ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCES SCHOOL OF PUBLIC HEALTH DEPARTMENT OF PREVENTIVE MEDICINE

ETHIOPIAN FIELD EPIDEMIOLOGY TRAINING PROGRAM

Compiled Body of works in Field Epidemiology

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June, 2019

Addis Ababa

Addis Ababa University College of Health Sciences

School of Public Health

Ethiopia Field Epidemiology Training Program (EFETP)

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Submitted to the School of Graduate Studies of Addis Ababa University in partial fulfillment for the degree of Master of Public Health in Field Epidemiology

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Abbreviations/ Acronyms

AAU	Addis Ababa University
AIDS	Acquired Immunodeficiency Disease Syndrome
ANC	Antenatal care
AOR	Adjusted Odd Ratio
API	Annual Parasite Incidence
AR	Attack Rate
ART	Anti-Retroviral Therapy
ASAR	Age Specific Attack Rate
BPR	Business Process Re-engineering
CBN	Community Based Nutrition
CDC	Center for Disease prevention and Control
CFR	Case Fatality Rate
CHA	Community Health Agent
CHP	Community Health Promoter
CI	Confidence Interval
COR	Crude Odd Ratio
CRF	Case Based Reporting Format
CSF	Cerebro spinal fluid
EC	Ethiopian Calendar
ECDC	European Centre for Disease Prevention and Control
EFETP	Ethiopia Field Epidemiology Training Program
EFY	Ethiopian Fiscal Year
EPHI	Ethiopia Public Health Institute
EPI	Expanded Program on Immunization
ETB	Ethiopian Birr
EU	European Union
FETP	Field Epidemiology Training Program
FMOH	Federal Ministry of Health

FSZ	Finfinne Special Zone
GC	Gregorian calendar
GTS	Global Technical strategy
HAD	Health Development army
HEW	Health Extension Workers
HH	Household
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
HP	Health Posts
IDP	Internally Displaced Peoples
IDS	Integrated Disease Surveillance
IDSR	Integrated Disease Surveillance and Response
IEC	Information, Education and Communication
IHR	International Health Regulation
IMR	Infant Mortality Rate
IOM	International Organization for Migration
IPD	Inpatient Department
IR	Incidence Rate
IRS	Indoor Residual Spray
IRS	Indoor Residual Spraying
ITN	Insecticide Treated Net
LLIN	Long Lasting Insecticide Treated Net
MCH	Maternal and Child Health
MCP	National Malaria Control Programmes
MDSR	Maternal Death Surveillance and Response
MenA	Serogroup A meningococcal meningitis
MenB	Serogroup B meningococcal meningitis
MHNT	Mobile Health and Nutrition Team
NGO	Nongovernmental Organization
NMSP	National Malaria Strategic Plan

OPD	Outpatient Department
OR	Odd Ratio
ORHB	Oromia Regional Health Bureau
ORS	Oral Rehydration Salt
OSZSF	Oromia special Zone Surrounding Finfinne
OTP	Outpatient Therapeutic program
PCR	Polymerase chain reaction
PF	Plasmodium falciparum
PHCU	Primary Health care unit
PHEM	Public Health Emergency Management
PICT	Provider Initiated Counseling Testing
PLW	Pregnant and Lactating Women
PLWHA	People Living With HIV/AIDS
PSNP	Productive Safety Net Program
PV	Plasmodium vivax
PVP	Predictive value positive
RBM	Roll Back Malaria
RDT	Rapid Diagnostic Test
RNA	Ribonucleic Acid
RRT	Rapid Response Team
SC	Stabilization center
SD	Standard Deviation
SES	Socio Economic Status
SIA	Supplementary Immunization Activities
SNNPR	Southern Nations, Nationalities and Peoples Region
SPSS	Statistical Package for Social Sciences
TB	Tuberculosis
TBA	Traditional Birth Attendant
TSF	Targeted Supplementary Food
TTBA	Trained Traditional Birth Attendant

UNHCR	United Nations Higher Commission for Refugees
US	United States of America
USD	United States Dollar
VCT	Voluntary Counseling and Testing
WASH	Water Sanitation and Hygiene
WHA	World Health Assembly
WHO	World Health Organization
WRF	Woreda Reporting Format

Executive Summary

This document contains all the work expected from Field Epidemiology trainee in Addis Ababa University School of Public Health for fulfillment of Master of Science Degree in Field Epidemiology. Starting from October 2017 to end of April 2019, I have been in Ethiopia Field Epidemiology Training Program, School of Public Health Addis Ababa University and Oromia Regional Health Bureau Field Base. We have carried out two outbreak investigation, One surveillance data analysis, one surveillance system evaluation, one district health profile description, two scientific manuscript for peer reviewed journals, two abstracts for scientific conferences, one Disaster Narration, one epidemiological research proposal and additional outputs like training for health professionals and weekly bulletin preparations.

Chapter I: we conducted two measles outbreak investigations. We identified 82 measles cases with no deaths in Dawe Serer district of Bale Zone with overall attack rate of 0.49%. Only 7(8.5%) was vaccinated. Travel history to measles affected area and contact with measles cases were identified risk factor by case control study. Increasing routine vaccination and mass vaccination of less than 15 years of age was recommended.

We identified 280 measles cases and 5 deaths in Hawi Gudina district of West Harerge zone with overall attack rate of 3.8 per 1000 populations and Case fatality rate of 1.8%. Majority 149(53.2%) was not vaccinated and district measles vaccination coverage was 67% in 2018. Low vaccination coverage was cause of outbreak and we recommend increasing routine vaccination and supplemental immunization activities for under 15 years age groups.

Chapter II: we analyzed surveillance data of meningococcal meningitis of Oromia Region from 2013-2017. We identified 2665 cases and 74 deaths and incidence rate was 1.57 per 1000 population with case fatality rate of 2.78%. We recommend strengthening routine surveillance system and aligning the PHEM and monthly HMIS reports.

Chapter III: we conducted malaria, measles and MDSR surveillance system evaluation in Oromia Special zone Surrounding Finfinne at 13 sites from December 06-21, 2018. The system was found to be useful, representative and flexible. Preparing Emergency Preparedness and Response Plan, conducting supportive supervision and Restoring function of committees are important to sustain the system on track.

Chapter IV: we prepared health profile description of Berek district of Oromia Region from February 12-24, 2018. Leading cause of morbidity in all ages was Acute upper respiratory infection 2833 (26.12%) and in < 5 years children was Diarrhea (non bloody) 1383 (39.82%).

Chapter V: we prepared scientific manuscripts for peer reviewed journals on meningococcal meningitis surveillance data analysis of Oromia Region, Ethiopia 2013-2017

Chapter VI: we prepared two abstracts for scientific conferences on measles outbreak investigation and response in Dawe Serer District of Bale Zone Oromia Region Ethiopia 2019 and meningococcal meningitis surveillance data analysis of Oromia Region, Ethiopia 2013-2017.

Chapter VII: we conducted Internally Displaced Population health need assessment in Meda Welabu District of Bale zone Oromia Region Ethiopia from April 12 to 25, 2019.

Chapter VIII: One epidemiologic research project proposal was prepared on LLIN utilization status and Malaria surveillance system evaluation in Sebeta Haws District, Oromia Region, Ethiopia 2019. We will conduct a community based cross sectional study on 616 households for LLIN utilization and institution based on system evaluation at 12 sites. It was estimated to cost 2978 USD. We have got award from Presidents Malaria Initiative to conduct study so we will start study as soon as fund was released by organization in the near future.

Chapter IX: we gave training on basic PHEM for zonal, district and health facility level PHEM focal persons who came from two zones and two town health offices.

We had prepared 5 Weekly epidemiologic bulletin of Oromia regional Health Bureau. The bulletin serves to summarize weekly surveillance data and performance of the region on epidemic prone diseases and other public health emergencies and to give feedback to the reporting agencies. We have attached weekly bulletin prepared on week 01, 2019 as a sample among others.

Chapter one

Outbreak Investigations

1.1. Measles Outbreak Investigation and Response in Dawe Serer District of Bale Zone Oromia Region Ethiopia, January 2019

Abstract

Back ground: - Measles is highly contagious and serious viral disease causes death among young children globally, despite the availability of a safe and effective vaccine. However measles outbreak is still a public health problem in different Ethiopian regions including Oromia. Among 20 districts in Bale zone Dawe Serer district was affected with measles outbreak from early December 2018 to end of January 2019. The Oromia Regional Health Bureau assigned a team which investigate and respond to measles outbreak in the area.

Methods: - We conducted descriptive and unmatched 1:2 case control study of 38 cases and 76 controls in Dawe Serer district from January 15-28, 2019. Cases were selected based on WHO case definition from line lists and controls from their neighbors. Structured questionnaire was used to interview participants and discussions were held with key informants' about cold chain management and Vaccination coverage. Micro soft office Excel, Epi Info 7.2.1.0 for and SPSS 23 used for data entry and analysis.

Result: - A total of 82 cases with no death identified in 5 kebeles with over all attack rate of 0.49 %. Most of them were age group ≥15 years old 46 (56.1%) and 47 (57.3%) are males. Only 7 (8.5%) were vaccinated. Travel history to measles affected areas and contact with measles case were risk factor for developing a disease AOR 9.79[95% CI= 2.25-42.52, P= 0.0023] and 4.41[95% CI= 1.44-13.49, P= 0.0092] respectively. Being vaccinated was protective factor from developing a disease AOR 0.09 [95% CI= 0.02-0.32 P= 0.0002]. Case management, Active case search and Health Education was conducted to control outbreak.

Conclusion and Recommendation: - Travel history to measles affected area was the cause of the outbreak while low measles vaccination coverage facilitated spread of the disease in the district. Increasing routine vaccination coverage and mass vaccination for <15 years children is crucial.

Key words: Measles outbreak, Dawe Serer, Case Control, Oromia

Measles Outbreak Investigation and Response in Dawe Serer District of Bale Zone Oromia Region Ethiopia, January 2019

1.1.Introduction

1.1.1. Background

Measles is an acute, highly contagious and serious viral disease. It remains an important cause of death among young children globally, despite the availability of a safe and effective vaccine. It is caused by a single-stranded, enveloped RNA virus with 1 serotype, classified as a member of the genus *Morbillivirus* in the *Paramyxoviridae* family. The virus is sensitive to ultraviolet light, heat, and drying. It remains active and contagious in the air or on infected surfaces for up to 2 hours. Humans are the only natural hosts of measles virus (1, 2).

It is spread by coughing and sneezing, by close personal contact or direct contact with infected nasal or throat secretions. It can be transmitted by an infected person from 4 days prior to the onset of the rash to 4 days after the rash erupts. Measles outbreaks can result in epidemics that cause many deaths, especially among young, malnourished children (3).

The incubation period is 10–12 days from exposure to the onset of fever and other nonspecific symptoms and 14 days (with a range of 7–18 days), from exposure to the onset of rash. Infectivity is greatest three days before rash onset. Secondary attack rates among susceptible household contacts have been reported to be 75%–90% (4).

Infected person shows prodromal symptoms of fever, malaise, cough, coryza, and conjunctivitis. Koplik's spots may be seen on the buccal mucosa in over 80% of cases up to 2 days before rash onset. Within 2-4 days of the prodromal symptoms, a rash made up of large, blotchy red spots (maculo-papular rash) appears behind the ears and on the face accompanied with a high fever. The rash spreads to the trunk and extremities and typically lasts 3 - 7 days, then disappears in the same order as its appearance (4, 5).

In about a third of the cases, measles is followed by at least one complication caused by disruption of epithelial surfaces and immune suppression. These include pneumonia, ear and sinus infections, mouth ulcers, persistent diarrhea, and upper airway obstruction from croup. Less common complications include corneal drying that could progress to ulceration and blindness, protein energy malnutrition, convulsions and brain damage (1, 4, 5).

Routine measles vaccination for children or combined with mass immunization campaigns in countries with high case and death rates, are key public health strategies to reduce global measles deaths (1, 5). In 2012, the WHA endorsed the Global Vaccine Action Plan with the objective to eliminate measles in 4 of the 6 WHO Regions by 2015 and in 5 Regions by 2020. Member States in all WHO Regions have adopted measles elimination goals to be reached by or before 2020 (6).

In 2017, there were 110,000 measles deaths globally, mostly among children under the age of five. Global measles deaths have decreased by 80% from an estimated 545,000 in 2000 to 110,000 in 2017 (3). As of 2013, it was estimated that, measles caused some 40,000 deaths annually in the African Region. Measles remains among the top causes of death in children less than 5 years of age in many African countries (5).

In Ethiopia in 2013, measles incidence was 7.2 cases per 100,000 populations and there were 243 confirmed measles outbreaks in 192 districts. A seasonal pattern of occurrence of measles has been observed over the years, with increased number of measles cases during the late-early part of the year (December to February). Due to the low sub national routine measles coverage and prevailing poor living and nutritional conditions, measles outbreaks continue to occur frequently in different parts of the country, most especially in Oromia and SNNPR Regions where the density of the population is relatively high (7).

In Oromia Region from July, 2017 to June 2018 there were 577 measles cases and 3 deaths reported via weekly PHEM reports with highest cases from 88 (15.3%) West Guji, 64 (11.1%) Borena and 64 (11.1%) West Harerge zones (8). The regional health bureau assigned a team which the aim was to confirm existence of measles outbreak, identify risk factors, prevent and control the outbreak by taking necessary intervention measures in Dawe Serer district Bale Zone of Oromia Region Ethiopia.

1.1.2. Statement of the Problem

Measles is a highly contagious, serious disease caused by a virus. Before the introduction of measles vaccine in 1963 and widespread vaccination, major epidemics occurred approximately every 2–3 years and measles caused an estimated 2.6 million deaths each year. While global measles deaths have decreased by 84 percent worldwide in recent years from 550,100 deaths in 2000 to 89,780 in 2016 measles is still common in many developing countries, particularly in parts of Africa and Asia. An estimated 7 million people were affected by measles in 2016. The overwhelming majority (more than 95%) of measles deaths occur in countries with low per capita incomes and weak health infrastructures (1).

Approximately 110,000 people died from measles in 2017, mostly children under the age of 5 years, despite the availability of a safe and effective vaccine (3). By the end of 2015, the African Region has documented 85% reduction in measles deaths as compared to measles mortality estimates for the year 2000 (9).

Among the estimated 20.8 million infants who did not receive the first dose of measles vaccine in 2015, 53% resided in 6 countries: India (3.2 million), Nigeria (3 million), Pakistan (2 million), Indonesia (1.5 million), Ethiopia (0.7 million) and the Democratic Republic of the Congo (0.6 million) (6).

In Ethiopia, Measles incidence increased from 20 cases per million total populations in 2006 to 194 cases per million in 2015 and declined to 49 per million in 2016 (10). The expected case-fatality rate is between 3% and 6%; the highest case-fatality rate occurs in infants 6 to 11 months of age, with malnourished infants at greatest risk. In certain high-risk populations, case-fatality rates as high as 30% have been reported in infants aged less than 1 year of age (4).

Oromia region is one of highly affected region with measles outbreak. In 2010 EFY (from July, 2017 to June 2018) there were 577 measles cases and 3 deaths reported via weekly PHEM reports with highest number of cases from West Guji 88 followed by Borena and West Harerge Zones that equally reported 64 cases (8). Starting from WHO Week 44, 2018 the measles outbreak started to occur in different districts of East Harerge, West Harerge, West Wollega, Bale, Arsi, South West Shoa, North Shoa and Arsi Zones. In most of zones there is ongoing outbreak of measles. This year in Bale Zone measles outbreak first occurred in WHO Week 47,

2018 in Goro district then spread to Ginnir, Ginnir Town, Sawena, Lege Hidha and Dawe Serer districts.

Significance of the study

Measles outbreak is the ongoing public health problem in different parts of the world including our country Ethiopia. Oromia regional state is among the regions which are highly affected by measles outbreak in the country. Due to highly contagious nature of the measles disease it is important to early investigate the occurrence of the outbreak and start early intervention. Based on this Oromia Regional Health Bureau deployed a team to the area which confirm the existence of the outbreak, identify risk factors and take necessary interventions to control outbreak. The result obtained from this investigation is useful to plan necessary intervention to prevent future occurrence of outbreak in the district and zone.

1.2.Literature Review

Pathogenesis

Measles is a systemic infection. The primary site of infection is the respiratory epithelium of the nasopharynx. Two to three days after invasion and replication in the respiratory epithelium and regional lymph nodes, a primary viremia occurs with subsequent infection of the reticuloendothelial system. Following further viral replication in regional and distal reticuloendothelial sites, there is a second viremia, which occurs 5 to 7 days after infection. During this viremia, there may be infection of the respiratory tract and other organs. Measles virus is shed from the nasopharynx beginning with the prodrome until 3 to 4 days after rash onset. The incubation period is approximately 10–12 days from exposure to the onset of fever and other nonspecific symptoms and 14 days (with a range of 7–18 days),from exposure to the onset of rash. Measles can be transmitted from four days before rash onset (i.e., one to two days before fever onset) to four days after rash onset. Infectivity is greatest three days before rash onset. Measles is highly contagious. Secondary attack rates among susceptible household contacts have been reported to be 75%–90%. Due to the high transmission efficiency of measles, outbreaks have been reported in populations where only 3% to 7% of the individuals were susceptible (4).

Complication

In about a third of the cases, measles is followed by at least one complication caused by disruption of epithelial surfaces and immune suppression. These include pneumonia, ear and sinus infections, mouth ulcers, persistent diarrhea, and upper airway obstruction from croup (laryngo-tracheo-bronchitis). Less common complications include corneal drying that could progress to ulceration (keratomalacia) and blindness, protein energy malnutrition, convulsions and brain damage. Complications are more common in young children below 5 years of age and complication rates are increased in persons with immune deficiency disorders, malnutrition, vitamin A deficiency, and inadequate vaccination. Immuno-compromised children and adults are at increased risk for severe infections and super infections. Unless managed early and aggressively, these complications may lead to death within the first month after the onset of rash. The case fatality from measles is estimated to be 3 – 5% in developing countries but may reach more than 10% in outbreaks especially when it is compounded by malnutrition (1, 4, 5).

Case fatality Rate

In Ethiopia, the expected case-fatality rate is between 3% and 6%; the highest case-fatality rate occurs in infants 6 to 11 months of age, with malnourished infants at greatest risk. These rates may underestimate the true lethality of measles because of incomplete reporting of outcomes of measles illness. In certain high-risk populations, case-fatality rates as high as 30% have been reported in infants aged less than 1 year of age. Malnutrition (including vitamin A deficiency), underlying immunodeficiency and lack of access to medical care are all factors leading to the high case-fatality rates observed in many parts of the world (4).

As of 2013, it was estimated that, measles caused some 40,000 deaths annually in the African Region. Measles remains among the top causes of death in children less than 5 years of age in many African countries. Before the widespread availability of measles vaccine, virtually all children contracted the disease (5).

Vaccination

Routine measles vaccinations for children, combined with mass immunization campaigns in countries with high case and death rates, are key public health strategies to reduce global measles deaths. Two doses of the vaccine are recommended to ensure immunity and prevent outbreaks, as about 15% of vaccinated children fail to develop immunity from the first dose. Global measles deaths have decreased by 80% from an estimated 545,000 in 2000 to 110,000 in 2017 due to measles vaccination. In 2017, about 85% of the world's children received one dose of measles vaccine by their first birthday through routine health services up from 72% in 2000. During 2000-2017, measles vaccination prevented an estimated 21.1 million deaths making measles vaccine one of the best buys in public health. In 2017, 67% of children received the second dose of the measles vaccine (3).

Efforts to eliminate measles

In 2010, the World Health Assembly (WHA) identified 3 milestones for measles control by 2015: (1) increased routine coverage with the first dose of measles-containing vaccine for children 1 year of age to ≥90% nationally and ≥80% in every district; (2) reduction in global annual measles incidence to <5 cases per million population; and (3) reduction in global measles mortality by 95% from the 2000 estimate. In 2012, the WHA endorsed the Global Vaccine

Action Plan with the objective to eliminate measles in 4 of the 6 WHO Regions by 2015 and in 5 Regions by 2020. Member States in all WHO Regions have adopted measles elimination goals to be reached by or before 2020 (6).

Shift of affected age groups

In Ethiopia epidemiologic data from the past several years show a decreasing proportion of measles cases in children under 5. This age group made up 56 % of measles cases reported in 2008 but only 30% of cases in 2014 (7).

Risk factors and causes of outbreaks

The risk factors for measles virus infection include: infants who lose passive antibody before the age of routine immunization, children with vitamin A deficiency and immunodeficiency due to HIV or AIDS, leukemia, alkylating agents, or corticosteroid therapy, regardless of immunization status and children who travel to areas where measles is endemic or contact with travelers to endemic areas (1, 4).

Outbreaks of measles occur due to many factors. The U.S. experienced 17 outbreaks in 2018 due to an increase in the number of travelers who get measles abroad and bring it into the U.S., and/or further spread of measles in U.S. communities with pockets of unvaccinated people (11).

The study conducted in October 2016 on the measles outbreak occurred in Mayuge District, Eastern Uganda with showed that over all attack rate [AR] = 4.0/10,000), while children <5 years were the most affected (AR=14/10,000). Thirty-two percent (13/41) of case-persons and 13% (21/161) of control-persons visited water-collection sites (by themselves or with parents) during the case-persons' likely exposure period (ORM-H =5.0; 95% CI=1.5–17). Among children aged 9–59 months, the effectiveness of the single-dose measles vaccine was 75% (95% CI=25–92); vaccination coverage was 68% (95% CI=61–76) (12).

The measles outbreak investigation conducted in Zimbabwe in 2010 revealed that contact with a measles case [AOR= 41.14, 95% CI (7.47-226.5)], being unvaccinated against measles [AOR= 3.96, 95% CI (2.58-6.08)] and not receiving additional doses of measles vaccine [AOR 5.48, 95% CI (2.16-11.08)] were independent risk factor for contracting measles. Measles vaccination

coverage for Zaka district was 75% and the median duration for seeking treatment after onset of illness was three days (Q1=2; Q3=7) (13).

The investigation done in Kyegegwa District in September 2015 disclosed that under 5 case-fatality rate was 25% , no history of vaccination against measles was found in 94% among the case-persons (i.e., measles patients who died) and 54% among the controls (i.e., measles patients who survived) (ORM-H = 12; 95% CI = 1.6–104), while 56% of case-persons and 67% of controls (ORM-H = 2.3; 95% CI =0.74–7.4) did not receive vitamin A supplementation during illness. 63% among the case-persons and 6.3% of the controls (ORM-H = 33; 95% CI = 6.8–159) were not treated for measles illness at a health facility (a proxy for more appropriate treatment), while 38% of the case-persons and 25% of the controls (ORM-H = 2.5; 95% CI = 0.67–9.1) were malnourished (14).

Measles outbreak investigation in 2016 in Kebridahar District, Somali Regional state of Ethiopia found that the overall attack rate was 0.4/1,000 with zero case fatality. From the total cases, 51% were male and 49% were female, 55% of cases were 5-14 years age group. 61% of the cases and 24% of the controls didn't ever receive vaccination for measles. Cases that had contact history with another confirmed measles case (AOR=3.5, 95% CI (5.9, 21.4)); presence of measles case (s) in the neighboring household and or within the household (AOR=14.5, 95% (3.0, 7.0)) and (AOR=9.5, 95% CI (1.8, 4.8)) respectively and not vaccinating children from measles virus (AOR=5.6, 95% CI (1.3, 2.4)) were significantly associated with the outbreak (15).

Study conducted in 2011 in Harena and Dawe Serer districts of Bale zone Oromia Ethiopia revealed that over all case fatality rate (CFR) was 9.1%, in Dawe Serar 15.7 % and 2.9% in Herena and higher among females than males (12.2% vs. 6.1%). All deaths and 42.6 % of the cases were not vaccinated against measles. Vaccination coverage was 45.4% in Dawe-Serer and 54% in Herena. The attack rate was highest among those 15 years of age. About 71% refrigerators used for vaccine-storage were not functional (16).

The study in Guji zone Oromia Ethiopia in 2015 also showed 1059 suspected cases and two deaths were reported from 9 woredas affected by a measles outbreak in Guji zone. The cumulative attack rate of 81/100,000 population and case fatality ratio of 0.2% was recorded. 77.5% cases were < 15 years of age, and 70% were zero doses of measles vaccine. Although, all

age groups were affected under five years old were more affected 48% than any other age groups. Children 6 months to 14 years old were targeted for outbreak response immunization and the overall coverage was 97 % (range: 90-103%). Case management with vitamin A supplementation, active case search, and health education was some of the activities carried out to curb the outbreak (17).

1.3.Objective

1.3.1. General Objective

To investigate and respond to measles outbreak in Dawe Serer District of Bale Zone, Oromia Region, Ethiopia from January 15 to 28, 2019

1.3.2 Specific Objectives

- To confirm the existence of measles outbreak in Dawe Serer District of Bale Zone, Oromia Region, Ethiopia from January 15 to 28, 2019
- To describe outbreak by person, place and time in Dawe Serer District of Bale Zone, Oromia Region, Ethiopia from January 15 to 28, 2019
- To assess risk factors associated with outbreak and recommend appropriate control and preventive activities in Dawe Serer District of Bale Zone, Oromia Region, Ethiopia from January 15 to 28, 2019

1.4.Methods and Materials

1.4.1. Study area and period

Measles outbreak investigation was conducted in Dawe Serer district Bale zone of Oromia Region from January 15 to 28, 2019. Bale zone was one of 20 zones found in Oromia Region. It has 18 districts and 2 Town Administrations. The Dawe Serer District is one of pastoralist woredas in the zone which established in 2006 after referendum conducted between Oromia and Somali Regional states. It found 730 KM from Addis Ababa / Finfinne capital city of country and region and 300 from Robe Town capital of The Zone. The district is bounded by North Rayitu and Dawe Kachen district by South Somali Region by East Rayitu district and Somali Region by West Gura Dhamole district. It has 18 administrative Kebeles (Lowest Administrative unit in Ethiopia). The total population of the district is 59,133 with Female 27793 (47%), Male 31,340 (53%), under one year old children 1904, under 5 years children 9716, less than 15 years 28153 and 12319 Households. It has 4 Health Centers and 18 Health Posts which serves the population of the district. The Human power distribution of the district is 49 Health Extension Workers, 12 Health Officers, 12 Nurses (BSc and Diploma), 9 Midwifery, 2 Druggist, 1 Laboratory Technician, 7 other health professionals and 31 nontechnical staffs total of 123 personnel. There are 4 Ambulances in the district.

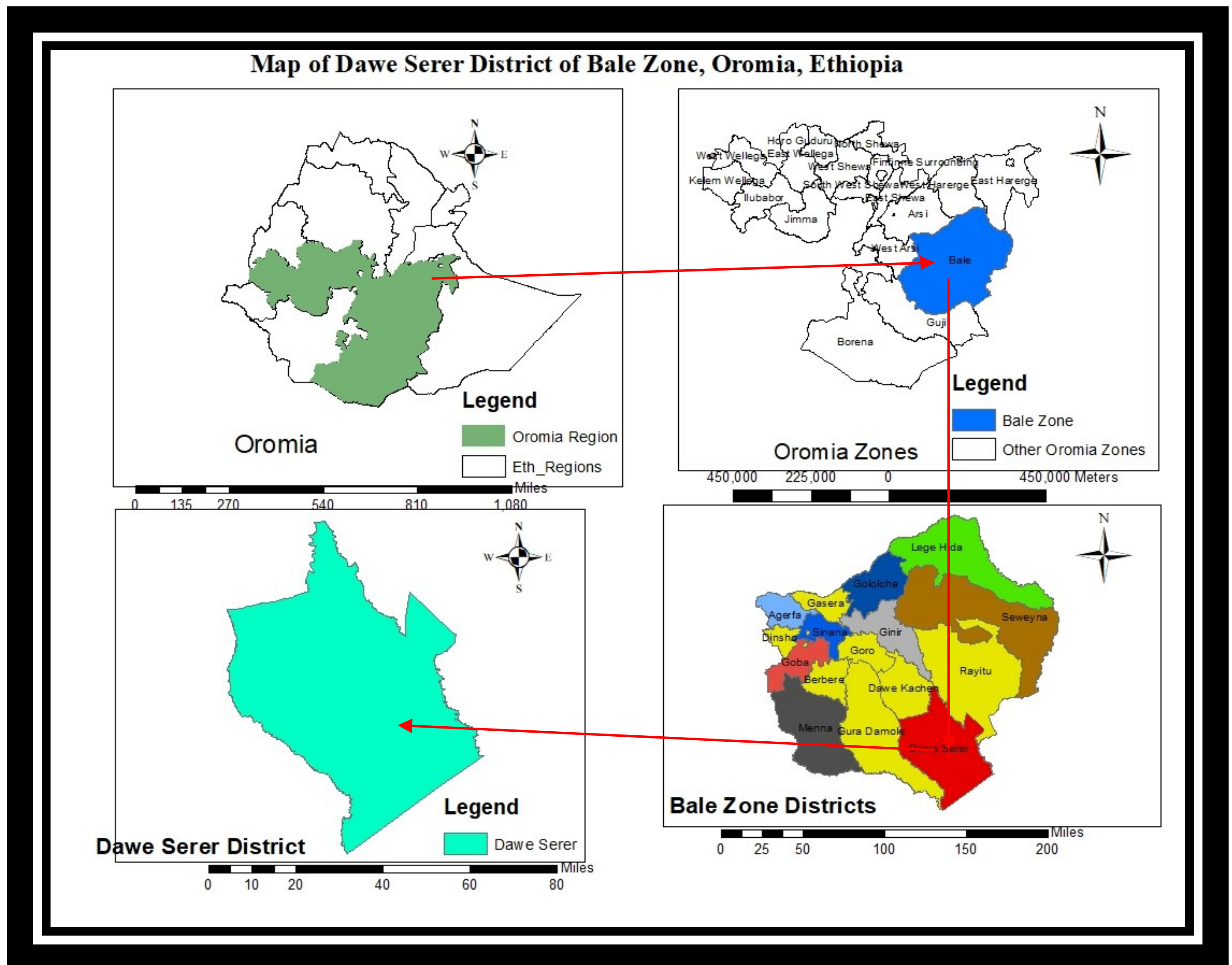

Figure 1 Map of Dawe Serer District of Bale zone Oromia Region, Ethiopia January 2019

1.4.2. Study Design

We conducted descriptive epidemiologic study and 1:2 unmatched case-control study designs with 38 cases and 76 controls. All 82 cases registered on line list were used for descriptive analysis of the outbreak.

1.4.3. Population

1.4.3.1.Source population

The population of Dawe Serer District

1.4.3.2.Study population

Study population was population of Dawe Serer District affected by measles and their neighbors

1.4.5. Sample Size and Sampling procedure

1.4.5.1. Sample size

We calculated sample size by using StatCalc of Epi Info 7.2.1.0 based on result of previous study. We took significant factor Travel History in to measles affected areas since measles outbreak of this district was associated with women who have travel history to measles affected district. Percent of Exposure among cases and control were 68.75% and 39.1% respectively with Odd Ratio 3.4 (95% CI, 1.4-8.4) and Power 80% obtained from measles outbreak investigation conducted in Limmu Seka District of Jimma Zone Oromia Ethiopia in 2017 (18). Based on this figures we obtained 38 cases and 76 controls to be included in the study.

1.4.5.2. Sampling Procedure

Cases were selected by systematic random sampling technique every 2 persons using line list as a reference; controls were selected randomly from neighbors of the cases.

1.4.6. Data Collection Methods

Epidemiologic data were obtained by review of secondary data (registry books, case based reports, line list records, surveillance data and related documents from woreda health office, health center and health posts found in the catchment area using WHO measles case definition. Unstructured questionnaire was used to interview participants and accordingly discussions, review of key informants about the cold chain management were made and Expanded Program for Immunization (EPI) coverage, reporting system and data quality and interpretation trends of the woreda and catchment health facilities were assessed from January 15 to 28, 2019.

Regarding the case control study, demographic information, clinical and treatment history, and vaccination status, contact history and knowledge and attitude towards measles vaccination were collected from the cases and controls. For the cases and controls who were adults (above 18 years and who could respond appropriately), information collected directly from them using structured questionnaire. For children under 18 years, their parents or care givers or guardian were interviewed. Four health workers working in health centers were participated to collect the data. They were trained for a half day before the data collection, in addition to that unclear issues and questions were discussed at any time during data collection process.

1.4.7. Case Definition

The case definition used was based on definition indicated in PHEM Guidelines and Measles Surveillance and outbreak management guidelines (4, 19).

Suspected case: Suspected measles case was defined as a person with fever, generalized maculopapular rash and at least one of the following: cough coryza or conjunctivitis who resides in any of the affected kebeles during outbreak period in the district.

Confirmed case: A suspected measles case that is laboratory confirmed (IgM positive)

Epidemiologically linked case: A suspected case that does not have a serological confirmation but is linked (in place, person & time) to a laboratory confirmed case.

Measles outbreak: Occurrence of five or more suspected measles cases, from which three samples were IgM positive for measles in one month in a defined geographic area like kebele, woreda or health facility catchment area.

Controls: We defined controls as individuals that have similar age groups and residency with that of the cases except they had no outcome (measles infection) on the date of data collection.

1.4.8. Inclusion and Exclusion Criteria

1.4.8.1.Inclusion criteria

A case was any resident of Dawe Serer District, who developed any of the following symptoms; fever and maculopapular rash (i.e. non-vesicular rash) and cough or coryza (runny nose) or conjunctivitis (red eyes) between 10 December 2018 and 28 January 2019, and who agreed to participate in the study after we inform them aim of the study.

A control was any resident of Dawe Serer District, who was a neighbor to a case and who did not develop signs and symptoms of measles and agreed to participate in the study.

1.4.8.2.Exclusion Criteria

Cases: the one who was too young child and/or unconscious to participate

Controls: Those who were previously affected by measles diseases and not resident of the kebele

1.4.9. Operational Definition

House ventilation: A house which people live in and having at least one window in addition to door that use for fresh air circulation in the house.

Knowing modes of transmission: A person responded for the mode of measles transmission is from infected person to the uninfected individual via droplet during sneezing and/or coughing.

1.4.10. Study Variables

Dependent Variable: Measles Infection

Independent variable: Vaccination status, travel history, house condition, nutritional status, knowledge on mode of transmission, contact history, educational status

1.4.11. Data Analysis

We checked data quality both line list for descriptive analysis and completeness of questionnaires for analytical analysis before entry into software. We used Micro Soft Office Excel to register line list and check for error during registration, Epi Info version 7.2.1.0 to enter data from collected questionnaire and perform analysis of case control data and SPSS version 23 for analysis of both descriptive and analytical output.

1.4.12. Ethical Clearance

Recommendation letter was written from Oromia Regional Health Bureau PHEM and Research Directorate to Bale Zonal Health Department for outbreak investigation and Response then the Bale zone wrote letter to the Dawe Serer district health office and also assign a team which works with us. All the respondents both case and controls were well informed about the objectives of the study and we conducted investigation after oral consent was obtained from them.

1.5. Results

1.5.1. Descriptive Analysis

1.5.1.1. Description of measles case by Person

We identified 82 suspected measles cases during outbreak which lasts from 12/10/2018 to 01/26/2019. Among them 47 (57.3%) are males. The sex specific attack rate was 0.53 per 100 males and 0.44 per 100 females while over all attack rate was 0.49 per 100 populations. There was no death reported due to this outbreak (figure 2).

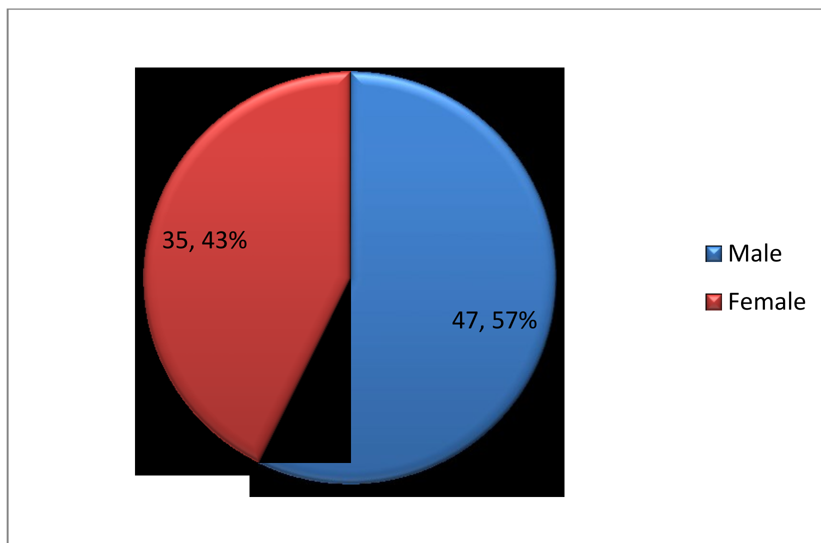

Figure 2 Description of measles cases by sex Dawe Serer District Bale Zone Oromia Ethiopia, January 2019

The age distribution of population attacked by disease ranges between 4 month children to 70 years old elder. The Mean age of the cases was 16 and SD 12.28. Most cases are >=15 years old 46 (56.1%) followed by 1-4 years and 5-14 years old which equally accounts 15 (18.3%) (figure 3).

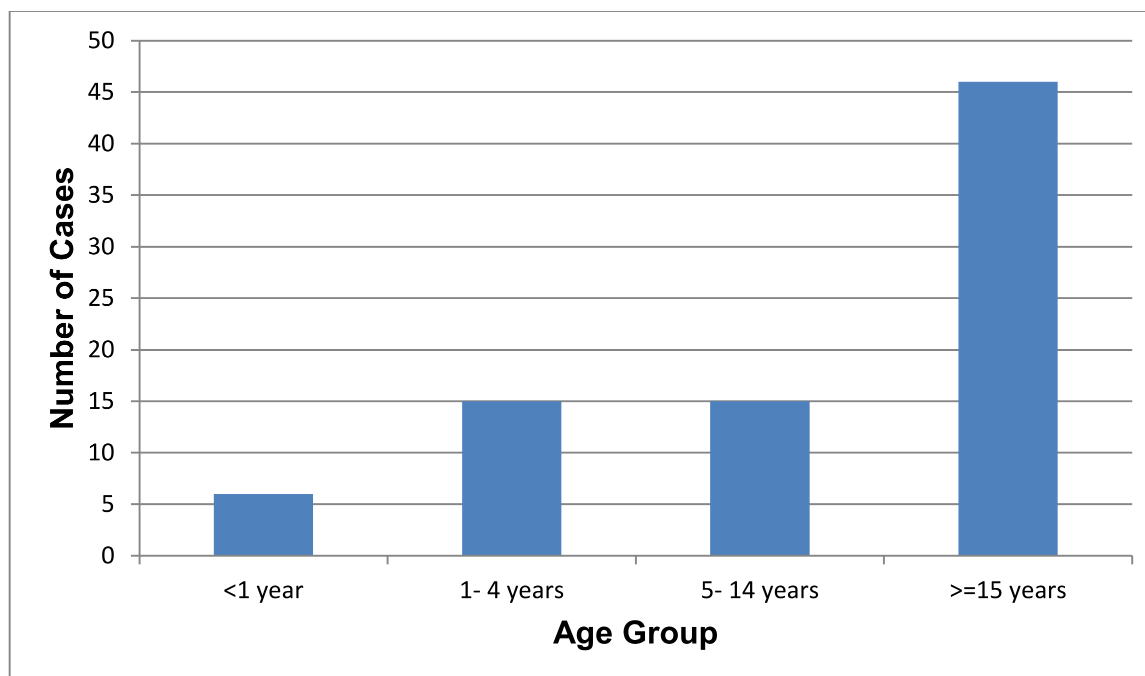

Figure 3 Distribution of Measles cases by Age Group in Dawe Serer District of Bale Zone Oromia Region Ethiopia, January 2019

The age specific attack rate was higher among under one year old children 1.1% followed by 1-4 years old children 0.67% (Table 1).

Table 1 Age Specific rate attack rate of Measles case in Dawe Serer District of Bale Zone Oromia Region Ethiopia, January 2019

S. No	Age Group	Pop at Risk	Frequency	AR per 100
1	<1 year	543	6	1.10
2	1- 4 years	2228	15	0.67
3	5- 14 years	5258	15	0.29
4	> 15 years	8835	46	0.52
	All age	16864	82	0.49

Treatment settings and complication

The cases that were treated by admission were 28 (34.1%) of this 13 (46.4%) were females. Of the total cases treated 36 (43.9%) has at least one measles related complication (Table 4).

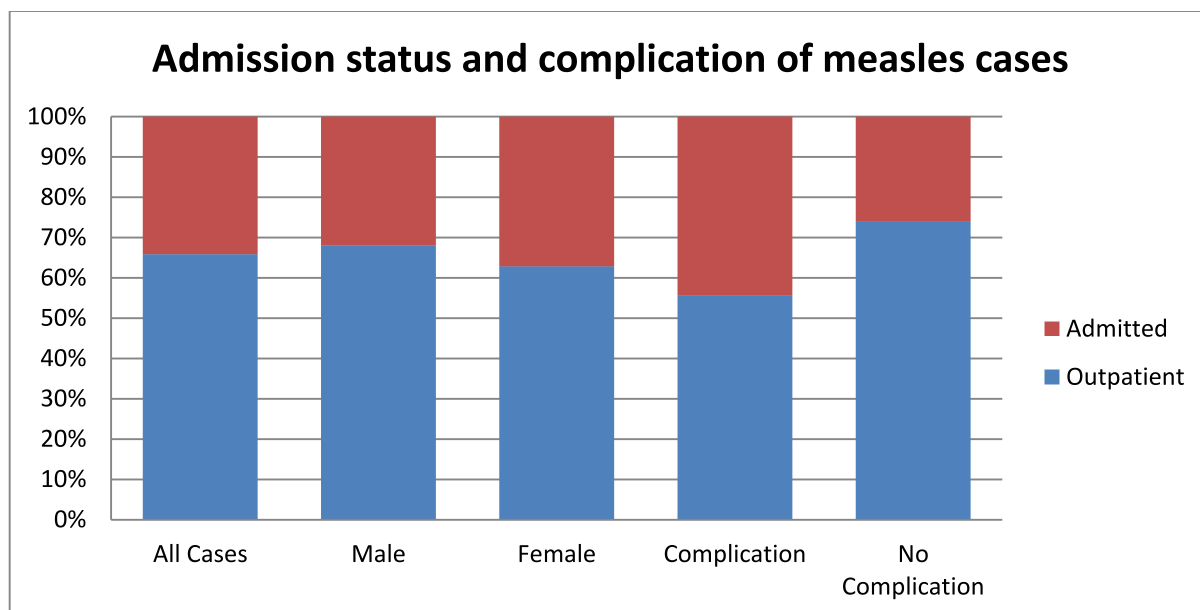

Figure 4 Admission statuses of measles cases in Dawe Serer District of Bale Zone Oromia Region Ethiopia, January 2019

1.5.1.2. Description of cases by Place

The majority of the cases were from Bered Kebele 58(70.7%) followed by Dhale Mandoyyu 9(11.0%) and Denduba 7(8.5%) kebeles. The overall attack rate was 0.49 per 100 populations.

Table 2 Description of Measles cases by Kebeles in Dawe Serer District of Bale Zone Oromia Region Ethiopia, January 2019

S. No	Kebele	Population at risk	No of Case	Percent from total cases	AR Per 100
1	Bered	3695	58	70.7	1.57
2	Gadab	2026	3	3.7	0.15
3	Mandoyyu	4626	9	11.0	0.19
4	Denduba	3186	7	8.5	0.22
5	Diglo	3331	5	6.1	0.15
	Total	16864	82	100.0	0.49

Vaccination status

Regarding vaccination status only 7 (8.5%) were vaccinated at least one dose of Measles Vaccine while majority of the cases 46 (56.1%) were not vaccinated against measles.

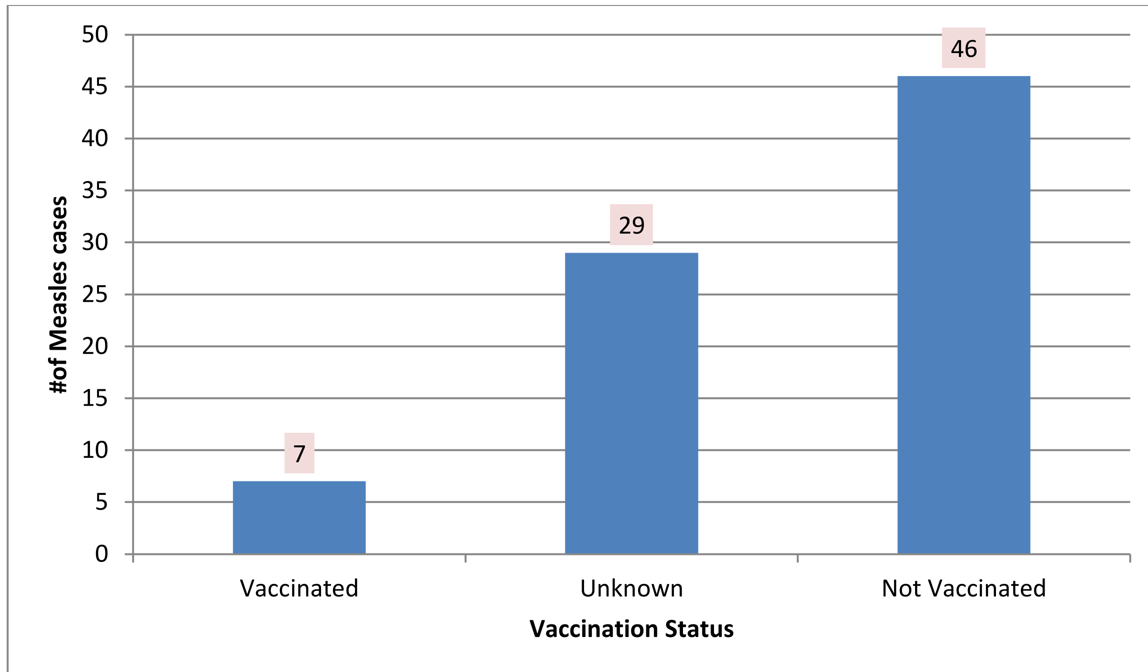

Figure 5:- Vaccination status of measles cases in Dawe Serer District of Bale Zone Oromia Region Ethiopia, January 2019

1.5.1.3. Description of cases by Time

The index case was a woman who has travel history to Ginnir District (where there is ongoing confirmed measles outbreak) she manifested maculopapular rash on December 10, 2018 and notified to Bered Health Center on December 14, 2018 then the second case was on 12/20/2018 from same kebeles. The district health office was too late to notify the Zonal Health office (Figure 6).

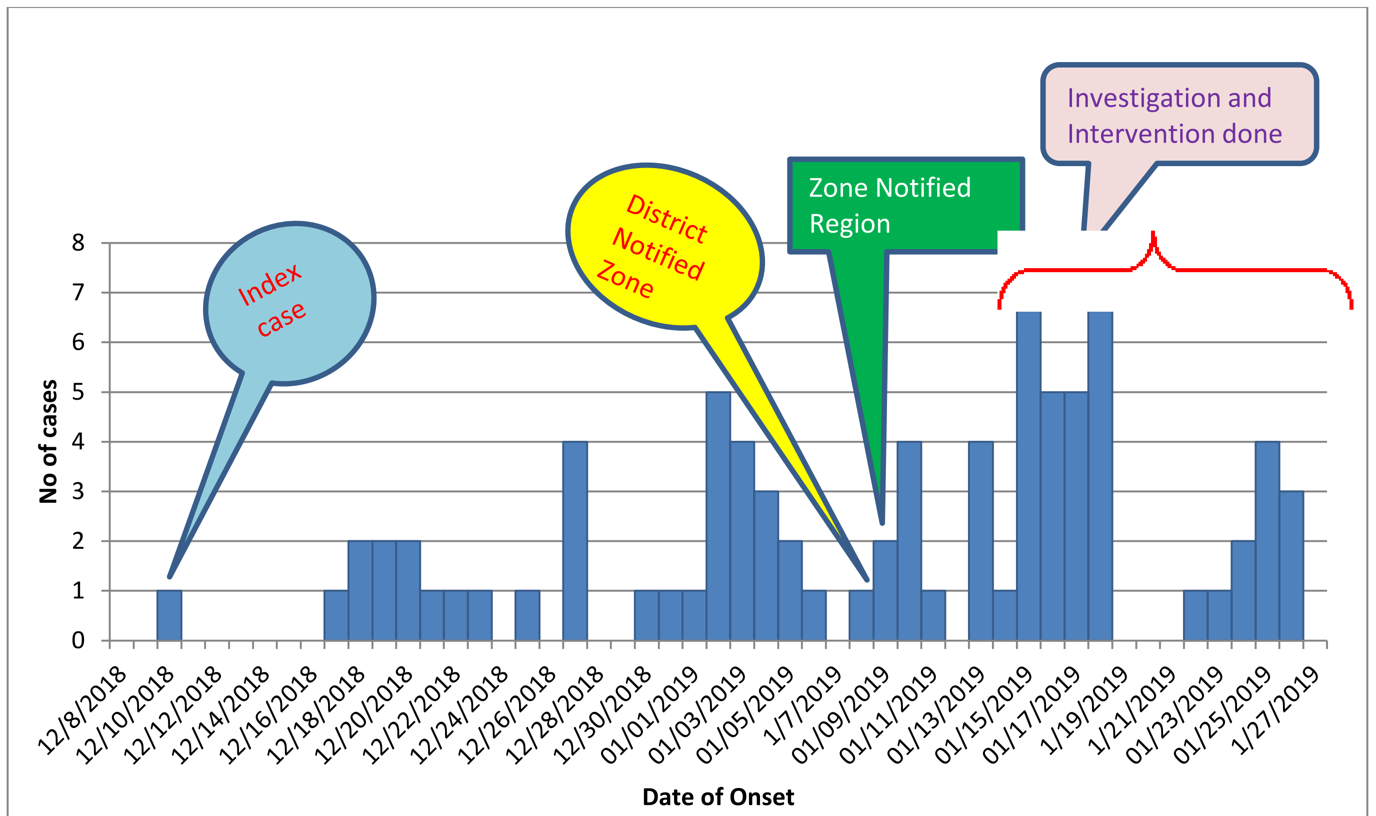

Figure 6 Epicurve showing number of measles cases by date of onset in Dawe Serer District of Bale Zone Oromia Region Ethiopia, January 2019

The outbreak lasts from Week 49, 2018 to Week 04, 2019 the highest case was registered on week 03, 2019 (24 cases) and Week 01, 2019 (16 cases) (figure 7)

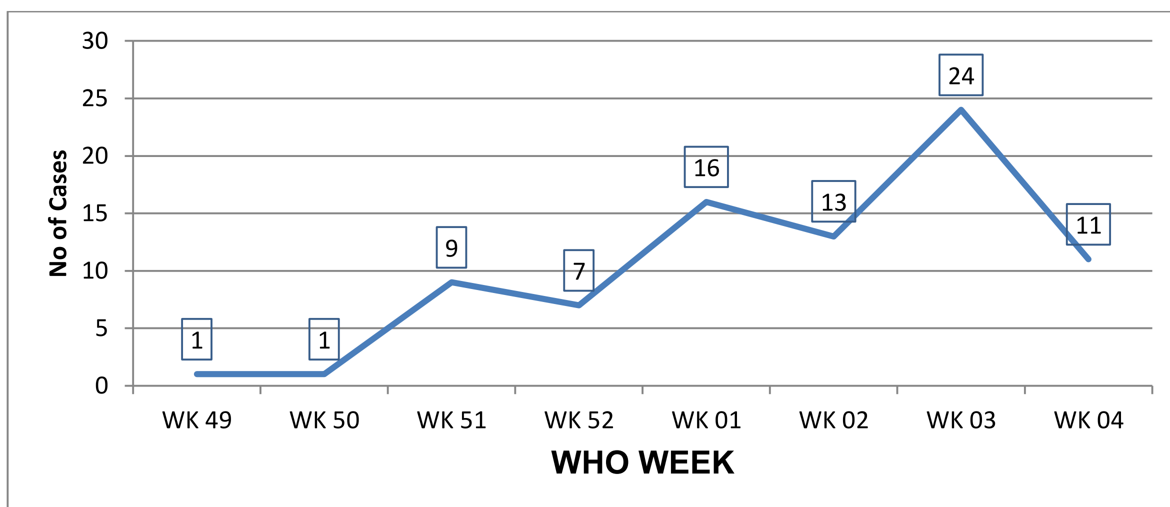

Figure 7 Distribution of Measles cases by Weeks in Dawe Serer District of Bale Zone Oromia Region Ethiopia, January 2019

1.5.2. Analytic Study

A total of 38 cases and 76 controls were involved in analytic study. They were assessed for risk factors associated with measles outbreak in Dawe Serer District of Bale zone. The Mean age and SD of Cases and Controls were 15.9 $\pm$ 14.6 SD for cases and 16.1 $\pm$ 14.3 SD for controls respectively. All 38(100%) cases and 76(100%) controls are Oromo Ethnic group and Muslim religion followers. All 38(100%) cases and 76(100%) controls had knowledge on mode of transmission and prevention of measles. Regarding the family occupation of cases Pastoralist were 33(86.84%) and Merchant 5(13.16%) and for family of controls 65(85.53%) were pastoralists and 11(14.47%) were Merchants (table 3).

Table 3 Socio demographic characteristics of measles cases in Dawe Serer district of Bale Zone Oromia, Ethiopia January 2019

S. No	Variables	Category	Case % (N= 38)	Control % (N=76)
1	Sex	Female	18 (47.37%)	33(43.42%)
		Male	20 (52.63%	43(56.58%)
2	Age Group	<1	4 (10.53%)	7 (9.21%)
		1-4	8 (21.05 %)	18 (23.68%)
		5-14	6 (15.79%)	10 (13.16%)
		≥15	20(52.63%)	41 (53.95%)
3	Family Size	≤5	21 (55.26%)	52 (68.42%)
		>5	17 (44.74%)	24 (31.58%)
4	Educational Level of Case/ Control	Can Read and Write	3 (7.89%)	11 (14.47%)
		Illiterate	6 (15.79%)	10 (13.16%)
		Not Applicable	14 (36.84%)	27 (35.53%)
		Primary (1-8)	12 (31.58%)	22 (28.95%)
		Secondary	3 (7.89%)	6 (7.89%)
5	Occupation of case/ control	Housewife	10 (26.32%)	19 (25.00%)
		Merchant	2 (5.26%)	2 (2.63%)
		Not Applicable	14 (36.84%)	28 (36.84%)
		Pastoralist	4 (10.53%)	10 (13.16%)
		Student	8 (21.05%)	17 (22.37%)
6	Marital Status of case/ control	Married	15 (39.47%	25 (32.89%)
		Not Applicable	19 (50.00%	38 (50.00%)
		Single	4 (10.53%	11 (14.47%)
		Widowed	0(0%)	2 (2.63%)
7	Family Educational Status	Can read and write	19 (50%)	32 (42.11%)
		Illiterate	5 (13.16%)	17 (22.37%)
		Primary (1-8)	14 (36.84%)	25 (32.89%)
		Secondary	0 (0%)	2 (2.63%)

The major sign and symptom of measles manifested by cases included in the study were 38 (100%) maculopapular rash, 38 (100%) fever and 38 (100%) runny nose (coryza) (Figure 8).

