females.

In this study more than 98% malaria cases were infected by Plasmodium falciparum. This is similar with the done in Bunshagul Gumuz, district northern Ethiopia Adebo district, Tanquae Abergelle district, Tigray region, and Uganda reveled Plasmodium falciparum were the most dominate sepsis. But, different from the studies done in southern Ethiopia, and Jima, predominant species was Plasmodium vivax. This might be due to variation in epidemiological distribution of plasmodium species in different parts of the world that might be attributed by geo-spatial variability (8)(16) .

Result from multivariable logistic regression of case-control study showed that, individual who stay outdoor during night, absence stagnant water near to house less 1 radius, sleeping under bed net during night and having of knowledge malaria transmission factors independently associated with malaria parasite.

Individual staying outdoor during nighttime were twenty-two time of developing malaria competing with individual who did not spent more time during night. This finding was similar study conducted Tanquae Abergelle district, Tigray region nighttime outdoors were significant associated with malaria transmission risk factors. This might be due to a nature of female anopheles mosquito more mobile and bite human being at night time(8).

Individual who slept under LLIN two weeks before symptom onset was 70 % less likely to have malaria compared to those individuals who do not sleep LLIN. This study supported other study in Kenya individual who utilize ITN had a reduced risk of malaria infection compared to those who do not utilize ITN. Hence a nature of ITNS is known to kill mosquitoes and have proven repellent properties that reduce the number of mosquitoes that enter the house. Individual who optimum utilized ITN 70 % protection compared with not used nets correctly (11). (WHO)

Individual who had mosquito breeding site were five time odd of having malaria parasite with compeer who had not. This similar study conducted in Zimbabwe reported the association of staying close to such water sources and contracting malaria. This can be described from the fact that they are more infected to mosquito bites, because; flat landscape of this area easy to hold water after raining, hence due to stagnant water sustainable for mosquito bearding and increase misquote density, chance of mosquito bite is high (14).

Individual who has Knowledge malaria transmission, prevention and control of malaria were 66% less likely develop than who do not have knowledge transmission and control of malaria. This study supported study conducted Nigeria reveled those that had low knowledge of malaria signs and symptoms were two times more likely to develop malaria compared to those that had high knowledge levels of the signs and symptoms of Malaria(17).

Conclusion

Adult male more affected than female**.** Individual who appropriately manage their living environment, HH who sleeping under bed net during night, knowledge on transmission were revention factor. However individual history of staying outdoor during night and Individual who had mosquito breeding site risk factor malaria disease

Recommendation

- ✓ Gamble region and Mengesh district health office should be early distributed insecticide treated bed net for all households. Should applied indoor residual spray all household of district twice per year before and after rainy season.
- ✓ Avoided potential mosquito breeding site by community mobilization and awareness creation should conduct sleeping under bed net during, minimize stay outdoor during nightie
- ✓ Larviciding should apply selective stagnant water near bay home which is potential mosquito breeding.
- ✓ Some people use bed net for other purpose, so health education and monitoring system strengthened in the community by HEW.

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Chapter II MALARIA DATA ANALYSIS

2. Five Years Malaria Surveillance Data Analysis of Gambella region (2015-2019), February 2020

Abstract

Background: Malaria is an acute febrile illness caused by Plasmodium parasites. Malaria remains to be a serious public health problem causing very large mortality, and morbidity. Children aged less than 5 years are the most vulnerable group affected by malaria. Most malaria cases in 2018 were in the World Health Organization (WHO) was African Region with (213 million or 93%). Malaria endemic countries are known to have lower economic growth. Ethiopia is one of the few countries with epidemiological pattern of malaria transmission is generally unstable. The objective ongoing Malaria Surveillance is to support reduction of the burden of malaria, eliminate the disease and prevent its re-establishment. The strategy sets the target of reducing global malaria incidence and mortality rates by at least 90% by 2030.

Methods: Descriptive cross-sectional study was conducted in Gambella Regional state. The data on malaria indicators were collected from Public Health Emergency Management core process (PHEM) database from Jan 2015 to Dec 2019. The five years malaria data was collected; organized; processed and analyzed by using Microsoft excel 2010.

Results: A total of 770,453 malaria suspected cases were reported among the reported cases 409,176 were a total of both (clinical + parasitological confirmed cases). Malaria detection rate from total suspected fever examined by RDT/ microscopy and clinical case were 46%. An average total malaria prevalence rates were 188 per 1000 person. The five years proportion of plasmodium falciparum and Vivax were 91: 9% respectively. The case fatality rate (CFR) was high in (2015) with 35.5per 1,000 persons. The highest malaria cases were observed during two seasons: summer and spring.

Conclusion: Even though different malaria control strategies were designed to roll back to its minimum level, still malaria cases were not decreased as expected level. Malaria continued to be a major cause of health problem in Gambella Regional state. Therefore, the regional health office should strength malaria prevention and control activity.

Keywords: Surveillance; Data analysis; Malaria; Ethiopia; Gambella regional state

Introduction

Malaria is an acute febrile illness caused by Plasmodium parasites. The parasites are spread to people through the bites of infected female Anopheles mosquitoes, called "malaria vectors." There are 5 parasite species that cause malaria in humans, and 2 of these species are P. falciparum and P. vivax – pose the greatest threat.

In a non-immune individual, symptoms usually appear 10–15 days after the infective mosquito bite. The first symptoms – fever, headache, and chills – may be mild and difficult to recognize as malaria. If not treated within 24 hours, P. falciparum malaria can progress to severe illness, often leading to death (1).

In 2018, an estimated 228 million cases of malaria occurred worldwide (95% confidence interval [CI]: 206–258 million), compared with 251 million cases in 2010 (95% CI: 231–278 million) and 231 million cases in 2017 (95% CI: 211–259 million). In 2018, there were an estimated 405,000 deaths from malaria globally, compared with 416,000 estimated deaths in 2017, and 585,000 in 2010. Children aged less than 5 years are the most vulnerable group affected by malaria. In 2018, they accounted for 67% (272,000) of all malaria deaths worldwide (2).

The incidence rate of malaria declined globally between 2010 and 2018, from 71 to 57 cases per 1000 population at risk. However, from 2014 to 2018, the rate of change slowed dramatically, reducing to 57 in 2014 and remaining at similar levels through to 2018 (2).

Most malaria cases in 2018 were in the World Health Organization (WHO) African Region (213 million or 93%), followed by the South-East Asia Region with 3.4% of the cases and the Eastern Mediterranean Region with 2.1% (2).

Malaria endemic countries are known to have lower economic growth (3). Ethiopia is one of the few countries with epidemiological pattern of malaria transmission is generally unstable and seasonal, the level of transmission varying from place to place because of differences in altitude and rainfall patterns. It usually occurs at altitudes < 2,000 m above sea level. Occasionally, transmission of malaria occurs in areas previously free of malaria, including areas > 2,000 m above sea level. For transmission of malaria parasite, climatic factors are important determinants as well as non-climatic factors that can negate climatic influences. Indeed, there is a scarcity of

information on the correlation between climatic variability and malaria transmission risk in Ethiopia (4).

Malaria is a leading public health problem and ranked at the top of hospital-based admissions, outpatient visit and mortality in the country. It is estimated that about 75% of the total area of the country and 65% of the population is at risk of infection. P. falciparum and P. vivax are the main two species accounting for 60% and 40% of malaria cases, respectively.

Major progresses have been made to improve the health status of the population through reducing the burden of malaria: But it is still among the 10 top leading causes of morbidity and mortality in children under the age of five and adults (5,6).

In Gambella regional state, malaria is endemic to the countries and one of the region's top three causes of sickness and death. The 2015 Malaria Indicator Survey indicated that malaria prevalence is higher in Gambella (18.4%) than in any other region in Ethiopia (national average of 1.2%). In 2017, Gambella health facilities reported 102,053 cases of malaria and 13 malaria deaths (7).

The Global Technical Strategy for Malaria (2016 – 2030) was adopted by the World Health Assembly in May 2015. It provides a comprehensive framework to guide countries in their efforts to accelerate progress towards malaria elimination. The strategy sets the target of reducing global malaria incidence and mortality rates by at least 90% by 2030 (8).

Ongoing Malaria Surveillance is therefore the basis of operational activities in settings of any level of transmission. Its objective is to support reduction of the burden of malaria, eliminate the disease and prevent its re-establishment. In settings in which transmission remains relatively high and the aim of national program is to reduce the burdens of morbidity and mortality, malaria surveillance is often integrated into broader routine health information systems to provide data for overall analysis of trends, stratification, and planning of resource allocation. In settings in which malaria is being eliminated, the objectives of surveillance are to identify, investigate and eliminate foci of continuing transmission, prevent, and cure infections and confirm elimination. After elimination has been achieved, its role becomes that of preventing re-establishment of malaria (9).

A malaria surveillance system comprises the people, procedures, tools, and structures necessary to generate information on malaria cases and deaths. The information is used for planning, implementing, monitoring, and evaluating malaria program. An effective malaria surveillance

system enables program managers to: identify and target areas and population groups most severely affected by malaria, to deliver the necessary interventions effectively and to advocate for resources (9).

Rational of the study

Ongoing systematically collected and analyzed malaria surveillance data are important for detecting outbreak, monitoring disease trends, and evaluating the effectiveness of malaria prevention and control activities in the Region.

This information is needed to determine the most appropriate and efficient allocation of public health resources and personnel. Also, this continuous surveillance and data analysis is very helpful for assessing incidence and prevalence of malaria cases (outpatient and in-patient cases and death due to malaria over time, place and affected communities throughout 5 years.

Analyses should be performed at regular intervals and in timely manner to identify changes in disease reporting. These analyses can be performed using standard approaches (e.g., running a standard computer program to generate a summary report). Findings of analyses should be reviewed regularly and provided as feedback to medical providers and others in the community who are asked to report cases.

OBJECTIVES

General Objectives

- To analyze five years malaria surveillance data of Gambella Regional State, from 2015 - 2019 G.C

Specific Objectives

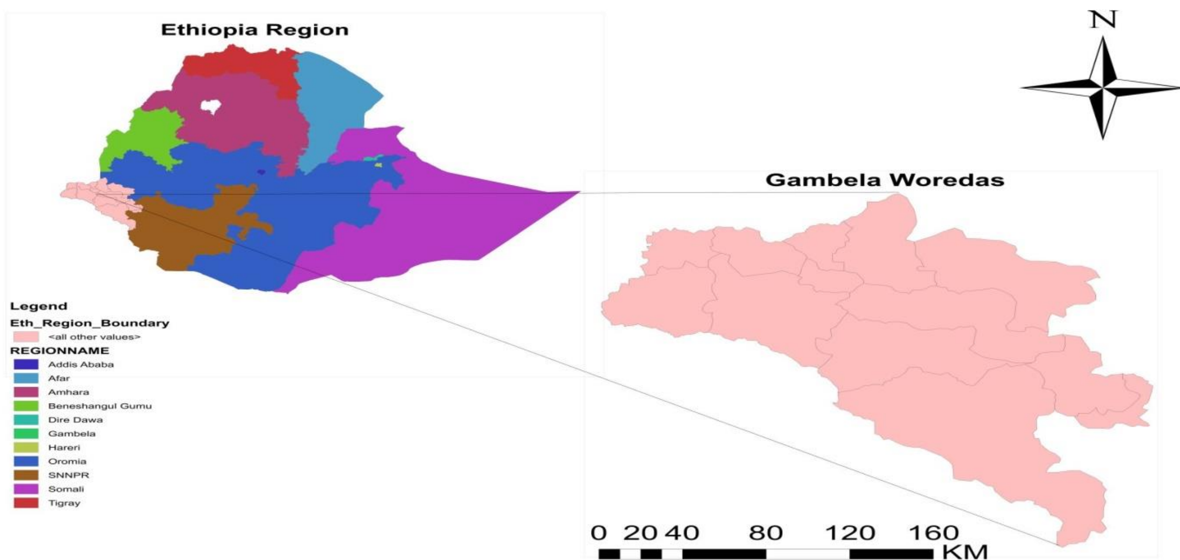
- To describe malaria by time, person, and place.
- To assess the distribution of malaria species of Gambella region,
- To describe of five-year malaria trends

Methodology

Study area

This malaria surveillance data analysis was conducted in Gambella Regional State, Ethiopia. Gambella is one of the nine member states of the Federal Democratic Republic of Ethiopia (FDRE). It is in the south-western Ethiopian lowlands bordering the Republic of South Sudan from the west, the Oromia Regional State from the North-east and the Southern Nations Nationalities and Peoples Regional State (SNNPRS) from the south-east.

Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), the Gambella Region has total population of 307,096, consisting of 159,787 (52%) men and 147,309 (48%) women; urban inhabitants number 77,925 (25.37%) of the population. With an estimated area of 29,782.82 square kilometers, this region has an estimated density of 10 people per square kilometer. The surveillance data analysis was carried out on the malaria surveillance data of Gambella Regional State, which is covering a period of 2015-2019 G.C.



Study Design

Descriptive cross-sectional study were conducted to assess the last 5 years 2015-2019 surveillance data analysis of malaria.

Sample size

All malaria cases, including suspected, confirmed and deaths reported during 2015 – 2019 and all zone and Woreda were included.

Data Source

Five year secondary data were obtained from PHEM weekly surveillance data 2016 -2019 G.C. variables such as zones and Woredas as well as, clinically and confirmed, inpatient, outpatient, P. Falciparum and P. Vivax, malaria suspected cases and malaria deaths were included during 2015-2019.

Data Quality Control

The collected data were checked for completeness, accuracy, clarity and consistency throughout the data collection period in order to maintain the quality of data.

Data processing and Analysis Technique

All data were checked for completeness and cleaned for any inconsistencies to analyze. The data were entered and analyzed with Microsoft office Excel 2010. Descriptive statistics were used to show the trends of malaria transmission in terms of seasons, years and species of malaria parasite. The analyzed data were presented using tables and figures.

Ethical Consideration

Official permission was obtained from EPHI to access surveillance data from its national surveillance database.

Data dissemination

The study finding prepared to be share with AA university school of public health, EPHI, Gambella Regional Health Bureau.

Definition of terms

Confirmed malaria case: A suspected case confirmed by microscope or RDT for Plasmodium parasite (41)

Malaria suspected case: - A person with a fever or fever with headache, chills, rigor, back pain, sweats, myalgia, nausea and vomiting diagnosed clinically as malaria(41)

Malaria outbreaks: - Crossing the norm line or doubling the number of malaria cases compared to the prior year of reported WHO epidemic week(41)

Clinically and confirmed case: - malaria suspected cases plus confirmed malaria cases (41)

Malaria control: reducing the malaria disease burden to a level at which it is no longer a public health problem.(42)

Result

Systematically collected and analyzed data from Gambella regional state was verified that, a total of 770,453 malaria suspected cases were reported in the region from January 2015 - December 2019 G.C. among the reported cases 409,176 were a total of both (clinical 53,900 (13.17%) + parasitological confirmed cases 355,276 (86.8%)).

Table 15 Last five years summarized malaria reported data of Gambella Regional State, from January 2015 – December 2019 G.C.

Year	Number of cases per year	Malaria Suspected Fever Examined	Confirmed and Clinical	Outpatient cases	Inpatient cases	Total Malaria	Total PF	Total P. vivax
2015	409,000	136688	77707	75762	1945	69	52474	7325
2016	422,002	171199	99049	96946	2103	5	75678	9018
2017	435,999	184186	100213	97977	2236	13	83235	6649
2018	452,772	136340	64692	63401	1291	9	54597	4037
2019	468,017	142040	67515	65474	2041	9	57858	4405
Grand Total	2187790	770,453	409,176	399,560	9,616	105	323,842	31,434

Malaria detection rate from total suspected fever examined by RDT/ microscopy and clinical case were, 46% (355,276/770,453*100). During the same period annual parasitic index (API) were increased by 146 per 1000; 200 per 1000 and 206 per 1000; but unlikely for the last two consecutive years (2018 and 2019) showed decrement by 129 per 1000; 133 per 1000 population respectively.

Table 16 : Total Malaria Outpatient, IPD and Mortality of Malaria in Gambella Regional State, (Jan. 2015 – Dec. 2019 G.C

Major Malaria Indicators	Years in G.C				
	2015	2016	2017	2018	2019
Total Malaria Outpatient cases/1000	185.2	229.7	224.7	140	139.8
Malaria Inpatient cases /1000	4.7	5	5.12	2.85	4.3
Confirmed Malaria cases /1000	146.2	200.7	206.1	129.5	133
Malaria Inpatient death /100,000	16.8	1.18	3	2	2

Malaria Surveillance Data Analysis by Time

The annual malaria prevalence rates over the years suggested that the rate has increased in a given calendar years from (2015-2016) by 190 to 235 per 1000 persons and on the other hand from (2017- 2019) the rate has declined by, 230 to 144 per 1000 persons. An average total malaria prevalence rates were 188 per 1000 person.

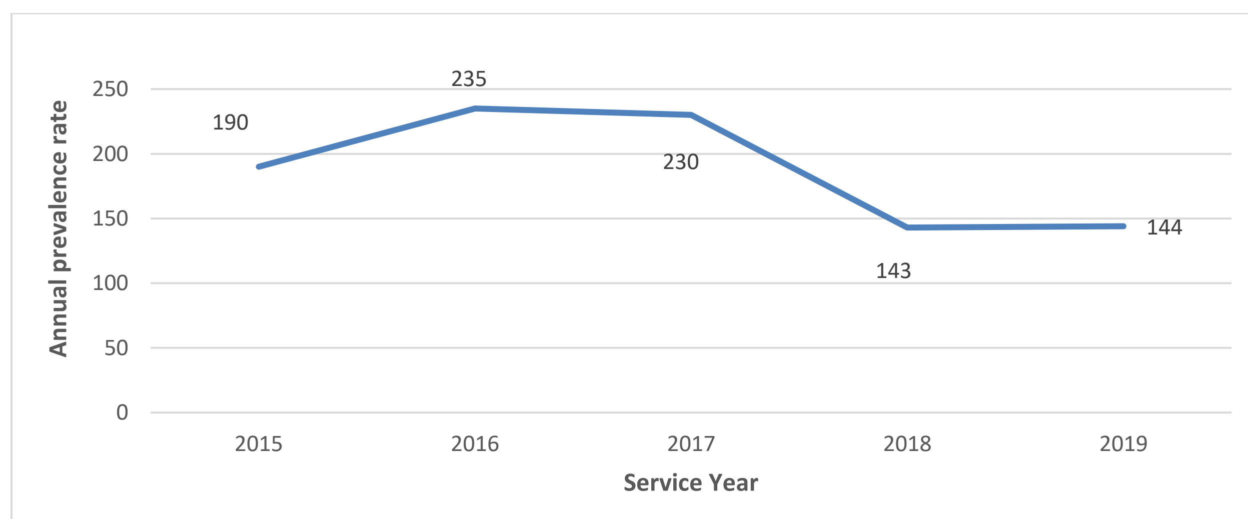


Figure 7: Annual prevalence rates of malaria cases per 1000 populations of the past five years in Gambella Regional State /January 2015 – December 2019 G.C/

Among the confirmed cases, plasmodium falciparum constitutes 91% (323,842/355,266*100) while the rest 9% (31,434/355,266*100) were covered by plasmodium vivax.

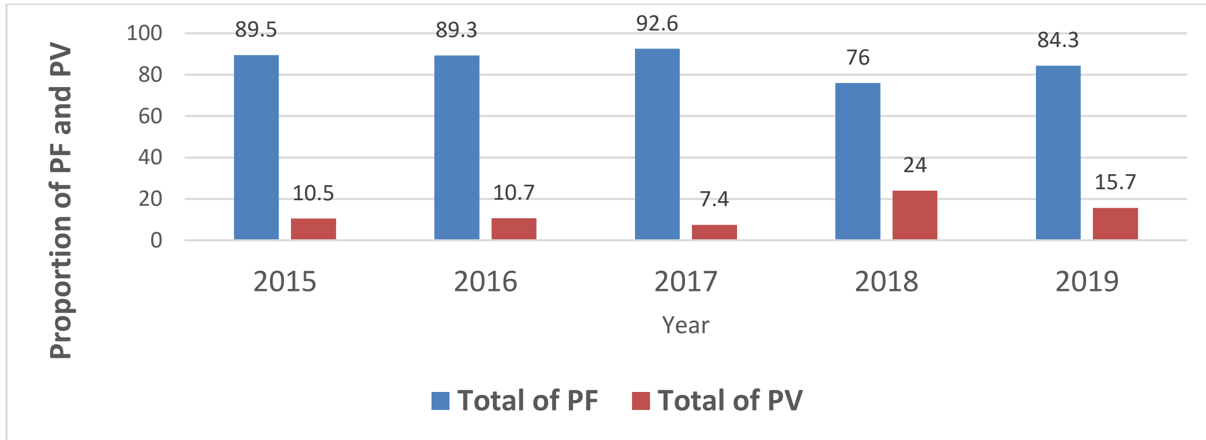


Figure 8: Proportion of plasmodium falciparum and plasmodium vivax malaria cases of the past five years of Gambella regional state (January 2015 – December 2019 G.C)

Proportion of parasitological confirmation treatment rate (show in Figure4. 1) were 77%, 85.5%, 89.7%, 90.6% and 92.2% in 2015, 2016, 2017, 2018 and 2019 respectively. The systematically collected and analyzed malaria data revealed that the parasitological confirmation treatment rate become increasing and unlikely, the clinical malaria treatment rate was decreases from year to year.

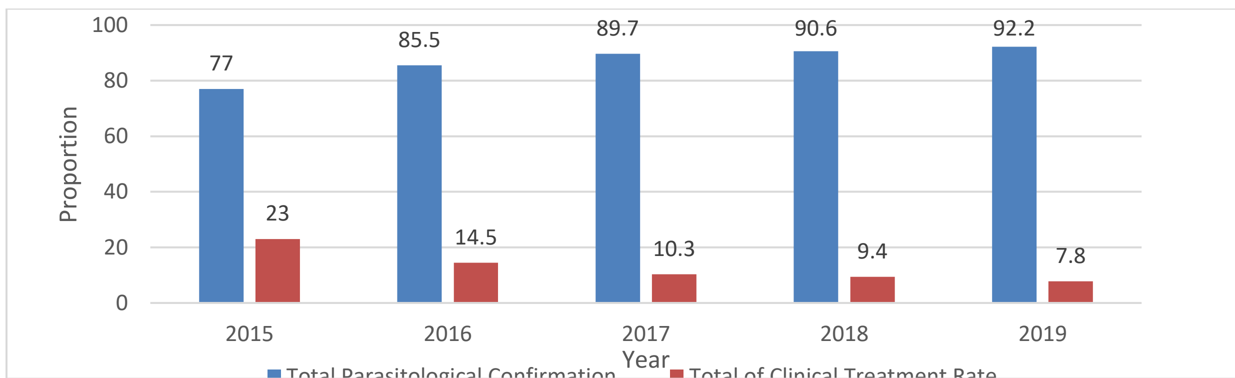


Figure 9: Proportion of parasitological confirmed and Clinical treatment rate malaria cases of the past five years of Gambella Regional State (January 2015 – December 2019 G.C).

A total of 9,616 malaria inpatient cases and 105 deaths were reported for the last five years from January 2015 - December 2019. The case fatality rate (CFR) was high in (2015) with 35.5per 1,000 persons. But it shows inconsistent decrement of the trend beginning from (2016 – 2019) by 2.3 per 1000, 5.8 per 1000, 7 per 1000 and 4.4 per 1,000 of persons, respectively.

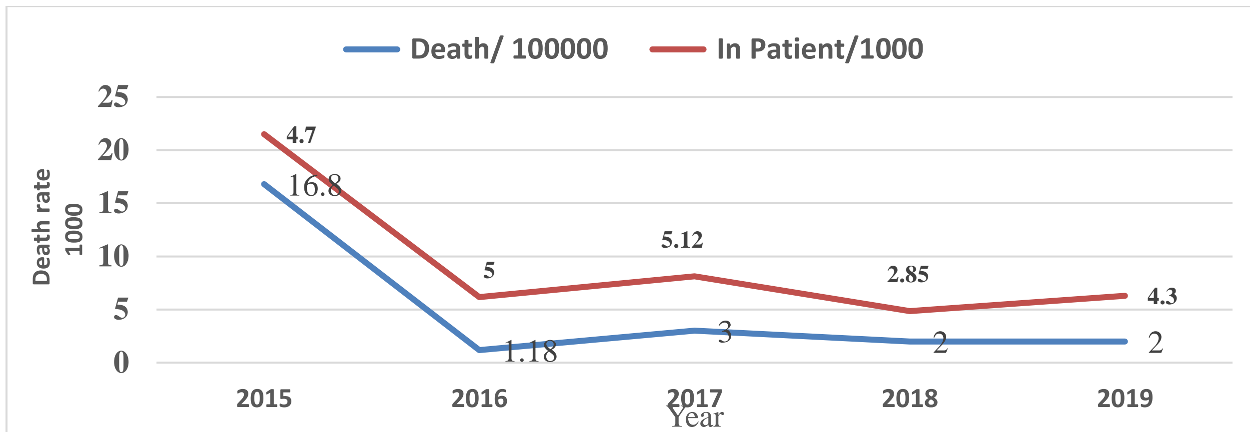


Figure 10: Rate of In-Patient cases and Death of malaria in Gambella Regional State from (January 2015 - December 2019)

The highest malaria cases were reported in WHO EPI week of (17 – 27) within past five year's period. And also, the lowest cases were observed from EPI week of (13 – 15) and at the end of the period or EPI week (53).

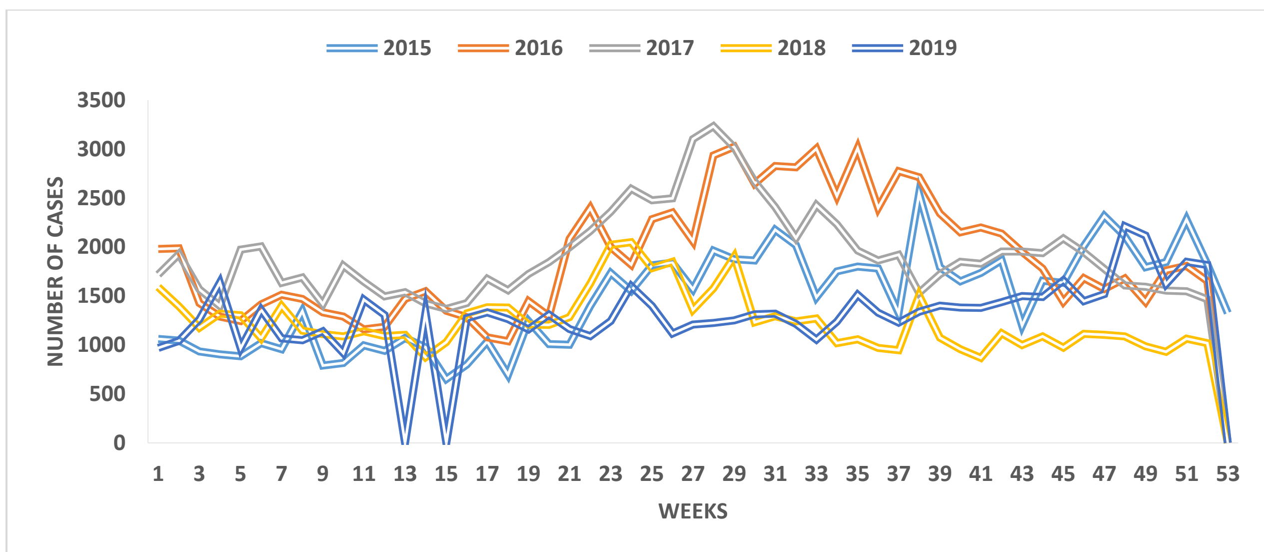


Figure 11: Trends of malaria in WHO EPI Weeks at Gembella Regional State, (January 2015 – December 2019).

From a total of 770,453 suspected fever cases examined by RDT or Microscopic, 355,276 patients were positive for plasmodium species from January 2015 to December 2019: with average malaria slide positivity rate of 46%. Malaria slide positivity rate was increased from 43.7% in 2015 to 49.4% in 2016. Finally, for the last three consecutive years from January 2017 - December 2019 makes a little drop down by (48.4%), (43%), and (43.8%) respectively.

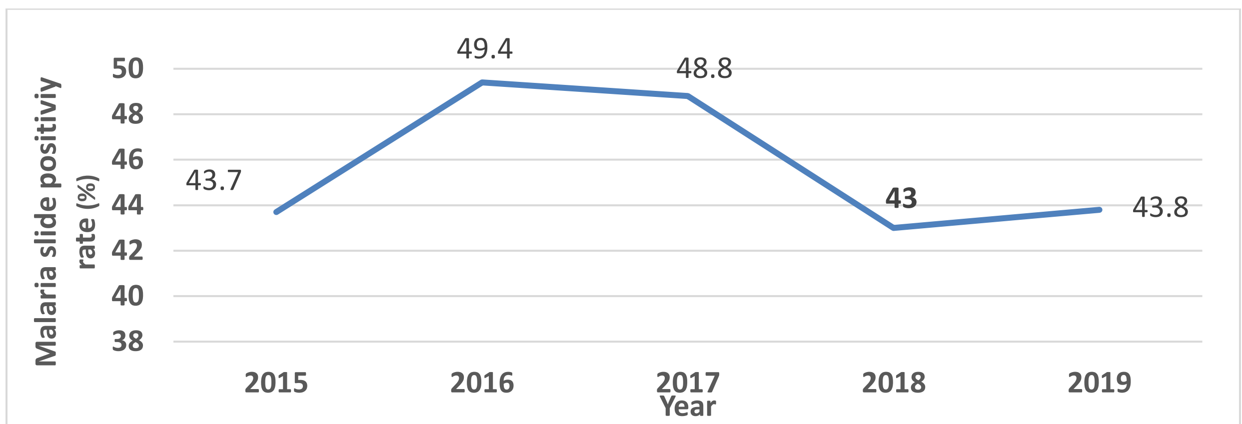


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Figure 12 : Trends of malaria slide positivity rate, Gambella Regional State, (January 2015 – December 2019).

Plasmodium falciparum and P. vivax were the only species in study area, where P. falciparum accounted for 743.4 (91%) of the overall prevalence, followed by P. vivax constituting 72.6 (9%).

The incidence of P. falciparum cases was increasing beginning from (2015 – 2017) by 129 per 1000, 179.3 per 1000 and 191 per 1000 persons and from (2018 – 2019) shows a slight decrement by 120.5 per 1000 and 123.6 per 1000 person, respectively.

The incidence of P. vivax was 18 per 1000 and 21.3 per 1000 person in (2015 – 2016) and from (2017 - 2019) the case showed decrement by 15.2 per 1000, 9 per 1000 and 9.4 per 1000 person, in the past five years trend, P. falciparum was more dominant over P. vivax.

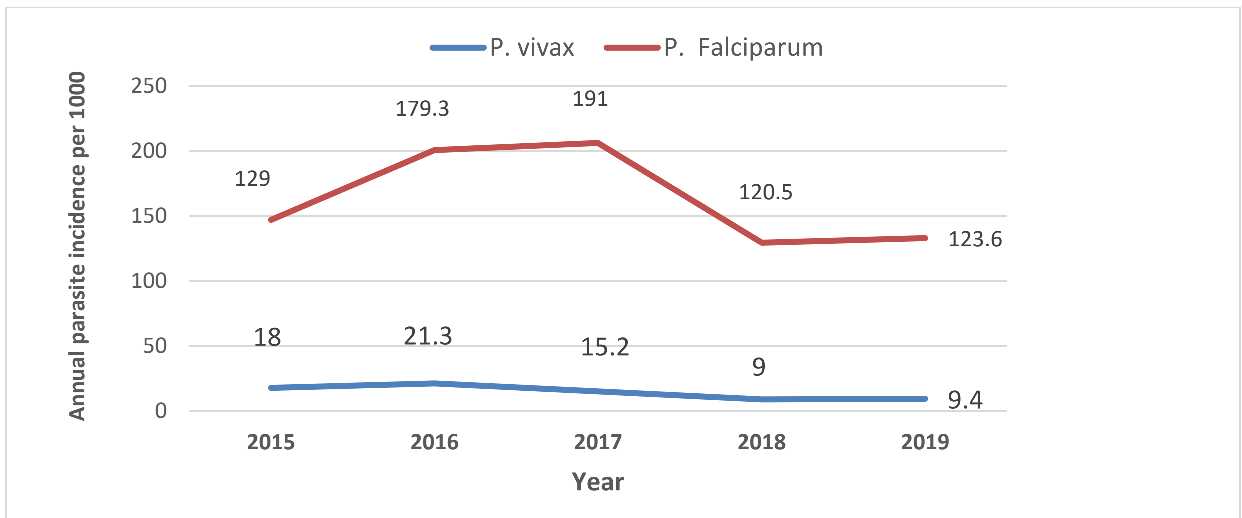

Figure 13: Trends of annual parasite incidence per 1000 population, Gembella Regional State, (January 2015 – December 2019).

Though malaria occurred in all seasons, the prevalence had fluctuating trend across four seasons over the last 5 years. The highest malaria cases were observed during two seasons; the first one were in summer (June, July and August) 127,694 (30.3%) and spring (September, October and November) 108,882 (26.6%), on the other and the lowest cases were observed during autumn (March, April and May) 81,575 (20.3%), respectively. While we try to observe by species higher number of cases of P. falciparum and P. vivax was observed during summer 104497 (32.2%), 8835 (28.1%) and spring 89027 (27.5%), 7984 (25.4%) respectively. However, the minimum numbers of Falciparum 59917 (18.5%) in autumn (March, April, and May) and slightly decrement of P. vivax cases by 7192 (22.8%) were observed during winter (December, January, and February).

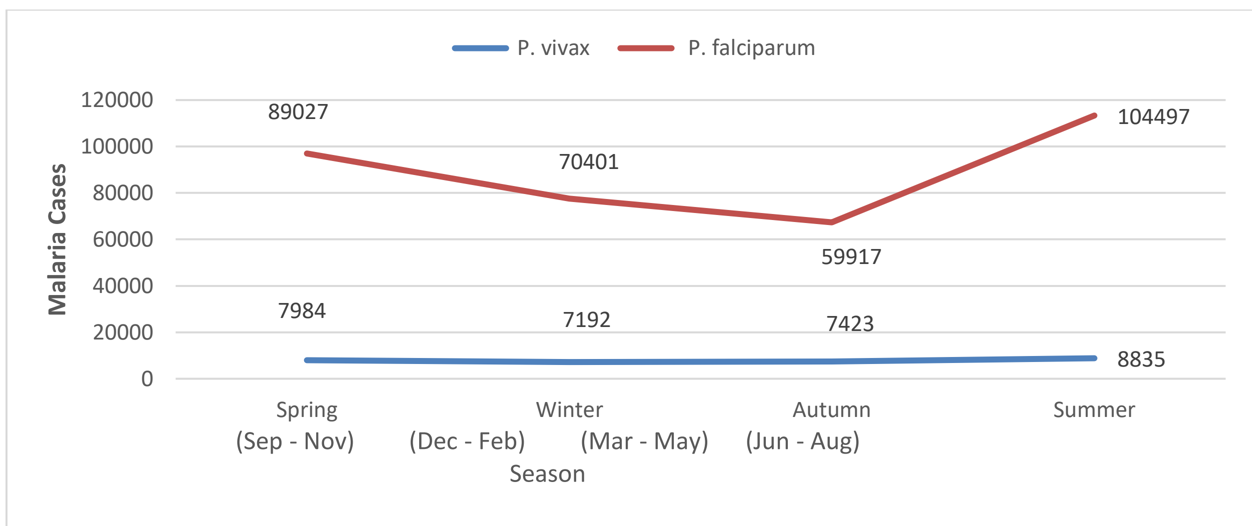

Figure 14: The distribution of plasmodium falciparum and P. vivax species in different seasons in Gambella Regional State, (January 2015 – December 2019)

Malaria Surveillance Data Analysis by Place

According to the last five years data of Gambella regional state a total of malaria cases by Woreda indicated that high number of cases was found in Gambella Town, Etang and Abobo respectively. On the other hand low cases were found in Akobo, Jore and Godere Woredas respectively.

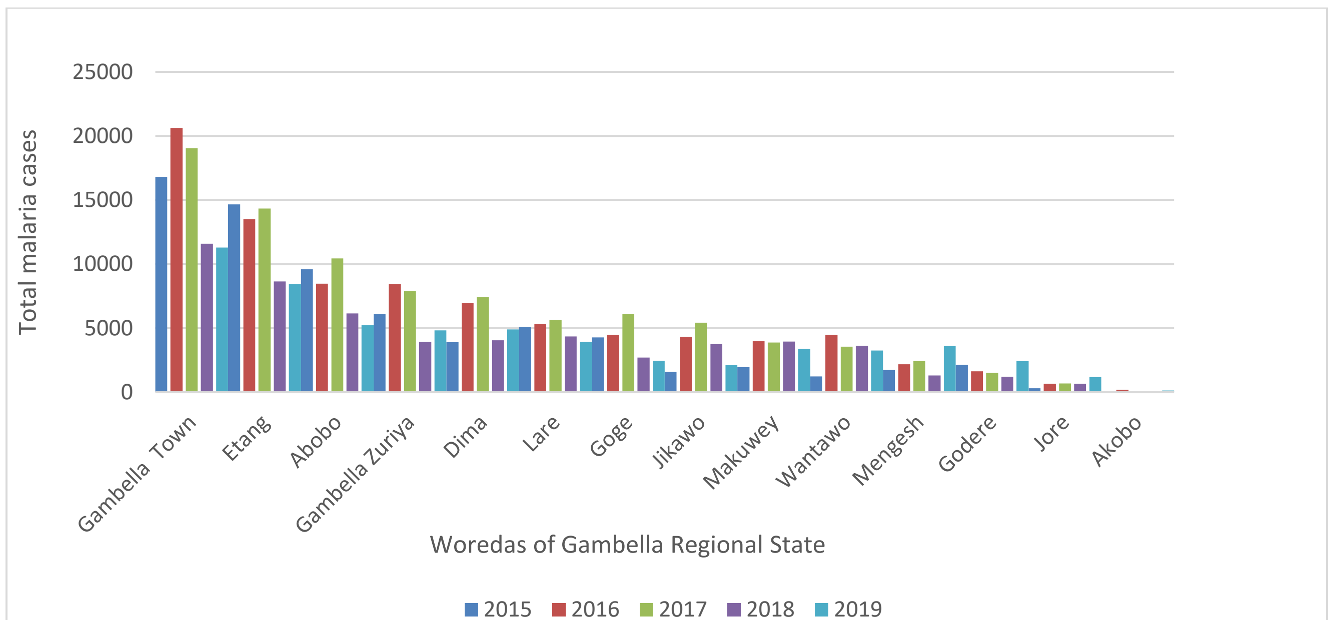

Figure 15: Total malaria cases by Woreda, Gambella Regional State, (January 2015 – December 2019).

More malaria deaths were observed by the analysis of past five years in Gambella regional state. During five period a total 94 malaria deaths was reported from teen woredas. The largest percentage of malaria deaths reported was 47% in Lare woreda, while the lowest percentage was 1% in Dima, Etang, and Gambella town.

