Addis Ababa University, College of Health Sciences,

School of Public Health

Ethiopia Field Epidemiology Training Program (EFETP)

Compiled Body of Works in Field Epidemiology

By:
Tarekegn Disasa Gutema

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

June, 2017
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Advisors: Dr. Ayele Belachew
Mr. Dagnachew Alemu

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Approval by Examining Board

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Chairman, School Graduate Committee

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Advisor

_______________________________ ______________

Examiner

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Acknowledgement

I would like to thank my mentor Mr. Dagnachew Alemu and Dr. Ayele Belachew, and also my Residents Advisor Mr. Abdulnasir Abbagaro for their constructive and valuable suggestions and comments on my body of work in addition to outputs separately.

My gratitude goes to dedicated AAU, Academic Coordinator of Field Epidemiology Training Program Dr. Adamu Addissie and Mrs. Abigia W for their continuous mentoring, advice and guidance. I would like to thank all instructors of the School of Public Health-AAU for their efforts in sharing their knowledge.

My thanks also go to Ethiopian Public Health Institute (EPHI) and Oromia Regional Health Bureau Public Health Emergency Management and Health Research core process staffs for their unreserved support during the residency period (Specially Mr. Gemechu Shume and Mr. Tesema Debela for his professional comments for every output).

I would also like to thank my colleagues and classmate cohort VII Field Epidemiology Training Program Residents, for their input during my presentations for parts of this document.

I would like to thank all study participants for their patience and hospitality to provide epidemiological information for outbreak investigation part of this document.

My gratitude goes to different regional health bureaus, zonal health departments, health facilities those were participated during investigation and assessment for their kind assistance and guidance.

I would like to express my utmost gratitude to the organizations: Addis Ababa University, School of Public Health, Federal Ministry of Health, CDC/Ethiopia, Ethiopian Public Health Association, Oromia Regional Health Bureau, for giving me this opportunity to study and all other sectors who gave me all support and for their cooperation during my outputs work.

At last but not the least my gratitude goes to my beloved Wife Sr. Senait Shiferaw ―Kiyya" and my delightful son ―Milki" for their encouragement and all sides support for this document, my beloved wife this was not successful without your support and encourage, you are really my backbone ―keep it up!".

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List of abbreviations and acronym

AAU	Addis Ababa University
ACPH	Addis Continental Institutes for Public Health
AFP	Acute Flaccid Paralysis
ANC	Ante Natal Care
AR	Attack Rate
ART	Anti-Retro Viral Therapy
ASAR	Age Specific Attack Rate
AWD	Acute Watery Diarrhea
BCG	Bacilli Calmette Guerin
BPR	Business Process Reengineering
CBN	Community Based Nutrition
CC	Community Conversation
CDC	Centers for Disease Control and Prevention
CFR	Case Fatality Rates
CHD	Community Health Day
CHWs	Community Health Workers
CMAM	Community based Management of Malnutrition
CSA	Central Statistical Agency
CSF	Cerebral Spinal Fluid
CTC	Cholera Treatment Center
DALYL	Disability Adjusted Life Years Lost
DHS	Demographic and Health Survey
E C	Ethiopian Calendar
EFETP	Ethiopian Field Epidemiology Training Program
EFY	Ethiopian Fiscal Year
EPHA	Ethiopian Public Health Association
EPI	Expanded Program on Immunization
ERIA	Enhanced Routine Immunization Activities
ETB	Ethiopian Birr
FAO	Food and Agricultural Organizations (UN)

FMOH	Federal Ministry of Health
FP	Family Planning
G C	Gregorian calendar
GMP	Growth monitoring Participation
HBCs	High Burden Countries
HEP	Health Extension Program
HFs	Health Facilities
HP	Health Post
IDSR	Integrated Disease Surveillance and Response
IgM	Immunoglobulin M
IHR	International Health Regulation
IOM	International Organization for Migration
IRS	Indoor Residual Spray
ITNs	Insecticide Treated Nets
LAFP	Long Acting Family Planning
MCH	Maternal and Child Health
MCV	Measles Containing Vaccine
MDG4	Millennium Development Goal 4
MDSR	Maternal Death Surveillance and Response
MFP	Malaria Focal Person
MMR	Measles-Rumps-Rubella
MOH	Ministry of Health
MOW	Ministry of Energy, Minerals and Water
MR	Measles-Rubella
MVC	Measles Vaccination Coverage
NGO	Non-Governmental Organization
NMA	National Metrological Agency
NNT	Neonatal Tetanus
OCHA	Offices for the Coordination of Humanitarian Affairs (UN)
ODF	Open Defecation Free
OPD	Out Patient Department

OPV	Oral Polio Vaccine
OTP	Therapeutic Program
PCV	Pneumoniasis Conjugated Vaccine
PF	Plasmodium Falciparum
PHCU	Primary Health Care Unit
PHEM	Public Health Emergency Management
PLW	Pregnant and Lactating Women
PLWA	People Living With AIDS
PMTCT	Prevention of HIV from Mother to Child Transmission
PSNP	Productive Safety Net Program
PTB	Pulmonary Tuberculosis
PV	Plasmodium Vivax
PVP	Predictive Value Positive
RED	Reaching Every District
RHB	Regional Health Bureau
RRT	Rapid Response Team
RUTF	Ready to Use Therapeutic Food
SAM	Severe Acute Malnutrition
SNNPR	Southern Nation, Nationality and Peoples Region
SOS	Sustainable Outreach Services
SSPE	Sub-acute Sclerosing Pan-Encephalitis
TB	Tuber Culosis
TSF	Targeted Supplementary Feeding
TT	Tetanus Toxoid
WASH	Water, Sanitation and Hygiene
WFP	World Food Program
WHO	World Health Organization
WoHO	Woreda Health Office
ZHD	Zonal Health Department

Executive Summary

Ethiopia has been giving special attention to the control of epidemic prone diseases, of international concern and diseases on eradication and elimination programs, through surveillance activities. The role of public health practitioners include ensuring effective health promotion, disease prevention and control activities, conducting surveillance on emerging public health threats and providing relevant information to policy makers and public health officials.

From October, 2015 to end of April, 2017 I have stayed in Field Epidemiology Training Program, School of Public Health-AAU and Oromia Regional Health Bureau field base.

We carried out two outbreak investigations, one surveillance data analysis, one evaluation of public health surveillance system, one woreda health profile description, two abstracts for scientific conference, one Maher assessment, one research proposal and other activities as additional outputs.

Chapter I: We conducted epidemiological investigations of two outbreaks. We used descriptive and analytic epidemiology during investigations. We identified several factors that contributed to AWD outbreak in Limmu Woreda and found that lack of knowledge about the disease and lack of purifying water they used were attributed for the outbreak. We recommended awareness creation and use of treated water to stop outbreak in the community. We also confirmed measles outbreak in Limmu Seka Woreda. Being unvaccinated and having poor awareness on the mode of transmission for measles infection were found to be risk factors for developing the disease. We recommended improved routine and campaign measles immunization targeting less than 15 years, and also health education on means of transmissions, treatment and prevention of measles infection has to be enhanced.

Chapter II: We did measles surveillance data analysis of five years (2011-2015 G.C) of Guji Zone to describe by person, place and time. Approximately equal numbers of cases were reported by gender and the most and the least affected age groups were 1-4 and ≥15 years respectively. Majority of cases were either not vaccinated or their vaccination status were unknown. Enhancing routine and campaign measles immunization targeting less than 15 years of age would prevent future risk.

Chapter III: We conducted evaluation of surveillance system in South West Shoa Zone from February 7-22, 2017. The overall surveillance system of the zone was weak. Regular monitoring of program specific supportive supervision and continuous feedback system should be strengthened for more improvement of the completeness and timeliness and/or surveillance system as whole.

Chapter IV: We did health profile description, health and health related data, of Tiyo Woreda during 01/28/2016- 02/08/2016 G.C. Acute febrile illness was a top leading cause of outpatient morbidity in the woreda. Acute upper respiratory infection, Typhoid fever, whereas Pneumonia are among top ten diseases that cause outpatient morbidity in adult and Pneumonia, Non-bloody diarrhea, Dysentery and Diarrhea with dehydration were the commonest diseases that cause morbidity in under-five children in the woreda. Typhoid fever, Malaria all cases, Urinary tract infection and Non-bloody diarrhea were among top ten diseases that cause inpatient admission.

Chapter V: We did scientific manuscript for peer reviewed journals on Measles outbreak in Limmu Seka, Jimma Zone.

Chapter VI: We prepared two abstracts for submission to scientific conference during residency time. These are;

- Five years (2011-2015)-Measles surveillance data analysis, Guji Zone Oromia Region, Ethiopia, 2016.
- Measles Outbreak-Limmu Seka Woreda, Jimma Zone, Oromia Region, Ethiopia, 2017.

Chapter VII: We conducted Meher assessment (Narrative summary of disaster situation) in Oromia Region to identify humanitarian needs in drought affected areas from November 20 to December 14, 2016 in selected woredas of Guji, Borena and West Guji Zones. Cholera outbreaks were occurred in all three zones. Malaria, cholera and measles are the most anticipated risk in the zones. Malnutrition was a major problem in all visited woredas.

Chapter VIII: We prepared one epidemiological research project proposal on assessment of prevalence and determinant factors associated with childhood measles vaccination status in Limmu Seka Woreda, Jimma Zone, Oromia Region. Descriptive cross-sectional study will be used for the study. A total of 865 mothers/caretakers with 12-23 months age child will be selected by systematic random sampling from randomly selected five kebeles of the woreda. Socio-demographic status of mothers/caretakers, knowledge of mothers/caretakers on immunization service, place of delivery will be assessed using questionnaire adopted from EDHS and different similar studies.

Chapter IX: I participated on post malaria epidemic need assessment and supporting mitigation activities conducted in Abaya Woreda, Borena Zone, Oromia Region during May/2016. Objective of the assessment were verifying reported data, identify potential risk factors and support mitigation activities in the woreda. About 7,762 malaria cases were reported from the woreda though there were data discrepancies at some health posts. Health posts reported 46% of cases. Guangua HC reported 30% of cases and Odo Mique HP reported 7% of cases during the epidemic period. Malaria cases reached peak during WHO week 17 in the woreda. Presence of different ponds, intermittent water and false banana for mosquito breeding sites and accumulation of malnutrition in the woreda identified as risks. Distribution of LLINs, Mass fever treatment, conducting spray and source reduction were major activities performed to control the epidemic.

I participated on different trainings and review meetings given by ORHB and partners. Topics: Cholera epidemic prevention and control and case management protocol, Training on Maternal death surveillance and response (MDSR), PHEM review meeting six months and ten months activities report and performance evaluation, Vulnerability Risk Assessment and Mapping (VRAM) given by EPHI.

I participated on cholera epidemic prevention and control activities in Sebeta, Burayu, Sululta, Laga Tafo and Bishoftu Towns and other four zones (support by distribution of Medicals supplies, receive report and give feedback).

I prepared weekly bulletin on PHEM report of Oromia Regional Health Bureau for WHO Epidemiologic week 34 of 2016. The health facilities report completeness for that week was 87% and above the expected national level (80%). Suspected measles cases, confirmed malaria cases and cholera cases were kept increasing and SAM were decreasing during week 34 of 2016.

Chapter–I Outbreak Investigations

1.1 AWD Outbreak Investigation, Limmu Woreda, East Wollega Zone, Oromia, Ethiopia, November 2016.

Executive summary

Introduction: Cholera is a diarrheic disease caused by vibrio cholera and is characterized by a sudden onset of profuse and painless watery stools. Cholera is living evidence to the consequences of poor sanitation. We conducted cholera outbreak investigation in Limmu Woreda, East Wollega of Oromia Region. The aim of this study was to describe the magnitude of morbidity and mortality due to cholera, investigate factors that contributed to the occurrence of the epidemics and to institute appropriate intervention measures to contain the epidemics in the woreda.