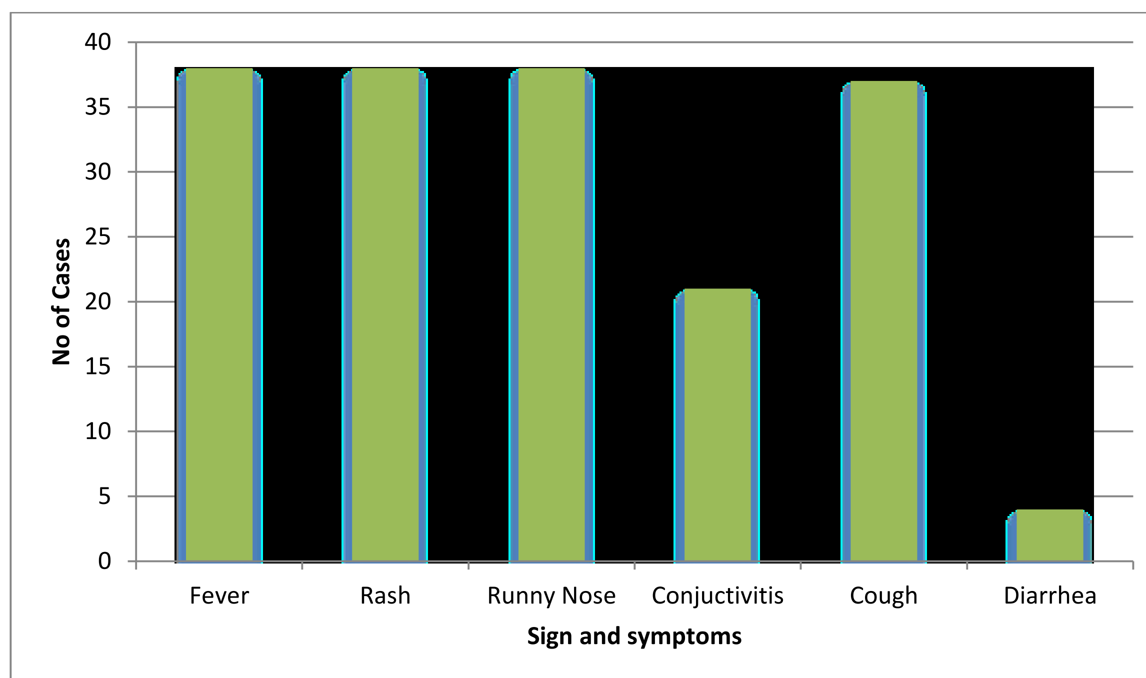

Figure 8: Sign and symptom of measles cases in Dawe Serer district of Bale Zone Oromia, Ethiopia January 2019

The cases were also treated for complications like 14 (36.8%) pneumonia and 3 (7.9%) diarrhea (table 4).

Table 4 Major complications of measles cases in Dawe Serer district of Bale Zone Oromia, Ethiopia January 2019

S. No	Disease/ Complication	Frequency	Percentage
1	Pneumonia	14	36.8
2	Diarrhea	3	7.9
3	Ear Infection	1	2.6
4	Mouth Ulcers	3	7.9

The cases were treated by different drugs 38 (100%) Vitamin A, 21(55.3%) TTC eye ointment and 21(55.3%) antibiotics (table 5).

Table 5 Treatment given for measles cases in Dawe Serer district of Bale Zone Oromia, Ethiopia January 2019

S. No	Drugs	Frequency	Percentage
1	ORS	4	10.5
2	Antibiotics	21	55.3
3	Vitamin A	38	100
4	TTC Eye Ointment	21	55.3
5	Antipyretic	24	63.2

Bivariate analysis of independent variables shows that Being Vaccinated with measles vaccine Crude Odd Ratio (COR) 0.20 [95% CI= 0.07- 0.51, P= 0.0008], travel history to measles affected area 2 to 3 weeks before onset of disease COR 7.38 [95% CI= 2.39- 22.8, P= 0.0005], contact with measles case COR 3.29 [95% CI= 1.46- 7.41 , P= 0.0040] and presence of window COR 0.19 [95% CI= 0.08-0.46, P= 0.0002] had statistically significant association with this measles outbreak (Table 6).

Table 6 Bivariate analysis of measles outbreak in Dawe Serer district of Bale Zone Oromia, Ethiopia January 2019

S. No	Variables	Category	Case % N=38	Control % N=76	COR (95% CI)	P- Value
1	Sex	Male	18 (47.37%)	33(43.42%)	0.85(0.39-1.86)	0.6896
		Female	20 (52.63%	43(56.58%)		
2	Vaccination status	Vaccinated	7 (18.42%)	40 (52.63%)	0.20(0.07-0.51)	0.0008
		Not vaccinated	31 (81.58%)	36 (47.37%)		
3	Educational status of family	Literate	33 (86.84%)	59 (77.63%)	1.90(0.64-5.61)	0.2458
		Illiterate	5 (13.16%)	17 (22.37%)		
4	Travel History	Yes	13 (34.21%)	5 (6.58%)	7.38(2.39-22.8)	0.0005
		No	25 (65.79%)	71 (93.42%)		
5	Contact with measles cases	Yes	24 (63.16%)	26 (34.21%)	3.29(1.46-7.41)	0.0040
		No	14 (36.84%)	50 (65.79%)		
6	Presence of sick person in the house	Yes	14 (36.84%)	33 (43.42)	0.76(0.34-1.69)	0.5016
		No	24 (63.16%)	43 (56.58%)		
7	Presence of window	Yes	10 (26.32%)	49 (64.47%)	0.19(0.08-0.46)	0.0002
		No	28 (73.68%)	27 (35.53%)		
8	Family size	≤5	21 (55.26%)	52 (68.42%)	1.75(0.78-3.91)	0.1696
		>5	17 (44.74%)	24 (31.58%)		

By multivariables analysis, being vaccinated and presence of window in the house were found to be a statistically significant protective factor from developing a disease by Adjusted Odd Ratio (AOR) 0.09 [95% CI= 0.02-0.32 P= 0.0002] and 0.10 [95% CI= 0.03-0.35, P= 0.0003]. Travel history 2 to 3 weeks before onset of disease to measles affected areas and contact with measles case were statistically significant risk factor for developing a disease by AOR 9.79[95% CI= 2.25-42.52, P= 0.0023] and 4.41[95% CI= 1.44-13.49, P= 0.0092] (table 7).

Table 7 Multivariable analysis of measles outbreak in Dawe Serer district of Bale Zone Oromia, Ethiopia January 2019

S. No	Variables	Category	COR (95% CI)	AOR (95% CI)	P-Value
1	Contact with measles cases	Yes	3.29(1.46-7.41)	4.41(1.44-13.49)	0.0092
		No	1	1	
2	Vaccination status	Vaccinated	0.20(0.07-0.51)	0.09(0.02-0.32)	0.0002
		Not vaccinated	1	1	
3	Presence of window	Yes	0.19(0.08-0.46)	0.10(0.03-0.35)	0.0003
		No	1	1	
4	Travel History	Yes	7.38(2.39-22.8)	9.79(2.25-42.52)	0.0023
		No	1	1	

1.5.3. Laboratory Result of outbreak

Blood samples were collected from five suspected measles cases at Bered Health Center of Dawe Serer district and sent to the EPHI for confirmation. Four of the five specimens tested were positive for measles IgM. Based on the result of the laboratory test, WHO criteria for measles outbreak, typical measles clinical manifestation and epidemiologically linked with laboratory confirmed cases, the outbreak was confirmed and cases were managed as measles in the woreda.

1.5.4. Public Health Intervention taken

The team which composed of Regional Health Bureau PHEM staff, FETP Resident and Zonal PHEM Focal Person started work in the district by making discussion with the District Health office staff about the outbreak situation. After the discussion with District health office staffs the team planned to activate woreda level Task force / Rapid response Team composed of different sectoral offices and Non Governmental Organizations which is lead by district chief administrator. The task force members held their first meeting on 17/01/2019 and made different decisions. They allocated additional budget for outbreak control for health office. Based on their decisions the woreda Cabinet members were oriented about the disease and assigned to all kebeles to aware community about sign and symptom, mode of transmission, means of prevention and to conduct active search. We all also made discussion with Bered and Buttu Health centers staffs and Health Extension workers. The district health office staffs were assigned to all PHCUs and the Health center staffs were assigned to all kebeles in their respective catchment to work with Health Extension workers on awareness creation and active case search and referral to Health center.

We supplied drugs like Amoxycillin capsules and syrup, paracetamol tabs and suspension and Tetracycline eye ointment for district health office from regional hub/ store.

Based on rumor came from community the district health office sent a team to remote kebele known as Dhale Mandoyyo which is 400 KM far from district center to treat suspected cases and supplement Vitamin A for susceptible community members. The team successfully accomplished its mission and saved life.

At Bered and Buttu Health center technical assistance was given for health workers on case management, on line list recording /to incorporate all necessary variables and reporting situation in place. We tried to review measles vaccination coverage of the district which was 85% and 73% in 2010 and 2011 EFY (six month report) respectively. But measles vaccination coverage of the Bered kebele, where high case load was reported, is 68% and 62% in 2010 and 2011 EFY (six month report) which are very low.

Intensive health education was given for the community members and students in areas where the community members are gathered like Mosques, schools, local meetings as well as at house

hold level. We conducted these activities while searching for active cases and more focus on how to prevent transmission of the disease, motivating health seeking behavior of the community for treatment if there is sign and symptoms of measles. We also tried to persuade the community to vaccinate their children based on schedule. Active surveillance has been conducted in neighboring kebeles of the woreda.

Cases were treated to prevent further spread and reduce morbidity and mortality related to measles. Cases found during active case search were referred to Health center for treatment and those who were unable to go on foot were transported by Ambulance. Routine surveillance was enhanced and overall activities were closely followed at each level on a daily bases.

We also admitted the measles cases come for treatment in the health center for the period of communicability to prevent spread of disease to other community members especially those who were coming from areas adjacent to IDP camps. Vitamin A was supplemented to all cases according to treatment guidelines.

Due to wide spread of measles epidemics in many parts of the country the Federal Ministry of Health of Ethiopia planned to conduct nationwide Supplemental measles immunization (SIA) in March 2019, so Dawe Serer district was also among the districts where vaccination will be given.

1.6. Discussion

The National guideline of Ethiopia indicates that if three or more samples were IgM positive for measles it is possible to declare the existence of the measles outbreak. Based on this the existence of measles outbreak in Dawe Serer District of Bale zone was confirmed by laboratory result that four out of five samples sent to laboratory was IgM positive for measles (4, 19).

In this outbreak the overall attack rate was 0.49% and no death was occurred. The attack rate is higher than outbreak occurred in 2015 in Guji zone which was 81/100,000 and Kabridehar district in 2016 which was 0.4 per 1000 population (15, 17). It was not catastrophic as there was no death, but outbreak occurred in same district in 2011 caused 25 deaths (CFR 15.7%) and Harena district 5 deaths (CFR 2.9%) so there were better management of cases (16).

The age of population affected ranges from 4 months children to 70 years old geriatric with mean age of 16 $\pm$ 12.28 SD. The majority of cases were age group $\geq$ 15 years old 46 (56.1%) which is different from Guji zone outbreak in 2015 where 77.5 % of cases were less than 15 years (17) and similar to study in 2014 in Sri Lanka where age group 12-29 years 36.6% and above 29 years accounts for 35.6% of cases and also presence of under one year old children affected by measles (20).

From cases mentioned in line lists 46(56.1%) were not vaccinated and 29 (35.4%) had unknown vaccination status. This large number of unknown vaccination status is similar to study in Sri Lanka in 2014 where 48.5% of cases were unsure about their immunization status which questions the quality of information provided to clients during vaccination (20).

The measles vaccination coverage of the district was 85% in 2017/18 and 73% in 2018 (six month) by administrative report but only 8.5% of cases were vaccinated as of line list and 41.2% were vaccinated as investigated in case control study. Over all the vaccination coverage of the district is very far from set target 95% coverage to achieve measles elimination from Africa Region in 2020 so it needs attention (5).

Of the cases involved in case control analysis 14 (36.8%) of them developed pneumonia while 3 (7.9%) developed diarrhea as about third of cases expected to develop complications like pneumonia, ear infections, diarrhea and mouth ulcers (4).

Vitamin A was supplied to all 82(100%) of cases as it is indicated in national guidelines to supplement it to all cases during measles outbreak (4).

In this study contact with measles cases 2 to 3 weeks before onset of disease and travel history to measles affected area was found to be statistically significant independent risk factor with Adjusted Odd Ratio (AOR) of 4.41 [95% CI = 1.44 – 13.49 P= 0.0092] and 9.79[95% CI= 2.25-42.52 P= 0.0023] respectively, while case control studies conducted in Kabridahar in 2016 contact with measles cases (AOR=3.5, 95% CI (5.9, 21.4)), in Zimbabwe in 2010 Contact with a measles case [AOR= 41.14, 95% CI (7.47-226.5)] and in Mayuge Uganda in 2016 visit to source area [OR M-H =5.0; 95% CI=1.5–17] had similar findings to our situation (12, 13, 15).

Being vaccinated with measles vaccine and presence of window in the house were found to be protective factor and statistically significant with AOR of 0.09 [95% CI= 0.02- 0.32 P= 0.0002] and 0.10 [95% CI= 0.03- 0.35 P= 0.0003] respectively. There was same finding for vaccination 0.12[95% CI = 0.02-0.68, P= 0.016] in Limmu Seka district of Jimma zone in 2017 (18).

1.7. Limitation

Due to lack of GPS apparatus/material we haven’t located the Longitude and Latitude of the respondents and Health facilities.

1.8. Conclusion

The $\geq$ 15 years old persons were most affected age group by this outbreak. Travel history to measles affected area was the cause of the outbreak in the district while low measles vaccination coverage created favorable condition for spread of the disease in the area.

1.9. Recommendation

The immunization coverage of the district needs to be improved from current status both by routine and Secondary Immunization Activities (SIA)for under 15 years age group in order to cover those accumulated at risk population and to reach set target 95% coverage for elimination of measles in 2020. So Bale Zone health office, Dawe Serer district health office and administration as well as Non Governmental organizations working in the area should focus on vaccinating at risk population.

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1.2. Measles outbreak Investigation in Hawi Gudina District of West Harerge Zone Oromia Region Ethiopia, March 2019

Abstract

Background:- Measles is a highly contagious and acute respiratory disease which causes a childhood morbidity and mortality. Despite the availability of safe and effective vaccine it is still the public health problem occurring as epidemic in the world including our country Ethiopia. The Hawi Gudina district of West Harerge zone was affected by measles outbreak from early January to early March of 2019. The team deployed by Health Bureau to investigate and respond to outbreak in the area.

Methods: - we conducted descriptive analysis of 280 cases registered on line lists in Hawi Gudina District from February 18 to March 03, 2019. Cases selected based on WHO standard case definition. We reviewed documents and held discussions with key informants on vaccination coverage and cold chain management. We used Microsoft office Excel for data entry and Epi Info for data analysis.

Results: - we identified 280 cases and 5 deaths in 19 kebeles with attack rate of 3.8/1000 populations and case fatality rate of 1.8%. Majority of cases were 119(42.5%) between 5-14 years, 238(85%) were females and 149(53.2%) were not vaccinated. Vaccination coverage in 2018 was 67%. Active case search, Case management and massive health education conducted.

Conclusion:- Low Measles vaccination coverage and weak surveillance system contributed to the spread of the disease in the district. Increase routine vaccination coverage, SIA for < 15 years and strengthening the surveillance system of the district is highly recommended.

Key words: Measles outbreak, Hawi Gudina, descriptive, Oromia

2.1. Introduction

2.1.1. Back ground

Measles is a highly contagious and acute respiratory disease which causes a childhood morbidity and mortality. Measles virus is the only member of the genus *Morbillivirus* in Paramyxoviridae family that infects humans. It is a single-stranded, enveloped RNA virus with 1 serotype. The virus is sensitive to ultraviolet light, heat, and drying. It remains active and contagious in the air or on infected surfaces for up to 2 hours. Humans are the only natural hosts of measles virus (1).

It is spread by coughing and sneezing, by close personal contact or direct contact with infected nasal or throat secretions. It can be transmitted by an infected person from 4 days prior to the onset of the rash to 4 days after the rash erupts. Measles outbreaks can result in epidemics that cause many deaths, especially among young, malnourished children (2).

The incubation period is 10–12 days from exposure to the onset of fever and other nonspecific symptoms and 14 days (with a range of 7–18 days), from exposure to the onset of rash. Infectivity is greatest three days before rash onset. Secondary attack rates among susceptible household contacts have been reported to be 75%–90%. Infected person shows prodromal symptoms of fever, malaise, cough, coryza, and conjunctivitis. Koplik's spots may be seen on the buccal mucosa in over 80% of cases up to 2 days before rash onset. Within 2-4 days of the prodromal symptoms, a rash made up of large, blotchy red spots (maculo-papular rash) appears behind the ears and on the face accompanied with a high fever. The rash spreads to the trunk and extremities and typically lasts 3 - 7 days, then disappears in the same order as its appearance (3).

In about a third of the cases, measles is followed by at least one complication caused by disruption of epithelial surfaces and immune suppression. These include pneumonia, ear and sinus infections, mouth ulcers, persistent diarrhea, and upper airway obstruction from croup. Less common complications include corneal drying that could progress to ulceration and blindness, protein energy malnutrition, convulsions and brain damage (1-3).

Routine measles vaccination for children or combined with mass immunization campaigns in countries with high case and death rates, are key public health strategies to reduce global measles deaths (3, 4). In 2012, the WHA endorsed the Global Vaccine Action Plan with the objective to

eliminate measles in 4 of the 6 WHO Regions by 2015 and in 5 Regions by 2020. Member States in all WHO Regions have adopted measles elimination goals to be reached by or before 2020 (5).

As of 2013, it was estimated that, measles caused some 40,000 deaths annually in the African Region. Measles remains among the top causes of death in children less than 5 years of age in many African countries (3). In 2017, there were 110,000 measles deaths globally, mostly among children under the age of five. Global measles deaths have decreased by 80% from an estimated 545,000 in 2000 to 110,000 in 2017 (6).

In Ethiopia measles incidence was 7.2 cases per 100,000 populations and there were 243 confirmed measles outbreaks in 192 districts in 2013. A seasonal pattern of occurrence of measles has been observed over the years, with increased number of measles cases during the late-early part of the year (December to February). Due to the low sub national routine measles coverage and prevailing poor living and nutritional conditions, measles outbreaks continue to occur frequently in different parts of the country, most especially in Oromia and SNNPR Regions where the density of the population is relatively high (7).

In Oromia Region there were 1487 measles cases and 4 deaths reported via PHEM weekly reports in 2018. The highest numbers of cases were from East Harerge 316(21.3%), West Harerge 160 (10.8%), West Wollega 160 (10.8%) and Woliso Town 116(7.8%). The deaths were 3 from East Harerge and 1 from Ilu Aba Bora zones (8). The team was deployed by Oromia regional health bureau to confirm existence of measles outbreak, prevent and control the outbreak by taking necessary intervention measures in Hawi Gudina District West Harerge Zone of Oromia Region Ethiopia.

2.1.2. Statement of the problem

Measles is a highly contagious, serious disease caused by a virus. Before the introduction of measles vaccine in 1963 and widespread vaccination, major epidemics occurred approximately every 2–3 years and measles caused an estimated 2.6 million deaths each year. While global measles deaths have decreased by 84 percent worldwide in recent years from 550,100 deaths in 2000 to 89,780 in 2016 measles is still common in many developing countries, particularly in parts of Africa and Asia. An estimated 7 million people were affected by measles in 2016. The overwhelming majority (more than 95%) of measles deaths occur in countries with low per capita incomes and weak health infrastructures (4).

Approximately 110,000 people died from measles in 2017, mostly children under the age of 5 years, despite the availability of a safe and effective vaccine (6). By the end of 2015, the African Region has documented 85% reduction in measles deaths as compared to measles mortality estimates for the year 2000 (9).

Among the estimated 20.8 million infants who did not receive the first dose of measles vaccine in 2015, 53% resided in 6 countries: India (3.2 million), Nigeria (3 million), Pakistan (2 million), Indonesia (1.5 million), Ethiopia (0.7 million) and the Democratic Republic of the Congo (0.6 million) (5).

In Ethiopia, Measles incidence increased from 20 cases per million total populations in 2006 to 194 cases per million in 2015 and declined to 49 per million in 2016 (10). The expected case-fatality rate is between 3% and 6%; the highest case-fatality rate occurs in infants 6 to 11 months of age, with malnourished infants at greatest risk. In certain high-risk populations, case-fatality rates as high as 30% have been reported in infants aged less than 1 year of age (2).

In Oromia Region there were 1487 measles cases and 4 deaths reported via PHEM weekly reports in 2018. The highest numbers of cases were from East Harerge 316(21.3%), West Harerge 160 (10.8%), West Wollega 160 (10.8%) and Woliso Town 116(7.8%). The deaths were 3 from East Harerge and 1 from Ilu Aba Bora zones (8). Starting from WHO Week 44, 2018 the measles outbreak started to occur in different districts of East Harerge, West Harerge, West Wollega, Bale, Arsi, South West Shoa, North Shoa and Arsi Zones. In most of zones there is

ongoing outbreak of measles. In West Harerge Zone the measles outbreak first occurred in Mieso District in Week 50, 2018 then spread to Daro Labu and Hawi Gudina Districts.

2.1.3. Significance of the Study

Measles outbreak is the ongoing public health problem in different parts of the world including our country Ethiopia. Oromia regional state is among the regions which are highly affected by measles outbreak in the country. Due to highly contagious nature of the measles disease it is important to early investigate the occurrence of the outbreak and start early intervention. Based on this Oromia Regional Health Bureau deployed a team to the area which confirm the existence of the outbreak and take necessary interventions to control outbreak. The result obtained from this investigation is useful to plan necessary intervention to prevent future occurrence of outbreak in the district, zone and region.

2.2. Literature Review

Pathogenesis

Measles is a systemic infection. The primary site of infection is the respiratory epithelium of the nasopharynx. Two to three days after invasion and replication in the respiratory epithelium and regional lymph nodes, a primary viremia occurs with subsequent infection of the reticuloendothelial system. Following further viral replication in regional and distal reticuloendothelial sites, there is a second viremia, which occurs 5 to 7 days after infection. During this viremia, there may be infection of the respiratory tract and other organs. Measles virus is shed from the nasopharynx beginning with the prodrome until 3 to 4 days after rash onset. The incubation period is approximately 10–12 days from exposure to the onset of fever and other nonspecific symptoms and 14 days (with a range of 7–18 days),from exposure to the onset of rash. Measles can be transmitted from four days before rash onset (i.e., one to two days before fever onset) to four days after rash onset. Infectivity is greatest three days before rash onset. Measles is highly contagious. Secondary attack rates among susceptible household contacts have been reported to be 75%–90%. Due to the high transmission efficiency of measles, outbreaks have been reported in populations where only 3% to 7% of the individuals were susceptible (1, 2).

Complication

In about a third of the cases, measles is followed by at least one complication caused by disruption of epithelial surfaces and immune suppression. These include pneumonia, ear and sinus infections, mouth ulcers, persistent diarrhea, and upper airway obstruction from croup. Less common complications include corneal drying that could progress to ulceration (keratomalacia) and blindness, protein energy malnutrition, convulsions and brain damage. Complications are more common in young children below 5 years of age and complication rates are increased in persons with immune deficiency disorders, malnutrition, vitamin A deficiency, and inadequate vaccination. Immuno-compromised children and adults are at increased risk for severe infections and super infections. Unless managed early and aggressively, these complications may lead to death within the first month after the onset of rash. The case fatality from measles is estimated to be 3 – 5% in developing countries but may reach more than 10% in outbreaks especially when it is compounded by malnutrition (1-4).

Case fatality Rate

In Ethiopia, the expected case-fatality rate is between 3% and 6%; the highest case-fatality rate occurs in infants 6 to 11 months of age, with malnourished infants at greatest risk. These rates may underestimate the true lethality of measles because of incomplete reporting of outcomes of measles illness. In certain high-risk populations, case-fatality rates as high as 30% have been reported in infants aged less than 1 year of age. Malnutrition (including vitamin A deficiency), underlying immunodeficiency and lack of access to medical care are all factors leading to the high case-fatality rates observed in many parts of the world (2).

As of 2013, it was estimated that, measles caused some 40,000 deaths annually in the African Region. Measles remains among the top causes of death in children less than 5 years of age in many African countries. Before the widespread availability of measles vaccine, virtually all children contracted the disease (3).

Vaccination

Routine measles vaccinations for children, combined with mass immunization campaigns in countries with high case and death rates, are key public health strategies to reduce global measles deaths. Two doses of the vaccine are recommended to ensure immunity and prevent outbreaks, as about 15% of vaccinated children fail to develop immunity from the first dose. Global measles deaths have decreased by 80% from an estimated 545,000 in 2000 to 110,000 in 2017 due to measles vaccination. In 2017, about 85% of the world's children received one dose of measles vaccine by their first birthday through routine health services up from 72% in 2000. During 2000-2017, measles vaccination prevented an estimated 21.1 million deaths making measles vaccine one of the best buys in public health. In 2017, 67% of children received the second dose of the measles vaccine (6).

The EDHS 2016 survey result showed that the national and the Oromia regional state measles vaccination coverage was low 54% and 43.2% respectively (11).

Efforts to eliminate measles

In 2010, the World Health Assembly (WHA) identified 3 milestones for measles control by 2015: (1) increased routine coverage with the first dose of measles-containing vaccine for

children 1 year of age to ≥90% nationally and ≥80% in every district; (2) reduction in global annual measles incidence to <5 cases per million population; and (3) reduction in global measles mortality by 95% from the 2000 estimate. In 2012, the WHA endorsed the Global Vaccine Action Plan with the objective to eliminate measles in 4 of the 6 WHO Regions by 2015 and in 5 Regions by 2020. Member States in all WHO Regions have adopted measles elimination goals to be reached by or before 2020 (5).

Risk factors and causes of outbreaks

The risk factors for measles virus infection include: infants who lose passive antibody before the age of routine immunization, children with vitamin A deficiency and immunodeficiency due to HIV or AIDS, leukemia, alkylating agents, or corticosteroid therapy, regardless of immunization status and children who travel to areas where measles is endemic or contact with travelers to endemic areas (2, 4).

The study conducted in October 2016 on the measles outbreak occurred in Mayuge District, Eastern Uganda with showed that over all attack rate [AR] = 4.0/10,000), while children <5 years were the most affected (AR=14/10,000). Thirty-two percent (13/41) of case-persons and 13% (21/161) of control-persons visited water-collection sites (by themselves or with parents) during the case-persons' likely exposure period (ORM-H =5.0; 95% CI=1.5–17). Among children aged 9–59 months, the effectiveness of the single-dose measles vaccine was 75% (95% CI=25–92); vaccination coverage was 68% (95% CI=61–76) (12).

The measles outbreak investigation conducted in Zimbabwe in 2010 revealed that contact with a measles case [AOR= 41.14, 95% CI (7.47-226.5)], being unvaccinated against measles [AOR= 3.96, 95% CI (2.58-6.08)] and not receiving additional doses of measles vaccine [AOR 5.48, 95% CI (2.16-11.08)] were independent risk factor for contracting measles. Measles vaccination coverage for Zaka district was 75% (13).

The investigation done in Kyegegwa District in September 2015 disclosed that under 5 case-fatality rate was 25% , no history of vaccination against measles was found in 94% among the case-persons (i.e., measles patients who died) and 54% among the controls (i.e., measles patients who survived) (ORM-H = 12; 95% CI = 1.6–104), while 56% of case-persons and 67% of controls (ORM-H = 2.3; 95% CI =0.74–7.4) did not receive vitamin A supplementation during

illness. 63% among the case-persons and 6.3% of the controls (ORM-H = 33; 95% CI = 6.8–159) were not treated for measles illness at a health facility (a proxy for more appropriate treatment), while 38% of the case-persons and 25% of the controls (ORM-H = 2.5; 95% CI = 0.67–9.1) were malnourished (14).

Measles outbreak investigation in 2016 in Kebridahar District, Somali Regional state of Ethiopia found that the overall attack rate was 0.4/1,000 with zero case fatality. From the total cases, 51% were male and 49% were female, 55% of cases were 5-14 years age group. 61% of the cases and 24% of the controls didn't ever receive vaccination for measles. Cases that had contact history with another confirmed measles case (AOR=3.5, 95% CI (5.9, 21.4)); presence of measles case (s) in the neighboring household and or within the household (AOR=14.5, 95% (3.0, 7.0)) and (AOR=9.5, 95% CI (1.8, 4.8)) respectively and not vaccinating children from measles virus (AOR=5.6, 95% CI (1.3, 2.4)) were significantly associated with the outbreak (15).

Study conducted in 2011 in Harena and Dawe Serer districts of Bale zone Oromia Ethiopia revealed that over all case fatality rate (CFR) was 9.1%, in Dawe Serar 15.7 % and 2.9% in Herena and higher among females than males (12.2% vs. 6.1%). All deaths and 42.6 % of the cases were not vaccinated against measles. Vaccination coverage was 45.4% in Dawe-Serer and 54% in Herena. The attack rate was highest among those 15 years of age. About 71% refrigerators used for vaccine-storage were not functional (16).

The study in Guji zone Oromia Ethiopia in 2015 also showed 1059 suspected cases and two deaths were reported from 9 woredas affected by a measles outbreak in Guji zone. The cumulative attack rate of 81/100,000 population and case fatality ratio of 0.2% was recorded. 77.5% cases were < 15 years of age, and 70% were zero doses of measles vaccine. Although, all age groups were affected under five years old were more affected 48% than any other age groups. Children 6 months to 14 years old were targeted for outbreak response immunization and the overall coverage was 97 % (range: 90-103%). Case management with vitamin A supplementation, active case search, and health education was some of the activities carried out to curb the outbreak (17).

2.3. Objective

2.3.1. General Objective

To investigate and respond to measles outbreak in Hawi Gudina District of West Harerge Zone, Oromia Region, Ethiopia from February 18 to March 03, 2019

2.3.2. Specific objectives

- To confirm the existence of measles outbreak in Hawi Gudina District of West Harerge Zone, Oromia Region, Ethiopia from February 18 to March 03, 2019
- To describe outbreak by person, place and time in Hawi Gudina District of West Harerge Zone, Oromia Region, Ethiopia from February 18 to March 03, 2019
- To control outbreak by taking appropriate control and prevention methods in Hawi Gudina District of West Harerge Zone, Oromia Region, Ethiopia from February 18 to March 03, 2019

2.4. Methods and Materials

2.4.1. Study Area and Period

Measles outbreak investigation was conducted in Hawi Gudina District of Oromia Region from February 18 to March 03, 2019. West Harerge zone was one of the 20 zones found in Oromia region towards Eastern part of the country. It has 15 districts and 02 towns a total of 17 administrations. Hawi Gudina District is one the pastoralist districts found in West Harerge Zone of Oromia Regional State. Rimeti town is the center of the district. It found at 486 KM from Addis Ababa Capital of region and Country and 160 KM from Chiro town capital of the zone. The district is bounded by East by Burka Dhintu District by West by Arsi Zone by North by Daro Labu District and by South Bale Zone. It has 32 kebeles (lowest administrative unit in Ethiopia). The total population of the district in 2019 was 113,516 with female population 57,893 (51%) and Male 55,623 (49%) ; under 1 year old children 3655, under 5 years children 18651, less than 15 years children 54034 and 23649 Households. The district has 5 health centers, 23 health posts and 6 private clinics which serve the population of the district and neighboring districts.

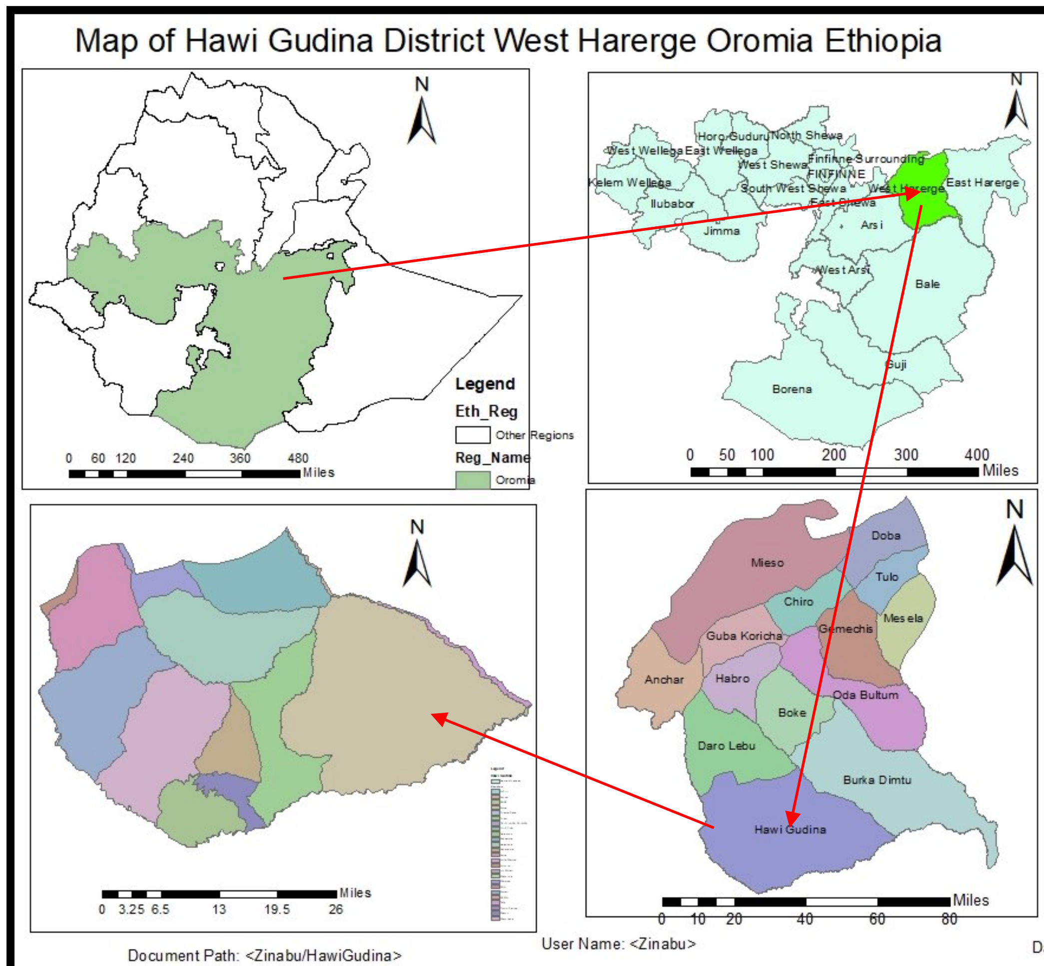

Figure 9 Map of Hawi Gudina District of West Harerge Zone of Oromia Region Ethiopia 2019

2.4.2. Study Design

We conducted descriptive epidemiologic study for 280 cases registered on line list

2.4.3. Population

2.4.3.1. Source population

All Population of Hawi Gudina district

2.4.3.2. Study population

Population affected by measles disease during current outbreak

2.4.4. Sample size and sampling technique

All 280 measles cases in the district were included in the study

2.4.5. Data Collection tools and method

Epidemiologic data were obtained by review of secondary data like registration books, case based reports, line list records, surveillance data and related documents from woreda health office, health center and health posts found in the catchment area using WHO measles case definition. Discussions were held with key informants about the cold chain management and Expanded Program for Immunization (EPI) coverage, reporting system and data quality.

2.4.6. Case definition

The case definition used was based on definition indicated in PHEM Guidelines and Measles Surveillance and outbreak management guidelines (2, 18)

Suspected case: Suspected measles case was defined as a person with fever, generalized maculopapular rash and at least one of the following: cough, runny nose (coryza) or conjunctivitis who resides in any of the affected kebeles during outbreak period in the district.

Confirmed case: A suspected measles case that is laboratory confirmed (IgM positive)

Epidemiologically linked case: A suspected case that does not have a serological confirmation but is linked (in place, person & time) to a laboratory confirmed case.

Measles outbreak: Occurrence of five or more suspected measles cases, from which three samples were IgM positive for measles in one month in a defined geographic area like kebele, woreda or health facility catchment area.

Measles death: - is defined as any death from an illness that occurs in a confirmed case or epidemiologically linked case of measles within 30 days of the onset of rash

2.4.7. Inclusion and Exclusion Criteria

2.4.7.1.Inclusion criteria

A case was any resident of Hawi Gudina District, who developed any of the following symptoms; fever and maculopapular rash (i.e. non-vesicular rash) and cough or coryza (runny nose) or conjunctivitis (red eyes) from January 11 to March 3, 2019 and registered on line list with full information.

2.4.7.2.Exclusion Criteria

Registered cases who does not full fill the case definition of measles

2.4.8. Data Quality

We checked quality of data in the line list for descriptive analysis. The registered data on the line list was checked against the registration books and patient cards for its quality and the missed variables were filled from the cards.

2.4.9. Data Analysis

We used Micro Soft Office Excel to register line list and check for error during registration and to prepare Epicurve and Epi Info 7 for descriptive analysis like frequency.

2.4.10. Ethical Clearance

Recommendation letter was written from Oromia Regional Health Bureau PHEM and Research Directorate to West Harerge Zonal Health Department for outbreak investigation and Response then the West Harerge zone wrote letter to the Hawi Gudina district health office and also assign a team which works with us. The interviewed bodies were asked for consent to give information after giving them necessary information on the purpose of investigation.

2.4.11. Result Dissemination

The study result was disseminated to AAU school of public health, Department of Preventive Medicine Ethiopia Field Epidemiology Training Program (EFETP), Federal Ministry of Health Ethiopia, Oromia Regional Health Bureau, West Harerge Zone Health Office and Hawi Gudina District Health office. It will be also send to scientific journals for publication.

2.5. Results

2.5.1. Descriptive Analysis

2.5.1.1. Description of measles cases by person

We identified 280 measles cases and 5 deaths during this outbreak which lasts from January 11, 2019 to March 03, 2019. Among them 238(85%) are females. The sex specific attack rate was 6.4 persons per 1000 females and 1.2 persons per 1000 males while over all attack rate was 3.8 people's per1000 populations (figure 2).

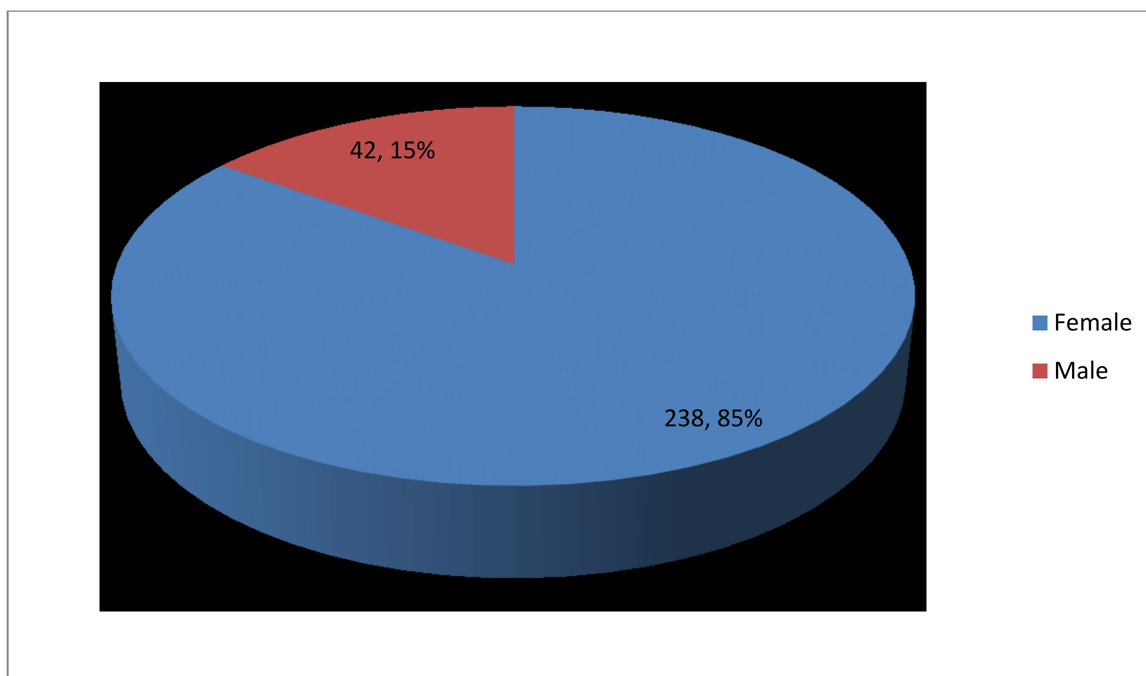

Figure 10 Description of Measles cases by sex in Hawi Gudina District of West Harerge Zone Oromia Region Ethiopia, March 2019

The age distribution of cases ranges from 2 months child up to 40 years old adult. The mean age of the cases was 7.92 and SD $\pm$ 7.93. Most cases 119 (42.5%) were 5-14 years followed by 105 (37.5%) 1-4 years age groups (figure 3).

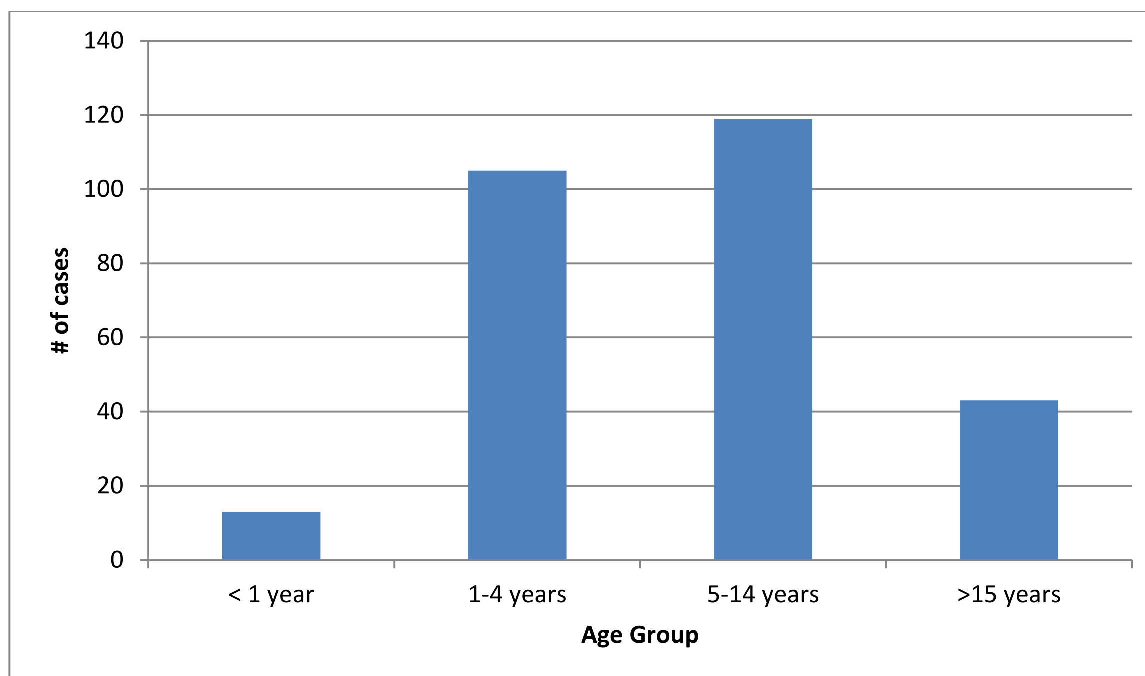

Figure 11 Distribution of measles cases by age group in Hawi Gudina District of West Harerge Zone Oromia Region Ethiopia, March 2019

The age specific attack rate was 10.9 per1000 populations for children 1-4 year's age group and 5.5 per 1000 populations for under 1 year age groups (Table 1).

Table 8 Age specific attack rate of measles cases in Hawi Gudina District West Harerge Zone Oromia Region Ethiopia, March 2019

S. No	Age group	Population at risk	No of cases	Percent	AR%
1	< 1 year	2356	13	4.6	0.55
2	1-4 years	9665	105	37.5	1.09
3	5-14 years	22805	119	42.5	0.52
5	≥15 years	38337	43	15.4	0.11
	All age group	73163	280	100	0.38

Vaccination status

Majority of the cases 149(53.2%) were not vaccinated against measles while 41(14.6%) of cases had unknown vaccination status (figure 4).

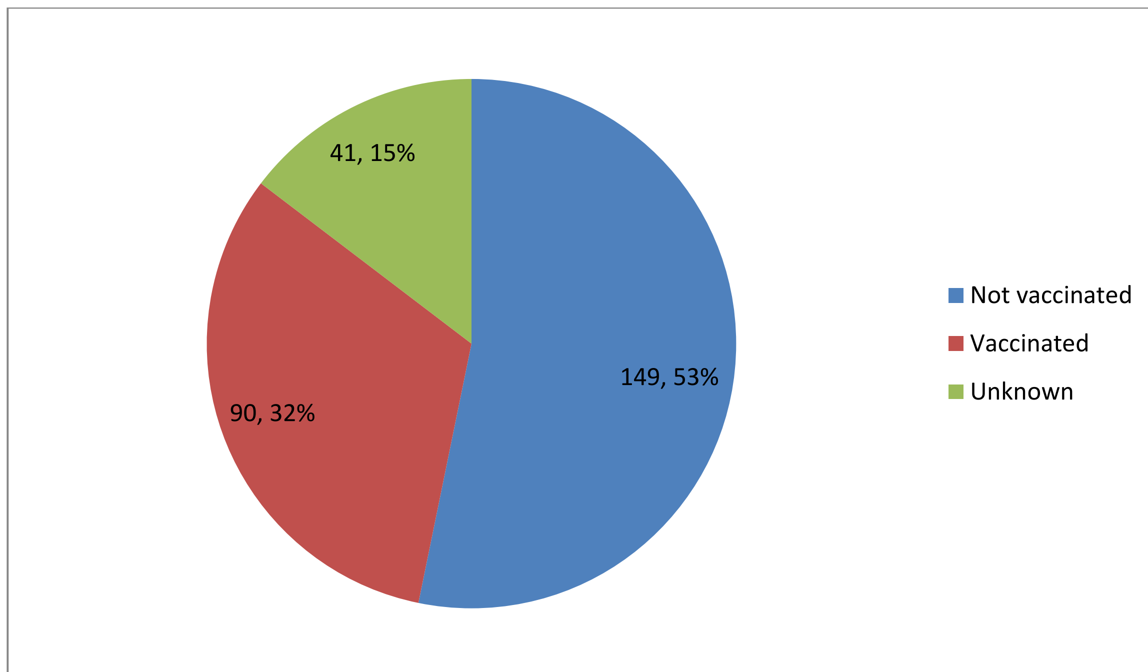

Figure 12 Vaccination statuses of measles cases in Hawi Gudina District of West Harerge Zone Oromia Region Ethiopia, March 2019

Admission status

Of the total 280 cases 53(18.9%) of them were treated by admission due to measles related complications (Table 2).

Table 9 Treatment settings of measles cases in Hawi Gudina District West Harerge Zone Oromia Region Ethiopia, March 2019

S. No	Treatment situation	Frequency	Percent
1	Outpatient	227	81.1
2	Inpatient	53	18.9
		280	100

Major sign and symptoms

The major sign and symptoms manifested by measles cases in the district were 280 (100%) Fever, 280 (100%) rash, 268 (95.7%) Runny nose, 261(93.2%) conjunctivitis, 259(92.5%) cough and diarrhea 74(26.4%) (Figure 5).

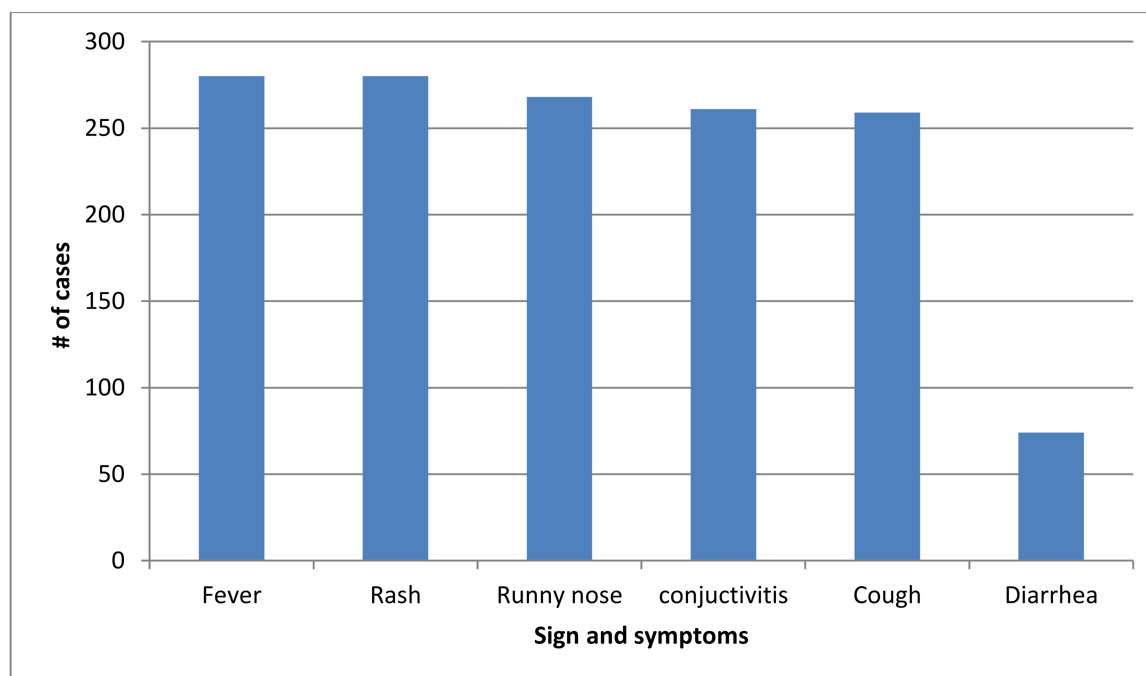

Figure 13 Major sign and symptom manifested by measles cases in Hawi Gudina District of West Harerge Zone Oromia Region Ethiopia, March 2019

Complication of measles cases

Pneumonia 78(43.3%) and Diarrhea 74(26.4%) were among major complications occurred during this outbreak. All 280 (100%) cases were supplemented with vitamin A and antipyretic drugs (figure 6).

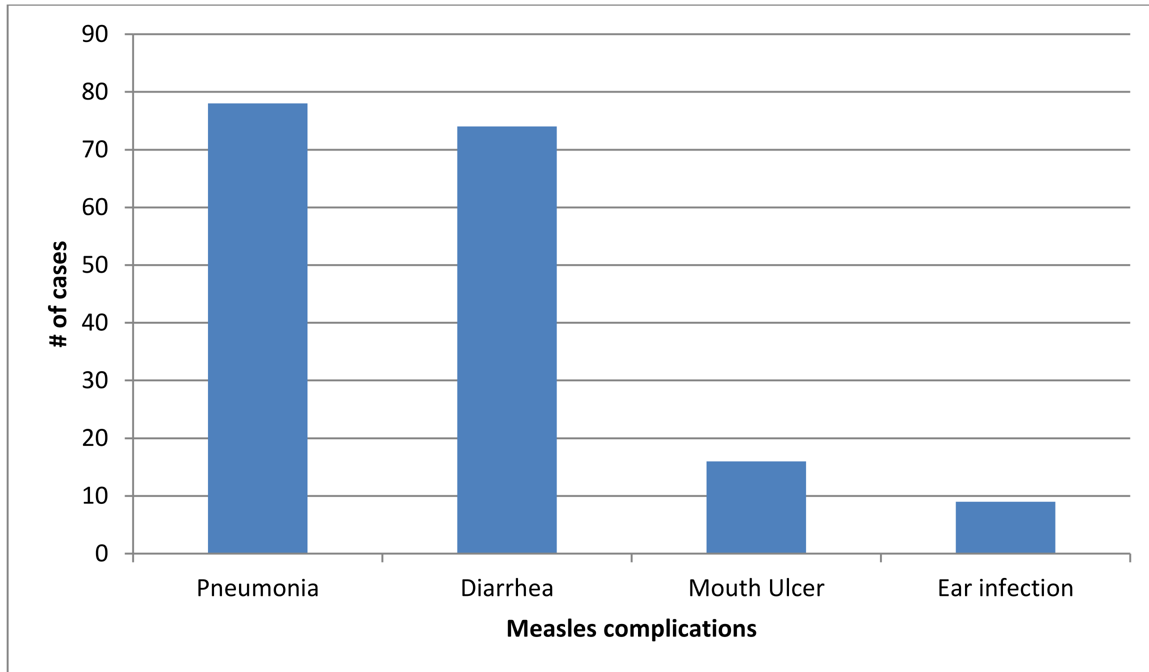

Figure 14 Complication of measles cases in Hawi Gudina District of West Harerge Zone Oromia Region Ethiopia, March 2019

Case fatality rate

There were 5(1.8%) deaths one facility death and four community death due to measles outbreak in the district (figure 7).

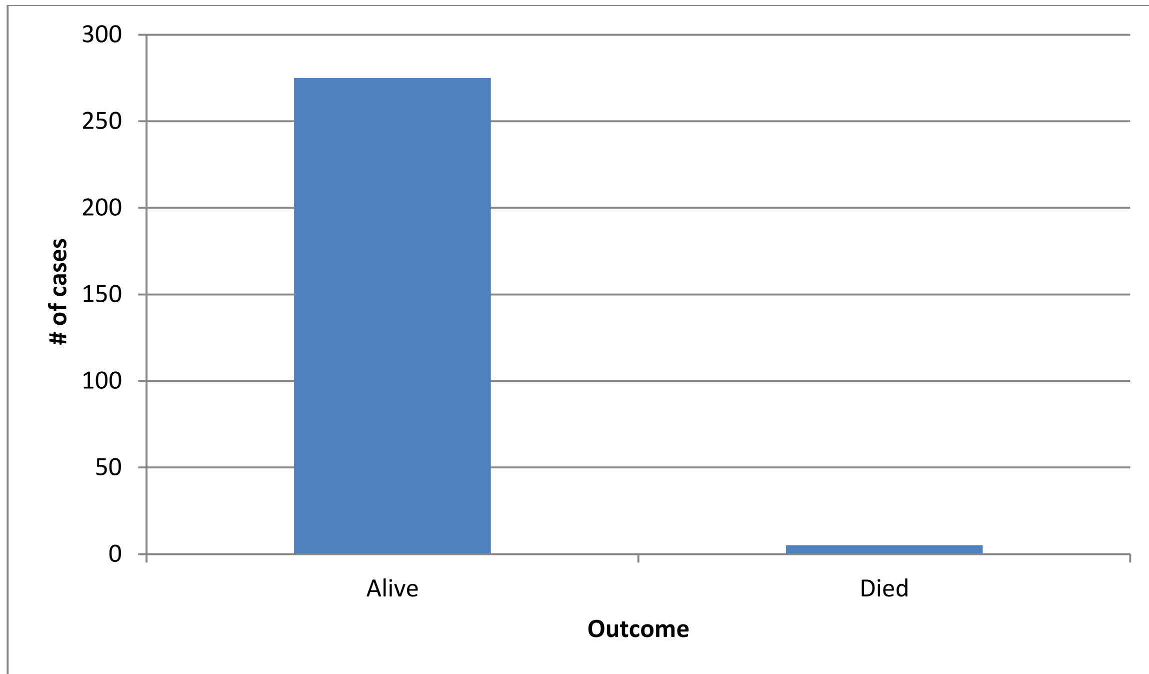

Figure 15 Outcome of measles cases in Hawi Gudina District West Harerge Zone Oromia Region Ethiopia, March 2019

2.5.1.2. Description of cases by place

The outbreak occurred in 19 (59.4%) kebeles where 73163 population of the district lives in. The largest the number of population attacked in Daro Gudo Kebele 87(31.07%) followed by Bu'i and Amenya kebeles which accounts 29 (10.36%) and 24 (8.57%) cases respectively (Table 3).