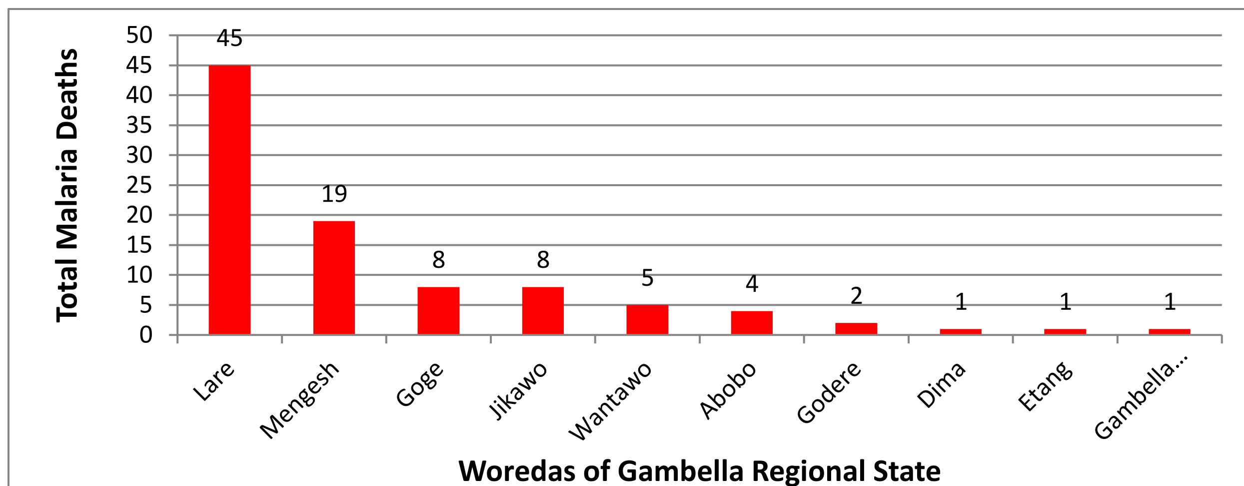

Figure 16: Total malaria Deaths by Woreda, Gambella Regional State, (January 2015 – December 2019).

Discussion

The present study attempted to assess the trend of malaria prevalence in Gambella regional state, Ethiopia. According to the last five years data of Gambella regional state a total of malaria cases by Woreda indicated that high number of cases was found in; Gambella Town, Etang and Abobo respectively. And, more malaria deaths were observed in Lare, Mengesh, Goge and Jikawo respectively.

The analyzed data verified that, a total of 770,453 malaria suspected cases were reported in the region from January 2015 - December 2019 G.C. Malaria detection rate from total suspected fever examined by RDT/ microscopy were, (46%). The rate was increased from 43.7% in 2015 to 49.4% in 2016. Finally, for the last three consecutive years from (2017 – 2019) makes a little drop down by (48.4%), (43%), and (43.8%) respectively. The result is somehow comparable or a little higher from the study analysis done in "Menge District, Assa zone, Benishangual Gumuz, Ethiopia, 2017"; with average malaria positivity rate of 38.9%. Malaria positivity rate was decrease from 53.2% in 2013/2014 to 24.3% in 2016/2017 (10).

Annual parasitic incidence (API) was increased by 146 per 1000; 200 per 1000 and 206 per 1000 from (2015 – 2017); but unlikely for the last two consecutive years (2018 and 2019) showed decrement by 129 per 1000; 133 per 1000 population, respectively. In 2017, the FMOH updated the country's malaria risk strata based upon malaria annual parasite incidence (API) is that; areas

with malaria transmission risk by (≥100 cases/1,000 population/year) is classified as high API, so Gambella regional state is categorized under high risk classification according to FMOH (11).

Malaria cases predominantly high during the month of (June, July, August, September, October and November) during Summer and spring season, the result is similar to the assessment conducted in Benishangual Gumuz region, malaria transitions were high during Kermit season of May, June, July, August and September (10,12).

Plasmodium falciparum and P. vivax were the only species in study area, contrary to the national report, P. falciparum accounted for 743.4 (91%) of the overall prevalence, and P.vivax constituting 72.6 (9%). which shows a great dominance of P. falciparum over the vivax species. The other study done in “Menge District, Assosa zone, Benishangual Gumuz, Ethiopia, 2017” suggested that: proportion of plasmodium Falciparum and Plasmodium Vivax were 91% and 9% respectively. This has the same number of proportions with our study findings (10).

Unlikely to our study result shows a difference on proportions of the species compared to other studies; “Malaria epidemiology and interventions in Ethiopia from 2001 to 2016”, shows Plasmodium falciparum and P. vivax co-exists, accounting for 60 and 40% of all malaria cases, respectively (13). and other study done in “Oromiya regional state, in Adama City” out of 6862 malaria cases reported from OPD data from 2013/14 to 2017/18 in retrospective study, 61% was *P*. vivax and 39% was P. falciparum (14).

Proportion of parasitological confirmation treatment rate was sharply increasing from (77%) to (92.2%) during the last five years (2015 - 2019) respectively. Unlikely, the clinical malaria treatment rate was decreases in the same study year from (21%) to (7.8%). Study done in Botswana shows the same result with our finding “Advances in malaria elimination in Botswana: a dramatic shift to parasitological diagnosis, 2008–2014”(15).

A total of 9,616 malaria inpatient cases and 105 deaths were reported for the last five years from January 2015 - December 2019. The case fatality rate (CFR) was high in (2015) with 35.5per 1,000 persons. But it shows inconsistent decrement of the trend beginning from (2016 – 2019) by 2.3 per 1000, 5.8 per 1000, 7 per 1000 and 4.4 per 1,000 of persons, respectively. Other study also support our findings describes that annual number of malaria deaths had significantly declined by

approximately 74%, from 34 in 2001/02 to 9 in 2008/09 with slight fluctuation of the study done in "Mpumalanga Province, South Africa (2001- 2009): a retrospective study" (16)

Limitation

PHEM reporting format lacks all variables of demographic information so, it was quite difficult to analyze the data by age and sex (distribution by person).

Conclusion

Malaria continued to be a major health problem in the region; it causes high morbidity in some woredas like: Gambella Town, Etang and Abobo respectively. Mortality also indicated in some Gambella regions like; Lare, Mengesh, Goge and Jikawo respectively. The five years PHEM data suggested that the malaria prevalence rate is still high (> 100 cases per 1000 person) in all years. Parasitological confirmatory malaria treatment rate was increased from year to year and on the contrary clinical malaria treatment rate were decreases. Plasmodium falciparum malaria species was very high (91%) and increased from year to years. The incidence of malaria inpatients and (API) annual parasitic index were increase with inconsistent trend, which is difficult to forecast the futurity. Malaria transmission starting to rise from September to November and again it starts to rise from June to August malaria is predominantly higher during summer seasons.

Recommendation

The Regional health office and health professions should strengthen the malaria prevention and control programmed, particularly in the geographical areas of highest incidence to keeping the current achievements and to roll back the disease.

The woreda heath office, health workers, health extension workers (HEWs) and the community should strength early detection and treatment of malaria cases at all levels to decrease malaria IP and CFR.

The Regional health bureau and the district should plan to do further study to know the cause of high prevalence of plasmodium PF malaria species, Malaria IP, and malaria case fatality (MCFR) rate for prevention and control of malaria to come to elimination.

The Regional health bureau should be incorporate personal variable such as age and sex in PHEM reporting format.

The PHEM officers at district and health facility level should strength documentation and handling of malaria data by species in all Kebelle of the district and analysis the data and alert the community before occurrence of outbreak during pick transition seasons.

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CHAPTER III - SURVEILLANCE SYSTEM EVALUATION

3. MALARIA SURVEILLANCE SYSTEM EVALUATION OF MAJAGI ZONE, GAMBELLA REGION, ETHIOPIA, 2021

Abstract

Introduction: Surveillance is an ongoing, systematic collection, analysis and interpretation of disease-specific data for use in planning, implementing and evaluating public health practice. This study aimed to assess the core and support function along with attributes of the malaria surveillance system of Mejining zone of Gambella Region 2021

Methods: This malaria surveillance system evaluation was conducted in Mejining zone, Gambella region from September 2021 to October 2021. We collected the data by using questionnaire adopted from updated Guidelines for Evaluating Public Health Surveillance Systems published by the CDC. Sixteen the surveillance sites and 24 health workers were selected and included in our study by using purposive sampling technique. The data collected were included core functions, supportive activity and surveillance attribute, flexibility, usefulness, acceptability, simplicity, sensitivity, completeness, and timeliness.

Results

The necessary surveillance guidelines, registers form and reporting formats were available in most health facilities. The district health offices had malaria Emergency Preparedness plan. But not adequate budget allocated to respond in case an emergency occurred. There were no regular data analysis and interpretations in terms of time, place, and person in health facility.

There was no written feedbacks and outbreak chick list were available in all health facilities Average weekly report completeness and timeliness were 83 and 79 % respectively. The surveillance system was reported to be acceptable, useful, simple, flexible, and representative. Poor data quality, shortage of budget, logistics, staff turnover and shortage of refreshment trainings has been reported as challenge of the current malaria surveillance system.

Conclusion: we found the malaria surveillance system was acceptable, useful, simple, flexible, and representative. However, completeness and timeliness were less than national standard. An irregular supervision, poor data quality, inadequate feedback, turnover trend staff, shortage of training, inadequate budget and shortage internet were identified.

Introduction

Public health surveillance is the ongoing systematic collection, analysis, and interpretation of data, which is closely integrated to the timely dissemination of these data to those responsible for disease prevention and control (1)

The WHO malaria reports, estimated cases and deaths for the 2020 years, were 229 million and 409, 000, respectively. The African continent accounts for 94% of all malaria cases worldwide. Malaria remains Ethiopia's most serious public health problem resulting in high levels of mortality and morbidity (2). About 3/4 of Ethiopia's land mass and 2/3 of the country's population is projected to be at risk of malaria due to climatic and ecological conditions favorable for its transmission (3).

It has been the major cause of morbidity and mortality for many years and affects four to five million people annually in the country. The disease causes 70,000 deaths each year and accounted for 17% and 15% of outpatient and inpatient visits to health institutions. Malaria is ranked as the leading communicable disease in Ethiopia, accounting for about 30% of the overall disability adjusted life years lost and making it a significant impediment to social and economic development t (4).

According to a report from the Ethiopian Federal Ministry of Health, out of 1,620,885 suspected cases, 25% (410,409) tested positive for malaria, with *P.* falciparum accounting for 65% of positive cases and P. vivax accounting for the remainder over the previous five years. Since malaria transmission is seasonal and variable in Ethiopia, protective immunity is often inadequate, and people of all ages are at risk of contracting the disease (5) .

Despite the fact that Ethiopia has implemented several malaria prevention and control methods with the goal of reducing malaria morbidity and death, malaria remains a serious public health problem in the country as a whole and in the study area specifically (6). The main obstacles to

controlling and preventing malaria are epidemicity owing to seasonal transmission, poor health care system like low coverage of insecticide treated nets (ITNs), drug resistance malaria due to self- treatment or incorrect species identification by microscopic, asymptomatic malaria cases, and Anopheles mosquito resistance to pesticides and chemicals analyzing the malaria morbidity.

A well-performing disease surveillance system is very important to the health system in providing evidence-based information for planning, implementation, monitoring, and evaluation of public health intervention programs. Effective communicable disease surveillance systems are one of the basic strategies of national disease prevention and control (1).

The ability of a surveillance system to detect outbreaks and monitor epidemiologic trends depends on its sensitivity, which is the proportion of all diagnosed cases of a disease that is identified by the surveillance system (7). A system with high sensitivity identifies challenges and gaps which would guide allocation and targeted deployment of appropriate resources for disease control. Improvement in a country's surveillance system will aid ascertaining trend in the burden of the disease and thus need for periodic performance evaluation of the system (8). Perfect surveillance system is desirable though it might not be attainable to eliminate malaria. However, persistent gaps in the system precludes optimal deployment of resources for malaria elimination. Additionally, improvement surveillance system will aid tracking of progress towards elimination. Essentially, a higher standard of surveillance system is desirable for malaria elimination.(9)

Gambella region is one of the areas of Ethiopia with high malarial endicimity. Gambella region is border with high malaria endemic country with South Sudan and after the violence broke in South Sudan, high migrant across border to Gambella region refuge. Malaria is one of the region's top three causes of sickness and deaths. The 2015 Malaria Indicator Survey indicated that malaria prevalence is higher in Gambella (18.4%) than in any other region in Ethiopia (national average of 1.2%). In 2017, Gambella health facilities reported 102,053 cases of malaria and 13 malaria deaths .Ethiopia currently hosts the second largest number of South Sudanese refugees after Uganda, of which the vast majority are in Gambella and as of the end of January 2017, there were 330,018 South Sudanese refugees in Gambella(10).

The public health surveillance system should be evaluated periodically to determine how well the system is operating. However, there was no previous malaria surveillance system evaluation

conducted in the Majining zone, Gambella region, the area also was repeatedly affecting by the outbreak. This may be linked to poor performance of the existing surveillance system. Therefore, this study was conducted to evaluate the performance of a malaria surveillance system and its key attributes in Majining zone, Gambella region, Ethiopia.

Malaria Surveillance System Description

In the context of malaria elimination programmers, surveillance is that part of the program designed for identification, investigation and elimination of continuing transmission, the prevention and cure of infections and final substantiation of claimed elimination. Data collection, analysis and reporting should guide necessary interventions in the health system. Interventions may include needs assessment, planning, malaria prevention and control and/or health programme evaluation. Surveillance is also carried out in the context of other public services, to monitor and improve the service concerned.

The characteristics of a surveillance system must be based on its objectives. If the objective is to detect an epidemic, the cases need to be identified rapidly and reported accurately. For detection of epidemics, the surveillance system should target patients and people at risk. On the other hand,If the objective is to monitor disease trends, the expected characteristics of the surveillance system will be different. These characteristics include timeliness of reporting such as monthly report versus weekly report

Rationale of the study

The public health surveillance system should be evaluated periodically to determine how well the system is operating. However, there was no previous malaria surveillance system evaluation conducted in the Mejining zone, Gambella region. Beside this, the area was repeatedly affecting by the outbreak. This may be linked to poor performance of the existing surveillance system. We conducted an evaluation malaria surveillance system in Mejining zone to fill the existing gap, and the findings of the study could help provide significant information about the efficiency and effectiveness of the system.

General objective

- To evaluate core function, supportive activity and attributes malaria surveillance system in Mejining zone, Gamble Region, Ethiopian, 2021.

Specific objectives

- To evaluate supportive activity of malaria surveillance evaluation
- To evaluate the core functions of malaria surveillance system
- To evaluate attributes of Malaria surveillance system

Methods

Study Area

The study was conducted in Mejining zone, it is located on the main road from Addis Ababa to Gambella, around 600KM from the capital of Ethiopia. According to the CSA's 2007 Census, this Zone has a total population of 59,248, with 30,567 men and 28,681 women living in an area of 2,254.65 square kilometers. Mezhenger Zone has a population density of 26.28 people per square mile.

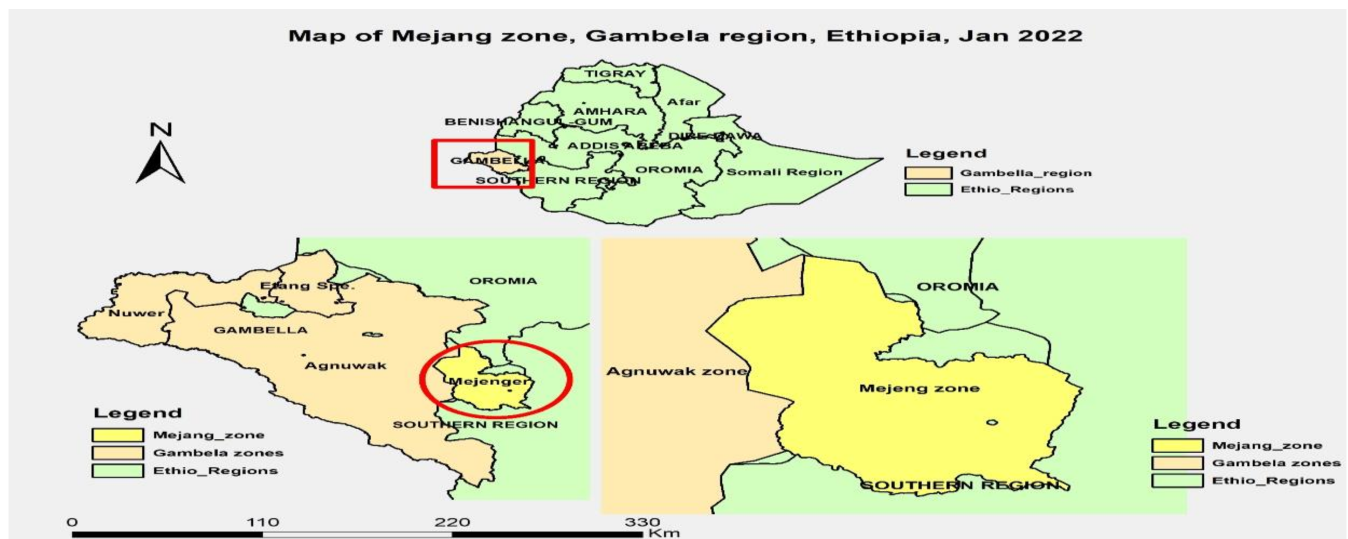


Figure 17 *: A map showing study area, Mejinining zone of Gambella Region, December 2022, Ethiopia*

Study period: the study was conducted from September 7/2021-to October 9/2021

Study design: The study was conducted as per the Updated Guidelines for Evaluating Public Health Surveillance Systems, published by the CDC and descriptive evaluative study was used.

Source population: the source population were all people at risk of malaria in Majining zone, Gambella region.

Study population: the study population were all peoples at risk of malaria during the specified study period Majining zone.

Source of population; the source population was all health facilities serving people at risk of malaria in Majining zone, Gambella region.

Study population: the study population was all government health facilities (woreda health office and hospitals, health centers and health posts were included malaria surveillance system evaluation in Majining zone

Sample Size and Sampling Procedure

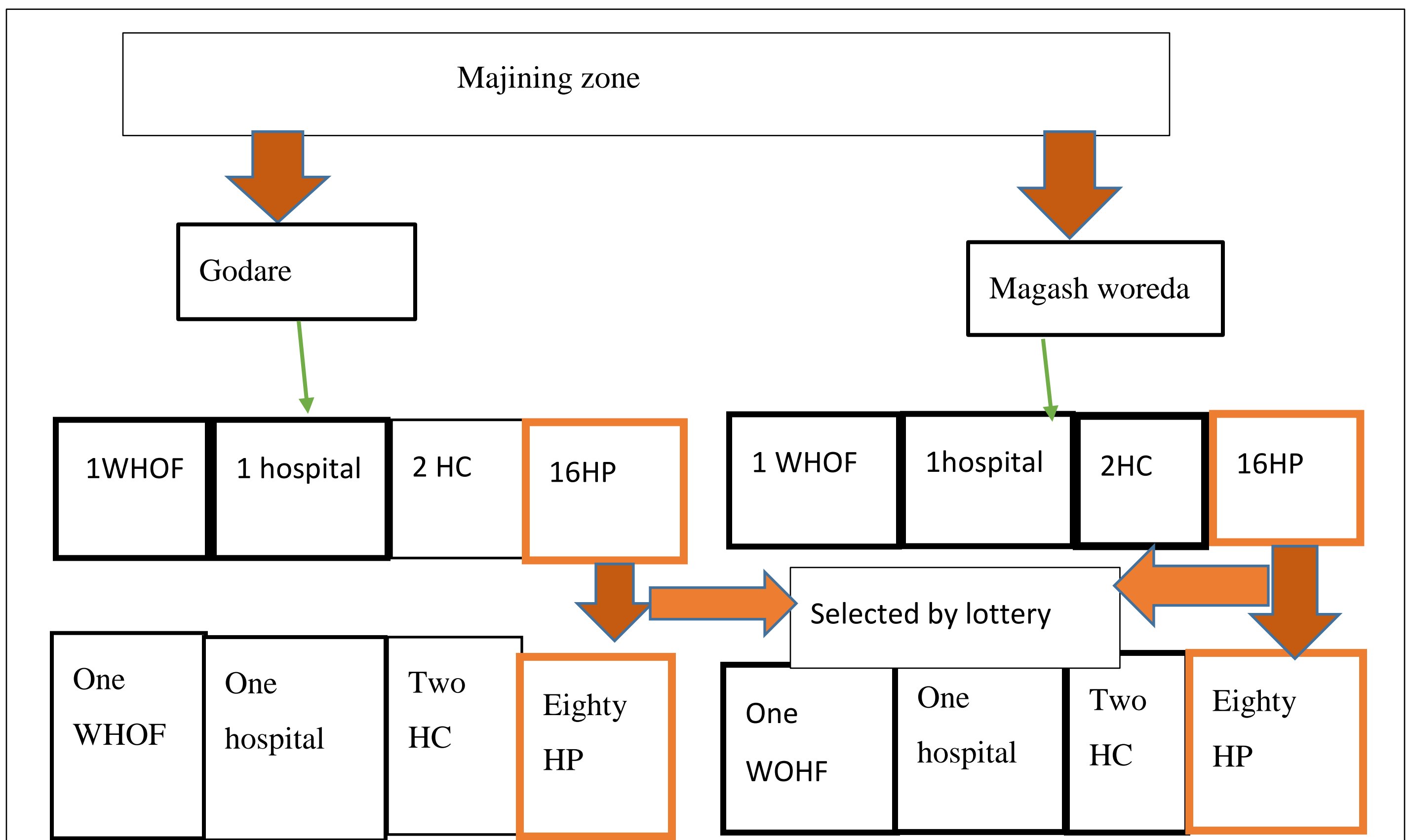
After a discussion with regional PHEM and malaria control office, the Majining zone was purposefully selected based on three years high malaria morbidity and mortality data.

The two districts in Majining Zone were included in this evaluation. In each district we included the district health office, one hospital, two health centers, and four health posts. Purposively, we selected PHEM officers and/or surveillance system focal persons from the respected facilities for Key informant interview. In addition, we have also involved lab technicians and other HCPs who were involved in surveillance activities.

Number woreda health office, Health center and Health posts included in this study

Woreda health office (WHOF 2(100%), Hospital=2(100%), HC=4(100%), HP 8(24%) selected by lottery method

Schematic presentation of sampling procedure and study site of Majang zones



Inclusion criteria

All selected health facilities and zonal health office that were functional greater than one year were included.

Exclusion criteria

New Health facilities and zonal health office which were not functional greater than one year were excluded

Data collection technique

The data were collected by standardized questionnaire adopted from CDC guideline. We interviewed all key informants; head of Woreda health office, surveillance focal person, and medical directors of health facility and health posts. This questionnaire was used to collect data from surveillance documentation availability, registers, reporting formats, data analysis and interpretation practices, computer skills and training profiles, epidemic response and preparedness situations, outbreak investigation and case confirmation, supervision and feedback systems, and questions on each surveillance attribute.

Operational Definition

Usefulness

A public health surveillance system is useful if it contributes to the prevention and control of adverse health-related events, including an improved understanding of the public health implications of such events. The level of usefulness was measured by the actions taken as a result of analysis and interpretation of the data from the public health surveillance system, the system useful to detect the diseases and outbreaks, providing estimates of the magnitude of morbidity and mortality(11).

Completeness; The proportion of health facilities that submitted a weekly report to the higher level, out of the expected facilities in the catchment area (district, Kebelle) (11).

Timeliness

The timeliness of the report was assessed at two levels. First, it was calculated by assessing how many of its expected reports were submitted to the next level within the prescribed time. The report is timely for the health facilities if a weekly report is submitted to the district health office every Monday before midday, and a timely report for the district is if the district health office submitted the compiled report to the zonal health department every Tuesday before midday. Second, the time interval between the onset of a health-related event and the reporting of the event, and the time required for the identification of an outbreak and initiation of control and prevention measures(11).

Simplicity

Refers to the structure of the system and the ease of implementation while still meeting its objectives. In this study, the simplicity of the surveillance system was measured in terms of clear and easily understandable case definition, route of data flow, difficulty in completing surveillance data, and time taken to complete surveillance data(11).

Flexibility

The ability of the system to adapt to changing information needs or operating conditions with little additional time, personnel, or allocated funds.[1] In this study, the flexibility of the surveillance system was assessed in terms of accommodating change in the existing procedure, a revised case definition, additional data sources, personnel, case detection, and reporting format(11).

Data Quality

Data quality was assessed based on content completeness of the reporting formats and validity of the data recorded.[1] The fields examined for completeness include the number of cases and deaths, the date the report was sent and received, and the blank responses. Validity of recorded data at health facilities compared to the reported data at the district level.

Acceptability

Willingness of surveillance stakeholders to implement the system as expressed by their active participation in case detection and reporting. Acceptability was measured by completeness of report forms, timeliness of data reporting, and use of standard case definition (11).

Predictive Value Positive

The proportion of cases detected by the surveillance case definition that actually have the disease

Representativeness

Measured in terms of distribution of a health-related event by time, place, and person, the health service coverage, and the reporting of surveillance data from all health facilities.

Stability

Refers to the reliability (ie, the ability to collect, manage, and provide data properly without failure) and availability of the public health surveillance system which is the ability to be operational when it is needed.[1] Measured by the availability of a surveillance focal person at all levels and integration of the system to routine healthcare delivery.

Data Analysis and Presentation

The collected data were entered into Microsoft office excel 2013. The results were presented by tables, graphs, charts Timeliness and completeness reporting was calculated by weekly reports received from health facilities.

Data Quality Management

The standardized questionnaire was translated from English into Majining local language. Prior to data collection, short training was given to data collector and supervisors on the purpose of the study, data collection tools and technique. After data collection completed, each questionnaire checked for completeness, missing values, and unlikely responses and then during data analysis missed value outliers and other errors were checkered if any error identified during data analysis counter checking preformed from original questionnaires.

Ethical Consideration

We obtained formal letter from EPHI to conduct the study in the Zone and All study facilities were allowed us to carry out the study with the respect to the letter issued by EPHI and each study participants were given us oral consent to participate in the study.

Result Dissemination

Findings of the study were disseminated to Majining zone woreda health offices, Majining zone health offices, Gambella RHB), Addis Ababa School of Public health and EPHI/PHEM Directorate

Results

Demographic characteristics respondents

Sixteen (16) health facilities were involved in the study. Of which, health posts were represented 8 (44%), health centers 4(33%) and hospitals 11 %. A total 24 health workers were interviewed. Among these, male was accounted for 15 (62.5 %). Regarding profession, health extension, health officer, Nurse, medical doctors and Environmental were accounted for 33%, 21%, 21%, 8% and 4% of the study participants, respectively.

Table 17 : demographic description of health workers and health facility Majining zone 2021

characteristics		**Frequency**	**Percentage**
Health facility n=16	Woreda health office	2	11
	Hospital	2	11
	health center	4	33
	health posts	8	44
	Total	16	100%
Sex respondent n=24	Male	15	62.5
	Female	9	37.5
Total		24	100%
	Doctor	2	8

Professional (n=24)	Health officer	5	21
	Nurse	5	21
	Environmental	1	4
	Laboratory	3	13
	health extent ion workers	8	33
	Total	24	100%

Communication and reporting system

Every Monday in the morning, the health posts send their weekly surveillance report to health centers through a phone call. On the same days, in the afternoon, the health centers in turn aggregate the surveillance report received from the catchment health posts and send to the district health office

Similarly, the district health office receives reports from health centers with phone and sends Majining Zonal Health Department on Tuesday afternoon. All study site were used standardized reporting format for data collection and aggregation purposes. Initially, report submission to the higher level was through a phone call, followed by the paper-based report submission. The community and health facility particular health posts are the main source of information. The surveillance system is fully integrated into the routine healthcare delivery system and implemented throughout the year without interruption.

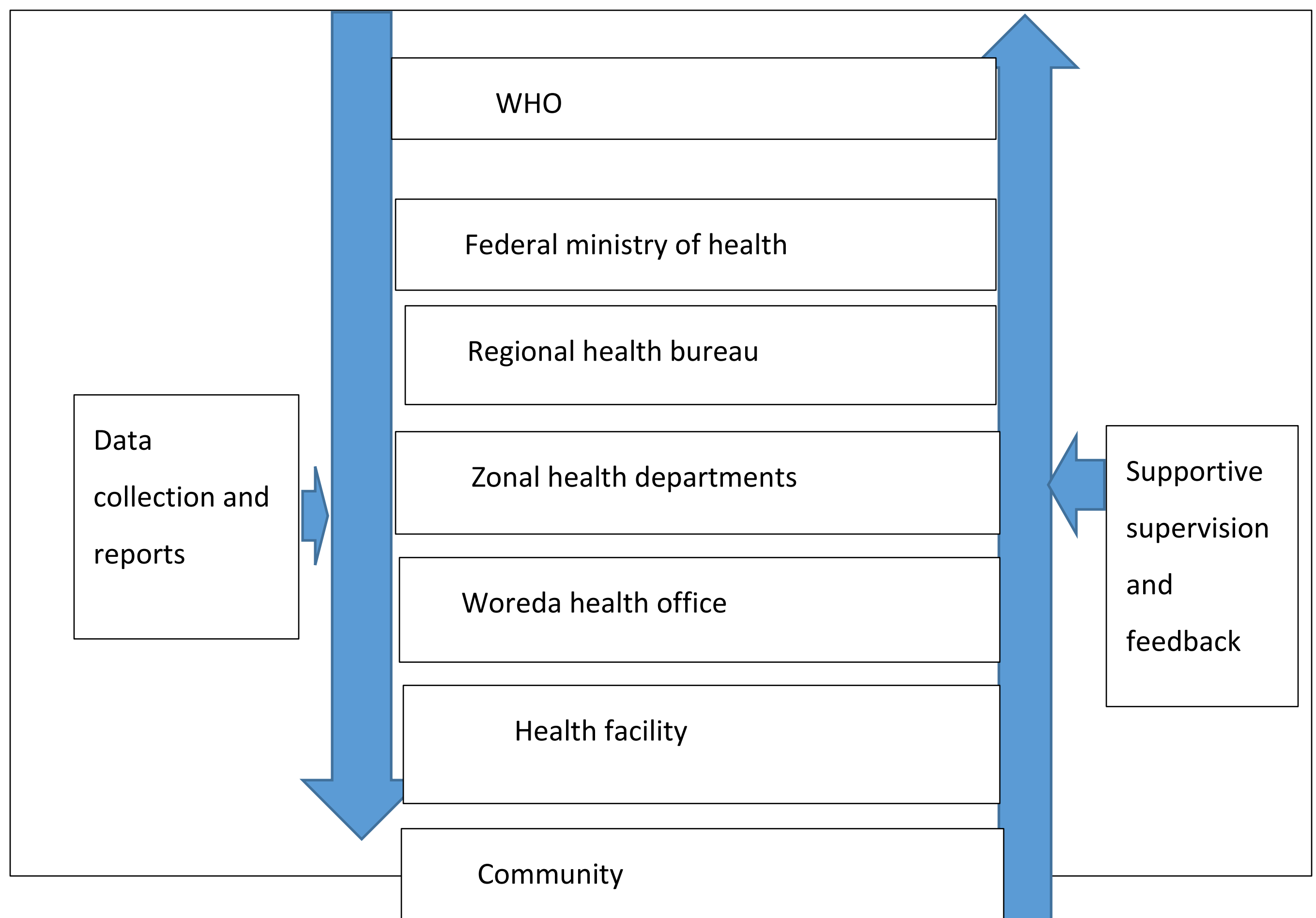


Figure 2. Shows the formal flow of Surveillance data and feedback provision.

Surveillance Guidelines, reporting formats availability and documentation practices of surveillance data.

All the Woreda health office and the health centers (100 %) had the malaria national guideline but in only 75 % of the health posts, the guideline was available. All heath facilities had Case definition but all did not post it in the visible areas. All the study facilities (100%) had standard weekly reporting formats. Regarding the documentation of a weekly surveillance reports, all health centers and the district health office had a copy of each week's reports. But only 3(37.5 %) of the visited health posts had these reports

Table 18 : Summary of the Surveillance activities regarding guideline availability, case detection and data reporting in Majining zone of Gambella Region, 2021.

Surveillance supportive function	Indicator	WHOF	HC	HP
		N=2(%)	N=4(%)	N=8(%)
	line list, epidemic reporting form, and rumor logbook	2(100%)	4(100%)	7(87.5)
	guideline availability	2(00%)	4(100%)	6(75%)
	Case definition availability	2(100%)	4(100%)	8(100%)
	Integrated case search form	1(50%)	4(100)	0(0%)
	rumor register form at facility level	1(50%)	4(100%)	8(100)
Case detection and registration	case management procedure form	2(100)	4(100%)	0
Data reporting	reporting formats	2(100%)	4(100%)	8(100%)

Supervision and feedback

All study sites had a supervision plan but not conducted regularly. All study sites had not a well-prepared supervision checklist to assess PHEM. They also didn't obtain a written letter of feedback from the respective higher level. According to study participants, shortage of manpower, lack of resources, poor coordination, and work overload were reason for poor supervision.

Training

The percentage of health workers who were trained in malaria surveillance system were accounted for 95%, 66%, and 90% in the Woreda health office, health center, and health posts respectively. However, none of them were taken refreshment training in the last one year.

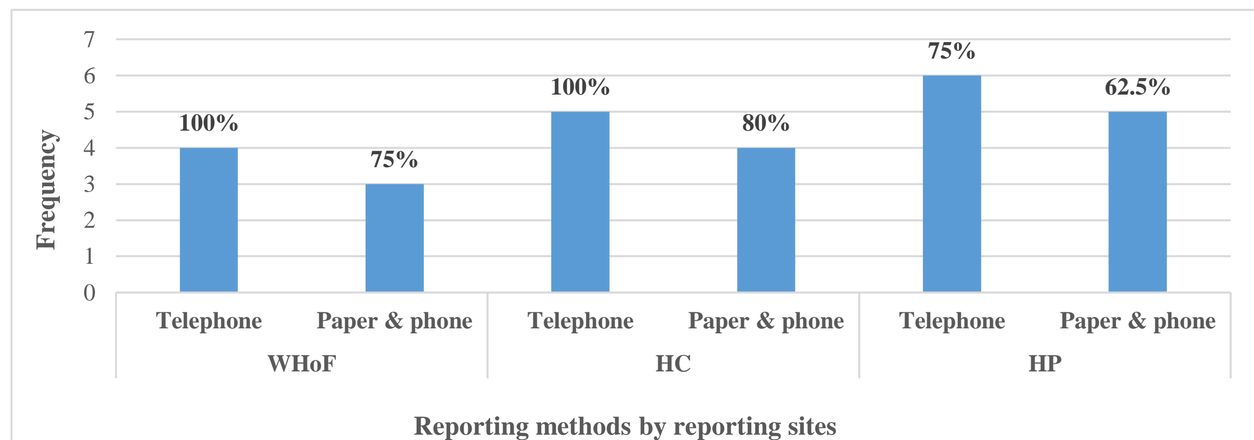


Figure 18: Shows the frequency of data reporting by reporting site, Majining zone of Gambella Region, 2021

Resources

Electricity was only available in 78 % of the study areas and only 37 % of the health posts Electricity. Computer was available in 69 % of the study units. 50 % of them were with internet access. 31. 5 %of the study units had motorcycles and 50 % vehicles.

Table 19: Availability of resources for PHEM activities (at all the visited site) Majining zone, Gambella Region, South-Western Ethiopia, 2021

S. No	Materials/Items	Woreda (N=2)	HCs (N=4)	Hospital	HPs (N=8)	Total
1	Electricity	100%	75%	100%	37%	78%
2	Bicycles	0%	0%	0%	0%	0%
3	Motorcycle	100%	25%	0%	0%	31.50%
4	Vehicle	100%	0%	100%	0%	50%
5	Computer	100%	75%	100%	0%	68.75
6	Printer	100%	75%	100%	0%	68. 75%
7	Fax	100%	0%	100%	0%	50%
8	Telephone	100%	33%	100%	0%	66.60%
9	Internet service	100%	0%	100%	0%	50%

Surveillance core activity

Emergency preparedness and response

Both district health offices had an Emergency Preparedness and Response Plan (EPRP), but an adequate budget to respond to the malaria outbreak was not allocated. All health centers and posts did not have a written EPRP and an outbreak investigation checklist. Epidemic Management Committee and rapid response team (RRT) was established in all woreda health office but all health centers and health posts did not establish. There were no available stocks of the emergency

drugs and supplies for epidemic response at all district health offices, heath centers and health posts. However, when an outbreak occurs, they were used drugs available for routine services.

Outbreak investigation and case confirmation

During year 2020-2021, malaria outbreak was detected and notified by the district health offices. Total 11598 malaria suspected were reported. Among total suspected, 7819 (67%) were confirmed. All districts were conducted the investigation of the outbreak, but health centers and posts didn't conduct malaria outbreaks which occurred their own catchment. Outbreak investigation checklist was unavailable in all health centers and health posts.

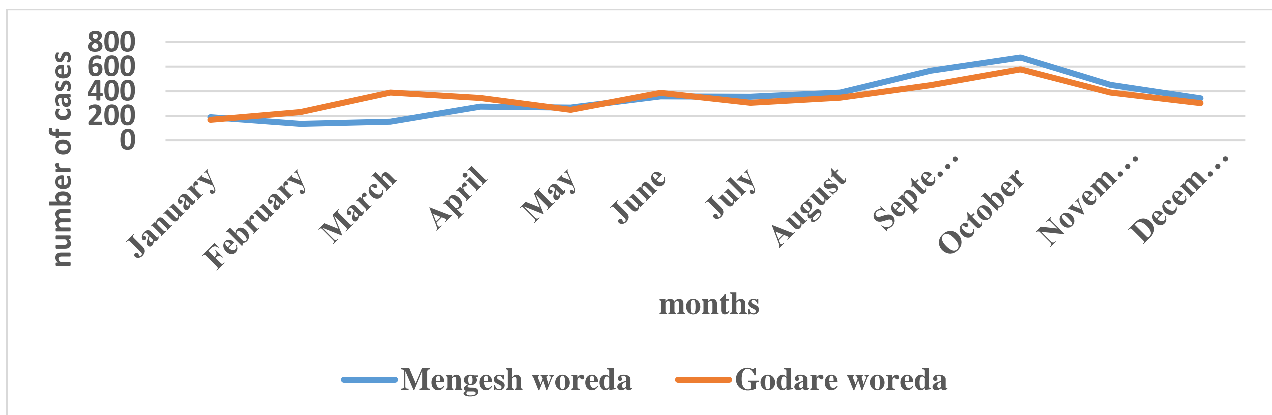


Figure 19: Trend of confirmed malaria case month in Majining Zone region, Ethiopia 202

Data analysis and interpretation practices

All districts health office was conducted data analysis by time place and person. But they did not analysis data regularly. Among total health centers, only one (33 %) were conducted data analysis and none of health posts were done the data analysis.

Surveillance system attributes

Usefulness

All study participants reported that current malaria surveillance was very useful. It had an ability to estimate malaria in the facility and community. 20 (83.5%) study partipants said the current

system has an ability to show the trend of malaria in the facility/community. The overall malaria system usefulness was 89.6%

Table 20: usefulness of malaria system evaluation Majining zone, Gambella region 2021.

Usefulness	YES	NO
The current system has an ability to estimate malaria in the facility	24(100%)	0(0%)
The current system has an ability to show the trend of Malaria in the facility/community	20(83.5%)	4(16.5%)
The current system has an ability to show the progress and effect of preventive and control methods applied against Malaria	24(100%)	0(100%)
The current system has an ability to indicate major causes of Malaria in the health facility/community	24(100%)	0 (100)
The current system has an ability to help the health facilities to improve clinical and ethical practices	22(91.6%)	0(0%)
The system have ability to stimulate research by providing hypothesis	15(62.5%)	9 (37.5)

Representativeness

All study participants (100%) reported that the current malaria surveillance system captured all malaria cases in the whole community, irrespective of their age, sex, ethnicity, religion, and other social and economic status. 91.6 % of the study participants agreed that notified Malaria cases represent the cases in the community. The overall malaria system usefulness was 23 (96%).