Methods: We conducted unmatched 1:1 case control study; case was selected based on the cholera case definition on guideline. Controls (persons with no cholera symptoms during the study period) were selected randomly from neighbors. Structured questionnaire was used to assess risk factors by face to face interview with cases and controls and their home were visited. Ms. Excel, Epi info and SPSS were used for data entry and analysis. Actual outbreak investigation and data collection were done from 7 November to 21/2016.

Result: Most affected proportions of age group was 15-29 years of age 42 (33.6%) Majority of the cases were severely dehydrated 76 (60.8%). About 71 (56.8%) of cases were from Arkumbe Mander two. Lack of knowledge on means of transmission and lack of purifying water were statistically significant risk factors for the outbreak, with (AOR) 12.2 [95% CI= 2.4-61.4] and 13.4 [1.9-93.6] respectively.

Conclusion: The highest proportions affected age group was above fifteen years of age. Lack of knowledge on means of cholera transmission and not purifying water they use for all purpose including drinking water were statistically significant risk factors associated with cholera outbreak in the area. Health education and awareness creation on communicable diseases, related to poor hygiene and sanitation focus on cholera should be enhanced. Since majority of the community use spring and river water, they have to use water treatment chemicals or boiling mechanism for water purification.

Key words: Cholera, Case-Control, Arkumbe Kebele, Limmu

1.1.1 Introduction

Cholera is a diarrheal disease caused by infection of the intestine with the bacterium Vibrio cholerae, either type O1 or O139. Both children and adults can be infected. About 20% of those who are infected develop acute, watery diarrhoea 10–20% of these individuals develop severe watery diarrhoea with vomiting. If these patients are not promptly and adequately treated, the loss of such large amounts of fluid and salts can lead to severe dehydration and death within hours. The case-fatality rate in untreated cases may reach 30–50%. Treatment is basically rehydration and, if applied appropriately, should keep case-fatality rate below 1% (1, 2).

Cholera is a diarrheal illness that primarily occurs in developing countries. The disease is associated with consumption of unsafe water, poor hygiene, poor sanitation and crowded living conditions. Vibrio cholera is gram negative bacteria. V. cholera sero-groups O1, O139, O_{141} and O_{75} produce cholera toxin. Only V. cholera sero-groups O1 and O139 have been associated with epidemic cholera.

Cholera is an acute bacterial enteric disease characterized in its severe form by sudden onset, profuse painless watery stools (rice water stool), nausea and vomiting early in the course of illness, and, in untreated cases, rapid dehydration, acidosis, and circulatory collapse. Asymptomatic or mild infection is frequent, especially with the El Tor biotype. Death may occur within hours in severe untreated cases, and the case-fatality rate can exceed 50%; with proper treatment the rate can be less than 1%. During epidemics, humans are the primary reservoir for V. cholera. Cholera is endemic in much of the developing world with potential for exposures to contaminated food and water during travel. Similar to other vibrios, V. cholera can occur naturally in aquatic environments including the Gulf of Mexico.

Transmission

Cholera is a diarrheal illness that primarily occurs in developing countries. The disease is associated with consumption of unsafe water, poor hygiene, poor sanitation and crowded living conditions. Cholera is most commonly acquired by ingesting food or water contaminated with feces of infected persons. Direct person-to-person transmission is rare. Since V. cholera also naturally occur in aquatic environments, the disease can be acquired by ingesting raw or undercooked shellfish. Sporadic cases have occurred in the United States after consumption of shellfish from the Gulf of Mexico. Incubation period from two hours to 5 days, usually 2–3 days and persons are presumably communicable for as long as stools are positive, which is usually only a few days after recovery. A carrier state occasionally persists for several months (2, 3).

1.1.1.1 Literature review of cholera

Currently, there are more than 130 sero-groups of V. cholerae, based on the presence of somatic O antigens. However, only the O1 sero-group is associated with epidemic and pandemic cholera. Other sero-groups may be associated with severe diarrhea, but do not possess the epidemic potential of the O1 isolates and do not agglutinated in O1 antisera. Isolation of V. cholerae non-O1 from environmental sources in the absence of diarrheal cases is common. Laboratories may choose not to report the isolation of V. cholerae non-O1 when investigating cholera epidemics, since health care providers or public health officials may be unaware of the important epidemiologic differences between O1 and non-O1 isolates.

Of the more than 30 species within the Vibrio Photo bacterium complex, only 12 have been recognized as being pathogens for humans. Although most of these 12 species are isolated from intestinal as well as extra intestinal infections, only V. cholerae is associated with epidemic cholera(4).

Cholera remains an important public health issue in Africa. In 2008, 94% of the 190,130 cholera cases reported world-wide occurred in Sub-Saharan Africa. In 2009, multiple areas in Kenya experienced cholera outbreaks with case fatality rates (CFRs) ranging from 0.4% to 19% in areas that have had more than 2 cases. This country-wide outbreak resulted in over 11,000 cases of acute water diarrhea. The majority of the specific areas reporting increases in acute watery diarrhea had culture-confirmed cases of Vibrio cholerae identified from stool specimens. This burden of suspect cholera cases in 2009 is more than the country has experienced in the past decade (.Of the 7099 cases with gender information, 49.8% of cases were female. Of the 6124 cases with age information, the median age of cases was 17 years (range: 0-90 years). The percentage of cases in each group was as follows: 0-2 years (11.9%), 3-5 years (11.1%), 6-10 years (12.9%), 20-39 years (29.8%), 40-60 years (13.3%), and over 60 years (3.2%). There were

122 deaths due to cholera reported on the national line list, and CRFs varied among districts and provinces from 0 to 14.3% according to the newly created national line list data (5).

Study conducted in Oromia Region during December 2010 showed that, outbreak occurred across the Ganale River, in Guji and Bale Zones to the lakes at the southern tip of East Shoa. East Shoa and Bale had similar numbers of cases, 233 and 223 each, whereas Guji had a significantly higher number of reported cases, i.e. 3848. These cases reflected CTC registration logs only and not community cases. The epidemic curve shows that the outbreak began rapidly on August 5, when 97 cases were reported in the Guji Zone. There were five peaks overall: August 8 (223 cases), August 12 (236 cases), August 15 (210 cases), August 17 (219 cases) and August 22 (220 cases). The number of cases steadily declined thereafter, and, by the end of September, the outbreak was nearing its end. The number of cases in Guji was so disproportionately high that the curve for the total number of cases closely approximates the curve for the Guji Zone. There seem to be fewer reported cases among infants and children. Furthermore, frontline health care workers indicated that there were more cases among men. The age categories given here represent the categories used for data collection at the CTCs. Available demographics for Oromiya were not detailed enough to determine age- and sex-specific attack rates. Attack rates were calculated for the regions within each of the zones. The attack rates ranged from a low of about 0.03% in Bore to a high of about 4.12% in the Girja and Adola districts. The overall attack rate for all three zones was almost 0.50%. These rates do not include community cases and therefore likely underestimate the true attack rate for the entire population.
To assess the adequacy of the epidemic response and to evaluate the quality of medical care at the CTCs, CFRs were calculated for each of the districts. The CFRs ranged from 0% in Dugda Bora to 6.4% in Wadera. The overall CFR for all the three zones was 1.11%. The numbers of deaths represent only deaths that occurred at a CTC or were reported to health care authorities; community deaths were not included (6).

1.1.1.2 Significance of the study

Cholera epidemic threshold is occurred whenever a single strain of vibrio cholerae has been isolated. Whenever a cholera alert threshold is reached, a rapid field investigation should be carried out in order to: confirm occurrence of an outbreak, verify diagnosis by reviewing clinical signs and symptoms and collecting samples for laboratory confirmation, identify additional cases and ensure appropriate treatment, determine the magnitude and patterns of the outbreak, if confirmed, estimate the potential for further spread; and recommend effective control measures for stopping transmission (7). Suspected cholera case was reported from Limmu Woreda, East Wollega Zone during WHO week 38/2016. Even though, there was cholera outbreak in Ethiopia including Oromia Region for the last six months, no cholera case was reported from Limmu Woreda in previous weeks or years. Limmu Woreda has no border sharing with other zones or woredas that reporting cholera cases. Therefore, following this principles, we decided to investigate suspected cholera case reported from Arkumbe Kebele, Limmu Woreda of East Wollega Zone starting from WHO week 40/2016 G.C. The aim of this study was to describe the magnitude of morbidity and mortality due to cholera, investigate factors that contributed to the occurrence of the epidemics and to institute appropriate intervention measures to contain the epidemics in the woreda.

1.1.2 Objectives

1.1.2.1 General objective

To assess magnitude, morbidity, mortality and risk factors associated with cholera outbreak in Arkumbe Kebele, Limmu Woreda, East Wollega, Oromia, Ethiopia during November 7-21/ 2016 G.C.

1.1.2.2 Specific objectives

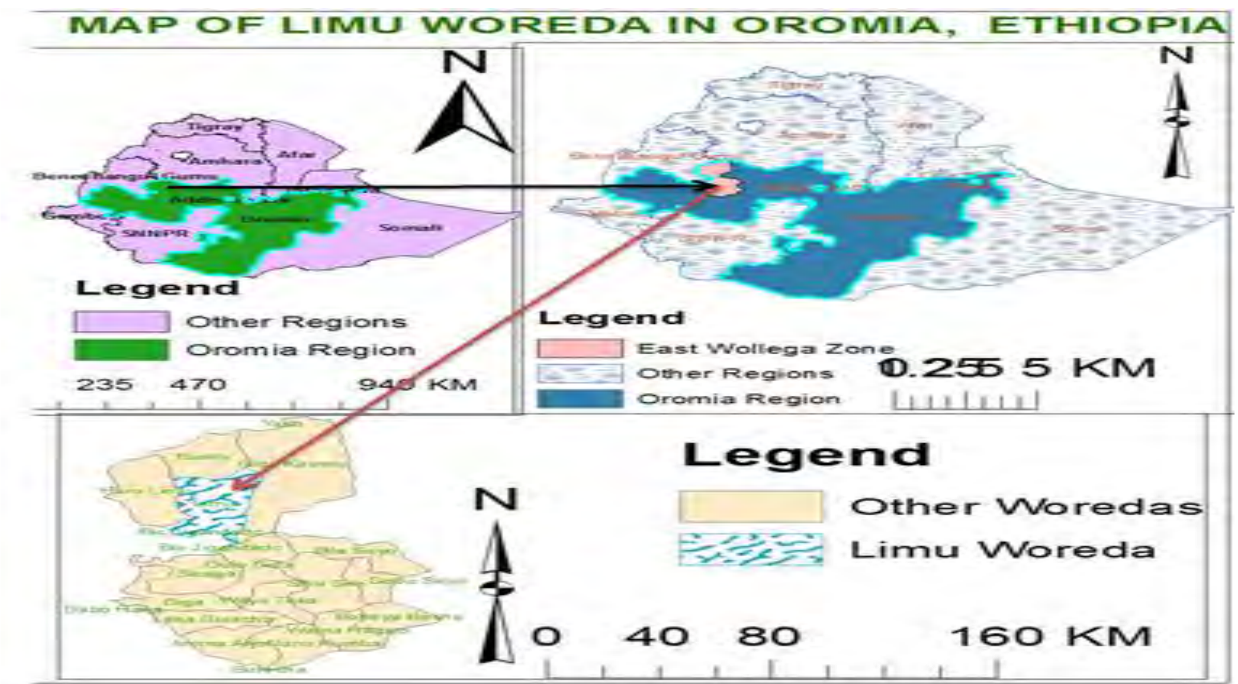
- ✓ To determine the magnitude of morbidity of the outbreak in Arkumbe Kebele, Limmu Woreda during November 7-21/2016 G. C.
- ✓ To describe the AWD outbreak by person, place and time, in Limmu Woreda.
- ✓ To assess risk factors related with the AWD outbreak in Arkumbe Kebele, Limmu Woreda, East Wollega during November 7-21/ 2016 G. C.