Table 10 Distribution of Measles cases by Kebeles in Hawi Gudina District of West Harerge Zone Oromia Region Ethiopia, March 2019

S. No	Kebele	Pop. At risk	No of cases	Percent	AR
1	Daro Gudo	6777	87	31.07%	1.28
2	Bu'i	5023	29	10.36%	0.58
3	Amenya	3124	24	8.57%	0.77
4	Kebenawa	5055	20	7.14%	0.40
5	Welenso	3478	17	6.07%	0.49
6	Qorkee	5323	16	5.71%	0.30
7	Wachu	6785	16	5.71%	0.24
8	Gada Hara	4445	15	5.36%	0.34
9	Mersu Chiro	1728	15	5.36%	0.87
10	H/Dhuga	2880	10	3.57%	0.35
11	Gara Dhima	3763	9	3.21%	0.24
12	Oda Kela	1906	7	2.50%	0.37
13	Hara Madda	3283	4	1.43%	0.12
14	Abona	2963	3	1.07%	0.10
15	Fedis	2753	2	0.71%	0.07
16	H/Ture	3071	2	0.71%	0.07
17	Haro Obba	2674	2	0.71%	0.07
18	Bate	2753	1	0.36%	0.04
19	H/Goba	5379	1	0.36%	0.02
	Total	73163	280	100.00%	0.38

2.5.1.3. Description of cases by time

The index case was first seen on January 14, 2019 at Rimeti health center. She is 8 years old female of Daro Gudo kebele resident who had no vaccination against measles disease. It was suspected that she had got disease from a guest who came to their home from Daro Labu district

whose child has a rash and stayed for a week in their home. The case has manifested rash on January 11, 2019 then came for treatment to health center. The outbreak lasts for about 53 days. The district health office notified zone health office lately after one month of outbreak on February 12, 2019 and Zone notified RHB on February 14, 2019 and the regional team started investigation and intervention on February 18, 2019 (figure 8).

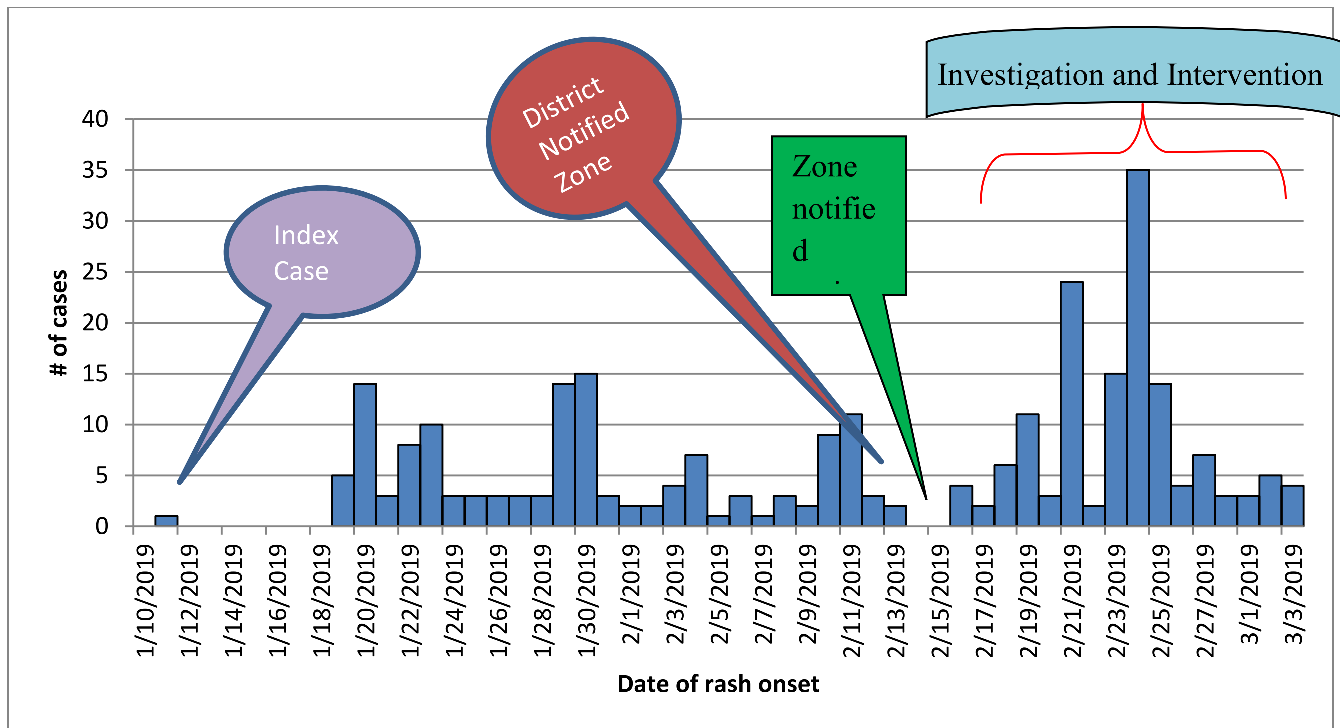

Figure 16 Epicurve showing number of measles cases by date of onset in Hawi Gudina District of West Harerge Zone Oromia Region Ethiopia, March 2019

The outbreak lasts from week 02 to week 09, 2019 the highest number of cases seen during week Eight 104(37.1%) followed by week five 47(16.8%) (figure 9).

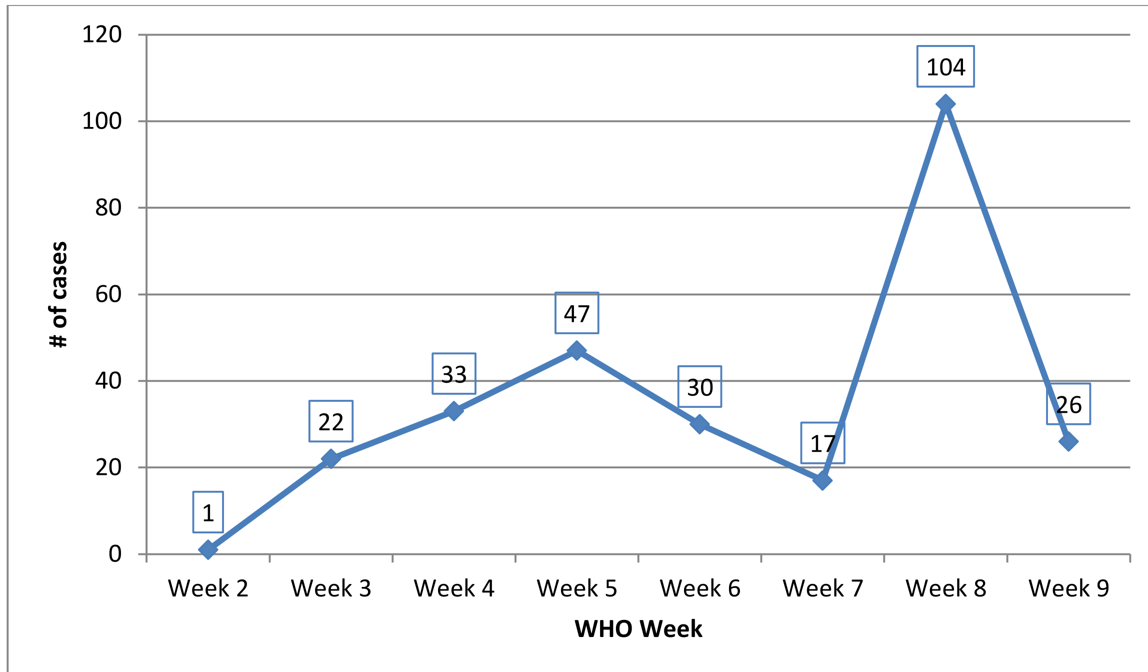

Figure 17 Distribution of measles cases by Weeks in Hawi Gudina District of West Harerge Zone Oromia Region Ethiopia, March 2019

2.5.2. Cold chain and vaccination coverage

Only 3 of 5 health centers can provide daily vaccination in the district. Measles vaccine was given bimonthly to minimize vaccine wastage in these three health centers. But the two health centers and all health posts conduct vaccination monthly due to shortage of power for the refrigerators. The temperature of refrigerators was not monitored daily in 2 of 3 health centers with functional refrigerators.

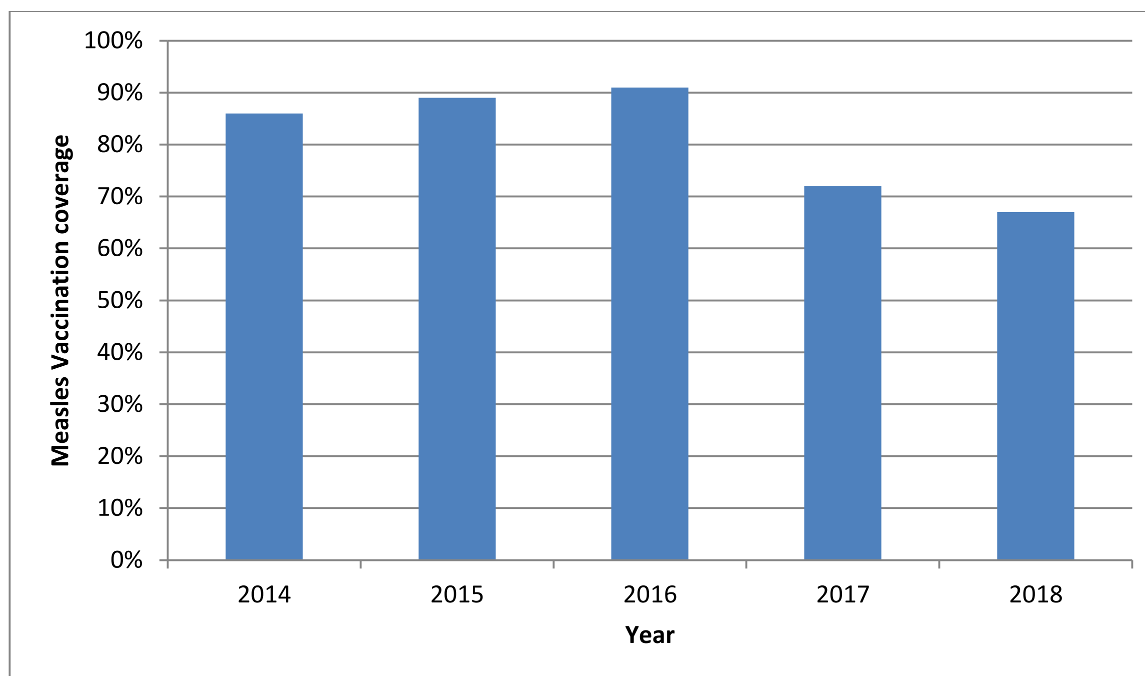

Figure 18 Measles Vaccination Coverage of Hawi Gudina District West Harerge Zone Oromia Region Ethiopia from 2014-2018

2.5.3. Laboratory Investigation

The sample was taken from five female cases at Rimeti Health center and sent to EPHI for investigation. All five tested samples were IgM positive for measles. The rest of the cases were epidemiologically linked cases and treated according to guidelines as measles cases.

2.5.4. Public Health Intervention

The Oromia Regional Health Bureau deployed a team to area which investigate and take necessary interventions. The team composed of Regional PHEM staff and FETP residents started work in the area first by communicating with zonal heath office staff and added additional member from West Harerge zone PHEM arrived at Hawi Gudina District on February 18, 2019. The team held discussions with District Health office staffs, the district administration, the health center staffs and Health extension workers. There were also discussions with Private health facilities, religious leaders and elders.

The district Task force established and held discussions then deployed the cabinet members of the district to all kebeles to mobilize the community and create awareness on mode of transmission, method of prevention and treatment seeking. The health centers staffs also assigned

to each kebeles of the district to create awareness by health education conduct active cases search, vitamin A supplementation and facilitate referral for complicated cases to health centers.

We supplied drugs like Vitamin A, TTC eye ointment, Amoxicillin, Ceftriaxone, IV fluids and others which used to treat the cases in the district.

We oriented the stakeholders about community case definition, standard case definition and management of cases. We supplied the measles guidelines for health office and health facilities in the district. The standard case definitions were posted to all health centers and health posts as well as private clinics.

We supported the staff members on how to fill the line lists, case based forms and analyze trends.

2.6. Discussion

The measles outbreak in Hawi Gudina District of West Harerge zone Of Oromia Region was confirmed since the five measles samples sent to National Laboratory were tested positive for Measles IgM. The national guideline indicated that if there were 5 suspected cases or 3 confirmed cases by laboratory it is possible to declare existence of measles outbreak in area (2, 18).

The overall attack rate was 3.8 per 1000 populations with case fatality rate of 1.8%. The attack rate was higher than outbreak occurred in Guji zone in 2015 with cumulative attack rate of 81/100,0000 populations and Mayuge District of Uganda with attack rate of 4/10,000 population (12, 17). The case fatality rate was lower than outbreak occurred in Harena and Dawe Serer District of Bale zone in 2011 with CFR of 9.1% and Kyegegwa District of Uganda in 2015 with 25% CFR (14, 16) and higher than outbreak in Guji Zone in 2015 with 0.2% CFR (17).

Most of the cases were female 238 (85%) and the sex specific attack rate was 6.4 persons per 1000 females and 1.2 persons per 1000 males is different from outbreak occurred in Kebridehar in 2016 where 51% of cases were males (15).

The affected population age ranges from 2 months infant to 40 years old adult with mean age of was 7.92 and SD $\pm$ 7.93. Most cases 119 (42.5%) were 5-14 years followed by 105 (37.5%) 1-4 years age groups with over all under 15 years accounts 84.6% which is similar to outbreak occurred in Guji Zone in 2015 where 77.5% of cases were < 15 years old (17).

According to administrative report the measles vaccination coverage of the district in the last five years was ranges from 67% in 2018 to 91% in 2016 with average of 81% of children vaccinated against measles. The same vaccination coverage observed in outbreak occurred in Mayuge District of Eastern Uganda in 2016 and Zaka district of Zimbabwe in 2010 with 68% and 75% measles vaccine coverage respectively (12, 13). The vaccination coverage of the district is low when compared to set target of 95% coverage by creating herd immunity to eliminate measles by 2020 from Africa Region (3).

From the affected population 149 (53.2%) of them were not vaccinated against measles while 41 (14.6%) had unknown vaccination status. Similarly outbreak occurred in Kebridehar in 2016

revealed that 61% of cases, in 2011 in Harena and Dawe Serer 42.6% of cases and all deaths, in 2015 in Guji 70% and in 2015 in Kyegegwa district of Uganda 94% had not vaccinated against measles (14-17).

2.7. Conclusion

This measles outbreak highly affected the group of population aged less than 15 years old and who had not vaccinated against measles. Low Measles vaccination coverage and weak surveillance system contributed to the spread of the disease in the district.

2.8. Recommendation

The district health office has to improve routine vaccination coverage to immunize all eligible children of the district in order to prevent future occurrence of measles outbreak. The refrigerators found in health centers and health posts should have to be functional in order to provide daily vaccination. All under 15 years age groups should have to be vaccinated against measles by supplemental immunization activities (SIA) to access those missed by routine immunization schedule and cover accumulated at risk population. The surveillance system of the district should have to improve its capacity to detect and manage outbreak as early as possible by training health workers in the district and creating awareness of Volunteers, health development army, religious and local leaders and other community members.

The west Harerge Zone Health office and Nongovernmental organizations working in the area should support the district health office to improve cold chain management system, improve vaccination coverage and strengthen the surveillance system by providing training for health workers, health extension workers and creating awareness for the whole community on immediately reportable diseases like measles in order to of the district.

The Oromia Regional Health Bureau along with its partners should support to conduct SIAs in the district.

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Chapter Two

Surveillance Data Analysis

2.1. Meningococcal Meningitis Surveillance Data Analysis of Oromia Region, Ethiopia 2013 – 2017

Abstract

Introduction: - Meningitis remains a serious global health problem. The infectious agent for meningococcus meningitis is *Neisseria meningitidis*. Epidemics occur in African "meningitis belt which extends from Ethiopia to Senegal. The aim of study was to describe distribution of meningococcal meningitis in Oromia regional state in past five years from 2013 to 2017.

Method: We conducted Cross sectional study design based on Retrospective record review of secondary surveillance data to collect and analyze five year (2013 – 2017) meningitis surveillance data of Oromia Region and data was compiled, analyzed and interpreted from March 01- 18, 2018. Data was analyzed by using Microsoft Office Excel 2007.

Result: There were 2665 suspected meningitis cases and 74 deaths reported from 2013-2017. Average incidence was 1.57 per 100000 populations. The highest case fatality rate 4.72% in 2015 and lowest 4(1.03%) at 2016 and over all case fatality rate was 2.78%. It was highly incident in Horro Guduru Wollega, West Guji, and Borena Zones with incidence rates of 9.90, 8.92 and 6.28 per 100,000 persons respectively.

Conclusion: The Incidence of Meningitis in the region was fluctuating from year to year reduced from 2013 to 2016 and showed slight increment in 2017. The disease was highly incident in West and South part of the region and during dry season of the year from December to May rarely in wet season like July. We recommend strengthening routine surveillance system, improving capacity of health facilities and aligning the report of weekly PHEM report and Monthly HMIS reports.

Key words: Meningitis, Surveillance, Oromia, Ethiopia

2.1.1. Introduction

Meningitis remains a serious global health problem. The term "meningitis" describes the inflammation of the membranes (meninges) and/or cerebrospinal fluid (CSF) that surrounds and protects the brain and spinal cord. Meningitis can result from many causes, both infectious and non infectious. Bacterial meningitis is a life threatening condition that requires prompt recognition and treatment. The most common causes of bacterial meningitis are *Niesseria meningitidis, Streptococcus pneumoniae, and Haemophilus influenzae.* All of them are respiratory pathogens and spread from person to person by close contact with respiratory secretions. Once acquired, each species can colonize the mucosa of the oropharynx, which is known as pharyngeal carriage and from there they cross the mucosa & enter blood then they can reach meninges causing meningitis or other body sites causing other syndromes (1).

The infectious agent for meningococcus meningitis is *Neisseria meningitidis*, a Gram-negative aerobic diplococcus. Invasive disease includes meningitis, bacteraemia, sepsis, or, less commonly, pneumonia, arthritis, and pericarditis. Case-fatality rates are high, at approximately 8–15%. Ten to 20% of survivors suffer long-term sequelae, including mental retardation, hearing loss, and loss of limb use. Infants younger than one year of age are at the highest risk of infection, followed by 15–24 year olds. Close and prolonged contact – such as kissing, sneezing or coughing on someone, or living in close quarters (such as a dormitory, sharing eating or drinking utensils) with an infected person (including a carrier) – facilitates spread of the disease. The average incubation period is four days, but can range between two and ten days (2).

There are 12 serogroups of N. meningitidis that have been identified, 6 of which (A, B, C, W, X and Y) can cause epidemics. Geographic distribution and epidemic potential differ according to serogroup. The bacteria are transmitted from person-to-person through droplets of respiratory or throat secretions from carriers. The average incubation period is 4 days, but can range between 2 and 10 days. Neisseria meningitidis only infects humans; there is no animal reservoir. The most common symptoms are a stiff neck, high fever, sensitivity to light, confusion, headaches and vomiting. Even when the disease is diagnosed early and adequate treatment is started, 5% to 10% of patients die, typically within 24 to 48 hours after the onset of symptoms (3).

Meningococcal meningitis, commonly designated as cerebrospinal meningitis, is the only form of bacterial meningitis which causes epidemics. Epidemics can occur in any part of the world. However, the largest epidemics occur mainly in the semi-arid areas of sub-Saharan Africa, designated the African "meningitis belt. The African meningitis belt extends from Ethiopia in the East, to Senegal in the West, mainly within the range of 300 mm to 1,100 mm annual rainfall. In this area sporadic infections occur in seasonal annual cycles while large-scale epidemics occur at greater intervals with irregular patterns. The countries within the meningitis belt are Benin, Burkina Faso, Northern Cameroon, Chad, Ethiopia, The Gambia, Ghana, Mali, Niger, Northern Nigeria, Senegal and Sudan. In the meningitis belt countries, the estimated incidence for the 20-year period 1970-1992 was about 800,000 cases. During the dry season, between December and June, because of dry windy conditions and higher incidence of upper respiratory tract infections, the local immunity of the pharynx is diminished thereby increasing the risk of meningitis (4).

During dry season Incidence rate in Meningitis belt is 10-100 cases per 100,000 populations and the area is punctuated by explosive epidemics which occur in 8-12 years cycle (incidence rate > 1000 cases per 100000 populations during cyclic epidemics). Meningitis epidemics are generally caused by serogroup A, although outbreaks have also been caused by serogroups C, W135, and X. outbreaks of different serogroups may overlap, therefore, laboratory confirmation is important both to recognize and monitor the progression of out breaks (1).

Since the late 1990s, a sustained decline in the incidence of meningococcal disease has been observed in the United States, decreasing from 1.3 cases per 100,000 populations in 1996 to 0.12 cases per 100,000 populations in 2015. This decline in incidence began prior to the introduction of MenACWY vaccine in adolescents in 2005 and the licensure of MenB vaccines in 2015. Incidence of serogroups B, C, and Y, the primary disease-causing serogroups in the United States, has declined and incidence of serogroup W has remained stably low (5).

In European Union countries Meningitis occurs as sporadic, outbreaks and large epidemics. Its Incidence rate was 0.68 cases per 100 000 population in 2012 and country specific rates of confirmed invasive Meningitis ranging from 0.11 to 1.77 cases per 100 000 population. Most cases of invasive meningococcal disease are caused by serogroups B and C, with serogroup B being dominant. Disease caused by serogroup Y has been increasing although it is still less frequent than B and C (6).

In Ethiopia, meningitis outbreaks have been described in written reports since 1901. Outbreaks were reported in 1935, 1940, 1950, 1964, 1981 and 1989. The 1981 and 1989 outbreaks were the largest ever recorded in Ethiopia with 50,000 and 45,806 cases, and 990 and 1686 deaths respectively. The 1981 outbreak affected the northern and western part of Ethiopia. Between March and August 2000 there was an outbreak in Addis Ababa with 850 cases and 33 deaths. During 2001 major epidemic was recorded with 6964 cases and 330 deaths followed by another epidemic during 2003-2004 epidemic seasons which recorded a total of 3326 cases and 160 deaths from all regions and was not limited to the traditional meningitis belt areas of North West and South Western part of the country. In the epidemic season 2005 a total of 1061 cases with 46 deaths were reported from four regions while epidemic in the year 2006 affected all Regions with a report of close to 3000 cases. Out of these cases 1300 cases (45%) with 43 deaths were reported from three regions, namely Oromia, SNNPR and Tigray (7).

During 2010, the country reported 1611 cases with 21 deaths from 23 woredas in Oromia, SNNPR, Amhara and Tigray while close to 1200 cases with 30 deaths (2.5%) from Oromia, SNNPR, Amhara and Gambella were recorded during the year 2011 and major epidemic was reported in 2013 from all zones of SNNP and central and south parts of Oromia region with report of 1466 cases with 40 deaths (Case fatality rate 2.7%) (7).

In 2007 EFY in Ethiopia the meningitis incidence rate was 2 per 100,000 population and case fatality rate was 3.3%. In the same year incidence rate in the Gambella, Tigray, Benishangul-Gumuz, SNNPR, and Oromia were 21, 6, 4,4 and 2 per 100,0000 population respectively while case fatality rate was 9.3% in Gambella, 6.9% in Benishangul-Gumuz and 4% in Oromia region (8).

The Retrospective study done from 2007 - 2011 in Hawassa and Gondar University Hospital showed that a higher prevalence of bacterial meningitis in males with an observed male to female ratio of 1.7:1 at Gondar and 1.9:1 at Hawassa. The disease incidence was highest in small children and young adults. Infants were the most commonly affected age group at Gondar University Hospital which formed almost 27% of the cases. Young adults between 15-24 years of age were among the most effected age groups at Hawassa Referral Hospital and also accounted to about 27% of the cases. A marked effect of seasonal variation was observed with more cases occurring in the summer months. Almost 35% of the cases of bacterial meningitis at

Gondar were recorded in the months of May and June. Culture specific results show that this variation was most pronounced in meningococcal disease in which almost 2/3 of the cases (67%) occurred in the dry season during the second quarter of the year i.e. April to June (9).

The Retrospective secondary surveillance data analysis of meningococcal meningitis conducted in Oromia region from 2009-2013 showed a total of 2498 suspected cases and 66 deaths (CFR 2.6%) with annual incidence of 1.64% were identified. During this time the highest number of cases were reported from Horo Guduru Wollega zone 394(15.8%), West Arsi Zone 377(15.1%), and Guji zone 260(10.4%) with annual incidence of 12.04, 3.25, 3.37 per 100,000 population respectively. The highest number of cases from Horo Guduru wollega was attributed to the epidemics of meningococcal meningitis in May 2013 outbreak with 244 cases and 2 deaths (CFR 0.8%) from Hababo Guduru woreda. The overall attack rate was 46/10,000 and the highest rate was among children aged 5-14 years (AR=79/10,000) during this outbreak situation (10).

Study on 2013 epidemic shows that a total of 1454 Meningococcal meningitis cases 40 death were reported from three regional states to PHEM through Line List in 2013. Of the total cases reported 918 (63.1 %), 527 (36.2) and 9 (0.61%) were from SNNP, Oromia and Tigray, respectively. From the total reported case 801(55%) were females and 656(45%) males (11).

Rationale of the study

Since our country Ethiopia is located in African Meningitis Belt it is important to deal with the epidemiology of meningitis as it is major public health problem with high case fatality rate especially during epidemics.

Oromia region, the largest region in the country by its population and geographical landscape, is also among affected region by meningitis epidemics and there is also high number of suspected meningitis cases each year reported via weekly PHEM reports. As we see from different literatures the region was affected by rounds of meningitis epidemics. So it is important to analyze and describe the meningitis cases in the past five years from 2013 to 2017 as well as put important recommendations and the control and prevention strategies under taken in the previous years will be evaluated.

2.1.2. Objective

2.1.2.1. General Objective

To describe distribution of meningococcal meningitis in Oromia regional state in past five years from 2013 to 2017

2.1.2.2. Specific objective

- To describe meningitis morbidity by time, place and person in Oromia region from 2013 to 2017
- To describe meningitis mortality by time, place and person in Oromia region from 2013 to 2017
- To assess trend of meningitis in Oromia region from 2013 to 2017

2.1.3. Methodology

2.1.3.1. Study area

The study was conducted in Oromia regional state, which is one of the nine regional states in the Federal Democratic Republic of Ethiopia.

2.1.3.2. Study Design

Cross sectional study design based on Retrospective record review of secondary surveillance data of meningitis was conducted to collect and analyze five year (2013 – 2017) meningitis surveillance data of Oromia Region.

2.1.3.3.Target population

All the population living in the Oromia regional state

2.1.3.4.Study population

All individuals suspected of meningitis in Oromia Region, in a five years time from 2013 to 2017

2.1.3.5.Study period

Meningitis surveillance data of the region from 2013 to 2017 was compiled, analyzed and interpreted from March 01 to March 18, 2018.

2.1.3.6.Data collection procedure

Archived data on meningitis for the last five years (2013- 2017) from Oromia Regional health Bureau PHEM and Research directorate was reviewed and collected. All five year weekly surveillance reports sent to Oromia PHEM from all zones and town administration health facilities was analyzed to describe the burden and distribution of meningitis in the region.

2.1.3.7.Data analysis and processing

Data was organized, processed and analyzed by using Microsoft Office Excel 2007 and presented appropriately.

2.1.3.8.Case definition

Based on the Ethiopian National Guideline on Meningococcal Meningitis Surveillance and Outbreak Management, First edition, November 2013:

Suspected case: Any person with sudden onset of fever (>38.5 °C rectal or 38.0 °C axillary) and one of the following signs: neck stiffness, altered consciousness, or other meningeal signs such as bulging fontanel, convulsion.

Probable case: Any suspected case with turbid or purulent CSF or with microscopic examination showing Gram-negative diplococci.

Confirmed case: A suspected or probable case confirmed by isolation of Neisseria meningitidis from CSF or blood by culture, PCR or agglutination test were used.

2.1.3.9.Ethical consideration

The data was obtained from PHEM archive via permission of PHEM director and it is kept confidential.

2.1.3.10. Dissemination of result

The report was submitted to AAU School of public health Department of Field Epidemiology and Oromia Regional Health Bureau.

2.1.4. Results

There were 2665 suspected meningitis cases and 74 deaths reported in the last five years, from 2013-2017, in Oromia region via weekly PHEM reports. The largest number of cases was reported in 2013 701(26.3%) followed by 681(25.55%) cases in 2014. The highest case fatality rate 4.72% was registered in 2015 and lowest 4(1.03%) was at 2016. Average incidence in the last five years was 1.57 per 100000 populations which ranges 1.11 per 100000 in 2016 to 2.19 per 100000 populations.

Table 11 : Meningitis incidence and mortality in Oromia Region, Ethiopia from 2013-2017

Year	Population at risk	No of cases	No of deaths	Percent	Incidence /100000	Death /100000	Case fatality rate
2013	32,046,915	701	24	26.30	2.19	0.07	3.42
2014	32,815,995	681	20	25.55	2.08	0.06	2.94
2015	33,692,000	381	18	14.30	1.13	0.05	4.72
2016	34,880,772	387	4	14.52	1.11	0.01	1.03
2017	35,875,159	515	8	19.32	1.44	0.02	1.55
Total		2665	74	100.00	1.57	0.04	2.78

Trend of Meningitis

The suspected meningitis disease morbidity was decreasing from 2013 to 2016 and there was a minor increment in 2017.

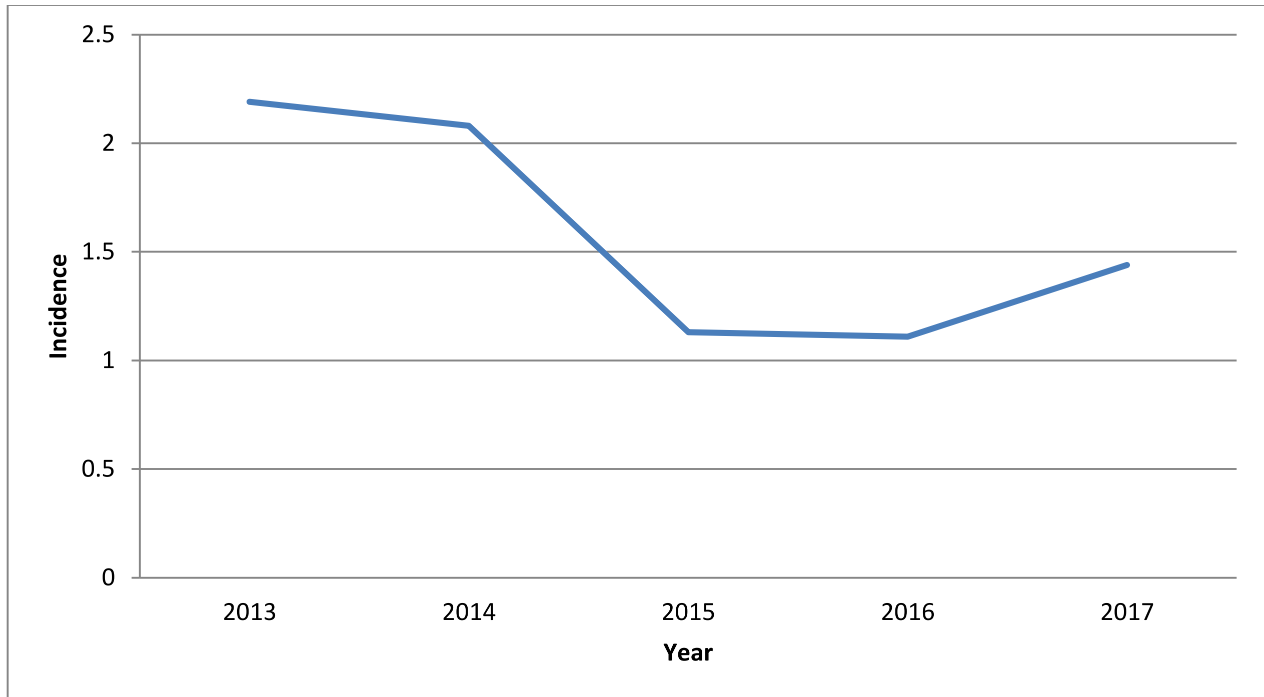

Figure 19 Suspected Meningitis Trend in Oromia Region, Ethiopia from 2013 to 2017

Distribution of Morbidity and Mortality by zone

The highest number of cases was reported from Horro Guduru Wollega zone 354 (13.28%) followed by Borena zone and Bale zone 338 (12.68%) and 328 (12.31%) respectively based on their share from regional total cases. But the disease was highly incident in Horro Guduru Wollega, West Guji, and Borena Zones with incidence rates of 9.90, 8.92 and 6.28 per 100,000 persons respectively. Its incidence was lower in North Shoa (0.07/100,000 persons), Kellem Wollega (0.20 /100,000 persons) and Arsi (0.24/100,000 persons) zones.

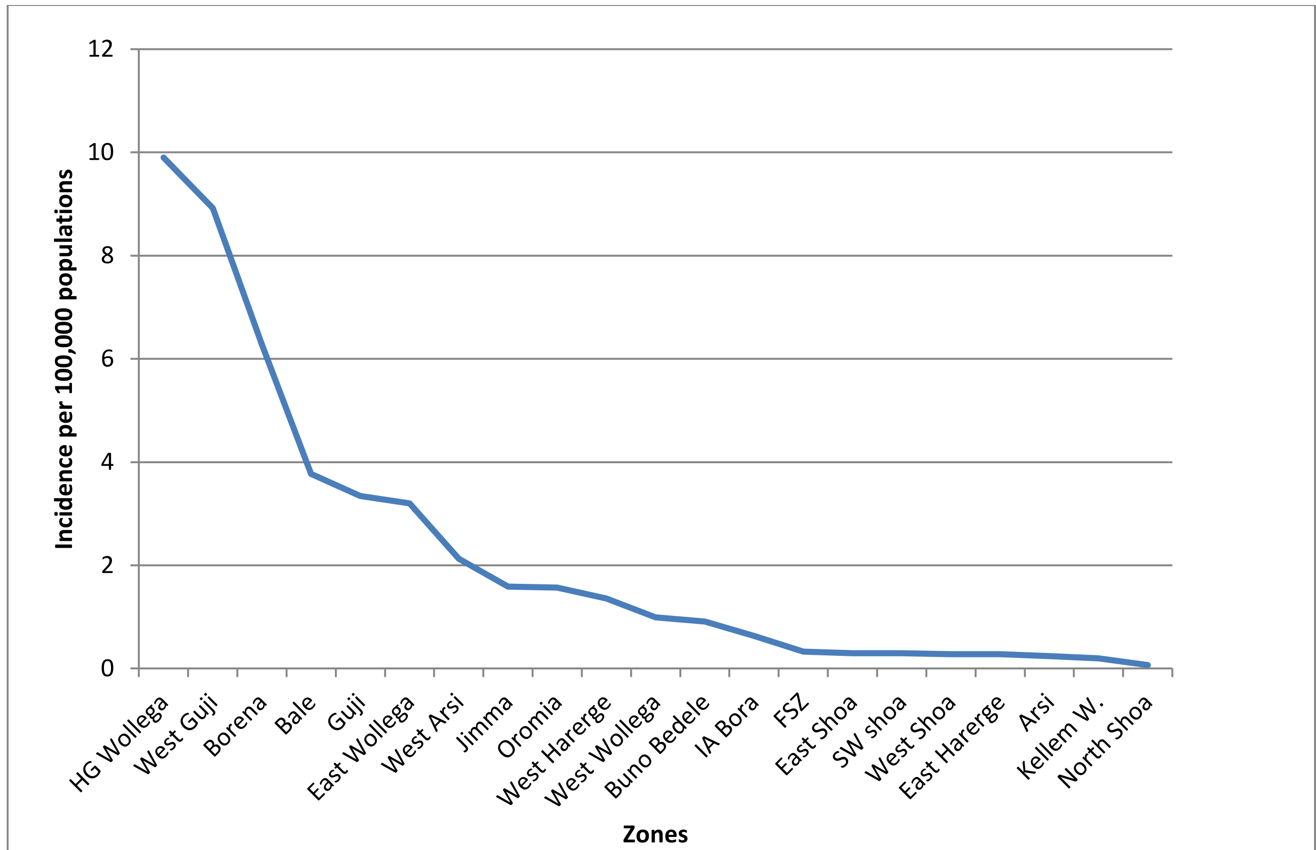

Figure 20: Meningitis Incidence by zones in Oromia Region, Ethiopia 2013-2017

The large number of deaths occurred in West Wollega zone 19(25.68%), Bale zone 13(17.57%) and East Shoa zone 10(13.51%). The highest case fatality rate was registered in East Shoa 10(34.48%) followed by West Wollega zone 19(22.62%) and Ilu Abba Bora 3(6.67%) zone. There were no deaths occurred in Arsi, West Shoa, Buno Bedele , Finfinne Zuria Special zone, East Harerge, East Wollega, Kellem Wollega, North Shoa and South west Shoa zones.

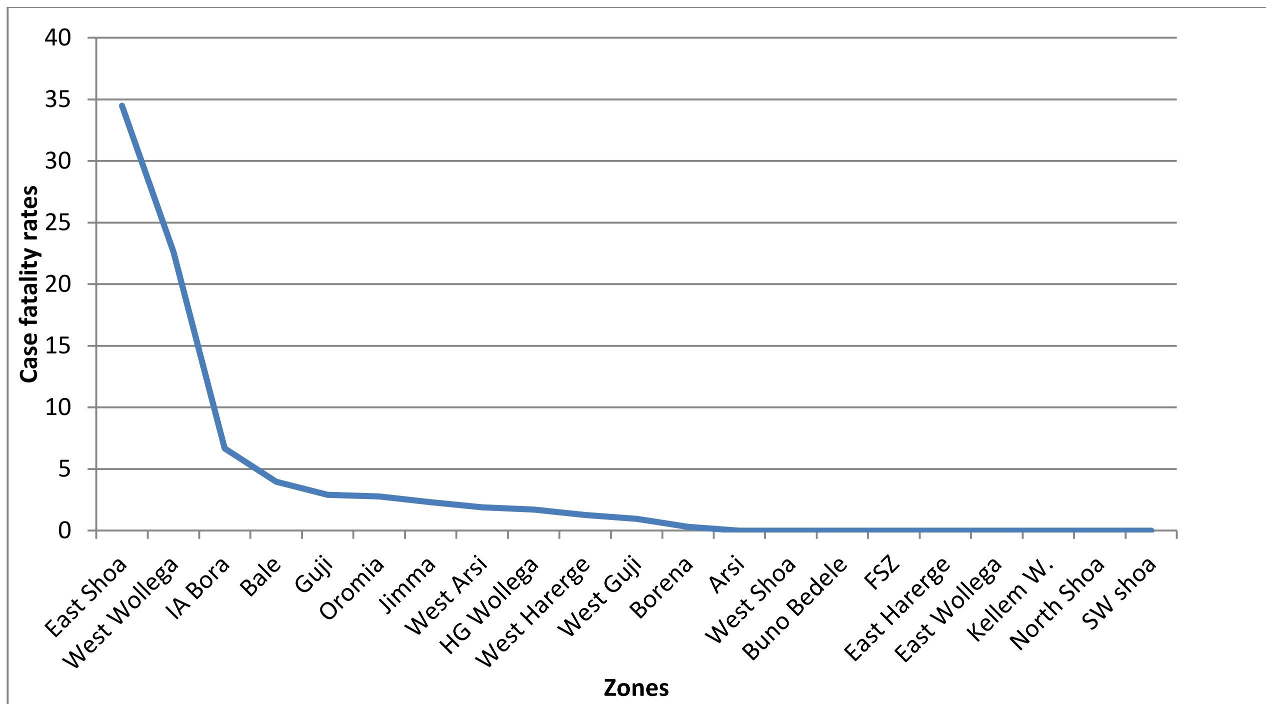

Figure 21: Meningitis case fatality rates By zones in Oromia Region, Ethiopia 2013-2014

Meningitis Incidence and Case Fatality rate by zones

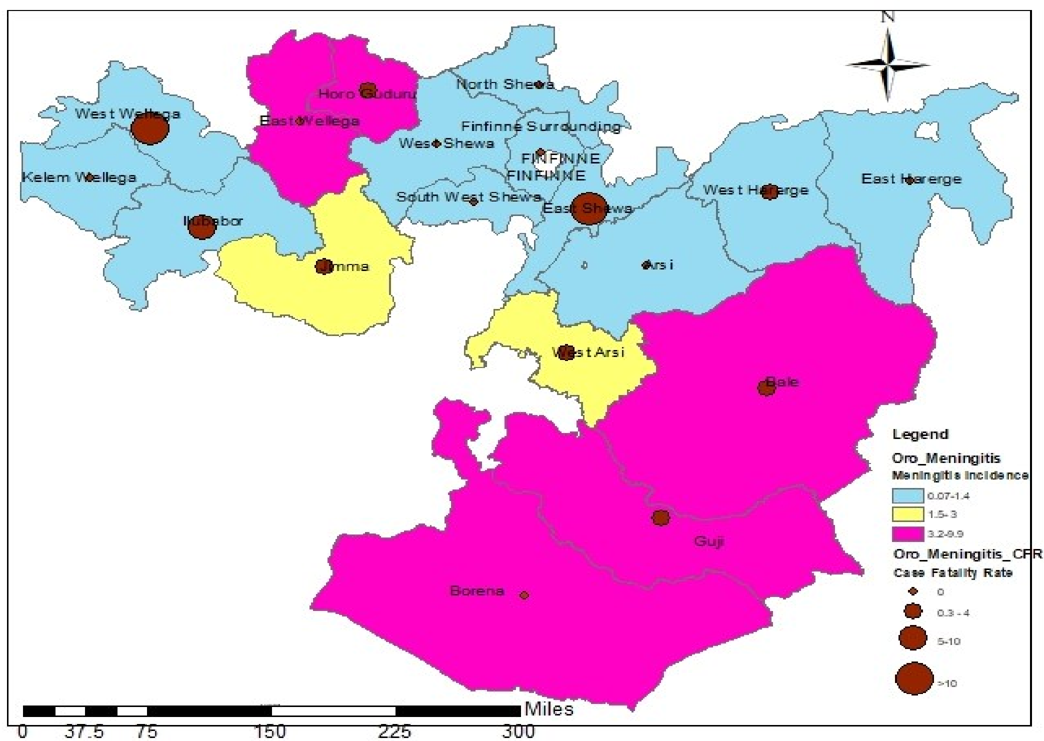

Figure 22 Meningitis incidence and case fatality rate by zones in Oromia region Ethiopia 2013-2017

Seasonal distribution of Meningitis Morbidity and Mortality

Distribution of cases by month

The majority of the cases were registered in May 464(17.41%) followed by July 340(12.76%), March 278(10.43%) and February 245(9.19%) in which these four months accounts around 50% of total cases treated in all months. Most of the death happened in January 14(18.92%) followed by March, May and October in which 9(12.16%) deaths occurred at each month and No death occurred in September. The highest case fatality rate was 6.67% in January followed by 5.96% in October and 4.03 In August.

Table 12: Meningitis monthly mortality and morbidity distribution in Oromia Region, Ethiopia 2013-2017

S. No	Month	No of Cases	Percent	No of Deaths	Percent	Case Fatality Rate
1	January	210	7.88	14	18.92	6.67
2	February	245	9.19	2	2.70	0.82
3	March	278	10.43	9	12.16	3.24
4	April	216	8.11	7	9.46	3.24
5	May	464	17.41	9	12.16	1.94
6	June	175	6.57	5	6.76	2.86
7	July	340	12.76	8	10.81	2.35
8	August	124	4.65	5	6.76	4.03
9	September	120	4.50	0	0.00	0.00
10	October	151	5.67	9	12.16	5.96
11	November	130	4.88	3	4.05	2.31
12	December	212	7.95	3	4.05	1.42
	Total	2665	100	74	100	2.78

Distribution of cases by month and year

The peak distribution of cases varied from year to year among different months; in 2013 the highest incidence was in May 229 cases, in 2014 in July 220 cases, in 2015 in January 77 cases, in 2016 in March 49 cases and in 2017 in December 66 cases occurred.

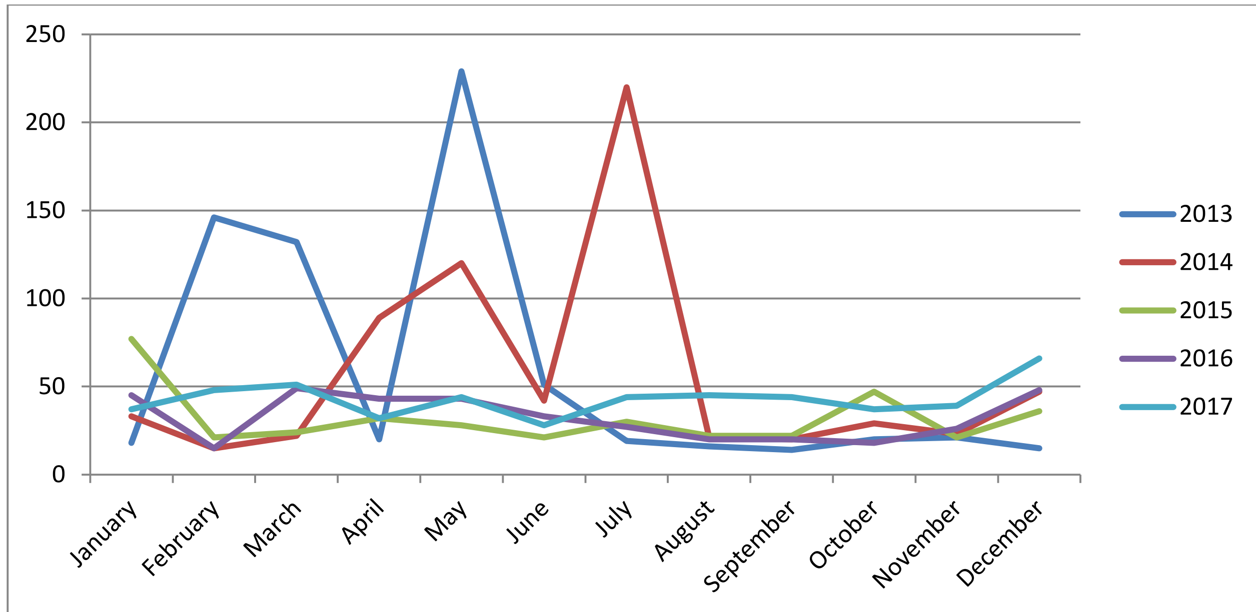

Figure 23: Meningitis case distribution by month for each year in Oromia Region, Ethiopia 2013-2017

Distribution of cases by Week

The peak incidence happened in week _30 218(8.18%) followed by week_ 19 162(6.08%) and week _10 100(3.75%) of total cases.

Table 13: Meningitis weekly distribution in Oromia Region, Ethiopia 2013-2017

WHO Week	No of Cases	Percent	No of deaths	WHO Week	No of Cases	Percent	No of deaths
1	51	1.91	9	**28**	43	1.61	2
2	49	1.84	3	**29**	23	0.86	6
3	50	1.88	0	**30**	218	8.18	0
4	27	1.01	1	**31**	29	1.09	0
5	26	0.98	1	**32**	37	1.39	0
6	49	1.84	1	**33**	20	0.75	3
7	88	3.3	0	**34**	23	0.86	2
8	64	2.4	1	**35**	37	1.39	0
9	51	1.91	0	**36**	24	0.9	0
10	100	3.75	0	**37**	31	1.16	0
11	60	2.25	1	**38**	38	1.43	0
12	56	2.1	2	**39**	24	0.9	0
13	55	2.06	6	**40**	23	0.86	5
14	61	2.29	1	**41**	29	1.09	0
15	50	1.88	3	**42**	26	0.98	2
16	39	1.46	0	**43**	42	1.58	1
17	55	2.06	1	**44**	42	1.58	2
18	67	2.51	5	**45**	33	1.24	1
19	162	6.08	1	**46**	40	1.5	1
20	83	3.11	5	**47**	22	0.83	0
21	90	3.38	0	**48**	27	1.01	0
22	73	2.74	0	**49**	32	1.2	1
23	59	2.21	2	**50**	49	1.84	1
24	35	1.31	2	**51**	59	2.21	0
25	47	1.76	1	**52**	61	2.29	1
26	34	1.28	0	**53**	11	0.41	0
27	41	1.54	0	**Total**	2665	100	74

Distribution of cases by Visit or treatment settings

The majority of the cases 1492(55.98%) were treated in inpatient settings or admitted to hospital beds while the rest 1173(44.02%) of the cases were treated at outpatient departments. In all years except 2014 majority of cases were treated in inpatients by admission.

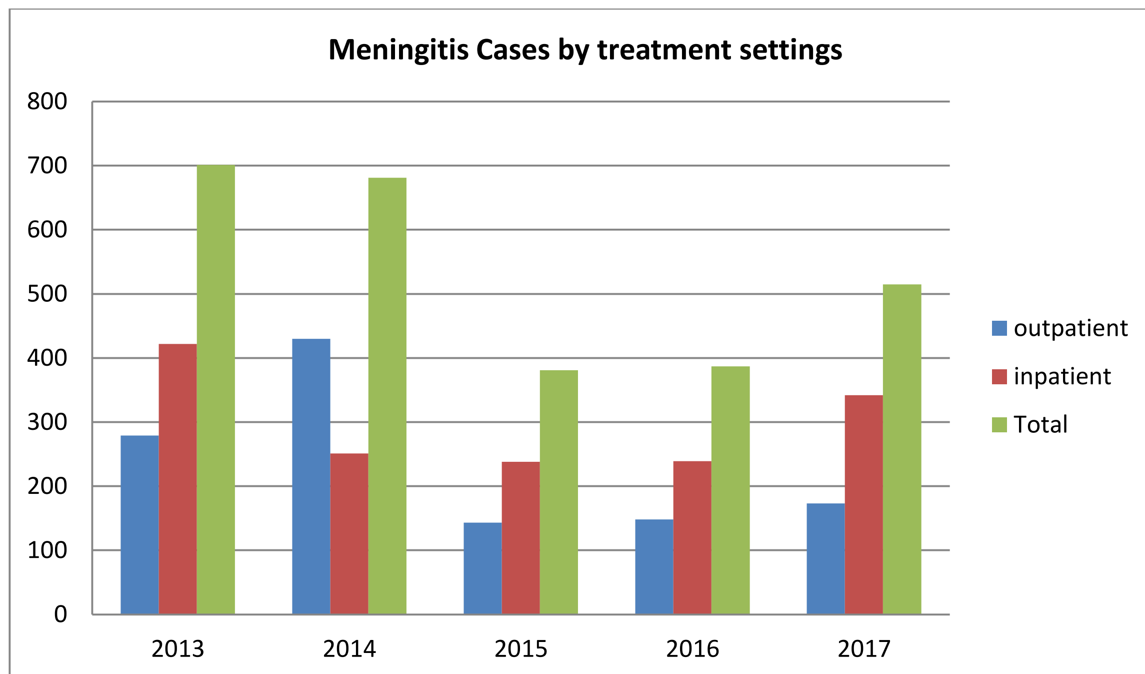

Figure 24: Meningitis case distribution by inpatient and outpatient for each year in Oromia Region, Ethiopia 2013-2017

Comparison between PHEM and Routine HMIS Report

The discrepancy between HMIS and PHEM report of 2013-2007 is 20751by morbidity.

Table 14 Comparison between HMIS and PHEM Report of Meningitis morbidity and mortality in Oromia region Ethiopia 2014-2017

S. No	PHEM Report	HMIS Report	Difference (PHEM- HMIS)
Morbidity	2665	23416	-20751
Mortality	74	1362	-1288

2.1.5. Discussion

Meningitis incidence rate in Oromia region in the last five years from 2013-2017 was 1.57 per 100000 populations (between 1.11 per 100000 in 2016 to 2.19 per 100000 populations) which is less than 2 per 100000 in 2007 EFY in Ethiopia and higher than 0.12 cases per 100,000 population in 2015 in USA and it is greater than average EU countries which is 0.68 per 100000 population (5, 6, 8).

Meningitis case fatality rate in the last five years in the region was 2.78% which ranges 1.03% in 2016 to 4.72% in 2015 which is lower than expected case fatality rate during epidemic which ranges from 5% to 10% as well as which occurred in Gambella region 9.3% and 6.9% in Benishangul-Gumuz and related to 3.3% case fatality rate in Ethiopia in 2007 EFY (3, 8).

This study reveals that majority of the cases were registered in May 17.41%, July 12.76%, March 10.43% and February 9.19% in which these four months accounts around 50% of total cases treated in all months which is at expected season of the year when the disease incidence is usually high. Most of the death happened in January 14(18.92%) followed by March, May and October in which 9(12.16%) deaths occurred at each month. Its incidence was relatively the same to that of from 2007 – 2011 in Gondar which is from May to June and in 2000 between March and August in Addis Ababa when more cases were occurred (4, 7, 9).

The highest number of cases was reported from Horro Guduru Wollega zone 13.28% followed by Borena zone and Bale zone 12.68% and 12.31% respectively based on their share from regional total cases and It was highly incident in Horro Guduru Wollega, West Guji, and Borena Zones with incidence rates of 9.90, 8.92 and 6.28 per 100,000 persons respectively and in addition to these zones there were also high number of cases in Jimma, East Wollega, Guji and West Arsi Zones since they share common climatic and weather condition that is favorable to the occurrence of disease so they are mainly affected by the disease as the disease was commonly occurring in North west and South western part of the country (7).

2.1.6. Limitation

Since the PHEM weekly reporting format has no Sex and age category it impossible to describe data by age and sex.

The data reported via PHEM weekly and routine monthly HMIS are no consistent.

It is difficult to browse various references since mobile internet/Data was cut off in the country when this analysis was conducted.

2.1.7. Conclusion

The Incidence of Meningitis in Oromia Region from 2013 - 2017 was fluctuating from year to year 2.19 per 100000 populations in 2013 and reduced to 1.11 in 2016 and showed slight increment to 1.44 per 100000 populations in 2017. Since the MenA vaccination was given in 2015 to most vulnerable population in the region the disease was not occurred as Epidemic. The case fatality rate was decreased from 2013 onwards to 2017 except in 2015 where it was as high as 4.72%. The disease was highly incident in West and South part of the region like Horro Guduru Wollega, Borena, Bale, Guji, West Guji, Jimma, East Wollega and West Arsi Zones. Most of the cases Occurred during dry season of the year from December to May except in 2014 when there were higher incidence in July so there is a probability to occur outside common season.