Table 21: the representativeness of malaria system evaluation Majining zone, Gambella region 2021

Representativeness	Yes	No
Surveillance system captured all malaria cases in the whole community, irrespective of their age, sex, ethnicity, religion.	24(100%)	0(%)
Notified Malaria cases represent the cases in the community	22(91.6%)	2(8.4%)

Data quality

Only 15(62 %) of the study participants were properly completed the surveillance reporting format. The following data quality gaps were identified, one was blank spaces that should be filled with zero number were not recorded, the starting and ending dates of the week were also not completely filled. The date the reports was received and sent is an important variable to determine the timeliness of the reporting was missed, but commonly missed at the district and health facility level.

Predictive Value Positive

A total 11,598 suspected malaria cases were reported from Majining zone. Among total malaria suspected cases, 7819 cases were confirmed either microcopy or RDT. The positive predictive value of the system was 67.4 % which is measured by total confirmed divided by total suspected

100 (7819 / 11598*100 = 67.4%).

PPV=A/A+B

Table 22: positive predictive value of the surveillance system of Mejininig zone, Gambella region 2021.

Woreda name	Total suspected	total confirmed	PPV
Mengeshi	5657	3678	65.0
Godere	5941	4141	69.7
Total	11598	7819	67.4

Completeness: all reports that expected Woreda health office, HC, HP were done accordingly and the six months (WHO week20-42) average completeness was 83%.

Timeliness: activities of malaria surveillance systems were conducted within a last six time (who week22-42). The six months (WHO week20-42) average timeliness was 79%.

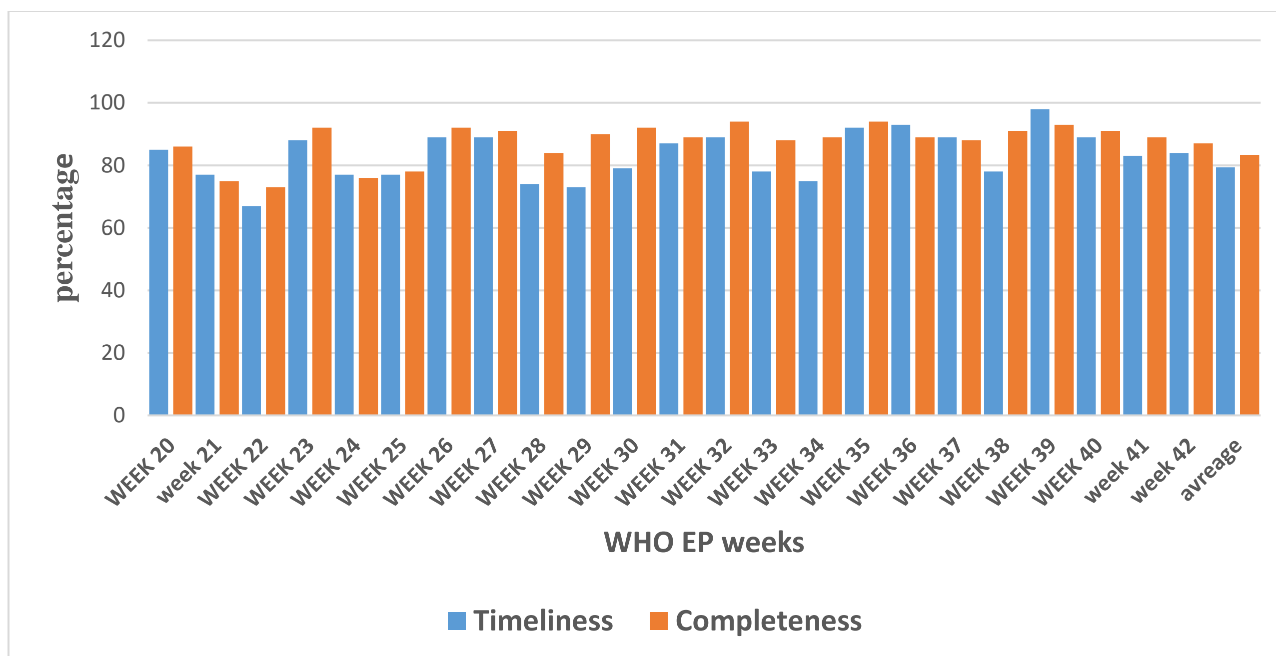


Figure 20: Timeliness and completeness of malaria system evaluations reports M zone, Gambella region 2021.

Flexibility

All study participants 24(100%) said public health surveillance could adapt easily to change in malaria case definition and include other disease. All study participants agreed that malaria data are easy to use by electronic systems, to integrate with PHEM systems, and have suitable case definition for any individual. The overall malaria system flexibility was 24 (100%).

Table 23: Flexibility of the surveillance system of Mejininig zone, Gambella Region, 2021.

Flexibility	Yes	No
Malaria data can be used in electronic systems	24(100%)	0(0%)
Malaria is integrated well in PHEM systems	24(100%)	0(0%)
Malaria case definition is suitable for any individual to reports	24(100%)	0(0%)

Acceptability

All participants said they were comfortable to participate in Malaria surveillance systems and to be assigned for active case search. 91 % of the study participants were worked together in developing work plan. 92% of them were engaged in the continuous and regular report. The overall malaria system acceptability was 23.2 (96 .6 %).

Table 24: Acceptability of the surveillance system of Majining zone, Gambella Region, 2021.

Acceptability	Yes	No
Health professional are comfortable to participate in Malaria surveillance system	24(100%)	0(0%)
Health professional comfortable in assigned to participate in active case search for Malaria	24(100%)	0(0%)
Health professional work in together in developing work plan	22(91 %)	8(16.5%)
All stake holders participate in system	24(100%)	0 (0%)
All concerned body uses report continuous and regular way	22(92 %)	2(8 %)

Simplicity

All participants agreed that malaria case definition was easy to apply and 23(95.8%) of them said malaria surveillance was not time taking the time to fill the weekly surveillance report within recommend time frame. All agreed that that malaria data collection, entry and storing and back up was easy for them to conduct. The overall malaria system simplicity was 23.6 (98 .6 %).

Table 25: Simplicity of the surveillance system of Majining zone, Gambella Region, 2021.

Simplicity	Yes	No
Case definition for Malaria is easy to apply	24(100%	0(0%)
No Special training is required to collect and interpret data	23(95.8%) 24(100%)	0(0%)
Malaria surveillance is no time taking	23(95.8%)	1(4.2%)
Malaria data is easy to manage during entry, storing and back up	24(100%)	0(0%)
Malaria need continues follow up	24(100%)	0(0%)
Malaria data collection is easy to conduct	24(100%)	0(0%)

Stability

All study participants said the system had ability to collect, manage, and provide data without failure and it was not costly as compared with the benefits it provided. The overall malaria system stability was 100 %

Table 26: Stability of the surveillance system of Majining zone, Gambella Region, 2021.

Stability		
The system is not costly as compared to the current benefit we gain from it	24(100%)	0(0%)
The system have the ability to collect, manage and provide data properly without failure	24(100%)	0(0%)
The system have ability to be operational when it is needed	24(100%)	0(0%)

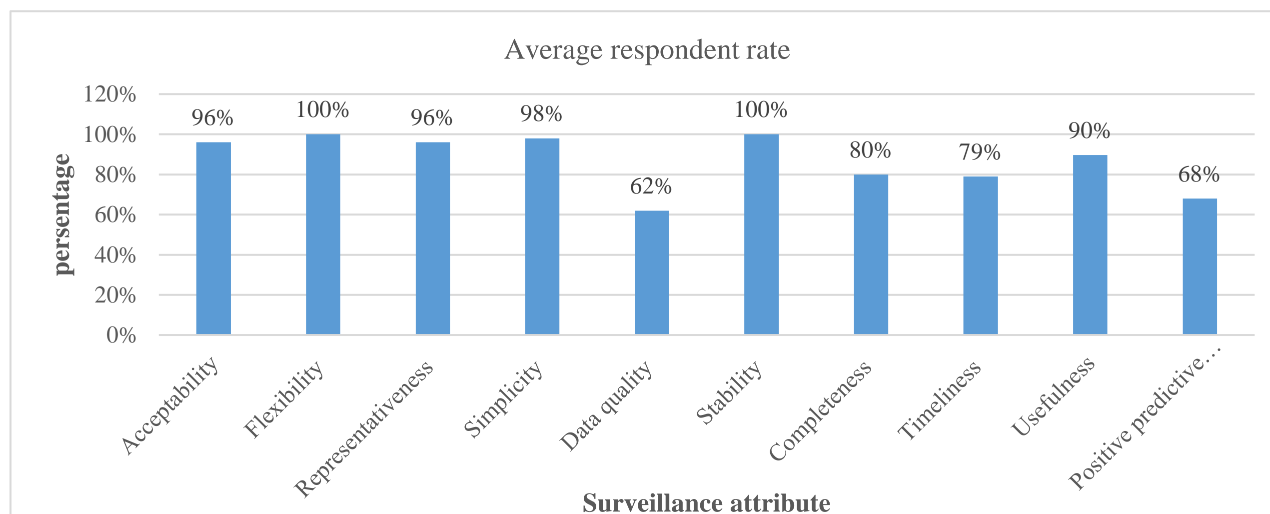


Figure 21: A summary of the implementation status of surveillance attributes and indicators in Majining, zone Gambella region, Ethiopia

Discussion

The malaria surveillance system's evaluation is the foundation for its improvement and proper morbidity and mortality monitoring. It is critical to identify the surveillance system's weaknesses and strengths and to provide evidence-based data to decision makers so that they can make decisions about the system's future and continuity(4).

In our study, there was good surveillance communication with well-structured surveillance data flow from lower to upper levels and collecting data from the community was easy to report to the next and clear to understand each role and responsibilities for each reporting unity. This finding is supported by the study conducted in Nigeria in 2020 (12).

In our study, two woreda health office had emergency preparedness and response plan but adequate budget was not allocated. All health centers and health posts were not developed emergency preparedness and response plan. The woreda health office had a plan to conduct supervision to assess health facilities, but the supervision was not carried out according to the plan. This study supported by malaria system evaluation in Danigla districts. This might be, due lack adequate budget, lack infrastructure, lack coordination and luck of regular supportive supervision.

All districts health office were conducted data analysis by time place and person. But they did not analysis data regularly. Among total health centers, only one (33 %) were conducted data analysis and none of health posts were done the data analysis. This might be due lack of updating training on disease surveillance and malaria surveillance and luck of budget.

The average data completeness in our study areas was 83%, which is higher than the 61.5% completeness report from upper east region of Ghana(12). But lower than national target of 85 % and study conducted in Dangila woreda Amahara region (13). They might be due to a lack of regular supervision, adequate feedback, turnover trend staff, shortage of training and refresher courses, and an overloaded work schedule.

Average timeliness reports of this study were 79%, which was lower than 85% national target and study conducted in Dagila district and Eritrea. This lower timeliness reports in our study might be inadequate infrastructure like the absence of transportation, lack of wired telephone, and luck internet access service.

In our study, the flexibility of the malaria surveillance system was high. It could adapt easily to change in malaria case definition and include other disease. All study partipants said that change system does not much cost and efforts, don.t need long term training staff on such change. This is similar to findings from malaria system evolution conducted Dangila district (13), Northwest Ethiopia Zimbabwe and Ebony State(7), Nigeria revealed; the data collection tools were very adaptable and could accommodate changes in malaria data collection (14).

In our study, the acceptability of the system was found to be high. All participate comfortable with reporting surveillance data. Malaria outbreaks have occurred on a regular basis in this woreda. Hence, to alleviate malaria disease and strengthen the surveillance system, the district PHEM officer, health center PHEM focal person, and health extension workers are willing to actively participate in reporting surveillance data. This study supported other study in Zimbabwe Solomon Island(12) and Amara region revealed study participants willingness and engagement of surveillance officials and reporting sites were as expected and the average reporting rates (14).

Our study found that the system was high representativeness, because it had captured all public health event particular people who live urban or people who live in near to health facility,

irrespective of their age, sex, ethnicity, religion, and other social and economic status. This study supported conducted in Nigeria, zimbabuye and Amahara region.

Regarding stability; More than 83 % participant reflects; available assigned surveillance focal person in all health facility has play great roll in current surveillance system to collect, manage, and provide data without failure and to be operational when needed, Bhutan (4), Dangila district, Northwest Ethiopia (8).

Only 15 (62%) of the study participants properly completed the surveillance reporting format. The following data quality gaps were identified: blank spaces that should be filled with zero numbers were not recorded; the starting and ending dates of the week were also not completely filled. Our findings are similar with the other study conducted in Malaria Surveillance System evaluation in (15). This might be due to lack of supportive supervision and feedback.

Conclusion: we found the malaria surveillance system was acceptable, useful, simple, flexible, and representative. However, completeness and timeliness were less than national standard. An irregular supervision, poor data quality, inadequate feedback, turnover trend staff, shortage of training, inadequate budget and shortage internet were identified.

Recommendation

Surveillance data should be analyzed, interpreted, and used for decision making at all facility levels. Region health bureau should allocate adequate budget at zonal level and regular feedback at level

Regional PHEM office should be give training and refreshments should be given for the staff.

The region, zonal, and woreda health bureaus should be improved through regular monitoring of supportive supervision and an ongoing feedback system to strengthen data quality, representativeness, completeness, timeliness, and/or other challenges in the public health surveillance system as a whole

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CHAPTER IV- HEALTH PROFILE

4. Health Profile Description of Woreda 06, Akaki Kality Sub City, Addis Ababa, Ethiopia, 2020

Abstract

Background

Health Profile is designed to help local government and health services identify problems in their areas and decide how to tackle them. However, in Woreda six, such valuable information is not complete, organized and updated comprehensive way of narrative description report. Therefore, the aim of the study was to generate information to support government and development agencies to address constraints.

Methods: Descriptive cross sectional study design was conducted in Akaki Kality Sub City Woreda six from Nov 10-20/2020. Health and health related data from July 8, 2019, to July 10, 2020 was collected and reviewed from district health information 2 (DHIS2), reports at the sub city health office and other relevant sectors. After checked for completeness data was described using Excel 2010software.

Results: Acute upper respiratory tract infection was the first leading cause of morbidity at outpatient department followed by Non bloody diarrhea in all age (adults and pediatrics). Tuberculosis detection rate, fully vaccination and PMTCT were 100%, 93.5%, and 94% respectively. Only 80% of households had latrines and 100% were utilized. Proportion of women receiving ANC1 was 93.6% and ANC4 was 78.96%. Among suspected COVID 19 case 55 % were tested positive. In 20119/2020 more than 41451013 ETB was allocated for the health.

Conclusion and recommendation: Acute upper respiratory tract infection, non-bloody Diarrhea, AFI and Pneumonia are the top three causes of morbidity in adult and pediatric; in addition to that, 20% of the community do not have functional latrine. ANC follow up of pregnancy women and TB detection rate were very high in the district. The major health problems were preventable communicable diseases therefore, the district must work with other sectors to improve the availability of toilet and hygiene practices as well as increase A community awareness regarding

to non-communicable disease by giving health education for the community through social mobilization

Introduction

Health is a state of complete physical, mental and social well-being, not just the absence of disease or infirmity; is the fundamental right of every human being everywhere; is crucial to peace and security; depends on the cooperation of all individuals and States; should be shared: extending knowledge to all peoples is essential (1). Based on this definition heath is multi-dimensional approach that encompasses different sectors rather than health sector. A community health profile is a system of collecting and organizing or summarizing health and other determinants of health related events to describe health conditions, demographic, socio-economic, political, cultural outbreaks/disasters, environmental sanitation, nutrition, human resources who serve in health, finance, logistic construction and maintenance, health facilities, health program administration, planning, monitoring and evaluation and other aspects of a particular population in the specific geographic area(2).

The data in a profile reflects the health of a given community from many different angles and its assessment is vital for prioritizing prominent health and health related problems of the community. It is basic for planning and for appropriate intervention; and is an entry point for operational research. Stakeholders of health and health related issues have access to evidence-based information from well compiled health profile. However, in low-income countries like Ethiopia, especially at district level, such information is usually not complete and comprehensive. Different health and health related data are available at different health organizations but most of the information is disorganized and incomplete in such a way that no one can access and use them at the right time and place for action (1, 3).

Descriptions of health profile enable health sector and other health partners of the sub city to understand the challenges of the community for their health needs. It encompasses compilation and interpretation of Demographic, Education and services like water, Transport, economy, Agriculture, and health status information of the woreda on the perspective of health (4). So, it contributes evidence-based information to governmental and non-governmental health stakeholders for prioritizing and institutionalized approach of appropriate public health interventions.

To improve the health status of the population the second Health sector Transformation plan (HSTP) is formulated and being on implementation from 2015/16 - 2019/20. To monitor progress towards HSTP to improvement in health status of the population, current and reliable information and use of information for making evidence-based decision are very crucial (5).

National Health Profile (NHP), published annually since 2005, brings together all health-related information in a single platform. It has six chapters covering Demographic, Socioeconomic, Health Status and Health Finance Indicators, Human Resources in Health Sector and Health Infrastructure. Importantly, it is a major source of information on various communicable and non-communicable diseases that are not covered under any other major programs. component of the framework used for the Profile, wellbeing, health condition ,health behavior ,accessibility, appropriate ,effectiveness, safety and environmental factors. Health Profile is now an established part of planning for health improvement. Data was collected, analyzed, and disseminated for decisions on the best information available (6).

The primary objective of the 2016 EDHS project is to provide up-to-date estimates of key demographic and health indicator (7). The health profile collected in DHS and mini-DHS every 5 years is not a complete profile, it deals only on the selected programs, and it was implemented by the Central Statistical Agency (CSA).

Rational of the study

Health profile invaluable tool to provides a lively, scientifically based account of health in community; it can stimulate public interest and political commitment. It can identify targets for the future progress towards them. However past decade's government Ethiopia has expanded health institution and diploid large number health profession over all country level but the quality issue also one big challenge. However to improve health and health related issue to this district measurement tools ; especial health profile has needed to improve quilt of health by identifying health problem and it also provide accurate ,up to date and unbiased information based on health indictors and it also support police maker.

Objective

General objective

- To describe health and health related profile of Woreda six, Akaki Kality sub city Administration, Addis Ababa, Ethiopia 2020

Specific objective

- To identify the health service status of a Woreda six
- To indicate the major problem related to communicable diseases of the Woreda
- To summarize health information relevant to Woreda Akaki Kality sub city Woreda six

METHODS

Area of Study Area

The health profile assessment was conducted in Akaki Kality sub-city Woreda six, Addis Ababa, Ethiopia 2019/2020

Study design

A descriptive cross-sectional study was conducted to describe the health profile of the Akaki Kality sub-city administration, Addis Ababa, Ethiopia.

Study Period

This study was done from Nov 10-20/2020

Data analysis procedure data collection

All data were gathered using checklist, interviewing with city responsible person, and collected from health office, education office, water & sanitation office, city administrative office, Culture and tourism office and different literature and publications to incorporate other unavailable information. Available 2011-year secondary data both Hard copy and Softcopy review to generate different data.

Data Analysis tool

Data were analyzed using Microsoft office excel 2007

Ethical consideration

Official latter and all contents of this study was send to Woreda health office to request the legality of study and it was started after ethical approval for this study received from the PHEM office and woreda 6 district local government also provided clearance.

Dissemination of Findings

The result obtained important issue during health profile study of this Woreda were disseminated to all concern bodies (Addis Ababa University School of Public health FETP, Woreda Health Office, PHEM and other relevant offices.

Operational Definitions

ANC rate: Proportion of Pregnant women attended, at least once during the current pregnancy, by a skilled health professional, for reasons related to pregnancy (8).

Contraceptive acceptance rate: Proportion of women of reproductive age (15-49 years) who are not pregnant, who are accepting a modern contraceptive method (new and repeat acceptors (4)

Early ANC: The proportion of women received Antenatal care before 16 weeks of Gestational age (8).

Fully immunized: According to the guidelines developed by WHO, children are considered to have received all basic vaccinations when they have received a vaccination against tuberculosis (also known as BCG), three doses each of the DPT-HepB-Hib (also called pentavalent) vaccine, vaccines against polio, and a vaccination against measles (9).

Improved latrine: a latrine having at least a hut, coverings over opening of a pit, hand washing facility attached to it and currently using it(8).

Postnatal care (PNC) coverage: Proportion of women who seek care at least once during post-partum (42 days after delivery) from skilled health attendants including HEWs for reasons relating to post-partum (4)

Skilled delivery: proportion of deliveries attended by skilled health attendants; A skilled birth attendant is an accredited health professional, such as a midwife, doctor, health officer, or nurse, who has been trained in the skills needed to manage normal (uncomplicated) pregnancies, childbirth, and the immediate postnatal period, as well as in the identification, management, and referral of complications in women and newborns (7).

TB case detection rate: Number of new smear positive, smear negative and Extra PTB cases detected, among TB cases estimated to occur in the district (12).

TB cure rate: Percentage of a cohort of smear-positive TB cases registered in a specified period that was cured as demonstrated by bacteriologic evidence (a negative sputum smear result recorded during the last month of treatment and on at least on one previous occasion during treatment (12).

TB treatment success rate: Percentage of a cohort of new smear positive TB cases registered in a specified period that successfully completed treatment. Successful completion entails clinical success with or without bacteriological evidence of cure (12).

Demography: The study population and its characteristics, with reference to such factors: size, age structure, density, fertility, mortality, growth, and social and economic variables (6).

Child mortality rate: The number of Child death occurring in 2008EC per 1000 women in the reproductive ages (i.e., women aged 15-49).

Skilled delivery: Proportion of deliveries attended by skilled health attendants (1).

A skilled birth attendant is an accredited health professional – such as a midwife, doctor or nurse – who has been trained in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborns. (Exclude TTBA and HEWs) (4)

Tuberculosis (TB) case detection rate: Number of new smear positive TB cases detected, among the new smear-positive TB cases expected to occur in the sub city for the year 2020. TB treatment success rate: Percentage of a cohort of new smear positive TB cases registered in a specified period that successfully completed treatment (4).

Successful completion: entails clinical success with or without bacteriological evidence of cure (4).

TB cure rate: Percentage of a cohort of new smear-positive TB cases registered in a specified period that were cured as demonstrated by bacteriologic evidence (a negative sputum smear result recorded during the last month of treatment and on at least one previous occasion during treatment) (7).

TB defaulter rate: Percentage of a cohort of new smear-positive TB cases registered in 2020 that interrupted treatment for more than 2 consecutive months (5).

Leading causes of morbidity: The frequently occurring causes of morbidity (10) among patients, of which the greatest number of cases have been reported during the year (10).

Fully vaccinated: Surviving infants who received all doses of vaccine antigen. The Infant Antigens are BCG, Pentavalent (DPT-HepB, Hib), doses 1 -3; OPV, doses 1—3; and Measles (3).

Postnatal care (PNC) coverage: Proportion of women who seek care at least once during postpartum (42 days after delivery) from skilled health attendants including HEWs for reasons relating to post-partum (9).

Leading causes of mortality: The most frequently occurring causes of mortality under which the greatest number of deaths have been reported during a given year.

Maternal mortality rate: The number of maternal death while pregnant or within 42 days after termination of pregnancy from any cause related to pregnancy or its management per 100,000 populations.

RESULT

Historical back grand of woreda 6, Akaki kality sub city

This health profile is conducted in Addis Ababa woreda 6 Akaki kality sub city. It is in the southern part of the city at 20 KM far from city of center. Before three decades this sub city is not part of Addis Ababa. It was a part of Shaw, and 90 % sub city land was covered by agriculture area and crops. During Dreg regime it became part of Addis Ababa by naming northern parts kality so called 27 Kefitegna and southern parts also 26 Kefitegna. Its population is estimated 220740 with 114095 female and 106645 male (2007) according to Ethiopia central statics authority (11).

Geography and climate

The altitude of the woreda six ranges from 2050 to 2331 above sea level which make the sub city categorized as the “woinadega” climate class. The average 2331 meters above sea level. The Highly elevated land exists in the north and east part there are small mountains while east part, there are small mounting while relatively lower elevation exist in south. Total area of the sub city is 118.08 sq. but woreda six squared of data not available. This woreda is in 27 region at 8°53'47" north of the equator and 38°47'20" east of the Prime Meridian.

Demographic information

Projection based on 2007 census result reports, woreda six had a total population of 59914 of with growth rate of 2.4% which is Male population 29545 (49.3%) and Female population 30572(51%) in 2020. From this male to female ratio is approximately about 0.97:1 (1:1), Of these total population, 1.5% under five children’s, women of reproductive age group (women 15-49 years of age) constitute 22.6% and 21% of the population were under 15 years of age. Numbers of pregnant women 284 (1. 33%) and total household size 4450.

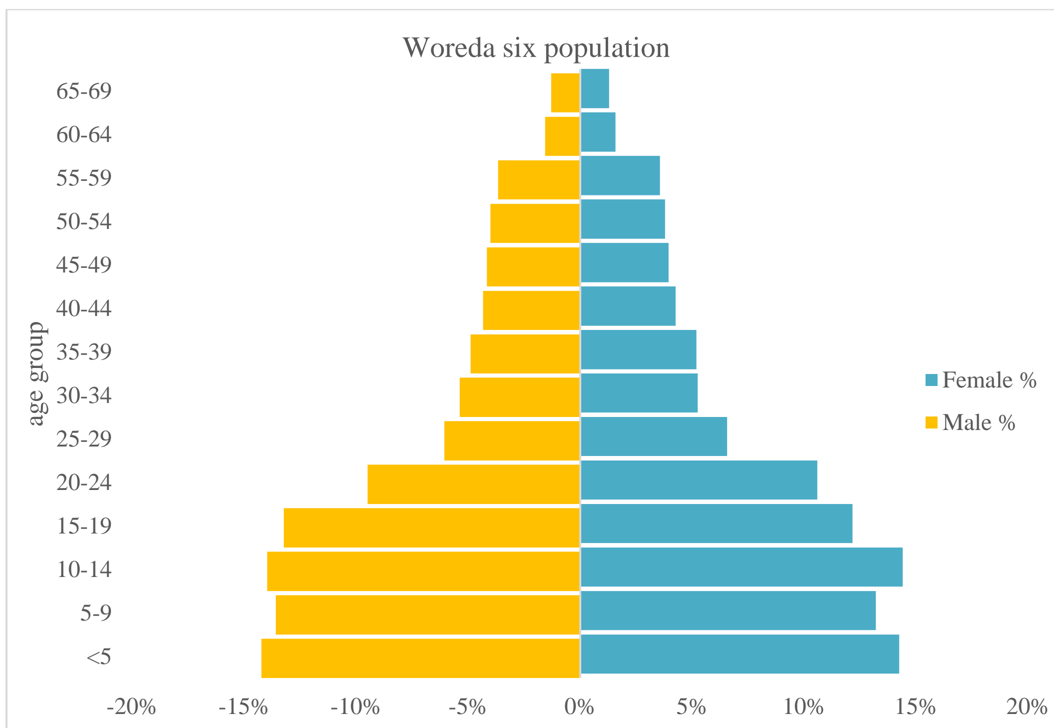

Figure 22. Population pyramid of Akaki kality, woreda six Addis Ababa, 2020

The above pyramid show male located at left and female are at right side, wider part at bottom of the pyramid included young age group and narrowed parts at top are contended old age groups. This may be due to short life expectancy and high number of young people influx in Addis Ababa from all over the countryside.

Administrative and political structure

Woreda six is one of the 11 Woredas of Akaki Kality sub city. Administratively the Woreda is divided into 10 Ketena (the lowest governmental structure) and 79 safer and 1643 household. The Woreda is surrounded by four woreda of Akaki Kality sub city in the North, West and East and on the South, Oromiya special zone surrounding Finifinne is shares boarder. Geographically the altitude varies from 2050 up to 2331 meter above sea level. For administrative purpose, all sector offices concentrated in one building. All the sector offices are under Akaki Kality sub city.

Table 27: Population size male and female of Akaki kality sub city woreda six by ketana in /2020

S/no	Ketana name	Male	Female	Total
1	Kenta one	2423(8.9%)	2817 (8.6%)	52575 (8.7)
2	Ketan two	3112(11.5%)	5740(17.5%)	8881(14.8)
3	Ketan three	2167(8.0%)	5228(15.9%)	7418.9(12)
4	Ketan four	3044(11.2%)	2983(9.1%)	6047 (10.1)
5	Ketan five	2714(10.0%)	2500(7.6)	5231.6(8.7)
6	Ketan sixe	2344(8.6%)	2133(6.5)	4492.1(7.5)
7	Ketan seven	2432(9.0%)	2687(8.2)	5136.2(8.5)
8	Ketan eighty	2995(11.0%)	2940(9.0)	5955(9.9)
9	Ketan nine	2801(10.3%	3125(9.5)	5945(9.9)
10	Ketan then	3082(11.4%)	2650(8.1%)	5751.4(9.6)
	Total	27114	32803	59917

Productive and factories and Industrial Plants

Currently there are more than 300 factories found Akaki kality sub city. 34 factories found in woreda six with estimated labor 2400 works. Fifteen factories accessed by community due release chemical, environmental pollution and 2 factories banned by sub city plan and industry authority. In Akaki kality sub city woreda six, factories found in the sub-city are Leather Products technology Institute, Plastic Industry, Nile Coffee Exports, Hashko Plastics and Shoe Factory, Metal works Industry, Addis Tires, Adwa Milling, Akaki Garment Factory, Akaki Textile Factory, Alfubek

Aluminum and Metal Works. From all above factor two banned to toxic chemical release into community.

Education

Woreda six has a total of 38 schools of these 19 pre-schools, 10 primary and 03 secondary schools ,2 preparatory schools, 1TVT and 3 university exist with a total of 12176 students enrolled in 2019/2020. Female students were 52.6%. A total of 430 teachers were registered. Student's dropout rate at primary school was 7.46 per 1000, and 9.3per 1000 registered at secondary schools. According to woreda education office. Privet schools is relatively batter than government by access water, transport, electricity, latrine utilization, wide crass room, and access first aid are almost in privet school at KG level but private college poor access to water, latrine utilization and student.

Table 28 : Woreda six total student, teacher, and school in 2020

	Number School		Number of student enrollment				Number of teachers	
Name institution	government government	Private	Male Students	Female students	school drop	Total student	Male	Female
KG	13	6	7716	9978	231	17694	2	211
Primary	4	6	3661	3958	54	7619	128	81
Secondary	1	2	806	903	16	1709	66	17
Preparatory	1	1	480	585	9	1065	60	8
TVT	1	0	256	104	7	360	19	5
University	0	3	567	856	4	1423	32	10
Total	20	18	5770	6406	90	12176	179	251

Health system

The health sector is structured by different organ-gram. Structurally, it is organized by the head of the district health office, vice head of the district health office, health promotion, disease prevention and health care delivery main core processer, health and health related cases team, public health emergency management case team, Planning monitoring and evaluation case team, logistic and cold chain case team are the structure that was decentralized subdivision. The organizational structure of woreda health office organ- gram is given by the following figure

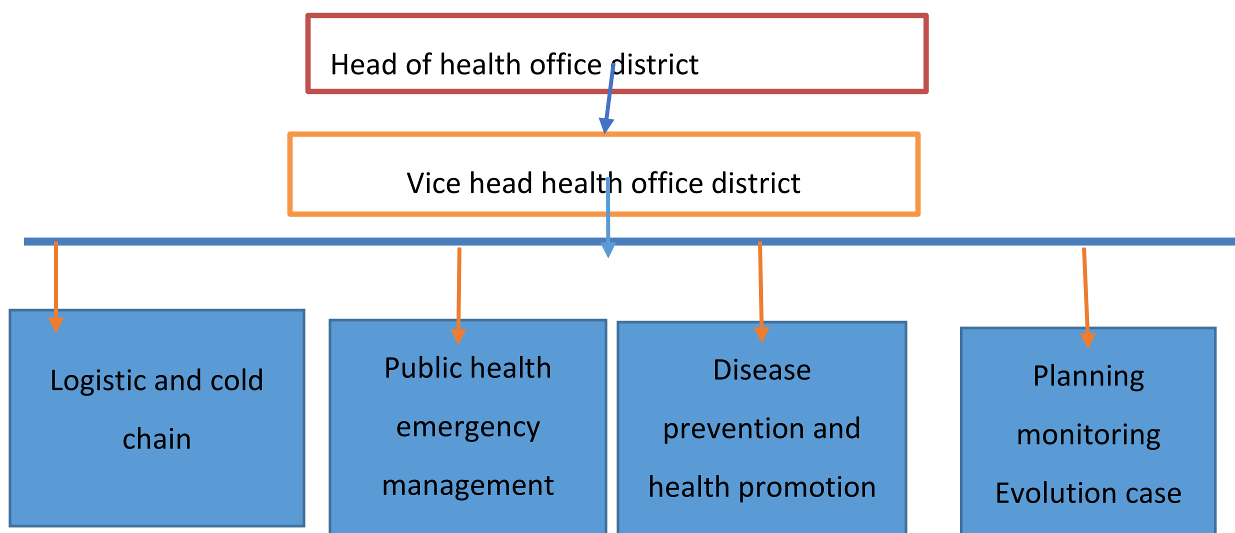

Table 29: Vital statistics and health indicators of Woreda 6, Akaki-Kality Sub-city, Addis Ababa, Ethiopia, 2020.

S. N	Vital statistics and health indicators	Total	Percent
1	Total male population	27114	45.3%
2	Total female population	32803	54.7%
3	Urban population	59917	100%
4	Rural population	0	0

5	Number of under 1 child	920	1.54%
6	Number of under 5 children	2860	1.50% %
7	Population less than 15 years	12561	20.90%
8	Population between 15-24	16543	27.60%
9	24-59 years age group	19303	32.20%
10	Women 15-49 years	13560	22.60%
12	>=65 years population	1345	2.200%
13	Dependency ratio	1345/358,46	3.7%%
14	Pregnant women	94	0.29%
16	Infant Mortality Rate	NA	Data not available
17	Neonatal mortality	NA	Data not available
18	Child Mortality Rate	NA	Data not available
19	Crude Birth Rate	650	10/1000
20	Crude Death Rate	14	0.2/1000
21	Maternal Mortality Rate	1	15/100,000

Health service facility and Human power

In woreda six, total 43 health facility served to people in different ways. From all healthy facility's 7% were governmental health facility and 93% were private health facility. 2.4% were traditional medicine who have permission from the woreda and sub city healthy regulatory. Both government and private health facility provide service to community OPD (outpatient department), treat in patient, Delivery, Abortion, ANC, IMNCI, TB/HIV, Minor surgery, Pharmacy. All health facility managed under woreda healthy office by HIMS report, PHEM reports, and supervision visited health facility based on schedule.

Table 30 : Number of health facility in woreda 6 k/k sub city, Addis Ababa, Ethiopia in 20/21.

S/no	Type of Health facilities	Government	Private	Total
1	Hospital	0	1	1
2	Health center	1	0	1
3	Medium clinic	0	10	10
4	Pharmacy	1	4	5
5	Specialty clinic	0	1	1
6	Drug store	0	5	5
7	Diagnostic laboratories	0	1	0
8	Factory clinic	1	14	15
9	Dental clinic	0	3	3
10	traditional medicine	0	1	1
	Total	3	40	43

Manpower of woreda health office and health Center in 2019/2020

In the woreda six, Total privet and government health facility worker were 167. From all healthy worker, healthy extension (HEW) was accounted 14(8%). According woreda healthy office; Health extension workers has been major great roll to provide safe, clean delivery, managing hemorrhage, preventing infection, identification complication early and making referrals to appropriate level of healthy service. 59(35%) were supportive stuff and the rest 92(55%) were health officers, midwife, nurses, lab technician, environmental, Dentists and Doctors. No field epidemiologist deployed at woreda level.

Table 31 *:* Type and Number of Health Institution to Population Ratio, 2020

S/no	Type	Number	Ratio
1	MD	3	1;23
2	Health officer	22	1;27
3	Laboratory technician/technologist	5	1;11
4	Pharmacy technician/pharmacist	9	1;6
5	Nurse	28	1;2
6	Midwife	12wa	1;49
7	X-ray	1	0
8	Dentist	4	1;1
9	HEWs	14	1;4
10	Environment	3	1;1
11	supportive staff	59	1;1
12	Total	165	

Top ten causes of morbidity

In 2020 ten top causes of morbidity in outpatient department, the most frequently occurred disease was Acute upper respiratory infection and accounts about 20% for adult and 30%under five children of total cases. List of ten top diseases presented as follow in table 31

Table 32 : Top then disease of adult and under five children OPD of woreda six in 2020

s/n	Adult cases	Number of cases	Percent (%)	Under 5 years old cases	Number	Percent
1	upper respiratory infection	6250	20	AURTI	2317	30
2	Diarrhea non bloody	4778	15	Diarrhea(Non-bloody	1256	16
3	AFI	3922	13	Pneumonia	958	12
4	Dyspepsia	3517	11	Infection of the Skin	724	9
5	Trauma	3123	10	Concavities	608	8
6	UTI	2799	9	UTI	562	7
7	Helminthes	2455	8	intestinal parasite	495	6
8	Pneumonia	1892	6	Dysentery	411	5
9	disease of	1566	5	AFI	311	4
10	Skin infection	987	3	Otitis media	67	1
11	Total	31289	100%		7709	100%

From the above tables AURI is the leading cause of adult OPD followed by non-bloody diarrhea-, AFI, and Dyspepsia. In addition, UTI is one of the top ten causes of diseases in the district. In under five old cases OPD among the top ten leading causes of OPD visits AURI, non-bloody diarrhea and pneumonia took the first three places as leading causes OPD visit. The highest death reported from all top ten disease were due to trauma or emergency cases (4 male adult and 1 female was from under five old).

Maternal and child health services coverage

Family planning is one of activities done under reproductive health/ MCH services. Contraceptive acceptance rate of the women in reproductive age group was 6695(58%). With regarding to method selection 2441 (36%) women used injectable forms, 2167(.32%) women used oral pills, 1986(29.30%) women used implant and 101 (1.5%) of the women in reproductive age used IUCD.

Proportion of women receiving ANC1 was 1250 (93.6%) out of which only 524 (41.92%) had early ANC and the proportion of women receiving ANC4 was 987(78.96%) and proportion of mothers received PNC was only 56.1%. From the total 284 pregnant women received ANC services, 94% had tested for HIV and known their HIV status of which 0.5% mothers tested HIV positive.