1.1.3 Methods and materials

1.1.3.1 Study area

We conducted cholera outbreak investigation in Arkumbe Kebele, Limmu Woreda, East Wollega Zone, Oromia Region, Ethiopia. Limmu is one of the seventeen woredas found in East Wollega. It located 464 KM far from Addis Ababa to northwest direction. Estimated total population during 2016 G.C of Limmu Woreda and Arkumbe Kebele are 95,112 & 29,809 respectively. Proportion of female constitutes 46,977 (51%), under one 3,062 (3.32%) and under five populations are 15,827 (17.2%). Woreda consist a total of eighteen kebeles of which one is town and seventeen are rural kebeles. There are four health centers and seventeen health posts in the woreda. Woreda‘s potential health service coverage was 100% by using available health centers.

Limmu Woreda is bordered by Beni-Shangul Gumuz Regional State and Sasiga Woreda in the south, Gida Ayana Woreda in the east, Eebantu Woreda in the north and Haro Limmu Woreda in the west direction. Geographical position of Limmu Woreda is 9^{0} 33‘N and 36^{0} 38‘E.



Annexes 1.1.1: Administrative map of Limmu Woreda, East Wollega, Oromia Region, Ethiopia, November 2016 G.C

1.1.3.2 Study period

We conducted the AWD outbreak investigation in Arkumbe Kebele, Limmu Woreda during November 2-21/2016 G.C.

Case definition

Suspected case definition: in an area where the disease is not known to be present since it was happened in the region, a patient aged 5 years or more develops severe dehydration or dies from acute watery diarrhoea.

During epidemic, a suspected case is defined as any person five years of age or older who has acute watery diarrhea, with or without vomiting.

Confirmed case definition: A case of cholera is confirmed when Vibrio cholera O1 or O139 is isolated from any patient with diarrhoea.

Inclusion and exclusion criteria

Inclusion criteria: - any person who developed sudden onset, profuse painless watery stools (rice water stool), nausea and/or vomiting early in the course of illness during 4 October to December 3/2016 in Arkumbe Kebele of Limmu Woreda.

Exclusion criteria:- any case who were unconscious and those who were under five years old that not confirmed by RDT.

Control:- any person who are neighborhood for cases and didn‘t develop sudden onset, profuse painless watery stools (rice water stool), nausea and/or vomiting during 4 October to December 3/2016 in Arkumbe Kebele of Limmu Woreda.

1.1.3.3 Study design

1.1.3.3.1 Cross sectional for descriptive epidemiology part

We used line list and CTC registrations as secondary data from Arkumbe health center, to describe outbreak by person, place and time. All relevant variables such as age, sex, address/kebele, date symptoms started and date seen at health facility, dehydration status, specimen collection and outcome status.

1.1.3.3.2 Case-control study design for analytical epidemiology part

We conducted unmatched case-control study design to identify risk factors associated with the AWD outbreak happened in Arkumbe Kebele, Limmu Woreda. Case was selected as person present with typical AWD symptoms (profuse watery diarrhea and/or vomiting) and treated at Cholera Treatment Center (CTC) established in compound of Arkumbe health center, with the same symptoms including those positive for Rapid Diagnostic Test (RDT) and cultural tests. Control was selected from the same kebele but with no cholera symptoms and those who not in the same house and not sharing common toilet. During data collection we tried to assess demographic characteristics, past and present clinical histories, travelling history, water source for drinking and other services in home, sanitation and hygiene practice and food habit.

1.1.3.4 Laboratory methods

Out of 125 AWD cases, five samples taken for RDT and cultural tests. All samples taken were positive for RDT and one was positive by culture. In collaboration with Water Office, water sample was taken from spring, where many people use it for drinking purpose and checked for bacteria coli form.

1.1.3.5 Environmental assessment

Data collection tool contained parts that used to assess environmental conditions like availability of latrine and its utilization, source of drinking water, water container at home, source of raw food, availability of sea food like fish, availability of hand washing facility near toilet and family size that use common utensils in house.

1.1.3.6 Data collection

We used structured questionnaires to collect all relevant information for both cases and controls. We visited their kebeles and houses of both cases and controls to identify associated risk factors that will exposure them for cholera outbreak.

Cases were selected randomly from Arkumbe Kebele based on their accessibility and those having full address and controls were randomly from the same kebele.

1.1.3.7 Data processing and analysis

We used Microsoft Excel 2010 for descriptive analysis from line list and imported it to Epi Info version 7.2 and SPSS for analytical analysis and to identify statistically associated factors for the cholera outbreak in Arkumbe Kebele of Limmu Woreda.

1.1.3.8 Data dissemination

We prepared written report of soft and hard copies and shared to Addis Ababa University, School of Public Health, Oromia Regional Health Bureau, East Wollega Zone Health Department, Limmu Woreda Health Office, EPHA and EFETP mentors, resident advisors and coordinator.

1.1.3. 9 Data quality control

We used standard questionnaire developed by Ethiopian Public Health Institute (EPHI) that adopted from cholera outbreak management guideline to collect case-control data. Line list format taken from cholera guideline was used to incorporate necessary information. Then data completeness was checked both for descriptive and analytical analysis.

1.1.3.11 Risk factors analysis

During cholera outbreak in Arkumbe Kebele, Limmu Woreda different possible risk factors were assessed for source identification and to implement appropriate prevention and control measures. Water sample was taken from source where many people used to fetch for drinking purpose. At household level, water containers, any uncooked and cold food eaten by the community were assessed by using structured questionnaire to determine their association with the outbreak.

1.1.4 Result

1.1.4.1 Descriptive analysis

Totally 125 AWD cases were managed in CTC established in compound of Arkumbe Health Center, Limmu Woreda of East Wollega Zone. Among these cases, 68 (54.4%) were male. The highest proportions 42 (33.6%) affected age group was 15-29 years followed by 30-44 years with 34 (27.2%) whereas the least proportion age group affected was under five children 8(6.4%). Median age of the cases during the outbreak was 28 [range: 1-65 years old]. Age specific attack rate (ASAR) and sex specific attack rate were also determined for cholera outbreak in the woreda. Accordingly, attack rate (AR) in under five children was 0.83% whereas AR in great or equal to fifteen years of age was 0.72%. Attack in male population (0.46%) was higher than AR in female population 0.37%.

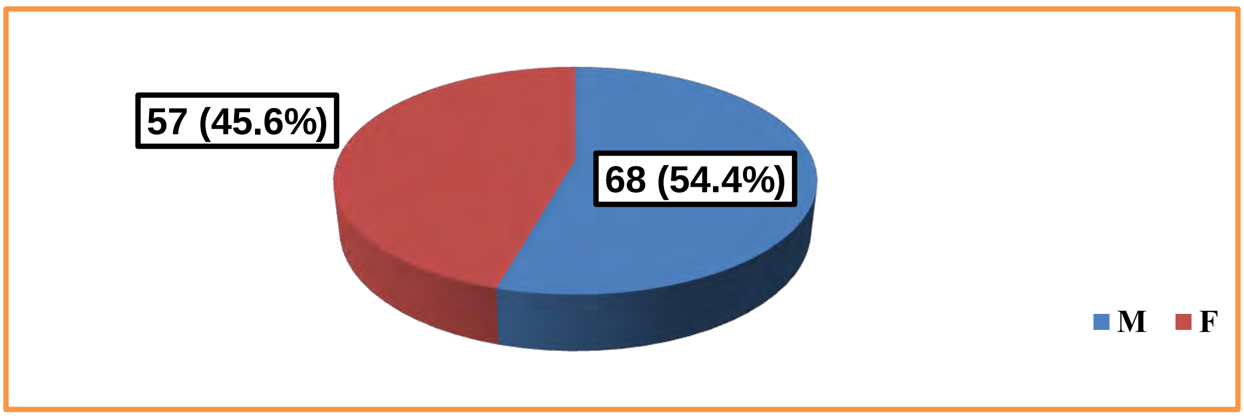


Figure 1.1.1: Distribution of AWD Cases by Sex in Limmu Woreda, East Wollega, Oromia, Ethiopia, November 2016 G.C.

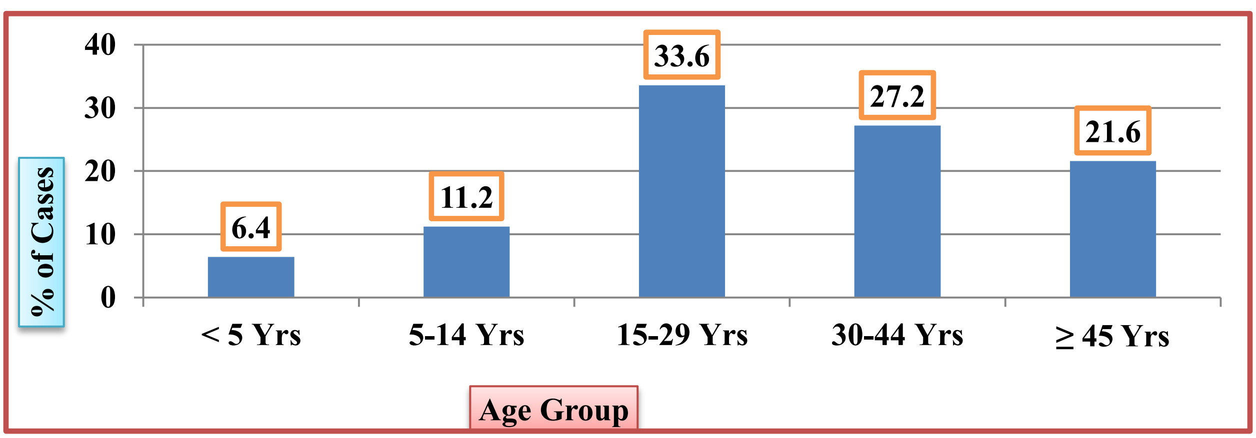


Figure 1.1.2: Distribution of AWD Cases by Age Group in Limmu Woreda, East Wollega, Oromia, Ethiopia, November 2016 G.C.

Among cholera cases identified during the outbreak, 76 (60.8%) of them were managed as severely dehydrated. Majority of the cases came from Arkumbe Mander two 71 (56.8%) and Mander six 19 (15.2%).