2.1.8. Recommendation

It is important to strengthen routine surveillance system to track early any epidemic including Meningitis before it causes severe devastation to the community and is better to alert silent zones, Town administrations and woredas with low meningitis incidence.

Since medical care given for the meningitis cases is highly expensive both in human capital and drugs as well as laboratory test for confirmation it is better to focus on prevention especially during sensitive season. It is also mandatory to equip health facilities with better diagnostic kits, drugs and medical equipments in order to reduce morbidity due to disease.

It is also important to increase awareness of the PHEM focal person and other health professionals to align the report sent via weekly PHEM report and Monthly routine HMIS reports.

2.1.9. Reference

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Chapter Three

Surveillance System Evaluation

3. Malaria, Measles and MDSR surveillance System Evaluation in Oromia Special Zone Surrounding Finfinne Zone, Oromia Region, Ethiopia 2018

Abstract

Background: - Public health surveillance is an ongoing, systemic collection, analysis, interpretation and dissemination of health data for planning, implementation and evaluation of public health programs. Malaria, Measles and Maternal Death Surveillance and Response are among priority diseases and events in Ethiopian Public Health Emergency Management system. The purpose of the study was to evaluate existing surveillance system of malaria, measles and MDSR in Oromia Special Zone Surrounding Finfinne, Oromia, Ethiopia in 2018.

Methods: - We conducted descriptive cross sectional study in Oromia Special zone Surrounding Finfinne and collected data from 13 purposively selected sites (1 zonal, 3 district, 1 town, 4 Health centers and 4 Health posts) for surveillance system evaluation from December 06-21, 2018. We interviewed PHEM focal persons using CDC questionnaire and reviewed documents for secondary data. The data was analyzed by Microsoft Office Excel.

Results: - All visited sites 13 (100%) agreed on the usefulness of the surveillance system. The potential health service coverage of the zone is 100% by health centers and health posts. There was no Emergency Preparedness and Response Plan at all sites. There rapid response team and epidemic management committee were not functional and no budget line for system. Case definition and Manuals found at 11 (85%) of sites. The report completeness was 85% and Timeliness 81%. There weren't feedback and weekly bulletin preparation.

Conclusion: - The surveillance system is representative, flexible and useful. The absence of Emergency Preparedness and Response Plan, no independent supervision by Zonal PHEM department to districts and feedbacks or bulletin, non functionality of Committees and shortage of budget may affect the stability of the surveillance system in the zone. Preparing Emergency Preparedness and Response Plan, conducting supportive supervision and Restoring function of committees are important to sustain the system on track.

Key words: - surveillance, system evaluation, Oromia, Ethiopia

3.1. Introduction

3.1.1. Background

Public health surveillance is an ongoing, systemic collection, analysis, interpretation and dissemination of health data for planning, implementation and evaluation of public health programs. Disease surveillance is essential for early detection of outbreaks, epidemics and pandemics in order to initiate timely response. It is essential to evaluate or monitor progress of ongoing interventions targeted for disease reduction (1).

Data disseminated by a public health surveillance system can be used for immediate public health action, program planning and evaluation and formulating research hypothesis. Public health surveillance system has been developed to address a range of public health needs. They include variety of data sources essential to public health action (2).

A well-functioning disease surveillance system is critical to measures the burden of a disease (health-related event), identification of populations at high risk. Establishing surveillance systems should regularly reviewed on the basis of explicit criteria of usefulness, cost and quality; systems should be modified as a result of such review. Attribute of quality includes: sensitivity, specificity, representativeness, timeliness, simplicity, flexibility, and accessibility (3).

To date, evaluation of surveillance system has been limited in scope and content. In most developing countries, surveillance systems are often weak even though the burden of communicable disease remains major public health concern. Surveillance system evaluation answers questions like what are the successes and deficiencies of the surveillance system. Is the surveillance system meeting its public health objective? How does surveillance both support and benefit stakeholders? What measures could improve performance and productivity of the surveillance system and the program(s) that it supports (4).

Since 2008 the Federal Ministry of Health (FMOH) has launched a reform and restructuring of the health sector in to different core processes, and in particular the disease surveillance and response with the concept of Business Process Re-engineering (BPR). This helps the surveillance of priority diseases to be a dependable system as Public Health Emergency Management

(PHEM) center. This new structure is extended down to the woreda level in their capacities. The goal of PHEM was to better track and monitor diseases of public health concerns (2).

As member state of the World Health Organization (WHO), Ethiopia is in the preparatory phase to implement the International Health Regulation (IHR) which was declared by member states in 2005. These all are good opportunities to strengthen surveillance. The FMOH of Ethiopia identified 21 top priority diseases (13 immediately and 8 weekly reportable) which are epidemic prone, of international concern and diseases that have eradication and elimination programs for surveillance activities. These diseases are monitored by a designated bodies through available means of communication telephone, paper based reporting etc. These diseases are mandatory notifications which are immediately reportable diseases and routine surveillance reported weekly (5).

To determine how well a public surveillance system operates it needs to be evaluated periodically. The purpose of evaluating public health surveillance system is to ensure that problems of public health importance are being monitored efficiently and effectively. Hence evaluation finding would yield specific recommendations for improving surveillance quality, efficiency, and usefulness. In addition to periodic evaluation, public health surveillance system should be monitored routinely to ensure they continue to meet their objectives (6).

Malaria is one of these 21 priority diseases which reported on the weekly bases and causes significant disease burdens to the public. Measles is immediately reportable disease which is highly contagious. MDSR is newly added as immediately reportable (5).

Malaria

Malaria is one of the most sever public health problems worldwide. It is the leading causes of death and disease in many developing countries, where young children and pregnant women are the groups most affected. It occurs mostly in poor, tropical and subtropical areas of the world. According to the World Health organization’s world Malaria report 2013 and the global malaria Action plan 3.2 billion people lives in areas at risk of malaria transmission in 106 countries and territories (7).

In 2016, nearly half of the world's population was at risk of malaria. Most malaria cases and deaths occur in sub-Saharan Africa. In same year 91 countries and areas had ongoing malaria transmission (8).

According to *World Malaria Report*, released in November 2017, there were 216 million cases and estimated 445,000 deaths of malaria occurred worldwide in 2016. The 90% of morbidity and 91% mortality due to malaria occurred in WHO African Region. Of the 91 countries reporting indigenous malaria cases in 2016, 15 countries – all in sub-Saharan Africa, except India carried 80% of the global malaria burden and death. *Plasmodium falciparum* is the most prevalent malaria parasite in sub-Saharan Africa, accounting for 99% of estimated malaria cases in 2016. Outside of Africa, *P. vivax* is the predominant parasite in the WHO Region of the Americas, representing 64% of malaria cases, and is above 30% in the WHO South- East Asia and 40% in the Eastern Mediterranean regions. In 2016, 85% of estimated vivax malaria cases occurred in just five countries India (51%), Pakistan (12%), Ethiopia (10%), Afghanistan (6%) and 6% in Indonesia (8, 9).

Nearly 60% of the Ethiopian population lives in malarious areas and 68% of the country's landmass is favorable to malaria transmission. Malaria transmission in Ethiopia is seasonal and unstable and peaks of malaria incidence follow the major rainfall season, from July to September (10, 11).

In 2015/2016 Ethiopia reported a total of 2,320,135 malaria illnesses including 1,325,409 laboratory confirmed *P. falciparum* malaria illnesses, 707,901 laboratory confirmed *P. vivax* malaria illnesses, and 286,825 clinical malaria cases. Five hundred and ten deaths were reported due to malaria (12).

Ethiopia has shown remarkable progress in reversing the burden and epidemics of malaria in the last two decades. Mortality and incidence rates of malaria declined by 96 and 89%, respectively, between 1990 and 2015. The number of new cases of malaria declined from 2.8 million in 1990 to 621,345 in 2015 GC (13).

In Oromia region in 2016/2017, via PHEM reports 156,412 malaria cases and 10 deaths were reported. Of total 1,214,627 examined fever cases 94,375 were tested positive for *P. falciparum* and 58,203 *p. vivax* overall positivity rate 12.5% (14).

MDSR

The MDSR was launched by WHO and other partners in 2012 by including surveillance of maternal deaths with timely notification and an action and response approach to the aggregated death review information. The primary goal of MDSR is reducing future preventable maternal mortality through continuous action and surveillance cycle of identification, quantification, notification and review of maternal deaths followed by the interpretation of the aggregated information on the findings and the avoid ability of the maternal deaths which is used for recommended actions that will prevent future deaths (15).

Based on the recommendation from the Commission on Information and Accountability for Women's and Children's Health's, the Federal Ministry of Health (FMOH) of Ethiopia has been implementing Maternal Death Surveillance and Response (MDSR) since 2013, which has been integrated with the existing national public health emergency management (PHEM) system 2014. In 2009 EFY 972 maternal deaths were reported via PHEM reports which is only 7.4% of expected maternal deaths and Oromia region reported 476 maternal deaths 9.3% of expected (16).

Measles

Measles is a highly contagious, serious disease caused by a virus. Approximately 110,000 people died from measles in 2017 mostly children under the age of 5 years. Accelerated immunization activities have had a major impact on reducing measles deaths. During 2000– 2017, measles vaccination prevented an estimated 21.1 million deaths. Global measles deaths have decreased by 80% from an estimated 545,000 in 2000 to 110,000 in 2017 (17). There were 1914 cases and 7 deaths of Measles reported in 2016/2017 in Oromia region (14).

The purpose of evaluating public health surveillance is to ensure that problems of public health importance are being monitored efficiently and effectively. Public health surveillance system should be evaluated periodically and the evaluation should include recommendations for improving quality efficiency and usefulness. The evaluation of public health surveillance system should involve an assessment of system attributes including simplicity, flexibility, data quality, accessibility, sensitivity, predictive value positive, representativeness, timeliness and stability (1).

3.1.2. Rationale of the study

Malaria, Measles and MDSR are a public health important disease and health condition that could be used as proxy indicator of the surveillance system of the zone.

Surveillance system evaluation is an important tool to assess the capacity of the system to meet its purpose and objectives; to improve its operation and to optimize the utilization of available resources. Health system evaluation has not yet conducted in the Oromia Special Zone Surrounding Finfinne zone. Hence evaluation of Oromia Special Zone Surrounding Finfinne surveillance system provides information if the surveillance system is useful, describes the specific attributes, identifies areas that needs improvement and make recommendations to improve the quality, efficiency and usefulness of the system. In addition it can be used as a base line for future evaluation of the system. Therefore the findings of this evaluation can be used as an input to strengthen the overall surveillance system activities of the zone to achieve its intended objectives and purpose.

3.2. Objective

3.2.1. General objective

To evaluate existing surveillance system of malaria, measles and MDSR in Oromia Special Zone Surrounding Finfinne, Oromia, Ethiopia in 2018

3.2.2. Specific Objectives

To assess the core activities of the surveillance system such as case detection, reporting, analysis and response in Oromia Special Zone Surrounding Finfinne in 2018

To assess support function of the surveillance system in Oromia Special Zone Surrounding Finfinne in 2018

To evaluate attributes of surveillance system of malaria, measles and MDSR in Oromia Special Zone Surrounding Finfinne in 2018

3.3. Methods and Materials

3.3.1. Study Area and period

The surveillance system evaluation was conducted in Oromia Special Zone Surrounding Finfinne of Oromia Region. It is bounded by North direction North Shoa South by South West Shoa East by East Shoa and West by West Shoa zones of Oromia region. As its name indicates the zone surrounds the Addis Ababa City Administration at its center. The zone has 1 Hospital (New), 27 Health centers and 144 Health posts in 6 districts and 1 Town administration. The total population of the zone in 2018 estimated to be 649, 403 from projection of 2007 census. The study was conducted from December 06-21, 2018.

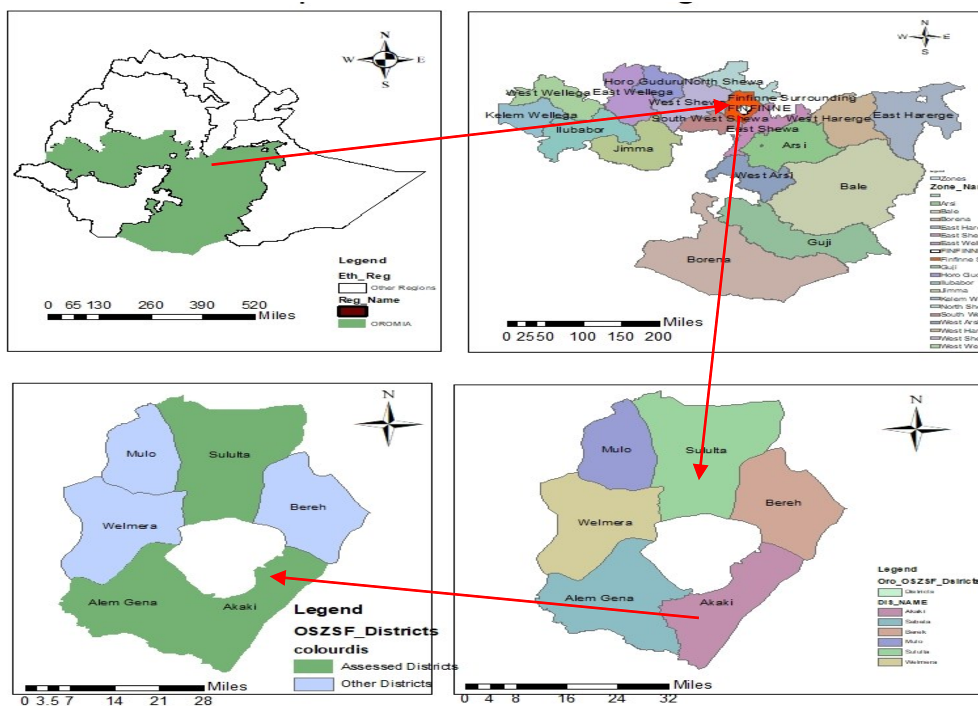

Figure 25 Map of Oromia Special zone surrounding Finfinne, Oromia, Ethiopia 2019

3.3.2. Study Design

Descriptive Cross sectional study design was conducted using questionnaires

3.3.3. Study Units

The study units were Zonal and district health office and health facilities (Health centers and Health posts) which are serving the population of the zone.

3.3.4. Sample size and sampling Techniques

Selection of Zone

Oromia special zone surrounding Finfinne was purposefully selected by discussion with ORHB PHEM Director and the investigation team since the zone surveillance system was not evaluated yet.

Selection of districts

We selected 3 malarious districts and 1 town health office by discussing with zonal PHEM officer. The selected districts are Sululta, Sebeta and Akaki districts and Sendafa town.

Selection of Health facilities

From each district one health center was selected by simple random sampling technique and one health post from each Health center catchments by same technique.

3.3.5. Data Collection tools and procedures

Data was collected by using questionnaire of CDC updated guideline for public health surveillance system evaluation. The questionnaire was used to interview the zonal, District, Health center and health post PHEM focal persons. We reviewed the reports, minutes and other documents at all levels.

3.3.6. Data Analysis

The data was analyzed by using Microsoft Office Excel

3.3.7. Data quality Control

We cross checked the data at different levels i.e. at regional health bureau, zonal health department, woreda health office and health facilities before summarizing at each level for its accuracy and consistency.

3.3.8. Ethical consideration

The support letter was written from regional health bureau to Zonal Health Office and from zonal health bureau to the district health offices.

3.3.9. Standard Case definition

Malaria

Suspected: - Any person with fever or fever with headache, rigor, back pain, chills, sweats, myalgia, nausea and vomiting diagnosed clinically as malaria (5)

Confirmed:-A suspected case confirmed by microscopy or RDT for plasmodium parasites (5)

Community case definition:-Any person with fever OR fever with headache, back pain, chills, vomiting OR suspected case confirmed by RDT (5)

MDSR

Maternal death is defined as the death of a woman while pregnant or within 42 days of the termination of pregnancy irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes. (ICD-10)

Maternal death surveillance and response (MDSR) has been defined as "a component of the health information system, which permits the identification, the notification, the quantification, and the determination of causes and avoidability of maternal deaths, for a defined time period and geographic location, with the goal of orienting the measures necessary for its prevention" (18).

Measles

Suspected case: Suspected measles case was defined as a person with fever, generalized maculopapular rash and at least one of the following: cough coryza or conjunctivitis who resides in any of the affected kebeles during outbreak period in the district (5).
Confirmed case: A suspected measles case that is laboratory confirmed (IgM positive) (5).

3.3.10. Operational definition

Terms used in the evaluation were operationally mentioned as follows:-

Case detection: is the process of identifying cases and outbreaks.

Case registration: is the process of recording the identified cases

Case/outbreak: Confirmation: refers to the epidemiological and laboratory capacity for confirmation.

Reporting: Refers to the process by which surveillance data moves through the surveillance system from the point of generation.

Epidemic preparedness: Refers to the existing level of preparedness for potential epidemics

Stakeholders: The organizations or individuals that generate or use surveillance data for promotion of health, prevention and control of diseases.

Guidelines: are official recommendations indicating how something should be done or what sort of action should be taken in a particular circumstance.

Standard case definition: is a case definition that is agreed upon to be used by every health professional within the country. Standard case definition can be classified as confirmed, probable, and possible or suspected

Community case definition: is a case definition of disease and Conditions adapted to suit to health extension workers (HEWs) and community members. The community case definitions were modified for simplicity and ease understanding by HEWs and the community members list of 14 disease or syndromes and conditions are identified to give simplified case definitions for community levels.

Usefulness: Usefulness of the surveillance system is reflected by documented changes in policies and procedures as a result of information generated by the system.

Simplicity: Simplicity denotes the structure and ease of operation of the surveillance system.

Flexibility: Flexibility of a surveillance system is its capacity to adapt to changing information needs or operating systems within minimal additional time, personnel and funding.

Quality: The quality of data reflects the completeness and validity of the data recorded in the district health office.

Acceptability: Acceptability is the willingness of persons, institutions or organizations to participate in the surveillance system.

Sensitivity: Sensitivity refers to the ability of the system to detect cases or outbreaks through trends in the surveillance data.

Positive predictive value: Positive predictive value refers to cases that actually have the health condition in question.

Representativeness: Representativeness refers to the extent to which the surveillance system accurately describes the occurrence of medical condition over time and their distribution in the population by place and person.

Stability: Stability was assessed by questioning the surveillance officers on the consistency of the system. Reliability (the ability to collect, manage, and provide data properly without failure) and availability (the ability to be operational when it is needed)

3.3.11. Dissemination of the Result

The study result was sent to AAU school of public health, Department of Preventive Medicine Ethiopia Field Epidemiology Training Program (EFETP), Oromia Regional Health Bureau, Oromia Special Zone Surrounding Finfinne Health Office and Visited District Health Offices.

3.4. Results

Involvement of stake holders

We started the evaluation process by discussing with Oromia Regional Health Bureau PHEM and Research Directorate Director on how to select the zone to be included in the study and to ensure that the evaluation of the system addresses appropriate questions and attributes to produce useful and acceptable findings. Based on this we selected Oromia Special Zone Surrounding Finfinne to be evaluated. Moreover we discussed the objectives and purpose of the evaluation with Oromia Special Zone Surrounding Finfinne Health Office Head and PHEM focal persons then selected three rural woredas, one town health office to be evaluated. We also discussed selected district health offices heads and surveillance focal persons and selected health facilities heads and surveillance focal persons. All individuals assigned and engaged on surveillance system of the selected organization participated in the evaluation process.

Description of the surveillance system

We observed the existence of the Public Health Emergency Management system in the zone and district health offices as well as health facilities. Public Health Emergency Management system is defined as the process of anticipating, preventing, preparing for, responding to and recovering from the impact of epidemics and health consequences of natural and manmade disasters. The sub processes identified for the process include preparedness and early warning, response and recovery. The early warning sub-process contains the integrated public health surveillance. It is part of the Organogram of the health system at all levels.

Description of Public Health importance of diseases/ conditions under Surveillance

Malaria and measles are diseases under elimination and also have epidemic potential in the zone and region. MDSR is also important program to control preventable causes of maternal death.

This surveillance evaluation assessed diseases targeted for epidemic potential in our region; those are immediately (measles) and weekly (malaria) reportable diseases. MDSR is also newly added component of surveillance system as immediately reportable event and it is important element in reduction of maternal deaths since its purpose is not only reporting but also response or action.

Description of the Purpose and Operation of Surveillance System

Overview of the Surveillance System

PHEM system is fully integrated, adaptable for all-hazards and all health approach for national preparedness and response system. This system is comprised of four sub processes which are: Public Health Emergency Preparedness, Early Warning, Response, and Recovery. Every public health emergency management processes starts with early warning and ends with recovery.

The major public health risks identified in the Ethiopian health system are from high priority to low priority Epidemics of communicable disease, Drought conditions with malnutrition, Food contamination, Flood, Pandemic Influenza, Diseases that affect people during conflicts and in displaced populations, Accidents including chemical spills, Earthquake, volcanic eruptions and Bioterrorism. The PHEM core process will provide the health sector with a system that is effective and efficient; and its implementation shall be in an accountability basis.

Population under Surveillance

In 2018 the total population of Oromia region estimated to be 38,422,583 from this Male 19,270,333 while Female population was 19,152,250 based on 2007 census projection. The population of Oromia Special Zone Surrounding Finfinne estimated to be 649,403 in 2018 (projection based on 2007 census). Of these population 327,949 are male and 321,454 are female; children under 5 years of age 106,697; numbers of women of reproductive age (15-49) 143,713; numbers of pregnant women 22,534. Expected maternal death based on EDHS 2016 was 93 mothers.

Oromia Regional Health Bureau Public Health Emergency Management (PHEM) Directorate targets all the population in the region to be under surveillance for all the twenty two priority diseases/ events.

Table 15 Population of Oromia Special Zone Surrounding Finfinne, Oromia, Ethiopia 2018

S.N	District/Town	Total Population	# PHCU
1	Akaki	84869	3
2	Berek	88957	4
3	Mulo	48742	2
4	S/Awas	123559	6
5	Sendafa	26350	2
6	Sululta	161229	6
7	Welmera	115697	4
8	**Zonal**	**649,403**	**27**

Description of usefulness, Core and Support Function and Attributes of Surveillance System

Usefulness

All PHEM focal persons 8(100%) and PHEM officers 5(100%) agreed that the Surveillance System helps to detect outbreaks; estimate the magnitude of morbidity and mortality related to those diseases, including identification of factors associated with these diseases and permit assessment of the effect of prevention and control programs. They also agreed that surveillance system is useful to guide the planning, implementation, and evaluation of prevention and control interventions.

Core Function of Surveillance System

Case Detection

Malaria

Oromia region, from total land mass around the 3/4th is malarious area and about 68% of the region population is at risk of infection. In 2016/2017, via PHEM reports 156,412 malaria cases and 10 deaths were reported. Of total 1,214,627 examined fever cases 94,375 were tested positive for *P. falciparum* and 58,203 *p. vivax* overall positivity rate 12.5%.

Oromia Special Zone Surrounding Finfinne has 58 malarious kebeles in 4 districts in which 17% of populations are at risk of malaria infection. In 2017/18 the zone reported 602 malaria cases of

which 336 were *p. falciparum* and 266 are *p. vivax* and positivity rate was 14.8%. In the last 48 weeks of 2018 there were 311 confirmed malaria cases of which 161(51.8%) were *p. falciparum*.

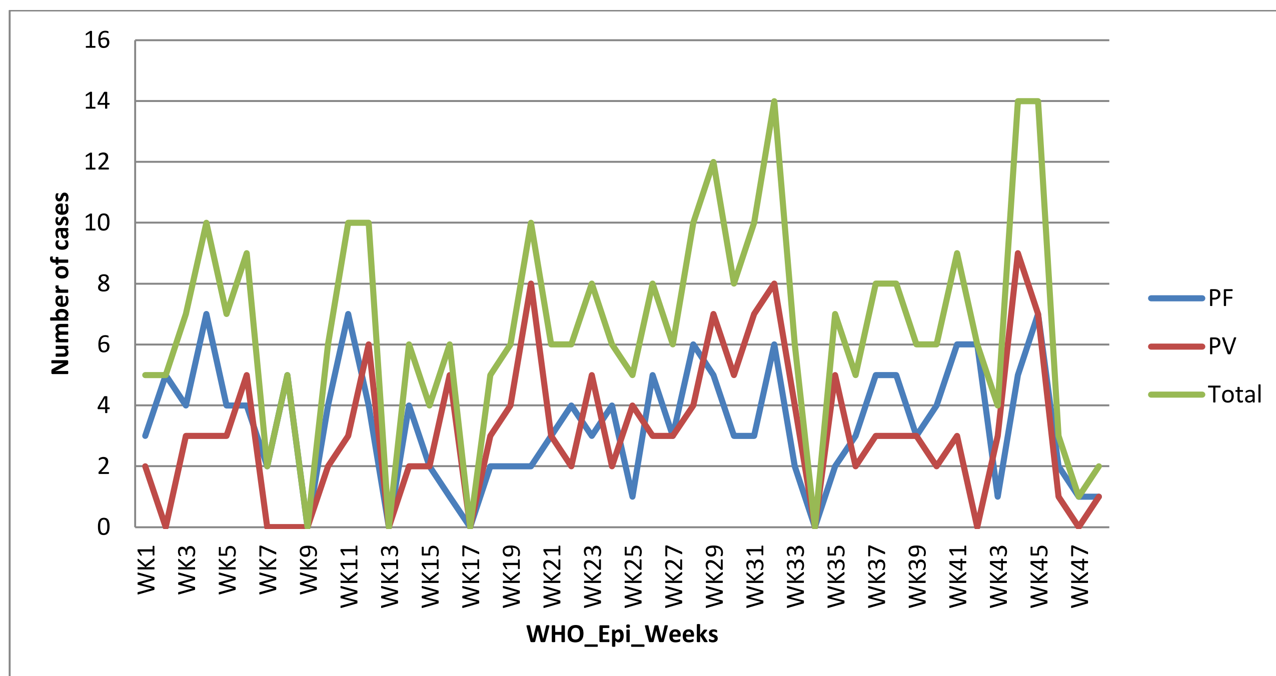

Figure 26 Confirmed malaria cases reported from Oromia Special Zone Surrounding Finfinne, Oromia, Ethiopia week 01-48, 2018

Measles

In Oromia Region from July 2017 to June 2018 there were 801 cases and 4 deaths of measles reported. Of these majority of cases were from West Guji (88cases), Borena (64 cases), West Harerge (64 cases) and East Harerge (63 cases) zones. The deaths occurred in West Shoa zone and Assela Town 3 and 1 death respectively. There were 6 outbreaks occurred in different districts of the region.

In OSZSF there were 5 cases reported and all of the cases were confirmed by laboratory in the last 48 weeks of 2018 but no death was reported. Sebeta Hawas district reported cases 3 and Sendafa Town and Sululta district reported 1 case each.

There were expected 2 measles cases per year per 100,000 population based on this expected annualized measles rash of the zone is 13 cases but zone reports only 5 cases until week 48 so its detection rate was at 0.82 far from expected rate which is 2.

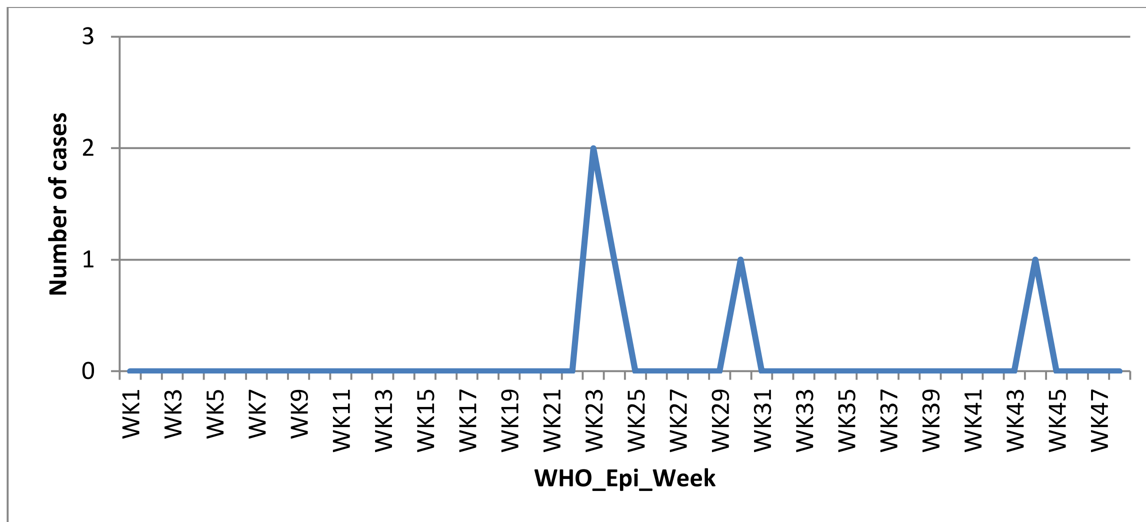

Figure 27 Measles cases reported from Oromia Special Zone Surrounding Finfinne, Oromia, Ethiopia week 01-48, 2018

MDSR

In Oromia Region there were 660 maternal deaths reported from July 2017 to June 2018 it is higher when compared to 2016/17 which is only 292. Oromia Special Zone Surrounding Finfinne reported 6 maternal deaths in the same period.

In the last 48 weeks of 2018 Oromia Special Zone Surrounding Finfinne reported 5 maternal deaths from Sululta district 2 deaths and Sebeta Hawas, Akaki district and Sendafa Town each 1 deaths. But only one death is reviewed by MDSR review committees in Sebeta Hawas district the rest was not reviewed and take necessary action.

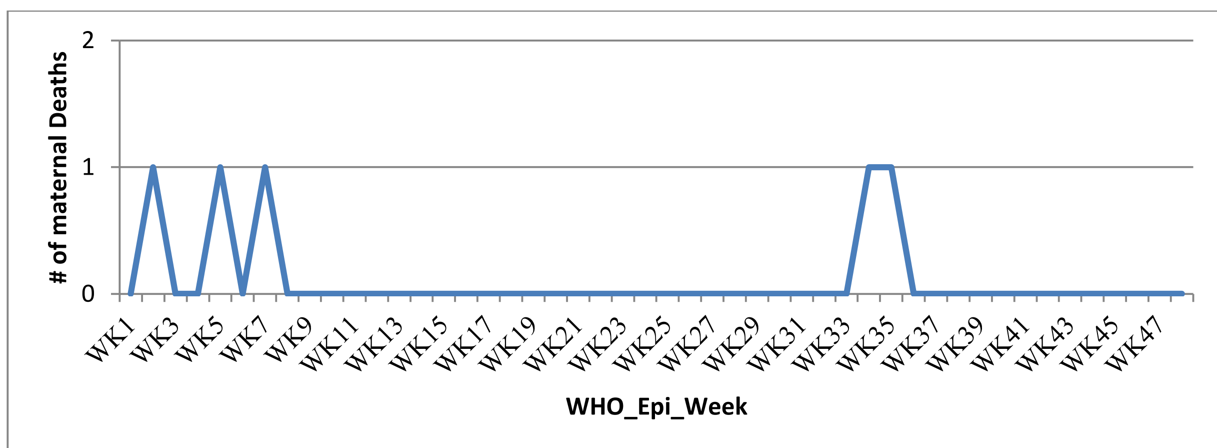

Figure 28 Maternal Deaths reported Oromia Special Zone Surrounding Finfinne, Oromia, Ethiopia Week 01-48, 2018

Availability of Guidelines, Case Definitions and Registers

We observed that from 13 visited sites 11 (85%) of them had PHEM guideline and case definition for Malaria, MDSR and Measles. On the other hand, Health practitioners and health extension workers who were interviewed during the assessment, 9 (69.2%) of them, were understood the case definition clearly and apply the case definition accordingly as per the national guide line. HMIS register was found in all of health centers while Health posts use family folder as well as Integrated and Health cards.

Table 16 Availability of PHEM formats in Oromia Special Zone Surrounding Finfinne, Oromia, Ethiopia 2018

S. No	Variable	Health post	Health Center	Woreda Health Office	Zonal Health Office	Total
1	Availability of PHEM guide lines	2(50%)	4(100%)	4(100%)	1(100%)	11(85%)
2	Availability of case definition	2(50%)	4(100%)	4(100%)	1(100%)	11(85%)
3	Availability of Registers (HMIS for H/C and Family Folder for HP	4(100%)	4(100%)			8(100%)
4	Rumor Log Book			4(100%)	1(100%)	5(100%)

Reporting

From reporting formats; 11(85%) of health facilities had only Weekly Reporting Format (WRF). Three health centers and all health posts send their reports by Short Message service and 2 of them only send summary of the report with routine report at the end of the month. All of health facilities faced shortage of surveillance formats like case based formats for different diseases, Case based laboratory reporting form (CLRF), epidemic reporting format and line listing formats. The remaining reporting formats were available at Zonal and Woreda level.

Case Confirmation and Laboratory status

All visited Health centers have at least one laboratory personnel. The laboratory rooms of all Health centers were found in the same Block/Building with Outpatient departments and they have registration books. Malaria was diagnosed by RDT at health posts and Blood Film in health centers. Measles samples were transported to Ethiopia Public Health Institute national Laboratory for confirmation. All of interviewed health professionals and Health Extension workers had enough knowledge on this information. Only 3 out of 4 health workers (focal persons) in health centers clearly explain the sample preparation procedure and transportation. Currently Regional PHEM Directorate receives laboratory result of measles from EPHI through e-mail. But Test result is too late to reach district health offices.

Data Analysis and Interpretation

At zonal level the data was analyzed monthly and quarterly by person, time and place for action. All District health office has prepared their quarter and annual performance report. None of the district analyzed data on weekly basis. Malaria epidemic monitoring chart was posted at all malarious areas (3 districts and 3 health posts) and zonal level.

Outbreak Investigation

No outbreak occurred in the zone and visited districts in the last one year. But there were AWD outbreak in 2016 in all visited woredas which is imported from Addis Ababa city since the zone founds by surrounding the city. During that time all the districts managed the outbreak by establishing CTC sites as per guideline and no death occurred.

Epidemic preparedness and Response

The Zonal health department and Woreda Health Offices had no Public Health Emergency preparedness and response plan separately. The zone and all districts have no specific budget line for emergency management and response except 2 districts (Sebeta and Sendafa) who allocated budget for emergency drugs. PHEM officers replied that there had been epidemic management committee and also RRT at zonal and District level. But we could not find recent indicator (meeting minutes) that show the functionality of both RRT and epidemic management committee at all level.

Support Function of Surveillance System

Training

All Zonal and District PHEM Officer and Health Center PHEM Focal persons were trained on PHEM basic Level Training which lasts 3 to 5 days. The district PHEM officers told us all HEW in their districts were oriented on PHEM including recently added components like MDSR. During our visit to Health Posts 1 HEW responded that she has not taken orientation on PHEM since she was newly recruited.

Currently also all district PHEM officers are on taking Frontline Field Epidemiology trainings and expected to be graduated in the near future. At zonal level there are 2 Field Epidemiology graduates one working as PHEM officer and other one is assigned on other position.

Supportive supervision and feed back

All visited Districts and Health centers got supportive supervision quarterly in the last six months by incorporating with other programs. But only 2 (50%) health posts were supervised in the last months. None of district and Zonal health office PHEM has conducted independent supervision due to lack of budget. Zonal health department was not supervised in the last one year by regional PHEM and Research Directorate. There were no written feedbacks given by district health offices to health facilities. But the regional health bureau prepares weekly bulletin and communicate to all zonal and town health offices via e-mail but OSZSF health office and its districts has not started bulletin preparation yet.

Resources

There is no independently assigned vehicle and motor bikes for surveillance system but they share with other departments in all visited sites.

At zonal level there is a separate desktop computer for PHEM but at district level they use computers in common with other programs.

Only zonal PHEM unit have tools for data management like computer accessories with statistical packages. At Woreda levels there are no statistical packages.

Zonal and Woreda level surveillance system use Telephone (fixed line and cell phone) for communication. The internet service was also currently available in all district health offices. At

all health institutions level the only available communication tool was personal mobile phones. Health extension workers use their mobile phone to communicate emergency and other health activities. There were also posters and flyers at visited health institutions, district and zonal offices.

Human Resource

All districts and zonal health office has assigned one PHEM officer as per standard set by their organizational structure. All visited health centers also assigned IDSR focal person who is responsible for reporting and coordinating the activities in the facility.

Describing Surveillance System Attributes

Simplicity

All visited health institutions Focal persons; Woreda health officer PHEM officers and zonal PHEM officer answered that the case definition of malaria, MDSR and measles was easy for case detection; ease of collection, compilation, analysis, reporting, and ease to fill it in reporting format. It takes 10-15 minute to fill the format for Health center focal persons, Woreda and Zonal PHEM officers and greater than 15 minutes for Health Extension Workers.

Flexibility

All visited focal persons answered that the current surveillance reporting formats will be used to report other new health events without any difficulty by filling other cell in the weekly reporting format and possible for any modification if new or reemerged health event occurred without difficulty.

However the current report format was difficult to add additional information's required by a surveillance system especially variables like age, sex, address and clinical symptoms.

Data Quality

We observed that from last three months reported formats of Districts 1(25%), Health Center 2(50%) and health Posts 3(75%) has blank (unfilled cell in the report format) spaces.

Acceptability

Acceptability of a system is a reflection of the willingness of the public health emergency staff to implement the system from the national to the grass root level. In this case the participants of the surveillance system are health facilities, health offices, health posts, nongovernmental organizations and private health facilities as Organizations and health workers and the

community as individuals. Therefore all the mentioned agents accept and are well engaged to the surveillance activities. But the engagement of private health facilities in the surveillance system is weak as visited in the documents in zonal and woreda health offices. The acceptance of the surveillance system by the above responders was indicated by the use of the standard cases definitions and the recent and standard reporting formats. The visited health facilities and health offices were using surveillance standard case definition and reporting formats.

Predictive value positive (PVP)

PVP is the proportion of reported cases that actually have the health related event under surveillance system. Assuming that reporting cases through public health surveillance system were correctly classified accordingly (true positive, true negative, false positive, false negative). It is possible to estimate the proportion of total number of cases in the population under surveillance being detected by our system.

For malaria we calculated predictive value positive as follows. The fever cases suspected based on case definition sent to lab for confirmation was 2803 among these 311were diagnosed as PF and PV. So Predictive Value Positive is 11%.

Representativeness

The representativeness of the surveillance system is related to the health service coverage, the reporting rate of the health facilities, the health seeking behavior of the community and the technical capacity of the health care providers. Geographical representativeness and health service physical accessibility in the Kebeles (the lowest governmental structure) are particularly greater important in an early warning system to ensure detection of outbreaks nationally notifiable and potential outbreak prone diseases. The zonal and Districts potential health service coverage was 100% by Health centers and Health posts. The health seeking behavior of the community was changed due to awareness creation done by Health Development Army in collaboration with HEWs in most of the rural communities of the zone as the zonal PHEM focal person responded.

Timeliness

Timeliness of the public health surveillance is usually considered that time interval between the onset of health-related event and the reporting of the event to the public health agency responsible for immediate control. It also had shown how much the reported data report on time.

In the last 48 weeks the OSZSF has sent 39 weekly reports on time and 6 late reports. The 3 weeks reports were not sent to region. So the average timeliness of the zone was 81% (figure 29).

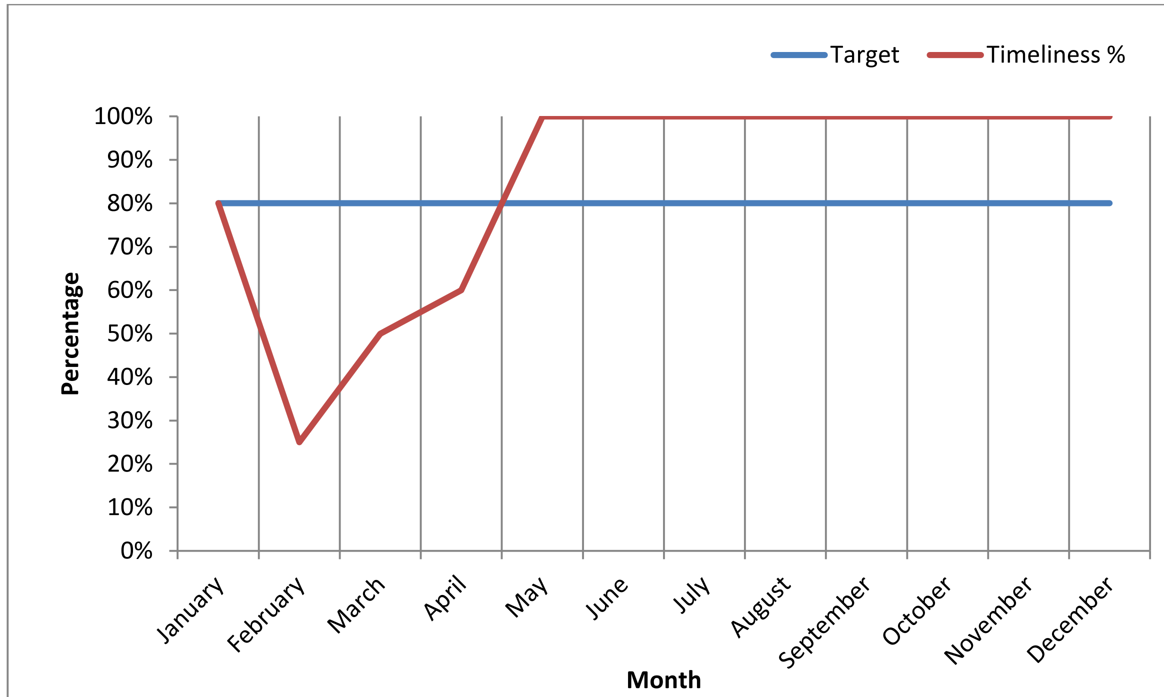

Figure 29 Report Timeliness of Oromia Special Zone Surrounding Finfinne, Oromia, Ethiopia 2018

Completeness

Completeness denotes whether all the reporting units have reported as expected. A report is said to be complete if all the reporting units within its catchment area has submitted the reports.

In the zone 144 health posts, 27 Health centers, 1 Hospital of government inistitution and 9 other health facilities a total of 181 facilities are expected to report weekly. In the last six months (27 weeks) the zone expects 4887 reports but received 4162 (85%) reports. The report completeness ranges from 83% in Sebeta Hawas district to 87% sendafa Town (Table 17).

Table 17 Report Completeness status by districts in Oromia Special Zone Surrounding Finfinne, Oromia, Ethiopia 2018

S. No	District	Weekly Expected Reporting Site				Total Expected Report	Total Report Received	Completeness %
		HP	HC	Hosp	Other			
1	Sebeta Hawas	38	6	0	2	1242	1034	83
2	Sululta	24	6	1	3	918	773	84
3	Akaki	28	3	0	0	837	728	87
4	Walmara	23	4	0	0	729	628	86
5	Berek	22	4	0	0	702	608	87
6	Mulo	8	2	0	0	270	227	84
7	Sendafa	1	2	0	4	189	164	87
	Zone	144	27	1	9	4887	4162	85

Stability

Stability refers to the reliability (i.e., the ability to collect, manage, and provide data properly without failure) and availability (the ability to be operational when it is needed) of the public health surveillance system.

Stability of surveillance system as visited in the zonal health department relating to data collection, data entry, data analysis and transfer is stable. But shortage of budget allocation and multiple job assignment of PHEM focal at health facility is challenge to the system.

3.5. Discussion

We involved all stakeholders at all levels and reach on consensus on the importance of conducting the surveillance system evaluation since is key tool to improve performance of the system. The zone and district PHEM focal persons participated in the evaluation of District, Health centers and Health posts. An evaluation of a public health surveillance system is often done by a small team consisting of a field epidemiologist and a few other public health workers, many times as part of training activities. This small team may engage other stakeholders in the course of the evaluation, especially if there is a need to evaluate activities across different level of a health system (6).

There is no well organized epidemic preparedness and response plan at all levels. This may cause weak case detection and lead to late response during epidemics. Epidemic preparedness refers to the existing level of preparedness for potential epidemics and includes availability of preparedness plans, stockpiling, designation of isolation facilities, setting aside of resources for outbreak response (5). There had been epidemic management committee at facility levels and RRT at zonal and District level. But we could not find recent indicator (meeting minutes) that show the functionality of both RRT and epidemic management committee at all level. So it is important to mobilize established committees as per set standard and guideline since it is mandatory to strengthen capacity in recognizing and responding to public health emergencies through conducting regular risk identification and analysis, establishing partnership and collaboration, enhancing community participation and implementing community-based interventions and strategic communication.

The report completeness of zone is 85% in average ranging from 83% Sebeta Hawas and 87 Sendafa Town Administration. The report Timeliness of the zone is 81% which is at expected standard by WHO and Federal Ministry of Health which is 80%. But there were 6 late and 3 non reporting weeks in the past 48 weeks in the zone. When reports are sent and received on time, the possibility of detecting a problem and conducting a prompt and effective response is greater (5).

This assessment revealed that from 13 visited sites 11 (85%) of them had case definition for Malaria, MDSR and Measles. On the other hand, Health practitioners and health extension workers who were interviewed during the assessment, 9 (69.2%) of them, were understood the

case definition clearly and apply the case definition accordingly as per the national guide line. The use of the case definition is the most important tool in early detection of any condition or outbreak (4, 5, 18).

The zone reported only 5 measles cases from expected 13 cases at the end of the year or 12 cases for 48 weeks. There were expected 2 measles cases per year per 100,000 populations based on this the detection rate of zone was 0.82 far from expected rate which is 2. So they should work hard to improve their detection rates (19).

Visited health centers laboratory personnel's have a capacity to collect, handle and transport specimen of measles to central laboratory which is an opportunity for early case detection and management and conduct malaria test at their facility. The laboratory result of measles has to be sent to the users within a maximum of 7 days (19). In all visited health facilities, the duration of laboratory confirmation of measles takes more times and do not return back to senders within expected time.

Stability is reliability (ability to collect, manage and provide data without failure) and availability (ability to be operational when needed) of the public health surveillance system without interruption. It can also be measured by using the desired and actual amount of time required for the system to collect, manage and release the data (6). According to this assessment there were factors that can be challenge for the stability of public health surveillance system in zone. These include shortage of budget allocated for surveillance activities, multiple responsibilities of human power working on surveillance activities at health centers, job burden of health extension workers and in all visited districts there were no computer and printer that separately assigned for surveillance activities for data entry and analysis.

All visited Districts and Health centers got supportive supervision quarterly in the last six months by incorporating with other programs. But only 2 (50%) health posts were supervised in the last months. None of district and Zonal health office PHEM has conducted independent supervision due to lack of budget. Zonal health department was not supervised in the last one year by regional PHEM and Research Directorate. There were no written feedbacks given by district health offices to health facilities. But the regional health bureau prepares weekly bulletin and communicate to all zonal and town health offices via e-mail but OSZSF health office and its

districts has not started bulletin preparation yet. As feedback is an important function of all surveillance systems and the way of encouraging, an individual or staffs working in the surveillance system. At all visited levels there were no written feedback. This can reduce the interest and acceptability towards the system and compromise the continuous learning plat form that can be developed by this system. Current practice of the region on preparation and dissemination weekly bulletin is a good starting point to strength feedback system. To assure high quality surveillance, the surveillance system must be monitored regularly and systematically, using a set of formal indicators (4, 5, 19).

3.6. Limitation

Due to poor data handling in the district and health centers it was difficult to analyze the completeness and timeliness of the report.

It was difficult to access distant health facilities since we used public transport to conduct the evaluation due to vehicle shortage at regional health bureau for other commitments.

3.7. Conclusion

The surveillance system of the zone was representative and useful. The report timeliness and completeness was above standard set by national guidelines and WHO even though variations exist among districts. The RRT and epidemic management committee were not functional. The MDSR committees were not functional. There were no epidemic preparedness and response plan and budget line for PHEM in the assessed areas. There were no independent supervision by PHEM department to districts from zone and no weekly bulletin and feedback at all level.

3.8. Recommendation

The regional health bureau has to conduct periodic supportive supervision to the zone and selected districts and health facilities.

The regional health bureau should assure that the distribution of printed PHEM tools to the intended facilities.

The zone and district health office should prepare and update Emergency Preparedness and Response Plan periodically by involving all stakeholders and should allocate necessary budget for its implementation. The MDSR committee should review maternal deaths and take necessary action.

The zonal health office has to conduct periodic supportive supervision to the selected districts and health facilities periodically and give necessary feedbacks. They should have to start weekly bulletin preparation and communicate to all stake holders.

The district health office has to be equipped with necessary computers, printers and other logistics to strengthen data quality of the districts.

The necessary copies of sent reports should be kept properly at all levels especially at district, health center and health posts.

3.9. Reference

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Chapter Four

Health Profile Description

4. Health Profile Description Report of Berek District, Oromia Special Zone Surrounding Finfinne, Oromia, Ethiopia, 2018

Abstract

Background: The Health Profiles give a snapshot of a population's state of health and key risk factors, along with a brief assessment of each health system's performance in terms of effectiveness, accessibility and resilience. Health profile assessment is a process of gathering and interpreting information from multiple and diverse sources in order to develop a deep understanding of the health of a community and area need to be studied. Berek woreda is selected since it was among low performing woredas in the Oromia special zone surrounding Finfinne. The purpose of the study was to assess and describe health related issues about health status, health indicators and to identify problems for priority setting of Berek district of Oromia Special Zone Surrounding Finfinne, 2017.

Methodology: Descriptive cross sectional study was conducted using well designed questionnaire, by reviewing archives and interviewing and discussion with concerned body. Important data's were collected from Feb 12, 2018 to February 24/2018 and data was analyzed by using Microsoft Office Excel 2007 and presented by tables and figures.

Result: Berek district which covers 772.32 KM^2 areas consists of 22 rural kebeles with a total population of 86069 and 17,931 households all lives in rural area in 2017. The potential health coverage of the district is 100% both by health center and health post. The district produces 1,100,921 quintal crops by cultivating 32,553 hectare land. There are 66 schools which enrolled 15,905 students of which 7013 (44.09%) are female students. There are total of 120 staffs; Nurse to population ratio is 1:4530 and the Health officer to population ratio is 1:7825. Leading cause of morbidity in all ages was Acute upper respiratory infection 2833 (26.12%) and in < 5 years children was Diarrhea (non bloody) 1383 (39.82%). MCH performance was 11639(73%) FP, 1470(49%) ANC_1, 862(28.9%) ANC_4, 633(21%) institutional delivery and 1838(62%) PNC service is given for pregnant women in the district. EPI service performance BCG 2586(87%), Pentavalent first dose 2633(95%), Pentavalent third dose 2586(93%) and Measles vaccine 2505(90%) is provided to children. The dropout rate for children pentavalent third dose and measles were 1.8% and 4.9% respectively. The latrine coverage of the district is 9686(54%). TB case detection rate was 28% and cure rate was 76%.

Conclusion and Recommendation: - Even though potential health coverage is 100%, activities like family planning, Antenatal care, institutional delivery, postnatal care, HIV testing and TB case detection rate are very low. The district health office should hire enough man power, avail water and electricity, promote maternity care, strengthen their laboratory service and conduct integrated supportive supervision and regular review meeting with its stakeholders.

4.1. Introduction

The Country Health Profiles give a snapshot of a population's state of health and key risk factors, along with a brief assessment of each health system's performance in terms of effectiveness, accessibility and resilience (1).

Health profile assessment is a process of gathering and interpreting information from multiple and diverse sources in order to develop a deep understanding of the health of a community and area need to be studied. It is also a process that uses these results to develop strategies to improve the health status of the community. This health profile assessment is both a process and a product (2).

It is a system of collecting, organizing and summarizing health and others health related events to describe health and others health related conditions, demographic, socio-economic, political, cultural and others aspect of a particular geographic areas of interest. The profiles present estimates to track changes in insurance status, disease prevalence, health behaviors and overall health status over time (3).

Its purpose is to promote evidence-based health policy making through a comprehensive and rigorous analysis of the dynamics of health situations and health systems in the district. Therefore, the main objective of this document is to avail compiled information concerning physical and socio-economic condition of the district and its health system.

The data used for the preparation of the document were compiled from Berek district administration, Agriculture, Health, Educational, Water Resource, culture and tourism, and energy office and Finance and Economic cooperation office, Plan and Economic Development office. The document covers almost the data and activities of the period 2017 (2009 EFY).
Berek woreda is selected because it is among low performing woredas in the Oromia special zone surrounding Finfinne. Most of the activities used as performance indicator are at low performance level. So health profile assessment is done to identify issues which hinder the performance of the district.

4.2. Objectives

4.2.3. General objective

To assess and describe health related issues about health status, health indicators and to identify problems for priority setting of Berek district of Oromia Special Zone Surrounding Finfinne, 2017.

4.2.4. Specific objectives

- To identify health service status of the Berek District in 2017
- To summarize health and health related data of Berek District in 2017
- To describe existing infrastructures of the Berek District in 2017
- To identify major health problems of Berek District in 2017

4.3. Methods

4.3.3. Study Area

Health profile description was conducted in Berek Woreda which is one of six rural woredas found in OSZSF of the Oromia Region.

4.3.4. Study Period

Important data's were collected, analyzed and interpreted from Feb 12, 2018 to February 24, 2018.

4.3.5. Study Design

Descriptive cross sectional study was conducted using well designed questionnaire, by reviewing archives and interviewing and discussion with concerned body.

4.3.6. Data collection methods

Health and health related data of the woreda was collected and reviewed by using well designed questionnaire, by reviewing archives and interviewing and discussion with concerned body from woreda administration office, woreda health office, woreda education office, woreda water , Mineral & energy office, woreda Finance and Economic Cooperation office, woreda Plan & Economic Development office, woreda Culture and tourism office and different literature and publications to obtain relevant information.

4.3.7. Data analysis procedures

Data was analyzed by using Microsoft Office Excel 2007 to organize and analyze the data appropriately.

4.3.8. Ethical consideration

Support letter was written from Oromia Regional Health Bureau to Oromia Special Zone Surrounding Finfinne health office then to Berek woreda health office, and then to all concerned sectors according to their level to cooperate during the data collection period. All collected data are used only for the description of health profile and important information was kept confidential.

4.4. Results

4.4.3. Historical Background

Berek woreda is formerly under North Shoa zone of Oromia region. Since 2002 EFY it becomes one of the six woredas and eight town administrations which together forms Oromia Special Zone Surrounding Finfinne. The woreda disintegrated into Aleltu woreda, Laga Tafo Laga Dadi town and Sendafa town. The woreda got its name from mountain found in the woreda known as Barrak which is found in Dire Sokoru, Girar Berek and Bura Berek kebeles. The Laga Dadi dam and Dire surface water dam, which serves Addis Ababa city as source of water, are found in the district. There is also area in the part of Berek Mountain at Girar Berek kebele which serves as "Irreecha" festival celebration in the end of January.

4.4.4. Geography and Climate

Berek woreda is one of the six rural districts found in Oromia Special Zone Surrounding Finfinne which is at the center of the country to the North East of Addis Ababa at 39 KM on the main road to Dessie. It is bounded on the North by Jidda Woreda and Aleltu woreda of North Shoa zone, on South Laga Tafo Laga Dadi Town administration and Addis Ababa City, by East Gimbichu woreda of East Shoa zone and Akaki woreda and to the West Sululta woreda. In the center it surrounded Sendafa town, which is previously part of the district, where all woreda sector offices based. The total area of the district is about 772.32 KM^2. Astronomically, the district lays between 38º40'48" and 39º05'07" East Longitude and between 8º50'0" and 9º15'0" North Latitude. Attitudinally the district stretches from 2200 – 3228 meters above sea level. The district is classified into 2 climatic zones namely highland (dega) 15(68.18%) kebeles and midland (woinadega) 7(31.82%) kebeles. Rain fall ranges from 970 to 1250mm. The temperature of the district ranges from 12 to 26ºC.