Table 33 : maternal health service coverage of Akaki Kality Woreda six 2020

maternal indicator	Plan	Achievement	Percent
ANC 1	1250	1170	93.6
Early ANC1	500	284	56.8
ANC 4	1250	1250	100
PNC	1300	1035	79.6
PMTCT	150	141	94
PW tested for syphilis	500	450	90

PW tested for hepatitis	776	557	71.8
Pregnant Women on ART	100	100	100
Iron supplement	1250	1250	100
Partner testing	500	189	37.8

Child health

Expanded Immunization Program

In 2019/2020, woreda six report showed that vaccination coverage of Penta-3 and measles, 82% and fully immunized 93.5%. TAT 2 for pregnant mothers were 84% % (see below Table 33)

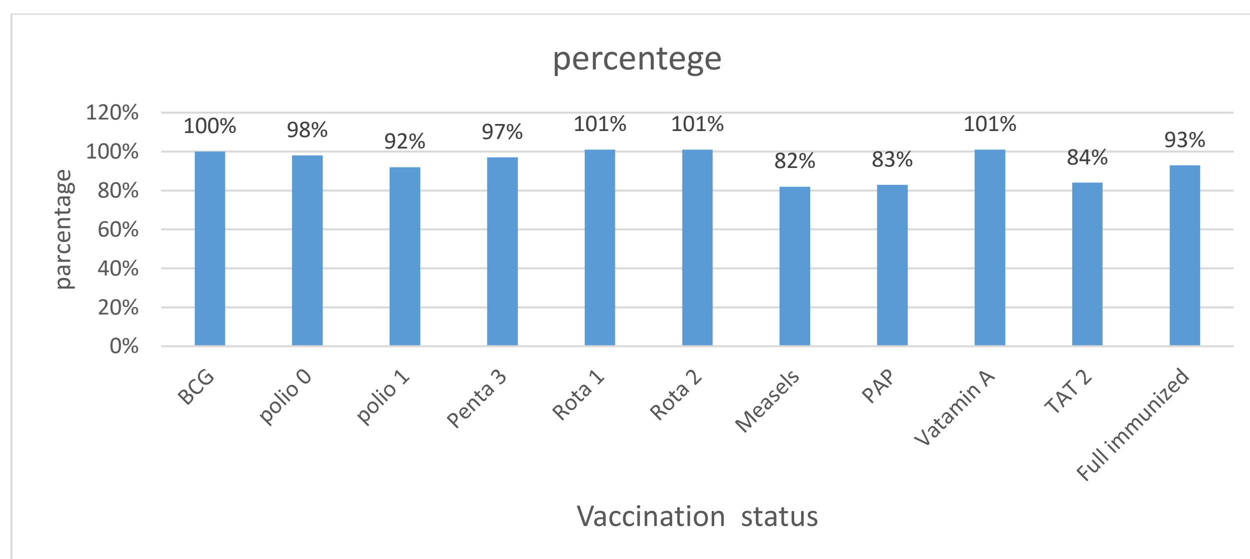

Figure 23 : EPI services coverage and achievement of Woreda six 2020

Child Nutrition

Under child health, Assessment of growth and development are one component. The growth monitoring coverage of <2 years children of the district was 876(94.2%). From total children 2136 (87.6%) screened for malnutrition 19 (2.1%) children with MAM and 150 (0.7%) children with severe acute Malnutrition were identified.

Table 34 : EPI coverage in Woreda 6, Akaki Kality Sub city, Addis Ababa, 2019/2020

S. No	Description	Plan	Achievement	Coverage %
1	Growth monitoring	929	876	94.2949
2	MAM among under 5 screened		19	2.1
3	SAM among under 5 screened		7	0.7
5	Deworming (24-59M age)	1522	134	88.4
6	Pneumonia	500	424	80.8
7	Diarrhea	700	446	54.5
8	Sepsis	200	7	2.6

Situation and disease under surveillance

Among total 22 immediately and weekly reportable diseases in Ethiopia, eight of them were reported from Woreda six health facilities with different magnitudes. From reported disease Typhoid fever and Typhus fever were contributed high number of cases, 850 (34.3%) and 554 (22 %) cases respectively. 442(17.8) were dysentery, 241(9.7%) were malaria, 144(5.8%) scabies, SAM 62 (2.4%), 22(0.9) RF were reported under weekly and daily reports.

Table 35 : Immediately and Weekly Reportable Diseases Woreda 06, Akaki Kality, 2020

S/no	PHEM immediately and weekly reportable disease	Cases	Percent	Death
1	Typhoid	850	34.3	0
2	Typhus	554	22.3	0
3	Dysentery	442	17.8	0
4	Malaria	241	9.7	0
5	Scabies	144	5.8	0
6	SAM	62	2.5	0
8	RF	22	0.9	0
9	Total	2481	100.0	0

ENDEMIC AND EPIDEMIC DISEASES

COVID 19 prevalence

Ethiopia reported its first case on 13 March 2020, and the number of reported cases has shown a slow but steady increase

In Akaki kality woreda six, total of 3469 suspect individuals were tested for COVID 19 and 1939 were tested positive. 1062 (54.8%) male and 877 (45.2%) female were confirmed by PCR until June 30, 2012EFY. All age group affected COVID 19 pandemic, Age group 40-49 were more affected than other than age group 370 (19%) .However, the trend of case fatality rate graph by age groups shows increased to old age groups.

Table 36: Demographic of COVID 19 of cases Akaki kality woreda six 2020

Sex	frequency	%
Male	1062	54.8
Female	877	45.2
Age group	frequency	%
<10	167	8.6
10-19	295	15.2
20-29	347	17.9
30-39	330	17.0
40-49	370	19.1
50-59	232	12.0
>60	198	10.2
Total	1939	1.0

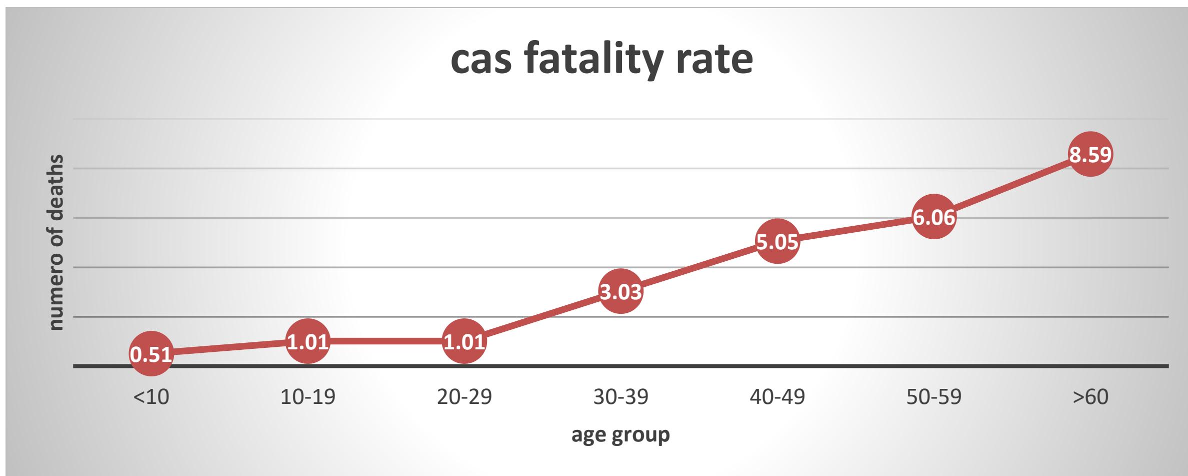

Figure 24 : COVID 19 case fatality rate by age group Akaki kality, woreda six 19/2020

Tuberculosis/Leprosy

In 2019/2020, a total of 186 clients were detect all forms of tuberculosis disease. Of these, 57 were smear positive, 129 smear negative and 28 cases were extra pulmonary tuberculosis diseases with 100 % case detection rate. There were 4(2%) deaths during time of TB treatment. 56(98%) patient ware completed 1st drug the regimen and one TB patient change to treatment site out to woreda. However, two patients were interrupted treatment due to drug side effect. The TB cure rate and treatment success rates are 97% and 98 % respectively. All TB patients were screened for HIV; out of those 38 (20 %) were reactive.

Table 37 : TB cases in woreda 6, Akaki Kality Sub city, Addis Ababa 2020

S/no	Description	case count	%
1	prevalence Tb	186	
2	Pulmonary TB -	162	87%
3	pulmonary TB smear positive	57	35.2
4	pulmonary TB smear negative	105	64.8
5	Extra PTB	28	25
6	TB detection rate	186	100
7	TB Rx completion rate	183	98
8	TB cure rate	181	97
9	TB Rx success rate	184	98
10	TB defaulter rate	2	2
11	Death rate on TB Rx	4	2
12	Total TB patients screened for HIV	186	100
13	HIV prevalence rate among TB cases	38	20
14	Prevalence of Leprosy	2	1

HIV/AIDS

A total of 1766 (916 female and male 850) people were screened for HIV antibody taste in 2020. Among that 1 male and 2 female were positive for HIV. A total of 2017 clients are on ART (1050 (52 %) male and 967(48 %) were female. PLWHIV among which 1298 are on ART (577 males and 721 females) and about 2772 clients are on pre-ART. In 2019/2020 health education were given for 3500 clients and 11000 condoms were provided to consumer.

Table 38 : HIV AIDS services in Akaki Kality Sub city Woreda six in 2020

S/NO	Activity	Plan	Achievement	%
	Total people screened for HIV	2000	1766	88.3
	New clients screened positive for HIV	10	3	37.7%
	VCT	0	0	0
	PICT	4000	3733	93.325
	PMTCT	5000	4322	86.44
	Total PLWHIV	3000	2820	94
	On ART	2324	2175	83.5
	Pre ART	200	154	77
	Expected new positive among screened	10	3	30%
	No of HFs providing ART service	5	5	100
	Condom distribution	10000	11000	110%
	Health education	5000	6500	130%

Malaria

According to sub city disease prevention and control, recently Akaki Kality sub city is tendency to becoming malaria endemic area. But not much more attention given malaria prevention and control in woreda six. In the line of this, total number of cases of malaria 112 (64 male and 48 cases were female. Plasmodium vivax most dominant (90 %) following to PF species 40(10 The

Insecticide-Treated Nets (ITN) coverage and Indoor Residual Spraying (IRS) not conducted to woreda households.

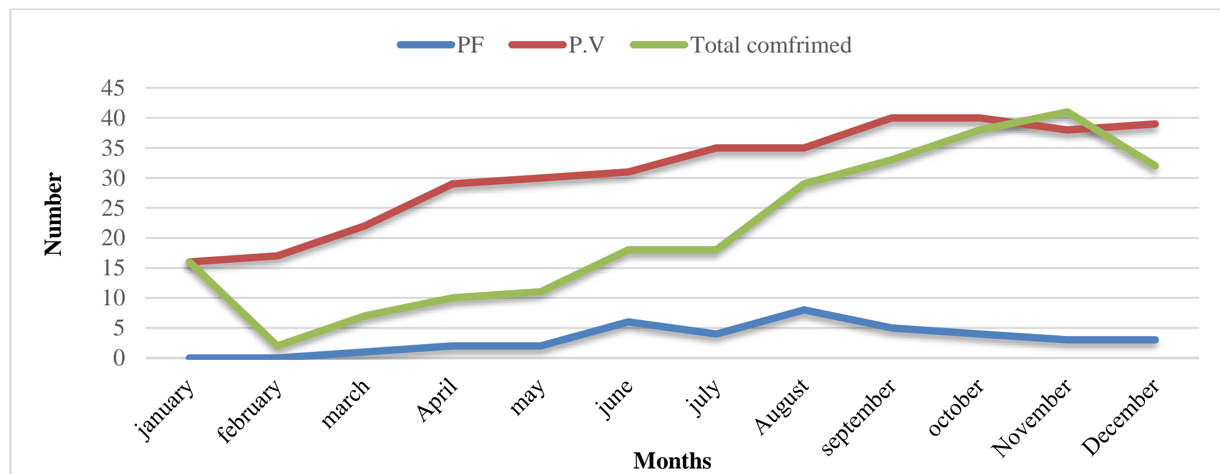

Figure 25. Malaria trend analysis of malaria cases of Akaki kality woreda six 2020

Disaster Status in the Woreda

The Woreda was affected by flooding in 2019/2020 at Jun to September with 48 household displaced, transportation bus caught in flush flooding. According to Akaki kality sub city woreda six water and irrigation authority vulnerability to flooding is more aggravated due to a poor drainage system, rapid housing development along river and using inappropriate construction materials.

Due to rapid urbanization and population increased, additionally the poor drainage systems of the city also intensify the risk of flooding. According to disease prevention and control of sub city due to aggravated flooding and lack potable water in woreda; acute watery diarrhea affected more than 49 patient (29 male and 20 female) in 2019 a month July to September but death was not reported. All seven factor were accessed by city water and irrigation authority due to release toxic poisoning in community. However, two factor was completely banned due to released poisoning chemical in Katena 7, ketana4, ketana 9 and 89 people complained with cough, sore throat, and headache.

Trauma

Trauma is one of the important public health problems that causes significant economic and social crisis with more than 10% disease cases are associated with it. It was one of top 5 cases in adult OPD. In 2012 about 3584 trauma cases were reported (2514 (72%) was male and 1070 female).

The main cause of trauma was fighting accident, road traffic accident, falling down accident and machine tools injury, burn injury, poisoning, occupation injury, animal bite, trauma from interpersonal violence and self-harm injury. Overall prevalence of trauma in Akaki Kality Woreda 6 was 7.7%.

Non communicable Disease

Hypertension and DM

In 19/2020, a total 850 hypertension cases reported from woreda six. 489(57%) female hypertension cases and the rest were male. Total 786 DM cases reported from one governmental health centers, two private hospital and 11 private clinics. 512 (65%) cases were male, and 274 (35%) cases were female. Many studies show, NCCDS such as physical inactivity, inadequate intake of fruits and vegetables, alcohol consumption, cigarette smoking and overweight associated factor for Hypertension, DM and other chronic disease in the Addis Ababa.

Zoonotic disease

In the woreda six, there were many suspected animal bites reported from woreda, particular dog bite very common than other than anther animal bite such, cat, cattle, ETC. But clear data regarding to zoonotic disease in woreda not available.

Environmental sanitation and availability of safe Water in 2011

Solid west management

Solid west management is a consequence of day-to-day activity of humankind, needs to be managed properly. Addis Ababa City Administration faces problem associated with poorly managed solid waste operation in last decade and much more efforts to manage solid wastes properly. According woreda 6 administration 105 rod cleaner and 3 car diploids to facilitate solid wastes in Akaki kality sub city woreda 6 in 2011. Municipal waste collection is handled in three ways, door to door collection for households, along accessible on streets, block collection for clients particular for large hotels enterprises and institutions. Major source of solid waste namely households, street, commercial institution, industries, hotels, and hospitals identified by woreda administration.

Liquid waste management

Liquid wastes is one of biggest challenge of urban sanitation, and it requires capital investment, skilled personnel, coordination between different origination and awareness of the issues by the public. There is no well summarized data about the coverage of safe water supply and latrine coverage in the woreda but according to information from health extension workers and community most of Ketene 8 and Ketene 10 community were use open defecation and river water for drinking and personal hygiene.

Table 39 : liquid waste management of Akaki kality woreda six 2020

S/n	Description	Number	Percent
1	Total household	8178	
2	Number of latrines	6548	80
3	Number of household without latrine	1630	20
4	Number of household use open defecation	142	1.7
5	Number Ketena access to safe water supply	9	
6	Number of household access to safe water supply	8018	98
7	Number of household use water from river or	160	1.9
8	Total factory in the woreda	22	
9	Sewerage system of the factory	15 are good	
10	Coverage HEW in the woreda	12	

Budget allocation

In 20119/2020 more than 41451013 ETB was allocated for the health budget for woreda administrative. Of these total budget 21676818(50 %) allocated woreda health office, 6317846 (15.2) internal income for drug and health service and the rest 13456349(32.4 %) ETB covered by different partners Budget allocation for woreda six, Akaki Kilaty sub city, Addis Ababa 2020

Table 41: liquid waste management of Akaki kality woreda six 2020

S/no	Description	Number	Percent
1	Total household	8178	
2	Number of latrines	6548	80.07
3	Number of households without latrine	1632	20.0
4	Number of households use open defecation	252	3.08
5	Number Ketena access to safe water supply	9	
6	Number of household access to safe water supply	7380	90.2
7	Number of household use water from river or spring	260	3.2
8	Total factory in the woreda	22	
9	Sewerage system of the factory	15 are good and 7 are bad	
10	Coverage HEW in the woreda	12	

Discussion

The woreda population pyramid show male located at left and female are at right side, wider at bottom of the pyramid, this included young age group and narrowed at top pyramid. Young population reported higher accounted. This may be due to short life expectance and high number of young people influx in Addis Ababa from all over the countryside. The result was supported in demographic health survey Ethiopia, in 2016 shows 51% of them were female, and 49% were male.

Acute upper respiratory infection was the first leading cause of morbidity at OPD followed by non-bloody diarrhea both in adults and pediatrics. In Most of ten top leading cause of morbidity at OPD was communicable disease linked to poor sanitation, limited access to safe water and overcrowding condition of house. According to the woreda TB report 2019/2020, HIV prevalence incident TB cases (TB/HIV coinfection rate) was about 20%, which is less than the study done in the Amara region (27.7%) in 2016. and 100% of detection of tuberculosis in the district was high compared to the national annual report (67.4%) and national target (76%) (Health and Health Related Indicator 2014/2015, Health Sector Development Programed IV).

When we look the woreda, HC to population ratio 1:59,917 was below the national standard (8). When we observe professional to population ratio, the district compared with national figures has been low which is 0.4/1000 population (health officer, nurse and midwife), (national target 2.3/1000 population minimum threshold), beside this, pharmacy and laboratory professional is very low in the woreda.

Regarding contraceptive acceptance rate, among total woman age 15-49, 13560 was 6695(58%). With regarding to method selection 3441 (51%) women used injectable forms, 2167(.32%) women used oral pills, 891(13%) women used implant and 283 (4.2%) of the women in reproductive age used IUCD. This study result was lower than when compared to the Ethiopian Mini-EDHS 2019 finding which means family planning method 55% plan in 2020. However it was lower than in 2018 before COVID 19 woreda health office which was 68% contraceptive acceptance rate, this may be due to all the health system needs to be significantly to reduce the direct and indirect impact of the pandemic on non-COVID 19 health service utilization at all levels.

Proportion of women receiving ANC1 was 1250 (93.6%) out of which only 524 (41.92%) had early ANC and the proportion of women receiving ANC4 was 987(78.96%). This study is lower than demographic health survey in 2019 of Addis Ababa region which ANC 1 and ANC 4 was 96.9 and 81.8 respectively

From the total 284 pregnant women received ANC services, 269 (94%) had tested for HIV and known their HIV status of which 4 (0.5%) mothers tested HIV positive. This also lower than last year woreda six showed all pregnancy (100% pregnancy) had tested to HIV. other study conducts in Addis Ababa; revealed that health care providers'-initiated HIV/AIDS consulting and testing significantly decreasing during COVID 19 cases official reported in the country (10).

The postnatal period is a critical phase in the lives of mothers and newborn babies. Most maternal and infant deaths occur during this time. the postnatal care service at the woreda was 79.6% above the national target which was 78% in 2014/2015 (national achievements (Health and Health Related Indicator 2014/2015).

Child Immunizations is very effective way of protective children from serious disease and prevent disease transmission. Immunization is cost-effective public health interventions and best way of reducing of child morbidity and mortality. The immunization as child health booster is being given routinely in all government health facilities available in the sub city under expanded program for Immunization. In 2019/2020 Akaki Kality sub city woreda 6 vaccination coverage was BCG (100%), POLIO 1(92%) POLIO3 (97%) PENTA more than 100%, ROTA1 (82%), Rota2 83% MEASLE (>100%), VITAMIN, A (93%) were provided to children under 5 and TAT 2 for pregnant mothers. This coverage is better compared to study done in Woldia and EDHS data analysis of Addis Ababa city that children aged between 12 months and 23 months were fully immunized with 87.7% and 86.8% respective (10).

Ethiopia has been experiencing a high prevalence of communicable diseases, which resulted in high morbidity, mortality, and hospital admission rates. One of the highest contributing factors for this is lower level of latrine utilization. From total households 8178 in the woreda six 65448(80.07%) had improved latrine and the rest 1632(20%) not had latrine. This study was supported demographic health survey in 2019, reveled most people in the urban slums (82%) used improved sanitation facilities and 2 % used open defection.

Limitation of the study

As the study was underwent in tight conditions with Covid-19 pandemic it was hard to find adequate data in some offices as there were no worker to provide data at office. No access aggregate some data particular; ethnic and religion composition, income level of the population, vital statistics like infant mortality rate, child mortality rate and neonatal mortality rate, zoonotic disease, none communicable disease such HPTN and DM. The study was based on secondary data which is more prone to incompleteness and subject to double data entry that may lead to inappropriate conclusion. The nature of the study by itself does not assess the cause-and-effect relationship of basic factors that impede the utilization of essential health services. There was shortage of local and sub city reference materials to make a comparison

Conclusion

In woreda six communicable disease like acute upper respiratory tract infection, non-bloody diarrhea, acute febrile illness, and pneumonia are the most frequently occurring disease both in adult and pediatric population. In addition, in the woreda, Twenty percent of household do not have functional toilet. There was shortage of adequate number and skilled human resource at health facilities specially Laboratory and pharmacy professional. There was better health improvement in ANC follow up as well as in immunization coverage. Moreover, there was good achievement in family planning coverage, contraceptive prevalence rate. The woreda should continue this progress.

The findings of this study show that there is a variation in the trend of essential health service utilization before and during the COVID 19 pandemic. Services utilization like Emergency, communicable disease such as URTI, AFI, TB detection rate and pneumonia Out-patient, VCT, significantly reduced during COVID-19 than before COVID -19

Recommendations

- Development of a joint plan between the water and health sector for the control and prevention of diarrhea diseases is recommended, the woreda should strength hygiene and sanitation activities by targeting all households.
- The sub city and woreda health offices should focus on the maternal and child health implementation protocol.

- The sub city health office and woreda six should have to allocate a specific budget as to tackle the burden of non-communicable diseases.
- The Addis Ababa City administration health bureau should work to increase health facilities manpower.

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CHAPTER V- MANUSCRIPT FOR PEER REVIEW

5. Investigation of measles outbreak in karat Zuria Woreda of Konso Zone, SNNPR Region, Ethiopia, January 2021/2022

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Subject: manuscript submission

Dear Editor:

We would like to submit the manuscript entitled "measles outbreak investigation, in Karat zuria Woreda of Konso Zone, SSNPR Region, Ethiopia, and January 2021/2022 to be considered for publication as an original article in EJHD.

The disease remains one of the leading causes of illness in all age group in the SSNPR region. Some regional measles outbreak investigations had been conducted. However, there is no similar study conducted on Karat zuria woreda. Therefore, our study aimed to investigate the magnitude of the measles outbreak and identify factors associated with measles infection in Karat woreda, Konso Zone, SSNPR, Ethiopia 2021/22. This study will contribute to the possible risk factors, the most affected areas, and the most at-risk groups and provide evidence-based information for further study. Furthermore, we believe these findings will greatly interest public health experts and decision-makers to improve political commitment to prevent measles outbreaks in the SSNPR region. We declare that this manuscript is original, has not been published before, and is not currently being considered for publication elsewhere. We know no conflicts of interest associated with this publication, and there has been no financial support for this work that could have influenced its outcome. As Corresponding Author, I confirm that the manuscript has been read and approved for submission by all the named authors. We hope you find our manuscript suitable for publication and look forward to hearing from you in due course.

Investigation of Measles Outbreak in Karat Zuria Woreda of district, Konso Zone, SNNPR region, Ethiopia, January 2021/2022

Abstract

Introduction: Measles is a serious respiratory disease that is easily transmitted through the coughing and sneezing of the measles virus, of which humans are the only reservoir. Measles outbreaks are still very common in Ethiopia. In 2018, 16,028 cases were reported from the nine regional states and two administrative cities. This study aimed to identify factors associated with measles outbreak in the Karat Zuria Woreda.

Methods: We conducted a descriptive and 1:2 unmatched case-control study in Karat Zuria district from December 7, 2020, to January 20, 2021. All cases are identified by national case definitions. A face-to-face interview was conducted using structured questionnaires. A logistic regression was employed to identify factors associated with the measles outbreak with a 95% confidence level, and statistical significance was declared at a p-value of 0.05.

Results: 77 measles cases with three deaths were investigated and five laboratories confirmed. The overall attack rate was 9/10000 in the population, and the case fatality rate was 4% in Karat Zuria Woreda. Contact with measles case-patients (AOR = 6.4, 95% CI: 2.99–14.07), malnourished individuals (AOR = 5, 95% CI: 2.29–12.25), mothers' knowledge of measles transmission (AOR = 0.29, 95% CI: 0.57–0.92), and being unvaccinated against measles (AOR =0.16, 95% CI: 0.54-0.97) were also found to be important predictors of measles outbreak (P-value <0.05 and 95% CI).

Conclusion: Majority of cases were male and age group less than five predominated affected by this outbreak. Attack rate and case fatality rate was high in age group less five. Contact with measles case and malnourished individual were risk factors for contracting measles outbreak and being unvaccinated against measles and mother with good knowledge of measles transmission were identified as protective factors for this outbreak.

Key words: Measles, outbreak, Karat Zuria district, case control, Ethiopia.

Background

Measles is an acute viral illness caused by a single-stranded RNA virus belongs to the genus Morbillivirus (1). Measles is one of the most contagious of all infectious diseases with > 90% attack rates among susceptible close contacts (2). Primarily it is transmitted by respiratory droplet or airborne spray to mucous membranes in the upper respiratory tract or conjunctiva. Measles cases are infectious starting from the prodromal period (when the first symptom appears) to four days after the appearance of the rash. Measles is characterized by a generalized maculo-papular rash, fever, cough, Coryza (running nose), conjunctivitis, and photophobia. The incubation period from exposure to the onset of fever is approximately 10–12 days and from the exposure to the onset of rash is 7–18 days. Though many children experience uncomplicated measles, nearly 30% of cases may develop one or more complications that are more common in young children with immune deficiency disorders, malnutrition, vitamin "A" deficiency, and inadequate vaccination (1).

Being unvaccinated against measles is a risk factor for contracting the disease. Other factors responsible for measles outbreak and transmissions in developing countries are lack of parental awareness of vaccination importance and compliance with routine immunization schedule, household overcrowding with easy contact with someone with measles, acquired or inherited immunodeficiency states and malnutrition. During outbreaks, measles case fatality rate (CFR) in developing countries is normally estimated to be 3-5% but may reach 10-30% compared with 0.1% reported from industrialized countries. Malnutrition, poor supportive case management and complications like pneumonia, diarrhea, croup and central nervous system involvement are responsible for high measles (3).

Vaccination has reduced a global measles morbidity and mortality over the last 30 years. Despite these acknowledged sign of progress in morbidity reduction, measles is still not controlled in many parts of the Immunity against measles is acquired by infection and usually lasts throughout life (4). The World Health Organization (WHO) recommended a two-dose vaccination policy, with the first dose administered during the first year of life and the coverage to be maintained at a level of at least 90–95% to interrupt the disease transmission. In many countries, measles vaccine is included in the country's immunization program and is freely available to all. Measles is considered as potentially eliminable disease because the reservoir is exclusively human, and

sensitive and specific diagnostic tests, as well as safe effective vaccines, are available. Globally, the annual incidence of measles decreased by 75.0% from 146 to 36 cases per million population during 2000–2015 (5) (6).

Till August 2019, a total of 8,202 suspected measles cases were reported from four region: Oromia (4611 cases), Amara (703 cases), Afar (548 cases) and Somali region (2,340 cases). SSPNR region most of zone which is extensively affected by measles outbreak and more than third (16/21) of Woredas under this zone is affected. Measles is one of the leading causes of death among children globally, particularly in developing countries. Approximately 110,000 measles death occurred globally in 2017-mostly children under the age of 5 years.

Economic impact studies of measles outbreaks in high-income countries illustrate a high cost of measles outbreaks and response activities. According to evaluation of economic costs of a measles outbreak and response activities in Keffa Zone of Ethiopia, the economic cost of the outbreak and response was 758,869 United States dollars (US$) and household economic cost was US$29.18/case (3). Outbreak preparedness and response is one of the five core strategies in the 2012-2020 WHO strategic plans for global measles and rubella. The Africa Region as well as Ethiopia is working towards measles elimination by 2020. Ethiopia adopted these regional goals and strategies and has been taking important steps to control and ultimately to eliminate measles by 2020.

Measles outbreaks occur when the accumulated number of susceptible individuals is greater than the critical number of susceptible individuals, or epidemic threshold for a given population [3](7). Various literature on outbreak investigation showed that the possible factors for measles infections were being unvaccinated for measles, low immunization coverage, malnutrition, poor cold chain management and travel history to measles area, presence of measles case in neighbor or in the household and having contact with person with measles case Despite the increase in immunization coverage (administrative) of measles in the country, there was a widespread measles outbreak(1)

SNNPR was requested to assist the EPHI region in investigating, controlling, and preventing a measles outbreak in the Karat Zuria woreda, Konso zone. We carried out this investigation with the aim of identifying the risk factors and control and preventive measures to contain this outbreak. The investigation also helped the health office and concerned stakeholders and partners make evidence-based actions ported from different zones of SSPRN region in 2020.

Statement of the Problem

Measles is contributing for five percent of under-five mortality and one of the major causes of death and sickness of children in Ethiopia (4). In 2018, a total of 3 062 suspected measles cases have been reported across the country. From the total suspected cases reported, 857 were confirmed cases (137 laboratory confirmed, no new suspected or confirmed cases were reported. So far, the outbreaks reported are from the regions of Amara, SNNPR, Somali, and Tigray. Between January and December 2017, a cumulative total of 4 011 suspected measles cases have been reported across the country (4).

Due to the conflict between Konso and Derashe especial district health post 3 completely damaged (health post burned, materials broken and looted) and other three health posts were partially damaged. Because of the damage on crops and food stock; the food security situation is expected to deteriorate, and children are at higher risk of becoming malnourished. The occurrence of confirmed measles cases in Konso can be the other potential factor that could exacerbate the malnutrition situation both for the host and IDP communities (8).

In one of conflict affected Kebelle which in the border of Konso and Derashe, Gato, it was reported that, there was no routine immunization program as well as SIA conducted for a longer period of time which makes the displaced people at risk of outbreaks for vaccine preventable diseases (8). Due to the low immunization coverage in the host community as well as in IDP's, there is a greater risk of having outbreaks of different vaccine preventable diseases like Measles, Pertussis, and others.

Objective

General objective

To investigate and identify factors associated with measles outbreak in Karat Zuria district, Konso zone, SNNR region, South Ethiopia, 2021

Specific objectives

- To confirm/verify the existence of measles outbreak
- To describe the outbreak by person, place, and time
- To identify potential risk factors of measles outbreak.

Methods

Study area

Study conducted in Karat Zuria district, Konso zone, SNNPR, Ethiopia. Karat Zuria Woreda in Konso zone which is located 595 Kms from Addis Ababa (capital of the country) and 365Kms from Hawassa, the capital city of SNNPR. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), this Woreda has a total population of 84562, of whom 40711 are male and 44385 were female**.**

Study design and study period: We used descriptive cross-sectional study to describe magnitude of measles outbreak and a 1:2 unmatched case-control study design to identify the risk factors associated with measles infection.

We conducted a descriptive and 1:2 unmatched case-control study in Karat Zuria district from December 7/2020- January 2021

Source population

All the population of Karat Zuria district was included as a source of the population.

The study population was selected from source population. All eleven-measles affected Kebelles were selected.

Sample size

Sample size was calculated by Stat Calc Epi Info version 7 by the following assumption. Based on measles outbreak investigation conducted in Sekota Zuria district (9).

Individual who contacts with measles:

- ✓ Proportion of Exposed controls = 75.5
- ✓ Proportion of exposed cases = 91.3%
- ✓ AOR= 3.4
- ✓ Confidence level=95 %
- ✓ Power =80%
- ✓ Cases=77
- ✓ Control =154
- ✓ Hence, the final adjusted sample size was 231 samples, which is assumed to be sufficient for this study

Dependent and independent variable

Dependent variable -Measles infection

Independent Variables

- Sex,
- Age,
- Occupation
- Marital status
- Knowledge of caregiver
- Vaccination status
- Nutritional status
- Contact history
- Previous exposure to Measles infection.

Case definitions

Suspected measles case: any person with fever and maculopapular (non-vesicular) generalized rash and cough, coryza or conjunctivitis (red eyes).

Confirmed measles case: a suspected case with laboratory confirmation (positive IgM antibody)

Operational Definition

Measles death: any death from an illness that occurs in a confirmed case or epidemiologically linked case of measles within one month of the onset of rash.

Good Knowledge: Sufficient knowledge: six knowledge questions were asked, and correct answers were given a score one and Incorrect answers scored zero. Those scores which are greater than the mean were classified as good knowledge (6).

Malnutrition: a condition that occurs when body does not get enough nutrients.

Under nutrition; a health state in which a child's nutrient requirement is not being met (6).

The Mid-Upper Arm Circumference (MUAC) is the circumference of the left upper arm, measured at the mid-point between the tip of the shoulder and the tip of the elbow (10). According to WHO guidelines, MUAC is used to assess nutritional status and is classified as normal, moderate and sever (11).

Normal; mid upper arm circumference (muck) >13 .5 moderate (green color).

Moderate acute malnutrition (MAM), mid-upper arm circumference (MUAC) between 11.5-13.5 millimeters (yellow).

Severe acute malnutrition ***(SAM)***; MUAC < 11.5 millimeters (red color)

Inclusion and exclusion criteria

Inclusion criteria

- **Cases**: residents of Karat Zuria district that had clinical signs and symptoms of measles based on the case definitions in the national measles guideline that were either laboratory confirmed or epidemiologically linked to confirmed cases.
- **Controls**: residents of Karat Zuria district who reside in the same household or neighborhood to a case and who did not fulfill measles case definitions.

Exclusion criteria

- Cases -those who were unconscious or not willing to participate in the study.
- Control -those who were not willing to participate in the study were excluded

Case and control selection technique

A total of 231 samples (77 cases and 154 controls) were included in this study. We found 55 cases that who full fill of above case definition was registered on a line-list. Then, we searched for their house for an interview, and we found 22 additional new cases during our active case search based on case definition. Two controls of the same household for one case or neighborhood who reside in the same village with cases were employed for each selected case.

Data collection

Face to face interview were conducted by using a standardized structured questionnaire to collect data for cases and control. The data collection tool was prepared by reviewing national guideline.

Five health workers (3 Health officer, 2 BScs nurse) were diploid to collected relevant data from cases and control. The questionnaire was included; socio-demographic characteristics, epidemiologic and, date of onsets, sign and symptoms, vaccination status, travel history, contact history, history of measles infection, care giver knowledge about measles infection. Nutritional status was measured using MUAC and interpretation based on the WHO.

Laboratory Investigation

To the outbreak verification, seven samples were collected from measles suspects who developed typical measles signs and symptoms at begging outbreak occurred. On November 5, 2020, five (71.4%) samples were positive for IGM. The remaining 70 cases were selected for epidemiological licked and clinical compatibility based on case definition.

Data Quality Control

Data quality was cheeked during data collection, coding, entry, and analysis. Two days training was given for data collector. Principal investigators were close follow up data completeness and consistency and any missing variable during data collection and entering.

Data processing and analysis

For descriptive study, cleaned line list data and analyzed by Microsoft Excel 2016. Summarized data descriptive analysis presented by person, time and by using table and graph. For cases and control. Statistical analyses were performed using SPSS version 25.0. A binary logistic regression was computed model to evaluate risk of measles infection. A multivariate followed regression

model was employed to evaluate the association between risk factors and risk of measles infection. Variables significant at a p-value of 0.25 in the bivariate analysis were selected for the multivariate regression analysis. Adjusted odds ratio with a 95% confidence interval was used to declare statistically significant variables based on p-value 0.05.

Ethical Clearance

Permission to conduct the outbreak investigation was obtained from EPHI and Konzo zone health bureau and Karat Zuria district health office respectively after an official permission request letter was submitted to both health bureau and health office.

Dissemination of the result

The final result of the investigation were disseminated to Addis Ababa university school of public health, Ethiopian Public Health Institute (EPHI)/PHEM directorate, Konso zone health bureau and Karat Zuria district health office.

Results

Socio-demographic characteristics of cases and control

From 77 measles cases, five were laboratory confirmed, and 72 were epidemiologically linked with confirmed cases and clinically compatible with measles cases. Of these, 45 (58%) cases were males, and 59 (77%) were in the age group of less than five. Of these, 59 (77%) were children born into farmer families, and 67 (87%) had no formal education. Regarding control, 154 were included in this study. Of them, 144 (94%) were in the age group of less than five, and most of the cases had no formal education, accounting for 120 (78%).

Table 40 Socio-demographic characteristics of cases Karat Zuria district, SNNPR region, 2021

Characteristics	Case %	Controls %
Sex		
Male	45 (58%)	85(55%)
Female	32 (42%)	69(45%)
Age group		

<5 year	59 (77%)	144(94%)
6-14 year	15 (19%)	32(21%)
15-24 year	2 (3%)	4(3%)
> 25	1 (1%)	4(3%)
Marital status of caregiver		
Married	68 (88%)	142(92%)
Single	5 (6%)	6(4%)
Divorce	3 (4%)	3(2%)
Windowed	1 (1%)	3(2%)
Educational status of caregiver		
No formal education	67 (87%)	120(78%)
Primary	9 (12%)	34(22%)
secondary and above	0	1
Occupation		
Farmer	56 (73%)	132(86%)
daily labor	14 (18%)	10(6%)
merchant	2 (3%)	2(1%)
Employed	5 (6%)	8(5%)
Family size		
<5	10 (13%)	79(51%)
> 5	67 (87%)	75(49%)

Description of measles cases by person

Seventy-seven were included in the investigation and three deaths were reported. Of cases, 45(58 %) were males. The overall attack rate was 9/10000 population and age specific attack rate were high in age group less than five (114/10000) population. The lowest AR were reported age group greater than 25 (0.7/10000 AR). Crude case fatality rate (CFR) was 4 % in karat Zuria district. Case fatality were high in age group less than five (AR= 5.5) and no deaths reported in age greater than five.

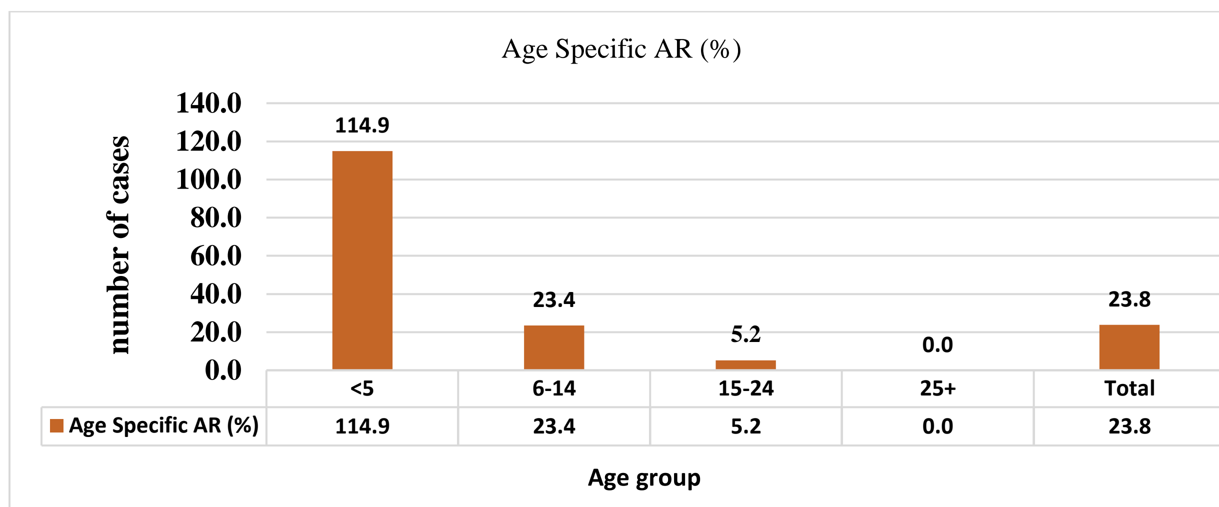

Figure 26 age specific attack rate in Karat Zuria district, Konso Zone, SNNPR in 2021

Table 41 : case fatality by age group in Karat Zuria Woreda, Konso Zone, SNNPR in 2021/ 2021

Age group	Number of deaths	Number of cases	CFR (%)
<5	3	54	5.5
6-14	0	15	0
15-24	0	6	0
25+	0	2	0
Total	3		

Clinical manifestations

All the cases had a history of having a rash and fever. The rest had developed coughs, conjunctivitis, diarrhea, coryza, and ear discharge. Of all the cases, 27 (35%) developed complications, and 18 (67%) were hospitalized. From all the complicated cases, 25 (96 %) had developed severe and moderate malnutrition.

Table 42: common symptoms encountered by persons affected of Measles outbreak in of Karat Zuria Woreda, SNNPR region, 2021.