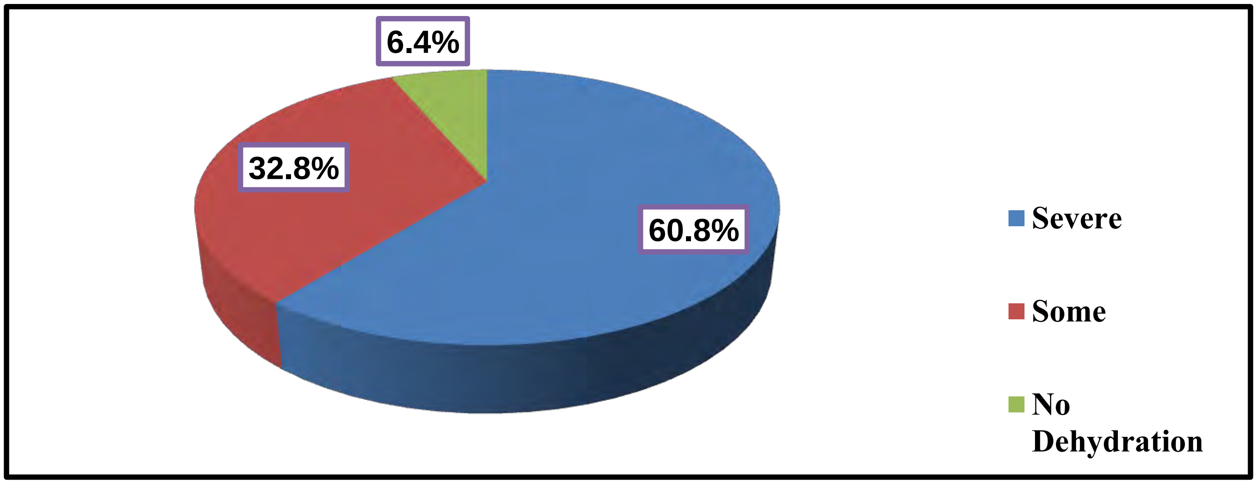


Figure 1.1.3: Distribution of AWD Cases by Dehydration Status in Limmu Woreda, East Wollega, Oromia, Ethiopia, November 2016 G.C.

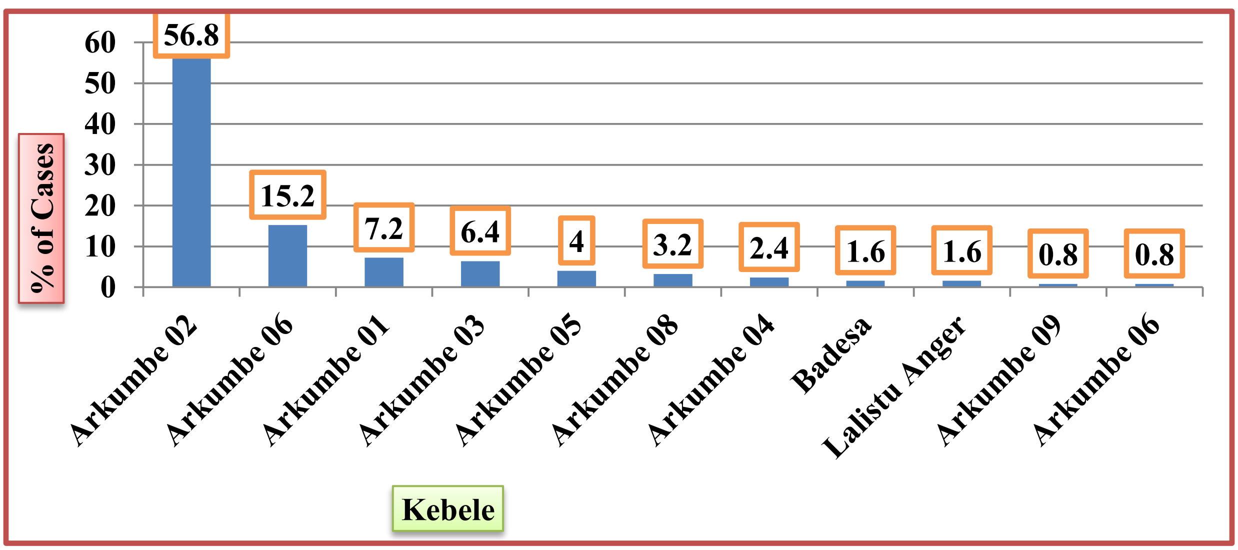


Figure 1.1.4: Distribution of AWD Cases by Mander/Village in Arkumbe Kebele, Limmu Woreda, East Wollega, Oromia, Ethiopia, November 2016 G.C.

Index case was reported from Arkumbe Health Center on 10/04/2016. On the following day woreda notified the zone and immediately the zone notified the region and deployed to the area for quick need assessment. RDT and other pharmaceuticals were supplied for the woreda. ORHB deployed one team to confirm the outbreak and to give orientation about cholera for all concerned bodies including non-health governmental sectors both in the zone and woreda.

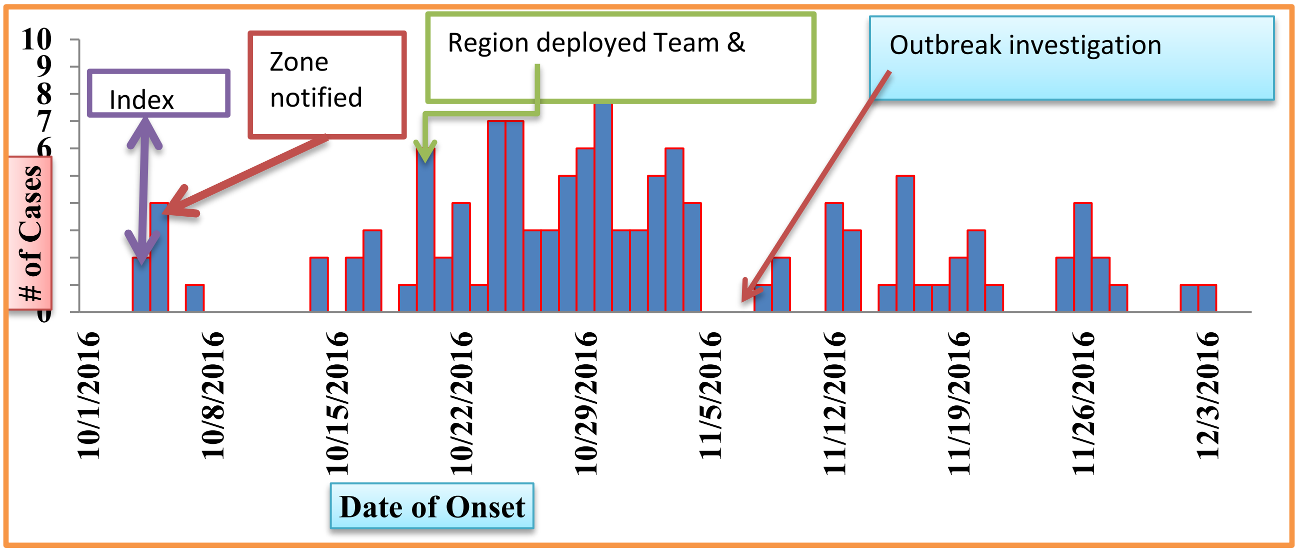


Figure 1.1.5: Distribution of AWD Cases by Date of Onset in Limmu Woreda, East Wollega, Oromia, Ethiopia, November 2016.

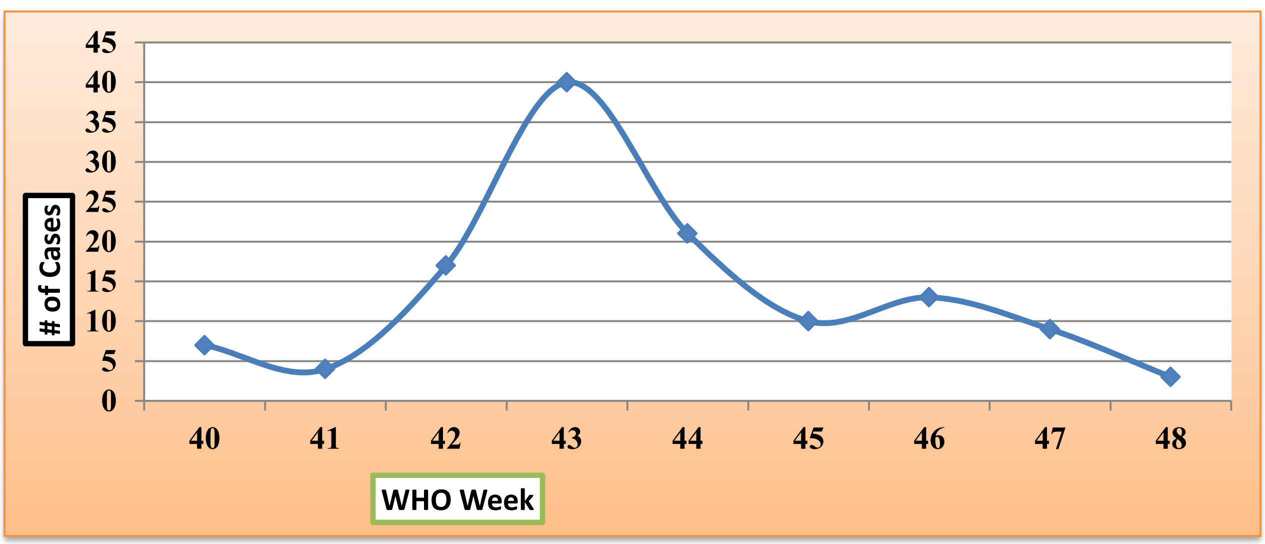


Figure 1.1.6: Distribution of AWD Cases by WHO Week in Limmu Woreda, East Wollega, Oromia, Ethiopia, November 2016 G.C.

AWD cases were started to visit Arkumbe Health Center from WHO week 40 (5/10/2016 and dramatically increase from week 41 then reached peak on week 43 (30/10/2016). Overall attack rate of the outbreak at woreda and Arkumbe kebele level were 0.14% and 0.42% respectively. Only one cholera death was occurred during the outbreak which implies, case fatality rate of 0.8%.

1.1.4.2 Laboratory investigation

To confirm the presence of V. cholerae it is important that laboratory tests are done. Bacteriological confirmation is compulsory on the first few suspected cases, in order to: confirm cholera, identify the strain, biotype and serotype and assess antibiotic sensitivity.

Confirmation of 5 to 10 stool or vomit samples is sufficient per outbreak/woreda. The confirmation of the samples will be done at Regional reference laboratories as well as at the National laboratory of Ethiopian Health and Nutrition Research Institute (2). In our study five samples were taken for RDT and cultural tests. All samples taken were positive for RDT and one sample was positive by culture.

1.1.4.3 Analytical analysis

1.1.4.3.1 Risk factors analysis

During cholera outbreak investigation in Arkumbe kebele of Limmu Woreda, different possible risk factors were assessed for source identification and to implement appropriate prevention and control measures. Unmatched one to one case-control study was conducted by taking fifty two cases and controls each. Water sample was taken from source where many people used to fetch for drinking purpose. At household level, water containers, any uncooked and cold food eaten by the community were assessed by using structured questionnaire to determine their association with the outbreak. In the area, cholera outbreak was started after rainy season during first week of October; this period is when water shortage begins to be observed. Majority of the cases 48 (92.3%) used spring (51.9%) and river (40.4%) water for drinking and other household utilities. Larine coverage and utilization was very poor during outbreak and we tried to persuade communities to construct new and repair already exist latrine by organized with Woreda, Arkumbe Health Center staffs, HEWs and community leaders. Even though, majority of the people use latrine, only very few household had latrine with hand washing facility. This intervention may use to prevent open defecation and to stop cholera outbreak by cutting one possible means of transmission.

1.1.4.4 Community intervention

After we created awareness about AWD and its means of transmission for the communities; they tried to take care of possible risk factors. Community started to use treated water (Aqua tab was supplied by Oromia Regional Health Bureau) and eating cooked food. Similarly, both private and communal latrine reconstruction and construction was conducted by the community during the AWD outbreak. Brochures and leaflets containing key messages about cholera and how to prevent were distributed for the community. Food and drinking establishments found in the kebele were assessed for source identification and awareness given for the owners and workers that working in the establishments. Hand washing facilities were placed at each corners of each latrine and even it was placed on the gate of each schools found in Arkumbe Kebele.