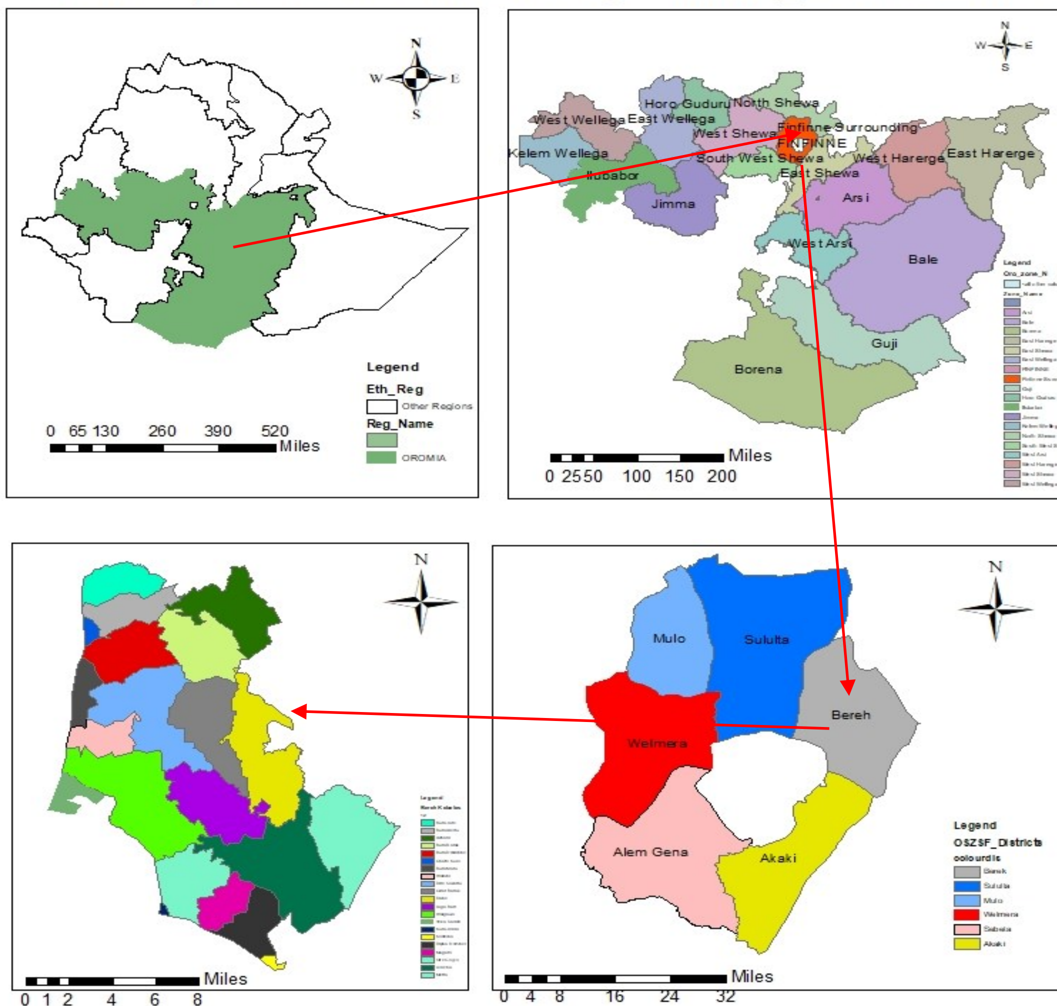

Figure 30 Map of Berek District, OSZSF, Oromia Region, Ethiopia 2018

4.4.5. Administrative and political structure

The woreda is previously under north shoa zone of oromia region but now under OSZSF since 2002 EC. It is one of oldest woredas in the region and it is subdivided into Aleltu woreda, Lege Tafo Lege Dadi town and Sendafa town. Berek woreda is currently composed of 22 rural kebeles and has no urban kebele. All of the woreda administration offices are found in the sendafa town which is previously part of the woreda. All kebeles has administration council which is composed of elected representatives from community and they are responsible to woreda council. The woreda administration is responsible to control sector offices and kebele administration. The woreda is currently governed by Oromo Peoples Democratic Organization

member of Ethiopian People's Revolutionary Democratic Front. Afaan Oromo is the working language of the district.

4.4.5. Demographic Information

Based on 2007 Ethiopian population and housing census projection, the population of Berek woreda in 2017 is estimated to be 86,069 of whom 43,465(50.5%) are females and all are rural dwellers. Of the total population 2771(3.22%) are children of under one year age and 14,141(16.43%) are children aged under five years. Women in the reproductive age group (women with age 15 – 49 years) constitute 19,047(22.13%) and non pregnant women 16,035 (18.63%) of the total population of the district (figure 31).

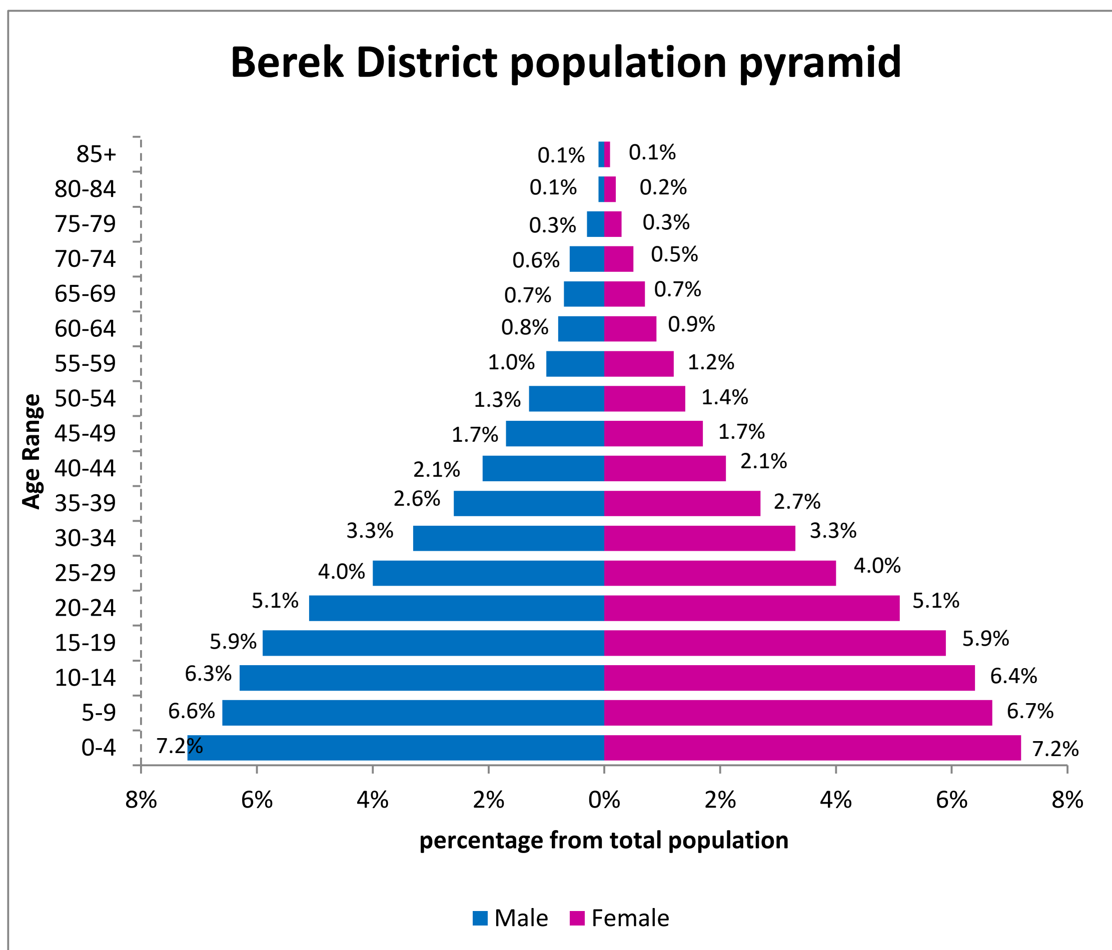

Figure 31 Population pyramid of Berek District OSZSF, Oromia, Ethiopia 2017

The largest ethnic group live in the woreda are 97.4% Oromo followed by 2.3% Amhara and 0.3% others ethnic group. The majority of the inhabitants are 84.2% Orthodox Christian, while 13.6% and 2.2% are Muslim and Protestant religion followers respectively. Afaan Oromo is spoken as a first language by 97.4% of the population and 2.3% speak Amharic and the remaining 0.3% speaks other languages as mother tongue. Lencha (6750) is where many population lives followed by Achani urufa (6185) and Meta (5919) kebeles. There are 17,931 households in the district (Table 18).

Table 18: Population distribution by kebeles in Berek District, OSZSF, Oromia, Ethiopia 2017

S. No	Name of Kebeles	Female	Male	Total Population	Total Households
1	Achani Urufa	3123	3062	6185	1288
2	Burra Barrak	1340	1314	2654	553
3	Burra Jaate Mogno	2031	1990	4021	838
4	Burra Alaltu	1089	1067	2156	449
5	Chafe kulo	1453	1424	2877	599
6	Dirre Sokorru	2187	2144	4331	902
7	Warabii Tenkole	1344	1318	2662	555
8	Burra Dibdibe Kike	1455	1427	2882	601
9	Walgawo	2370	2323	4693	978
10	Burra Maru	1586	1554	3140	654
11	Girar Barrak	1755	1720	3475	724
12	Siree goyyo	2339	2294	4633	965
13	Mugaro Habru	1711	1676	3387	706
14	Ripha Danbal	1383	1355	2738	570
15	Kura Jidda	1559	1529	3088	643
16	Roge Abbuu	1913	1875	3788	789
17	Kontoba Wadecha	1703	1670	3373	703
18	Yekka Saden	2676	2623	5299	1104
19	Laga Barii Laga Bolo	1844	1807	3651	761
20	Lencha Coba Bululta	3409	3341	6750	1406
21	Meta Guta Kombole	2989	2930	5919	1233
22	Dabee Godo Muda	2205	2162	4367	910
	Berek District	43465	42604	86069	17931

Source: Berek woreda health office

4.4.6. Productivity and Income

Since all of the district's population lives in the rural areas agriculture is the means of living. They lead life by farming and rearing animals. There are 11,560 Male and 1,606 Female farmers who own land in the woreda. There are also 354 Male and 90 female licensed and registered Merchants. The major food crops like Wheat, Teff, Barley, bean, Lentil, chickpea etc. are produced in the district during rainy season of the year. Of 772.32 KM^2 total land of the district 325.53 kilo meter square land is for farming, 150.02 KM^2 is for grazing, 143.55KM2 is covered by forest and 153.22 KM^2 is for other purpose. The district produces 1,100,921 quintal crops by cultivating 32,553 hectare land in the year during regular rainy season. They utilized 21894 DAP and 19522.5 quintal Urea fertilizer during production year. The woreda also gains 153,823 quintal product by cultivating 989 hectare land by irrigation (table 19).

Table 19: The type of crops produced in Berek district, OSZSF, Oromia, Ethiopia 2017

S. No	Crop Type	Cultivated land (in Hectare)	Amount of crop produced (in Quintal)	Percentage %
1	Wheat	10824	495576	45.01
2	Teff	7636	206592	18.77
3	Barley	3920	148856	13.52
4	Bean	3387	68882	6.26
5	Chickpea	1660	43959	3.99
6	Lentil	2996	85834	7.80
7	Pea	336	5318	0.48
8	Linseed	31	310	0.03
9	Others	1763	45594	4.14
	Total	**32553**	**1100921**	100.00

Source: Berek woreda Agriculture and Natural Resource Office

The woreda is also rich in domestic animals there are 127,866 Cattles and 84139 sheep in 2017. Animal fattening and dairy products are also good sources of income to households in the district. There are 10,651 and 5,494 households who engaged in milk production and animal fattening respectively. There are 4 Veterinary Doctors (DVM) and 15 assistant physicians (diploma level) who are working at 1animal clinic and 6 animal health posts to keep health of animals at a spot (table 20).

Table 20: Type of live stock found in Berek district, OSZSF, Oromia, Ethiopia 2017

S. No	Types of animals	Quantity (in Number)	Remark
1	Cattles	127,866	
2	Sheep	84139	
3	Goat	4550	
4	Horses	15187	
5	Mules	165	
6	Donkeys	22428	
7	Poultry	84589	
8	Bee	3651	Hive /colony of honey bee

Source: Berek Woreda Live stock and Fishery Office

4.4.7. Education

There are 7 kindergarten, 56 Elementary and 3 high schools in Berek woreda in 2017. From total of 66 schools in the woreda 53 are owned by government while all 7 KGs, 5 primary first cycle schools (grade 1-4) and 1 Elementary second cycle school (grade 5-8) are private owned schools. Among 56 elementary schools only 10 schools are limited to 1-4 grades while the rest 46 are from grade 1-8. There is no preparatory (grade 11-12) school in the woreda. All schools in the woreda have Anti HIV/AIDs clubs (table 21).

Table 21: Number and Type of schools in Berek district, OSZSF, Oromia, Ethiopia 2017

S. No	Type	Number of schools		
		Government	Private	Total
1	Kindergarten	0	7	7
2	Primary first cycle (1-4 Grade)	5	5	10
3	Primary first and second cycle (1-8 Grade)	45	1	46
4	Secondary High school (9-10)	3	0	3
	Total	53	13	66

Source: Berek woreda Education Office

There are 15,905 students enrolled in the woreda in 2009 EFY among them 7013 (44.09%) are female students. According to woreda education office reports Net enrollment for primary education grades 1-4 is male 100.7 %, female 95% and total 97.85% , for second cycle male 76.6%, female 57.12% and total 66.94% for secondary education grades 9-10 Male 27 %, Female 26% total 26.5%. The dropout rate of the students in first cycle was male 2% and female 2%, and at grade 8th male 4.3% and Female 5%. The grade 8th Regional Examination transfer rate among students sat for exam was for Male and Female 98% and 99.5% respectively.

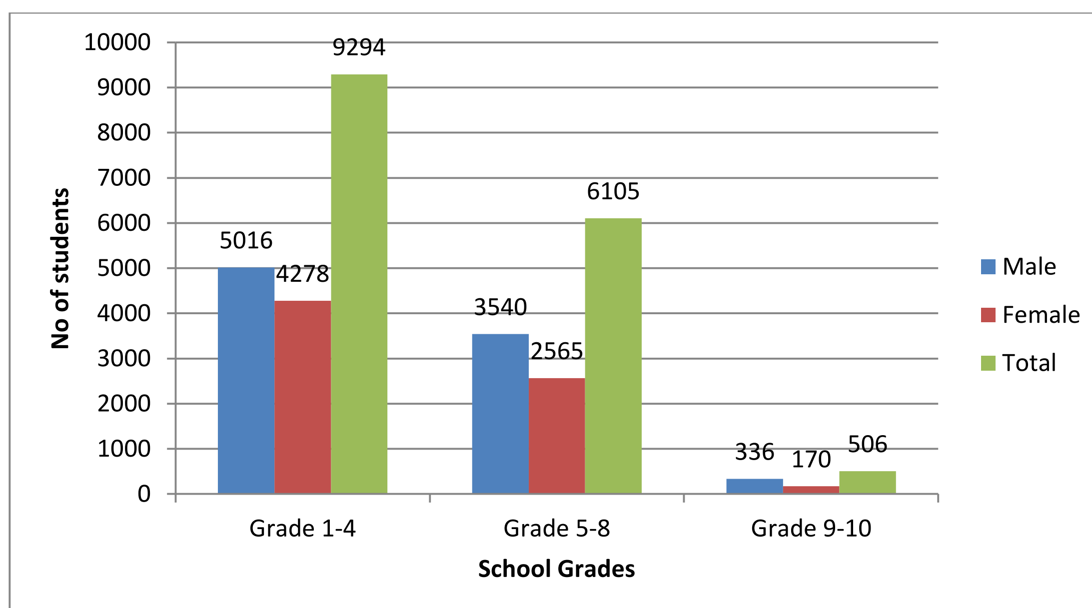

Figure 32 Number of students enrolled in schools by sex and Grade in Berek district, OSZSF, Oromia, Ethiopia 2017

There are 444 teachers in the woreda among them 273(61.5%) are males while the rest 171 (38.5%) are females. Regarding educational status of teachers only 87(19.59%) are first degree holders.

Table 22: Number of Teachers by their educational status and teaching grades Berek district, OSZSF, Oromia, Ethiopia 2017

S. No	School grade	10-12*			Diploma			Degree			Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
1	1-4	25	23	48	73	81	154	7	8	15	105	112	217
2	5-8	0	0	0	115	39	154	24	11	35	139	50	189
3	9-10	0	0	0	0	1	1	29	8	37	29	9	38
	Total	25	23	48	188	121	309	60	27	87	273	171	444

Source: Berek woreda Education Office

* are those who completed grade 10 or 12 hired by woreda education office for the purpose of caring preschool children

4.4.8. Facilities and Infrastructure

Main road from Addis Ababa to Debre Birhan, Dessie, Woldia, Mekelle pass through Berek District covers 33 KM. There is also 275.57 KM gravel road built by Universal Rural Road Access Program (URRAP) and other programs which connects kebeles with district center. Among the 22 health post in the district 19 (86.4%)of them were accessible in all season and the rest 3 health posts namely Bura Jate HP, Chafe Kulo HP and Bura Maru HP are accessible only in dry season due to unfinished bridges and all 4 health centers were accessible year round. Regarding Telecommunication 16 (72.7%)Health Posts and 3 (75%)Health centers have access to mobile phone net work coverage and non of health institution has fixed wired phone. Only one health center had water supply and none of health post has piped water supply. Concerning electric power supply among the health facilities in the district only one of the health center and 3 health posts had electric power supply and 3 health posts has solar power.

4.4.9. Woreda Health System

4.4.9.1. Organogram of Woreda Health Office

As stated in HSTP, “Woreda” is an administrative division in Ethiopia with an average population of 100,000 and is managed by democratically elected council that forms a local government. Woredas are composed of a number of Kebeles, which are the lowest administrative units. As per the national standard for health facilities woreda is expected to have health posts, health centers and a primary hospital. The woreda health office is organized to provide programmatic and administrative support for the primary health care facilities. It plays a stewardship role ranging from multi- sectoral coordination and linkages across local government to regulation of public and private health services (mainly primary care), generating strategic information and assessing performance for accountability. It has also a financial responsibility to provide oversight for the revenues generated by health facilities, the budget allocated by the council for the health sector, resource generated through community-based health insurance schemes and purchasing services. In a nutshell, the woreda health office is responsible for the prevention of disease, promotion of health and provision and regulation of essential health services in the woreda (4).

Based on newly studied structure of woreda health offices by Oromia regional health bureau and Oromia Public service and Human Resources Development Bureau the Organogram of Berek woreda health office is as described in the following diagram.

The woreda health office has one head and one deputy head as well as well as program coordinators which are members of woreda management committee. Each team has different number of officers which are responsible to perform daily activities given to them by BPR and they are evaluated based on their plan of Balanced Score Card (BSC). There are also supportive staffs which are assigned to the office like drivers, secretary and cleaners.

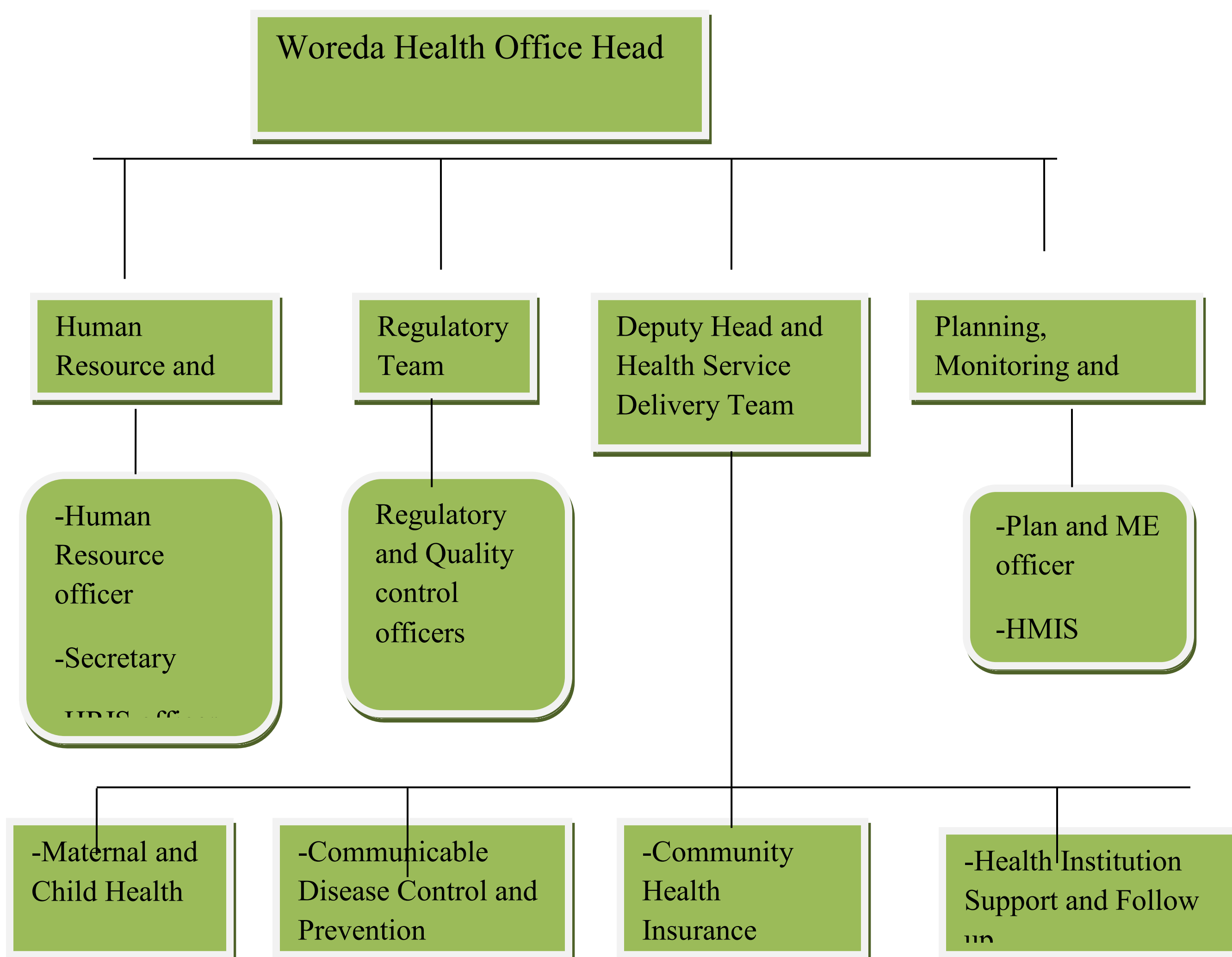

Figure 33 Organogram of Berek Woreda Health Office OSZSF, Oromia Ethiopia 2017

4.4.9.2. Health Facility

The Berek district Health office has 4 health centers (among them 1 started service in 2017) and 22 health posts making potential health service coverage of the district 100% by HC and Health posts. There are also 1 medium private clinic and 2 primary private clinics in the district. But there is no Hospital in the district.

Table 23 : Types of Health facility found in Berek district, OSZSF, Oromia, Ethiopia 2017

S/N	TYPE		NUMBER		REMARK
			Governmental	Private	
1	Hospital		0	0	
2	Health Center		4	0	
3	Health posts (HPs)		22	0	
4	Clinics	Primary	0	2	
		Medium	0	1	
Total			26	3	

Source: Berek Woreda Health office

The kebeles in the district are assigned under nearby health center for administrative and Technical support. Based on this scenario all 22 health posts are assigned to 4 health centers based on their geographical proximity as listed in the following table.

Table 24: Health Centers and their catchment health post in Berek district, OSZSF, Oromia, Ethiopia 2017

S. No	Health Center /PHCU	Health posts/Kebeles	Total population served
1	Burra Berek HC	Bura Jate, Bura Aleltu, Chafe Kulo, Burra Berek, Achani urufa	17893
2	Dirre HC	Bura Dibdibbe, Bura Maru, Warabi Tenkole, Dirre Sokorru, Walgawo, Girar Barrak	21183
3	Sire Goyo HC	Ripha Dembel, Roge Abu, Kontoba Wedesa, Kura jida, Sire Goyo, Mugaro	21007
4	Lencha HC	Meta Guta, Lencha Coba, Dabe Godo, Laga Bari, Yeka Saden	25986
	Berek Woreda		86069

4.4.9.3. Human Resources of the District

There are total of 120 staffs in Berek woreda health office among these 19 are working at district office level while the rest works at health center and health post. Health facilities are staffed with health professionals like; health officers, clinical nurses, laboratory professionals, pharmacy professionals, midwifery nurses, public health nurses, health extension workers and supportive staffs. The Nurse to population ratio is 1:4530, the Health officer to population ratio is 1:7825, Midwifery to population ratio is 1:14345 and HEW to Population ratio is 1956.

Table 25: Human Resource working in Berek district, OSZSF, Oromia, Ethiopia 2017

S/N	Category	Number of staff	Remarks
1	Physicians (MD)	0	
2	Health officers	11	2 @ WorHO
3	Nurses	19	5 @ WorHO
4	Midwifery	6	
5	Lab. Technician	3	
6	Pharmacy	3	1 @ WorHO
7	Env. Health	1	1 @ WorHO
8	HEWs (Rural)	44	
9	HIT	3	1 @ WorHO
10	Emergency Medical Technician (Ambulance)	2	2 @ WorHO
11	Supportive staffs	28	7 @ WorHO
Total		120	

Source : Berek woreda health office HR Department

4.4.9.4. Community Health/ Health Development Army

In the district 10576 women were organized in 466 groups of health development army known as "Garee Misoomaa". They meet twice weekly to discuss on their health issues at 1-5 level and twice monthly at group level. They also play a critical role on fundraising activities for pregnant women by collecting money and cereals.

Table 26: Health Development Army status in Berek district, OSZSF, Oromia, Ethiopia 2017

S.No	Health center	Number of Women grouped in HAD	Number of Group/Garee Misoomaa	Number of 1-5 network	Money collected in 2009EFY (ETB)	Cereal collected in 2009EFY (Quintal)
1	Burra Berek HC	2297	92	460	8875	17.68
2	Dire HC	3124	114	570	16875	15.9
3	Sire Goyo HC	2105	138	690	10590	21.18
4	Lencha HC	3050	122	610	9600	10
	Berek Woreda	**10576**	**466**	**2330**	**45940**	**64.76**

Source: Berek woreda Health office

4.4.10. Health Budget Allocation

In 2017 (2009 EFY) a total of 79, 361,824 Birr was allocated for the district from the government, of which 7,398,251 (9.32%) Birr were the total budget allocated for the district health office which exceed previous 2016 (2008 EFY) by 376,772 birr. From the total budget of the health office 5,454,344 Birr (73.7%) were allocated for health centers and the rest is for woreda health office and five health posts. From budget allocated for Health centers 540,000 Birr were for drugs procurement and 383,387 birr were utilized by health centers from internal revenue generated. The District health office also got additional 311,955 Birr from One WASH project for promotion of environmental sanitation and construction of latrine for health post and incinerator and placenta pit for Health Center.

4.4.11. Health Indicators and Vital statistics

Since the vital statistics registration system in the country is on introduction it is difficult to obtain basic full data on the important indicators (table 27).

Table 27: Health indicators and vital statistics of Berek district, OSZSF, Oromia, Ethiopia 2017

S/N	INDICATORS	Number	Percent (%)
1	Total population	86069	100
2	Male population	42604	49.5
3	Female population	43465	50.5
4	Under 1 years infant	2771	3.22
5	< 3 years children	8039	9.34
6	6-59 months age group	12910	15
7	24-59 months age group children	9227	10.72
8	Under 5 years children	14141	16.43
9	Women of child bearing age (15-49 years)	19047	22.13
10	Pregnant women	2987	3.47
11	Live births	2987	3.47
12	Non pregnant women in fertile age group	16035	18.63
13	15-24 year age group population	17007	19.76
14	15-59 age group population	40909	47.53
15	Infant mortality rate/1000	NA	
16	Under 5 mortality rate/1000	NA	
17	Maternal mortality ratio/100,000 LB	NA	

4.4.12. Top Causes of Morbidity and Mortality

4.4.12.1. Leading causes of Outpatient visits (morbidity)

In 2017 Acute upper respiratory infection (AURTI) 2833 (26.12%) was leading cause of morbidity followed by Diarrhea (non bloody) 1912 (16.96%) and Acute febrile illness 1837(16.29%) (figure 34).

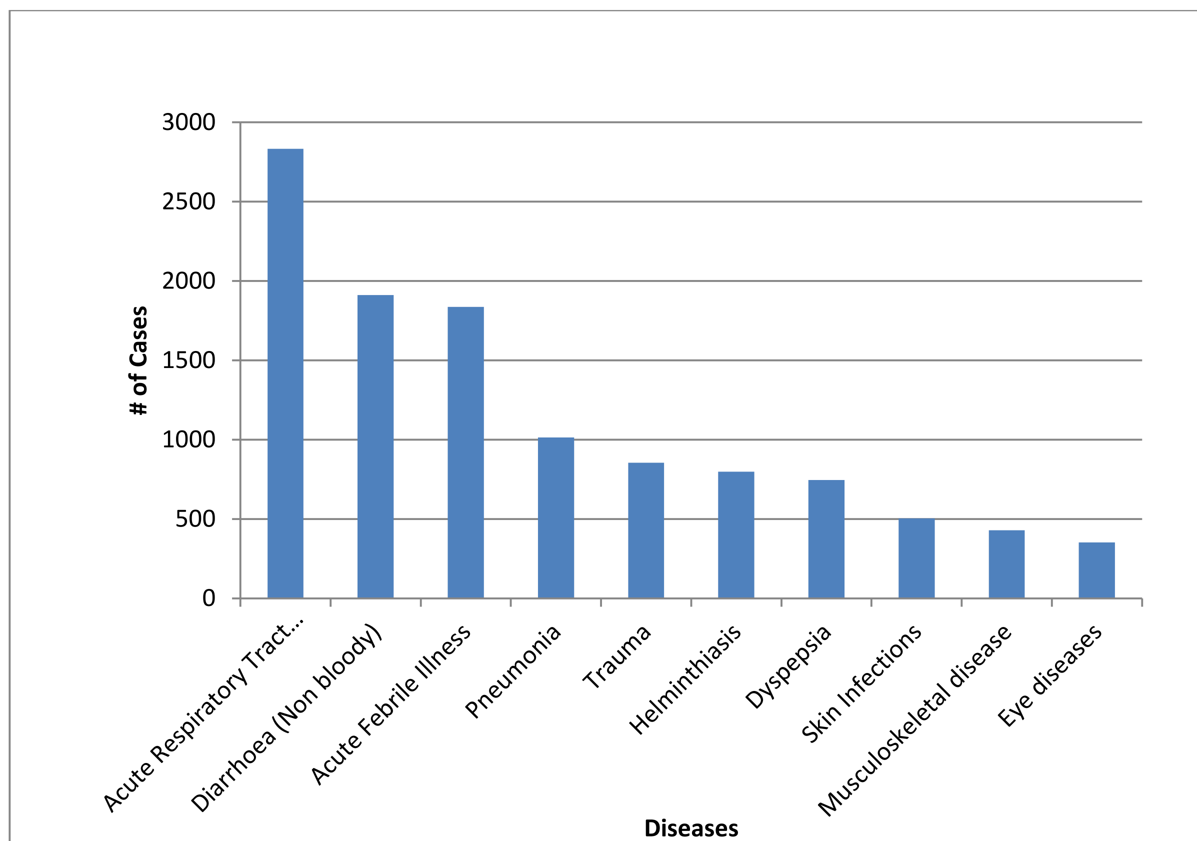

Figure 34: Top Ten Leading causes of morbidity in Berek district, OSZSF, Oromia, Ethiopia 2017

4.4.12.2. Top five causes of morbidity in < 5 children

In children under five years diarrhea (non bloody) 1383 (39.82%) was the major causes of morbidity along with acute upper respiratory infections 896 (25.77%) and pneumonia 769(22.14%) in Berek woreda of OSZSF in 2017 (figure 6).

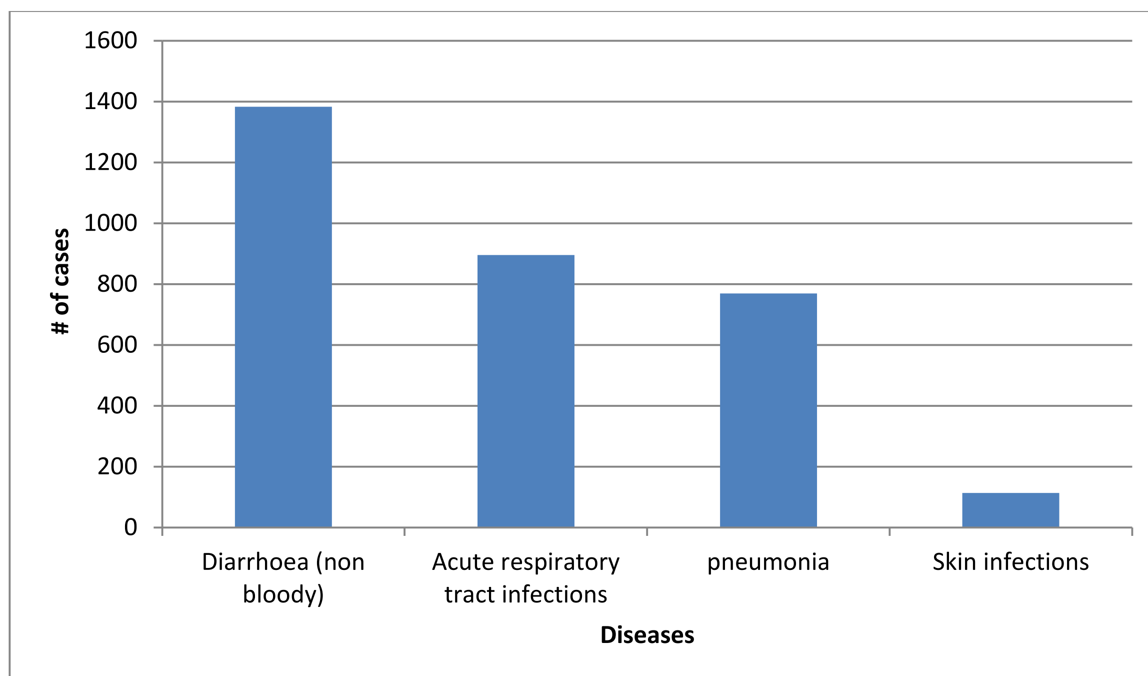

Figure 35: Leading causes of less than five years children morbidity in Berek district, OSZSF, Oromia, Ethiopia 2017

Regarding the inpatient or admission and mortality there was no recorded data in the woreda health office.

4.4.13. Outbreak/ Disaster Situation in the woreda

In this woreda, there were no any outbreak or disaster situations that occurred in the last five years. But concerning other priority diseases the woreda sent 2 AFP samples and 5 measles samples to EPHI laboratory for confirmation test but none of them were positive.

4.4.14. Maternal and Child Health (MCH)

Maternal Health

Basic maternal health services like Family planning, Antenatal care, post natal care, syphilis test, prevention of maternal to child transmission of HIV/AIDS, abortion and delivery services are provided to mothers in health facilities in the woreda.

Family planning

Among 16035 non pregnant women in the woreda 11639(73%) received modern type of family planning method in 2017. From total acceptors 3636(31.24%) were New acceptors while 8003(68.76%) were repeat acceptors. Regarding the method used injectables (Depo-Provera) 6675(57.4%) was the most preferable method followed by Implants 2906 (24.9%) and Oral contraceptive pills 1948(16.7%). Long acting family planning method accounts 2925(25.1%) from total method used (figure 36).

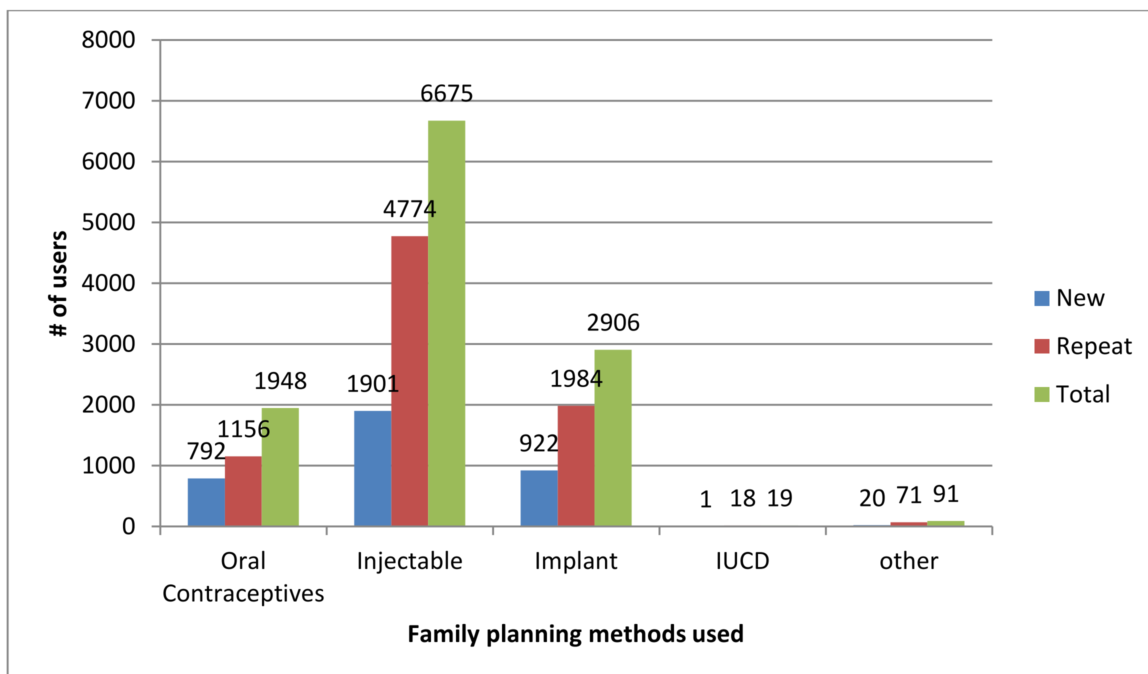

Figure 36: Contraceptive acceptance by method and visit in Berek woreda, OSZSF, Oromia, Ethiopia 2017

Antenatal Care

From 2987 pregnant women in the woreda only 1470(49%) of them received antenatal care at least for first time, and from these who came for service 402(27.3%) & 1077(73.2%) women tested for Syphilis and HIV respectively (table 28).

Table 28: ANC and related services for pregnant women in Berek district, OSZSF, Oromia, Ethiopia 2017

S. No	Activities	Eligible	Performance	Percent %
1	ANC for first time (ANC 1)	2987	1470	49
2	ANC 4 from total pregnant	2987	862	28.9
3	ANC 4 among women who received ANC for first time	1470	862	58.6
4	Syphilis tested women from total pregnant	2987	402	13.5
5	Syphilis tested women among women who received ANC for first time	1470	402	27.3
6	HIV tested women from total pregnant women	2987	1077	36.1
7	HIV tested women among women who received ANC for first time	1470	1077	73.2
8	Comprehensive abortion services	299	13	4.3
9	HIV + women linked to ART	3	3	100

Source: Berek woreda health office

Delivery and post natal service

The delivery attended by skilled personnel was only 633(21%) from eligible pregnant women, while 1838 (62%) women received postnatal services in health institutions. All health centers have maternal waiting homes. The institutional delivery trend of Berek District from 2014-2017 (2006-2009 EFY) was shown in the following diagram (37).

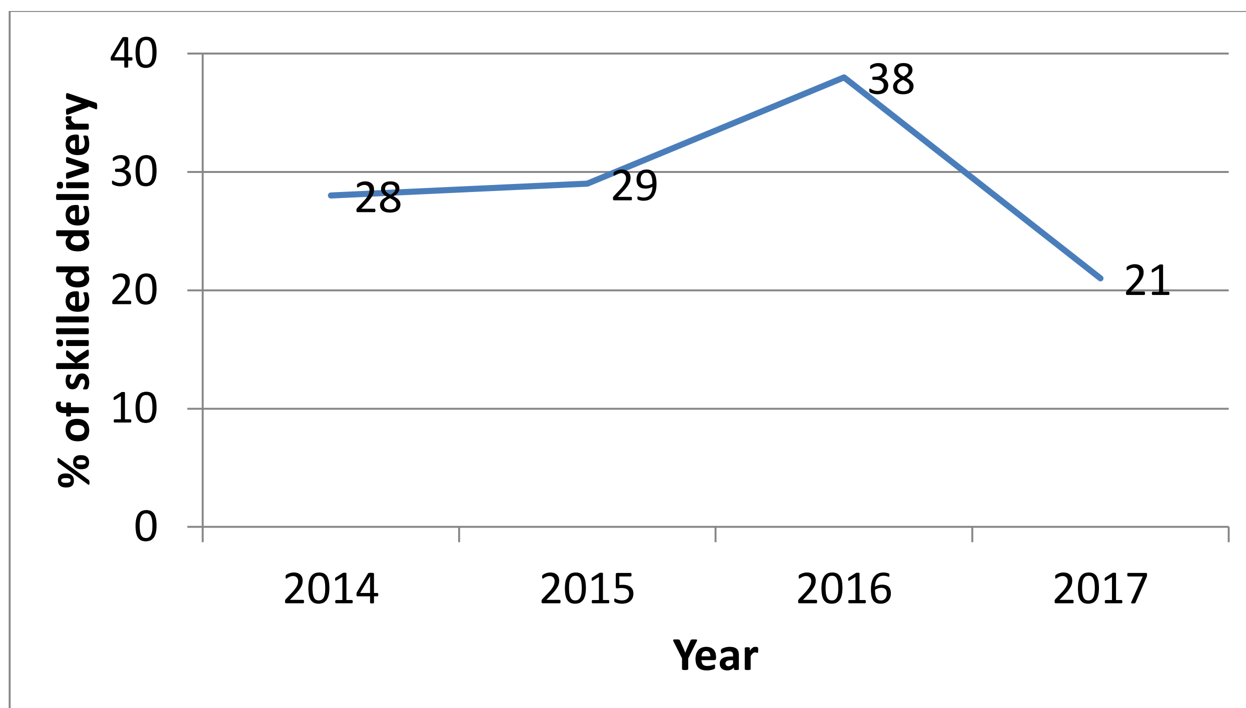

Figure 37: Institutional Delivery trend in Berek district, OSZSF, Oromia, Ethiopia from 2014-2017

Immunization

Expanded program on Immunization started in Ethiopia in 1980 with the aim of reducing mortality and morbidity of children and mothers from vaccine preventable disease (5). In 2017 EFY the district provide BCG, Pentavalent (DPT-HepB-Hib) first dose, Pentavalent (DPT-HepB-Hib) third dose and Measles vaccine for 2586(87%), 2633(95%), 2586(93%) and 2505(90%) children respectively. All health centers and 4 health posts has functional refrigerators so they provide immunization services daily. The rest health posts provide immunization based on monthly basis (figure 38).

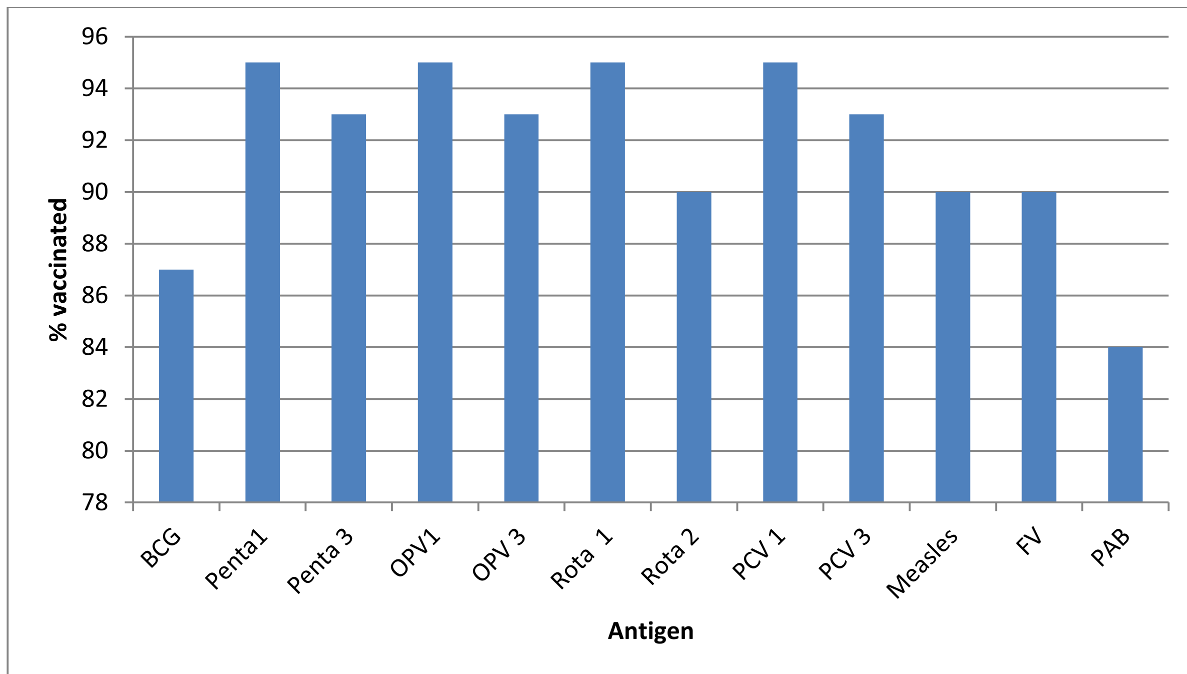

Figure 38 Vaccination coverage of Berek District Oromia Special Zone Surrounding Finfinne Oromia Ethiopia 2017

The dropout rate for children who vaccinated pentavalent first dose and does not take pentavalent third dose and measles were 1.8% and 4.9% respectively (figure 39).

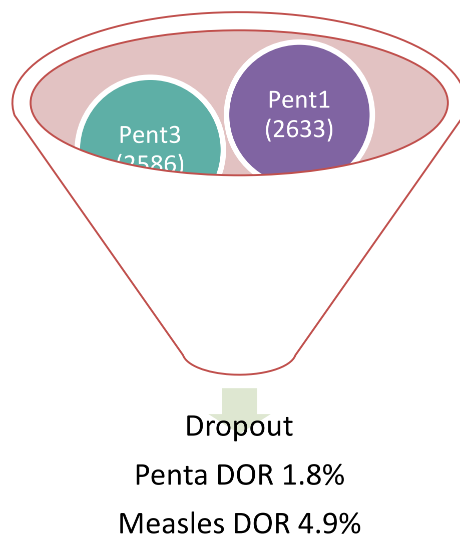

Figure 39: Measles and Pentavalent dropout rate in Berek district, OSZSF, Oromia, Ethiopia 2017

4.4.15. Environmental Health and WASH

The latrine coverage of the district is 9686(54%) from total 17931 households. Among the latrines 4221(43.58%) are improved while are 5465(56.42%) unimproved latrine. There is only one Open Defecation Free (ODF) kebele in the end of 2017.

According to the District water, mineral and Energy office report 52% of district populations are accessible to safe drinking water.

4.4.16. Health Education

Health education a basic tool to create awareness, brought behavioral change and to deliver other health extension packages as stated on primary health care and Health Extension program (6, 7). The woreda HEP officer states that health education is given on different health topics for patients and clients come to health center sometimes and also delivered by HEWs on community gatherings as well as during home visit but there is no recorded information to know exact number of population reached by session due to absence of standard report format since implementation of HMIS.

4.4.17. Endemic Diseases

Tuberculosis/ Leprosy

In 2017 only 49 cases of all forms of Tuberculosis/TB were diagnosed out of 178 cases expected to be detected. From total cases detected 20 bacteriologically confirmed PTB, 10 clinically diagnosed Pulmonary Negative and 19 are clinically diagnosed EPTB cases. All of them were screened for HIV and one tested HIV + and linked to ART. TB case detection rate of the district for stated year was 28%. TB cure rate for bacteriologically confirmed case was 76% and Treatment success rate for all forms was 100%. There were no death and defaulter of TB patient this year in the district. There was no Leprosy case in the district for the last five years (figure 10).

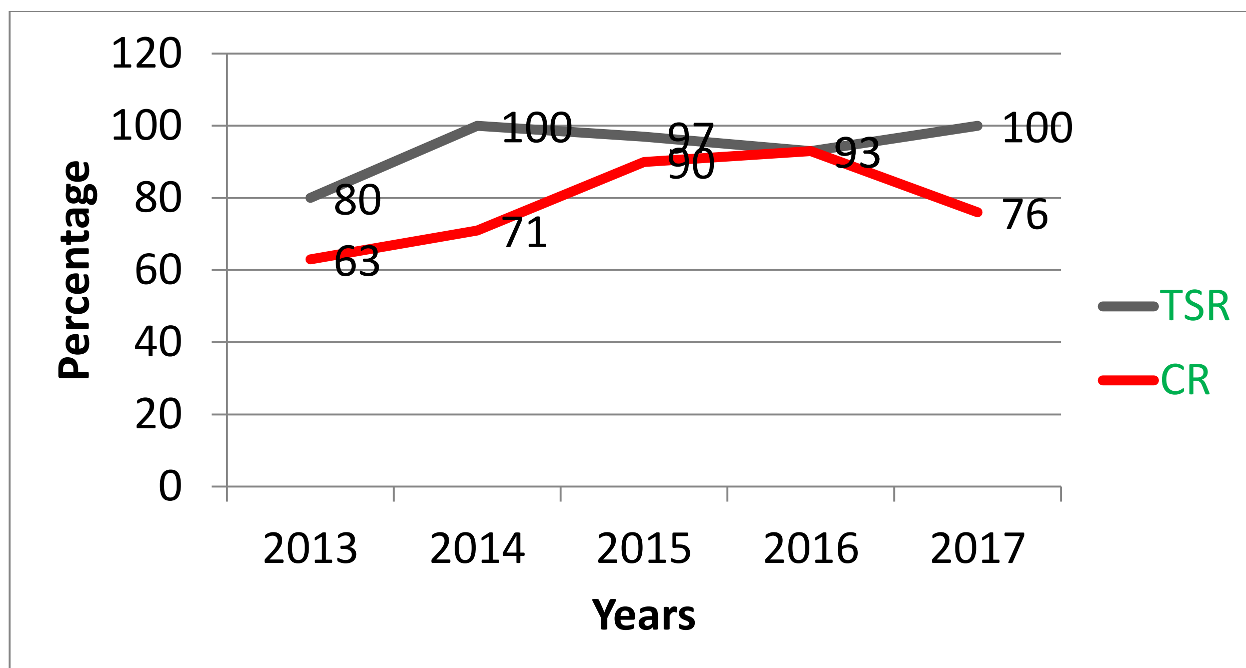

Figure 40: Trend of TB cure rate and success rate in Berek district, OSZSF, Oromia, Ethiopia from 2013-2017

HIV/AIDS

In the district only one health center is providing ART service and 2 health centers provide PMTCT service for HIV + pregnant mothers. In the Fiscal year 889 males and 2236 females total of 3125 peoples were tested for HIV in the district among them 2860 (91.5%) and 265 (8.5%) via PITC and VCT respectively. There were 11 HIV + among tested clients from them 7 were females while the rest 4 were males. The testing rate of the district is only 3125(7.64%) from expected 40909 (15-59 years old population). From HIV + tested clients 6 were linked at ART site in the district and the rest 5 linked to nearby town ART site. Cumulative Incidence rate was 3.52/1000 persons while 4.49/1000 for male and 3.13/1000 females. There are 26 persons receiving clinical care among them 21 are on ART while the rest 5 persons are on Pre-ART. Regarding social part of HIV prevention activities 9095 condoms were distributed, 30 sectors allocated 136,550 birr budget for mainstreaming, 37 PLHIV and 90 OVC were received support in the district.

4.4.18. Nutrition and Early Warning

All health posts and health centers provide OTP services. There are 72 children entered into OTP program in the year among them 1 transferred out to other health institution, 1 defaulted and the rest 70 (97.2%) recovered. There is no functional stabilization center (SC) in the woreda if case occurred they refer to Hospitals in Addis Ababa. The woreda is not included in TSF and PSNP programs since it is one of food secured woreda in the region.

4.4.19. Drug and Medical Supplies

The woreda allocated 180,000 birr per health center from the regular budget and also the health centers assigned additional budget from internal revenue generated. The problem occurred concerning drug and medical supplies was delay in delivery as per requested time. There was also shortage of Pharmacy professionals in the woreda. Only 50% of Health center has at least one pharmacy professional. All health centers have functional DTC committee.

4.5. Discussion

The potential health coverage of the district is 100% both by Health center and Health post. There should be primary hospital which is the component primary health care unit and it is immediate referral center for health centers so the woreda should have to negotiate with concerned body to construct hospital to fully satisfy the health care need of the community (4).

Latrine coverage of woreda is 54% which is less than 61% in rural part of Ethiopia as stated in EDHS 2016 so increasing the latrine utilization of the community is crucial as most of the diseases are caused by open defecation (8).

The leading causes of illness in the district are Acute upper respiratory infection 26.12%, Diarrhea (non bloody) 16.96% and Acute febrile illness 16.29%) and in Children of under 5 years old diarrhea (non bloody) 39.82% was the major causes of morbidity along with acute upper respiratory infections 25.77% and pneumonia 22.14% so when we see these all the diseases are caused by lack of personal hygiene and poor environmental sanitation; therefore mobilizing the community to towards sanitation and improving healthy behavioral practices is crucial (4).

The contraceptive acceptance rate for modern method of the woreda is 73% which is better than in the country 36% among married women and 55% among sexually active unmarried women as of EDHS 2016 but it is far behind set standard of Key performance indicator which is 85% (8, 9).

The Antenatal care coverage of the district was at least one time (ANC_1) 49% and four times or more (ANC_4) 28.9% while in Ethiopia women receives care during pregnancy were 62 % and 32% for ANC1 and 32 ANC4 respectively and in Oromia 50.7% of women received antenatal care at least once during their pregnancy so the woreda should have to work hard to improve its performance (8).

The rate of infants protected at birth from neonatal tetanus in the woreda were 84% which is better than 46.7% in Oromia region as shown in EDHS 2016 (8).

The percentage of women give birth in health institutions in the district was only 21% while 26% of women gave birth in health facilities in Ethiopia as EDHS 2016 and the woreda is very far

from expected performance by HSDP to increase from 60% to 90%. The district should set clearly stated strategies to cover this wide gap (4, 8).

The post natal coverage of the district was 62% which is low when compared with national target which aims to increase early post natal coverage from 90% - 95% to be achieved at the end of growth and transformation plan (4).