Symptoms	Frequency	%
Fever	77	100
Rash	77	100
Coryza	61	79
Conjunctivitis	57	74
Cough	45	58
Diarrhea	25	32
Ear discharge	8	10

Nutritional status of the cases

Among total cases 25 (32%) cases had malnutrition (16 were severe malnutrition and 9 were moderate) identified by MUAC. Age group less than five years had developed malnutrition more than other age group 23 (92%), the following to age group 6-14 accounted 2 (8% cases). There was no reported malnourished cases age group greater than fifteen.

Table 43 : malnutrition status among affected of Measles cases in Karat Zuria Woreda, SNNPR region, 2021

Age group	Normal (MUAC =>13.5)	Moderate (MUAC=12.5-13.5)	Severely (MUAC< 11.5)
<5	35 (67.3)	7(77%)	16(100%)
6-14	9(17)	2 (23)	0(0%)
15-24	6(11%)	0(%)	0(0%)
25+	2(3%)	0(%)	0(0%)
Total	52	9	16

Vaccination status of the cases and control

Among total 77 cases; 63 (81 %) unvaccinated and 10% had unknown or undocumented vaccination status. The remaining 14 (19%) were reported as having history of vaccination previously, which is obtained from their vaccination card. Among vaccinated cases 30 (73%) were received first doses of vaccine and the 23 % received more than one doses during campaign. Regarding to control 89 (62%) were vaccinated and 55(38%) were not vaccinated.

Description of measles cases by place

Among 24 Kebeles, measles cases were reported in 17 Kebeles, and the distribution of cases varied from Keble to Keble. The outbreak started in Baide Keble and gradually spread to other nearby Kebles. 88% of cases occurred in Baide and Gato Kebeles, which are hard to reach in Kebele due to ethnic conflict. It is very difficult to provide routine immunization. The highest attack rate was reported for Baide Kebele (142/10000 population), followed by Gato Kebele (4.1/10000 population).

Table 44 : Description of measles cases by place in Baide Kebele, Karat Zuria Woreda, SNNPR region, 2020/2021

NO	KABALE NAME	NO cases	total population	attack rate	%
1	Baide	68	4767	142.6	88
2	Gato	2	4909	4.1	3
3	A/dera	1	3167	3.2	1
4	Jarso	1	11510	0.9	1
5	Lehayte	0	5921	0.0	0
6	Gelabo	1	1257	8.0	1
7	Masoya	0	4469	0.0	0
8	Ketama	1	2442	4.1	1
9	Mechalo	0	3701	0.0	0
10	Kolmale	1	3288	3.0	1
11	Ramole	1	3256	2.0	1
12	Tashimale	1	6362	1.6	1
13	Sorbo	0	4264	0.0	0
14	Arfaide	0	4909	0.0	0
15	Buso	0	4469	0.0	0
Total		77	68691	172.3	100

Descriptions of measles cases by time

The index case was a 20-year-old female, unvaccinated, reported from Bayide Kebele, Karat Zuria Woreda. She had contact with a known measles patient in Derashe Woreda. She developed a fever and rash on December 5, 2021, and was seen at Bayide Health Center on December 7, 2021. The outbreak reached its peak level in September 2021 and decreased after intervention started in September 2021. The outbreak was controlled on October 10, 2021.

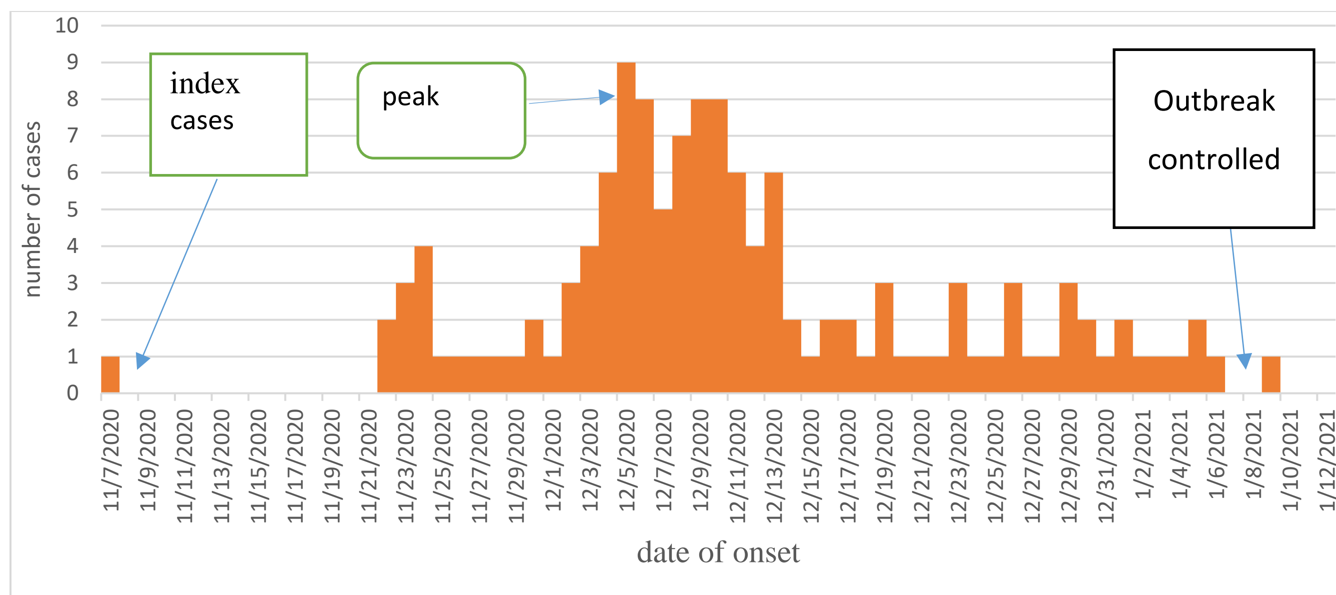

Figure 27*: Epi-curve of the measles outbreak by date of onset, karat Zaria Woreda, and Konso zone SPPR in 2021*

Laboratory results

On November 7/2020 sample results were collected and sent to EPHI. From a total of seven samples, 5 (71.4 %) tested positive for measles IgM antibody tests. This result confirmed the existence of the measles outbreak in karat Zuria woreda.

Analytical analysis

Multivariate regression analysis

Multivariate analysis indicated being vaccinated against measles and mother with good knowledge of measles transmission were identified, as protective factors for this outbreak and contact with measles case and malnourished individual were risk factors for contracting measles outbreak.

Individuals who had contact history with the measles case were 6 times more risk to get measles infection than those did not have (AOR=6.4 95%, CI 2.99-14.07). Those who had malnutrition were five times more likely to be infected with measles that did not have the malnutrition (AOR= 5 95%, CI 2.29 -12.25).

Those caregivers knew about measles mode of transmission were 71 % less likely to infect with measles than those lacked knowledge about mode of transmission (AOR= 0.29 95% CI, 0.57-0.92)

and individual who received vaccinate against measles were 84 % less likely to have measles that did not vaccinate (AOR= 0.16 95% CI 0.54-0.97)

Table 45 : factors independently associated with measles infection in karat Zuria, Konso zone, SNNPR region, Ethiopia, January 2021

Variables	Category	Case	Control	(COR, 95% C.I.)	Adjusted odd ratio (95%CI)	P-value
Contact history	Yes	46(59.7)	34(22%)	5.2 (2.8-9.4)	6.4(2.99-14.07)	0.00*
	No	31(40.3%)	120 (77.9%)	1	1	
Know mode of transmission	Yes	22(28%)	79(51.30%)	0.38(0.21-0.68)	0.29 (0.57-0.92)	0.02*
	No	55(71.4%)	75(48.7%)	1	1	
Malnutrition	Yes	25(32.46%)	7(4.5%)	10.09(4.012-24.7)	5 (2.29 -12.251)	0.00*
	No	52(67.5%)	147(95.4%)	1		
Vaccination status	Vaccinated	14(18.18)	103 (66.9%)	0.11(0.56-0.215)	0.16 (0.54-0.97	0.001*
	Not vaccinated	63(81.9%)	51(33.12%)	1	1	
Travel history	Yes	41(53.2%)	34(22%)	4.2(2.3-7.6)	9 (3.53-22.97)	0.81
	No	36(47%)	120(78%)	1	1	

Discussion

Our measles outbreak investigation in the Karat Zuria Woreda revealed, measles infection was confirmed after five serum samples were positive for measles specific-IgM antibodies. That more than 57% measles cases were male and age group less than five years were predominantly affected by this outbreak. Most affected people were children born from farmer family (61 %) and age group less than five years (84%) more affected than other age group.

Based on our finding, proportion of unvaccinated children (81%) were affected in this outbreak. This was lower than study conducted, Yeman and measles outbreak investigation in Oromia Zone, Amara Region, Ethiopia, and all study participants had not vaccination history. Our study higher than study conducted measles outbreak in Western Uganda and Cameron; proportion of unvaccinated patient were 69.8 %, 35% respectively. This is because measles vaccination is critical for preventing measles infection (12).

In this outbreak investigation, all age groups affected by this outbreak, despite 59 (76 %) cases were mainly children aged group less than 5 year. Similarly, to other study conducted in measles outbreak Madagascar in, Bale zone ginner district (68.5% were <5 years), most of cases occurred among children under 5 years. Other study conducted in; Mizan Tep University reveled age group 15-24 more affected than others. This study was quite difference with our study, measles disease more affected age group less than five. Under five children were more affected in our investigation. this might be due to poor vaccination coverage in three consecutive years in the Woreda related to ongoing conflict which was left large pockets of children with unvaccinated and and shortage of food (13)(14) .

In this outbreak investigation, the overall attack rate was 9/100,000, this was lower than study conducted measles outbreak investigation in Nigeria (15) ; over all attack was 50.1 / 100,000. another study conducted in Yemen overall AR was 82/ 100,000 (all cases not vaccinated)(16) but higher than measles Outbreak in Thailand 1.4 %(17) and measles outbreak in Myanmar , AR in vaccinated population was zero and not vaccinated population was 4.9 per 1000 population.

This difference might be due to income level and routine immunization capacity of health facility and weakness of the surveillance system, level of community health seeking behavior and delayed outbreak response.

Based on our study finding, over all case fatality rate were demonstrate 3.8% this were same concept line with WHO reports which case fatality rate of measles is estimated to be 3-6% in developing countries, may reach more than 10% when occurred in nutritionally and epidemic areas. Similar study conducted to Oromiya ,CFT was 3.07% ,But upper than study conducted Democratic Republic of the Congo, case fatality rate ware 1.9 and Central African Republic case fatality rate were 0.7 and lower than study conducted South Gonder zone, Ethiopia (CFR=13.4(18) . This variety could be; due to all community death not registered, early respond of outbreak and early treatment to prevent complication and effective case management following an early detection of the outbreak .(19)(20)

Multivariate analysis indicated being vaccinated against measles and mother with good knowledge of measles transmission were identified as protective factors for this outbreak and contact with measles case and malnourished individual were risk factors for contracting measles outbreak.

The result from multivariable logistic regression of case-control study showed that, individual who received vaccinate against measles were 84 % less likely to have measles that did not vaccinate. This result is supported with many studies conducted in Ethiopia, Bale ginner zone, Boso bila district Amara region demonstrated which vaccinated individuals had less risk to acquire a measles infection. In other hand WHO strongly recommended vaccine is very effective at protecting people against measles and preventing the complications caused by measles diseases, People who receive one dose of measles vaccine is 93% effective against measles and two doses of vaccine are 97% effective against measles. Global measles deaths have decreased by 73% from an estimated in 2000 in 2018 (21).

Other important factor that Individuals who had contact history with the measles case were 6 times more risk to get measles infection than those did not have. This finding is supported with a study conducted in Yamane in, DR Congo, new work city and Mizan Tep University, reveled measles occurred including the close contact, through contact with immediate and extended family members, friends, and neighbors), schools, and childcare programs. This is due to fact of nature of measles disease transmission strongly shows, respiratory droplets direct or indirect contact with nasal and throat secretions of infected persons and the secondary attack rate of measles is above 90% in the presence of susceptible individuals. When measles virus is introduced to a non-immune population, nearly 100% (22).

Those caregivers knew about measles mode of transmission were 71 % less likely to infect with measles than those lacked knowledge about mode of transmission (AOR= 0.29 95% CI, 0.57-0.92) This is in congruent with a study conducted in North Ethiopia, Bale zone, Giggii zone Bale zone Ginnir district. Many previous studies conducted in various countries were in line with knowledge level of mothers to be among the most important determinants for acquiring Measles infection, especially in under five children. This could be because mothers who are aware of the measles are more likely to feed their children and take their children to a vaccination site as soon as possible (23).

Those who had malnutrition were five times more likely to be infected with measles that did not have the malnutrition. This was agree with outbreak study in Yemen reveled; malnourished children are at risk of measles infection 24 times than normal children(16) and measles outbreak conducted in Afar , malnourished children were 3.21 times more likely to be affected by measles than children who were not malnourished. Based on need assessments in the Konso zone, due to ongoing conflict in 2020, a high influx of IDPs in Bayide Kebelle (more than five thousand IDPs). This also contributed to the burden of malnutrition in the woreda. This was consistent with other studies and guidelines that found malnutrition to be a risk factor for measles infection (12)(24).

Prevention and control measures taken

Case management: to prevent further spread and complications of measles, we treated medications with antibiotics, oral rehydration salt, tetracycline eye ointment, vitamin A).

Active case search: Despite hard-to-reach areas that required a lot of effort, active measles case search and management were conducted in all affected Kebelles of the district. Among total 77 cases, 22 were found during active cases searches.

Health information: Health education and community mobilization activities were given on measles prevention and control measures. In addition, a mass vaccination campaign was conducted and provided for children from 6 months to 14 years.

Vaccine campaign. After the occurrence of outbreak 15-kebeles were targeted for the mass vaccination. From total targeted (2240) under five population, 2202 (98%) of them were vaccinated during campaign.

Gaps/Challenges

The sample size was small; hard to reach Gots in the Kebelle due to ethnic conflict and due to cultural influence, some mothers/care givers might hide some measles cases. Recall bias was occurred due to absence of vaccination card that was difficult to determine the vaccination status and exact date of vaccination. There might be recall bias on the date of rash onset by the participant and their caregivers.

Conclusion: Majority of cases were male and age group less than five predominated affected by this outbreak. Attack rate and case fatality rate was high in age group less five. Contact with measles case and malnourished individual were risk factors for contracting measles outbreak and being unvaccinated against measles and mother with good knowledge of measles transmission were identified as protective factors for this outbreak

Recommendation

SNNPR region, Woreda office and health centers should improve and strengthen routine measles vaccine immunization coverage and under five years age groups should be targeted for supplementary immunization programmed for measles.

Woreda health office and health center; establish strong district surveillance system and advocate childhood vaccination/immunization by undertaking regular community-based health education campaigns.

More than one third of cases affected sever malnourished, Hence RHB should work together with other sectors and partners like save the children and UNICEF to solve the prevalence of malnutrition in the Woreda.

Woreda health office should focus to reboot the hard-to-reach immunization services and strengthen surveillance and response system.

Woreda health office should be well informed community about the ongoing measles outbreak, and house-to-house social mobilization should be established to identify and detect unimmunized children and to connect health facilities within the community.

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CHAPTER VI – ABSTRACT

6. Investigation of Measles Outbreak in Karat Zuria District, Konso Zone, SNNPR region, Ethiopia, January 2021

Abstract

Introduction: Measles is a serious respiratory disease that is easily transmitted through the coughing and sneezing of the measles virus, of which humans are the only reservoir. Measles outbreaks are still very common in Ethiopia. In 2018, 16,028 cases were reported from the nine regional states and two administrative cities. This study aimed to identify factors associated with measles outbreak in the Karat Zuria Woreda.

Methods: we conducted a descriptive and 1:2 unmatched case-control study in Karat Zuria district from December 7/2020- January 2021. All cases identified by national cases definitions. A face-to face interview was conducted using a structured questionnaire. A Logistic regression was employed to identify factors associated with the measles outbreak with a 95% confidence level and statistical significance was declared at a p-value 0.05.

Results: A total of 77 measles cases with 3 deaths were investigated and five of laboratory confirmed. The overall attack rate was 9/10000 population and case fatality rate were 4 % in Karat Zuria Woreda. Contact with measles case-patient (AOR= 6.4, 95% CI: 2.99-14.07), malnourished individual ;(AOR=5, 95% CI (2.29 -12.25), mother's knowledge of measles transmission (AOR= 0.29, 95%CI, and 0.57-0.92), being unvaccinated against measles (AOR =0.16, 95% CI: 0.54-0.97), were also found to be important predictors of measles outbreak (P-value <0.05 and 95% CI).

Conclusion: Majority of cases were male and age group less than five predominated affected by this outbreak. Attack rate and case fatality rate was high in age group less five. Contact with measles case and malnourished individual were risk factors for contracting measles outbreak and being unvaccinated against measles and mother with good knowledge of measles transmission were identified as protective factors for this outbreak.

Key words: Measles, outbreak, Karat Zuria district, case control, Ethiopia.

7. Investigation of Malaria Outbreak in Mengeshi Woreda of Mejining Zone, Gembella Region, Ethiopia, October 2021

Abstract

Introduction: Malaria is widespread throughout tropical and subtropical regions of the world. In Ethiopia, there are about 810(77%) districts with malaria risk with an estimated at-risk population of 53.6 million people. in 2021. We investigated to describe the malaria outbreak and to identify associated risk factors in Mengesh district.

Methods: A descriptive and unmatched case control study for 92 cases and 184 controls was conducted in Mengesh district from September 5 to October 28, 2021. We found 748-line list and 71 were during active cases search. All cases were identified microscopy or RDT. National standard case-definition used for case control study. Interviewed was conducted by using structured questionnaire. We conducted bivariate and multivariable logistic regression to identify risk factor.

Results: within two-month period a total of 1207 suspected malaria cases 840 (70%) were confirmed either by RDT or microcopy and death was not reported during this study period. from 840 confirmed malaria cases 513 (61%) were male and the rest 317 (39 %) were female. Female and age group more than fifteen more affected than others. The median age of cases was 36 years old. The attack rate (AR) was 24/1000 population and over all positivity rate was 840 (70 %). Plasmodium falciparum was the most dominant species 819 (98%).

Multivariate regression analysis: HH who sleeping during night were 70%% time less likely to develop malaria compared to those individuals who not used ITN during night AOR = 0.3(0.16-0.56). Individual who appropriately manage their living environment where, 80 % less like to develop malaria compared to those individuals who did.t control their environment, AOR= 0.8(0.02-0.3), knowledge on transmission, prevention, and control of malaria (AOR = 0.41, CI 0.28–0.88). Individual history of staying outdoor during night was twenty-two time to develop having malaria compared with not staying outdoor; AOR= 22, 95% CI (10.3-49.4) were also found to be important predictors of malaria infection (P-value <0.05 and 95% CI.

Consolation; adult male more affected than female. HH who sleeping during night, knowledge on transmission, prevention and control of malaria, Individual who appropriately manage their living environment protective factor for malaria. However individual history of staying outdoor during nigh risk factor malaria disease.

8. Five Years Malaria Surveillance Data Analysis of Gembella region (2015-2019), February 2020

Abstract

Background: Malaria is an acute febrile illness caused by *Plasmodium* parasites. Malaria remains to be a serious public health problem causing very large mortality, and morbidity. Children aged less than 5 years are the most vulnerable group affected by malaria. Most malaria cases in 2018 were in the World Health Organization (WHO) was African Region with (213 million or 93%). Malaria endemic countries are known to have lower economic growth. Ethiopia is one of the few countries with epidemiological pattern of malaria transmission is generally unstable. The objective ongoing Malaria Surveillance is to support reduction of the burden of malaria, eliminate the disease and prevent its re-establishment. The strategy sets the target of reducing global malaria incidence and mortality rates by at least 90% by 2030.

Methods: Descriptive cross-sectional study was conducted in Gembella Regional state. The data on malaria indicators were collected from Public Health Emergency Management core process (PHEM) database from Jan 2015 to Dec 2019. The five years malaria data was collected; organized; processed and analyzed by using Microsoft excel 2010.

Results: A total of 770,453 malaria suspected cases were reported among the reported cases 409,176 were a total of both (clinical + parasitological confirmed cases). Malaria detection rate from total suspected fever examined by RDT/ microscopy and clinical case were 46%. An average total malaria prevalence rates were 188 per 1000 person. The five years proportion of plasmodium falciparum and Vivax were 91: 9 respectively. The case fatality rate (CFR) was high in (2015) with 35.5per 1,000 persons. The highest malaria cases were observed during two seasons: summer and spring.

Conclusion: Even though different malaria control strategies were designed to roll back to its minimum level, still malaria cases were not decreased as expected level. Malaria continued to be a major cause of health problem in Gembella Regional state. Therefore, the regional health office should strength malaria prevention and control activity.

Limitations: PHEM reporting format lacks all variables of demographic information so, it was quite difficult to analyze the data by age and sex (distribution by person).

Key words: Surveillance; Data analysis; Malaria; Ethiopia; Gambella regional state

9. Malaria surveillance system evaluation in Mejining zone, Gambella region, 2021

Abstract

Introduction: Surveillance is an ongoing, systematic collection, analysis, and interpretation of disease-specific data for use in planning, implementing and evaluating public health practice. This study aimed to assess the core and support function along with attributes of the malaria surveillance system of Mejining zone of Gambella Region 2021

Methods: This malaria surveillance system evaluation was conducted in Majining zone, Gambella region from September 2021 to October 2021. We collected the data by using questionnaire adopted from updated Guidelines for Evaluating Public Health Surveillance Systems published by the CDC. Sixteen the surveillance sites and 24 health workers were selected and included in our study by using purposive sampling technique. The data collected were included core functions, supportive activity and surveillance attribute, flexibility, usefulness, acceptability, simplicity, sensitivity, completeness, and timeliness.

Results: The necessary surveillance guidelines, registers form and reporting formats were available in most health facilities. The district health offices had malaria Emergency Preparedness plan. But not adequate budget allocated to respond in case an emergency occurred. There were no regular data analysis and interpretations in terms of time, place and person in health facility.

There was no written feedbacks and outbreak chick list were available in all health facilities Average weekly report completeness and timeliness were 83 and 79 % respectively. The surveillance system was reported to be useful, acceptable, useful, simple, flexible, and representative. Poor data quality, shortage of budget, logistics, staff turnover and shortage of refreshment trainings has been reported as challenge of the current malaria surveillance system.

Conclusion: we found the malaria surveillance system was acceptable, useful, simple, flexible, and representative. However, completeness and timeliness were less than national standard. An irregular supervision, poor data quality, inadequate feedback, turnover trend staff, shortage of training, inadequate budget and shortage internet were identified.

CHAPTER VII– NARRATIVE SUMMARY OF DISASTER SITUATION VISITED

10. Impact Assessment of the Tigray Conflict in Mekele Zone, Tigray region 2021

Summary

Background

In Ethiopia, 2020, a total of 1,692,000 new displacements associated with conflict and violence were recorded in the country, mostly as a result of escalating tensions in the northern region of Tigray and 664,000 displacements, mostly due to floods(7)

Method: we used observation, formal and informal discussion with key stakeholders from local and international non-governmental, governmental personnel's and local communities and moreover, secondary data were collected from (Bureau of Labor and Social Affairs), local authorities and humanitarian organization used to revise and triangulate

Result: A total of 68,708 with 34,894 (52% male and rest of 33,814(48%) female, 5375 (8%) were household, 1.4 % (489) pregnant mother, 698 (3 %) were lactate mother under-five 8146(11%), 655 (3) were age group greater than 65yearsand the rest 188 disability person have been displaced as result of the conflict. Vulnerable women and children have been the worst affected. They need psychological support to coup the existing situation. Fifty four percent IDPs spent day without eating food, inadequate living and sanitary conditions in many collective centers would be conducive to several health conditions (like diarrhea, TB and COVID19, depression). Non-governmental organizations and international agencies have provided inadequate services to IDPs in their programmes. IDP were argent needed diversify food, shelter, inessential health service. Shortage family planning supplies problems was observed in Health facilities and mobile clinics and Condoms and emergency contraceptives were not adequate in mobile clinic. Open defecation was observed in some schools due to the limited number of latrines available and issues around utilization

Conclusion: Humanitarian aid has relieved a significant burden of this displaced population's basic needs. The most vulnerable groups of IDPs are children, adolescents, elderly and the disabled, lacking reliable care and living in inadequate conditions. The IDPs are living under

psychologically stressful conditions because of the uncertainty of their future and the security situation in the region. Inadequate provision of waste disposal facilities for solid waste excreta and drainage was observed in all ten camps and severe overcrowding in five camps. Therefore, Prompt action needs to be taken by the government, NGOs, and the international community to support IDPs in Tigray region.

Introduction

The current global context is one in which the international community faces an era of unprecedented multiplicity and complexity of crises(1) . These include natural disasters, climate change, rapid environmental degradation, pandemics, armed conflict, and intensification of violence, forced displacement, irregular migration, trafficking in persons, radicalization, and terrorism. Key facts and projections borne out by recent research on the links between disasters, fragility and conflict, as well as other threats such as climate change and forced displacement are detailed in the paper as well(2)

A disaster defined as: "a sudden accident or a natural catastrophe that causes great damage or loss of life. In 2018, disasters were the leading cause of new displacements, triggering 61% of internal displacement globally, with conflict and violence triggering 39%. In 2018 alone, disasters caused 17.2 million new displacements (3). Most of Which were the result of weather-related events such as cyclones, Storms, and monsoon rains. The number of people displaced by slow onset disaster such as drought, Remains largely unknown. It has been found that displacement is becoming "more protracted and more urban of the average 17 million People at risk of being displaced by floods, over 80% are in urban or per urban Areas (4).

The Ethiopia has a long history of extreme weather events and is highly prone to disasters, particularly to drought, floods and landslides, that drive food insecurity. Over the past three decades, there have been multiple major drought events, five of which resulted in famines. The drought and famine of 1984 is estimated to have caused around 1 million deaths(5). The impacts of Ethiopia's worst drought in 30 years, which left about ten million people in need of humanitarian assistance in 2015, contributed to fueling communal tensions and conflict. The seasonal movement of pastoralists has caused conflict over resources, as grazing becomes increasingly scarce. Tensions over access to resources in the Somali region, in particular, have morphed into conflict over resource ownership (6)

Conflict over land and resources, political and inter-communal violence, and high levels of vulnerability to drought and seasonal floods trigger thousands of new displacements every year in Ethiopia. In 2020, a total of 1,692,000 new displacements associated with conflict and violence were recorded in the country, mostly because of escalating tensions in the northern region of Tigray. Disasters, on the other hand, triggered 664,000 displacements, mostly due to floods(7)

The main drivers of displacement are political violence, disputes over land and resources, inter-communal violence, armed conflict, and disasters. In recent years, significant waves of internal displacement have taken place in Ethiopia. In 2018, almost 2.9 million new conflict displacements were recorded, the largest figure ever for the country and the highest number globally for that year.

The number of new displacements fell significantly to just over a million in 2019. 1.2 million IDPs were thought to have returned by the end of the year. Most displacement sites in Gedeo, West Guji and East and West Wollegas were dismantled (8).

Conflict tensions escalated sharply between federal government and Tigray region in September 2020, later 539,000 new displacements in addition to reports of human rights violations and abuses, including sexual violence, as well as food insecurity. Violence also forced people from their homes in the Afar, Amara, Beninshangul Gumuz and Southern Nations, Nationalities and People's (SNNP) regions, pushing the number of new displacements to nearly 1.7 million in the country as a whole, a 61 per cent increase on the figure for 2019(9). A total of 2,060,000 people remained internally displaced by armed conflict and violence and 633,000 remained displaced by disasters as of the end of 2020.

The Tigray war is an ongoing armed conflict was beginning on 2020, between TPLF Tigray region ruling party and the federal government. The war has killed thousands and displaced maybe a third of Tigray's population amid reports of atrocities by all sides(7)

According to ECC (Emergency Coordinating Center) report more than 4.5 million people in Tigray reportedly require urgent emergency food aid and hundreds of thousands could starve. More than five hundred thousand (500,000) people internally displaced and sheltered in schools, church/mosque and host community (10). Most of the infrastructure such as schools, medical centers, hospitals, roads, industries, and governmental institutions are damaged and looted. Many conflict-affected populations in Tigray remain inaccessible to relief organizations due to access

impediments and insecurity(4). More than one hundred thousand people flee to eastern Sudan's Blue Nile, Gedaref, and Kassala states

Objectives

- To assess overall situations of internal displacement people Mekelle zone Tigray region 2021

The specific objectives

- To assess the impact of the conflict on the livelihood of IDPs and host community
- To understand the influences on health, nutrition, WASH, and Protection.
- To better understand shelter and NFI demands of the affected IDP community and assess the availability, accessibility, and affordability of market for S/NFI materials.

Methodology

Study area

This study was conducted in Mekelle town, Mekelle zone which included seven sub city and ten IDP site, all internal displacement of People school.

Study design

Community based descriptive cross-sectional design was conducted

Source population

All internal displaced people were living in all seven-sub city Mekelle city temporally sheltered in school, in community and religion such mosque and church.

Study population

Displacement people who were looted or destroyed during the conflict and temporarily live in Mekelle city.

Data collection

This rapid need assessment were used observation, formal and informal discussion with key stakeholders from local and international non-governmental, governmental personnel's and local communities and Moreover, secondary data were collected from (Bureau of Labor and Social Affairs), local authorities and humanitarian organization used to revise and triangulate Key

informant interview with all stock holder using a checklist, focus group discussion with IDP representatives which includes IDP committee, voluntary health workers works and others stockholder, field observation to visualize and document the extent of the damage. .

Operational definition

Internal displaced people are persons or groups of persons who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular because of or in order to avoid the effects of armed conflict, situations of generalized violence, violations of human rights or natural or human-made disasters, and who have not crossed an internationally recognized state border

Shelter: define as the individual households for the repair or construction of dwellings or the settlement of displaced households within existing accommodation or communities

Food security: defines as all people, always, have physical and economic access to sufficient, safe and nutritious food for a healthy and active life

Nutrition: define as the sum of the process by which living things receive and utilize the necessary materials for survival and growth.

Food aid: defines as the stored, prepared and consumed in a safe and appropriate manner at both household and community levels

Hygiene promotion: defined as the planned, systematic attempt to enable people to take action to prevent or mitigate water, sanitation, and hygiene related diseases and provides a practical way to facilitate community participation and accountability in emergencies.

Sanitation: defines as the provision of facilities and services for the safe management of human excreta from the toilet to containment and storage and treatment onsite or conveyance, treatment and eventual safe end use or disposal.

Ethical consideration

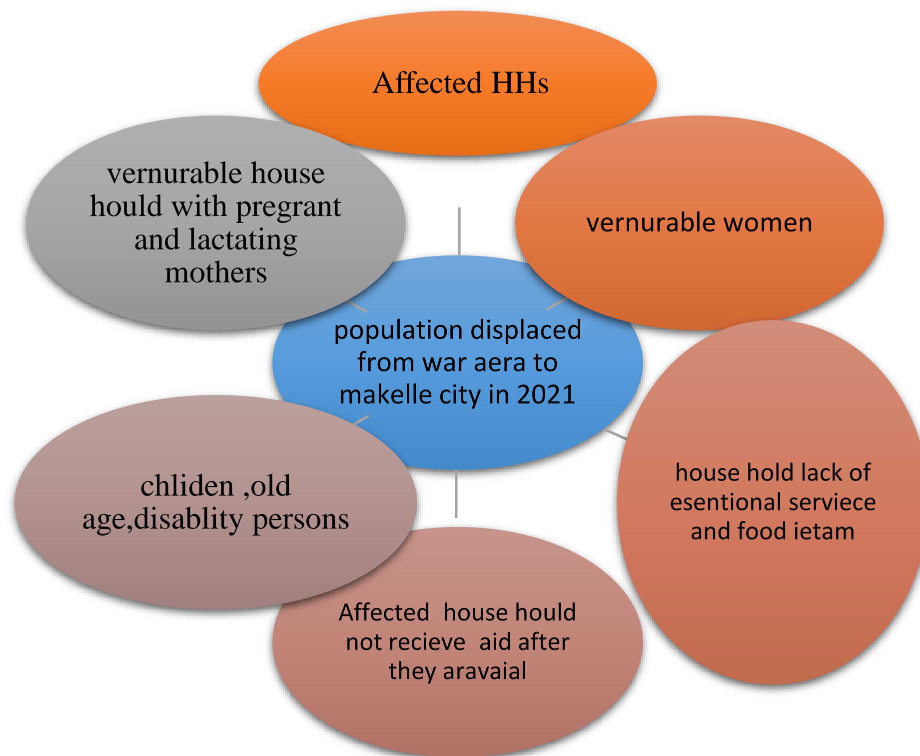
Formal letter was written from APHI to IDP comet, Tigray region lobar association affairs and Tigray region health office

Results

General description about internal displacement people in Mekelle city, Mekelle zone, Tigray region 2021

Internally displaced people and the affected communities lost their belongings, mainly household items, livestock, farming equipment, food stock, jewelry, and cash. Most of those belongings were looted or destroyed during the conflict. Most of them are traveled on the foot for 2-3 days without food to reach Mekelle and other towns. According to the regional Disaster Risk Management Commission, areas like the West, Central, and North of Tigray region are the most affected. The IDPs are living in a school compound (all Schools are closed due to Covid 19), living with the host community/the family/relatives, and living in an open space like churches and the mosque.

The Tigray region labor and social affairs with national disaster and risk management commotion take responsible to establish ten IDP. All seven sub city representatives agreed to prioritize as follow; IDPs representatives agreed to prioritize as follow

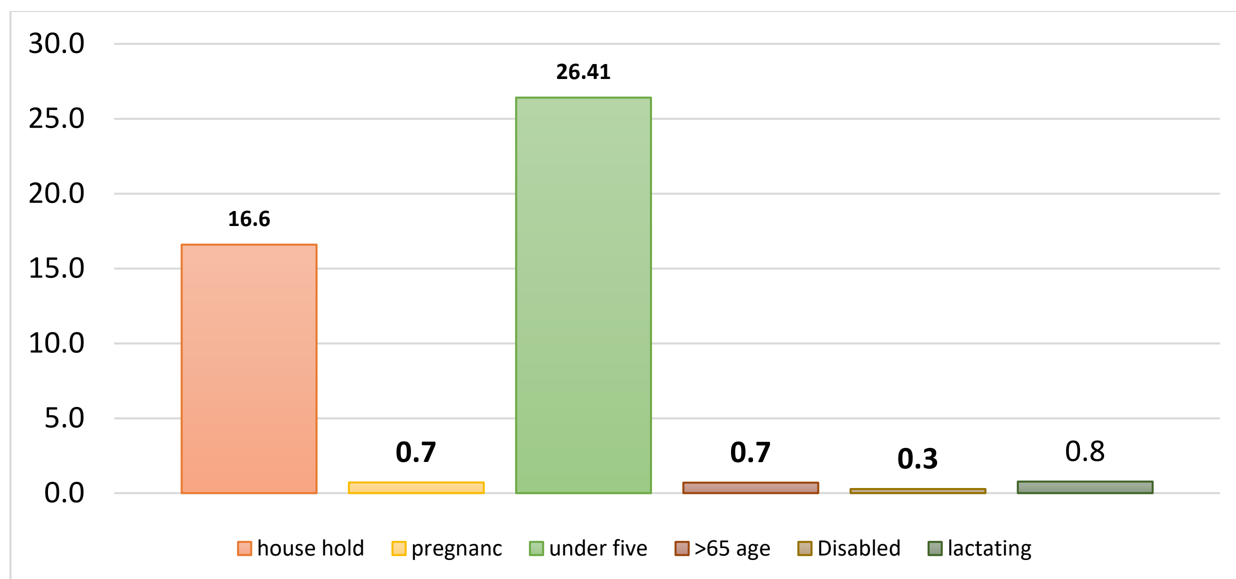


Figure; 31 compositions of IDP in Mekelle zone

According to Tigray region labor and social affairs with national disaster and risk management representatives, IDP committee, total 68708 with 34894 (52% male and rest of 33814(48%) female, 11400 17% were household, 0.7% (489) pregnant mother, 530(0.8%) were lactate mother, under-five 8146(26.4%), 655 (3) were age group greater than 65(0, 3%).and the rest 188(0.8%) disability person.

Table 44; distribution of IDP by sex in Mekelle zone, Tigray region 2021.

NO	sub city name	total displaced in IDP	Male	Female
1	Adaya	10453(15.2%)	4546(13%)	5907(17.5%)
2	Ayider	8650(12.6%)	4200(12.0%)	4450(13.2%)
3	Hadinet	7130(10.4%)	3602(10.3%)	3528(10.4%)
4	Hawilt	9430(13.7%)	4750(13.6%)	4680(13.8%)
5	K/wayene	11200(16.3%)	5540(15.9%)	5660(16.7%)
6	Semen sab city	14345(20.9%)	8200(23%)	6145(18.2%)
7	Quiya	7500(10.9%)	4056(11.6%)	3444(10.2%)
	Total	68708	34894	33814



Figure; 30 distributions of IDP Mekelle zone Tigray region 2021

Identified humanitarian prioritized needs by IDPs and host community members

Food

Almost all interviewed said that food was their number one priority. 95 % of the interviewed people respond they could not afford to buy food in January 22/2021- February 12/2021 and 54 % population spent days without eating food. They are consuming meals less frequently than normal (i.e., one to two times per day, frequently going entire days without food) with a very limited range of food types. Since February 15/2020 government of Ethiopia and other partners started to distributed food item for ten refugee camps in Mekelle city. The numbers of internally displaced persons have been growing in Mekelle city, this led to increased food demand. 95 % respondent said food distribution drawback due to imbalance delivery food item, delayed food distribution, current security problem in Mekelle city and increased influx large number internal displacement in refugee camp.

Food assistance from the Government and partners remains the main source of food for most IDP. But Partners report serious concerns about poor targeting and, in some areas, food not reaching those in most need. All those interviewed say the food distributed was already consumed. Still Internal displacement people in Mekelle refuge, they did not get adequate food and they eat usually same kind food but thanks host community of Mekelle people, they continue to support IDP in

Mekelle city. Eider and other small association in Mekelle straggle cop up IDP (each edir supports 100 injera per day).

Figure 28 : food distribution for IDP in Mekelle zone in 2021

Shelter

More 80% IDPs are sheltered in school and the remaining 20% IDP live in church and mosques.

However almost all IDP are live overcrowded class, and more than 50 people live one room (25 msq). 25 %. Adolescent, age group greater than twelve years live in open air abandoned or hobo school and 10 % of IDP (newcomer to refuge, people who infected or suspected to communicable diseases such TB, COVID and pregnant mother) live in tent. To alleviate the overcrowded condition WHO provided ten tents for the refuges. But some newcomer IDP are live unfinished buildings, as well as in improvised shelters built on school by using tin plastic sheeting, sticks and open air. Half of class occupied school martial such as chair, desk, black board, stationer material.

Most of Internal displaced peoples living in schools, church, and mosques without non-food items like blankets, mattress, kitchen materials, and etc.

Figure 29 : shows IDP resident in school in Mekelle zone 2021

Screening for malnutrition

Based on the Tigray region the month of February 2021 screening for malnutrition was conducted for the IDP under five children and pregnant and lactating mothers. To alleviate malnutrition in refuges, TRHB other partners such Word vision and IRC provided training for voluntary health workers. Since February 20/2021 malnutrition screening conducted in all refugee camp. Out of the total 5422 screened IDP children; 56 (1%) were severely malnourished and 203 (3.7%) were moderately malnourished. All refuges conducted to malnutrition screening and the highest SAM reported from Adahaki IDP (30%) and the highest MAM (27.5) reported from Adaha refuges in Mekelle, currently all IDP linked nearby 15 health facility. This healthy facility serves IDP, and all SAM were treated nearby healthy facility, but moderate malnutrition was treated in mobile clinic which established in each IDP.