Table 1.1.1: Socio-demographic characteristics of AWD outbreak investigation, Limmu Woreda, East Wollega, Oromia, Ethiopia, November 2016 G.C

Exposure status of respondents		**Status**		**Total**
		Control	**Case**	
Educational Status of respondents	Elementary & above	19 (36.5%)	10 (19.2%)	29 (27.9%)
	Read and write only	3 (5.8%)	4 (7.7%)	7 (6.7%)
	NA	7 (13.5%)	7 (13.5%)	14 (13.5%)
	Illiterate	23 (44.2%)	31 (59.6%)	54 (51.9%)
Occupation of respondents	Housewife	16 (30.77%)	17 (32.7%)	33 (63.5%)
	Farmer	17(32.7%)	17(32.7%)	34(32.7%
	Student	6 (11.5%)	6 (11.5%)	12 (23%)
	Other	6 (11.5%)	5 (9.6%)	11 (21.1%)
	NA	7 (13.5%)	7 (13.5%)	14 (13.5%)
Sex of respondents	Female	28(53.8%)	27(51.9%)	55(52.9%)

Exposure status of respondents		Status		Total
		Control	Case	
	Male	24(46.2%)	25(48.1%)	49(47.1%
Ethnicity of Respondents	Oromo	2 (3.8%)	2 (3.8%)	4(3.8%)
	Amhara	50 (96.2%)	50 (96.2%)	100 (96.2%)
Religious of respondents	Other	3 (5.8%)	4 (7.7%)	7 (6.7%)
	Orthodox	49 (94.2%)	48 (92.3%)	97 (93.3%)
Marital status of the respondents	Single	5 (9.6%)	5(9.6%)	10 (9.62%)
	Married	35 (67.3%)	31 (59.6%)	64(63.5%)
	NA	12 (23.1%)	13 (25%)	25 (24%)
	Other	0	3 (5.8%)	3 (2.9%)
Family Size living together	≤5	35 (67.3%)	32 (61.5%)	67(64.4%
	>5	17 (32.7%)	20 (38.5%)	37(35.6%

About 31 (59.6%) of cases and 23 (44.2%) of controls had no education during the AWD outbreak assessment in Arkumbe Kebele. Occupation of both cases and controls were assessed; around 17 (32.7%) of both cases and controls were farmer. About 4 (7.7%) of cases were identified to be daily laborer in private investment farm land. Around 32 (61.5%) of cases had ≤5 family members during the assessment.

Table 1.1.2: Results of two by two for some variables, cholera outbreak investigation, Limmu Woreda, East Wollega, Oromia, Ethiopia, November 2016 G.C

Exposure status of respondents		Status of respondents		Total
		Control	Case	
Source of drinking water	Pipe	1 (1.9%)	1 (1.9%)	2 (1.9%)
	Spring	40 (76.9%)	27 (51.9%)	67(64.4%
	Deep Well	3 (5.8%)	3 (5.8%)	6 (5.8%)
	River	8 (15.4%)	21 (40.4%)	29(27.9%
Family Size living together	≤5	35 (67.3%)	32 (61.5%)	67(64.4%
	>5	17 (32.7%)	20 (38.5%)	37(35.6%

Exposure status of respondents		Status of respondents		Total
		Control	Case	
Having knowledge on means of AWD transmission	Yes	39 (75.0%)	9 (17.3%)	48(46.2%
	No	13 (25.0%)	43 (82.7%)	56(53.8%
Presence of AWD sick person in the same house	No	51 (98.1%)	48 (92.3%)	99 (95.2%)
	Yes	1 (1.9%)	4 (7.7%)	5 (4.8%)
Presence of AWD sick person in the village	No	16 (30.8%)	6 (11.5%)	22 (21.2%)
	Yes	36 (69.2%)	46 (88.5%)	82 (78.8%)
Have contact with AWD case	No	47 (90.4%)	23 (44.2%)	70 (67.3%)
	Yes	5 (9.6%)	29 (55.8%)	34 (32.7%)
Travel history out of their village	No	49 (94.2%)	42 (80.8%)	91 (87.5%)
	Yes	3 (5.8%)	3 (19.2%)	13 (12.5%)
Respondents place of defecation	Toilet	43 (82.7%)	34 (65.4%)	77 (74.0%)
	Open field	9 (17.3%)	18 (34.6%)	27 (26.0%)
Availability of hand washing facility near toilet	Yes	12 (23.1%)	6 (11.5%)	18 (17.3%)
	No	40 (76.9%)	46 (88.5%)	86 (82.7%)
Hand washing practice after using toilet	Yes	37 (71.2%)	12 (23.1%)	49 (47.1%)
	No	15 (28.8%)	40 (76.9%)	55 (52.9%)
Types of containers used to store water at home	Other	21 (40.4%)	14 (26.9%)	35 (33.7%)
	Jerry cane	31 (59.6%)	38 (73.1%)	69 (66.3%)
Purify water they used at home	Yes	24 (46.2%)	4 (7.7%)	28 (26.9%)

Exposure status of respondents		Status of respondents		Total
		Control	Case	
	No	28 (53.8%)	48 (92.3%)	76 (73.1%)
Reheated food, if not eaten immediately	Yes	43 (82.7%)	24 (46.2%)	67 (64.4%)
	No	9 (17.3%)	28 (53.8%)	37 (35.6%)
Re-eat leftover food	No	51 (98.1%)	34 (65.4%)	85 (81.7%)
	Yes	1 (1.9%)	18 (34.6%)	19 (18.3%)

About 21 (40.4%) of cases and only 8 (15.4%) of controls were using river water source for drinking purpose. Among assessed participants during AWD outbreak investigation only 9 (17.3%) of cases and about 39 (75%) of controls had knowledge about means of cholera transmission. Even though, 12 (23.1%) of cases practiced hand washing after using toilet, only 6 (11.5%) of cases had hand washing facility near to their toilet. Among fifty two cases assessed for risk factors 18 (34.6%) re-ate the food that was leftover, 6 (11.5%) dumped it into waste disposal area, 5 (9.6%) of them gave it for domestic animals and 23 (44.2%) reheated it to eat again. About 29 (55.8%) of cases have contact with person having similar symptoms of cholera. Only 4 (7.7%) of cases and about 24 (46.2%) of controls purified the water they use by mechanical methods like filtration (Table 2.1.1).

Bivariate analysis of independent variables was determined for the outbreak in the area. Accordingly, educational levels, family size and having travel history were some variables that had no statistical significance with the outbreak. Lack of knowledge of means of cholera transmission, having contact with the same complaint person and lack of hand washing practice after using toilet were found statistically significant factors with crude odd ratio (COR) of 3.3 [95% CI= 1.8-6.15], 5.8 [95% CI= 2.2-14.98] and 8.2 [95% CI= 3.4-19.8] respectively [Table 1.1.3].

Table 1.1.3: Bivariate analysis for independent factors related to AWD outbreak in Limmu Woreda, East Wollega, Oromia Region, Ethiopia, November 2016 G.C.

Variable	Response	Case	Control	Crude OR	CI (95%)	P-Value
Educational level	Illiterate	31 (59.6%)	23 (44.2%)	1.3	0.78-2.3	0.3
	Read & write only	4 (7.7%)	3 (5.8%)			
	NA	7 (13.5%)	7 (13.5%)			
	Elementary & above	10 (19.2%)	19 (36.5%)	1.00		
Family Size	> 5	20 (38.5%)	17 (32.7%)	1.17	0.62-2.2	0.62
	≤5	32 (61.5%)	35 (67.3%)	1.00		
Lack of knowledge on means of AWD transmission	No	43 (82.7%)	13 (25%)	3.3	1.8-6.15	0.0000
	Yes	9 (17.3%)	39 (75%)	1.00		
Presence of AWD sick person in the house	Yes	4 (7.7%)	1 (1.9%)	4	0.45-35.8	0.21
	No	48 (92.3%)	51 (98.1%)	1.00		
Presence of AWD sick person in the village	Yes	46 (88.5%)	36 (69.2%)	2.8	0.99-8.06	0.052
	No	6 (11.5 %)	16 (30.8%)	1.00		
Contact with the same complaint person	Yes	29 (55.8%)	5 (9.6%)	5.8	2.2-14.98	0.0000
	No	23 (44.2%)	47 (90.4%)	1.00		
Travel outside of the village	Yes	10 (19.2%)	3 (5.8%)	3.33	0.92-12.1	0.067
	No	42 (80.8%)	49 (94.2%)	1.00		
Place of defecation	Open field	18 (34.6%)	9 (17.3%)	2.5	1.01-6.3	0.048
	Toilet	34 (65.4%)	43 (82.7%)	1.00		
Hand washing practice after toilet	No	40 (76.9%)	15 (28.8%)	8.2	3.4-19.8	0.0000
	Yes	12 (23.1%)	37 (71.2%)	1.00		
Purifying water they use	No	48 (92.3%)	28 (53.8%)	10.3	3.2-32.7	0.0000
	Yes	4 (7.7%)	24 (46.2%)	1.00		
Reheat cooked food if not eaten immediately	No	28 (53.8%)	9 (17.3%)	5.57	2.26-13.7	0.0000
	Yes	24 (46.2%)	43 (82.7%)	1.00		
River as source of drinking water	Yes	21 (40.4%)	8 (15.4%0	2.6	1.16-5.9	0.020
	No	31 (59.6%)	44 (84.6%)	1.00		

Table 1.1.4: Multi-variables Vs bivariate analysis for independent risk factors related to AWD outbreak, Limmu Woreda, East Wollega, Oromia, Ethiopia, November 2016 G.C.

S.No	Risk factors	Crude OR, 95% CI	Adjusted OR, 95% CI	P-value
1	Lack of hand washing practice after using toilet	8.2 (3.4-19.8)	2.7(0.52-13.7)	0.24
2	Lack of knowledge on means of AWD transmission	3.3 (1.8-6.15)	12.2 (2.4-61.4)	0.002
3	Lack of purifying drinking water	10.3(3.2-32.7)	13.4 (1.9-93.6)	0.009
4	Having contact with AWD case	5.8 (2.2-15)	4.7 (1.14-19.6)	0.032
5	Lacking of reheat cold food	5.6 (2.5-13.7)	2.78 (0.65-11.8)	0.17
6	Open defecation practice	2.5 (1.01-6.3)	1.4 (0.24-8.05)	0.71
7	Presence of AWD sick person in the village	2.8 (0.99-8.06)	5.6 (1.1-29)	0.041

On multivariate analysis, lack of purifying water, having contact with the same complaint person, lack of knowledge of means of AWD transmission and presence of AWD sick person in the village were independent factors having statistically significant association with the AWD outbreak in Limmu Woreda with adjusted odd ratio (AOR) of 13.4 [95% CI= 1.9-93.6], 4.7 [95% CI= 1.14-19.6], 12 [95% CI= 2.4-61.4] and 5.6 [95% CI=1.1-29] respectively [Table 1.1.4].

1.1.5 Discussion

Poor social and economic environment, precarious living conditions associated with: insufficient water supply (quantity and quality), inappropriate and poor sanitation and hygiene practices, inadequate food safety including cultural influences on food preparation and storage at home, inadequate/lack of food safety in markets and restaurants and by street vendors. During cholera outbreak one should have to peel, cook or leave it. Cholera epidemics often start at the end of the dry season or at the beginning of the rainy season, when water sources are limited. This pushes people to accumulate at the fewer water sources available and increasing risks of contamination and transmission. Furthermore, the salinity can increase during the dry season and favors the growth of vibrio. Heavy rains can also provoke the emergence of cholera: flooding of contaminated water from sewage systems, latrines or septic tanks may contaminate wells or other water sources and thereby increase the concentration of organic nutrients in the water (2). In Limmu Woreda, cholera outbreak was started after rainy season during first week of October; this period is when water shortage begins to be observed. Majority of the cases 48 (92.3%) used spring (51.9%) and river (40.4%) water for drinking and other household utilities. Save drinking water was not available and the community use water from spring and river sources. Even though, there was no data showing latrine coverage and utilization, most people use latrine. But there was no latrine with hand washing facility during the outbreak.