The immunization coverage of the woreda was 87% BCG, 95% Pentavalent (DPT-HepB-Hib) $_1$, 95% OPV1, 93% Pentavalent (DPT-HepB-Hib) $_3$, 93% PCV$_3$, 90% Rota2, 90% Measles and 90% fully Vaccinated which is better when compared to national average in 2016 EDHS 69% BCG, 73% Pentavalent (DPT-HepB-Hib) $_1$, 53% Pentavalent (DPT-HepB-Hib)$_3$, 81% OPV1 , 56% OPV3, 49% PCV3, 56% Rota$_2$, 54% measles and 39% fully vaccinated. But still the district have to push forward to achieve HSTP set targets in providing quality and potent vaccine for the children (4, 8). The dropout rate for children were 1.8% and 4.9% for pentavalent third dose and measles respectively among children taking first dose of pentavalent so it is in good range as set WHO standard (5).

The TB case detection rate of the district was as low as 28% while cure rate was 76% when we compare these with nationally set target TB detection rate (increase from 61% to 87%) and TB cure rate (increase from 78% to 90%) the districts performance is low so it is better to improve activity by setting feasible strategy to reach expected level (4).

The HIV/ AIDS testing rate from expected population is very low only 7.64% but the country envisioned to test at least 90% of target population to know their status (4).

The woreda council allocated 9.32% of its total budget to the health sector which is proportional to target set nationally that 10% of total government budget is to be spent on health care (4).

The human resource composition of the district was 34.5% for office level, 47.5% of health center and 100% of HEW since health work force is one of the building blocks of health service delivery the district should have to prioritize to hire enough human power to conduct work to satisfy need of the community (10).

4.6. Limitation

There is no data on Inpatient admission status and mortality, No vital statistics data like Maternal Mortality, Child mortality, Neonatal Mortality and Perinatal mortality. There were no long term data on certain indicators especially those which are not reported by HMIS to conduct trend analysis.

Difficult to get appropriate person who gives information wanted at different offices on the day of request.

4.7. Conclusion

In the district even though potential health coverage is 100%, activities like family planning, Antenatal care, institutional delivery, postnatal care, HIV testing and TB case detection rate are very low.

The latrine coverage of the district is low as a result of it hygiene and environmental sanitation related diseases like acute upper respiratory infection, diarrhea (non bloody) and acute febrile illness are among the leading causes of illness in overall population.

The immunization coverage among children less than 1 year is good and dropout rate is within acceptable range in the district.

4.8. Recommendation

The district health office should hire enough human power for health centers and health office.

The district health office should be avail water and electricity service to health facilities by working with concerned bodies.

The health centers should have to mobilize the community via HDA and other means to register and refer pregnant women early for service and to enter maternal waiting homes 1 or 2 weeks prior to delivery.

The health centers should have to strengthen their laboratory service to increase TB case detection rate and syphilis and other tests done for pregnant mothers.

The district health office should conduct integrated supportive supervision and regular review meeting with its stakeholders.

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Chapter Five

Scientific Manuscripts for Peer Reviewed Journals

5. Meningococcal Meningitis Surveillance Data Analysis of Oromia Region, Ethiopia 2013 – 2017

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Abstract

Introduction: - Meningitis remains a serious global health problem. The infectious agent for meningococcus meningitis is *Neisseria meningitidis*. Epidemics occur in African "meningitis belt which extends from Ethiopia to Senegal. The aim of study was to describe distribution of meningococcal meningitis in Oromia regional state in past five years from 2013 to 2017.

Method: We conducted Cross sectional study design based on Retrospective record review of secondary surveillance data to collect and analyze five year (2013 – 2017) meningitis surveillance data of Oromia Region and data was compiled, analyzed and interpreted from March 01- 18, 2018. Data was analyzed by using Microsoft Office Excel 2007.

Result: There were 2665 suspected meningitis cases and 74 deaths reported from 2013-2017. Average incidence was 1.57 per 100000 populations. The highest case fatality rate 4.72% in 2015 and lowest 4(1.03%) at 2016 and over all case fatality rate was 2.78%. It was highly incident in Horro Guduru Wollega, West Guji, and Borena Zones with incidence rates of 9.90, 8.92 and 6.28 per 100,000 persons respectively.

Conclusion: The Incidence of Meningitis in the region was fluctuating from year to year reduced from 2013 to 2016 and showed slight increment in 2017. The disease was highly incident in West and South part of the region and during dry season of the year from December to May rarely in wet season like July. We recommend strengthening routine surveillance system, improving capacity of health facilities and aligning the report of weekly PHEM report and Monthly HMIS reports.

Key words: Meningitis, Surveillance, Oromia, Ethiopia

Introduction

Meningitis is a serious global health problem. The most common causes of bacterial meningitis are *Niesseria meningitidis, Streptococcus pneumoniae, and Haemophilus influenzae.* There are 12 serogroups of *N. meningitidis* that have been identified, 6 of which (A, B, C, W, X and Y) can cause epidemics. The average incubation period is four days, but can range between two and ten days. Meningitis epidemics can occur in any part of the world. The largest epidemics occur in the semi-arid areas of sub-Saharan Africa, designated the African "meningitis belt'' which extends from Ethiopia in the East, to Senegal in the West the estimated incidence for the 20- year period 1970-1992 was about 800,000 cases. The dry season, between December and June, because of dry windy conditions increase incidence of Meningitis. During dry season Incidence rate in Meningitis belt is 10-100 cases per 100,000 populations and the area is punctuated by explosive epidemics which occur in 8-12 years cycle (incidence rate > 1000 cases per 100000 populations during cyclic epidemics) (1-5).

Incidence of meningitis in the United States, decreasing from 1.3 cases per 100,000 populations in 1996 to 0.12 cases per 100,000 populations in 2015. In European Union countries its Incidence rate was 0.68 cases per 100 000 population in 2012 and country specific rates of confirmed invasive Meningitis ranging from 0.11 to 1.77 cases per 100 000 population. In Ethiopia, meningitis outbreaks have been described in written reports since 1901. In 2013, 1466 of cases and 40 deaths of meningitis reported. In 2015 meningitis incidence rate was 2 per 100,000 populations and case fatality rate was 3.3%. In the same year incidence rate in the Gambella, Tigray, Benishangul-Gumuz, and Oromia were 21, 6, 4 and 2 per 100,0000 population respectively while case fatality rate was 9.3% in Gambella, 6.9% in Benishangul-Gumuz and 4% in Oromia region. The Retrospective study done from 2007 - 2011 in Hawassa and Gondar University Hospital showed that a higher prevalence of bacterial meningitis in males with an observed male to female ratio of 1.7:1 at Gondar and 1.9:1 at Hawassa. A marked effect of seasonal variation was observed with more cases occurring in the summer months. The Retrospective secondary surveillance data analysis of meningococcal meningitis conducted in Oromia region from 2009-2013 showed a total of 2498 suspected cases and 66 deaths (CFR 2.6%) with annual incidence of 1.64% were identified (6-12).

There is no study conducted on meningococcal meningitis prevalence in Oromia region in the last five years so this study tries to describe distribution of meningococcal meningitis in Oromia regional state in past five years from 2013 to 2017.

Methods

Study area: - We conducted in Oromia regional state, which is one of the nine regional states in the Federal Democratic Republic of Ethiopia.

Study Design: - We conducted Cross sectional study design based on Retrospective record review of secondary surveillance data of meningitis to collect and analyze five year (2013 – 2017) meningitis surveillance data of Oromia Region.

Target population: - All the population living in the Oromia regional state

Study population: - All individuals suspected of meningitis in Oromia Region, in a five years time from 2013 to 2017

Study period: - Meningitis surveillance data of the region from 2013 to 2017 was compiled, analyzed and interpreted from March 01 to March 18, 2018.

Data collection procedure: - Archived data on meningitis for the last five years (2013-2017) from Oromia Regional health Bureau PHEM and Research directorate was reviewed and collected.

Data analysis and processing: - We organized, processed and analyzed data by using Microsoft Office Excel 2007 and presented appropriately.

Ethical consideration: - The data was obtained from PHEM archive via permission of PHEM director and it is kept confidential.

Dissemination of result: - We submitted report to AAU School of public health Department of Field Epidemiology and Oromia Regional Health Bureau.

Case definition: - Based on the Ethiopian National Guideline on Meningococcal Meningitis Surveillance and Outbreak Management, First edition, November 2013:

Suspected case: Any person with sudden onset of fever (>38.5 °C rectal or 38.0 °C axillary) and one of the following signs: neck stiffness, altered consciousness, or other meningeal signs such as bulging fontanel, convulsion.

Probable case: Any suspected case with turbid or purulent CSF or with microscopic

examination showing Gram-negative diplococci.

Confirmed case: A suspected or probable case confirmed by isolation of Neisseria meningitidis from CSF or blood by culture, PCR or agglutination test were used.

Result

There were 2665 suspected meningitis cases and 74 deaths reported in the last five years, from 2013-2017, in Oromia region via weekly PHEM reports. The largest number of cases was reported in 2013 701(26.3%) followed by 681(25.55%) cases in 2014. The highest case fatality rate 4.72% was registered in 2015 and lowest 4(1.03%) was at 2016. Average incidence in the last five years was 1.57 per 100000 populations which ranges 1.11 per 100000 in 2016 to 2.19 per 100000 populations.

Table 29: Meningitis incidence and mortality in Oromia Region, Ethiopia from 2013-2017

Year	Population at risk	No of cases	No of deaths	Percent	Incidence /100000	Death /100000	Case fatality rate
2013	32,046,915	701	24	26.30	2.19	0.07	3.42
2014	32,815,995	681	20	25.55	2.08	0.06	2.94
2015	33,692,000	381	18	14.30	1.13	0.05	4.72
2016	34,880,772	387	4	14.52	1.11	0.01	1.03
2017	35,875,159	515	8	19.32	1.44	0.02	1.55
Total		2665	74	100.00	1.57	0.04	2.78

Trend of Meningitis: - The suspected meningitis disease morbidity was decreasing from 2013 to 2016 and there was a minor increment in 2017.

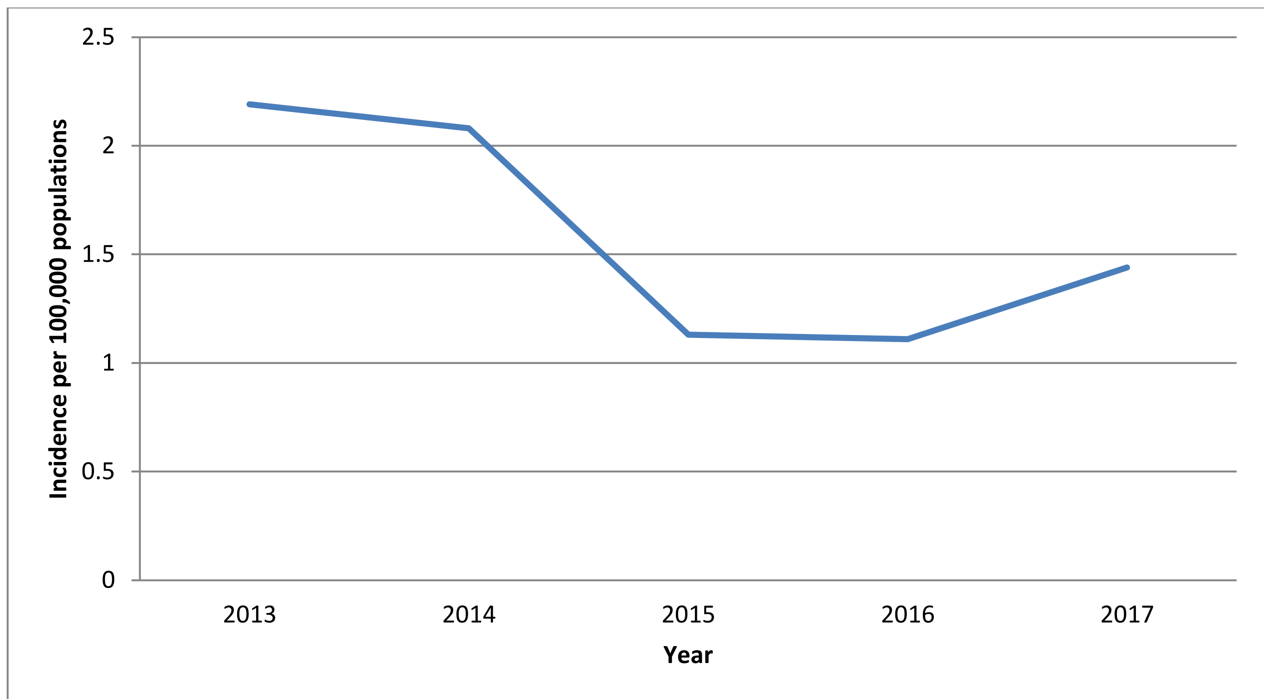

Figure 41: Meningitis trend in Oromia Region, Ethiopia from 2013-2017

Distribution of Morbidity and Mortality by zone

The disease was highly incident in Horro Guduru Wollega, West Guji, and Borena Zones with incidence rates of 9.90, 8.92 and 6.28 per 100,000 persons respectively. Its incidence was lower in North Shoa (0.07/100,000 persons), Kellem Wollega (0.20 /100,000 persons) and Arsi (0.24/100,000 persons) zones.

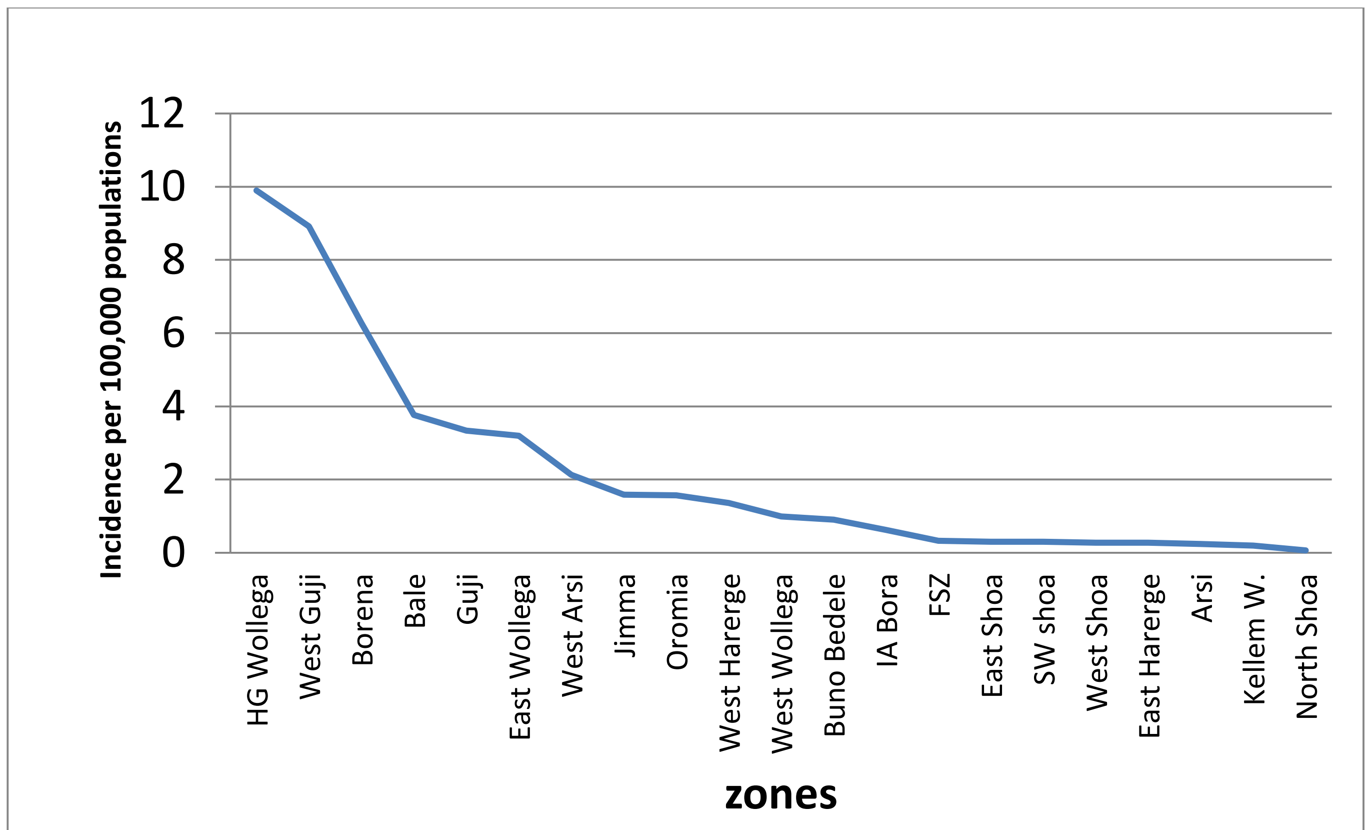

Figure 42:- Meningitis incidence by zone in Oromia region, Ethiopia from 2013-2017

Mortality by zones

The large number of deaths occurred in West Wollega zone 19(25.68%), Bale zone 13(17.57%) and East Shoa zone 10(13.51%). The highest case fatality rate was registered in East Shoa 10(34.48%) followed by West Wollega zone 19(22.62%) and Ilu Abba Bora 3(6.67%) zone. There were no deaths occurred in Arsi, West Shoa, Buno Bedele , Finfinne Zuria Special zone, East Harerge, East Wollega, Kellem Wollega, North Shoa and South west Shoa zones.

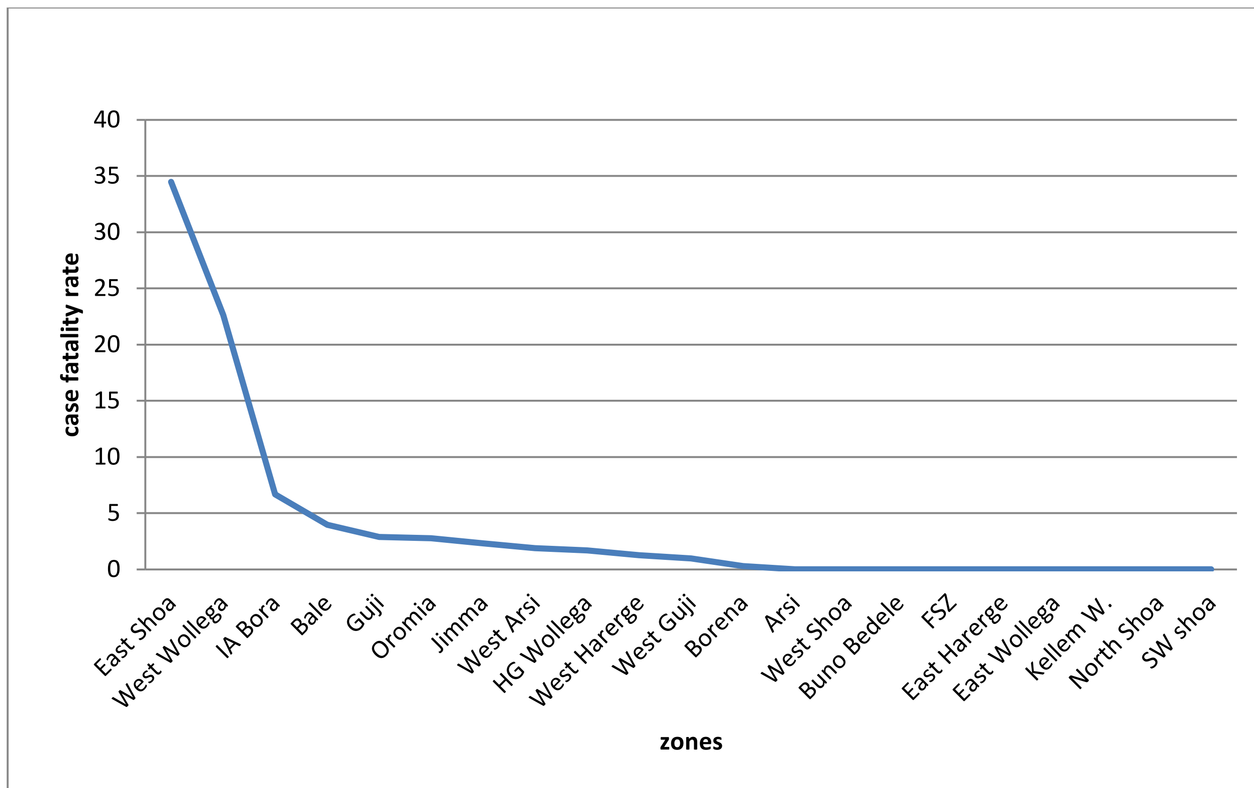

Figure 43:- Meningitis Mortality rates by zones in Oromia Region, Ethiopia 2013-2017

Seasonal distribution of Meningitis Morbidity and Mortality

Distribution of cases by month

The majority of the cases were registered in May 464(17.41%) followed by July 340(12.76%), March 278(10.43%) and February 245(9.19%) in which these four months accounts around 50% of total cases treated in all months. Most of the death happened in January 14(18.92%) followed by March, May and October in which 9(12.16%) deaths occurred at each month and No death occurred in September. The highest case fatality rate was 6.67% in January followed by 5.96% in October and 4.03% in August.

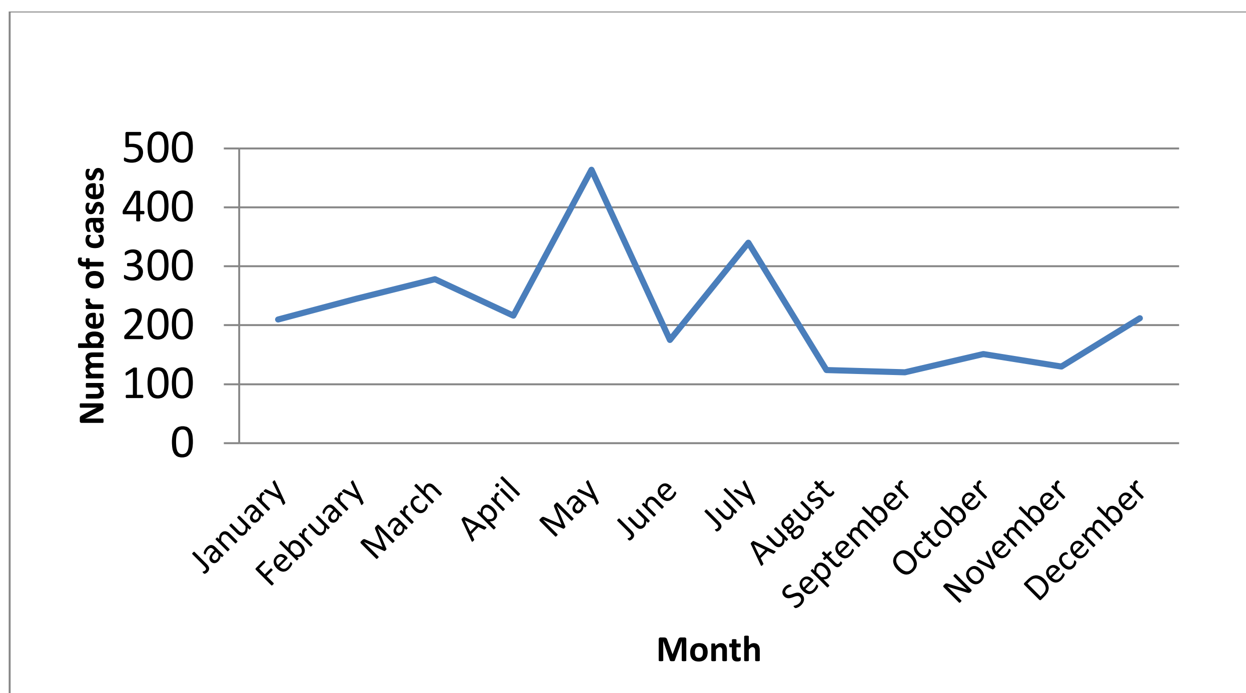

Figure 44:- Meningitis case distribution by month in Oromia Region, Ethiopia 2013-2017

Distribution of cases by Visit or treatment settings

The majority of the cases 1492(55.98%) were treated in inpatient settings or admitted to hospital beds while the rest 1173(44.02%) of the cases were treated at outpatient departments. In all years except 2014 majority of cases were treated in inpatients by admission.

Discussion

Meningitis incidence rate in Oromia region in the last five years from 2013-2017 was 1.57 per 100000 populations (between 1.11 per 100000 in 2016 to 2.19 per 100000 populations) which is less than 2 per 100000 in 2007 EFY in Ethiopia and higher than 0.12 cases per 100,000 population in 2015 in USA and it is greater than average EU countries which is 0.68 per 100000 population (6, 7, 9).

Meningitis case fatality rate in the last five years in the region was 2.78% which ranges 1.03% in 2016 to 4.72% in 2015 which is lower than expected case fatality rate during epidemic which ranges from 5% to 10% as well as which occurred in Gambella region 9.3% and 6.9% in Benishangul-Gumuz and related to 3.3% case fatality rate in Ethiopia in 2007 EFY (3, 9).

Limitation

The PHEM weekly reporting format has no Sex and age category it impossible to describe data by age and sex.

The data reported via PHEM weekly and routine monthly HMIS are no consistent.

Conclusion

The Incidence of Meningitis in the region was fluctuating from year to year reduced from 2013 to 2016 and showed slight increment in 2017.

The disease was highly incident in West and South part of the region and during dry season of the year from December to May rarely in wet season like July.

Recommendation

Strengthen routine surveillance system to track occurrence of epidemic early in prone areas

Improve capacity of health facilities with better diagnostic kits, drugs and medical equipments in order to reduce morbidity due to disease

Align the report sent via weekly PHEM report and Monthly routine HMIS reports

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Chapter Six

Abstracts for Scientific Presentations

6.1. Measles Outbreak Investigation and Response in Dawe Serer District of Bale Zone Oromia Region Ethiopia, January 2019

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Abstract

Back ground: - Measles is highly contagious and serious viral disease causes death among young children globally, despite the availability of a safe and effective vaccine. Measles outbreak is still a public health problem in different Ethiopian regions including Oromia. Dawe Serer district of Bale zone was affected with measles outbreak from early December 2018 to end of January 2019. The Oromia Regional Health Bureau assigned a team which investigate and respond to outbreak.

Methods: - We conducted descriptive and unmatched 1:2 case control study of 38 cases and 76 controls in Dawe Serer district from January 15-28, 2019. Structured questionnaire was used to interview participants and discussions held with key informants'. Micro soft office Excel, Epi Info 7.2.1.0 and SPSS 23 used for data entry and analysis.

Result: - we identified 82 cases with no death and over all attack rate was 0.49 %. Most of them 46 (56.1%) were ≥15 years old and 47 (57.3%) were males. Only 7 (8.5%) were vaccinated. Travel history to measles affected areas and contact with measles case were risk factor for developing a disease AOR 9.79[95% CI= 2.25-42.52, P= 0.0023] and 4.41[95% CI= 1.44-13.49, P= 0.0092] respectively. Case management, Active case search and Health Education was conducted to control outbreak.

Conclusion: - Travel history to measles affected area was the cause of the outbreak while low measles vaccination coverage facilitated spread of the disease in the district. Increasing routine vaccination coverage and mass vaccination for <15 years children is crucial.

Key words: Measles outbreak, Dawe Serer, Case Control, Oromia

6.2. Meningococcal Meningitis Surveillance Data Analysis of Oromia Region, Ethiopia 2013 – 2017

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Abstract

Introduction: - Meningitis remains a serious global health problem. The infectious agent for meningococcus meningitis is *Neisseria meningitidis*. Epidemics occur in African "meningitis belt which extends from Ethiopia to Senegal. The aim of study was to describe distribution of meningococcal meningitis in Oromia regional state in past five years from 2013 to 2017.

Method: We conducted Cross sectional study design based on Retrospective record review of secondary surveillance data to collect and analyze five year (2013 – 2017) meningitis surveillance data of Oromia Region and data was compiled, analyzed and interpreted from March 01- 18, 2018. Data was analyzed by using Microsoft Office Excel 2007.

Result: There were 2665 suspected meningitis cases and 74 deaths reported from 2013-2017. Average incidence was 1.57 per 100000 populations. The highest case fatality rate 4.72% in 2015 and lowest 4(1.03%) at 2016 and over all case fatality rate was 2.78%. It was highly incident in Horro Guduru Wollega, West Guji, and Borena Zones with incidence rates of 9.90, 8.92 and 6.28 per 100,000 persons respectively.

Conclusion: The Incidence of Meningitis in the region was fluctuating from year to year reduced from 2013 to 2016 and showed slight increment in 2017. The disease was highly incident in West and South part of the region and during dry season of the year from December to May rarely in wet season like July. We recommend strengthening routine surveillance system, improving capacity of health facilities and aligning the report of weekly PHEM report and Monthly HMIS reports.

Key words: Meningitis, Surveillance, Oromia, Ethiopia

Word count: 248

Chapter Seven

Narrative Summary of Disaster Situation

7. Internally Displaced Population Health needs Assessment Report of Meda Welabu District Bale Zone Oromia Region Ethiopia April 2019

Abstract

Back ground: - An internally displaced person is someone who has forced to flee their home but never cross international border. At the end of 2017, some 40 million people were internally displaced due to armed conflict, generalized violence or human rights violations. In Ethiopia there are 3.19 million IDPs and IDP returnees most of them 47% are in Oromia followed by Somali 32% and SNNP regions 13%. Meda Welabu District of Bale zone is one of the areas hosting many Internally Displaced Populations since September 2017 due to border conflict. The purpose of this study is to assess the health situation of IDPs in the district from April 12 to 25, 2019.

Methods: community based cross sectional study was conducted at Meda Welabu district from April 12-25, 2019 by using assessment checklist adopted from EPHI and Sphere project by interview and observation.

Results:- We identified 29,336 IDPs of them 15,283(52.1%) are females and 4786 Households lives at 5 sites. The shelter renewal is needed by 1905 (39.8%) among total households. There were 31 trench latrines, 2 water trucks and 10 tankers. One mobile health team, one health center and one health post were providing health service. The water supplied is not fulfilling standard both in quantity and quality.

Conclusion:- There are 29, 336 IDPs in the district due to border conflict between Somali region of which 1905 (39.8%) households need immediate shelter support. They were at high risk of diarrheal disease outbreak due to low and contaminated water supply as well as open defecation in the area. We highly recommend the stakeholders to supply materials for shelter construction and water treatment kits, conduct health education and enhance surveillance system.

1.1. Introduction

1.1.1. Back ground

An internally displaced person, or IDP, is someone who has forced to flee their home but never cross international border. These individuals seek safety anywhere they can find it in nearby towns, schools, settlements, internal camps, even forests and fields. IDPs which include people displaced by internal strife and natural disasters are the largest group that UNHCR assists. Unlike refugees, IDPs are not protected by international law or eligible to receive many types of aid because they are legally under the protection of their own government even if that government is the reason for their displacement. Countries with the largest internally displaced populations are Colombia, Syria, Democratic Republic of Congo and Somalia (1).

At the end of 2017, some 40 million people were internally displaced due to armed conflict, generalized violence or human rights violations, according to internal displacement centre. To coordinate assistance to IDPs, a cluster approach is used. A cluster is when a group of agencies work together to set up and deliver an area of assistance such as a shelter, health care, Water, sanitation and hygiene (WASH), camp management or protection (2).

All internally displaced persons have the right to an adequate standard of living; at the minimum, regardless of the circumstances, and without discrimination, competent authorities shall provide internally displaced persons with and ensure safe access to: Essential food and potable water; basic shelter and housing, appropriate clothing; and essential medical services and sanitation (3).

Ethiopia is one of the countries experiencing large numbers of internal displacement. Consequences of climate change combined with inter-ethnic and inter-regional violence has caused a multiplication of internal displacement in the country over the last six years a tenfold rise since 2012. IOM, along with governments and international organizations, promotes three durable solutions for displaced populations: integration in areas where they settle, relocation to a third location, or, ideally, return home after the crises they fled are resolved (4).

There are 3.19 million IDPs and IDP returnees in need of assistance, out of which 30 percent are in acute need. Most of the IDPs and IDP returnees are in Oromia 47%, Somali 32% and SNNP regions 13%. Most sever areas are in Oromia and Somali regions (5).

In Oromia Region there are around 1.4 million IDPs in 8 zones, 70 woredas and 160 IDP sites. These are in West Wollega and East Wollega due to border conflict with Benishangul Gumuz Region; in East Harerge, West Harerge, Borena, Bale and Guji due to border conflict with Somali Region and in Guji and West Guji due to conflict with Gedeo Zone. Meda Welabu District of Bale zone is one of the areas affected by border conflict and hosting many Internally Displaced Populations since September 2017 (6).

1.1.2. Rationale of the study

In Oromia region there are two types internally displaced populations: those who displaced from different areas outside of region specially from Somali, SNNPR (Gedeo) and Benishangul Gumuz and those who displaced from border areas of the region. Majority of the populations displaced from different areas outside of Oromia Region mainly from Somali regions were resettled in different towns found in Oromia regions. But the internally displaced populations from border areas are not resettled yet to their original residence or other areas due to ongoing security threat around border areas with these regional states. So this caused the community to stay for a longer period in temporary camps and expose them to different health and other problems. We tried to assess the overall condition of these populations in Meda Welabu Woreda of Bale Zone from April 12 to 25, 2019.

1.2. Objective

1.2.1. General objective

To assess the health condition of internally displaced population in Meda Welabu District of Bale Zone Oromia Region Ethiopia April 2019

1.2.2. Specific objective

To characterize internally displaced population by person and place in Meda Welabu District of Bale zone Oromia Region Ethiopia April 2019

To describe WASH situation of IDP sites in Meda Welabu District of Bale zone Oromia Region Ethiopia April 2019

To assess health and nutritional status of internally displaced population in Meda Welabu District of Bale zone Oromia Region Ethiopia April 2019

1.3. Methods

1.3.1. Study area and period

The study was conducted in Meda Welabu district of Bale Zone Oromia Region from April 12-25, 2019. Meda Welabu is one of the districts found in Bale zone; its capital Bidire founds 630 KM from regional and National capital Addis Ababa and 200 KM from Robe Town capital of zone. It is bounded by North Dallo Manna and Harena Buluk district; by south Guji zone Goro Dola district; by East Somali region Kersa Dula district and by West direction West Arsi Nansabo district and Guji Zone Girja district. The district has 22 kebeles (20 rural and 2 urban kebeles). In 2019 the district is the home of 134,372 populations projected from 2007 census among these 65842 (49%) males and 68530 (51%) are females living in 27994 households. There are 1 hospital, 6 health centers, 24 health posts, 5 primary clinics (private), 2 drug stores and 3 rural drug vendors serving the populations of the district.

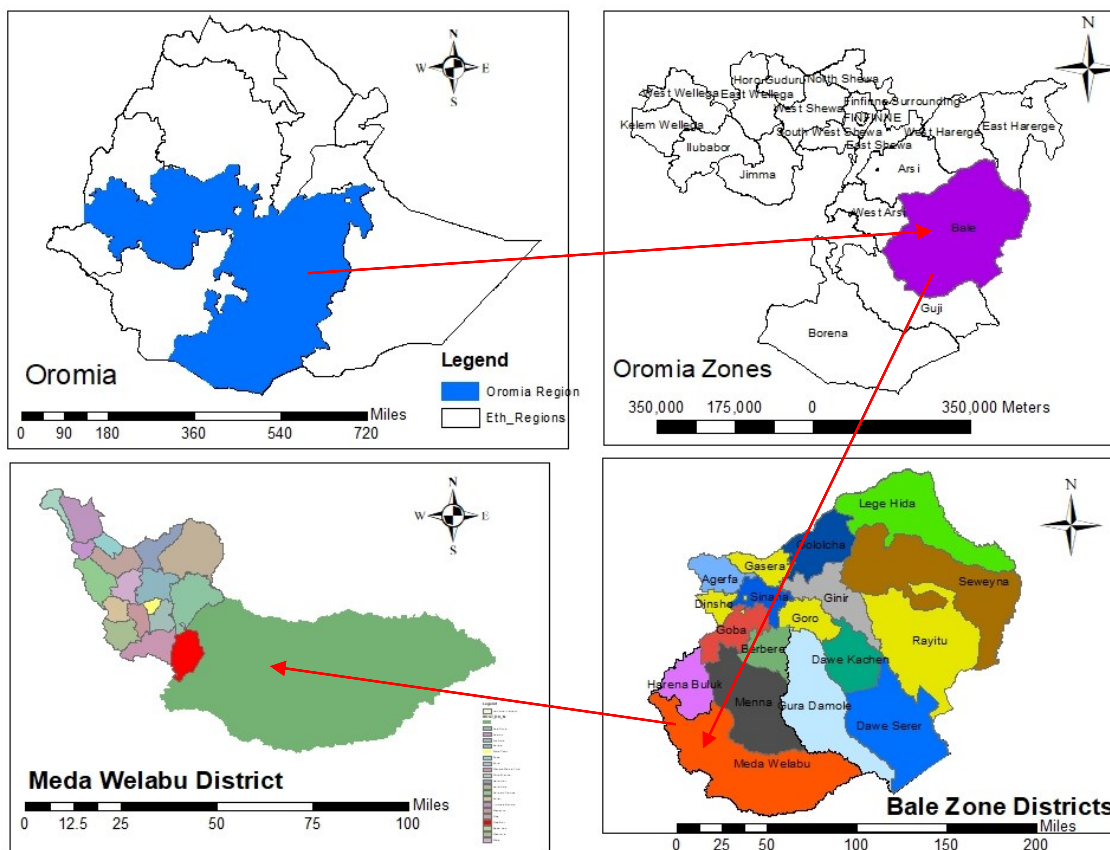

Figure 45 Map of Meda Welabu District Bale Zone Oromia Region Ethiopia 2019

1.3.2. The study design

Descriptive community based cross sectional study was conducted

1.3.3. Study population

All internally displaced population found in Meda Welabu district of Bale zone

1.3.4. Sample size

All IDP sites in the district

1.3.5. Data collection tools and methods

The assessment check list which adopted from Ethiopian public health Institute and Sphere project was used to collect necessary information. The data was collected by observation of the IDP site, key informant interview at community level as well as representative of different government sectors (Administration office, Disaster Risk Management Office, Water Office, Health Office and others), service providers (Teachers, Health workers, Water Delivering Drivers) and nongovernmental organizations, and review of records for secondary data.

1.3.6. Ethical consideration

Recommendation letter was written from Oromia regional health bureau to Bale Zone Health office to conduct the study. Bale zone health office also wrote letter to Meda Welabu woreda health office to support the team.

1.3.7. Result Dissemination

The finding of the study was disseminated to AAU School of Public Health, Oromia Regional Health Bureau, Bale zone Health office and Meda Welabu Woreda Health office.

1.4. Results

There are 29,336 displaced population of which 15,283(52.1%) are females and 4786 households at 5 IDP sites in Meda Welabu District (table 30).

Table 30 Internally Displaced population by sex and IDP sites in Meda Welabu District of Bale Zone Oromia Region Ethiopia April 2019

S. No	IDP Site	Kebele	# of HH	Population displaced		
				Male	Female	Total
1	Hara Gobana	Madda	862	2402	2697	5099
2	Tullu	Madda	780	2329	3264	5593
3	Sammu	Madda	1200	2354	2304	4658
4	Sara	Madda	1308	4147	4459	8606
5	Kebri Mamme	Odaa Boojjii	636	2821	2559	5380
			4786	14053	15283	29336

There are 1007 pregnant and lactating mothers and 4820 less than 5 years old children in the area (figure 46).

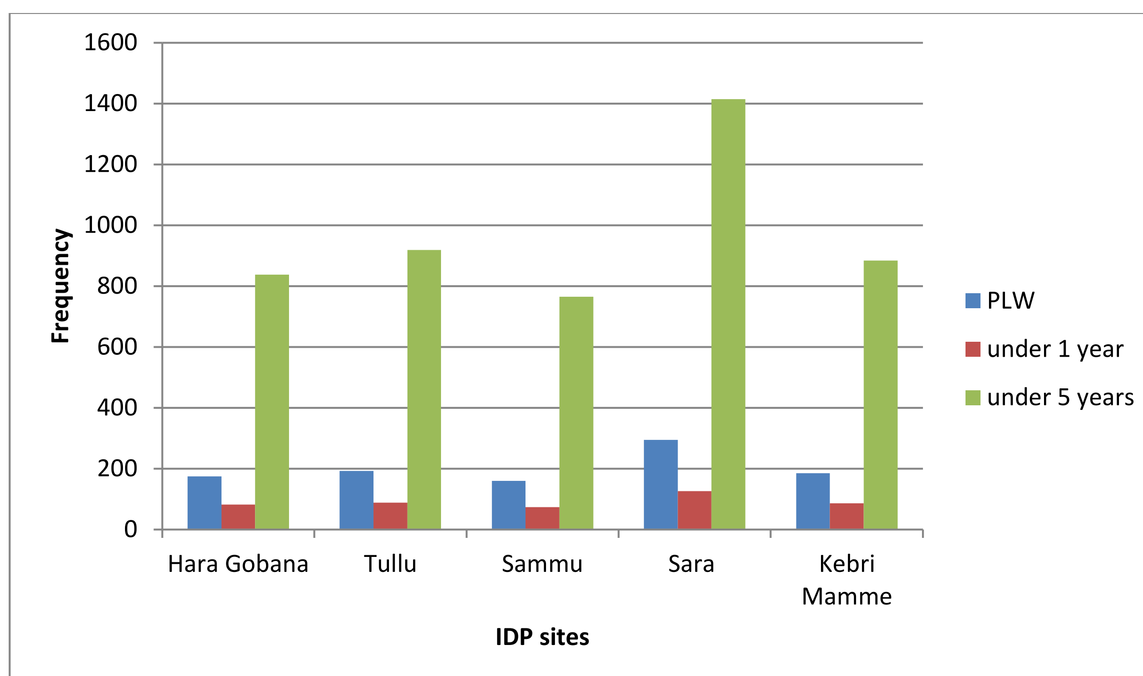

Figure 46 Number of Pregnant and Lactating Mothers, Children under 5 years by IDP sites in Meda Welabu District of Bale Zone Oromia Region Ethiopia April 2019

From 4786 households 1905 (39.8%) of them needs material for shelter renewal or construction

Table 31 Shelter renewal requirement of affected population by IDP sites in Meda Welabu District of Bale Zone Oromia Region Ethiopia April 2019

S. No	IDP Site	Total population	Number of House Holds	House hold need shelter renewal
1	Hara Gobana	5099	862	357
2	Tullu	5593	780	298
3	Sammu	4658	1200	523
4	Sara	8606	1308	486
5	Kebri Mamme	5380	636	241
	Total	29336	4786	1905

There are only 31 (21.2%) trench latrines of 10 seats available in the IDP sites. The number of latrines required is based on Sphere project criteria 1 latrine for 20 peoples (figure 47).

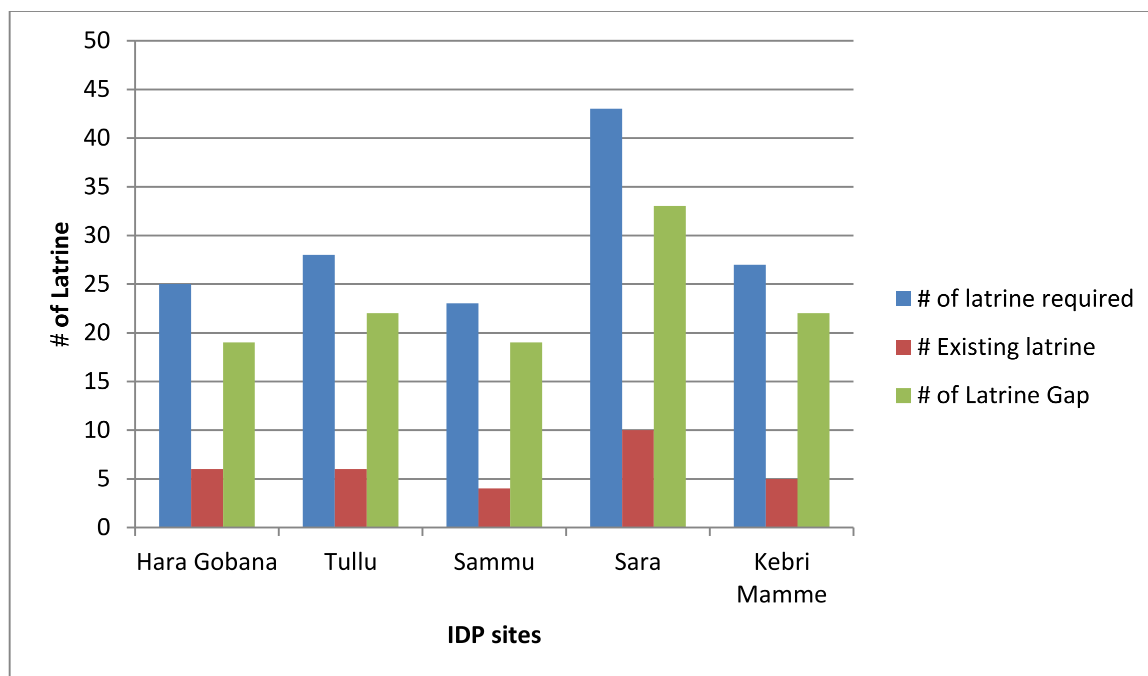

Figure 47 Number of Required and Existing Latrine by IDP sites in Meda Welabu District of Bale Zone Oromia Region Ethiopia April 2019

There are 2 water trucks which transports water to the IDP sites and stores water in 10 tankers

Table 32 Amount of water distributed to IDP sites in Meda Welabu District of Bale Zone Oromia Region Ethiopia April 2019

S. No	IDP Site	Total population	# of Liters of water required in a day	# of liters of water supplied per day	# tankers per camp
1	Hara Gobana	5099	76485	48000	2
2	Tullu	5593	83895	48000	2
3	Sammu	4658	69870	48000	2
4	Sara	8606	129090	48000	2
5	Kebri Mamme	5380	80700	48000	2
	Total	29336	440040	240000	10

NB: 15 liters of water per person per day is required for drinking and domestic hygiene purposes

There are 1 Health center and 1 Health posts available around IDP sites (table 33)

Table 33 Health facilities available at IDP sites in Meda Welabu District of Bale Zone Oromia Region Ethiopia April 2019

S. No	IDP Site	Kebele	# of HH	# Existing Health center	# Mobile clinic	# Existing Health Posts
1	Hara Gobana	Madda	862	1	1	
2	Tullu	Madda	780			1
3	Sammu	Madda	1200		1	
4	Sara	Madda	1308		1	
5	Kebri Mamme	Odaa Boojjii	636		1	
	Total		4786	1	1	1

Observation of the areas

Environmental sanitation

The compound of the residents in all 5 IDP sites is not clean there is a drop of household dusts and there is no waste disposal pit. There are faeces on the ground and in the bush around residential areas which is manifestation of open defecation.

Hand washing

There is no constructed hand washing facilities in the compound and around latrines so they are forced to use plastic bags to wash their hands after using latrines.

Water supply

There is only one water source, known as "Madda", to supply all IDP sites with water and is not protected to be safe for use. But since there is no other water source in the area they are forced to use it. The animals are also using this water. The water supplied by water truck is not properly

distributed it is dumped in hole covered by plastic and it is susceptible to contamination and wastage. During distribution the elderly are not prioritized.

Figure 48 shows the water source of IDP in Meda Welabu District of Bale Zone Oromia Region Ethiopia April 2019

Health service

Of total 5 IDP sites 3 of them have access to Health center while the other 2 get service only via Mobile health and Nutrition team supported by one Non Governmental organization. The registration review shows that none of them is utilizing family planning service and HIV test is not performed due to shortage of kit.

Nutrition screening

The nutrition screening of under 5 years old children and pregnant and lactating mothers is conducted every two weeks. During the last screening sever acute malnutrition 27 (0.6%) children, moderate acute malnutrition 825(18.75%) children.

1.5. Discussion

There are 29,336 peoples of 4786 households displaced from their usual residence and forced to live at 5 IDP sites in two kebeles of Meda Welabu District due to ongoing border conflict with Somali region starting from September 2017 up to now. They need different humanitarian and health related supports (1).

The shelter of 1905 (39.8%) households has to be renewed or reconstructed so materials like Plastic (roof) or tent has to be supplied urgently for them since the rainy season is coming by concerned bodies to fulfill their basic needs (3).

The water supplied to the population is fetched from unprotected source and distributed to them by truck to the site. At the distribution point it is not stored in tankers rather it is drawn into hand dug hole covered by plastic then they fetch from it. The absence of hand washing facilities and water shortage hinders them from washing their hands after using toilets, cleaning the bottom of a child who has defecated. The amount of water supplied is on average 8 liters per person per day which less than half of expected amount is of water needed 15 liters per person per day according to Sphere project (7).

There were 31 (21.2%) trench latrines each with 10 seats constructed for the community in the IDP sites but 146 latrines of ten seats is required according to Sphere project criteria so it needs huge efforts to fulfill the latrine requirements. There is no separate latrine for girls and women in the sites but the agreed standard is 3 to 1 ratio for females to males which have to be improved by stakeholders (3, 7).

There was open defecation in the compound and surrounding bushes which is a risk factor for different communicable diseases like diarrheal diseases. Since there were previous history of acute watery diarrhea in the district it is important to stop open defecation by bringing behavioral change in the community towards latrine utilization (7).

The medical service is mainly given by one mobile health and nutrition team supported by nongovernmental organization known as Goal once per week to all sites. In addition to that, sites like Tullu, Hara Gobana and Sara were getting service from Health center due to their proximity but sites like Sammu and Kebri Mamme were Mobile health team dependent. The service is

interrupted sometimes due to logistics and man power shortage. The roads heading to Sara, Sammu and Kebri Mamme IDP sites will be cut following rain fall so Mobile health service will be interrupted during rainy times (7).

The essential drugs were supplied from the federal government following the formal procedure as emergency drug kits to the service delivery point. We observed that HIV test kit is not available in the health center and district store but there were peoples who were treated as sexually transmitted infections which necessitates the importance of HIV test kit (7).

Nutrition screening of under five years children and pregnant & lactating mothers were conducted every 2 weeks in the sites as a campaign but children come for treatment at any time were checked for their nutritional status as per guidelines. Those found to be malnourished were treated as inpatient in stabilization center or Outpatient based on their classification (7).

Limitation

The study has not included household behavioral survey

1.6. Conclusion

There are 29, 336 internally displaced populations in Meda Welabu district of Bale zone Oromia Region due to border conflict between Somali region. They were at high risk of diarrheal disease outbreak due to low and contaminated water supply as well as open defecation in the area.

1.7. Recommendation

The supplies required should be stored to the area before roads were closed by rain fall as majority of roads are dry weather roads.

The quantity and quality of water supplied should be improved as gaining safe and enough water is basic human right. The number of water trucks should be increased to supply them with enough amount of water. The water source should be protected and the water treatment chemicals should be provided in enough amounts to the household.

The latrines should be constructed to meet minimum standard of latrine to population ratio as well as ensure safety of women and girls by availing the separate latrine for them.

The health education should be given to the community members on latrine utilization, hand washing, household water treatment and family planning service utilization during water and food rationing time, clinic visit and any community gatherings.

Avail HIV testing kits and promote condom distribution by preparing Condom outlet in the camp as well as in health center and Health post.

The surveillance system of the district should be enhanced to investigate and respond to outbreaks as early as possible. To prevent occurrence of AWD outbreak following rainfall in the area the woreda should have to work closely with health center staff, local leaders, religious leaders and elders, community members to enhance latrine utilization, avoid open defecation, regular hand washing practice at critical times, use cooked food, household treatment of water and early report of suggestive sign and symptoms to concerned body.

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Chapter Eight

Protocol/ proposal for Epidemiologic Project

8.1. LLIN utilization status and Malaria surveillance System Evaluation in Sebeta Hawas District, Oromia Region, Ethiopia 2019

Executive Summary

Background: Malaria is one of the most severe public health problems worldwide, where young children and pregnant women mostly affected. In Ethiopia 60% of population lives in malarious areas while 68% of land mass is favorable for malaria transmission. Many countries across sub-Saharan Africa are increasing long lasting insecticide nets (LLINs) coverage to combat malaria. However,LLINs utilization varies between and within countries. Ethiopia set target to provide LLINs to all at risk population and achieve levels of use above 80% by all age groups. The purpose of this study is to identify factors associated with LLINs use and to evaluate malaria surveillance system of the district.

Methods: We will conduct Cross sectional study in Sebeta Hawas District of Oromia Region and collect data from 616 households for LLIN utilization and 12 health institutions (3 health center and 9 health posts) for surveillance system evaluation using semi structured and interviewer administered questionnaire, household survey and documents review from February 1, 2019 to May 30, 2019. The data will be entered into Epi Info 7 and analyzed by Statistical Package for Social Sciences version 23.

Work Plan and Budget: The study project will last from February 01 to May 30, 2019 with expected cost of 83,347 ETB or 2,978 USD.

8.8.1. Introduction

8.8.1.1. Back ground

Malaria is one of the most sever public health problems worldwide. It is the leading causes of death and disease in many developing countries, where young children and pregnant women are the groups most affected. It occurs mostly in poor, tropical and subtropical areas of the world (1). It is caused by parasites of the Plasmodium family and transmitted by female *Anopheles* mosquitoes. There are four different human malaria species (*P. falciparum*, *P. vivax*, *P. malariae* and *P. ovale*) and a zoonotic plasmodium *P. knowlesi,* of which *P. falciparum* and *P. vivax* are the most prevalent and *P. falciparum being* the most dangerous and responsible for majority of malaria related deaths (2).

Globally, *according to world malaria report 2018*, there were 219 cases of malaria occurred in 2017, compared with 237 million cases in 2010 and 217 million cases in 2016. Most malaria cases in 2017 were in the WHO African Region 200 million (92%). Almost 80% of all malaria cases globally were in 15 African countries and in India. Nearly 50% of all cases globally were accounted for by Nigeria (25%), the Democratic Republic of the Congo (11%), Mozambique (5%), India (4%) and Uganda (4%). *Plasmodium falciparum* is the most prevalent malaria parasite in the WHO African Region, accounting for 99.7% of estimated malaria cases in 2017. *P. vivax* is the predominant parasite in the WHO Region of the Americas, representing 74.1% of malaria cases. About 82% of estimated vivax malaria cases in 2017 occurred in just five countries: India, Pakistan, Ethiopia, Afghanistan and Indonesia (3).

Approximately 60 percent of Ethiopia's population lives in malarious areas, and 68 percent of the country's landmass is favorable for malaria transmission, with malaria primarily associated with altitude and rainfall. In general, the peak of malaria incidence follows the main rainfall season (July to September) each year. However, many areas in the south and west of the country have a rainfall season beginning earlier in April and May or have no clearly defined rainfall season. Consequently, malaria transmission tends to be highly heterogeneous geo-spatially within each year as well as between years. Additionally, malaria in Ethiopia is characterized by widespread epidemics occurring every five to eight years (4).

Plasmodium falciparum and *P.vivax* are the most dominant malaria parasites in Ethiopia. They are prevalent in all malarious areas in the country with *P.falciparum* representing about two-

thirds to three-quarters of the cases, although their relative composition can be variable. *P. malariae* and *P. ovale* are rare and account for <1% of all confirmed malaria cases. The major malaria vector incriminated in Ethiopia is Anopheles arabiensis; in some areas *A. pharoensis*, *A. funestus* and *A. nili* also transmit malaria (5).

Between July 2016 and June 2017, HMIS reported 1,530,739 confirmed malaria illnesses including 1,059,847 *P. falciparum* and 470,892 *P. vivax* malaria illnesses. In addition, there were 225,009 clinical malaria cases reported for a total of 1,755,748 malaria cases. Three hundred and fifty-six deaths were reported due to malaria (6).