Word vision engaged in providing nutritional kits and targeted supplementary food for children under five and pregnant and lactating mothers was done. The main challenge observed in nutritional intervention was the shortage of nutritional kits) Sam several obvious cases of SAM requiring immediate referral and treatment.

Table 46 : Total malnutrition screed in displacement people Mekelle zone IDP 2021

	IDP name	Totally screening	MAM	SAM	Total
1	Hawilty	823	17	8	25
2	K/wayane	778	22	7	29
3	Adaha	656	29	17	33
4	Adahaki	724	56	3	59
5	Semen	735	34	12	46
6	Ayider	723	22	4	39
7	Quiha	120	23	5	28
Total		4559	203	56	259

Water supply / sanitation and hygiene:

Water shortage has big challenge for Mekelle city, as well as current displacement people in Mekelle. Most of the equipment used for generating water in Mekelle city electro-mechanical equipment, such as switchboards, generators, pumps, solar panels, transformers, reservoirs and spare parts were damaged or robbed. Most of displaced populations accessed water by the trucker covered by Red Cross.

The rest accessed piped water in school yard, and some are use water pond. Access to Gereb Sege Dam, located 5 kilometers south of Mekelle that serves as the main source water to supply IDP and serve for 50 per cent of the surrounding population.

Sanitation and hygiene.

After the conflict, water, Sanitation and Hygiene (WASH) generally, the people of Mekelle rely on a limited water supply domestic use. Power infrastructure which was partially damaged during war continue to be severely hampered due to the current electricity and fuel shortages. Totally 58 toilets are available in 10 refugee camps. On average 340 IDP share toilet per day. From all total 58 toilets 45 (77.5) are use pit latrine, 32 % are use trench with pit latrine. Totally 52 % are do not

have light, doors and washing material. Some toilet was filled, this leading open defection common practice. Open defecation was observed in some schools due to the limited number of latrines available and issues around utilization. Red Cross and world vision were distributed some sanitation and washing material such as soup, detergents, and pails. But a proportion disturbed Martials and internal displeased people needed varied. Still IDPs in the camps need basic sanitation materials such as soup, degenerate, and Pail to keep the toilet and the surrounding environment clean.

Table 47 : Number and type of latrine available in IDP site /school in Mekelle zone 2021.

Colum	IDP site	Total population	number of	type latrine	Ratio
1	Adahki	2450	4	pit latrine	3:55
2	Adaha	1987	6	pit latrine	7:14
3	Duhun	3213	6	pit latrine	4:28
4	Ayider	2241	2	pit latrine	2:08
5	Elishadayi	2753	6	pit latrine	5:13
6	Ethiochaina	2502	6	pit latrine	5:45
7	MIdirgadet	2456	2	pit latrine	1:57
8	Hawilt school	2560	6	trench &pit latrine	5:37
9	Kisanet	3874	4	trench &pit latrine	2:28
10	Kassete	2210	4	Trench	4:20
11	Lachi	7100	4	open defection	1:21
12	Merest	3085	8	trench &pit latrine	6:13

Hygiene

On average the IDPs used less than 25 liters of water per day. Due to lack of an adequate soup and water they told as they wash their hands with only water before eating and after using the toilet. They are not fully aware of water purification and safe storage/hygienic practices. IDPs wash their cooking utensils with only water b/c they can't afford sufficient detergent or soup. IDPs also wash their clothes with detergent when they have access to it but women in the camps do not have access to sanitary pads as they use pieces of cloths instead of the cloths. The IDPs expressed needs of non-food items such as Dettol (disinfectants), soap, detergent. Almost all IDP camps poor manage wastes disposal, they disposed in the school yard. Water treatment is not a common practice in the camp because the IDPs use the water as they get it and it is stored in 25 liters jerkin.

Response Tigray Regional Water Bureau, with support from UNICEF and WASH partners, distrusted more than 25,000 people across the IDP have received emergency WASH NFI kits. In IDP sites in Mekelle, partners have begun hygiene promotion activities, as well as implementing additional latrine. Block toilet and water storage facilities assessed ever weeks and immediate response by Cluster coordination structure in IDP, with meetings taking place weekly

Protection

Protection is a critical issue in this situation. Incidents of killings, gender-based violence (GBV) and rape continue to be reported, mainly among women and children. Ethiopian government also confirmed that several survivors of sexual violence are being housed in a shelter in Mekelle. The assessment team also confirmed that there are women in the IDPs center who are raped and faced gender-based violence. More women and children need psychosocial support to coup the existing situation.

Health risk and health status

Health profiles: the following to conflict, overall essential health services obstructed through region. After February 7/2021 EPHI and MOFH willing to diploid expert to revitalization of healthy service and to reactivate TRHB EOC. Since February 10/2021all healthy facility had started to give service for all community. Health Facilities Overcrowding were foremost issue at all health centers and at Mekelle Hospital. All health centers serve catchment populations much larger than the intended population of 25,000 people; this is compounded by the fact that none of

the facilities is sufficiently staffed to serve even the intended population. Mekelle Hospital is supposed to serve about one million people from Mekelle and its immediate surround. For IDP mobile clinic were established and 66 voluntary health workers were diploid. All IDP linked with nearby healthy facility to farther treatment and management. Access to drugs also remains critically low at 28 per cent. Regarding Ambulance, in the region there is 280 ambulances only 50 remain. According to Bureau of Labour and Social Affairs (BoLSA) and humanitarians in displacement centers in Mekelle Town, for example, showed a high number of diarrheal diseases and women delivering in the camps, as no emergency services are provided during the night

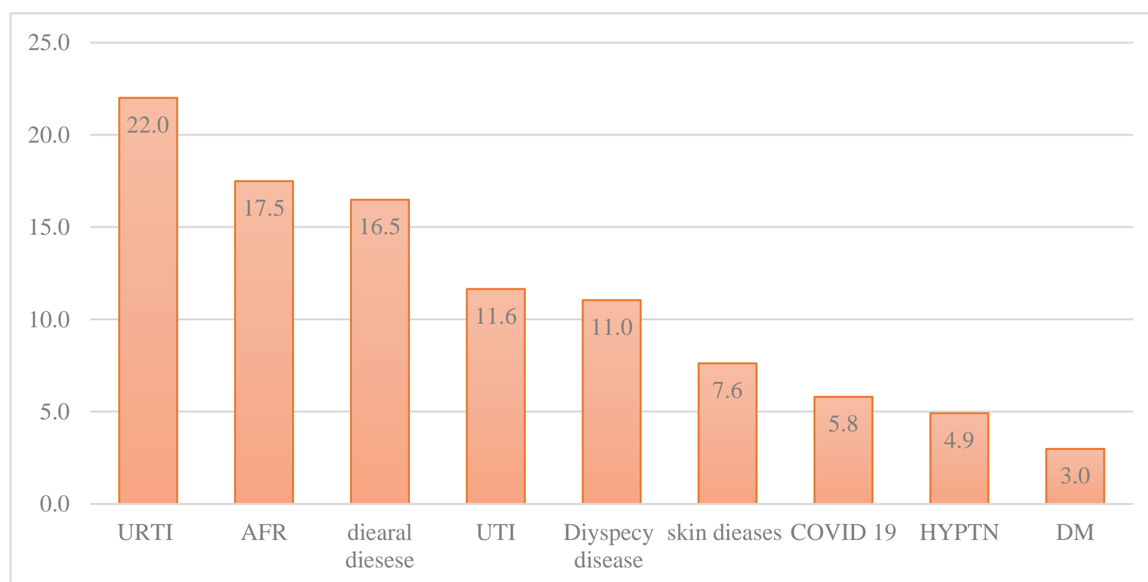


Figure 30 : shows top ten disease in IDP Mekelle zone 2021.

Maternal and child health

After the conflict, EPI diploid experts at region and MCH services has started in Mekelle zone. Training was given for fifty-five MCH focal person and volunteer healthy workers who diploid IDP. Mobile clinic was established in all IDP, these mobile clinic in IDP start to MCH service such provide emergency pills, pregnancy taste, PMTCT service in IDP, HIV counseling and testing, STI, screening and management were started in IDP. Pregnancy mother in IDP who need ANC follow up, delivery service and complicated cases related to maternal and child health has linked or refer to nearby healthy facility. Partners such red cross and MOI provide some material and emergency pills and condom for IDP. However, the shortage family planning supplies

problems was observed in Health facilities and mobile clinics and Condoms and emergency contractiveness were not adequate in IDP.

Mental health services

Mental health services very important services for the IDPs. EPHI has diploid seven team experts who working on gender-based violence and mental health. These team were started working with Tigray region social Affairs. The experts were given to training for assigned mental health workers. The main roll this trained mental health are to identify venerable women and children who need immediate supports. The mental health team were selected 33 sexual violence women, children and men who have sign and symptom of mental illness from IDP. Seventeen suspected mental ills were treated in IDP and the rest fifteen were linked with ADER referral hospital for farther and managements.

Risk communication

Risk commination and advocacy sector very important to identification of public health treat and closely and frequently monitoring predicting the risk it poses with Collaboration of Preparedness and response team in community level and at IDP centers.

In Mekelle zone risk commination workers were assigned at regional level. These communication workers team give health education mainly on communicable disease such diarrheal disease, AFI, cholera, malaria and covid 19 and venerable women and children who need immediate supports. The main tool to covey messages was audio based and megaphone. Social mobilization and advocacy conducted with IDP committee, social fairs by using megaphone focused COVID 19, environmental hygiene, nutrition, HIV, and gender-based violence and other communicable disease. Under the healthy extension and promotion sector, provided trying for180 health extension workers who current working in community as well IDP. These trained healthy extension workers started give awareness for IDP and self and environmental management. Encourage the humanitarian organization to focus on the rehabilitation program in addition to the humanitarian assistance.

Disease's surveillance

Based on Tigray health bureau recent reports; after the conflict between Tigray and federal government, health infrastructure of the region especially the primary health services collapsed

and millions of people out of basic medical health services. Currently more than 32% health facility are of the Tigray region was restore and become functional by emergency response team. In Mekelle all health facility has started to be rutting healthy service. After the conflict early warning and response system (EWARS) of PHEM totally interrupted across the region) Shortage of safe water supply in quantity and quality expose to risk of water born diarrhoea and can erupt an outbreak, Vaccination services is interrupted in many parts of the region exposed to outbreaks like measles, pertussis etc. Rumour investigated so far reported from a community and health facilities acute water diarrhoea in Lech IDP (investigated not an outbreak).

Eye diseases outbreak from ADaha IDP (investigated the diseases were bacterial conjunctivitis and 36 cases treated) Acute Water diarrhoea from Ethiochana IDP (under follow up).

COVID 19 surveillance activity preformed in IDP and Mekelle zone

The following to conflict, overall COVID 19 activity was break out through region. After February 7/2021 EPHI and MOFH diploid expert to revitalization of COVID 19 over all activity and to reactivate TRHB EOC. While seven Covid 19 pillar was established in EOC level. From all seven COVID 19 pillar surveillance team is curial and has mandate to screening, isolation, tasting and reporting taste results is as primary responsibility of this team in health facility and IDP. Under surveillance team, RRT team and surveillance focal person were assigned at regional level. But other important team, contact tracing and flow up, toll free team, data management team and especial attendant team not yet established. A total of 15 facilities are found in Mekelle: 10 health centers, 4 primary and general hospitals, and 1 specialized hospital.

By the rapid assessment conducted earlier by the team, all IDP and health facility were no dedicated room for isolation, and they didn't screening and tasting suspected COVID 19 cases. There was no bonding between TRHB ECO surveillance focal person and woreda office and health facility.

IDP were argent needed food, shelter, inessential health service as well as covid 19. COVID 19 curial in IDP who live very overcrowded but due to lack of capability to linkage with nearby health facility, IDP were did not get sufficient healthy service and COVID 19 testing, screening and isolation was not conducted. Since March 20/2021 to alleviate for covid 19 high risk group in IDP who live in overcrowded condition and to established isolate corner in each refugee camps; surveillance team, management team and protection team was played great roll to assure accuses

and distribution of tent for all IDP. Thanks to WHO Tigray region, provide a tent for all refugee camps. This tent has started to serve as isolation corner for suspected COVID 19 cases and slightly relieve who live over crowdedness at IDP. Only 10 % of IDP (newcomer to refuge, people who infected or suspected to communicable diseases such TB, COVID and pregnant mother) live in tent. However, many IDP are live overcrowded unfinished Buildings, as well as in improvised shelters built on school by using tin plastic sheeting, sticks and open air

Figure 31: shows suspected taste COVID 19 in IDP Mekelle zone 2021

Education

After the conflict Mekelle zone Schools are not functional. Some were school material robbed or some materials were damage. Many teachers were displaced to safe them live. Insecurity and lack of salary payment are affecting the plans to resume schooling. Lack of public transportation, security concerns, and lack of operational budgets are also bottlenecking to continue education. In some sub city, school computers were looted, supplies delay before the conflict and the COVID-19 pandemic resulted in schools' closure. In Mekelle, opined opened before the conflict and then closed again on 4 November 2020. All private and public schools are currently closed. Currently all school are serving as shelter for IDP in Mekelle zone.

Coordination and collaboration

The coordination and collaboration among the different government sectors and other partner was good. In Mekelle EOC level daily meeting has conducted with local different coordinator but overall meetings with health sector, different partner or NGO, Tigray region labor and social

affairs, national disaster and risk management representatives, IDP committee, and command post office or security office meeting are regularly held at weekly bases.

Some social support origination such as religion, private origination and some community leader not participated in meeting

Team activity

Rapid Need Assessment was conducted in Mekelle zone, Tigre region between 20 to 28 February 2020. The assessment team were visited all IDP in Mekelle zone. Seven members of team involve in the assessment.

The main of mission of this team required to better understand the critical humanitarian needs and gaps on the ground, identify protection risks informing appropriate protection response, and understand the coordination mechanisms and the ongoing response in visited areas. The team was conducted interviewed with responsible body using check list, observations, and focused group discussions with community leaders.

Day to day major fading reports was disseminated to responsible body. This increased different partner involvement which help immediate humanitarian need.

Figure 32 : Mobile clinic in IDP MEKELLE in 2021.

Involvement of partner

A different humanitarian organization such as CRS / Catholic Relief Service /, WV / World Vision /Samaritan Purse, Save the Children, Goal Ethiopia, Rescue Operation, almost all UN agencies / IOM, WFP, WHO, UNHCR, UNICEF, International Red Cross Society, Ethiopia Red Cross Society etc. are participated in different humanitarian internal displacement of people in Mekelle.

Table 48 : Total involvement of partner and role in humanitarian practice in Mekelle zone IDP 2021.

	Origination name	Activity	Targeted to population	Estimate Number of supported IDP
1	WFP and disaster risk Mngt commotion	Food	Ten IDP	38000 IDP
2	UNSEF and disaster risk Mngt commotion	shelter	all IDP	2500
3	Health Bureau, and WHO	Health and nutrition	All IDP	25000
4	Water Bureau and UNICEF	Water	All IDP	30000
	Education Bureau and UNICEF	Education	All local and IDP	
	Bureau of labour and Social Affair and UNICEF	Protection	All IDP	50000

Challenges

- Delayed partner response for IDP who immediate need immediate of humanitarian response including food, water, and health services
- Lack of communication or coordination between community leader and government sector
- Poor documentation and difficulties to access data/information particularly in health sector.
- Lack of food; increased internal displaced people in Mekelle city need immediate food accesses
- The existence of unidentified different military group other than Ethiopia defences force.
- Power interruption, lack internet service and lack of resource / financially and materially

Conclusion

- According to Tigray region labor and social affairs with national disaster and risk management representatives, IDP committee; total 68708 with 34894 (52% male and rest of 33814(48%) females displaced to Mekelle. All IDP sheltered in overcrowd school camp which closed before conflict due to COVID 19 pandemic.
- Affordability food very challenge for most households of IDP. People's purchasing power has diminished due to loss of income, nonpayment of salary, and absence of cash.
- There is no adequate mobile clinics in all IDP and shortage of medical supply
- All mobile clinics does not include ANC, PNC service, clinical management of rape and Psychosocial service started in IDP and Poor surveillance activity in all IDPs
- Patient referral system is poor and associated with lack of linkage IDP with nearby healthy facility some IDP established without recognition social affairs.
- Maternal health services such as PMTCT, HIV counseling and testing, Still screening and management, ANC, PNC, skilled delivery, EPI not available in mobile clinic.

Recommendations

	Responsible body
	Federal and regional government , NGO ,
Food security	Provider of emergency food assistance (powder, item for wheat, oil and vegetable) to the conflict-affected People, including IDPs. Provision of supplementary food to under five children, pregnant and lactating women as well as disable people and chronic patient such TB, HIV, HPTN and DM Provide cash to 4566 households so that they start life again and establish themselves a sustainable and better livelihood Timely delivery of relief foods: it is strongly recommended to provide the required amount of food commodities/supplies in a timely manner to the people in need There is need for a quick scale-up of humanitarian response including blanket distribution of food, Shelter/NF Provide increased quantity, quality and type of food items needs special fulfil additional needs Kitchen items/NFIs: Even though the returnees might receive food assistance, the kitchen items/NFIs to prepare, eat and store food remains a challenge – this should be addressed either by government or humanitarian partners, in collaboration with the Shelter & NFI Cluster Proved of support and reunification of separated and unaccompanied children and protecting vulnerable children.

Health	To alleviate healthy related gaps at IDP, should provide of health materials (Medicine and health service) kits for IDPs Especial consideration should be for Children, old age group greater than 65, disabled and IDP with chronic dieses such as DM, HPTN and others. For batter treatment and accesses health services, all IDP linked nearby health facility Increased availability critical drugs in all IDP clinic To prevent maternal mortality and other emergency health service; ambulance should be deploying in health canter Established adequate mobile clinics in all IDP site and strengthening surveillance system of IDP and local community Strengthening Health all health facility by supplying medicine and medical equipment is needed to improve the health services and address problems resulting from the current conflict. Encourage the humanitarian organization to focus on the rehabilitation program in addition to the humanitarian assistance. COVID 19 cases critical in IDP who live very overcrowded, however to prevent COVID 19 personal protective (mask ,sanitizer) needed
Protection	Restoration of protection services in the areas affected by the conflict. Strengthening provision of mental health and psychosocial support for vulnerable groups of IDPs and children Provision of support and reunification of separated and unaccompanied children and protecting vulnerable children. Conduct SGBV risk assessments and establish strong referral services in all IDP camps Protect women, grill, and child by providing additional matrices and tent, make safe temporary living condition.

Water and sensation	Better-quality water provide to schools of IDPs are recommended for all stockholder Supply water trucking for emergency water requirement in IDP sites and affected institutions immediate repair, and maintenance as switchboards, generators, pumps, solar panels, transformers, reservoirs, and spare parts were damaged or robbed Hygiene promotion in IDP sites and the host community. Parches WASH NFI kits (jerricans, buckets, washing basins) and dignity kits.

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CHAPTER VIII. PROJECT PROPOSAL

11. Assessment of ownership, utilization, and associated factors of long –lasting insecticidal nets in the rural district of Gambella zuria, Gambella region, Ethiopia: a community based cross-sectional study.

Abstract

Background:

Malaria remains one of the most serious public health problems in the world. According to world malaria reports 2020, there were 229 million cases and 409 000 deaths in 2019 most of death were among children less than five years age in Africa. WHO African Region disproportionately carries a high share of the global burden of the disease accounting for 93% of cases and 94% of deaths in 2018. Malaria remains the leading public health problem in Ethiopia. The problem covers 75% of the landmass of the country, and 68% of the population are living in malaria-risk areas. ITN utilization is one of the effective malaria preventive and strategies Worldwide, studies have revealed major benefits from LLINs ownership and use.

Objective: To assess ownership and utilization and association factor of ITN among households of Gembella Zuria Woreda, Gembella region in the year 2021

Assessment of Ownership, utilization, and association factor of long –lasting insecticidal nets in the rural community of Gambella zuria district, Gambella region, Ethiopia: A community based cross-sectional study –April 2021.

Methods: A community-based cross-sectional study will be employed, and data will be collected using interviewer-administered questionnaire. Systematic random sampling method will be used to select 843 households in Gambella Zuria woreda. Data will be entered into a computer using Epi Info (version7) and exported to Statistical Package for the Social Sciences (version 21) for further analysis. Variables with *P*-value less than 0.05 will used to declare statistical significance between the dependent and the independent variables in multivariable logistic regression.

Budget: the total estimated cost of the project will be approximately one hundred fifteen thousand five hundred fortify nine-birr (115,549.5) Ethiopia Birr.

Background

Malaria remains one of the most serious public health problems in the world. According to world malaria reports 2020, there were 229 million cases and 409 000 death in 2019 most of death were among children less than five years age in Africa (1).WHO African Region disproportionately carries a high share of the global burden of the disease accounting for 93% of cases and 94% of deaths in 2018 (2). The goal established by the Member States at the World Health Assembly and the Roll Back Malaria (RBM) Partnership is to reduce malaria mortality and morbidity recorded in 2000 by 50% or more by the end of 2010 and by 75% or more by 2015 (2)(3).

Malaria remains the leading public health problem in Ethiopia. The problem covers 75% of the landmass of the country, and 68% of the population are living in malaria-risk areas. In spite of this, the Ministry of Health in Ethiopia designed a 5-year (2011–2015) malaria-prevention and control strategic plan to fight the vector by using indoor residual spray (IRS) and long-lasting Insecticide-Treated Nets (ITNs) as a main tool for program implementation, in line with early case detection and treatment with a strong surveillance system by using the existing health system of the country (4).

Four main intervention strategies that are being applied in Ethiopia to combat malaria. These are early diagnosis and prompt treatment, selective vector control, the use of ITNs, and environmental management (5). ITN utilization is one of the effective malaria preventive and strategies Worldwide, studies have revealed major benefits from LLINs ownership and use (6). High population coverage of the bed nets and effective treatment programmes may reduce the mortality and morbidity of malaria and other mosquito borne diseases up to 50% in the areas of intense perennial malaria transmission (7).

Different studies conducted in the parts of the Ethiopia shown that there were improvements on ITN ownership, whereas regarding utilization at HH level, there are a lot of ups and downs (8) According to the 2015 National Malaria Indicator Survey, only 64% of Ethiopian House Holds (HHs) owned at least one LLIN and only 40% of the population slept under LLINs the night before the survey, below the goals of 100% ownership and 80% utilization. The proportion of Shaving at

least one LLIN for every two people was 31.7% nationally and 38% in Amara Region in 2015(9)(3).

The country planned to cover 90% of malarial areas with IRS in 2013–2015, to cover 100% of households (HHs) of malaria-endemic areas with one LL ITN (LLIN) per sleeping space, and to reach at least 80% consistent LLIN utilization status. Overall, with an aim of attaining the RBM target in Ethiopia, 20 million ITNs were distributed between 2005 and 2007(9)

Different studies conducted in the parts of the Ethiopia shown that there were improvements on ITN ownership, whereas regarding utilization at HH level, there are a lot of ups and downs (10). According to study conducted in Itang special district, Gembella region, Ethiopia 2017 indicted ITN ownership in this study area was low and is not in line with family size or the RBM target of ownership. The proportion of HHs reporting at least one family member sleeping under an ITN the night prior to the survey was below average and below half the RBM or country target of 2015. The consistent-utilization report of this study was poorest when compared to RBM and country targets of consistent ITN use (11)

The aim of this project: to assess ownership and utilization of ITNs in 2021 with factors that influenced use in the highly malaria endemic area Gembella Zuria woreda, Gembella region, Ethiopia. In addition, this project may also provide basic information for programme managers and policy makers targeting on prevention of malaria infection and reduction of corresponding indirect community mortalities and/ or morbidities.

Statement of the Problem

Malaria is still a public health problem in the world and in Africa in Ethiopia, 60% of the population are at risk of malaria infection, and 68% of the country's area is favorable for malaria transmission. (4)(12) Gembella is one of the areas of Ethiopia with high malarial Endemicity and the areas with stable malaria in the humid tropical region of the country. In other side is continuing refugee influx from high endemic malaria country South Sudan into Gembella Region. In last decade's hospital of Gembella region records indicate that in, 20% of outpatient morbidity and 26% of deaths in this region were due to malaria one of the Gembella region top three causes of sickness and death based on FOMH reported 2016. The 2015 malaria indicator survey indicated

that malaria prevalence is higher in Gembella (18%) greater than other region in Ethiopia (National average of 1.2%)(13)(14).

Remarkable implementations of different integrated vector-control strategies throughout the country have shown a progressive impact on the improvement of malaria morbidity and mortality; however, malaria is still a major public health problem in Ethiopia. An estimated 64 million LLINs were distributed within the country through periodic mass campaigns between 2005 and 2015 with an additional 29.6 million LLINs distributed in 2015 (15)(1).

However, the three national malaria indicator surveys (MIS) have shown that universal access to LLIN ownership and use has yet to be achieved. Furthermore, households with at least one LLIN for every two persons were as low as 37% in 2007, 24% in 2011 and 32% in 2015. The overall LLIN use rates were 32% in 2007 and 40% in 2015 (16)(15).

In 2017 study Itag special district, Gembella region was low and not in line with family size or the RBM target of ownership. The proportion of HHs reporting at least one family member sleeping under an ITN the night prior to the survey was below average and below half the RBM or country target of 2015(10). Different study shows, reason for not using ITNs in Ethiopia include, a lack of space to hang the LLINs, discomfort, a low-risk perception of malaria, saving nets for future use, and a lack of awareness and perception of low efficacy to prevent malaria (17)(15).

Rational of the study

Gembella region is one of the regions considered as endemic for malaria in the country. In different times and different parts of the region, several malaria related outbreaks have been being reported several times**.** To help reduce the burden of malaria, the U.S. President's Malaria Initiative (PMI) Vector Link Project conducted throughout Gembella in 2018. In Ethiopia, ITN planning is based on the WHO recommendation of 1 net for 1.8 people. Long-lasting insecticidal nets are regarded as a key weapon in the armory of effective malaria vector preventive measures, and hence malaria prevention strategies. Long-lasting insecticide-treated bed nets/insecticide-treated bed nets are one of the major components of the selective vector control strategies in Ethiopia along with indoor residual spraying (IRS), environmental management and larval control.

Despite the activities pertaining to the distribution of ITNs, many questions remain unanswered. The extent to which people are aware and acquire nets is not understood clearly. Observation and

rumors of not hanging nets at all, hanging nets in a wrong manner. The perception of the population on the role of ITNs in the prevention of malaria is still another issue.

With free mosquito net distribution in some region including Gembella, coverage had assumed to be attainable. However, there is large gap both in terms of ownership and utilization. To inform policy and re-engineering of programme (10) delivery to meet the set targets, evaluation should not just be limited to know percentage coverage of ownership and use. It is important to investigate the predictors of utilization of ITN in Gembella Zuria woreda, Gembella region.

A project aims are bridging the current information gap on the status of implementation of malaria control program in terms of the ownership and utilization of ITNs among the households and determining the factors that predict utilization. This will help to identify gaps in programme implementation and provide a scientific basis for policy decisions on scaling up interventions in malaria high burden area, such as Gembella Zuria woreda.in addition, findings generated from this study will provide empirically sound information to the scientific community.

Literature Review

According to world malaria report 2020, by the end of 2019, about 1.5 billion malaria cases and nearly 7.6 million deaths had been averted since the beginning of the century. Who African region, 2000–2019 with an estimated 215 million malaria cases and 384 000 malaria deaths in 2019. The WHO African region accounted for about 94% of cases and deaths globally. Although there were fewer malaria cases in 2000 (204 million) than in 2019, malaria case incidence reduced from 363 to 225 cases per 1000 population at risk in this period, reflecting the complexity of interpreting changing disease transmission in a rapidly increasing population. The population living in sub-Saharan Africa increased from about 665 million in 2000 to 1.1 billion in 2019. Malaria deaths in the WHO African region reduced by 44%, from 680 000 in 2000 to 384 000 in 2019, and the malaria mortality rate reduced by 67%.Over the same period, from 121 to 40 per100 000 population at risk.(17)(3).

According to WHO malaria 2018 reports; in 2017, an estimated 219 million cases of malaria occurred worldwide (95% confidence interval [CI]: 203–262 million), compared with 239 million cases in 2010 (95% CI: 219–285 million) and 217 million cases in 2016 (95% CI: 200–259 million)(19). By 2019, 68% of households in sub-Saharan Africa had at least one ITN, increasing

from about 5% in 2000. The percentage of households owning at least one ITN for every two people increased from 1% in 2000 to 36% in2019. In the same period, the percentage of the population with access to an ITN within their household increased from 3% to 52%. The percentage of the population sleeping under an ITN also increased considerably between 2000 and 2019, for the whole population (from 2% to 46%), for children aged under 5 years (from 3% to 52%) and for pregnant women (from 3% to 52%). These indicators represent impressive progress since 2000, although coverage peaked in 2017 (20).

Using concentration indices, socioeconomic equity of ITN use by the children aged under 5 years at the subnational level was analyzed. The most recent household survey data from DHS and MIS from 24 countries1 for 2015–2019 were used. In most West African countries, ITN use was generally pro-poor. The concentration index varies from -1 to +1, with a value of zero indicating perfect equality. In this analysis, negative and positive values suggest that ITN use is concentrated in the poorest and richest households. In contrast, ITN use was higher in wealthier households (i.e. concentration index >0) in many parts of the Democratic Republic of the Congo, Kenya, Mozambique, Uganda and the United Republic of Tanzania (21).

According to WHO reports, between 2016 and 2018, a total of 578 million insecticide-treated mosquito nets (ITNs), mainly LLINs, were reported by manufacturers as having been delivered globally, with 50% going to Côte d'Ivoire, the Democratic Republic of the Congo, Ethiopia, Ghana, India, Nigeria, Uganda, and the United Republic of Tanzania. In 2018 about 197 million ITNs were delivered by manufacturers, of which more than 87% were delivered to countries in sub-Saharan Africa. Globally, 80% of ITNs were distributed through mass distribution campaigns, 10% in antenatal care facilities and 6% as part of immunization programme (20).

Half of people at risk of malaria in Africa are sleeping under an ITN: in 2017, 50% of the population was protected by this intervention, an increase from 29% in 2010. Furthermore, the percentage of the population with access to an ITN increased from 33% in 2010 to 56% in 2017. However, coverage has improved only marginally since 2015 and has been at a standstill since 2016. Households with at least one ITN for every two people doubled to 40% between 2010 and 2017. However, this figure represents only a modest increase over the past 3 years, and remains far from the target of universal coverage.(8)(22).

World Health Organization (WHO) indicators of bed net use were lower in the highlands than in the lowlands. The per cent of households owning a bed net was lower (37 vs 53 %), as was the per cent of households with at least one person sleeping without a bed net (85 vs. 59 %). Lack of use of owned bed nets was also more common in the highlands than lowlands (9.3 vs. 5 %) (19).

Determinants of bed net use in the Gambia: implications for malaria control shows that household size, expenditure on other malaria prevention products and practices, age, education, ethnicity, occupation of household head, and whether the road to a community was impassable at certain times of the year were all significant determinants of bed net ownership. Specifically, the likelihood of net ownership decreases with an increase in the number of household members in the 20–29- year-old age bracket and increases with the number between 5 and 9 years of age. The more a household spends on other forms of malaria prevention, the less likely they are to own a bed net (23).

Comparing ownership and use of bed nets at two sites with differential malaria transmission in western Kenya Disease was also positively correlated with the perception that people in the community only use bed nets when it is the rainy season (OR = 2.8, $p < 0.001$, that there is no benefit to using a bed net because they will get malaria anyway (OR = 2.3, $p = 0.01$), that using malaria drugs is easier than using a bed net, and that using a bed net is difficult (24).

Rwanda Long-lasting insecticidal net source, ownership and use in the context of universal coverage: a household survey indicted; Sleeping on a bed was associated with three-fold higher odds of net use (95 % CI: 1.79–5.08) compared to not sleeping on a bed. Although a reported ownership of ≥two ITNs on the night before the survey was associated with higher odds of net use in general, bed net use was also influenced by the number of sleeping places in a house. Persons from households that reported using ≥ two sleeping spaces the night before the survey were associated with higher odds of net use compared to household that had only one sleeping space. Multivariate results (2).

In Ghana ownership and use in social contacts is associated with uptake of bed nets for malaria prevention in pregnant women; The results of this study suggest that there is an association between the decision by pregnant women to use or own bed nets and the use of bed nets by the people they go to for pregnancy advice in Kumasi, Ghana. Although the cross-sectional design of

this investigation prevents the establishment of a causal relationship, similar finding other disease prevention settings suggest that interpersonal influence could be an important factor in the uptake of bed net use. Further research into the relationship between social influence and bed net use is warranted, as interventions could capitalize on interpersonal relationships to raise bed net ownership and usage rates in Ghana and worldwide (25).

A study done in malarias areas of Eritrea shows determinants of insecticide treated net (ITN) ownership and use are environmental heterogeneity, perception of risk, and proximity to a clinic are important predictors of ITN possession and use. Among households with at least one ITN, 17.0% reported that children under five were not under an ITN the night before the survey, while half of all such households did not have all occupants using them the night before the survey. The number of ITNs was also significant determinants of use in those households with at least one ITN (26)

Based on cross-sectional survey looking at long lasting insecticide-treated bed net ownership, utilization, and attrition in SNNPR, Ethiopia 2009; two-stage cross-sectional survey was undertaken in December 2009 in SNNPR, Ethiopia to determine current LLIN ownership and rates of net utilization, rate of loss of nets and maintenance. Results show that 67.5% of households owned at least one net of any type. One-quarter of households owned two nets and fewer than 5% owned three or more. Of those nets owned, 60.5% were used the previous night, 69.9% of net owners who agreed to demonstrate their use did so correctly (18)(3).

Determinants of Ownership and Utilization of Insecticide-Treated Bed Nets for Malaria Control in Eastern Ethiopia 2012; women's and head of household's education, head of household's occupation, marital status, household size, household wealth, living in rural areas, and expenditure on other malaria prevention products and practices were found to be associated with ITN ownership. A strong association remained between using ITNs, owning radio, and living close to a health institution. In addition, households' desire for mosquito avoidance and correct knowledge of malaria transmission were reported to be strong determinants of ITN usage (27).

Other study conducts in 2017 Itang especial district, Gembella region indicted; ITN ownership in this study area was low and is not in line with family size or the RBM target of ownership. The proportion of HHs reporting at least one family member sleeping under an ITN the night prior to

the survey was below average and below half the RBM or country target of 2015. The consistent-utilization report of this study was poorest when compared to RBM and country targets of consistent ITN use. The RBM target was seated to have ITN herd effect on mosquito population reduction and on the reduction of risk of malaria through its barrier and knockdown effect. Therefore, study-area populations were at higher risk of mosquito bites and acquiring malaria and other vector-borne diseases that can be prevented by higher utilization of ITNs. This study also showed barriers to ITN use among the study population. According to this research, the use of ITNs is affected by socio demographic, individual, and ITN-related factors (10)

Objective

General objective

To assess ownership, utilization, and associated factor of ITN among households of Gembella Zuria woreda, Gembella region in the year 2021.

Specific objectives

The specific objectives of this study in Gembella Zuria district is to:

- Describe the magnitude of ITNs utilization
- Assess ownership of ITNs
- Determine factors associated with utilization of ITNs

Conceptual Framework

Utilization of long-lasting insecticidal nets (LLINs) is regarded as key malaria prevention and control strategy. However, many studies have reported a large gap in terms of both ownership and utilization particularly in the sub- Saharan Africa (SSA). With continual efforts to improve the use of LLIN and to progress malaria elimination, examining the factors influencing the ownership and usage of LLIN is of high importance. Therefore, the current study will be conducted to examine the level of ownership and use of LLIN along with identification of associated factors at household level. Ownership and utilization of bed nets has been found to be positively associated to the socio-economic status of a household, the age of the household head, (women's) knowledge of malaria, and the presence of a pregnant woman or children below the age of 5 years. Increasing distance to

the nearest health facility and poor access to transport service, on the other hand, have been reported to negatively affect net ownership.

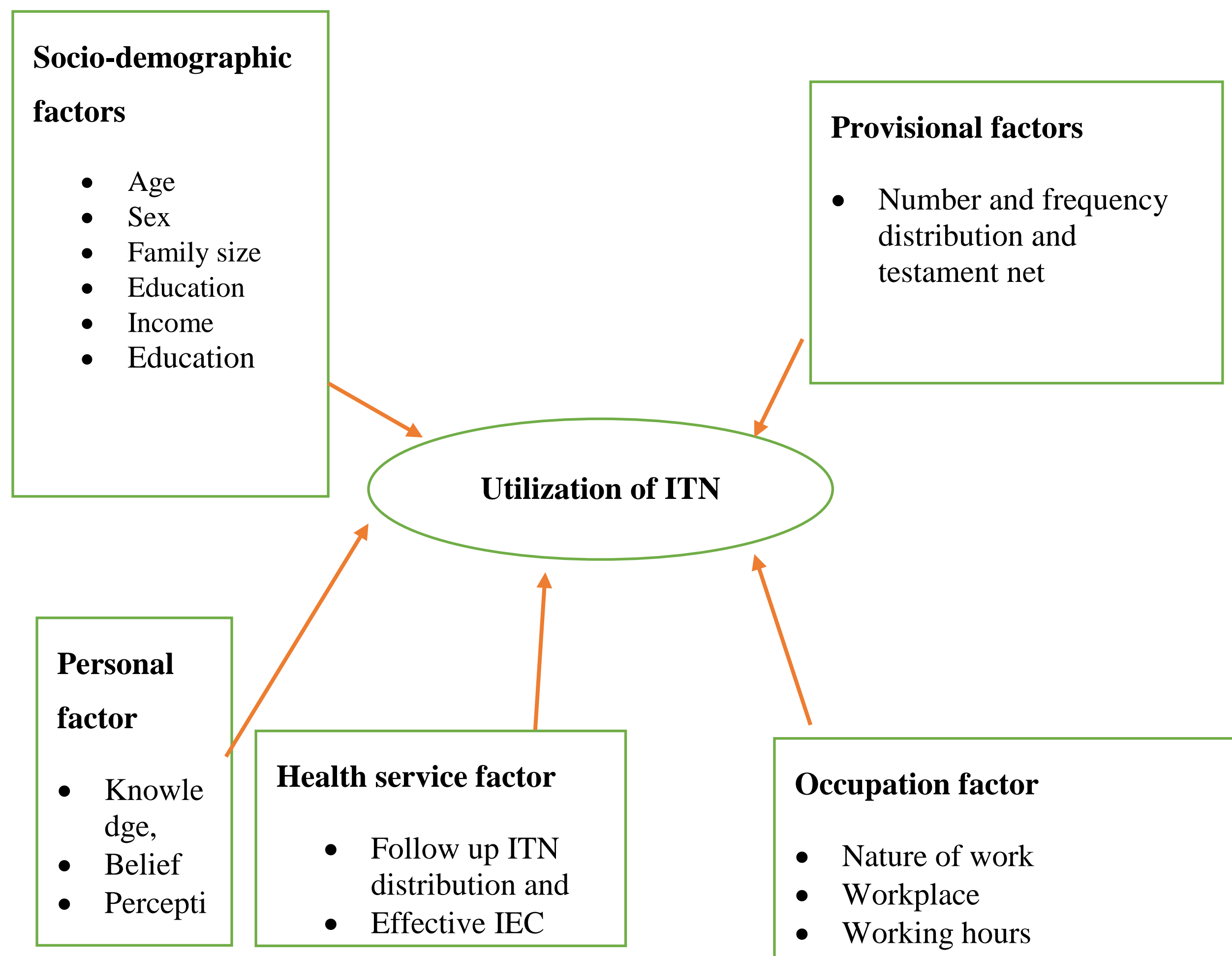

Figure 33. A diagram illustrating factors associated with utilization of bed nets.