Male populations 68(54.4%) were more affected by cholera outbreak compared to female population. This finding was similar with study conducted in East Shoa, Guji and Bale (6). When we compare infectivity of vibrio cholerae by age group, 15-29 years of age constituted the highest percent (33.6%) followed by 30-44 years old with (27.2%) and above forty five (21.6%) age groups. The median age of cases during this outbreak was 28 years old [range: 1-60 years]. This result was also similar with the above reference (6). Cholera outbreak investigation conducted in Abeokuta, Nigeria (68.3% of cases were 15 years and above) also support this finding (8).

Among risk factors assessed for cholera outbreak in Limmu Woreda, independent variables showed statistically significant association were lack of knowledge on means of cholera transmission with AOR of 12.2 [95% CI= 2.4-61.4], lack of purifying water they used 13.4 [95% CI= 1.9-93.6], having contact with the same complaint patient 4.7 [95% CI= 1.14-19.6]. These means those not having knowledge on means of cholera transmission had 12.2 times higher chance of getting the disease while those who had contact with cholera patient have 4.7 time higher chance of getting cholera disease than those didn‘t have contact. Health education is the key to public awareness and cooperation. An outbreak can be more quickly controlled when people understand how to stop its spread and immediately visit health facility after they get sick of cholera. Regarding to this study only 9 (17.3%) of cases had knowledge on transmission means of cholera disease, this may related with educational level because among cases interviewed for risk assessment 42 (80.8%) had no education. But about 39 (75%) and 19 (36.5%) of controls had knowledge of cholera disease and education respectively. Lack of hand washing practice after using toilet and lack of reheating cooked food if not eaten immediately showed no statistical significance with cholera outbreak investigation in the area.

Majority of the cases visited and managed at Arkumbe CTC were severely dehydrated 76(60.8%) followed by some 41(32.8%), despite that high number of cases were severely dehydrated, case fatality rate of this outbreak was 0.8% which is much lower than study conducted in Nigeria (CFR of 9.6%) and CFR expected by cholera guideline < 1% (1, 2, 7). Based on this finding, we can say that case management applied at Arkumbe CTC was achieved the target because case fatality was less compared to high percentage of severely dehydrated cases. Arkumbe Mander two, six and one contributes high number of cases, this may be because of their high population density and epi-curve of this outbreak also showed propagated type histogram.

1.1.6 Limitation

Inaccessibility some cases due to poor registration of their addresses on line list. Some cases admitted at CTC were not linked with HEW in the kebele for contact trace and to easily identify their zone/Goti and home.

1.1.7 Conclusion

The highest proportions affected age group was above fifteen years of age. The median age of cases was 28. Lack of knowledge on means of cholera transmission and not purifying water they use for all purpose including drinking water were statistically significant risk factors associated with cholera outbreak in the area. Even though high numbers of cases managed during the outbreak were severely dehydrated, case fatality rate was lower than expected value. Arkumbe two and six contribute high percent of cholera cases during the outbreak.

1.1.8 Recommendation

Arkumbe health center staffs and (HEWs), working in the catchment kebeles should conduct regular health education and awareness creation on communicable diseases, related to poor hygiene and sanitation focus on cholera. Limmu Woreda Health Office (WoHO) has to follow its implementation. Since majority of the community use spring and river water, Woreda Water Office in collaboration with WoHO, Zonal Water Office and Regional Mineral, Energy and Water Bureau have to supply safe drinking water for the residents. Communities have to use water treatment chemicals or boiling mechanism for water purification.

1.1.9 Reference

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1.2 Measles Outbreak Investigation, Limmu Seka Woreda, Jimma Zone, Oromia, Ethiopia, February 2017 G.C

Executive Summary

Introduction: Measles is a highly contagious viral infection caused by a Morbillivirus and it is a public health problem that causes high morbidity and mortality worldwide. Limmu Seka is one of the twenty districts found in Jimma Zone, usually reporting measles cases. During 2015/2016, the district reported 396 measles cases. In February 2017, Limmu Seka district reported 75 measles cases and three deaths. We decided to investigate the outbreak to determine the magnitude and interfere with the ongoing morbidity and mortality and to identify associated risk factors for the outbreak.

Method: We conducted both descriptive and unmatched case-controls analytical studies with 32 cases and 64 controls in Limmu Seka district from February 9-22/2017. We used StatCalc of Epi Info 7.10 to calculate sample size. We used WHO standard case definition. Control was any neighbor to a case but without symptoms during the study period. Cases were selected by simple random sampling technique and two controls were selected from neighbors for each case. We used Micro Soft Excel, Epi Info and SPSS for data analysis.

Results: Seventy five confirmed measles cases were identified during the outbreak. About 38 (50.7%) cases were female. Around 28 (37.3%) were 5-14 years followed by 1-4 years 25 (33.3%) and 15-24 years 19 (25.3%). Attack rate of the outbreak was 0.04 % with CFR of 4%. ASAR for under five and under fifteen years of age were 0.1% and 0.06% respectively. About 35 (46.67%) of the cases were unknown vaccination status followed by zero vaccination status 26 (34.66%). Contact with measles case showed statistically significant associated with AOR of 6.6 [95% CI=1.4-31.16, P=0.017]. Having knowledge on mode of transmission and being vaccinated for measles were found to be protective independent factors significantly associated with AOR 0.15 [95% CI=0.04-0.62, P=0.009] and 0.12 [95% CI=0.02-0.68, P=0.016] respectively.

Conclusion: Majority of the cases affected by the outbreak were 5-14 years old children. Children less than fifteen years old in the woreda have to be targeted for mass vaccination for measles. Continues awareness creation on mode of transmission and advocacy as measles is one of the vaccine preventable diseases if family immunizes their children following the schedule.

Key words: Measles outbreak, Limmu Seka Woreda, case control

1.2.1 Introduction

Measles is an acute viral illness caused by a RNA virus in the family of paramyxovirus, genus Morbillivirus. It is a highly contagious viral disease and remains an important cause of death among young children globally, despite the availability of a safe and effective vaccine. It is an enveloped, single-stranded RNA virus that has globally retained its monotypic antigenic structure for decades. The genome encodes 8 proteins, including the haem-agglutinin (H) and the fusion (F) proteins. The lifelong immunity that follows infection is attributed to neutralizing antibodies against the H protein. Sequencing of the measles virus genome has so far identified 23 different genotypes that can be used to track transmission (1).

Measles is characterized by a sign and symptoms of fever (as high as 105°F) and malaise, cough, coryza, and conjunctivitis, followed by a maculopapular rash. The rash usually appears 14 days after exposure and spreads from head to trunk to lower extremities.

Measles is usually a mild or moderately severe illness. The severity of measles varies widely, depending on a number of host and environmental factors. The risk of developing severe or fatal measles increases for those aged <5 years, living in overcrowded conditions, who are malnourished (especially with vitamin A deficiency), and those with immunological disorders, such as advanced HIV infection. In developing countries, case-fatality rates among young children may reach 5–10%. In industrialized countries, deaths from measles are rare, although severe forms of the disease and even death may occur in previously healthy individuals. Relatively common complications of measles include otitis media, laryngo-tracheobronchitis and pneumonia. In children, otitis media occurs in 5–15% of cases and pneumonia in 5–10%. In developing countries, persistent diarrhoea with protein-losing enteropathy may ensue, particularly in infants. Post-infectious measles encephalitis occurs in about 1/1000 cases, and sub-acute sclerosing pan encephalitis, a slowly progressing infection of the central nervous system, occurs in about 1/10 000–100 000 cases (1).

There are three stages of illness.

Prodrome: Measles has a distinct prodromal stage that begins with a mild to moderate fever and malaise. Usually within 24 hours, there is an onset of conjunctivitis, photophobia, coryza (sneezing, nasal congestion, and nasal discharge), an increasingly severe cough, swollen lymph nodes (occipital, post auricular and cervical at the angle of the jaw), and Koplik‘s spots (seen only for a day or two before and after onset of rash). These spots are seen as bluish-white specks on a rose-red background appearing on the buccal and labial mucosa usually opposite the molars.

Rash: The rash begins with flat, faint eruptions of upper lateral parts of the neck, behind the ears, along the hairline and on the posterior parts of the cheeks. The rash may appear from 1–7 days after the onset of the prodromal symptoms, but usually appears within 3–4 days. Individual lesions become more raised as the rash rapidly spreads over the entire face, neck, upper arms and chest. In severe cases, the lesions may become confluent. In mild cases, the rash may be macular and more nearly pinpoint, resembling that of scarlet fever.

Fever: Fever is mild to moderate early in the prodrome, and goes up when the rash appears. Temperatures may exceed 40°C (104°F), and usually fall 2–3 days after rash onset. High fever persisting beyond the third day of the rash suggests that a complication (e.g., otitis media) may have occurred (2).

Modes of Transmission: Virus is spread directly from person to person by inhalation of suspended droplet nuclei or by contact with infective nasopharyngeal secretions. It can also be transmitted indirectly by objects (fomites) contaminated with nasopharyngeal secretions. Measles virus is labile. Half the infectivity is lost every 2 hrs at 37^0 C. So it depends on the initial number of viral particles in the droplet. It does not survive drying on a surface, so it has a short survival time on contaminated fomites. It is effectively spread as an aerosol. The virus survives drying in micro-droplets in the air relatively well, as opposed to drying on a flat surface. Measles is one of the most contagious of all infectious diseases, with >90% attack rates among susceptible close contacts.

Incubation Period: The incubation period ranges from 7–18 days (average 10–12 days) from exposure to the onset of prodromal symptoms. The interval from exposure to rash onset is usually 14 days (range 7–18 days), rarely as long as 19–21 days. The administration of IG early in the incubation period may extend this period to 28 days.

Period of Communicability: As acutely infected humans are the only reservoirs of measles virus, persons infected with measles are infectious 4 days before rash onset through 4 days after rash onset. Immunosuppressed persons might have a longer period of communicability (2).

1.2.1.1 Literature review of measles

Measles is one of the most infectious human diseases and can cause serious illness, lifelong complications and death. Prior to the availability of measles vaccine, measles infected over 90% of children before they reached 15 years of age. These infections were estimated to cause more than two million deaths and between 15 000 and 60 000 cases of blindness annually worldwide.

The highly effective, safe and relatively inexpensive measles- and rubella-containing vaccines protect individuals from infection, and their widespread use can completely stop the spread of the viruses in populations that achieve and maintain high levels of immunity. Countries began using measles vaccines in the 1960s, and immediately identified their use as highly cost-effective.

In the year 2000, the World Health Organization (WHO) estimated that 535, 000 children died of measles. The majority of them were in developing countries and this burden accounted for 5% of all under five mortality. In some developing countries, case-fatality rates for measles among young children may still reach 5–6%. In industrialized countries, approximately 10–30% of measles cases require hospitalization, and one in a thousand of these cases among children results in death from measles complications.

Improving measles vaccination coverage and reducing measles-related deaths is a global imperative, particularly as it relates to the United Nation's Millennium Development Goal 4 (MDG4), which aims to reduce the overall number of deaths among children by two-thirds between 1990 and 2015 (3).

While global measles deaths have decreased by 75 percent worldwide in recent years — from 544,000 deaths in 2000 to 146,000 in 2013 — measles is still common in many developing countries, particularly in parts of Africa and Asia. Indeed, more than 20 million people are affected by measles each year. The overwhelming majority (more than 95%) of measles deaths occur in countries with low per capita incomes and weak health infrastructures.