In Oromia region from July 2017 to June 2018, Weekly PHEM reported 124,957 total confirmed and clinical malaria cases of these 83030 *p. falciparum* and 39984 *p. vivax* cases and 3 malaria deaths. The positivity rate was 10.96%. Sebeta Hawas District, where malaria is endemic, all of its villages/ kebeles are affected by malaria (7). The purpose of this study will be to identify factors associated with LLINs use and to evaluate malaria surveillance system of the district.

Statement of the Problem

Malaria is one of the most sever public health problems worldwide. It is the leading causes of death and disease in many developing countries, where young children and pregnant women are the groups most affected. It occurs mostly in poor, tropical and subtropical areas of the world. According to the World Health organization's world Malaria report 2013 and the global malaria Action plan 3.2 billion people lives in areas at risk of malaria transmission in 106 countries and territories (1). There were 219 million cases and 435,000 deaths due to malaria globally in 2017, the WHO Africa Region accounted for 92% and 93% of morbidity and mortality respectively. Globally, 266,000 (61%) malaria deaths were estimated to be in children aged under 5 years (3).

Malaria prevention and control efforts in Ethiopia have focused on the ownership and use of long-lasting insecticide-treated nets (LLINs) and indoor residual spraying (IRS). Ethiopia NMSP 2014-2020 set target to provide LLINs to all target population to reach and maintain 100% ownership of LLINs (100% of households in LLIN targeted areas own at least one LLIN per two persons). Achieve and maintain levels of use above 80% by all age and biological groups. Encourage local production of at least 3 million LLINs per year (8).

The FMOH of Ethiopia conducted a mass campaign in 2014-2016, distributing 29.6 million long-lasting insecticidal nets (ITNs) to protect all Ethiopians living in areas with ongoing malaria transmission, representing 60% of the total population. The Global Fund contributed the majority of the ITNs with PMI supporting the remaining gap (9).

Ethiopia, India, Madagascar, Myanmar, Niger, Nigeria and Sudan were countries that were below the operational universal coverage target of one ITN per two persons at risk by 2017 (3).

Robust and responsive surveillance systems are critical for the success of malaria control and elimination. When a malaria control program transitions to elimination, the surveillance system must change (10).

Pillar 3 of the Global technical strategy for malaria 2016–2030 (GTS) is transformation of malaria surveillance into a core intervention in all malaria-endemic countries and in those countries that have eliminated malaria but remain susceptible to re-establishment of transmission. 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 (11, 12).

Insecticide based vector control remains a key component of malaria prevention and control in Ethiopia. Universal coverage of mosquito nets is necessary to accomplish significant reductions in malaria transmission. Pregnant women and under 5 years children needs to be prioritized. High ownership and use of ITNs reduces the incidence of uncomplicated malaria episodes by 50 percent and all cause mortality in children under five by about 20 percent (8, 13, 14).

Malaria is endemic in all kebeles of Sebeta Hawas district of Oromia Special Zone Surrounding Finfinne. So all populations, 123,559 peoples in 2018 from 2007 census projection, residing in the district are at risk of malaria.

Study conducted in different areas showed that the ownership of LLIN does not necessarily indicate utilization. Since the study is not conducted yet in the district it's important to investigate LLINs utilization status of the community. It is also necessary to determine the factors associated with LLIN utilization to help the district to design methods which increase utilization behavior of community and to end up with elimination of the malaria from the district.

Significance of the study

This study will generate information about the household level of LLIN ownership, utilization status and determine associated factors with LLIN utilization in the Sebeta Hawas district of Oromia Region. These information are important for district to know their status against nationally set targets of providing LLINs to all target population to reach and maintain 100% ownership of LLINs (100% of households in LLIN targeted areas own at least one LLIN per two persons) and achieve and maintain levels of use above 80% by all age and biological groups. Knowing the gap the district will revise its plan and design the appropriate information, education and communication (IEC) interventions strategies towards improving LLIN utilization at household level.

The malaria surveillance system evaluation of the district provides information on data completeness, representativeness, timeliness and systems readiness and ability to recognize outbreak and respond as early as possible as well as the alignment of data reported via PHEM weekly and HMIS monthly. It enables the district to use Epidemic monitoring chart.

The information obtained from this study will serve as baseline to determine the progress of malaria elimination status in the district, zone and Region. The stake holders working in similar context also use the findings of the study to improve their performance.

Literature Review

Epidemiology and Burden of malaria

Malaria is commonly associated with poverty and has a major negative effect on economic developments. It is estimated to result in losses of US$12 billion a year due to increased healthcare costs, lost ability to work, and negative effects on tourism (1).

In 2017, an estimated US$ 3.1 billion was invested in malaria control and elimination efforts globally by governments of malaria endemic countries and international partners. Nearly three quarters (US$ 2.2 billion) of investments in 2017 were spent in the WHO African Region. To reach the GTS 2030 targets, it is estimated that annual malaria funding will need to increase to at least US$ 6.6 billion per year by 2020 (3).

Most malaria cases in 2017 were in the WHO African Region 200 million (92%), followed by the WHO South-East Asia Region (5%) and the WHO Eastern Mediterranean Region (2%). Almost 80% of all malaria cases globally were in 15 African countries and in India. Nearly 50% of all cases globally were accounted for by Nigeria (25%), the Democratic Republic of the Congo (11%), Mozambique (5%), India (4%) and Uganda (4%). About 82% of estimated vivax malaria cases in 2017 occurred in just five countries: India, Pakistan, Ethiopia, Afghanistan and Indonesia (3).

Approximately 60 percent of Ethiopia's population lives in malarious areas, and 68 percent of the country's landmass are favorable for malaria transmission, with malaria primarily associated with altitude and rainfall. In 2017, the FMOH of Ethiopia updated the country's malaria risk strata based upon malaria annual parasite incidence (API). A malaria risk based on API classified as: high (≥100 cases/1,000 population/year), moderate (≥5 <100), low (>0 -<5), and malaria-free (~0). Areas with the highest malaria transmission risk as stratified by district API appear to be largely in the lowlands and midlands of the western border with South Sudan and Sudan (4, 9).

Ethiopia has shown remarkable progress in reversing the burden and epidemics of malaria in the last two decades. Mortality and incidence rates of malaria declined by 96 and 89%, respectively, between 1990 and 2015. The number of new cases of malaria declined from 2.8 million in 1990 to 621,345 in 2015 GC (15).

Clinical malaria incidence rate dropped from an average of 43.1 cases per 1000 population annually between 2001 and 2010 to 29.0 cases per 1000 population annually between 2011 and

2016. Malaria deaths decreased from 2.1 deaths per 100000 people annually between 2001 and 2010 to 1.1 deaths per 100000 people annually from 2011 to 2016. There was shrinkage in the malaria transmission map and high transmission is limited mainly to the western international border area. Proportion of P. falciparum malaria remained nearly unchanged from 2000 to 2016 indicating further efforts are needed to suppress transmission (16).

In Ethiopia the total estimated cost of the national strategic plan of 2014 – 2020 is US$973,884,080. Of total, US$336,214,359 (34.5%) will be for long lasting insecticidal nets; US$280,681,801 (28.8%) for indoor residual spraying; US$163,877,879 (16.8%) for diagnosis and case management; US$92,321,189 (9.5%) for advocacy, communication and social mobilization; US$61,698,360 (6.3%) for programme management, US$14,995,686 (1.5%) for elimination and US$24,094,806 (2.5%) is for other programmatic areas. Majority of cost, US$725,934,693 (74.5%) will be for procurement of commodities (8).

LLIN Distribution, ownership, Utilization and Associated factors

LLIN distribution

Vector control is an essential component to mitigate mosquito born diseases. The main malaria vector control interventions are long-lasting insecticidal nets and indoor residual spraying. Chemical larvicidal and environmental managements are also important control parameters (17).

In 2007 WHO recommended that universal coverage of long lasting ITNs to the entire population at risk for malaria. High ownership and use of ITNs reduces the incidence of uncomplicated malaria episodes by 50 percent and all cause mortality in children under five by about 20%. Roll Back Malaria (RBM) recommends that countries plan to replace long lasting ITNs after three years (13, 14).

Between 2014 and 2016, a total of 582 million insecticide-treated mosquito nets (ITNs) were reported by manufacturers as having been delivered globally. Of this amount, 505 million ITNs were delivered in sub-Saharan Africa, compared with 301 million bed nets in the preceding 3 year period (2011–2013). Data from national malaria control programmes (NMCPs) in Africa indicate that, between 2014 and 2016, 75% of ITNs were distributed through mass distribution campaigns. Across sub-Saharan Africa, household ownership of at least one ITN increased from 50% in 2010 to 80% in 2016. However, the proportion of households with sufficient nets (i.e. one net for every two people) remains inadequate, at 43% in 2016 (18).

The FMOH of Ethiopia conducted a mass campaign in 2014-2016, distributing 29.6 million long-lasting insecticidal nets (ITNs) to protect all Ethiopians living in areas with ongoing malaria transmission, representing 60% of the total population. Ethiopia has recently declared malaria elimination efforts in 239 selected districts located in 6 different regions (9).

Ethiopia NMSP 2014-2020 set target to provide LLINs to all target population to reach and maintain 100% ownership of LLINs (100% of households in LLIN targeted areas own at least one LLIN per two persons). Achieve and maintain levels of use above 80% by all age and biological groups. Encourage local production of at least 3 million LLINs per year (8).

LLIN ownership and Utilization

Despite huge efforts of distributing LLINs by stakeholders different study shows that the universal coverage is not achieved yet. The baseline study done in Ethiopia and Uganda in 2012 showed that ITN ownership did not vary by SES and 56–98 % and 68–78 % of households owned at least one ITN in Ethiopia and Uganda, respectively. In three of the four sites, 69–76 % of people with access to ITNs used them (19).

Cross sectional study in Ghana in 2016 at ANC clinic showed that Ownership of LLIN was 81.4% while usage was 42.5% and the study in Southern Africa (Zimbabwe and Zambia) between March 2012 and March 2017 identified that ownership of any bed net was 69.9%, while ownership of sufficient bed nets i.e. at least one bed net for every two members was 39.7% (20, 21).

The EMIS 2015 results indicate that the majority of households own at least one LLIN (64%) and 32 % own at least one LLIN for every two persons who stayed in the household the night before the survey. Sixty-four percent of households owned at least one LLIN in 2015 compared to 55 percent in 2011. In malarious areas, 38 % of the population slept under an LLIN the night before the survey. Among people living in households owning at least one LLIN, 61% slept under an LLIN the night before the survey. 44% of pregnant women and 45 % of children U5 slept under an LLIN the previous night. However, in households owning at least one LLIN, use by children and pregnant women was 70 % and 74 % respectively (4).

The cross sectional study in Adama district in 2016 showed that 96.7% households owned LLIN, and 76% of household members had slept under LLIN during the previous night prior to interview. Regarding LLINs priority to household family members, only 65.4% households given priority to their children under five years and 50% for pregnant women (22).

Based on EMIS 2015 in Oromia region 58% of HHs had at least one LLIN, 46% had access to one LLIN for two peoples, 41% slept under LLIN in the previous night from all household and 70% slept under LLIN among HHs own at least one (usage), 74.5% of children under 5 years slept under LLIN last night among HHs having at least one, 43% of children under 5 years slept under LLIN among all households, 41.7% of pregnant women slept under LLIN last night from all households and 81.2% of pregnant women from households owned at least one LLIN (4).

The Study in Limmu Seka district, South West Ethiopia April 2012 showed that 90% owned LLINs and 68.3% had slept under the net on the night prior to the survey, while the study conducted in Jimma zone three districts (Mana, Kersa and Goma) in January 2014 reveals that 70.9 % of HH own ITNs and 38.4% of household members slept under LLIN the night before the survey (23, 24).

Three different studies conducted in Adami Tullu district showed that: cohort study in 2013 identified that only 27.3 % of the households owned insecticide treated nets, Cross sectional study in February 2014 revealed that 25.3% of Household had at least one long lasting insecticide nets; 60.6% of HH with at least one household member had slept under it during the previous night prior to interview, 63.9% of under-five children slept under net the night preceding the survey among net owning households and while the case control study from October 2014 to November 2015 showed 31% of HHs had at least one LLIN, only 24.3% of the total respondents reported that they slept under LLINs the previous night (25-27).

Associated factors

There were many factors associated with Long Lasting Insecticide treated Nets utilization as identified by various studies.

The study conducted in Ghana in 2014 showed significant relationships between ITN utilization and region, residence, religion, ethnicity, mother's education, distance to seek medical care by mother, partner's education, and household wealth while another study in 2016 also identified that level of education significantly influenced LLIN ownership and utilization and the main barriers to LLIN utilization were inconvenience due to heat, lack of ownership of LLIN and absence of mosquitoes (20, 28).

Study in Ekiti state Nigeria identified factors that affected utilization of ITN include; type of household structure, number of people sleeping in the household, intra-household gender relations, sleeping arrangements, disruption of sleeping patterns due to visitors and cultural

rituals and functions. Utilization was also affected by poor perceptions, beliefs and attitudes that discourage caregivers from using the ITNs (29).

The study in Southern Africa (Zimbabwe and Zambia) between March 2012 and March 2017 identified that knowledge of ITNs was associated with a 30–40% increased likelihood of bed net use. Other factors significantly associated with bed net use were age, household size and socioeconomic status, although the direction, strength and size of association varied by study site (21).

The cross sectional study in Adama district in 2016 showed that the reasons for not utilizing were inconvenience of LLIN and other purposes. Those households who are literate, governmental employee, roof made up of corrugated iron sheet were almost two times more likely to sleep under LLIN during the previous night prior to interview (22).

The case control study in Adami Tullu from October 2014 to November 2015 showed significant determinants of LLINs ownership were household's head malaria knowledge, educational status, primary education or higher, farmer respondent, having ≥ 3 sleeping areas and corrugated roof type (27).

Study in Limmu Seka district, South West Ethiopia April 2012 showed that The factors associated with LLIN usage were knowledge of the mode of malaria transmission, the preferred conical shapes of the LLIN, receiving information about their use from Health Extension Workers (HEWs), hearing media campaigns, education at a health facility or having a family size of three or less (23).

Cross sectional study in Adami Tullu in February 2014 revealed that knowledge of sleeping under net every night prevents malaria, spouse education and kebeles were associated with net ownership. Net utilization among under-five children was affected by knowledge that LLIN kills malaria mosquitoes, knowing fever as a symptom of malaria and male gender of the child (26).

The study conducted in Jimma three districts (Mana, Kersa and Goma) in January 2014 reveals that low risk perceptions, lack of access, negligence, saving and misusing nets, technical difficulties related to hanging, and perceived degraded efficacy of the nets were also cited reasons for poor utilization of LLIN. Females were more likely to use LLIN than males across all age groups in households with sufficient access to LLIN. Moreover, under five children were also more likely to use LLIN than younger adults and older people (24).

Malaria Surveillance system Evaluation

Pillar 3 of the Global technical strategy for malaria 2016–2030 (GTS) is transformation of malaria surveillance into a core intervention in all malaria-endemic countries. 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 (11, 12).

Effective surveillance of malaria cases and deaths is essential for identifying the areas or population groups that are most affected by malaria, and for targeting resources for maximum impact. In 2016 and 2017, countries in the WHO African Region indicated that at least 80% of public health facilities had reported data on malaria through their national health information system. In 2017, among 52 moderate to high-burden countries, reporting rates of malaria were 60% or more (3, 18).

The purpose of evaluating public health surveillance systems is to ensure that problems of public health importance are being monitored efficiently and effectively. Evaluation of a public health surveillance system focuses on how well the system operates to meet its purpose and objectives (30).

Malaria surveillance system evaluation conducted in Qatar showed that the overall external completeness was 47% (31). The malaria surveillance system evaluation done in Ebonyi state in Nigeria identified 79% of suspected cases reported were confirmed by laboratory, 85% of health facilities had the harmonized HMIS data capturing tools of which 77% reported monthly aggregated data and 95% report on time, 22% of private health facilities did not submit malaria surveillance data to HMIS. The stakeholders interviewed assured that 80% flexibility and simplicity, 90% usefulness of the system (32).

According to the NMSP, the goal of the national Surveillance, Monitoring &Evaluation plan for malaria control in Ethiopia is to provide reliable information on sustaining malaria control and accelerating progress towards elimination. Ethiopia has recently declared malaria elimination efforts in 239 selected districts located in 6 different regions (9).

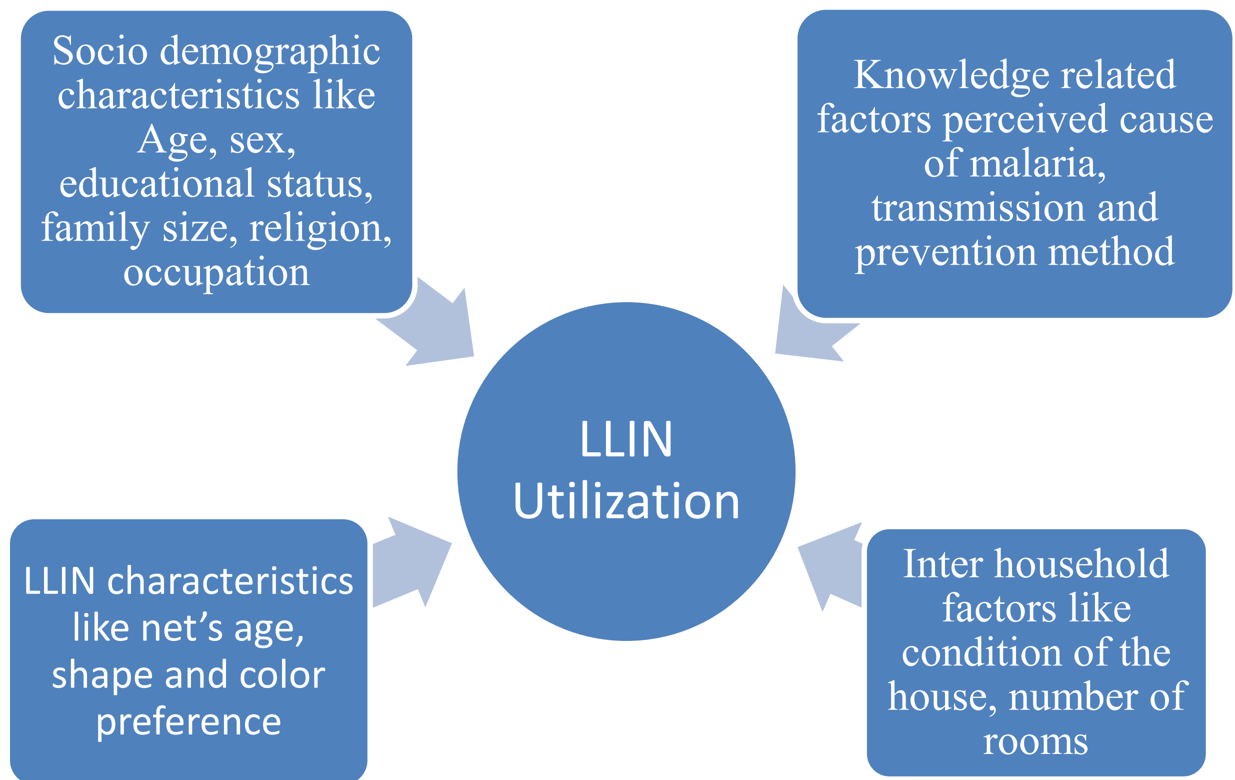

Figure 49 Conceptual framework for factors associated with LLIN utilization

8.8.2. Objectives

8.8.2.1. General Objective

To assess LLIN utilization status and evaluate existing malaria surveillance system of Sebeta Hawas district, Oromia Region, Central Ethiopia in 2019

8.8.2.2. Specific objectives

- To identify LLIN utilization in Sebeta Hawas district, Oromia Region, Central Ethiopia in 2019
- To identify factors associated with LLIN utilization in Sebeta Hawas district, Oromia Region, Central Ethiopia in 2019
- To assess malaria surveillance system activities in Sebeta Hawas District, Oromia Region, Central Ethiopia 2019
- To check consistency of malaria data reported via weekly PHEM report and routine HMIS report in Sebeta Hawas district, Oromia Region, Central Ethiopia 2019

8.8.3. Methods

8.8.3.1. Study Area

The study will be conducted in Sebeta Hawas district of Oromia Special Zone Surrounding Finfinne of Oromia Region Ethiopia. The Oromia Regional state is one of nine regional states of Ethiopia. It has 20 zones and 18 Town administrations. Sebeta Hawas district is one of 6 districts and 1 Town administration found in Oromia special zone surrounding Finfinne. The district has 42 kebeles (lowest administration unit in Ethiopia): 38 Rural and 4 urban. There are 6 health centers and 38 health posts in the district.

8.8.3.2. Study Design

Community based cross sectional study will be conducted for ITN utilization and associated factors and institution based cross sectional study for malaria surveillance system evaluation.

8.8.3.3. Study Period

The study will be conducted from February 1, 2019 - May 30, 2019

8.8.3.4. Population

8.8.3.4.1. Source population

All population living in the Sebeta Hawas district

8.8.3.4.2. Study Population

The study population will be selected households and health facilities in the district

8.8.3.4.3. Study Unit

The study unit will be selected households from kebeles in the district for LLIN utilization and district health office and health facilities (Health centers and Health posts) for malaria surveillance system evaluation.

8.8.3.5. Sample size and sampling techniques

For ITN utilization and associated factors

Multi stage sampling method will be used. In first stage from 38 malarious kebeles of the district 12 (30%) kebeles will be selected by simple random sampling technique. Then we will stratify the total sample size proportionally to each selected Kebeles according to their total number of households, finally we will identify selected households by systematic random sampling technique by using list of households registered by community health information system.

The sample size will be determined by single population proportion formula

$n = (Z\alpha/2)^2 P(1-P)/d^2 * DEFF$

Where

n= sample size

P= proportion of households slept under LLIN. Study conducted in Adama district (22) showed that 76% of HH utilize LLIN (slept under LLIN) = 0.76

D= margin of error tolerated 5% = 0.05

Z= standard normal value at 95% confidence level is = 1.96

DEFF = Design Effect=2

$n = (1.96)^2 * 0.76(1 - 0.76)/(0.05)^2 * 2$

= 560

By adding 10% non respondent rate

n= 616

For system surveillance system evaluation

The health facilities included in the study will be selected based on their malaria risk; high malaria risk kebeles will be prioritized. The 3 (50%) health centers and 9 Health posts (3 under each Health center) will be assessed.

8.8.3.6. Data Collection Tools and Procedures

The data related to ITNs utilization and associated factor will be collected by using National Malaria Indicator Survey semi-structured and interviewer administered questionnaire. The data collectors will capture information by interview of household head or member and observation of house.

The malaria system evaluation data will be collected using questionnaire of CDC updated guideline for public health surveillance system evaluation. The questionnaire will be used to interview the District health office and Health center PHEM focal persons and Health Extension workers of health posts. We will review documents like registers, tally sheets and family folders (at health post) then compare them with reports. We will also observe the minutes of Rapid Response Team and EPRP documents.

8.8.3.7. Data Quality

Quality of data will be assured by giving a two days training which include practical exercises on field for the data collectors and supervisors towards the objective of the study, the right and benefit of the study participant, clarification of terminologies, method of data collection, checking completeness and daily supervision activities. Data collectors will be enrolled from the study district and who have diploma and working experience on health data collection and supervisors will be also recruited based on their educational back ground (BSc and above) with supervising experience. There will be daily supervision of the data collectors in their daily activities. The team who conduct system evaluation will compose of Regional health bureau representative, zonal health office representative, field epidemiology resident and Principal investigator.

8.8.3.8. Data Processing and Analysis

Data collected for LLIN utilization will be entered into Epi Info version 7 (CDC Atlanta Georgia) and analyzed by Statistical Package for Social Sciences version 23 (SPSS Inc., Chicago). Odds ratio and 95% confidence intervals, p- value <0.05 will be used to determine the associations between independent variables and the outcome variable. Data collected for surveillance system evaluation will be analyzed by Microsoft office Excel 2007.

8.8.3.9. Ethical Consideration

Ethical approval and clearance will be received from Oromia regional Health bureau Ethical review committee. Then Support letter will be written from Oromia Regional Health Bureau to Oromia Special Zone Surrounding Finfinne health office then from zone to Sebeta Hawas district health office. The district health office will write letter to Health centers, Health posts and kebele administrations. Informed consent will be received from each house hold to participate in study and their information will be kept confidential.

8.8.3.10. Variables

Dependent variable: LLIN utilization

Independent variable:

- Socio demographic characteristics like Age, sex, educational status, family size, religion, occupation

- Inter household factors like condition of the house, number of rooms
- Knowledge related factors perceived cause of malaria, transmission and prevention method
- LLIN characteristics like net's age, shape and color preference

8.8.3.11. Inclusion and Exclusion Criteria

Inclusion criteria

Households residing in selected kebeles and health facilities in the district which had malaria morbidity registration.

Exclusion criteria

If randomly selected household will be an organization rather than the individual households.

8.8.3.12. Operational definitions

A long-lasting insecticidal net (LLIN): is a factory-treated mosquito net made with netting material that has insecticide incorporated within or bound around the fibers. The net must retain its effective biological activity against vector mosquitoes for at least three years in the field under recommended conditions of use, avoiding the need for regular insecticide treatment.

LLIN ownership: presence of one or more LLIN in the household

LLIN utilization: Is defined as having slept under LLIN during the night preceding the data collection date.

Malaria knowledge: respondent mention mosquito bite as mode of transmission

8.8.3.13. Dissemination of the Result

The study results will be disseminated to AAU school of public health, department of Preventive Medicine Ethiopia Field Epidemiology training program (EFETP), Federal Ministry of Health Ethiopia, Oromia Regional Health Bureau, OSZSF Health Office, Sebeta Hawas District Health office and Presidents Malaria Initiative Ethiopia. There will be one day briefing on the findings at the district level to the concerned bodies. It will be also send to scientific journals for publication.

8.8.3.14. Expected Outcomes

- Improved malaria surveillance system which detects outbreak and respond timely
- Consistent data production
- Local use of data for action and Report completeness will be improved
- Improved utilization of LLINs and minimized barriers associated with low utilization

8.8.4. Work plan

The project is planned to be accomplished according to the following tentative schedule.

Table 34: Schedule of the LLIN utilization status and malaria surveillance system evaluation in Sebeta Hawas District of Oromia Region, central Ethiopia 2019

S. No	Activities	Responsible personnel	Time Table						
			Dec	Jan	Feb	Mar.	April	May	June
1	Proposal writing	PI	■	■					
2	Ethical clearance	PI		■					
3	Contact with zonal and Woreda Health office	PI			■				
4	Recruit Data collectors and supervisors	PI			■				
5	Train Data collectors and supervisors	PI			■				
6	Duplicate questionnaire	PI			■				
7	Pretest questionnaire	PI, DC			■				
8	Data collection	DC			■	■			
9	Data entry	Data Clerk					■		
10	Data Analysis	PI					■	■	
11	Write up the result	PI					■	■	
12	Dissemination of result	PI							■
13	Present the finding at district level workshop	PI							■

Key

PI- Principal Investigator

DC- Data Collectors

8.8.5. Budget Breakdown

The estimated budget to operate the project or study will **be 83,347 ETB** or **USD 2978** as detailed cost is indicated in the following table.

Table 35: Budget Breakdown for LLIN utilization status and malaria surveillance system evaluation in Sebeta Hawas District of Oromia Region, Central Ethiopia 2019

S. No	Description	Item	Unit cost (ETB)	Multiplying factor	Total (ETB)
1	**Perdiem and Training**	Principal Investigator	300	300*20*1	6000
		Supervisors	300	300*12*2	7200
		Data collectors	300	250*12*5	15000
		System evaluation Team	300	300*4*5	6000
		Data clerk	300	210*7*1	1470
		Data briefing Team	300	210*15*1	3150
		Refreshment	80	80*30*1	2400
		Hall Rent	500	500*3	1500
	Sub total				**42,720**
2	**Stationery**	Printing paper (Ream)	120	120*10	1200
		Toner (Ink refill)	500	500*1	500
		Pen	5	10*5	50
		Pencil	4	4*50	200
		Sharpener	20	20*10	200
		Eraser	10	10*10	100
		Fillip chart	250	250*2	500
		Note book	15	15*10	150
		Parker	15	15*10	150
Sub total					**3,050**
3	**Transport**	Car Rent	1500	1500*20	30000
	Sub total				**30,000**
	Total				**75,770**
	Contingency (10%)				**7,577**
4	**Grand Total**	**ETB**			**83,347**
		USD		**$**	**2,978**

NB: ETB- Ethiopian Birr
USD- United states dollar
Exchange rate 1 USD = 28 ETB (January 4, 2018)

8.8.6. Reference

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Chapter Nine

Additional Output Reports

9.1. Basic PHEM Training for Zonal, District and Health Facility level PHEM focal persons organized by WHO and Oromia Regional Health Bureau December 10-13, 2018 Adama

Introduction

Training is one of the supportive functions of surveillance so that personnel's working in the system should have enough knowledge and skill to operate the system.

The burden of disease in our country is mainly due to preventable communicable diseases, which are the common causes of morbidity, mortality & disability. The National health Policy gives due attention to the control & prevention of preventable communicable diseases and epidemic prone diseases as well. The best strategy for strengthening of prevention & control of communicable diseases is surveillance as it provides evidences on which to base decisions on public health interventions. Importance of disease surveillance in guiding health planning and intervention was recognized long ago; nevertheless, current routine surveillance system is constrained by many factors such as shortage of trained personnel, poor data collection, non recording, failure to report diseases of epidemic potential in time, incomplete and late reporting of notify able diseases and inadequate data analysis especially at peripheral level. As a result of these constraints IDSR/events and case management remain weak.

As it is clearly known and as to the frequent supervisory visits conducted from time to time by the indicators surveillance system was very weaken by this time. Also the reports received from health facilities are incomplete and observation at health facilities shows that the surveillance of Measles case detection and Acute Flaccid Paralysis Surveillance is very poor.

In order to achieve effective disease surveillance system, improve case management in our region, improve the knowledge and skills of PHEM focal persons on general PHEM activities and outbreak investigation of selected epidemic prone diseases, improve the recording, reporting and case managing abilities of focal persons, training of the untrained PHEM focal persons at zone, district and health facility levels is paramount important. To achieve this mission Regional PHEM directorate with Collaboration World Health Organization decided to prepare training for the PHEM officers works at different levels mainly zonal, district and health facility (health centers and hospitals).

Objective

General objective

To improve the knowledge and skills of PHEM focal persons on general PHEM activities, outbreak investigation and response of selected epidemic prone diseases and to strengthen the recording, reporting and case managing abilities of zone, district and health facility focal persons

Specific Objectives

To enable PHEM focal persons develop the necessary skills to detect and respond to cases at health facilities

To improve the health workers' ability on case management of selected epidemic prone diseases

To strengthen the recording and reporting capabilities of the health workers

Methods

Training methods

- Presentation
- Group discussion
- Experience sharing, Questions and answers

Training Materials

- LCD
- Laptop computer
- Flip chart
- Marker
- Printed recording and reporting formats
- Note book
- Pen

Training participants

Selection criteria

The participants were selected based on the following criteria's

Untrained and newly assigned zonal health office PHEM officers

Untrained PHEM focal persons at health facilities both hospital and health centers

Newly assigned district PHEM focal persons were selected for training

Based on the above criteria's the trainers were selected from 2 zones and 2 town administrations

Table 36 Number of Basic PHEM Training Participants with their respective zones and towns, 2018

S. No	Zone/Town	Number of participants	Remark
1	Arsi Zone	30	
2	North Shoa Zone	25	
3	Asella Town	2	
4	Adama Town	2	
	Total	**59**	

Training period

The training was conducted from December 10 – 13, 2018

Training Venue

Training was given at Adama Town Kuriftu Resort Hotel

Evaluation method

Pre test and post test

Results

Trainee profiles

A total of 59 participants attended the training from 2 Zones and Town administrations. Among them 47 (79.7%) were males while the rest 12 (20.3%) were females. Most of them 38 (64.4%) were from Health facilities and the rest from zonal 2 (3.4%) and 19 (32.2%) district health office.

Training Topics

The training mainly covered the following topics

- Introduction to PHEM
- Early warning and Surveillance
- Public Health Emergency Preparedness
- AFP Surveillance
- Measles Prevention, Control and Surveillance
- NNT Epidemiology and surveillance
- AWD Epidemiology, AWD case management and CTC
- Malaria Epidemiology prevention and Control
- Scabies prevention and control
- Meningitis Epidemiology and surveillance
- Guinea Worm prevention, control and surveillance
- Public Health Emergency Response and Recovery
- PHEM Recording and reporting tools

Trainers

The trainers were from WHO 3, Oromia regional health bureau staffs 4 and 2 FETP residents a total of 9 trainers participated.

Evaluation Result

All participants had taken both pre test and post test examinations. The test results for pretest was maximum 76% and minimum 10% and mean 36.6 standard deviation 14.2. The post test result was minimum 72% and maximum 96% and mean 84.5 and standard deviation 4.4.

Discussion

The training was intended to equip the health workers working on the PHEM at Zonal, District and Health facility level namely health centers and hospitals. So the eligible trainees attended the training with good manner without interruption for whole duration of training session. The training was participatory they can ask the question at the end of presentation and clear answer was given from the presenters and the group members. They were shared their experience as they came from different zones as well as different working settings mainly zonal health office, District health office, Town health office and health facility levels. The group discussion on selected topic enabled the trainee to get enough knowledge and experience from each other. The trainees were evaluated by giving them pretest and post test examination. Their mean score improved from 36.6% in pretest to 84.5% post test which showed that they got better knowledge which enables them to work in the PHEM system. But the training time was not enough to complete the entire training topic as required and obliged us to use extra time in addition to working hours to complete the topics.

Limitation

The time planned for the training was inadequate to cover entire topic

The power was interrupted many times during presentations

Conclusion

The training given to PHEM focal persons at different levels was completed by achieving its intended objective of equipping trainees with enough knowledge to work in the surveillance system.

Recommendation

The organizers WHO and Oromia Regional Health Bureau should increase time to five days or more to cover all topics equally when preparing similar training in the future.

The training venue selected should have automatic power backups for future trainings prepared by organizers.

Annex I: Training schedule

The training was given according to the schedule in the following table

Table 37 Time Table of Basic Level PHEM training for Zonal, District and Health facility PHEM focal persons from December 10 - 13, 2018

Public Health Emergency Management Basic Level Training Schedule Adama Town Dec. 10_13, 2018				Moderator
Day	**Parallel Sessions**	**Time (LT)**	**Presenters**	
Day1	Registration	2:30 to 3:00	Organizers	Birhanu Kenate
	Opening Remark	3:00 to 3:10	Gemechu Shumi	
	Pre test	3:10 to 3:30	Facilitators	
	Introduction to PHEM	3:30 to 4:00	Dagnachew	
	Early warning and Surveillance	4:00 to 4:30	Aseffa	
	Tea break	***4:30 to 4:50***	***Organizers***	
	Public Health Emergency Preparedness	4:50 to 6:30	Zemedkun	Zinabu
	Lunch	***6:30 to 8:00***	***Organizers***	
	AFP Surveillance	***8:00 to 9:30***	Dr.Taye	
	Measles Prevention, Control and Surveillance	9:30 to 10:00	Dr.Nejib	
	Tea break	***10:00 to 10:20***	***Organizers***	
	Measles Prevention, Control and Surveillance continue	10:20 to 11:00	Dr.Nejib	
	NNT Epidemiology and surveillance	11:00 to 11:30	Dr.Taye	
Day2	Recap of Day1	2:30 to 2:45	Bokona	Dr. Taye
	AWD Epidemiology, AWD case management and CTC	2:45 to 4:30	Deribe	
	Tea break	***4:30 to 4:50***	***Organizers***	
	Malaria Epidemiology prevention and Control	4:50-6:30	Zinabu	
	Lunch	*6:30 to 8:00*	***Organizers***	Dr. Nejib
	Scabies prevention and control	*8:00 to 9:00*	Bokona	
	Meningitis Epidemiology and surveillance	*9:00 to 10:00*	Zinabu	
	Tea break	*10:00 to 10:20*	***Organizers***	
	Guinea Worm prevention, control and surveillance	*10:20 to 11:30*	Birhanu	
Day3	Recap of Day2	2:30 to 3:00		Bokona
	Public Health Emergency Response and Recovery	3:00-4:30	Zinabu	
	Tea break	***4:30 to 4:50***	***Organizers***	

	Public Health Emergency Response and Recovery continue	4:20-6:30	Zinabu	
	Lunch	***6:30 to 8:00***	***Organizers***	
	Public Health Emergency Response and Recovery continue	8:00-10:00	*Bokona*	Birhanu Kenate
	Tea break	***10:00 to 10:20***	***Organizers***	
	PHEM Recording and Reporting Tools	10:20-11:30	*Zinabu*	
Day 4	Recap of day 3	2:30-3:00	*Participants*	Bokona
	General Discussion	3:00-4:30	***Gemechu Shumi***	
	Tea break	4:30-4:50	Organizers	
	General Discussions continued	4:50-6:30	***Gemechu Shumi***	
	Lunch	6:30-8:00	Organizers	
	Post Test	8:00-8:50	Facilitators	
	Closing Remarks	8:50-9:10	Gemechu Shumi	

9.2. Bulletin Preparation

Epidemiological WHO Week 01, 2019

Highlights of the Week

- *Regional surveillance report completeness and timeliness were 84% & 81% respectively.*
- *Suspected Measles Cases were decreased by 20(19.1%) as compared to week 52.*
- *Confirmed malaria cases were decreased by 294(23.2%) as compared to Week* 52

I. Introduction

This bulletin serves to summarize weekly surveillance data and performance of ORHB/PHEM on epidemic prone diseases and other public health emergencies. It comprises completeness, timeliness, trends of priority diseases and response activities. It also provides feedback on surveillance activities for WHO week 01, 2019 (table 1).

Table 1: Key Indicators/diseases/conditions Reported in week 01, January, 2019

S/N	Indicators/cases	Reported
1	Malaria cases Ex. With RDT/ Micr	17405
2	Malaria confirmed & clinical Cases	993
3	Confirmed malaria (PF+PV)	972
4	Sum of SAM	1485
5	Scabies Cases	3394
6	Completeness	84
7	Timeliness	81
8	Dog/Animal bite	78
9	Suspected Meningitis cases	32
10	Measles Cases	85
11	Suspected Maternal Deaths	10
12	Cholera/AWD Cases	0
12	Guinea warm Cases	0
13	Suspected Anthrax	0
14	Relapsing Fever	5
15	AFP cases	4

II. Weekly Surveillance Report

Regional surveillance report completeness and timeliness of government health facilities were 84% and 81% respectively. Report completeness of six zones and five adminstrative towns was below target as well as reports were not received timely from two zones and three administrative towns.

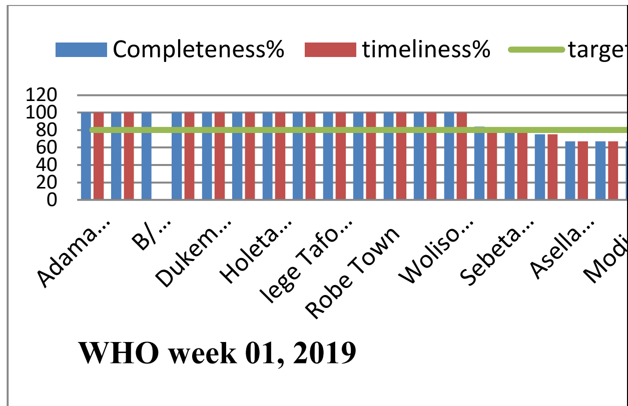

Fig.1 Report completeness and timeliness by Towns, Oromia as of WHO week 01, January, 2019

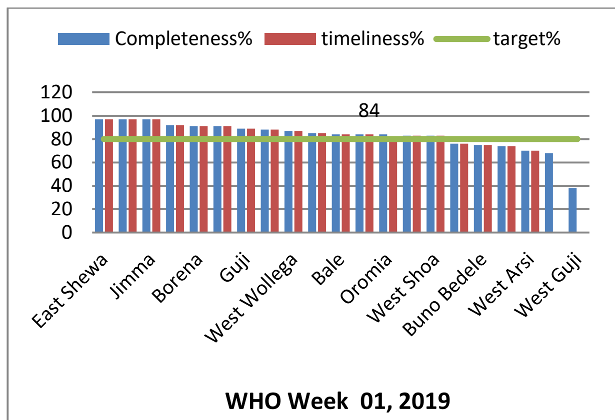

Fig.2 Report completeness and timeliness by Zones, Oromia as of WHO week 01, January, 2019

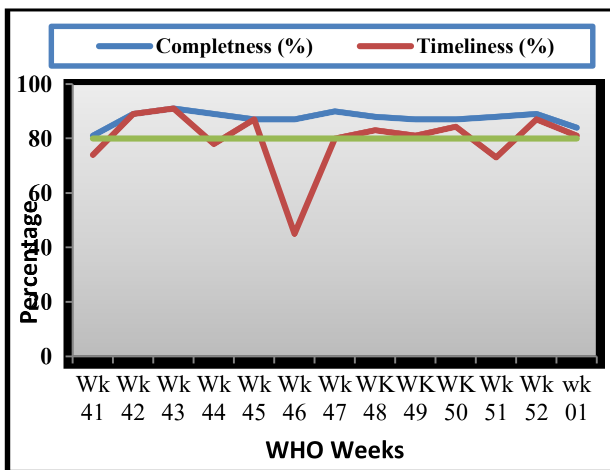

Fig.3:-Trends of regional surveillance report completeness and timeliness of 12 consecutive weeks, (WHO weeks 41–01) January, 2019

III. Diseases or conditions

1. Malaria

In this week, 993 clinical and confirmed malaria cases were reported. Among the total clinical and confirmed malaria cases 972(97.9%) of them were confirmed cases. Of the total confirmed cases, 638(65.6%) of them were plasmodium falciparum and 2 inpatient case in this week. Confirmed malaria cases were decreased by 294(23.2%) as compared to Week 52, 2018. A total of 17405 febrile cases were laboratory tested, yielding a positivity rate of 5.6 % this week.

The highest number of confirmed malaria cases were reported to region from zones and woredas as depicted (table -2).

Table-2: Malaria Positivity rate by zones/ woredas of Oromia Region, week 01, January 2019

Zone/Woreda name	Exam. by RDT/Mic	PF+PV	SPR	% from Reg/ zones
Borena	203	40	19.7	4.1
Teltele	152	28	18.4	70
East Shewa	2136	130	6.1	13.4
Fantale	288	30	10.4	23
Metehara	154	32	20.8	24.6
East Hararge	425	44	26.3	4.5
Fedis	95	25	26.3	56.8
West Shoa	483	54	11.2	5.6
Nono	167	28	16.8	51.9
Guji	822	110	13.4	11.3
Shakiso town	171	38	22.2	34.5
Woliso Town	317	25	7.9	2.6

A trend of regional confirmed malaria cases for the last 14 consecutive weeks is indicated below (fig: 4).

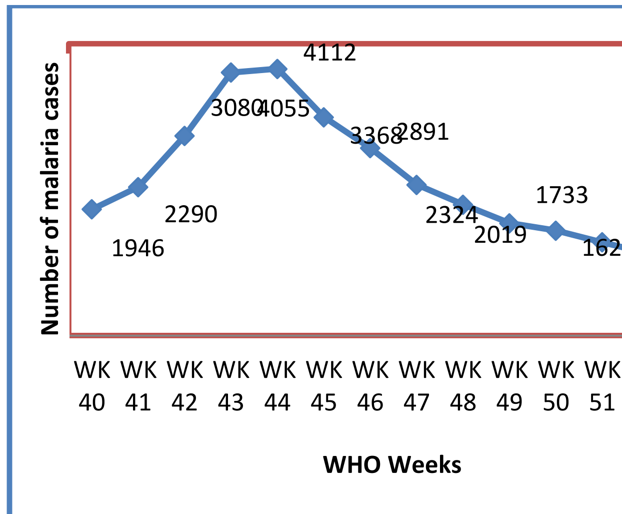

Figure 3: Trends of confirmed malaria cases by week, Oromia Region, 37-01 Week, January, 2019

2. Dysentery

In this week, a total of 1,262 dysentery cases were reported to the region. There were 07 admitted dysentery cases in this week. Cases were decreased by 58(4.4%) as compared to week 52. The highest number of cases were reported from East Hararge 120 (9.5%), Jimma 99 (7.8%), East Wollega 90(7.1%), East Shoa 82(6.5%) and Arsi 77 (6.1%) .

Trends of dysentery cases for the last 12 consecutive weeks are shown below (fig: 5).

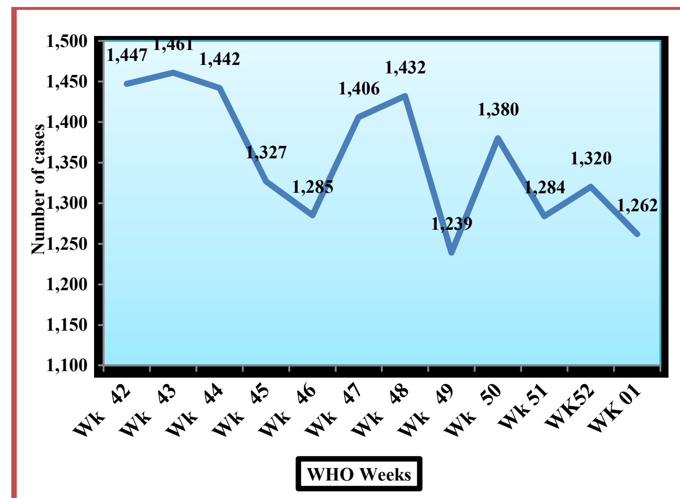

Figure 4: Trends of Dysentery cases by weeks, Oromia Region, 42 to 01 weeks, Jan, 2019

3. Measles

In this week, a total of 85 suspected measles cases were reported to the region. Suspected cases were reported from different districts and health facilities of Oromia zones and towns(table).

Table 3: distribution suspected Measles cases by districts and reporting health facilities of Oromia region in week 01,2019

S. No	Zone name	Woreda/ reporting facility Name	Measles Cases	Zone total
1	Arsi	Merti	1	1
2	Bale	Dawe Kach	2	33
		Dawe Serar	16	
		Ginir	3	
		Ginir Town	11	
		Goba Town	1	
3	East Hararge	Babile Town	7	15
		Babile Woreda	1	

		Chelenko Hos	1	
		Garemuleta Hosp	1	
		Girewa	2	
		Kumbi	1	
		Midega	2	
4	Illuababora	Matu town	1	1
5	West Harerge	Gelemso Hospital	2	6
		Hawigudina	4	
6	West Wollega	Sayo Nole	28	28
7	Nekemte Town	Nekemte Town	1	1
Oromia			**85**	85

Trends of the past 15 consecutive weeks of suspected measles cases were shown below (Fig:6).

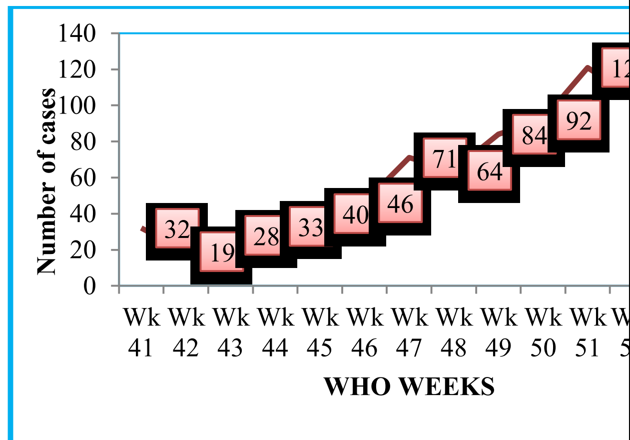

Figure 6:Trends of suspected measles cases by time,Oromia Region,week 41 to week 01, Jan. 2019

4. Acute Flaccid Paralysis (AFP)

In this week, 4 AFP cases were reported to the region. Cases were reported from West Shoa (2),West Harerge (1) and Jimma(1) Zones.

5. Malnutrition

In this week 1,485 new severely acute malnutrition (SAM) cases were reported to the region. Of the total cases, 204(13.7%) of them were treated at stabilization center. SAM cases were decreased by 308(17.2%) as compared to week 52. Most of the cases were reported from East Hararge 407(27.4%), followed by West Hararge 219(14.7%), West Arsi 174(11.7%), Bale 142 (9.6%), Jimma 107(7.2%) and Arsi 81 (5.5%) Zones.

Among Woredas; Girawa 50 (12.3%), Bedeno 36(8.8%), Gursum 30 (7.4%) and chinaksen 29(7.1%) of East Hararge; Mesela 36(16.4%) and Oda Bultum 32(14.6%) districts of West Hararge, Shalla 67(38.5%), Shashamane rural 48 (27.6%) and Siraro 32 (18.4%) of west Arsi, Harena Buluk 25 (17.6%) of Bale and Shabe 12(11.2%) of Jimma zones were contributing higher number of cases in this week.

Note: Percentage of Malnutrition in the districts was calculated from their respective zones.

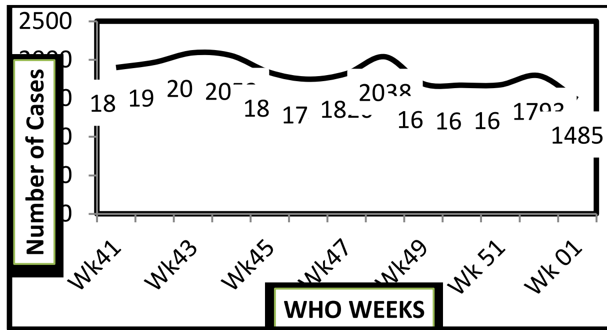

Fig 7: Trends of regional SAM cases by time, Oromia Region, week 41 to week 01, Jan, 2019

6. Meningococcal Meningitis

In this week, 32 suspected meningococcal meningitis cases and 1 deaths were reported to the region. These cases were reported from West Shewa (10), Guji (6), West Guji (5), West Harerge (3), Arsi (2), Bale (2) & Huru Guduru Wollega (1) zones. The death was from Jimma zone.

7. Anthrax

In this week, zero suspected anthrax case was reported to the region in this week.

8. Relapsing Fever

In this week, 5 suspected Relapsing Fever cases were reported to the region. These cases were reported from West Shoa (2), East Shoa(1), Adama town (1) and Shashemenne Town (1).

9. Maternal deaths

In this week, 10 suspected maternal deaths were notified. Cases were reported from Sululta Town(2), Bale (1) , East Shoa (1), Horo Guduru Wollega (1), North Shoa (1), West Arsi (1), West Hararge (1), west Wollega (1), and Batu Town (1) in this week.

10. Acute Watery Diarrhea (AWD) Cases

In this week, no suspected Acute Watery Diarrhea (AWD) case was reported to the region. There is no new AWD cases in the region for the last consecutive 77 days that enable us to declare over the local transmission of AWD outbreak this week in the region as per the national and WHO guideline (at least 42 consecutive days).

11. Guinea Worm (GW)

In this week, no suspected guinea worm case was reported to the region.

12. Scabies

Regionally, since the occurrence of Scabies outbreak a total of 169,038 cases were reported to date of which 42,775 cases were reported in 2009 EFY while the rests were in the 2010 and 2011 EFY. Seventeen zones, twelve towns and 118 woredas were affected up to now. In this week 3,394 scabies cases were reported to the region.

Table-4: Scabies cases by zones/towns of Oromia Region, week 52, Dec, 2018.

Zone /Town Name	# of Cases	% from Region
Oromia	3394	100.0
East Harerge	1756	51.7
East Shewa	560	16.5
West Harerge	309	9.1

Arsi	268	7.9
West Arsi	211	6.2
West Guji	87	2.6
East Wollega	75	2.2
Bishoftu Town	26	0.8
Jimma	22	0.6
Horro Guduru Wollega	17	0.5
North Shoa	14	0.4
Sululta Town	10	0.3
West Shoa	9	0.3
Batu Town	6	0.2
Asella Town	5	0.1
Jimma Town	5	0.1
Finfinne Zuria	4	0.1
Kellem	4	0.1
Robe Town	4	0.1
Lege Tafo town	2	0.1

13. Other cases

In this week, a total of 91 other cases reported to the region., were 78 Dog bites/animal bite, 1Mumps and 5 prenatal death.

IV. Response Activities

Based on weekly surveillance report, feed-back is often given to all zones and towns timely. Health and nutrition taskforce meeting is conducted with our partners every two weeks. Any rumors have been received, verified and risks have been communicated timely.

Contact us:

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About this newsletter:

This bulletin is weekly Public Health Emergency Management and Health Research Directorate of Oromia Regional Health Bureau. It is prepared and disseminated on a weekly basis. Your comment & suggestion will plays a great role in improving our bulletin.

Annexes

Annex I: Measles Outbreak Investigation Questionnaire

Questionnaire for Measles outbreak Investigation in Dawe Serer District Bale Zone Oromia Ethiopia 2019

Instructions: (Fill the questionnaires accordingly by ***interview or observation)***

Data collector information:- Name: ________ Responsibility _____ Phone number: _________

Date of Data collection: _______________

Region ________Zone______ Woreda______ Kebele ____________Got _____________

Longitude: _________________Latitude: ____________________

Who is answering the questionnaire?□ Parent/ guardian of sick person □ Sick person □ other (please specify) ______

Respondent category: □ case □ control Active case: Yes□ No

I. Socio-demographic information

1. Patient Name___________________
2. How old are you? : _____months ____ years

   Sex: □ Male □ Female
3. What is your occupation?

   □ Farmer □ Merchant □ Housewife □ Government employed□ Pastoralist □Student

   □ Not applicable □ other _____
4. What is your ethnicity? □ Oromo □ Tigre □ Amhara □ Somali □ other (specify) _____
5. What is your religion?: □ Orthodox □ Protestant □ Muslim □ other________________
6. What is your marital status?: □ Single □ Married □Widowed □ Divorced □ Not applicable
7. Have you ever attended school?: □ yes (go to question 8) □ No (go to question 9)
8. What is the highest level of education you have completed? (read answers): □KG □ Primary

   □ Secondary □ Collage/University□ Not applicable
9. Father's occupation: □ Farmer □ Merchant □ Government employed□ Student

   □ Pastoralist □ Other __________________
10. Parents' of case/control's education:

    Mother: □ Illiterate □ Primary □ Secondary □Collage/University

    Father: □ Illiterate □ Primary □ Secondary □ Collage/University

II. Knowledge Questions

1.What is measles? ____________

2. How do you think measles is transmitted? You can pick more than one response:

 Through the air Fecal/oral Food Close contact with an ill person other ______

3. How do you think measles can be prevented?

 Vaccination, there is no prevention local healing other _____________________

4. Who do you think can be affected by measles? Children less than 5 years old

 Children between 5-18 years People over 18 years old any age groups of both male and women don't know other (specify):_____________________

5. Why do some people vaccinate their children with measles vaccine?
    To prevent measles To get help Other Specify________________________
6. What is the routine age for a child to be vaccinated with measles vaccine?
   3 month's 6 months 9 months don't know Other _________
7. Do you think vaccination can prevent measles? Yes No Don't know

III. Clinical presentations (for case ONLY)

1. What were the symptoms of measles? a) rash: Yes No b) fever: yes No
   c) Runny nose: yes No d) red eyes: yes No e) cough: yes No

   f) Tiny white spots or sores inside the mouth yes No

2. What is the date when you first saw a rash on your body? : ____/_____/_________
3. Were you in your home when you first noticed your illness?
    Yes (skip to question 5) No (go to next question)
4. Where were you when the illness started? District; _________Kebele; _____________
5. How long have you had a rash? ________days
6. Do you still have the rash? yes No
7. Did you visit health facility for this illness? Yes (date went to facility____/____/____)
    No (go to no.13)

8. How long were you sick before visiting the health facility? ____________ in days/hours
9. Admitted: □ Yes □ No, If yes, date admitted:___/___ /______
10. Treatment given? □ yes □ No,
11. If yes □ ORS □ Antibiotics □ Vitamin A □ Supplementary food □ TTC ointment
    □ Anti pyretic□ other _________________
12. Outcome: □Alive □ death
13. Did you have any of the following complications when you were sick with measles?