Methods

Study design

A community based cross-sectional study design will be implemented at household level in Gambella Zuria woreda, Gambella region.

Study area and period

Gambella is one of nine regional states of Ethiopia, located approximately 720 km southwest of Addis Ababa. Most of the region is flat, hot, and humid, with an altitude range of 300–2,000 m above sea level and sloping westward. The annual average temperature of the region is 21.1°C–35.9°C, with an average annual rainfall of 600 mm. Gambella Zuria is one of the 14 woredas of Gambella and is situated 42 km to the west of the regional capital of Gambella.

The woreda has 14 Kebeles (lower-level administrative units), with the total projected population of 16,662 in 2020 and 4,566 households. Woreda climatic conditions are favorable for the existence of a stable form of malaria throughout the year. According to the regional health bureau annual report in 2020, the woreda has a total of three health centers and six health Posts. The study period will be from May 2021 to June 2021.

Study population

The study population will be selected households found in Gambella Zuria woreda

Variables and measurement

Dependent variable

- Insecticide-treated net ownership and utilization.

Independent variables

- **Socio-demographic:** Age, sex, marital status, level of education, family size, income etc.
- **Personal factors:** Knowledge, belief, attitude, habits…etc.
- **Occupational factors:** Nature of work, working hours, workplace
- **Provisional factors:** Number and frequency of distribution bed net

Inclusion and exclusion criteria

Inclusion criteria

Households will be selected to participate in the study if they are located in the selected kebelles for the study. Household heads or any other household members aged at least 18 years and above will be requested to provide informed consent.

Exclusion Criteria

Household members who are incapable of giving informed consent during time of data collection; due to small age, mental problems, severely ill persons, and those who refused to participate will be immediately excluded from the study.

Sample size

The sample size for the number of households to be included in the study will be calculated using single population proportion formula as follows:

$$n = \frac{(z_{1-\alpha/2})^2 \times p\,(1-p) \times 2}{d^2}$$

n = the required sample size

P= is estimated proportion of study population with bed net utilization (that is estimated to be 52.3% from findings of the previous study in neighboring Itang special woreda of Gambella region).

$z_{(1-\alpha/2)} = 1.96$ for 95% confidence interval

d=5% (0.05) the level of statistical significance set.

$$n = \frac{(1.96)^2 \times 0.52\,(0.48)}{(0.05)^2}$$

$$n = \frac{3.84 \times 0.249}{0.0025}$$

= 383

For this study, 383 households will be needed x2 (design effect) for multistage sampling

383x2=766

Considering non-response rate, 10% addition to the sample size seems logical.

766+76.6(none –response rate) = 843

Hence, the final adjusted sample size will be 843 samples, which is assumed to be sufficient for this study.

Sampling technique

A multi-stage sampling approach will used to obtain the estimated sample size of 843 households for the study. A combination of sampling technique will be implemented to select the sampling units.

First, by using lottery method, 25% (five) Kebelle will be selected by lottery method from all 20 Kebelles in the district, using PPS, sample households will be allocated for each selected Kebelle village.

Second; 30 % Kebelle village will be selected by lottery method, to get sampling frame all, the selecting Kebelle village or got will be listed by household. Then using systematic random sampling method households will be selected from the sample frame.

Data collection techniques and Instruments

A standardized structured questionnaire will be used to collect data. The data collection tool was prepared by reviewing relevant literatures. Data collection process will include both face-to-face interviews and observations. Data will be cross-checked in the data collection process. To ensure the quality of the questionnaire, the questioner will be pretested on 20 households of neighboring villages of Itang special district.

Five data collectors and two supervisors who speak local language (Agnuak) and Amharic and who have experience in malaria prevention and control activities will be assigned for the data collection process. Before entering to the data collection, the principal investigator will provide orientation on the overall data collection process. The orientation will focus on the basics of this project with an emphasis on ethical issues, the data collection tool prepared (questionnaire) and how to administer it followed by a pre-test.

Data analysis and presentation

The data will be managed by the principal investigator. A data of SPSS and Epi Info (version 7) software will be created, and data will be entered for further descriptive and inferential statistical analysis. Descriptive summaries of (frequencies and proportions) and bivariate and multivariable

analysis will be conducted. Multivariable logistic regression analysis will be used to determine factors associated with ITN ownership and utilization. Un-adjusted and adjusted Odds Ratios (OR) and their corresponding 95% Confidence Intervals (CI) will be used to examine the strength of association. The level of significance will be set at 0.05. The analyzed data will be presented using different statistical data presentation methods including tables, graphs, and charts and using word narration.

Data quality assurance

The collected data will be checked for completeness and other data quality issues daily by immediate supervisors. After checking for consistency and completeness, the supervisors will submit the filled questionnaire to the principal investigator. Incorrectly filled or missed ones will sent back to respective data collectors for correction. The principal investigator again rechecks the complete questionnaires to maintain the quality of data. The principal investigator and supervisors will also crosscheck the collected data.

Ethical considerations

Ethical clearance to conduct the study will be obtained from EPHI and Gambella regional health bureau. Official letter of support from the regional health bureau to the woreda health office will be prepared. Additionally, informed consent will be obtained from study participants. Confidentiality of the participants will be assured and maintained, and no participants' identifier will be recorded.

Result Dissemination

Findings from this study will be disseminated to participating organizations, individual participants, EPHI, GRHB and President's malaria initiative. It will also be published in peer

Reviewed journals**.**

Work Plan

Budget Breakdown

Funding

This project will be funded by the President's Malaria Initiative (PMI) of Center for Disease Control and Prevention (CDC) and UNAID's with the support of Ethiopian Field Epidemiology and Laboratory Training Program (EFELTP).

S.N.	Activities	April				May				June			
		1st wk	2nd wk.	3rd wk	4th wk	1st wk	2nd wk	3rd wk	4th wk	1st wk	2nd wk	3rd wk	4th wk
1	Proposal writing												
2	Proposal submission for ERB approval												
3	Obtain ethical clearance												
4	Data collection and recording												
5	Data transcription												
6	Analysis of data												

7	Report writing									■		
8	Presentation of finding										■	
9	Finalized research report writing											■

This project will be funded by the President's Malaria Initiative (PMI) of Center for Disease Control and Prevention (CDC) and UNAID's with the support of Ethiopian Field Epidemiology and Laboratory Training Program (EFELTP).

Table 49. Stationary materials required for the study.

S. N	**Stationary materials**					
	Items	Unit	Number of items	Unit cost (ET Birr)	Total (ET Birr)	Contingency (5%)
1	Paper	Pac	5	500	2500	150
2	Pen	Pac	2	600	1200	100
3	Flip chart	Pieces	5	150	1500	50
4	Exercise book	Pac	1	800	800	40
5	Flash disk (8GB)	Piece	10	450	4500	112.5
6	CD-WR	Piece	7	150	1050	32.5

7	printing & photocopy	Piece	1266	7	8862	280
8	Marker	Pac	1	650	650	22.5
9	Binder	Pieces	7	150	1050	50
10	Stapler	Pac	7	200	1400	100
Grand total (Birr)						24,449.50

Table 50. Personal cost required for the Study

S. N	Personal cost				
	Category	number of items	Unit cost/day (Birr)	Duration	Total (Birr)
1	Principal Investigator	1	500	21 days	10,500
2	Supervisors	2	500	21 days	21,000
3	Data collectors	3	500	21 days	40,950
4	Driver	1	500	21 days	13,650
5	Fuel & maintenance	1	19birr/Lit	21 days	5,000
6	Grand total (Birr)	91,100			

Note: the total estimated cost of the project will be approximately 115,549.5 Ethiopia Birr

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CHAPTER EIGHTY: ADDITIONAL OUTPUTS

12. Ethiopian Public Health Institute Center for Public Health emergency Management

Early Warning and Information System weekly epidemiological bulletin

Week 5: January 31 – February 6, 2022

Opening paragraph

PHEM weekly report is one of indicator-based surveillance use as an early warning system in selected priority disease /condition/ event notification in a weekly base. This weekly bulletin is supposed to address the all-region from Week 5: January 31 – February 6, 2022, according to WHO week format. It enables them to act according to respective analysis.

Introduction

Ethiopia is providing humanitarian assistance in the northern and other parts of the country where there are displacements, responding to COVID-19 pandem throughout the country and ongoing outbreaks of malaria and measles in different parts of country. Severe acute malnutrition is also affecting the community in some parts of the country where there were conflicts, internal displacement, and related emergencies.

In this weekly bulletin ongoing the reportable diseases, outbreaks and other emergencies will be discussed. All the immediately and weekly reportable diseases including COVID-19 will be entertained in the bulletin.

Methods

Data was collected starting with the community using the health post. At the district level, it was complied with before moving on to the zone and finally the region. It was anticipated to come in on a weekly basis at the federal level.

Completeness and timeliness of reports

The national surveillance data report completeness and timeliness are 81.6% which is higher than national standard and 69.1% which is lower than the national standard, respectively. All regions except Afar, Benishangul Gumuz, SNNPR and Tigray regional states had achieved above the minimum requirement of 80%. In the week 5, there are no reports from Tigray regional

states because of current security issues and humanitarian crisis in the region.

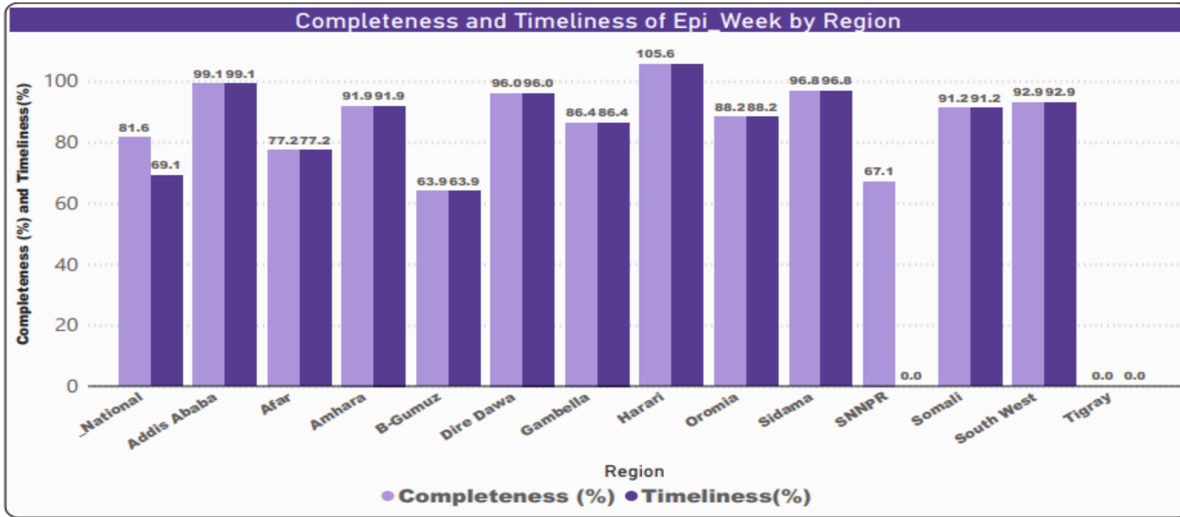
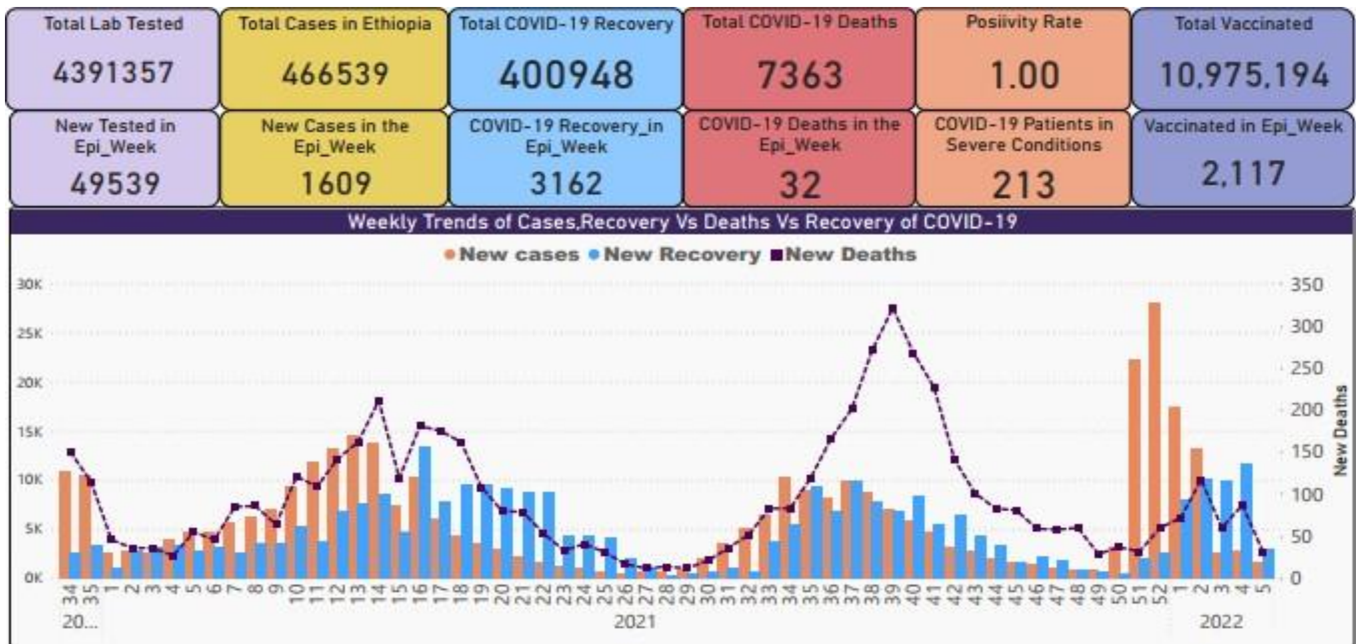


Figure 37: National weekly report completeness and Timeliness by region, week 5, 2022.

A total of 1,609 new confirmed COVID-19 cases and 32 COVID-19 related deaths were reported during the Epi-Week-5 bringing the total cases and death to 466,539 and 7,363, respectively. This makes overall Case Fatality Rate of COVID-19 to be 1.7% in the country. In this week, there is a 43% decrease in the number of COVID-19 confirmed cases and there is an 63% decrease in the number of deaths dueto COVID-19.



February 2022, a total of 4,391,357 (748, 16 by Rapid Diagnostic Test) samples have been tested for COVID-19 by laboratories across the country. 49,539 laboratory tests were processed during the Epi-Week-5 which is an 13% increase compared to number of tests performed in the previous week.

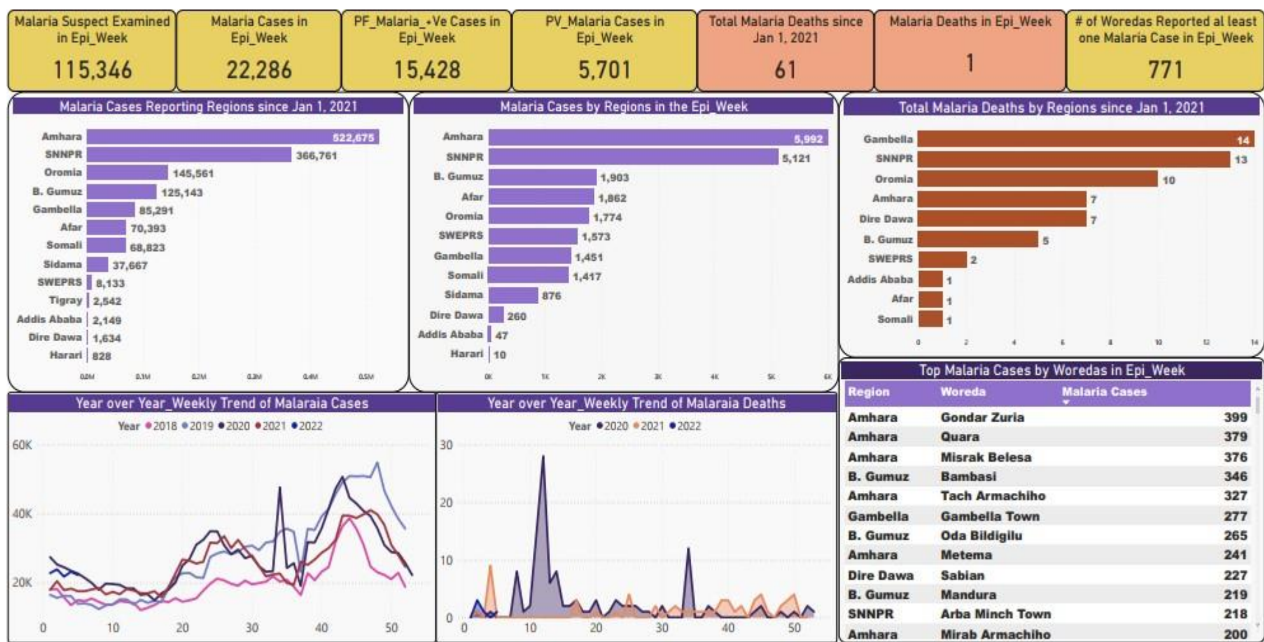
In 2021 and 2022, as of 06 February a total of 5,299 suspected cases and 29 deaths reported (Case Fatality Rate (CFR) 0.7%). Out of the 206 231 suspected cases reported, 46% (107 cases) were reported from SNNP region followed by Oromia region (23% of the national report) in the week-5 and there is a 12% increase in the number of new measles cases compared to previous week. Two (2) new deaths due to suspected measles was reported in this week.

Figure 38. Summary of COVID 19 situation in Ethiopia as February 6, 2022.

Malaria

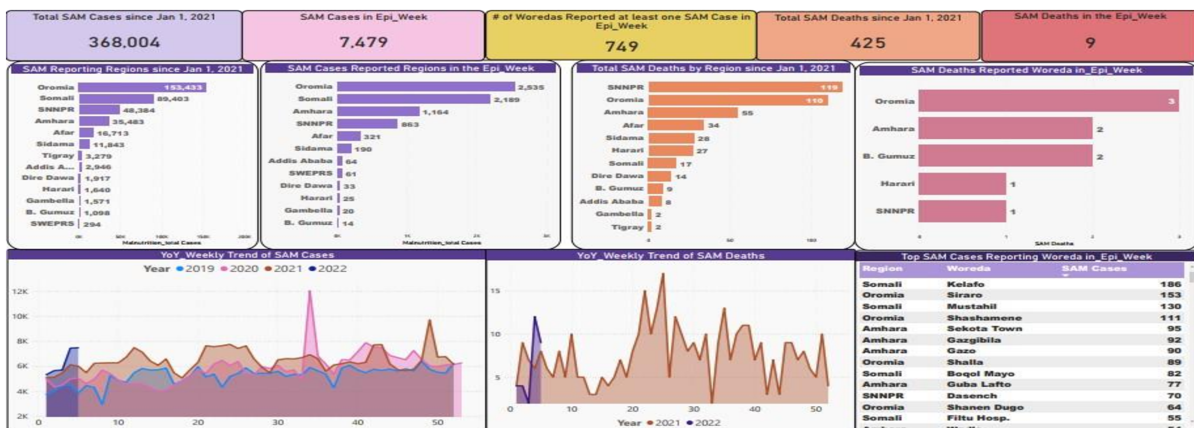
A total of 22,286 malaria cases (4.1% increase compared to previous week) were reported in the week-4 most of which, 15,428 (69%) were caused by plasmodium falciparum. Amhara reported the highest number (27% of the total) of malaria cases followed by SNNPR (23%) region in this week. There is no death reported due to malaria in the week.

Figure 4. Summary of malaria situation in Ethiopia as of February 6, 2022.



Severe Acute Malnutrition (SAM)

High number of Severe Acute Malnutrition (SAM) cases is reported in 2022 as compared to the same weeks of previous three years based on the report as of February 06, 2022. A total of 368,004 SAM cases and 425 deaths (CFR=0.12%) are reported in since January 1, 2021, so far out of which 7,479 cases and nine (9) deaths are reported in week 5. There is a (32 cases) increase in number of SAM cases in this week as compared to the previous week. Oromia region reported the highest number (34% of the national report) of SAM cases in the week followed by Somali region (28% of national



report).

Figure 39: Severe Acute Malnutrition in Ethiopia as of February 6, 2022

Cholera

A total of 1081 suspected cholera cases and 12 deaths were reported in Ethiopia, since January 01, 2021, with overall CFR of 1.95%. No cases and deaths due to suspected Cholera were reported in the week-5 in the country.

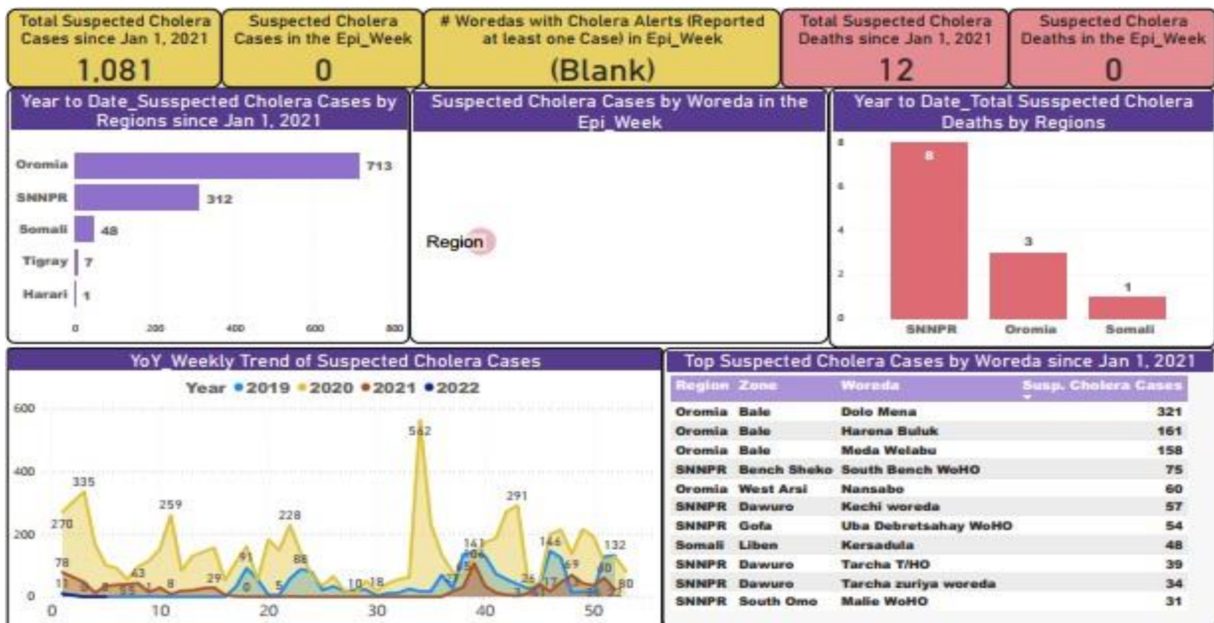


Figure 40: Summary of cholera disease situation in Ethiopia as of February 6, 2022.

Acute Flaccid Paralysis (AFP) /Polio

In this week, 16 suspected AFP/polio cases were reported which is a six (6 cases) increase in number as compared to the previous week. No new deaths due to AFP/Polio reported in this week.

Figure 41: Acute Flaccid Paralysis / Polio status update in Ethiopia as of January 30, 2022

Perinatal death

As of February 06, 2022, a total of 9,774 perinatal deaths were reported in 2021 and 2022 out of which 201 perinatal deaths were reported in week 5. There is an 7% increase compared to the previous week. Jenella Woreda from Harari region reported the highest number (5%) of perinatal deaths followed by Debre Markos Hospital (4% of national) from Amhar region in the week.

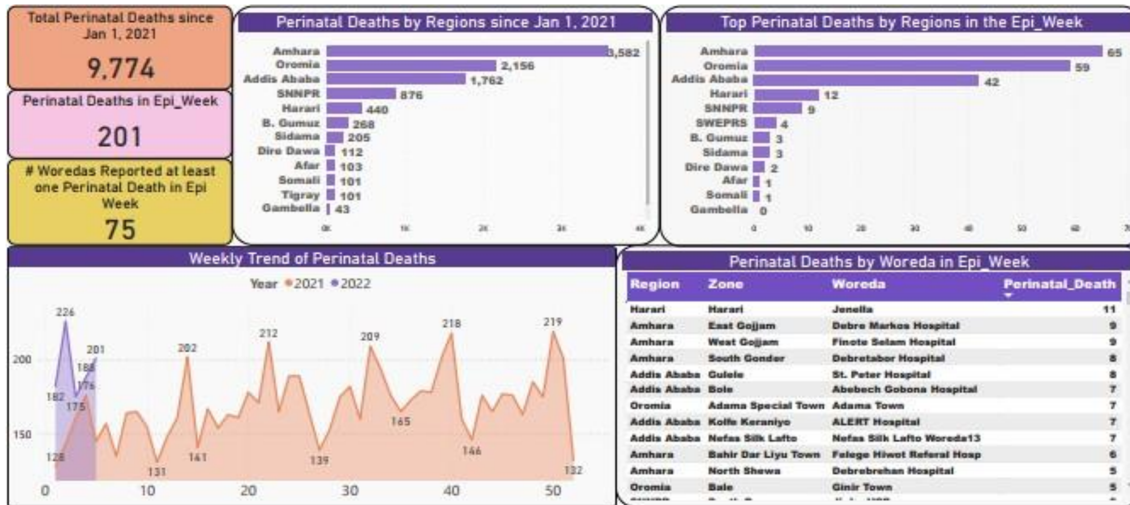


Figure 42: Perinatal death update in Ethiopia as of February 6, 2022

Maternal deaths

16 maternal deaths from 14 different Woreda/Hospitals of the country were reported in the week 5 which is a (48%) decrease in number of deaths as compared to previous week of which five (5) of deaths are reported from Oromia region followed by Somali region (4 deaths).

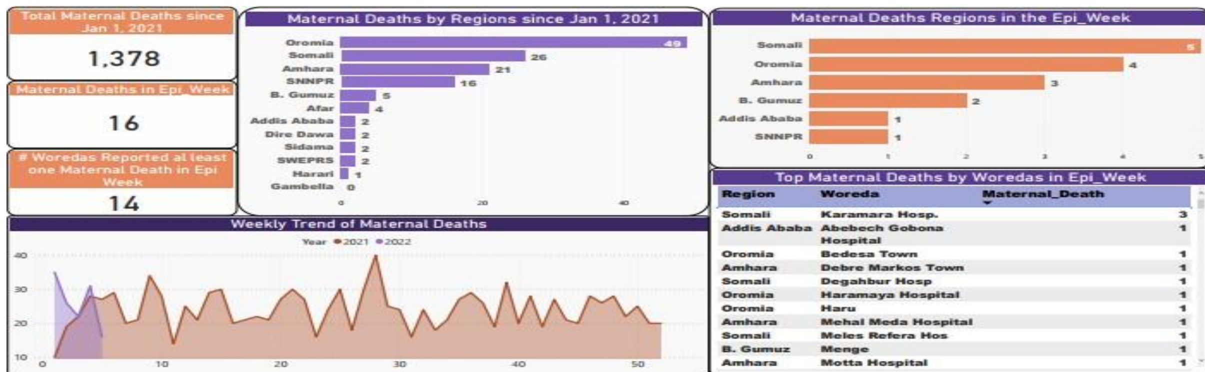


Figure 43: Maternal death summary in Ethiopia as of February 6, 2022

Rabies exposure

Nationally 171 rabies exposures with one (1) death were reported during the week which is shown a 20% increase in number of cases as compared previous week. Highest number of rabies exposures are reported from Addis Alem Hospital (22%) from Amhara region followed by Assosa Hospital (21% of national report) from Benishangual Gumuz region in the week.

Figure 44: Rabies exposure summary in Ethiopia as of February 6, 2022

Dysentery

A total of 353,032 dysentery cases were recorded since January 01, 2021, of which 5,805 cases were reported in week 5. This is a (3%) increase as compared to the previous week. Oromia region is the highest number of dysentery cases reported (41%) followed by Amhara region (27%) in the week.

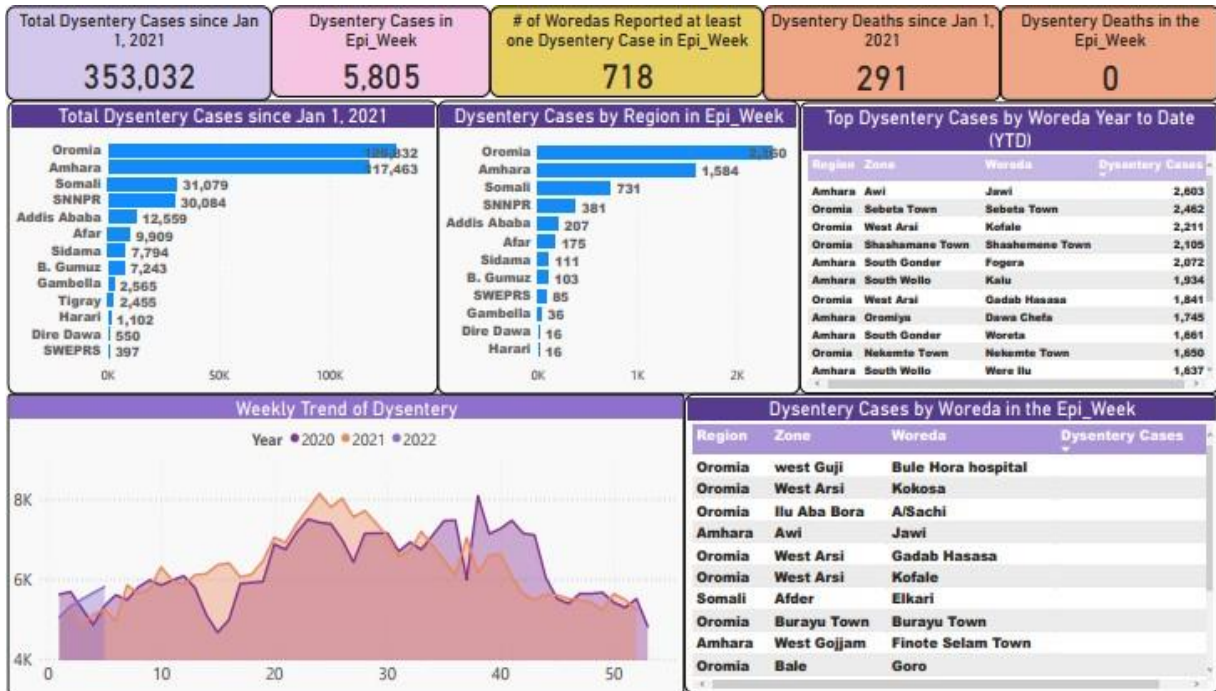


Figure 45: Summary of Anthrax situation in Ethiopia as of February 6, 2022.

Scabies

A total of 3,019 Scabies cases (4% decrease as compared to previous week) were reported during the week. Amhara region reported the highest number (37%) of Scabies cases followed by Oromia region (26%) in the week.

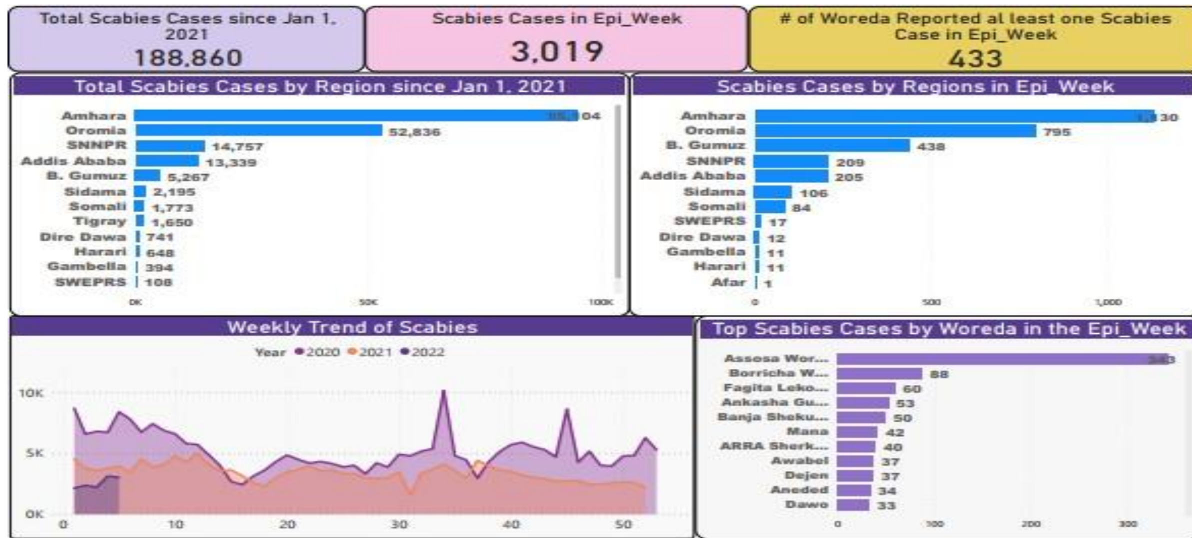


Figure 46: Summary of Anthrax situation in Ethiopia as of February 6, 2021.

Meningitis

A total of 109 suspected meningitis cases (12 cases) increase compared to previous week. No new death was reported due to suspected meningitis in the week. Oromia region reported the highest number (54%) followed by Somali region (16% of national report) in the week.

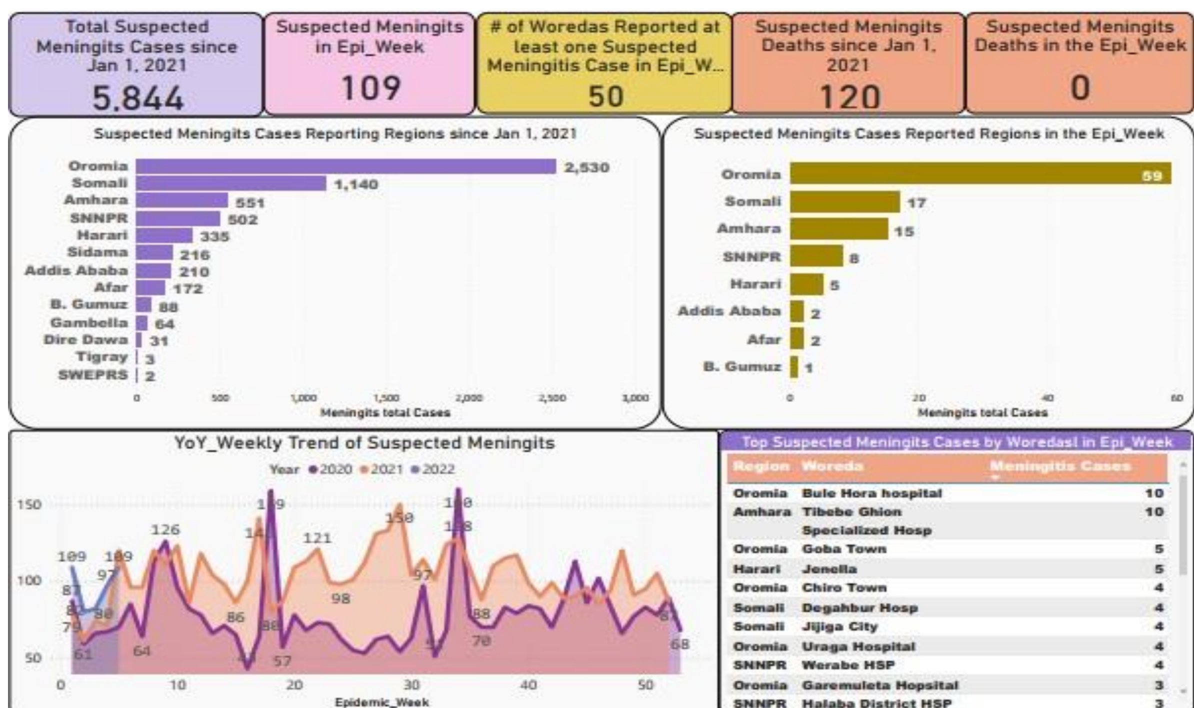


Figure 47: Summary of suspected meningitis cases in Ethiopia as of January 30, 2022

Neonatal tetanus

Overall, 126 neonatal cases and 49 deaths occurred since January 1, 2021, with CFR of 36.9%. One (1) case and one (1) new death were reported in week 5.

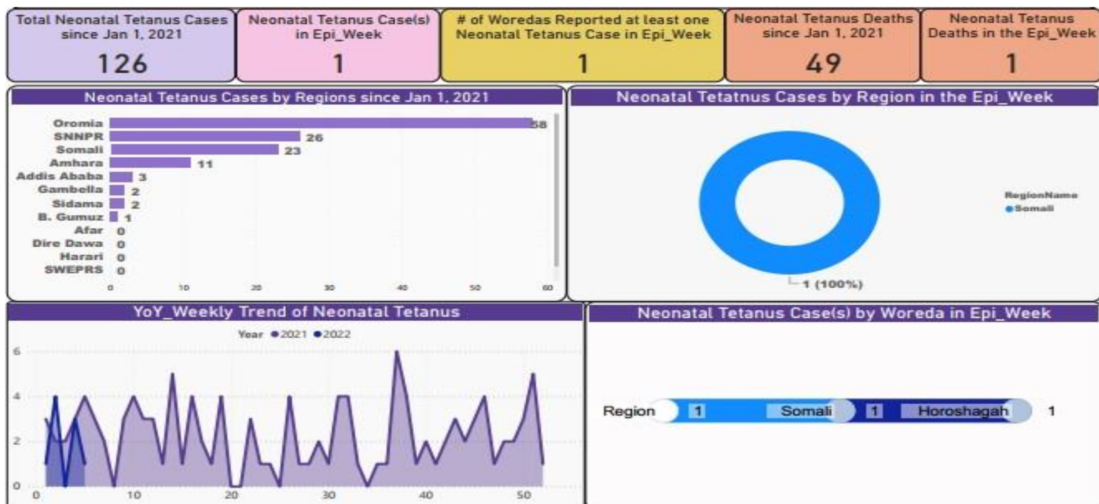


Figure 48: Summary of neonatal tetanus in Ethiopia as of February 6, 2022.

Relapsing fever

A total of 69 relapsing fever (RF) cases which is a (5 cases decrement as compared to previous week) with no death were reported during the week. Highest number of Relapsing Fever cases were from Somali region (49%) followed by Addis Ababa city administration (26%) in the week.