The measles vaccine has been in use since the 1960s. It is safe, effective and inexpensive. WHO recommends immunization for all susceptible children and adults for whom measles vaccination indicative. Reaching all children with two doses of measles vaccine, either alone, or in a measles-rubella (MR), measles-mumps-rubella (MMR), or measles-mumps-rubella-varicella (MMRV) combination, should be the standard for all national immunization programs (4).

Measles is almost eliminated in most parts of the world, but measles outbreaks are still among the common epidemics contributing to high mortality and morbidity in sub-Saharan Africa, especially among children with malnutrition. The accelerated measles control strategy that began in 1998 introduced case based surveillance activity that was built upon the acute flaccid paralysis (AFP) surveillance infrastructure and closely linked to IDSR principles. This has brought the disease burden and mortality due to measles to a significantly low level. However small and infrequent measles outbreaks continue to occur due to low immunization coverage and gaps in surveillance activities. In 1999, of approximately 871,000 deaths from measles worldwide, 61% occurred in sub-Saharan Africa. In 2004, of the 1,590 districts under case-based surveillance, 80 (5%) reported outbreaks of measles. In 2005, 47(2.5%) districts reported outbreaks out of 1,850. In 2006, 178 (6%) of 2,923 districts reported outbreaks, which spanned across 29 countries. The most affected countries were: Democratic Republic of Congo 62,933 cases/868 deaths, Nigeria 2,919 cases/18 deaths, Ethiopia 1,665 cases/0 deaths and Tanzania 1, 606 cases/8 deaths (5).

Measles immunization activities in Ethiopia from 1993-2002

After 1993, the coverage started to steadily increase until 1997. For the first time percentage of fully immunized children as measured by measles coverage reached over 50% for two successive years of 1996 and 1997. In 1998, there was a decrease in coverage of all antigen as compared to 1997, DPT3 and measles coverage have decreased by 4% and 5% respectively. The Ethio-Eritrean war, the unforeseen effect of the health sector reform and focus on polio NIDs and sudden reduction of funds from external partners for routine EPI activities have all attributed for the decline. In the following years from 1999 up to 2002 there was again an improvement of EPI coverage as compared with the previous years.

Measles coverage increased from 44% in 2003 to 55% in 2004. The coverage survey done in 2006 and 2012 disclosed that the measles coverage was 54.3% and 68.2% respectively. The improvement of performance mainly attributed to, implementation of the Reaching Every District (RED) approaches initiated in 2004.

The DHS, 2011 and the 2012, National immunization coverage survey results have showed a big discrepancy with the national administrative report of FMOH, in that the administrative report claim, national measles vaccination coverage of 81% in 2011 as compared to DHS and coverage survey report of 56% and 68.2 % in the same year respectively (6).

Global measles elimination initiative

A combination of poor quality of record keeping, failure to identify epidemics and proper filing as well as failure of mothers to bring children affected by measles to health facilities for treatment are among other contributing for under reporting. In 2013, measles incidence was 7.2 cases per 100,000 populations. A total of 243 measles outbreaks were confirmed in 2013 compared to 146 in 2012 with a total of 192 affected woredas (districts) in 2013 compared to 125 in 2012.

Based on the epidemiology of measles in Ethiopia and burden of disease modeling, it is estimated that more than 1.5 million cases of measles (all age) and 70,000 deaths (assuming 4% case fatality ratio) would occur in Ethiopia annually. For many years the average number of measles cases reported to the Ministry of Health by the region ranged from 500-2000 annually. In Ethiopia, 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 (6).

Ethiopia adopted the regional measles mortality reduction goal in 2002 and has been implementing the recommended strategies which include increasing the coverage of the first dose of measles vaccine, providing a second opportunity through SIAs, implementing sensitive disease surveillance, and improving case management. In 2012, Ethiopia adopted the regional measles elimination goal and developed a National Measles Strategic Elimination Plan, 2012-2020. Several efforts have been made to implement the elimination strategies since 2012, including implementation of a follow up measles campaign targeting under-five children in 2013. Key activities conducted in 2014 included: Localized measles outbreak investigation and response activities in different parts of the country were implemented. A total of 302 outbreaks were registered with 6,401 confirmed ―outbreak associated" cases, and 249 woredas were affected. 67% of measles cases were above 5 years old. An external assessment of the recurrent measles outbreaks was done in SNNPR. Based on the findings, the main ICC chaired by the State Minister of Health decided to plan for an under 15 measles campaign in 2015 (7).

During 2014, a total of 16,702 clinically suspected cases were reported through the system of which 5,418 (33%) of the cases are reported through measles case based surveillance, while the rest 10,789(67%) are through line lists. Of the cases reported in 2014, a total of 13,301 cases are confirmed cases including 2,373(18%) laboratory confirmed, 5,692(43%) epi-linked cases and 5,236(39%) clinically compatible cases. The number of reporting woredas has shown an increasing trend with exception of 2014 where 80% of the woredas have reported at least one case with blood specimen. The measles incidence showed an increasing trend from 2002 to 2011. From 2012 onward it showed a declining trend. On the contrary, the positivity rate has increased for the last two years reaching 35% and 53% in 2013 and 2014 respectively. Additionally, the number and extent of epidemics has increased greatly particularly for the last two years including the number of woredas affected. In 2013 and 2014, a total of 243 and 302 outbreaks were registered, while 192 and 249 woredas were affected respectively (7).

As of 31 May 2016, 4,395 measles cases had been reported, including 3,597 confirmed cases (469 Lab confirmed, 2,889 epi--linked and 239 clinically compatible). Addis Ababa in Gulele Sub-city, Afar (Afar 5 zone, Semu Robi woreda), Amhara (East Gojjam zone, Debra Markos Town; and Wag Himra zone, Sekota Woreda) and Oromia (North Shoa Zone and Dera Woreda).

All regions are affected by the outbreak of which the top three are; SNNPR (49%), Oromia (29%) and Somali region (8%). Children under five (53% of all cases) are the most affected age group, followed by children 5-14 years (34%). It is anticipated that, measles outbreaks will affect all parts of the country based due to sub optimal immunization coverage ,<95% coverage of routine immunization and Supplementary Immunization Activities. The El-Niño drought effects resulted further increase the risk of measles outbreaks in high-risk areas (8).

1.2.1.2 Statement of the problem

The Expanded Programme on Immunization (EPI) was established by the World Health Organization in 1974 to control vaccine preventable diseases. In Ethiopian, EPI programme was launched in 1980 with the objective of achieving 100% immunization coverage of all children under two years old by 1990. In 1986, the coverage target was reset to 75% and the target age group was changed to less than one year old but progress in increasing coverage has been slow. With the introduction of new approaches known as Reaching Every Districts (RED) and Sustainable Outreach Services (SOS) for immunization in 2003, improvement has been documented (9).

In contrary to the control and elimination activities performed, there were a numbers of measles outbreaks in Ethiopia from year to year. In 2012, 146 outbreaks in 125 woredas, 243 measles outbreaks were confirmed in 2013 and 192 affected woredas, 302 outbreaks were registered and 249 woredas were affected by 2014 and as of 31 May 2016, 4,395 measles cases had been reported (6-8).

In Oromia Region, started from WHO week 43/2016 to week 7/2017 there were more than six measles outbreaks. During this period about 715 measles cases were reported to the region by line list. The distribution of these cases by zone were: Guji Zone 442 (61.8%), Bale Zone 125 (17.5%), Jimma Zone (Limmu Seka Woreda) 75 (10.5%), West Shoa Zone 73 (10.2%). About 369 (51.6%) of the cases were not vaccinated for measles immunization and majority of them were 328 (46%) under five years of age. About 24 samples were taken to Ethiopian Public Health Institutes (EPHI) for confirmation and sixteen of them were positive for measles IgM.

1.2.1.3 Significant of the study

Measles outbreak is still a public health problem in different Ethiopian regions including Oromia. From WHO week 43/2016 to week seven 2017, 715 measles cases were reported from four different zones to Oromia Regional Health Bureau. About 125 cases from Bale (Herena Buluk and Meda Walebu Woredas), 442 cases from Guji (Ana Sora, Wadera, Liben, and Goro Dola Woredas), 73 cases from West Shoa (Danno Woreda) and the rest 75 cases were reported from Jimma Zone.

As evidence obtained from Jimma Zone Health Department and Limmu Seka Woreda Health Office, there were histories of measles outbreaks in the woreda every two years. By this year (2009 E.C) Limmu Seka Woreda reports 75 measles cases. As data obtained from line list showed, increment of cases was started from WHO week 3 (16/01/2017). Then bureau deployed one team for intervention activities, confirmation of outbreak and for conducting investigation in order to identify sorts of risk factors for the recurrent measles outbreak in the area from 9 February to 22/2017 G.C. The result of this finding will be used for appropriate planning and further interventional activities in the woreda.

1.2.2 Objectives

1.2.2.1 General objective

To confirm the existence of outbreak and assess risk factors associated with measles outbreak in Limmu Seka Woreda, Jimma Zone, Oromia Region, Ethiopia, during February 9-22/2017 G.C.

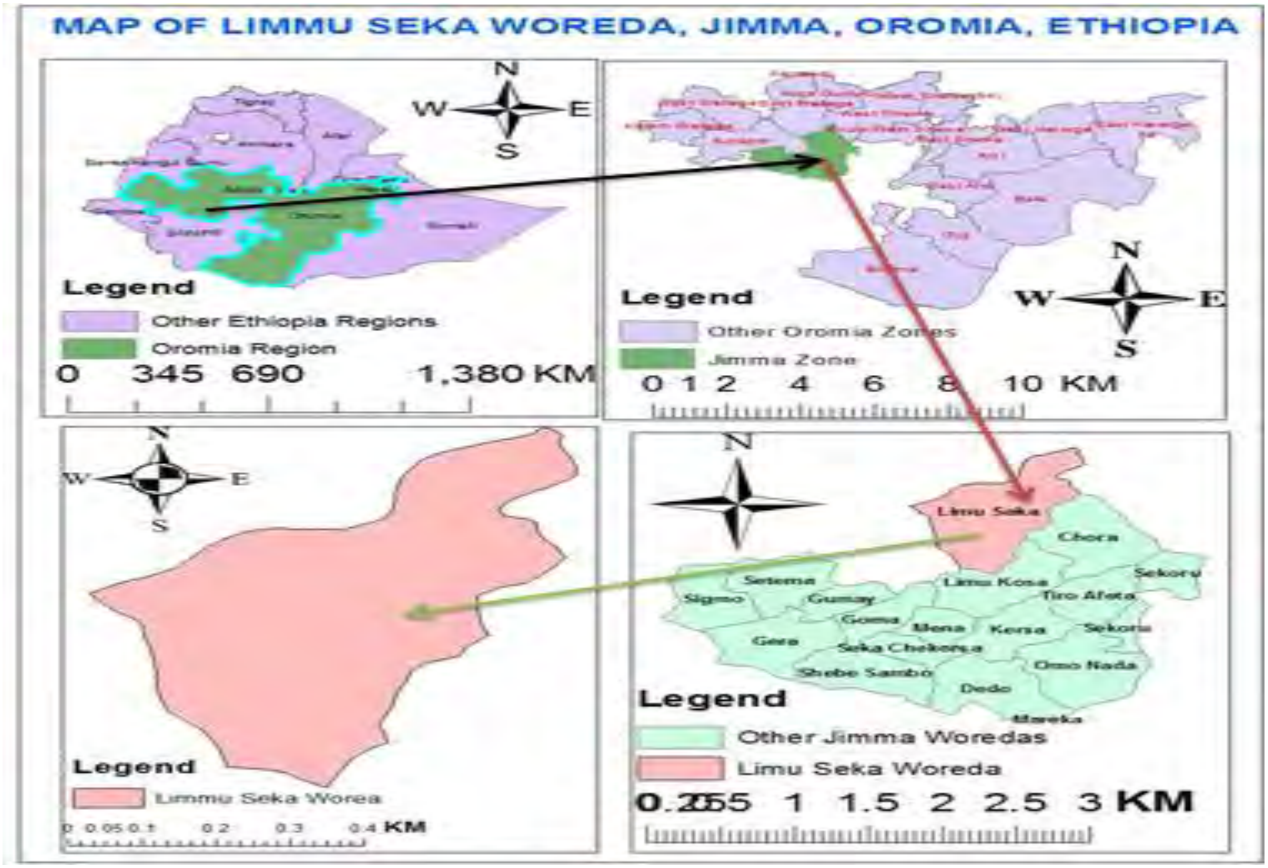
1.2.2.2 Specific objectives

- ✓ To confirm existence of measles outbreak in Limmu Seka Woreda, Jimma Zone during February 9-22/2017 G.C
- ✓ To describe the outbreak by person, place and time during February 9-22/2017 G.C
- ✓ To assess risk factors associated with measles outbreak and recommend appropriate control and prevention activities in Limmu Seka Woreda during February 9-22/2017.