Pneumonia: □ yes □ No Diarrhea: □ yes □ No Ear infection: □ yes □ No

Convulsions □ yes □ No Change in vision: □ yes □ No Blindness:□ yes □ No

14. Did you travel four days prior to or four days after rash onset?
15. □ Yes □ No
16. Where did you travel to? ___________________________

IV. Risk factors

VACCINATION STATUS

1. Can I see your immunization card? □ Yes (go to question 3) □ No (go to question 2)
2. Were you vaccinated against measles?: □ Yes □ No (go to question 6)
   □Don't know
3. What is the number of measles vaccine doses received? □One □Two □ More than two
   Age of first dose ___________
   Age of second dose _________
   Age of third dose ___________
4. Were these vaccinations given during routine programming (at the health center during vaccination days) or during a campaign, or both? : □ Routine program □ Campaign □ Both□ Don't know
5. Date last measles vaccine dose received? ___/____/______
6. What is the main reason were you not vaccinated against measles?□ Clinic was too far
   □ Absent during vaccination campaign □ You didn't know time for vaccination
   □ You think the vaccine will hurt the child □ Someone told you not to go
   □You are scared of vaccines □ other, (specify) ____________________________

EXPOSURE

7. Did you have contact with a person with measles symptoms the 2-3 weeks before onset of illness? yes No don't know
8. Have you travelled outside of your village the 2-3 weeks before onset of illness?
    Yes, No.
9. If yes, District ______________________ Kebele__________
10. Is there other person with measles symptoms in your household? Yes No
11. Does the case have any symptoms of malnutrition? yes, No.
12. If yes, on OTP: Yes, No

    Measure BMI:-

Height ________________________________

Weight _______________________________

MUAC _______________________________

13. How long does it take you to walk to the health center from your house? Less than 10 minutes 10-30 minutes' 31 minutes – 1 hour more than 1 hour More than 2 hours
14. How many windows does your house have?
    Two or more windows or doors
    less than two windows or doors

    Illumination yes No
15. How many sleeping rooms are there in your house? _______________
16. How many people slept in your house last night? _________________

Annex II: Surveillance System Evaluation Questionnaires

Zonal Level Questionnaire for Surveillance System Evaluation

Region _______________ Respondent Name _________________________

Zone__________________ Interviewer ____________________________ Date __/___/_____

General

1. **Availability of a National Surveillance Manual;**

1. Is there a national manual for surveillance? A. Yes B. No C. Unknown

If yes, describe (last update, diseases included, case definitions, surveillance and control, integrated or different for each disease): _________________

2. **Case Detection and Registration;**

2. Do you have standard case definitions for all country priority diseases?

a. Yes b. No c. Unknown d. Not applicable

If yes, observe the standard case definition for those diseases _____________________

3. **Data reporting:**

3. Who is responsible for providing you reporting formats of surveillance?

A. Federal Ministry of Health PHEM unit B. NGOs C. Others _____________

4. Have you encountered shortage of appropriate surveillance forms at any time during the last 6 months? a. Yes b. No c. Unknown

5. What are the reporting entities for the surveillance system?

A. Public health facilities B. NGO health facilities

C. Military health facilities D. Private health facilities E. Others__________________________

6. Number of woredas has reported weekly and immediately report in the last 3 months compared to expected number? ____________________________________

7. Number Health centers, Hospitals, NGO health facility, Others (private) sent immediately and weekly report in the last three months? ____________________________________

Weekly: ____

Immediately: ____

8. On time (use national deadlines)

Number of woreda has sent weekly reports on time in the last 3 months: _______

9. Was there any report of the immediately reportable diseases in the past 1 month?

a. Yes b. No

If yes, with in what time is the report received after detection of the case/ diseases?

A. Less than 1 hour B. 2-24 hour c. 1- 2 days d. 3- 7 days e. After 1 week f. Other____

10. How do you report to the next level? A. Mail B. Fax C. Telephone D. Other________

4. **Data analysis**

11. Do you describe data by person (case based, outbreaks, and sentinel)?

a. yes b. no c. don't know

If yes, observe analyzed data by person: ___________________________________

12. Do you describe data by place? a. yes b. No c. don't know

If yes, Observe description of data by district (tables, maps) ______________

13. Do you describe data by time? a. yes b. no c. don't know

If yes, observe description of data by time: _______________

14. Do you perform trend analysis? a. yes b. no c. doesn't know

If yes, observe line graph of cases by time _______________

List disease(s) for which line graph is observed _________________________

5. **Availability of defined threshold;**

15. Do you have defined threshold level for Measles and Malaria? a. yes b. No c. doesn't know

If yes, observe for some diseases ____________________

16. Who is responsible for the analysis of the collected data? _______________

17. How often do you analyze the collected data? a. Daily b. Weekly c. Every 2 weeks

d. Monthly e. Quarterly f. As needed

18. Have you an appropriate denominator? a. Yes b. No c. don't know

If yes, observe presence of demographic data (E.g. population by woreda and hard to reach groups) ________________________________

6. **Outbreak Investigation**

19. Number of outbreaks suspected in the past one year: _________________________

20. List the diseases: ____

21. Of those suspected/detected, how many of them were investigated? _____________

(Observe reports and take copies if possible) ________________________________

22. Number and percentage of outbreaks in which risk factors were looked for: _____________

23. Number and percentage of outbreaks in which findings were used for action: ____

[Observe report]

24. Number of woredas that looked for risk factors [observe in reports] ________________

25. Number of woredas that used the data for action [observe in final report] ___________

7. **Epidemic preparedness (relevant for epidemic prone diseases)**

26. Is there zonal plan for epidemic preparedness and response?

a. Yes B. No c. Unknown

If yes, observe a written plan of epidemic preparedness and response

27. Has the zone had emergency stocks of drugs, vaccines, and supplies at all times in past 1 year? A. Yes B. No C. Unknown

28. Has the zone experienced shortage of drugs, vaccines or supplies during the most recent epidemic (or outbreak)? a. Yes b. No c. Unknown

29.Is there standard case management protocols for Measles and Malaria? A. Yes B. No Observe the existence of a written case management protocol for at least 1 priority disease ____

8. **Presence of a budget line for epidemic response;**

30. Is there a budget line for epidemic response? a. Yes b. No c. Unknown

If yes, describe total budget allocated and utilized in the past one year ________________

9. **Existence of zonal epidemic management committee;**

31. Is there established zonal epidemic management committee? A. Yes B. No C. Unknown

If yes, observe minutes (or report) of meetings of epidemic management committee

____

32. Has epidemic management committee evaluated its preparedness and response activities during the past one year? A. yes B. No C. don't know

If yes, observe written report to confirm _____________________________________

10. Zonal rapid response team for epidemics;

33. Does the zone have a rapid response team for epidemic? A. Yes B. No C. Unknown

34. Is there any notification of recently reported outbreak to which you had response within 48 hrs? A. Yes B. No C. Unknown

If yes, observe that the zone responded within 48 hours of notification of most recently reported outbreak (from written reports with trend and intervention)

11. **Feedback;**

35. How many feedback bulletin or reports has the regional level produced in the last year? ____

Observe the presence of a report or bulletin that is regularly produced to disseminate surveillance data________________

12. **Supervision;**

36. How many supervisory visits have you made in the last 6 months compared to expect? ______________(%)

37. If the supervision was not made during the past 6 months, please mention the reasons, ______________________________

13. **Training on surveillance activities;**

37. Did you give any onsite orientation about surveillance system for HC and Woreda PHEM focal persons? Yes No

38. What percent of your subordinate personnel have been trained in surveillance? ___________

39. On what topics have you gave training in the last 6 months? ______________

40. What are your stakeholders those supporting you in giving training? ____________

41. Major challenges during and after training activities ____________________________

14. Resources

Do you have?

43. Data management equipment Computer__________ Printer ______ Photocopier _______

Data manager ______ Statistical package _____ Stationery _________

44. Communications: Telephone service _______ Fax _______ Mobile phone _______

Other_______

15. **Surveillance Networking**

45. Do you have functional computerized surveillance network at this level?

A. Yes B. No C. Unknown

16. **Budget for surveillance**

46. Is there a budget allocated for surveillance activities from the Regional Health Bureau budget (governmental source)? A. Yes B. No C. Unknown

If yes, what is the proportion of this budget from total allocated budget for other activities? ____(%)

47. Budget line (from donors) A. yes B. No

48. How could surveillance be improved? ___________________

17. **Surveillance Co-ordination**

49. Is there a focal unit for surveillance at this level?

A. Yes B. No C. Unknown

If yes, observe Organogram of the zone to confirm _________________

50. What opportunities are there for integration of surveillance activities and functions (core activities, training, supervision, guidelines, resources etc.)?

Questionnaire for Attributes and level of Usefulness:

A. Total population under surveillance_____________

B. In 2018, what is the incidence / Prevalence of:

Measles incidence ________ prevalence __________Deaths_________

Malaria incidence ________ prevalence __________Deaths_________

MDSR notified_____________ reviewed_____________

1. **Level of Usefulness of the Surveillance System for these selected priority diseases**

Does the surveillance system help to:-

A. To detect outbreaks of these selected priority diseases early? Yes/ No

B. To estimate the magnitude of morbidity and mortality of these diseases, including identification of factors associated with these diseases? Yes/ No

C. Permit assessment of the effect of prevention and control programs? Yes/ No

Observe (confirmation):

Interventions and diseases trends analyzed _______________________

2. **Description of Each System Attributes:**

I. Simplicity:

1. Is the case definition of Measles, malaria and MDSR easy for case detection by all level health professionals? a. Yes b. No c. Unknown

2. What are the organizations which need to receive reports of the surveillance data? ________

3. Do you feel that additional data collected on cases are time consuming?

a. Yes b. No c. Don't know

4. How long it takes to fill the reporting format?

a. <5 minutes b. 10-15 minutes c. >15 minutes

Overall comments on the above points ________________________________

ii. Flexibility:

1. Can the current reporting formats be used for other newly occurring health event (disease) without much difficulty? a. Yes b. No c. Don't know

2. Do you think that any change in the existing procedure of case detection, case definition, allocating funds, report forms, and formats will make difficult to implement?

a. Yes b. No c. Don't know

Overall comments on the above points: _______________________________

iii. Data Quality: (Completeness of the reporting forms/and validity of the recorded data)

1. Are the data collection formats for these priority diseases clear and easy to fill for all the data collector's/ reporting sites? a. Yes b. No

2. Have you ever given training for data collectors on data quality management?

A. yes B. No. C. don't know

3. Are the reporting site and data collectors supervised regularly? a. Yes b. No

4. **Observe:** Review the last month report of selected diseases

A. Average number of ***unknown or blank responses*** to variables in each of the reported forms

____

B. Percent of reports which are complete (that is with no blank or unknown responses) from the total reports____

Comment ____

2. During the most recent outbreak of (measles, malaria) within how many days these outbreaks were reported to the region after the first case/index case/ __________________________

3. Is enough information is available for control of selected diseases during outbreak?

a. yes b. no c. doesn't know

Comment____

4. How long does it take to have laboratory confirmation of Measles ____ Malaria _____

iv. Stability:

1. Was there lack of resources that interrupt the surveillance system? Yes/No

2. Was there any time /condition in which the surveillance is not fully operating? Yes No

If the answer for Q2 is yes, explain why? _________________________________

District Level Questionnaire

District____________________________ Respondent___________________________

Interviewer _______________________ Date _______________________________

General Information

1. Is there a national PHEM /IDSR Guide line or manual at this site? Yes/No

   If yes, **Obs** national PHEM /IDSR Guide line/manual: ______________________

2. Does the district have the **capacity** to transport specimens to a higher level lab? Yes/No

   If No, Reason __________________

3. Does the district have guidelines Or SOP for specimen collection, handling and transportation to the next level? Yes / No

4. Have you lacked forms recommended for the country at any time during the last 6 months? Yes/ No

5. 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

6. Number of weekly reports submitted on time: ____/12 times the number of health facilities (**On Monday)**

7. Number of immediately reports submitted on time: __________/3 times the number of health facilities (**within 30minutes of events)**

8. How do you report Weekly or immediately to the next level?

   a/ Mail b/Telephone c/ Fax d/Radio e/ Electronic f/ Other

9. How can reporting system be improved? ______________________________________.

10. Did you analysis IDSR data? Yes/No

    a) If yes, Is data describe by person for any case based, outbreaks or sentinel? Yes/No

       If yes, Obs description of data by age and sex

    a) Is description of data by place (locality, village, work site etc)? Yes / No

       If yes, Obs. description of data by Place

    b) Is the description of data by time? Yes/ No

       If yes, **Obs** observed description of data by time

11. Is there a trend analysis for the following disease?

    a) Malaria Yes/ No

b) Measles Yes/No

c) MDSR Yes/No

If yes, **Obs**. line graph of cases by time

12. Do you have an action threshold for any of the country priority diseases? Yes/ No

If yes, what is it? _________cases ________% increase _______rate

(Obs for 2 priority diseases)____

13. Did you have appropriate denominators? Yes/ No

If yes, Obs. demographic data at site (E.g. total population by village, <5 yrs,---)

14. Who is responsible for IDSR data analysis? ___________________ ___

15. How often do you analyze the IDSR data?

a. Daily b. Weekly c. Every 2 weeks

d. Monthly e. Quarterly f. As needed……..

Outbreak investigation

16. Is there any Outbreak or suspected in the district in the past year6 months? Yes/No

If yes, number investigated_______ (Observe reports and take copies if possible)

Epidemic preparedness

17. Dose the district epidemic preparedness plan? Yes/No

If, yes,**(Obs)** a written plan of epidemic preparedness and response.

18. Has the district had emergency stocks of drugs and supplies at all times in past 1 year? Yes/No **If yes, Obs,** Observed the stocks of drugs and supplies at time of assessment

19. Has the district experienced shortage of drugs, vaccines or supplies during the most recent epidemic (or outbreak)? Yes/ No

20. Is there a budget line or access of funds for epidemic response? Yes/ No

21. Does the district have a rapid response team for epidemics? Yes/No

If yes, **Obs** Observed minutes (or report) of meetings of epidemic management

22. Did epidemic response team evaluated their preparedness and response activities during the past year? Yes/ No **If yes,** (observe written report to confirm)

Responses

23. Has the district implemented prevention and control measures based on local data for at least one reportable disease or syndrome? Yes/No

24. Present of epidemic that responded by districts within 48 hours of notification of most recently reported outbreak?_______

Feedback

25. How many feedback written reports has the district produced in the last year?______________

26. **Obs** Observed the presence of a written report that is regularly produced to disseminate

Supervision

27. Did you supervise the health facilities in the last 6 month? Yes/No

    If yes, how many times have you been supervised in the last 6 months?______

    (**Obs** supervision report)

28. If No, the most usual reasons for not making all required supervisory visits.

    Reason ____

Training

29. Have you trained PHEM/IDSR disease surveillance? Yes/No

    If yes, specify when, where, how long, by whom? ______________________.

30. What percent of your staffs in the district trained on PHEM/IDSR surveillance?____%

Resources

31. Logistics Available

a)	Bicycles	Yes/No
b)	Motor cycles	Yes/No
c)	Vehicles	Yes/No
d)	Stationery	Yes/No
e)	Computer & Printer	Yes/No

32. Communication available

a)	Telephone service	Yes/No
b)	Fax	Yes/No
c)	Radio	Yes/No
d)	Computers that have modems	Yes/No

33. Information education and communication materials

a)	Posters	Yes/No
b)	Megaphone	Yes/No

c) TV Screen Yes/No

d) Projector (Movie) Yes/No

39. Availability of hygiene and sanitation materials

a) Spray pump Yes/No

b) Disinfectant Yes/No

Surveillance

40. Is there a IDSR focal person in the district epidemic management committee? Yes/ No

41. Are you satisfied with the current surveillance system? Yes /No

If no, why? ____.

Attributes

a) Usefulness

42. Total population of the district under surveillance_____________

43. How many cases and deaths reported in the district from the following disease past month?

a) Malaria cases _________Deaths ________

b) Measles cases _________Deaths ________

c) MDSR notified ______ Reviewed_____

44. Does the surveillance system help?

a) To detect outbreaks of these selected priority diseases early? Yes / No

b) To estimate the magnitude of morbidity, mortality and factors related to these diseases? Yes/ No

c) Permit assessment of the effect of prevention and control programs? Yes/ No

b) **Simplicity**:

45. Do you feel that data collections on a case report form are time consuming? Yes/No

46. If yes, how long it takes to fill the format? a, <5 minute b- 10-15minuts c- >15 minutes

c) Flexibility:

47. Do you think that the current reporting formats used for other newly occurring health event (disease) without much difficulty? Yes / No

48. Do you think that any change in the existing procedure of case detection, reporting, and formats will be difficult to implement? Yes/ No **If yes ,** how__________________

d) Data Quality:

49. Are the data collection formats for these priority diseases clear and easy to fill for all the data collectors/ reporting sites? Yes/ No
50. Are the reporting site / data collectors trained/ supervised regularly? Yes/No

    If, **Obs:** Review the last months report of these diseases
51. Average number of ***unknown or blank responses*** to variables in each of the reported forms ____
52. Percent of reports which are complete(that is with no blank or Unknown responses) from the total reports _______________

e) Acceptability:

53. Do you think all the reporting agents accept and well engaged to the surveillance activities? Yes/No If yes, how many are active participants (of the expected to)? ________

If no, what is the reason for their poor participation in the surveillance activity?

a) Lack of understanding of the relevance of the data to be collected
b) No feedback / or recognition given by the higher bodies.
c) Reporting formats are difficult to understand
d) Report formats are time consuming
e) If Others: _________________________________.

f) Representativeness:

54. What is the health service coverage of the district? _____%
55. Do you think, the populations under surveillance have good health seeking behavior for these priority diseases? Yes/ No
56. Who do you think is well represented by the surveillance data? urban / rural

g) Timeliness:

57. What proportion of health facilities reports in acceptable time? ---------------%

h) Stability:

58. Was there lack of resources that interrupt the surveillance system? Yes/No

If yes, how did you manage it?__________________

59. What do you suggest to overcome such problems?_____________________________.

____

____.

Health facility Questionnaire (Health center)

District______________ Name of health facility_______________

Type of health facility _________________ Respondent________________

Interviewer: ______________________ Date ______________________________

General Information

1. Is there PHEM/IDSR national Guide line or manual at this site? Yes / No

   If yes, Obs; for the existence PHEM/IDSR national guide line or manual

2. Is there a clinical register in health facilities? Yes/ No

   If yes, Obs the existence of a clinical register

3. Is there the health facilities correctly register cases during the previous 30 days?

   Yes/No If yes, Obs; the clinical register

4. Do you have a standard case definition for: (each priority disease)

a) MDSR Yes/No

b) AFP (polio) Yes/No

c) Measles Yes/No

d) Malaria Yes/No

If yes, Obs the standard case definition for: (each priority disease)

5. Do health facilities use standardized case definitions for the country's priority diseases? Yes/ No

If yes, Obs; the respondent correctly diagnosing one of the country's priority diseases using a standard case definition (Interview about of these)

6. Do the health facilities have the capacity to collect the following specimens?

a) Sputum Y N N/A

b) Stool Y N N/A

c) Blood Y N N/A

d) CSF Y N N/A

7. If yes, Obs the presence of materials required to collect

a) Stool Yes No N/A

b) blood/serum Yes No N/A

c) CSF Yes No N/A

8. Do you have the capacity to handle sputum, stool, blood/serum and CSF until shipment at this facility? Yes No N/A If yes, Obs presence of status cold chain at health facility

9. Does the health facility have the capacity to ship specimens to a higher level Lab?

Yes No N/A If yes, Obs presence of transport media for stool at health facility

10. Have you lacked appropriate surveillance forms at any time during the last 6 months?

Yes No N/A If yes, what the reason? ____________________

11. Observed that the last monthly report agreed with the register for 4 diseases (1 for each targeted group [eradication; elimination; epidemic prone; major public health importance])

a. Obs Measles Yes No N/A

b. Obs Malaria Yes No N/A

c. Obs AFP (polio) Yes No N/A

d. Obs AWD Yes No N/A

e. Obs MDSR Yes No N/A

12. Number of reports in the last 3 months compared to expected number

Obs Weekly: ________ /12 times the number of health post sites

Obs immediately: _______/--- times the number of health post sites

13. on time (use national deadlines)

Obs Number of weekly reports submitted on time:-_____ /12 times the number of sites

Obs Number of immediately reports submitted on time: ___/-- times the number of sites

14. How do you report? a/ Telephone b/ Fax c/ Mail d/ Radio e/ Electronic f/ Other

15. How can reporting be improved? Your suggestion ______________________

16. Describe data by person, place and time (outbreaks, sentinel) Yes No N/A

If yes, Obs data

17. Is there trend analysis Performed? Yes No N/A

If yes, Obs line graph of cases by time

18. Do you have an action threshold for any of the priority diseases? Yes No N/A

If yes, what is it (Ask for 2 priority diseases)?

Malaria cases ____ % increase

Measles cases____ % increase

19. Who is responsible for data analysis? _______________

20. How often do you analyze the collected data?

a) Daily b) Weekly c) Every 2 weeks d) Monthly e) Quarterly f) As needed

21. Presence of demographic data at site (E.g. population <5 yr., population by village, total population) Yes / No

Epidemic preparedness

22. Is there standard case management protocol for epidemic prone diseases at health facilities? Yes No N/A

If yes, Obs the existence of a written case management protocol for 1 epidemic prone disease

Epidemic response

23. Has the health facility implemented prevention and control measures based on local data for at least one epidemic prone disease? Yes No N/A

Feedback

24. Have you received feedback report in the last year from higher level? Yes/No

If yes, how many feedback reports has the health facility received in the last year? ___

Obs; at least 1 report received

25. Have you conduct meeting with community in the last 6 month? Yes No N/A

If yes, how often a) weekly b) every two weeks c) monthly d) quarterly e) as needed

Supervision

26. Did you supervise health posts in the last 6months? Yes No N/A

27. If yes, how many times have you been supervised in the last 6 months?_________

Obs; supervision report or any evidence of supervision in last 6 months

28. Did you get any supportive supervision from higher level in the last 6 months? Yes No N/A

If yes, Obs; supervision report or any evidence for appropriate review of surveillance

Training

29. Have you trained in disease surveillance and epidemic management? Yes No N/A

If yes, specify when, where, how long, by whom?_____________________________

Number of Staffs trained in disease surveillance and epidemic management_______

Resources

30. Logistics

a) Electricity Yes/No

b) Bicycles Yes/No

c) Motor cycles Yes/No

d) Vehicles Yes/No

31. for data management

a) Stationery Yes/No

b) Calculator Yes/No

c) Computer Yes/No

d) Software Yes/No

e) Printer Yes/No

32. Communications available

a) Telephone service Yes/No

b) Fax Yes/No

c) Radio call Yes/No

d) Computers Yes/No

33. Information education and communication materials

a) Posters Yes/No

b) Megaphone Yes/No

c) TV Yes/No

d) Other: Yes/No

34. Hygiene and sanitation materials

a) Spray pump Yes/No

b) Disinfectant Yes/No

35. List Personal Protection materials (PPE) available in health facility _____________

Attributes

a) Usefulness

36. Total population of the district under surveillance_____________

37. How many cases and deaths reported in the facility from the following disease past 6 month?

a) Malaria cases _________Deaths ________

b) Measles cases _________Deaths ________

c) MDSR notified _________reviewed ________

38. Does the surveillance system help?

a) To detect outbreaks of these selected priority diseases early? Yes / No

b) To estimate the magnitude of morbidity, mortality and factors related to these diseases? Yes/No

c) Permit assessment of the effect of prevention and control programs? Yes/ No

b) Simplicity

39. Do you feel that data collections on a case report form are time consuming? Yes/No

If yes, how long it takes to fill the format? a, <5 minute b- 10-15minuts c- >15 minutes

c) Flexibility

40. Do you think that the current reporting formats used for other newly occurring health event (disease) without much difficulty? Yes / No

41. Do you think that any change in the existing procedure of case detection, reporting, and formats will be difficult to implement? Yes/ No If yes, how________________

d) Data Quality

42. Are the data collection formats for these priority diseases clear and easy to fill for all the data collectors/ reporting sites? Yes/ No

43. Are the reporting site / data collectors trained/ supervised regularly? Yes/No

If, Obs: Review the last months report of these diseases

44. Average number of unknown or blank responses to variables in each of the reported forms __

Percent of reports which are complete (that is with no blank or Unknown responses) from the total reports _______________

e) Acceptability

45. Do you think all the reporting agents accept and well engaged to the surveillance activities? Yes/No If yes, how many are active participants (of the expected to)? ________

If no, what is the reason for their poor participation in the surveillance activity?

a) Lack of understanding of the relevance of the data to be collected

b) No feedback / or recognition given by the higher bodies.

c) Reporting formats are difficult to understand

d) Report formats are time consuming

e) If Others: _________________________________.

f) Representativeness

46. What is the health service coverage of the district? _____%

47. Do you think, the populations under surveillance have good health seeking behavior for these priority diseases? Yes/ No

48. Who do you think is well represented by the surveillance data? urban / rural

g) Timeliness

49. What proportion of health facilities reports in acceptable time? ---------------%

h) Stability

50. Was there lack of resources that interrupt the surveillance system? Yes/No

If yes, how did you manage it? ___________________

What do you suggest to overcome such problems? ______________

Health Post Level Questionnaire

District____________________________ Name of health Post_______________

Interviewer _________________ Respondent _______________ Date _______

General Information

1. Is there PHEM/IDSR National Guide line or manual at this site? Yes No

If yes, Obs PHEM/IDSR national guide line or manual:

2. Is the Health Post has a clinical register? Yes No N/A

3. Is cases correctly register in the health post? Yes No N/A

If No, state the reason; ____

If yes, Obs; the correct filling of the clinical register during the previous 30 days

4. Do you have a standard case definition for: (each priority disease)

a) AFP (polio)	Yes	No	N/A
b) Measles	Yes	No	N/A
c) Malaria	Yes	No	N/A
d) MDSR	Yes	No	N/A

If yes, Obs; the standard case definition for: (each priority disease)

5. Do you use standardized case definitions for the priority diseases? Yes/No

If yes, select one of the priority diseases in the facility's clinical register and ask how they diagnosed it — interviewer should have the standard case definition from MOH)

6. Have you lacked appropriate surveillance forms at any time during the last 6 months? Yes/ No

7. Does the health post report accurately cases from the registry into the summary report to go to higher level? Yes/No

If yes, the last monthly report agreed with the register for 4 diseases (1 for each targeted group [eradication; elimination; epidemic prone; major public health importance])

a) Obs Measles	Y	N	N/A
b) Obs Malaria	Y	N	N/A
c) Obs AFP (polio)	Y	N	N/A
d) Obs AWD	Y	N	N/A
e) MDSR	Y	N	N/A

8. Number of reports in the last 3 months compared to expected number

Obs Weekly: ______/12 times the number of sites

Obs immediately: ______/-- times the number of sites

9. On time (use national deadlines)

Obs; Number of weekly reports submitted on time:-_ /12 times health post.

Obs ; Number of immediately reports submitted on time: ___/-- times from health post .

10. How do you report? a) Mail b) Fax c) Telephone d) Radio e) Electronic f) Other

11. How can reporting be improved? Suggest___________________________________

12. Describe data by person, place & time (outbreaks, sentinel) Yes/ No Not applicable

Epidemic response

13. Has the health post implemented prevention and control measures based on local data for at least one epidemic prone disease? Yes No N/A

Feedback

14. Have you received feedback in the last 6month? Yes No N/A

15. How many feedback reports has the health post received in the last year? ___

If yes Obs; Observed at least 1 report at the health post from a higher level during the past year on the data they have provided

16. Have you conduct meeting with community members in the 6month? Yes No N/A

17. If yes, how many meetings has this health post conducted with the community members in the past six months? _________________

Obs Observed the minutes or report of at least 1 meeting between the health post and the community members within the six months

18. If No, list the reason ____________________________________

Supervision

19. Have you supervised by higher level in the last 6 months?

20. If yes, how many times have you been supervised in the last 6 months? __________

Obs; supervision report or any evidence of supervision in last 6 months

Training

21. Have you trained in disease surveillance and epidemic management? Yes No N/A

22. Number of staffs trained______________________

If yes, specify when, where, how long, by whom?__________________

Resources

23. Logistics

a) Electricity yes No N/A

b) Bicycles yes No N/A

c) Motor cycles yes No N/A

24. Data management

a) Stationery yes No N/A

b) Calculator yes No N/A

c) Computer Software &Printer Yes No N/A

25. Communications

a) Telephone service yes No N/A

b) Fax yes No N/A

c) Radio call yes No N/A

d) Computers that have modems Yes No N/A

26. Information education and communication materials

a) Posters yes No N/A

b) Megaphone yes No N/A

c) Flip charts Image box yes No N/A

d) Other: yes No N/A

27. Hygiene and sanitation materials

a) Spray pump yes No N/A

b) Disinfectant Yes No N/A

28. List of Personal Protection Equipment (PPE) ____________________________

Satisfaction with surveillance system

29. Are you satisfied with the surveillance system? Yes No N/A

If no, how can the surveillance systems will be improved? Suggest____________

30. What opportunities are there for integration of surveillance activities and functions (core activities, training, supervision, guidelines, resources etc.) _______________________

Attributes

a) Usefulness

31. Total population of the district under surveillance_____________

32. How many cases and deaths reported in the district from the following disease past 6 month?

a) MDSR Notified _________reviewed ________

b) Malaria cases _________Deaths ________

c) Measles cases _________Deaths ________

33. Does the surveillance system help?

a) To detect outbreaks of these selected priority diseases early? Yes No N/A

b) To estimate the magnitude of morbidity, mortality and factors related to these diseases?

Yes No N/A

c) Permit assessment of the effect of prevention and control programs? Yes No N/A

b) Simplicity

34. Do you feel that data collections on a case report form are time consuming? Yes No N/A

35. If yes, how long it takes to fill the format? a- <5 minute b- 10-15minuts c- >15 minutes

c) Flexibility

36. Do you think that the current reporting formats used for other newly occurring health event (disease) without much difficulty? Yes No N/A

37. Do you think that any change in the existing procedure of case detection, reporting, and formats will be difficult to implement? Yes No N/A

If yes how ____.

d) Data Quality

38. Are the data collection formats for these priority diseases clear and easy to fill for all the data collectors/ reporting sites? Yes No N/A

39. Are the reporting site / data collectors trained/ supervised regularly? Yes No N/A

If, Obse: Review the last months report of these diseases

40. Average number of unknown or blank responses to variables in each of the reported forms__

41. Percent of reports which are complete (that is with no blank or Unknown responses) from the total reports __________

e) Acceptability

42. Do you think all the reporting agents accept and well engaged to the surveillance activities? Yes No N/A If yes, how many are active participants (of the expected to)? ________

43. If no, what is the reason for their poor participation in the surveillance activity?

a) Lack of understanding of the relevance of the data to be collected

b) No feedback / or recognition given by the higher bodies.

c) Reporting formats are difficult to understand

d) Report formats are time consuming

e) If Others: _________________________________.

f) Representativeness

44. What is the health service coverage of the district? _____%.

45. Do you think, the populations under surveillance have good health seeking behavior for these priority diseases? Yes No N/A

46. Who do you think is well represented by the surveillance data? Urban / rural

g) Timeliness

47. What proportion of health facilities reports in acceptable time------?

h) Stability

48. Was there lack of resources that interrupt the surveillance system? Yes No N/A

If yes, how did you manage it? __________________

49. What do you suggest to overcome such problems? _______________________________

____

Laboratory Assessment Tool

General information

Name of the laboratory	**Response**	**Comments**
Address of the laboratory:	Telephone_______ Fax_______ e-mail__________	
Level of the Laboratory :	Community Health Facility District Regional National	
Affiliation of the Laboratory :	**Public**/Private/Academic	
Building Facilities and utility services		
Is the laboratory in a free-standing building or part of larger structure?		
How many rooms with bench space are there in the laboratory Does the Laboratory have the following services available? Electricity/Running water		
Is there a back-up power source in case of power failure (e.g. emergency generator)?	Yes No	
If yes, what systems are protected?		
Refrigerators/freezers	Yes No	
Computers	Yes No	
Other(specify)	Yes No	
What types of communications systems are available?		
Post	Yes No	
Telephone	Yes No	
Fax	Yes No	

Satellite phone	Yes No	
E-mail (no. computers)	Yes No	
Internet (no. computer)	Yes No	
Laboratory staff		
V. Medical Laboratory Professionals Number a. MSc/MPH b. Bsc c. Dipoma		
VI. Assistants (not doing tests)		
VII. Clerical/Cleaner		
Has training been conducted for the laboratory staff on		
Measles		
Malaria		
Other epidemic prone diseases (briefly describe)		
If yes when was the last training been conducted for your laboratory staff?		

Reagents & kits

Where you are getting your reagents?	From a commercial supplier
	From another laboratory
	Supplied by Regional/Zonal/District/health office
Was there shortage of reagents in the last six month which are used for identifying diseases	Yes No
If Yes, What Are the most important reasons?	Lack of funds Lack of information Un prioritizing others(specify)

What type of water is used for preparation of media and reagents?		
Deionized Distilled	Yes	No
Distilled	Yes	No
Tap water	Yes	No

Tests performed at the laboratory

Disease	Specimen type	Assay Performed	Yes	No	Number/ Month
Meningitis	CSF	a. Cell count b. Latex agglutination c. Gram stain d. Culture e. Identification tests f. A-M susceptibility			
Watery diarrhea (cholera)	Faeces	Microscopy of wet preparation Culture-TCBS Culture-Alk. Peptone Serotyping			
Malaria	Blood	Thick/Thin film microscopy			
Measles	Serum Throat swab, Conjunctival swab	IgM by EIA Other serological test Virus isolation			
Yellow fever	Blood, postmortem Liver	IgM Virus isolation			
Suspect typhoid or Brucellosis	Blood, faeces serum	Culture Identification tests A-M susceptibility Serological tests (Widal, brucella			

		agglutinins)			
Hepatitis	Serum	Anti-HAV IgM Anti-HbsAg Anti-HCV IgM			
Viral haemorrhagic fevers (any)	Serum, other tissue specimens	IgM Virus detection			
Acute flaccid Paralysis	Faeces	Virus isolation Virus typing			

Specimen collection, labeling and handling

Do request forms contain **ALL** of the following patient information: specimen source, date and time of collection, type of test requested?	Yes No
Are specimens that are received labeled with the patient's name and unique identifiers?	Yes No
Does the laboratory have a logbook/electronic record of all specimens sent for diagnostic testing?	Yes No
Are specimens discarded after testing, or are they stored?	Discarded Stored
Does you laboratory refer bacteriology isolates or serum samples to a reference laboratory?	Yes No
If yes, reason for referral (tick all)	
Confirmation Identification of unknown organism Test not performed on site	Yes No Yes No Yes No
Number of sample referred in the last six month?	
Types of transport media used (tick all that apply)	
Trans-isolate Cary and Blair Viral transport medium	Yes No Yes No Yes No
Other (describe):	

Reporting procedures

Are records kept of the number and type of tests performed and results?	Yes No

Question	Response
Does the laboratory have a list of diseases that are supposed to be reported to the Ministry of Health?	Yes No
Does the lab staff know what diseases should be reported?	Yes No
Does the lab provide regular reports of patients with reportable diseases to any of the following Ministry of Health offices/institutions?	
District Health Office State Health Office	Yes No Yes No
National / MOH level	Yes No
If reports are submitted, how frequently?	
Weekly Monthly Quarterly Other	Yes No Yes No Yes No Yes No
Quality control procedures and programs	
Does the laboratory use any system for internal quality control?	Yes No
Does the laboratory participate in any external quality assurance or proficiency schemes?	Yes No
Was there any general laboratory supervision conducted to this laboratory?	Yes No
If yes, how often in for the last one year?	one times/two times/ three and more
Does your laboratory have a system for regularly monitoring of quantities of reagents and materials so that there is warning if stocks become low?	Yes No

Annex III Data collection tools for Health profile Description

1. **Historical Aspects of the area (Culture & Truism office).**
   1.1. Woreda at a glance: where it is______________________________
   1.2. The name (how& why) ______________________________________
   1.3. How the woreda was formed__________________________________
   1.4. Any other historical aspect_____________________________________

2. **Geography and Climate (including map, altitudes, agro ecological zones etc…)**
   2.1.Woreda map__________________________________
   2.2.Location (distance and direction) __________________ _________________
   2.3.Altitude __________________
   2.4.Annual rain fall (average)_______ Max_______Min_________
   2.5. Annual temp(average)_________High __________Low_____________
   2.6.Climatic zones Highland_______% Midland ____________% Lowland ___________%
   2.7.Accessibility to main roads____

3. **Administrative setup**
   3.1.Total no. of kebeles: _________ Rural________Urban____________

   3.2. Woreda boundaries North_______________South_________________

   East________________ West_____________

4. **Demographic information**
   4.1. Population: Total__________ urban__________.rural_________
   4.2. Male Popn ____________Female Popn ___________ sex ratio____________
   4.3. < 1yrs_________, <2 yrs _________ < 5 yrs_________, < 15 years______, >64 years____________, Women 15-49 yrs of age___________.
   4.4.Total population by kebele (each kebele pop)____________Ethnic composition/language ______________ __________________ ___________________

5. **Economy(mainstay of the economy, average income levels etc)**

   5.1. Main source of the economy__________________

   5.1.1. Land density __________________
   5.1.2. Cultivated ____________________
   5.1.3. Farming ________________________
   5.1.4. Grazing ____________________
   5.1.5. Main crops ____________, ________________, ___________, ____________
   5.1.6. Fertilizer utilization __________________________________

5.2.House hold income source(average)

5.2.1. Agriculture______ (No.)

5.2.2. Different business_____(No.)

5.2.3. Employee_______(No.)

5.2.4. Jobless ______(No.)

5.2.5. Average income per HH/year_________

6. Education and school Health

6.1.Distribution of Schools:

6.1.1. Primary (1-8) ____1st Cycle(1-4)________ 2ndCycle (5-8)____

6.1.2. Secondary (9-10)______

6.1.3. Preparatory schools (11-12)_________,

6.1.4. TVET/colleges________

6.1.5. K.G _________________

6.2.**Educational status of the community**

6.2.1. Total School Age Children (target)____________________

6.2.2. Total Enrolment _________________________(_____%)

6.2.3. School dropout in 6 months or year 2009 ______________

6.2.4. If there is school dropout ,why ___________________

6.2.5. Total Educated people as a whole, ________ Male ________ Female ______

6.3.School health activities:

6.3.1. Water supply: schools with water supply________

6.3.2. Toilets: schools with functional latrines (Male& Female)_______

6.3.3. Schools with HIV/other Health clubs________________________

7. Facilities (Transport, Telecommunication, Power supply, Water supply…)

7.1. How many of the **health posts** have access to transportation_________(______%) , Telecommunication__________(________%) ,Electric power______________(________%) ,Water supply ______________(______%)

7.2.How many of the **health centers** have access to transportation_________(______%) , Telecommunication__________(________%) , Electric power__________(_______%) , Water supply ______________(______%)

8. Health delivery system (District Health Structure/organogram)

8.1. Health Facility

Type	Number	Total No. of beds
Hospital		
Health center		
Private HFs(clinics/diag.lab/drug stores)		
Health posts		

8.2.Health institution to pop ratio:

8.3.Hospital: Pop _________. HC: Pop __________ HP: Pop _____________

8.4.Health service coverage ___________________

8.5.Human resource for health (all type)

Type	No.	Remark
Physicians		
Health officers		
Midwives		
Nurses		
Lab.		
Pharmacy		
Env. Health		
HEWS		
Others		

Doctor: pop ratio______, Nurse: pop ratio_________ HEW: pop ratio________

Top causes of morbidity and mortality

8.5.1. **Top ten leading causes of OPD visit (morbidity):**

S. No	Adult	Pediatrics
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

8.5.2. **Top ten causes of admissions**

S.No	Adult	Pediatrics
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

8.6. **Vital Statistics and Health Indicators**

8.6.1.Infant Mortality Rate (IMR) __________(total <1 yr deaths in 2009 yr_______)
8.6.2.Total live births______
8.6.3. Total still births________
8.6.4.Total neonatal deaths______
8.6.5.Child Mortality Rate______________(total <15 yr deaths in 2009 yr______)
8.6.6.Crude Birth Rate_________
8.6.7.Crude Death Rate__________ (total deaths 2009 yr____)

8.6.8.Maternal Mortality Rate___________(total maternal deaths in 2016/17______)
8.6.9.Contraceptive Prevalence rate______________
8.6.10. Long acting Family Planning coverage ___________
8.6.11. Contraceptive acceptance rate _________
8.6.12. ANC rate (how many of the total expected pregnancies attended 1st ANC) ________
8.6.13. ANC rate (how many of the total expected pregnancies attended 4th ANC) ________
8.6.14. Percentage of deliveries attended by skilled birth attendants_________
8.6.15. Percentage of deliveries attended by HEWs__________

9. Immunization Coverage (for children);

9.1. BCG __________
9.2. OPV-0 ________OPV -1 ________ OPV-3 __________
9.3. Penta-1________ Penta-3 ___________
9.4. PCV_{10} -1 ________PCV_{10} -3 _________
9.5. Rota1 _________ Rota2 _________
9.6. Measles ___________
9.7. Fully immunized____________

10. Health budget allocation:

10.1. **Government**
10.1.1. Total budget allocated for the district ______________
10.1.2. Total budget allocated for health ________(____%)

10.2. **Funds from NGO**
10.2.1. Total ___________ (purpose/programs)____________________

11. Disaster situation in the woreda

11.1. Was there any disaster (natural or manmade) in the woreda in the last one year?________
11.2. Any recent disease outbreak/other public health emergency_________
11.3. If yes, cases________ and deaths__________

12. Community Health Services:

12.1. **Status of services provided by community health workers namely**
12.1.1. No. of HDA_________ and their responsibility _______________________
12.1.2. Responsibility of HEWs____
12.1.3. Others____

12.2. **Status of Primary Health Care Components – with focus on the eight PHC elements**
12.2.1. MCH(Delivery, ANC, PNC)____
12.2.2. FP(Methods) ____
12.2.3. EPI(outreach service, cold chain, vaccine)_____________________________

12.3. **Environmental Health, Sanitation Hygiene (WASH)**
12.3.1. Latrine coverage_______(____%) & utilization rate__________(_____%)
12.3.2. Total safe water supply coverage_________ (_______%)

12.3.3. Safe water supply coverage by kebele with its popn ___________________________

12.3.4. Main source of water supply ________________________

12.3.5. Others____

12.4. **Health education**____

13. Endemic diseases ; (in No & % for all questions)

13.1. **Malaria:**

13.1.1. Total malarious kebeles___________________________

13.1.2. Pop at risk_____________________________________

13.1.3. ITNs coverage (including current distn) ________________________

13.1.4. Is there IRS this year (No of kebeles) __________________________

13.1.5. If yes, No of kebeles undertaking IRS_______________________

13.1.6. Popn covered ____

13.1.7. HHs covered____

13.1.8. Total malaria cases/yr_____________ Deaths/yr_______________,

13.1.9. <5yr cases_________________ deaths___________________

13.1.10. Malaria supplies (Coartem, RDT, etc) shortage _________________(month)

13.1.11. If, Other issues____

13.2. **TB/Leprosy**

13.2.1. Total TB cases_________

13.2.2. PTB negative_________

13.2.3. PTB positive____

13.2.4. Extra PTB _________

13.2.5. TB detection rate ______________

13.2.6. TB Rx completion rate __________

13.2.7. TB cure rate ______________

13.2.8. TB Rx success rate ___________________

13.2.9. TB defaulter____________

13.2.10. Death on TB Rx_________________________

13.2.11. Total TB patients screened for HIV___________

13.2.12. Total Leprosy cases__________ on Rx__________

13.3. **HIV/AIDS;**

13.3.1. Total people screened for HIV (last one year)___________

13.3.2. VCT_____

13.3.3. PITC______

13.3.4. PMTCT___________

13.3.5. HIV prevalence_______________

13.3.6. HIV Incidence (new cases/yr)_____________

13.3.7. Total PLWHA_________________________

13.3.8. On ART________________

13.3.9. On Pre-ART______________

13.3.10. Other HIV prevention activities_____________________

13.4. **Nutrition (malnutrition related OTPs, SC,TSF, CBN and PSNP activities)/HO & Early warning**

13.5. Total OTP sites______,

13.6. Total admissions to OTP/yr_______

13.7. Total SC sites,_______

13.8. Newly opened/yr______

13.9. Total admissions to SC/yr________

13.10. Is there TSF (Targeted Supplementary Feeding) program in the woreda? ____

13.11. If yes children in the program, _______________ (No & %)

13.12. CBN program________

13.13. If yes children in the program, _______________ (No & %)

13.14. PSNP_______ other_________________

13.15. If yes children in the program, _______________ (No & %)

13.16. General food security condition____

_____.

13.17. Shortage of Essential drugs

____

____

____.

13.18. What do you think the major Health problem/s of the woreda?____

_.

14. Discussion of the highlights and the main findings of the health profile assessment and description____

____

__________________________________.

15. Problem Identification and Priority Setting – set priority health problems based on the public health importance, magnitude, seriousness, community concern, feasibility etc,

____

____

____

____________________________.

Annex IV: IDP Assessment Checklist

Identification

Region ________ Zone __________ Woreda ___________ Kebele ________ IDP site ______

1. **Basic data**

1.1. Number Of Internally displaced population

Male _______ Female ____________ Total ________

House Hold __________

1.2. Number of pregnant and lactating women ______

1.3. Number of under one year ___________

1.4. Number of Under five years old children _________

1.5. Number of water truck available _______

1.6. Number of water tankers available ______

1.7. Source of water _________

1.8. Amount of water supplied per day in liters ________

1.9. Number and type of latrine constructed Type _________ Number______

1.10. Number of Hand washing facilities ___________

1.11. Hand washing materials distributed_______

1.12. Health facilities available

Hospital _________

Health center ________

Health post _________

Mobile Health and Nutrition Team (MHNT)_______

1.13. Number of Stabilization center (SC) ____________

1.14. Number of OTP sites _______________

2. **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)

Annex V : Consent Form for LLIN utilization status and system evaluation in Sebeta Hawas District Oromia Region Ethiopia 2019

This Questionnaire was prepared for assessment of ownership, utilization and factors associated with utilization of Long Lasting Insecticide treated Nets at household level in Sebeta Hawas District of Oromia region, Central Ethiopia

Hello. My name is ______________________________________ we are conducting the assessment of ownership, utilization and factors associated with utilization of Long Lasting Insecticide treated Nets at household level in your Woreda. The information we collect will help the government to plan the health services. Your household is selected for the survey. The survey usually takes about 25 to 30 minutes. We do not write your name, all of the answers you give will be confidential and will not be shared with anyone. You have right to disagree on the survey, but we hope you will agree to answer the questions since your views are important. If I ask you any question you don't want to answer, just let me know and I will go on to the next question or you can stop the interview at any time.

Do you have any questions?

Are you willing to participate in the interview?

Yes No (Thank and stop)

Name and Signature of interviewer __________________________

Date__________________

Name and Signature of the supervisor _________________

Date_____________________

Annex VI: Questionnaire for LLIN utilization status in Sebata Hawas District Oromia Region Ethiopia 2019

Questionnaire for assessment of ownership, utilization and factors associated with utilization of Long Lasting Insecticide treated Nets at household level in Sebeta Hawas District of Oromia region, Central Ethiopia

Identification

Woreda_________ Kebele __________ Gote / village _______ House number _____

I. Socio-demographic Characteristics

Code	Questions	Alternatives	Responses	Remark
101	Place of the residence	1. Urban 2. 2. Rural	1 2	
102	Sex of the respondent	1. Male 2. Female	1. 2.	
103	Age of the respondent in complete years	_________years		
104	Ethnicity	1. Oromo 2. Amhara 3. Gurage 99. other specify _______	1. 2. 3. 99.	
105	Educational level	1=Cannot read and write 2=Read and write 3=Elementary 4=Secondary 5= Above secondary	1. 2. 3. 4. 5.	
106	Occupation	1=Farmer 2=House wife 3=Student 4= Unemployed 5=Daily laborer 6=Government employee 7=Merchant 99= Other(specify)________	1. 2. 3 4 5 6 7 99	
107	Religion	1=Orthodox 2=Protestant 3=Muslim 4=Catholic 5=wakefata 99= Others, specify	1 2 3 4 5 99	
108	Marital status of the respondent	1=Single 2=Married	1 2	

		3=Divorced 4=Widowed	3 4	
109	Responsibility of the respondent in the house	1= Husband 2=Wife 3=Child 99= Other______________	1 2 3 99	
110	How many people live in the house?	__________		
111	Estimated Monthly and annual income of the household	Monthly _____ Annually ______		
112	Are there pregnant women in the house?	1. Yes 2. No	1 2	
113	If the response is yes for Q.112 how many pregnant women are there?	____________		
114	Are there children less than 5 years of age in the house?	1=Yes 2=No	1 2	
115	If the response is yes for Q.114 how many children under 5 years are there?	_______		
116	Does your household have A radio?	1. yes 2. No	1 2	
117	Does your household have A television?	1. yes 2. No	1 2	
118	Does your household have A telephone/ mobile?	1. yes 2. No	1 2	
	II. Availability and Utilization			
201	Does your household have any mosquito nets that can be used while sleeping that is distributed in the last three years?	1= Yes 2= No	1 2	If yes go to Q202
202	If Q18 is Yes How many mosquito nets does your household get?	1=one 2=two 3=three 4=four 99= other specify_____	1 2 3 4 99	
203	Observe how many of the LLINs were there	1=one 2=two 3=three 4=four 5. Other specify ________	1 2	Observe

	in the household?		3 4 5	
204	If the Observed is less than expected (Q202>203) Reasons for unavailability of LLINs?	1=sold 2=used for other purpose 3=give for others 4=stolen 99= other specify _______	1 2 3 4 99	
205	Did you purchase the net?	1=Yes 2 =No 98=I don't know	1 2	
206	If Q 22 is yes, how much did you pay for the net when it was purchased?	______ birr		
207	Please observe or ask the general Conditions of the net	1= Good (no holes) 2= Fair (no holes that fit a torch battery) 3= Poor (1-4 holes) 4=Unsafe (>5 holes) 5= Unused (still in package) 98= unknown	1 2 3 4 5	Observe the nets
208	How long ago did your household obtain the mosquito net?	______ year/month 1= less than 3 years ago 2= more than 3 years ago	1 2	
209	Did anyone sleep under this mosquito net last night (at least one of the available ITNs)?	1=Yes 2= No	1 2	If No skip to Q212
210	If Yes to Q209 Who was slept under ITNs?	1= elderly people 2=head of household 3= young children 4=pregnant women 5= who obtained / bought the net 6= people who contribute the most money to the household person other 98= I don't know	1 2 3 4 5 6 98	
211	Frequency of using their ITNs?	1=Always 2=sometimes 3=If Mosquitoes is seen in the house 4=if somebody was sick 5=during transmission season 99=other (specify)__________	1 2 3 4 5 99	
212	If Q209 is No, Why did no one sleep under this mosquito net last night?	1= no malaria 2= No nuisance/insects 3= no space for net 4=irritation due to chemical of ITN 5=suffocation / too hot 6=difficult hanging net 7=shape 8= absence from home	1 2 3 4 5 6	

		9= Absence of bed 99= other (specify) ________	7 8 99	
213	How many separate rooms are in this household? Include all rooms, including kitchen, toilet, sleeping rooms, salon, etc?	__________		
214	How many rooms in this household are used for sleeping? Include only rooms which are usually used for sleeping	_____________		
215	How many sleeping rooms were LLINs hanged?	___________		
216	Is the bed net hanged(placed) properly over the bed or sleeping area	1=Yes 2= No	1 2	
217	Is there any window?	1. Yes 2. No	1 2	Observe
218	If yes How many?	___________		
	Knowledge Questions			
301	Main transmission mechanism of malaria?	1= eating immature sugarcane 2= Mosquito bite 3=Cold or changing weather 4= Drinking dirty water 5=hunger (empty stomach) 99=Other (Specify)________	1 2 3 4 5 99	
302	Have you ever caught malaria in the past two year?	1=Yes 2=No	1 2	
303	If yes where treated?	______		
304	Did anyone in your family travel away from home in the last one month?	1=Yes 2=No	1 2	
305	If Yes, Did she/he use LLIN while on travel?	1= Yes 2=No	1 2	
306	How can we prevent malaria infection?	1= DDT spray 2= Source reduction 3= Drugs (prophylaxis) 4= ITNs	1 2	

		utilization 6= drink alcohol 98= Not known 99= If other, specify__	3 4 5	
307	Ever heard/seen education messages about LLINs?	1=Yes 2=No	1 2	
308	Source of information for LLIN	1= Mass media 2= Health Extension Workers 3=HDA 4=Neighborhood 99=other specify ________	1 2 3 4 99	
309	Do think that sleeping under ITN have benefit	1=Yes 2=No	1 2	
310	If yes what is the benefit?	1=don't get bitten by mosquito 2=don't get bothered by other insects 3=don't get malaria 4=To get warmth 99=other specify _________	1 2 3 4 5 99	
311	Believe that sleeping under ITN has problem	1= Yes 2=No		
312	If Q311 is yes Problems associated with sleeping under ITN	1= Difficult to get up at night 2= It is too hot 3= It takes time to tuck a net each night 4=No enough air when sleeping under it 5= Mosquito can still bite through ITN 6=No comfort 99= other specify ___	1 2 3 4 5 6 99	
313	How does ITNs prevent malaria transmission?	1= Physical barriers 2=Kills mosquito 3= irritate mosquito 98= Not known 99= If other, specify __	1 2 3 98 99	
314	Did They Wash Their LLINs in the last One year?	1= Yes 2=No	1 2	
315	If Yes, frequency of Washing per year?	________		
316	What color of LLINs do you prefer for use?	1=White 2= Blue 99= other specify _______	1 2 -- 99	
317	What shape of LLINs do you prefer for use?	1=circular (conical) 2= rectangular	1 2	
318	Whom do you prioritize to sleep under LLINs?	__________________		

Declaration

I declare that this is my original work output and has never been presented by another person in this or any other University and that all the source materials and references used for this thesis have been duly acknowledged.

Name: Zinabu Feyissa Geleta

Signature _____________

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Date of submission: 28 June, 2019

The thesis has been submitted for examination with my approval as a university advisor.

Advisors:

____

Signature:_______________ Date __________