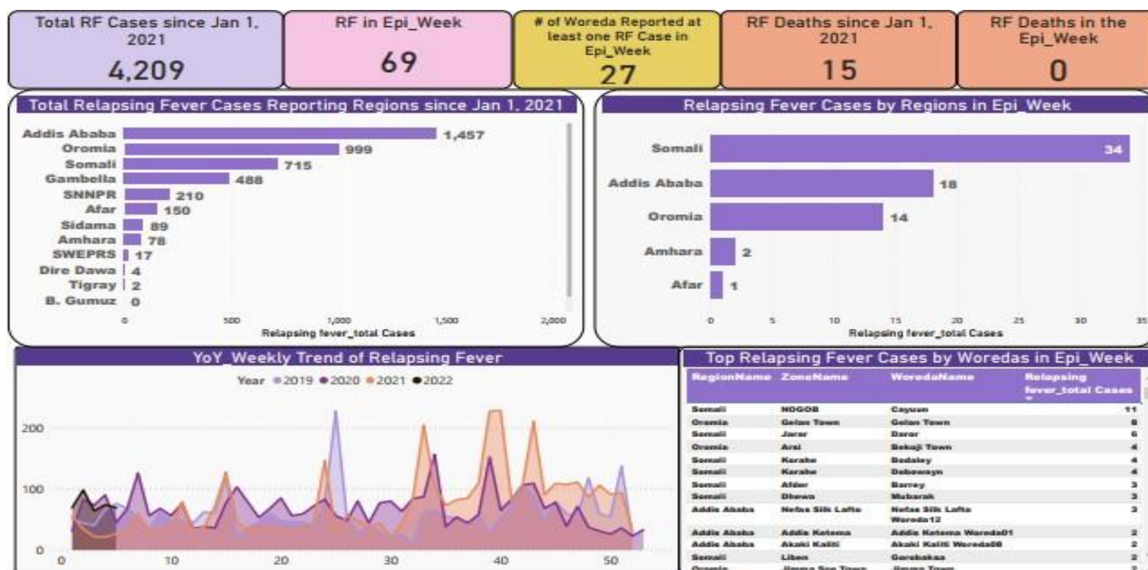


Figure 49: Relapsing fever in Ethiopia as of February 6, 2022

Epidemic typhus

A total of 774,248 epidemic typhus cases and 32 deaths are reported in the country making the Case Fatality Rate 0.005% since January 1, 2021. Among the total cases and deaths, 10,604 cases and eight (8) new deaths were reported during week 5. The number of Epidemic typhus cases reported in this week decreased as compared to the one reported in the previous week.

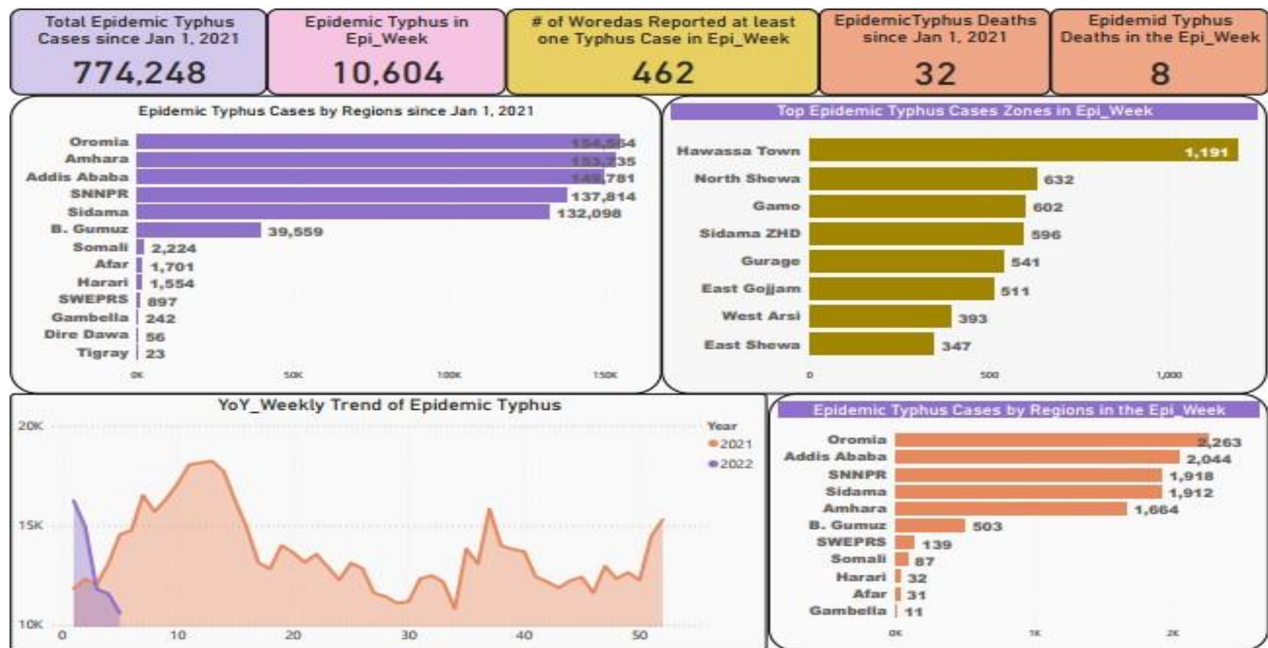


Figure 50: Summary of typhus cases in Ethiopia as of February 6, 2022

Typhoid fever

A total of 27,328 typhoid fever cases with no death are reported during the week 5, which showed decrement as compared to the number of typhoid fever cases reported in the previous week.

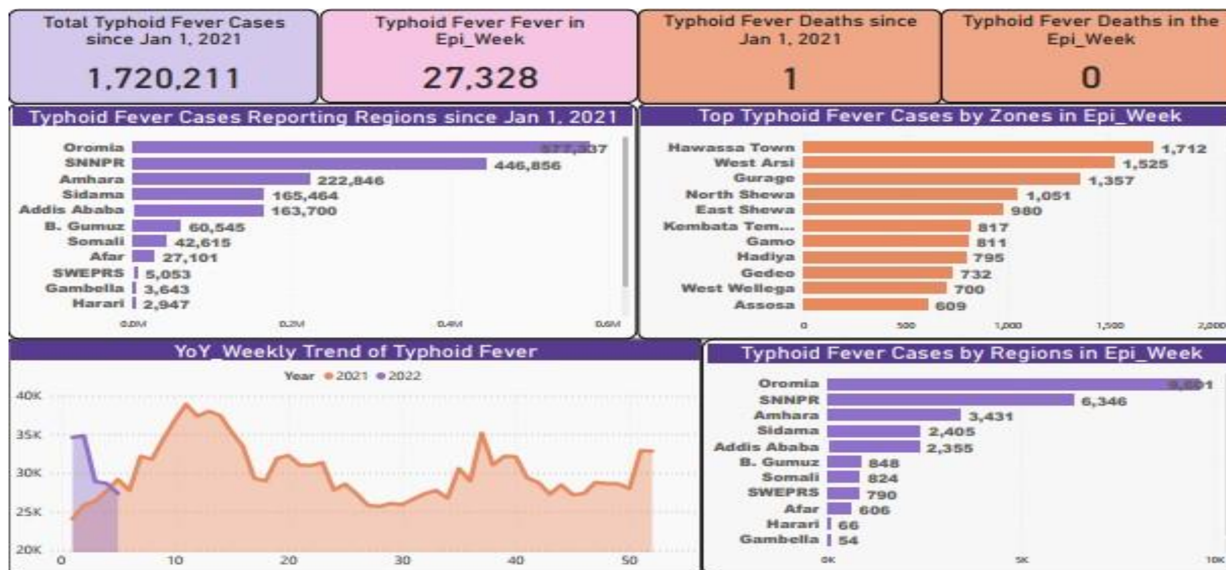


Figure 51: Summary of typhoid fever situation in Ethiopia as of February 6, 2022

Outbreak weekly reportable disease

No cases and deaths were reported for Avian Human Influenza, dracunculiasis (guinea worm), Pandemic Influenza, smallpox, viral hemorrhagic fever and yellow fever among the immediately and weekly reportable diseases in the week. Public health intervention activities against the diseases and events are not included in this bulletin.

Table 52: Summary of weekly reportable diseases by regions, as of February 6, 2022

Cases Summary of Weekly Reportable Disease/Conditions by Regions								
Region	Malaria	Susp. Meningitis	Dysentery	Typhoid Fever	Relapsing Fever	SAM	Epidemic Typhus	Scabies
Oromia	1,774	59	2,360	9,601	14	2,535	2,263	795
Somali	1,417	17	731	824	34	2,189	87	84
Amhara	5,992	15	1,584	3,431	2	1,164	1,664	1,130
SNNPR	5,121	8	381	6,346	0	863	1,918	209
Afar	1,862	2	175	606	1	321	31	1
Sidama	876	0	111	2,405	0	190	1,912	106
Addis Ababa	47	2	207	2,355	18	64	2,044	205
SWEPRS	1,573	0	85	790	0	61	139	17
Dire Dawa	260	0	16	2	0	33	0	12
Harari	10	5	16	66	0	25	32	11
Gambella	1,451	0	36	54	0	20	11	11
B. Gumuz	1,903	1	103	848	0	14	503	438
Total	**22,286**	**109**	**5,805**	**27,328**	**69**	**7,479**	**10,604**	**3,019**

Annex 1.

Data collection tools for Measles outbreak investigation in Karat Zuria woreda, Konso zone,SNNPR Region, Ethiopia, 2021G.C

1. Case-☐ 2. Control ☐ Name ______________________________ Date of Data collection___________________ Address____________________________ Dormitory number______________________ Birthplace:_______________________

I. Socio-demographic Characteristics

S.N	Questions	Alternatives
1.1	Sex	1. Male 2. Female
1.2	Age	years_________ Months_________
		1. Farmer 5. Daily laborer
		2. Housewife 6. Merchant
		3. Student 7. Gov't employee
1.3	Occupation of the patient	4.Unemployed8.Other (specify)____
		1. Farmer 5. Daily laborer
		2. Housewife 6. Merchant
		3. Student 7. Gov't employee
1.4	Family Occupation	4. Unemployed 8. Other (specify)__
	Educational level of the patient	1. Illiterate 4. Secondary

		2. Read and write 5. Above secondary
1.5		3. Elementary 6. Under school age
		1. Illiterate 4. Secondary
		2. Read and write 5. Above secondary
1.6	The educational level of the family	3. Elementary
		1. Single 4. Widowed
		2. Married 5. Separated
1.7	Marital status of the patient	3. Divorced
1.8	Family size	
1.9	Is there any sick person with rash, fever, running nose in the family?	1. Yes 2. No
1.1	If yes, number of sick people	

II. Clinical History of Diseases:

2.1	What was the symptom?	1. fever
		2.Rash
		3.cough
		4.coryza (runny nose),

		5. Conjunctivitis (red eyes)
		6. Others_________
2.2	ONLY if complication	a) Pneumonia: 1. yes 2. No
		b) Cornea: 1. yes 2. No
		c) Blindness: 1. yes 2. No
		d) Convolution 1. Yes 2. No
		e) Otitis media (ear discharge): 1. yes 2. No
		f) Diarrhea: 1. yes 2. No
		g) Feeding problem 1. Yes 2. No
2.3	Date of onset of rash	_____/____/_____
	Duration of rash________	
	Date seen at health facility	____/_____/____
	Illness duration before visiting the health facility	_____________in days/hours
	Did you (he/she) take treatment?	1.Yes 2.No
	If yes, treatment taken	1.ORS
		2.Antibiotics
		3.Vitamin A
		4.Supplementary food

		5. TTC ointment
		6.Anti pyretic
		7.Others given______
2.4	Did you recover after the treatment?	1.cure
		2. partially
		3. deteriorated/disabled
		4.death

II. Clinical History of Diseases:

2.1	What was the symptom?	1. fever
		2.Rash
		3.cough
		4.coryza (runny nose),
		5. Conjunctivitis (red eyes)
		6. Others_________
2.5	ONLY if complication	a) Pneumonia: 1. yes 2. No
		b) Cornea: 1. yes 2. No
		c) Blindness: 1. yes 2. No
		d) Convolution 1. Yes 2. No

		e) Otitis media (ear discharge): 1. yes 2. No
		f) Diarrhea: 1. yes 2. No
		g) Feeding problem 1. Yes 2. No
2.4	Date of onset of rash	_____/____/_____
2.5	Duration of rash________	
2.6	Date seen at health facility	____/_____/____
2.7	Illness duration before visiting the health facility	______________in days/hours
2.8	Did you (he/she) take treatment?	1.Yes 2.No
2.9		1.ORS
		2.Antibiotics
		3.Vitamin A
		4.Supplementary food
		5. TTC ointment
		6.Anti pyretic
	If yes, treatment taken	7.Others given_____
2.1	Did you recover after the treatment?	1.cure
		2. partially
		3. deteriorated/disabled

		4.death

III. Risk factor

3.1	Did you ever vaccinate for measles?	1. Yes
		2. No
		3. Unknown
		4. Not applicable
3.2	Is there vaccination card	1. Yes 2. No
3.3		1.patientrecall____/____/__ dd/mm/yy
		2.Vaccinationcard______ ___/____/____ dd/mm/yy
	If yes last vaccination date	3. I don't remember
3.4		1.one dose
		2. two doses
	Number of vaccine doses received	3.three and above
3.5	Age at first vaccination.	1. lack of knowledge about vaccination campaign,
		2. absence during vaccination campaign,

		3. Religious exemptions
		4. other, specify
3.6	Did you have any travel history 7-18 days to areas with active measles cases before onset of symptoms?	1. Yes 2. No
3.7	If yes, (where) place of travel	1.School
		2.Neighbor
		3.Market
		4.Other________
3.8	If yes, (where) place of travel	1.School
		2.Neighbor
		3.Market
		4.Other________
3.9	Did you contact with a person with measles symptoms within the last 2- 3 weeks?	1. Yes 2. No
3.1	Do you have any travel history four days before and after rash onset	1. Yes 2. No
		If yes where _____________
3.11	Do you have any contact history with someone else four days before and after rash onset	1. Yes 2. No
		If yes with whom _____________

3.12	Do you know modes of transmission for measles	1. Yes 2. No
		3. If yes specify____________
3.13	Nutritional status of the cases/control	1. Normal
		2. Moderate
		3.Severely malnourished
3.14	What is the estimated area of the house?	____________
3.15	House condition?	1. ventilated 2. not ventilated
3.16	Distance from house to HC?	1.greater than 5 km
		2. equal or less than 5 km
3.17	Where did you go first when you get ill?	1. Health Facility
		2. Traditional Healers
		3. Holy Water
		4. Stayed at home
		5. Other (Specify)
3.18	How do you think people get measles?	1. Contact with a virus from ill person
		2. From God
		3. Bad attitude of other people
		4. Other (Specify)

3.19	Do you Know measles is vaccine preventable?	1. Yes
		2. No
		3. Don't Know
3.2	Who do you think can be affected by measles?	1. Children of aged less than 5 years
		2. Children of aged less than 18 years
		3. Women of any ages
		4. Any age groups of both male and women
		5. Other (specify): ______________________
3.21	How do you think measles can be cured?	1. Using modern medicine
		2. Using traditional Medicine
		3. Holy water
		4. By feeding nutritious foods
		5. Keeping the sick person indoor
		6. Other (Specify)_______

Annex 2

Outbreak Investigation tool for Malaria outbreak investigation Megeshi zone, Megining zone, Gambella region, Ethiopia in 2021

I. Socio-demographic information:

1. ID number of respondents______

2. Age in years_____

3. Sex: M F

4. Address: Region _______Zone_________ Woreda___________ Kebelle

_________________village_____

5. Occupation: Employed unemployed Student Pastoralist farmer

6. Total family member's ___________

7. Ethnicity: ______________

8. Religious: Orthodox, Protestant, Muslim other

9. Marital status: Married, single Widowed Divorced

10. Education status: Illiterate Primary, Secondary tertiary, non-formal

11. Case status

a) Case Yes

b) Control yes

II. Clinical presentations:

***(For case only)**

12. What was the first symptom? _____

13. When was the 1st symptom started (date of onset of symptoms)

DD/MM/YY__________

14. What were other symptoms?

a) Fever: Yes No, if yes duration of fever____ was its constant fever? Yes No

Or every other day's fever? Yes No

b) Vomiting: Yes No

c) Diarrhea: Yes No,

d) Anorexia (appetite loss): Yes No,

e) Headache: Yes No

f) Sweating Yes No

g) Chilling and shivering: Yes No

h) Weakness: Yes No

i) Caught: Yes No

j) Back pain: Yes No

k) Muscle pain: Yes No

l) Rigor: Yes No

Ask the following signs (M to Y) for complicated malaria only

m) Altered consciousness (e.g., confusion, sleepy, drowsy, comma) Yes No

n) Not able to drink or feed yes No

o) Severe dehydration, Yes No

p) Persistent fever, Yes No

q) Frequent vomiting yes No

r) Convulsion or recent history of convulsion Yes No

s) Unable to sit or stand up Yes No

t) Pallor (Anemia) Yes No

u) No urine output in the last 24 hours Yes No

v) Bleeding yes No

w) Jaundice (yellowish coloration) Yes No

x) Difficult breathing Yes No

y) Other conditions that cannot be managed at this

leve____

15. Did you visit health facilities? Yes No if yes, when did you visit health facilities?

DD/MM/YY_________

16. Did you get any treatment 1. Yes No if yes, what treatment did you get?

(a) Coartem Yes No, was it for PF Yes No

(b) Chloroquine? Yes No, was it for PV Yes No?

(c) Quinine tablets Yes No, was it for pregnant and <5 Kg? Yes, No

(d) Quinine injection Yes No, was it for sever malaria Yes No

(e) Other treatment given____________________________________

17. Did you recover completely after the treatment: Yes- No.?

18. Place of residence during 2 weeks before onset of illness_________

19. Blood samples taken: Yes- No

20. If yes Q18, what was the result: Positive negative

III. Risk Factors:

***(*For both cases and controls*)**

21. Specific living areas ______________________

22. Sleeping areas inside home ____________outside home_________

23. Do you stay outside over night? Yes- No

24. Is there anybody in your home with similar sign and symptoms? Yes- No

25. Did you travel outside your village in the past 2-3 wks Yes- No?

26. If yes Q 24, indicate

(a) Date of travel DD/MM/Y_____________

(b) The place of travel

(c) Date when you returned back DDMMYY_______

27. If Q 24 is yes, is there sick patients (same symptoms) in the place where you have been

Yes- No

28. Is there a similar sick patient in your household Yes- No

29. Do you have bed net in your household Yes- No, it is yes, how often do you use

Always Sometimes Never

30. Do mothers and children given priority of using bed nets? Yes- No

31. If yes Q 28 the number of bed nets ______

32. Was bend card sprayed this year? Yes- No

33. If yes Q31 when? _____

34. If yesQ31 how many? Once twice

IV. Environmental investigation

35. Place of stay during night? _____________

36. is there any artificial water -holding containers close to your home? Such as:

a. old tires: Yes- No

b. Plant in the containers /flowerpots Yes- No

c. plant with temporary water pools Yes- No

d. Open deep well: Yes- No

e. Broken glass bottles Yes- No

f. Cans Yes- No

g. Plastic container Yes- No

h. Gutter to collect rainwater: Yes- No

i. Uncovered water storage/ septic tank Yes- No

j. Stagnant water Yes- No

37. Presence of mosquito vectors/ mosquitoes breeding sites around the home or vicinity?

Yes- No

38. If Q36 yes, presence of larvae in breeding sites Yes- No

39. Types of houses screened yes- No unscreened Yes- No

40. Do you use repellents Yes- No

41. Protective clothing Yes- No

42. Waste collection: Yes- No

43. Unprotected irrigation Yes- No

44. Presence of Intermittent rivers cloths to the community Yes- No

45. Presence of tick grass Yes- No

V. Awareness assessment

46. Do know malaria? Sign and symptoms ---

Annexes: 3

Annex 1. Surveillance system evaluation data collection tool, in Mejininig zone, Gambella Region, Ethiopia.

Date of Interview: ----------------------------------Region ----------------------Woreda-------------

Interviewer: ----------------------- Interviewee: -------------------Responsibility: ----------------- contact Address------------------

Availability of national surveillance manual

1. Is there national guideline for PHEM at this site?

1. Yes 2. No 3. Unknown 4. Not Applicable

2. Does the district have line list, epidemic reporting form, and rumor logbook?

1. Yes 2. No 3. Unknown 4. Not Applicable

Case detection and registration

1. Do you have Integrated case search form?

1. Yes 2. No 3. Unknown 4. Not applicable

2. Do you have rumor register form at facility level?

1. Yes 2. No 3. Unknown 4. Not applicable

3. Do you have case management procedure form?

1. Yes 2. No 3. Unknown 4. Not applicable

4. Do you have SOP for overall Malaria surveillance and case management?

1. Yes 2. No 3. Unknown 4. Not applicable

Data reporting:

1. Have you lacked forms recommended for the country at any time during the last 6 months?

1. Yes 2. No 3. Unknown 4. Not applicable

2. Number of reports received in the last 3 months compared to expected number

Weekly: __________________ /12 times the number of health facilities

Immediately: ______________________/----- times the number of health facilities

On time (use national deadlines)

3. Number of weekly reports submitted on time: ____/12 times the number of health facilities

4. Number of immediately reports submitted on time: __________/3 times the number of health facilities

5. How do you report (Multiple answers are possible):

1. Mail   4. Telephone

2. Fax   5. Electronic

3. Radio   6. Others (specify)…………

6. How can reporting be improved?

____

Data Analysis:

1. Percent of sites that: Describe data by person, time, and place (case based, outbreaks, and Sentinel)

1. Yes   2. No   3. Unknown   4. Not applicable

2. Do you have an action threshold for any of the country priority diseases?

1. Yes   2. No   3. Unknown   4. Not applicable

3. If yes, what is it? _________cases ________% increase _______rate

____

4. Do you have appropriate denominators? Observe presence of demographic data at site (E.g. Population <5 yr., population by village)

1. Yes   2. No   3. Unknown   4. Not applicable

5. Who is responsible for data analysis? ______________________

6. How often do you analyze the collected data?

1. Daily 3. Every two weeks
2. Weekly 4. Monthly
5. Quarterly 6. As needed

Outbreak investigation:

1. Number of outbreaks suspected in the past 6 months: ____________

2. Observe: Of those, number investigated (Observe reports and take copies if possible): --------

3. Has your district ever investigated an outbreak?

1. Yes 2. No 3. Unknown 4. Not applicable

Epidemic Preparedness

4. Existence of epidemic preparedness and response plan at district level

1. Yes 2. No 3. Unknown 4. Not applicable

5. Do the districts have written plan of epidemic preparedness and response

1. Yes 2. No 3. Unknown 4. Not applicable

6. Has the district had emergency stocks of drugs and always supplies in past 1 year?

1. Yes 2. No 3. Unknown 4. Not applicable

7. Has the district experienced shortage of drugs, vaccines or supplies during the most recent epidemic (or outbreak)?

1. Yes 2. No 3. Unknown 4. Not applicable

8. Is there budget line or access to funds for epidemic response?

1. Yes 2. No 3. Unknown 4. Not applicable

9. Percent of districts that have an epidemic management committee

Observation: Observe minutes (or reports) of meetings of epidemic management committee

1. Yes 2. No 3. Unknown 4. Not applicable

10. Does the district have rapid response team for epidemics?

1. Yes 2. No 3. Unknown 4. Not applicable

Responses:

1. Has the district implemented prevention and control measures based on local data for at least one reportable disease or syndrome?

1. Yes 2.No 3.Unknown 4.Not applicable

2. Does the district responded within 48 hours of notification of most recently reported outbreak

(From written reports)

1. Yes 2.No 3.Unknown 4.Not applicable

3. Has epidemic management committee evaluated their preparedness and response activities during the past year? (Observe written report to confirm)

1. Yes 2.No 3.Unknown 4.Not applicable

Feedback:

1. Is there written feedback reports has the district produced in the last year?

1. Yes 2.No 3.Unknown 4.Not applicable

2. How many feedbacks bulletin or reports has the district received in the last year? _______

Supervision____

4. How many times have you been supervised in the last 6 months?

5. How many supervisory visits have you made in the last 6 months? _______

(Obtain required number of visits from central level) _________________

6. the most usual reasons for not making all required supervisory visits.

Reason 1____

Training

7. Percent of health personnel (in position of responsibility) trained in disease surveillance

8. Have you been trained on disease surveillance?

1. Yes 2. No 3. Unknown 4. Not applicable

9. If yes, specify when, where, how long, by whom?

____

10. What percent of your personnel in the district have been trained in surveillance and epidemic management? ________________________

Resources:

Percent of sites that have:

1. Logistics

1. Electricity 3. Motorcycles

2. Bicycles 4. Vehicles

2. Data management

1. Stationary 2. Calculator 3. Computer 4. Printer

3. Communication

1. Telephone service 3. Fax

2. Radio 4. Computers that have modems

4. Information Education and Communication materials

1. Posters 2. Megaphone 3. Generator 4. Screen

5. Projector (Movie) 6. Others (specify): ___________

5. Hygiene and sanitation materials

1. Spray pump 2. Disinfectant

Surveillance coordination: ____

7. Is there a surveillance co-ordination focal point within the district epidemic management committee?

8. Are you satisfied with the surveillance system?

1. Yes 2. No 3. Unknown 4. Not applicable

9. If no, how can the surveillance system be improved?

List of attributes measure		**Scale of measurement**				
8. Stability		**Strongly Agree (5)**	**Agree (4)**	**Neutral (3)**	**Strongly Disagree (2)**	**Disagree (1)**
8.1	The system is not costly as compared to the current benefit we gain from it					
8.2	The system can collect, manage, and provide data properly without failure					
8.3	The system has ability to be operational when it is needed					
9. **Usefulness**						

9.1	The current system has an ability to estimate Malaria in the facility /community					
9.2	The current system has an ability to show the trend of Malaria in the facility /community					
9.3	The current system has an ability to show the progress and effect of preventive and control methods applied against Malaria					
9.4	The current system has an ability to indicate major causes of Malaria in the health facility/community					
9.5	The current system has an ability to help the health facilities to improve clinical and ethical practices					
9.6	The system have ability to stimulate research by providing hypothesis					

Annex 5 health profile data collection tools

10.1.1. Historical Aspects of the area (Culture and tourism office).

Woreda Name______________________________

When the woreda was formed__________________________________

Any other historical aspect_______________________________________

10.1.2 Geography and Climate (including map, altitudes, agro ecological zones etc…)

Woreda map_________________________________

Location (distance and direction) _________________ ________________

Altitude _________________

Geographical coordinate

Latitude __________________________ longitude _______________________

Annual rain fall (average) ________________, annual temp (average) _______

Climatic zones_____________ (%) ___________ (%) ____________ (%)

Area of woreda__________SqKm

10.1.3. Facilities

Accessibility (main roads) ____

Type of road by size ________________

Transportation access _____________

How many people have access to fixed telephone? _____________________

How many people satisfied with the telephone service? _____________________

How many people have access to mobile phone? (Coverage)___________________

How many people get power supply_____________?

How many people satisfied power supply?

10.1.4. Woreda setup

Total number of Mender (village) _____________ Block (got) |_________

North_________________________________South__________________________

East__________________________________ West__________________________

10.1.5. Demographic information

Population: Total_________________ Male_________________ Female_____________

Woreda boundaries ____

North_________________________________South__________________________

East__________________________________ West__________________________

10.1.5. Demographic information

Population: Total_________________ Male_________________ Female_____________

Sex ratio_____________

Under1yr_____________1-4yrs_____________5-15Yrs_____________16-49yrs-------------------------50-

64yrs----------------------≥65years______________

Population pyramid type ___________________

Age	Sex (No.)			Remark
	Male	Female	Total	
<1				
1-5				
6-14				
15-24				

25-34				
35-49				
50-64				
> 65				

Age distribution

Women 15_49 years of age_______________ Total population by Kebele (each Kebele pop) ------

10.1.6. Ethnic

Oromo________________ ______ %), Amhara_____________ _____ %),

Tigre__________________ %), Garage___________________ %) Others___%

Religion

Orthodox _________________ %), Muslim__________________ %),

Protestant____ %) Other _______________________ %)

10.1.8. Economy (mainstay of the economy, average income levels etc.)

Main income sources

Different business__ (No.), Employee____ (No.) Jobless____ (No.)

Average income per HH/year_________

Education and school Health

Number of educational institutions

College/ TVET_____, High school______, Medium _____Elementary ___K.G.___ not attended formal education

School health activities:

Water supply: schools with water supply_______

Toilets: schools with functional latrines (male and female) _______

Schools with HIV/other Health clubs_____________

	Government		Private			Remark
	Male	Female	Male	Female	Total	
Master and						
Above						
Degree						
Diploma						
Certificate						
Supportive						
Staffs						

Infrastructure for health Facilities (Transport, Telecommunication, Power supply, water supply…)

How many of the health centers have access to?

Transportation___________ %), Telecommunication___________ %),

Electric power____________ %), Water supply ___________ %)

Character tics Frequency Percentage

Transport

- ✓ Accessibility main road___________
- ✓ Type of road_______________
- ✓ How many ketena access to transport ____________
- ✓ Flow of the transport per day_______________
- ✓ Telecommunication__________________
- ✓ How many people accessed to
- ✓ Fixed telephone________________________
- ✓ How many people accessed________________
- ✓ Mobile phone? (Coverage)________________
- ✓ How many satisfied with the____________________
- ✓ Telephone service? _______________
- ✓ Safe water coverage___________________
- ✓ Woreda getting safe water_______ _____ %)
- ✓ Population getting safe water______________________ %)
- ✓ Main source of water___________________________

Sanitation

- ✓ Latrine coverage------------------------ latrine utilization rate-----------

Solid waste management----------------liquid waste management------------Other-------

Health delivery system

s.n	Type of Health facility	Government	Private	NGO	Total	Remark
1	Health post					
2	Health center					
3	Medium clinic					
4	Higher clinic					

5	lower clinic					
6	General Hospital					
7	Referral Hospital					
8	Special clinic					
9	Cultural clinic					
10	Diagnostic laboratory					
11	Pharmacy					
12	Drug store					
13	Total					

Health institution to population ratio:

Hospital: Pop______________ HC: Pop____________

Human recourse for health sector

s.n	Type of professional	Government	Private	NGO	Total	Remar
1	Specialist doctor					
2	General practitioner					
3	Health officer					
4	Professional Nurse					
5	Clinical Nurse					

6	Public nurse					
7	Laboratory technician/technologist					
8	Pharmacist/Druggist					
9	Midwifery					
10	Radiologist					
11	Dentist					
12	Urban HEWs					
13	HEW supervisor					
14	Anesthetist					
Total						

Top ten pediatrics causes of morbidity at OPD level

S. N	Adults	# of cases	%	Pediatrics/< 5 years	# of cases	%
1						
2						
3						
4						
5						

6						
7						
8						
9						
10						

Vital Statistics and Health Indicators

Infant Mortality Rate (IMR) __________ (total <1 yr. deaths this 2016 yr._______

Child Mortality Rate______________ (this year's total <15 yr. deaths______

Crude Birth Rate_________

Crude Death Rate__________ (total deaths 2016 yr.____

Maternal Mortality Rate___________ (2016 total maternal deaths______

Contraceptive Prevalence rate______________

Contraceptive acceptance rate _________

ANC rate (how many of the total expected pregnancies attended 1st ANC) ________

ANC rate (how many of the total expected pregnancies attended 4th ANC) ________

Percentage of deliveries attended by skilled birth attendants_________

How many post-natal cares done-------------------------------

How many PNC done at facility level and home______________?

10.2.7. Immunization Coverage (for children and Women);

BCG _______ %). OPV0________ %), OPV1_____ ___ %), OPV3______ ___ %)

Measles ________ %). Penta1_____ ___ %). penta2 ________ %) penta 3_________ %)

PCV-1_______ %), PCV-3_________ %), TT2+P.W_______ %), TT2+ N.P.W________ %)

SIAs______________

Health budget allocation:

Government

Total budget allocated for the woreda ______________

Total budget allocated for health ________ %)

Funds from NGO

Total ___________ (purpose/programs) ____________________

Emergency in the woreda

Was there any emergency (natural or manmade) in the woreda in the last one year? ________

Any recent disease outbreak/other public health emergency_____________________

If yes, cases________ and deaths__________

Community Health Services.

Status of services provided by community health workers namely

No. of WDA ____________________________________

No. of 1to 25 WDA_________________

No. of 1to 5 WDA_________________

Status of Primary Health Care Components – with focus on the eight PHC elements and MDG.

MCH (Delivery, ANC, PNC) ____

FP ____

EPI (outreach service, cold chain, vaccine):________________________

Environmental Health and sanitation---

Latrine coverage____________________ and utilization rate________________

Safe water supply coverage______________

others____

Health Education (what, when, where how and who conducted health education)

On what____

When ____

Where____

How____

Who conducted____

Endemic diseases.

Malaria:

Total cases/yr.______ deaths/yr.________, <5yr cases_____ deaths________

Malaria supplies (Coartem, RDT, etc.) shortage ___________________

Other issues____

TB/Leprosy

Total TB cases________ PTB negative_______ PTB positive_____ Extra PTB ________

TB detection rate _____________

TB Rx completion rate _________ TB cure rate _____________

TB Rx success rate __________________

TB defaulter___________

Death on TB Rx_________

Total TB patients screened for HIV______________

Total Leprosy cases_____________ on Rx_________

HIV/AIDS.

Total people screened for HIV (HCT) (last one year) ________________

HIV prevalence______________

HIV Incidence (new cases/yr)____________

Total PLHA_____________________________

On ART____________ on Pre-ART_________

10.2.13. Nutrition (malnutrition related OTPs, SC, TSF activities)/HO and Early warning

Total OTP sites______, total admissions to OTP/yr._______

Total SC sites, _______, newly opened/yr.______, total admissions to SC/yr.________

Is there TSF (targeted supplementary feeding) program in the woreda_____?

Essential drugs (shortage):-______

Annex5: IDP Assessment check list

Name of respondent: ___________________________Pre-disaster address: ________

Post-disaster address: ________________

I. Disaster
1.1. Cause of IDP: Flood Conflict Drought Land slide
1.2. Number of persons displaced___________________ Male__________Female________
1.3. Home affected (households)_____________
1.4. Number of pregnant women_______1.5. Number of lactating women -----------
1.5. Number of under five children___________________
1.6. Number and type of health facility destroyed__________
1.7. Number of other public services partially or destroyed_______
Essential health services
1.8. Number of pregnant mothers receive ANC services

1.9. Number of deliveries attend by skilled health professionals
1.10. Number of women receive PNC services
1.11. Number of women in reproductive age group receive contraceptives
1.12. Number of illegible children received BCG
1.13. Number of illegible children received Pent1
1.14. Number of illegible children received Pent3
1.15. Number of illegible children received Measles
1.16. Number of sick children treated for Pneumonia
1.17. Number of sick children treated for Diarrhea
1.18. Number of under 5 children screened for malnutrition
1.19. Number of under 5 children identified us MAM__________SAM_____
1.20. Children enrolled to SC________OTP________
1.21. Number of Stabilization center (SC)____________OTP center _______SF______
1.22. Number of PLW screen for malnutrition _____________MUAC<23_____________>=23___________
1.23. Water source for domestic use
1.24. Number of tankers
1.25. Amount of water supplied per day
1.26. Number of hand washing facility available_______________
1.27. Hand washing materials distributed___________

1.28. Type and number of latrines constructed_______
1.29. Health facility available hospital:_______Health center:______Health post:____ Mobile health and nutrition team(MHNT)_______

Observation check list

2.1. Observe the overall situation of the IDP site (environmental sanitation, latrine utilization, open defecation, waste disposal situation, etc.)

2.2. Observe source of water and determine its situation

2.3. Observe distribution condition of water at delivery point (fair distribution, queue times, priority for elderly and disability, distance from homes, etc.)

2.4. Observe utilization of hand washing facilities (presence of hand washing facilities, soap, utilization status, etc)

2.5. Observe Health service delivery condition (number of teams, professional mix, frequency and composition of service, etc)

2.6. Observe the availability of essential drugs and emergency drug kits at store and service delivery point or dispensary

2.7. Observe registration and report formats

2.8. Ask about general condition of the site (Local leader, community members, service providers, etc.)

2.9. Remembering that many people need help; does the family require any of the following?

Type of goods Quantity a. Blankets_____ b. Bedding_____ c. Plastic Tarp_____ d. Flashlights/lanterns______ e. Storage boxes f. Clothing for adults___ g. Clothing for children___ h. others ___ Fuel

17. What type of cooking and heating fuel did you use before the disaster (circle all that apply)?

A. Gas supplied by gas line B. Bottled gas C. Kerosene D. Firewood E. Other

18. If (a) or (b), is any gas leaking now? Yes No

19. If (a), has gas service been restored to your line? Yes No

20. What type of sanitary facilities did you have before the disaster (circle all that apply)? A. Flush toilet in dwelling B. Communal flush toilet in building C. Access to public toilets D.Pit latrine (earthen) E. Other ___

21. If (a) or (b), is the toilet working now? Yes No

22. Will the family require assistance for any of the following (circle all that apply) a. Temporary shelter b. Building materials/tools for shelter c. Building materials/tools for housing repair?

Annex 6. Project proposal questionnaire

Study Title: Assessment of Ownership, utilization, and association factor of long-lasting insecticidal nets in the rural community of Gambella zuria district, Gambella region, Ethiopia: A community based cross-sectional study –April 2021.

Please answer the following questions as accurately as you can.

General Information

1) Name of data collector………………………………………………….
2) Date……………/………………/………………
3) Informed consent obtained………………… (Yes/No)

Section 1: **Information about the household (head of household or adult > 18 years)**

4) What is the highest level of education of the head of the household? 1-. Primary school 2-Secondary school 3-Higher education 4-Other, specify………………...?
5) How many sleeping rooms do you have in your household ……………….?
6) Do your household have bed nets………………… (Yes/No)
7) If yes (Q no 6) how many………..?
8) If yes for Q no 6, where did you get your bed net?

    1-ANC   3-mass distribution

    2-Bought   4-Oher, specify................

9) When was the net obtained?

    1-<1 month, 2- <3month, 3-<6month, 4-<1 yrs. 5->1yrs

Section 2: Status of the bed net

10) Have you impregnated the bed net since you last obtained it ………………? (Yes/No)
11) If yes when was this………. 1-<1month, 2- <3month, 3-<6month, 4- <1 yrs. 5->1yrs
12) What is your bed nets used for?
    1- Use to sleep under the net
    2- Still in package
    3- Used for other purpose, specify…………….............
13) If your answer for Q no 12 is choice (2), can it be used for sleeping under it.......................? (Yes/No)
14) If No, why this net is no longer available for sleeping under it in the household?

    1-Net was damaged and thrown away

    2-Net was given away to others

    3-Net was stolen

    4-Net was sold

15) How many months ago did this net become unavailable for sleeping under in the household? 1-.0–6 months, 2-.> 6 months, 3-Don't know

16) What the nature of your bed net is under used…………1- good, 2-Torn 3. Others…………

Section 3: Bed net use and handling

17) When did you start using net…...? (1- Before the massive distribution of bed nets in 2011, 2-After the distribution of bed nets in 2011)

18) Who are those using the net…………………… 1-<5yrs, 2-5 to15yrs, 3->15yrs 4-sex….M………? F, 5-everybody in the household.

19) Was this net used last night to sleep under…...? (Yes/No)

20) If No, why was this net not used last night……….1-Too hot 2-Do not like the smell 3-Feel "closed in" 4-No malaria now 5-No mosquitoes 5-The net is too torn or old 6-Used another net 7-User did not sleep her 8- Don't know

21) During which periods of the year is this net used to sleep under……. 1... All year, 2....Only the rainy seasons, 3....Only the dry season, 4 ....Do not know

22) Do you tuck the net in at night..? (Yes/No)?

Section 4: Morbidity Monitoring Questionnaire

Site Name	Household number	Number of individuals in the household	Date of visit	Participant status	
				Number using nets	Number not using nets

1) In the past week, how often did you used the bed net……. 1-Every night (7 nights),2-Most nights (5–6 nights) 3-Some nights (1–4) 4-Not used at all (0 nights) 5-Do not know
2) Did all those using bed net slept under the net last night……………………. (yes/No)
3) If no who are those who didn't …….1-children, -<5yrs 2-children 5-15yrs 3-adult >15yrs
4) If no for 2 why did they not use the net…………1-Too hot 2-No malaria now 3-No mosquitoes now 4- Don't know
5) Has any person had fever after our last visit…………………….………………(Yes/NO)?

6) If yes did the person report to the Hospital ………………………………………. (Yes /No)
7) If yes for 6 check his/her hospital data to see the cause of fever………… (1=malaria 2=others)

If auto medication taken, what medication was taken……..… (1=Anti malaria, 2= others