1.2.3 Methods and materials

1.2.3.1 Study area and period

Measles outbreak investigation was conducted in Limmu Seka Woreda, Jimma Zone, Oromia Region from February 9 to 22 /2017. Jimma Zone is one of the zonal administrative found in Oromia Regional State. Jimma Zone is located 335 KM far from capital city of Ethiopia, Addis Ababa to southwest direction. Whereas, Limmu Seka Woreda is one of the twenty woredas found in Jimma Zone. Limmu Seka is 445 KM far from Addis Ababa and 110 KM far from Jimma Town in north direction. In 2009 E. C, estimated total population of Limmu Seka Woreda is 173,575, of which 88,523 (51%) of them are female. Only 11,469 (6.6%) of the woreda‘s population were living in urban. Under one, under five and women of 15-49 years of age are 5,589, 28,518 and 38,412 respectively. Limmu Seka Woreda has 38 rural and two town kebeles and shared bounders with East Wollega Zone in the North, Nonno Benga Woreda in the East, Limmu Kosa Woreda in the South and Illu Aba Bora Zone in the West direction. The woreda has six health centers, 38 health posts, 64 health extension workers and a total of 69 different health professionals. Potential health service coverage of the woreda was 98 % and 92% by health centers and health posts respectively. Woreda‘s measles vaccination coverage (MVC) of the last two years, 2007 and 2008 E.C was 84% and 86% respectively.



Annexes 1.2.2: Administrative map of Limmu Seka Woreda, Jimma Zone, Oromia, Ethiopia, 2017.

1.2.3.2 Study design and participants

We conducted descriptive epidemiologic study and a 1:2 unmatched case-controls study with total of 32 cases and 64 controls. All 75 measles cases registered on line list were used for descriptive analysis of the outbreak.

1.2.3.2.1 Study population

The study population was composed of the inhabitants of Limmu Seka Woreda, mostly from kebele with high case load based on their proportion from which both cases and controls were selected.

1.2.3.2.2 Sample size

We calculated sample size by using StatCalc of Epi Info 7.10 from previous study. We took more significant factor (vaccination status). Percent exposure of cases and controls were 24 and 56 respectively with odd ratio of 0.25 (95% CI, 0.12-0.53) and power 80% obtained from Measles outbreak investigation conducted in Dedesa Woreda, Ilu Aba Bora Zone, March 2014. By using this result, we got 32 cases and 64 controls to be included in the study.

1.2.3.3 Inclusion criteria

A case was any resident of Limmu Seka Woreda, who developed any of the following symptoms; fever and macula papular rash (i.e. non-vesicular rash) and cough or coryza (runny nose) or conjunctivitis (red eyes) between 15 December 2016 and 22 February 2017, and who agreed to participate in the study after we inform them aim of the study.

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

1.2.3.4 Exclusion criteria

- **Cases:** the one who was too young child and/or unconscious to participate and whose families were not present at a time we visited their house.
- **Controls:** Those who refused to participate in the study and those from family members with the case.

1.2.3.5 Sampling procedure

Cases were selected from affected kebeles by systematic sampling every K^{th} using line list as a frame whereas; controls were selected randomly from neighbors of the cases.

1.2.3.6 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 formants 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 February 9-22/2017.

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. A total of four data collectors with health background were participated to collect the data. They were trained before the data collection for half a day, in addition to that unclear issues and questions were discussed at any time during data collection process.

1.2.3.7 Case definitions

A standard case definition (WHO) of suspected and confirmed measles cases was used as tool for detecting measles cases. These definitions must be used at all levels including the community, health professionals working at government and non-government health facilities.

Measles suspected cases at community level: A community definition of measles (also called gifira or shifto in Oromiffa and kufign in Amhariffa) was any person with rash and fever and/or having eye redness and runny nose.

Suspected measles case: Any person with fever and maculo-papular (non-vesicular) generalized rash and cough, coryza or conjunctivitis (red eyes) or any person in whom a clinician suspects measles.

Confirmed measles case: Cases with a positive laboratory result for measles specific immunoglobulin (IgM) antibody testing that had not received measles vaccination within four weeks before the specimen collection and epidemiologically linked cases with laboratory confirmed measles cases.

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.

Epidemiologically linked case: A suspected measles case that has not had a specimen taken for serologic confirmation and is linked (in place, person and time) to a laboratory confirmed case; i.e., living in the same or in an adjacent district with a laboratory confirmed case where there is a likelihood of transmission; onset of rash of the two cases being within 30 days of each other.

Measles death: For surveillance purposes, a measles death is defined as any death from an illness that occurs in a confirmed case or epidemiologically linked case of measles within one month of the onset of rash.

1.2.3.8 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.

1.2.3.9 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 etc.

1.2.3.10 Data analysis and clearance

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 Excel, Epi Info version 7.10 and SPSS for descriptive and analytical output.

1.2.3.11 Ethical consideration

The woreda health office has accepted for the investigation of measles outbreak through the formal letter of ORHB. All the respondents as well as the parents were well informed about the objectives of the study and we got oral consent from them. And also, some of the respondents were voluntary to get their photographs through our camera after they have been informed fully.

1.2.4 Result

1.2.4.1 Descriptive epidemiology analysis

We identified seventy five measles cases during the outbreak. About 38 (50.7%) of them were female. Over all attack rate (AR) of this outbreak was 0.04%. Sex specific attack rate of the outbreak was calculated and it was found to be 0.04% for female population.

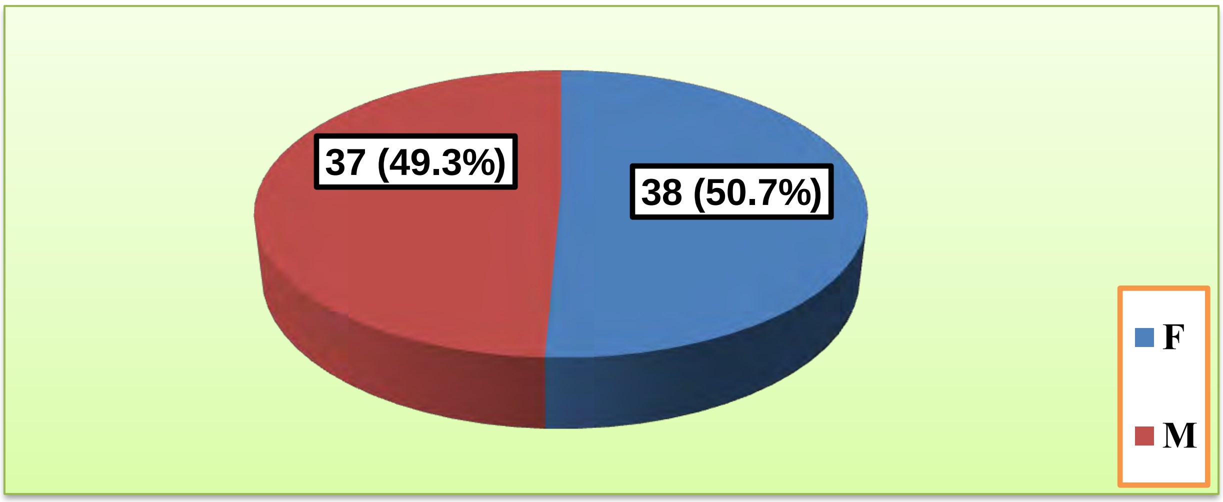


Figure 1.2.7: Distribution of Measles Cases by Sex in Limmu Seka Woreda, Jimma Zone, Oromia Region, Ethiopia, February 2017 G. C

We tried to determine distributions of cases by age group during this outbreak investigation. The highest proportions of measles cases were occurred in 5-14 years 28 (37.3%) whereas the lowest proportions 1 (1.3%) were under one age group. The mean age of the cases was 9 with ± 5.9 SD. Age specific attack rate (ASAR) was also identified and found to be 0.1% in under five and 0.06% in under fifteen years of age. The woreda reported three deaths of measles cases; that indicated case fatality rate (CFR) of 4%.

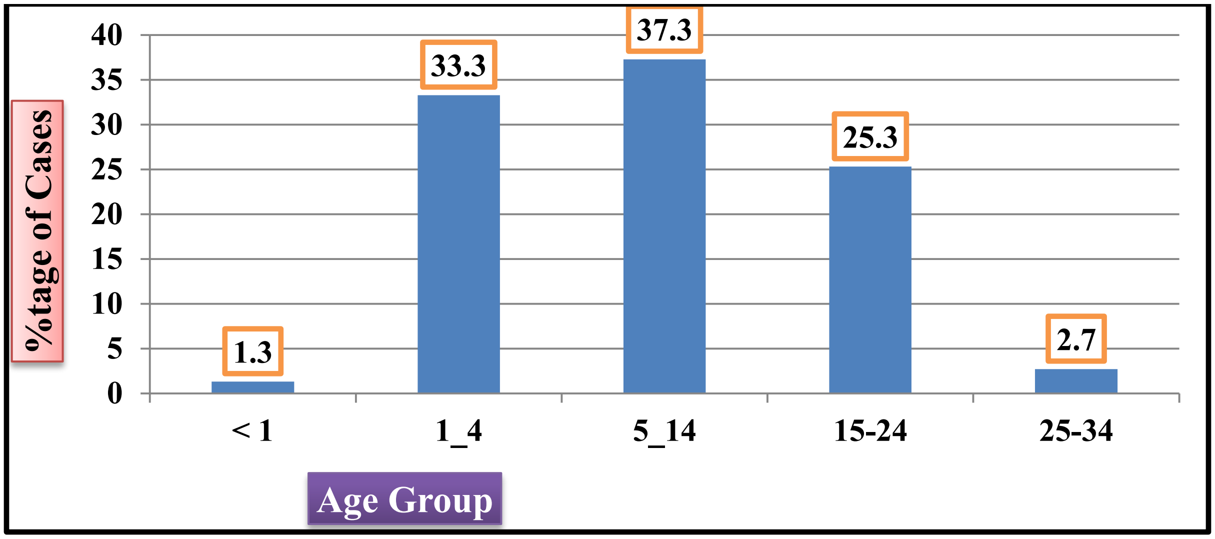


Figure 1.2.8 Distributions of Measles Cases by Age Group in Limmu Seka Woreda, Jimma Zone, Oromia Region, Ethiopia, February 2017 G.C.

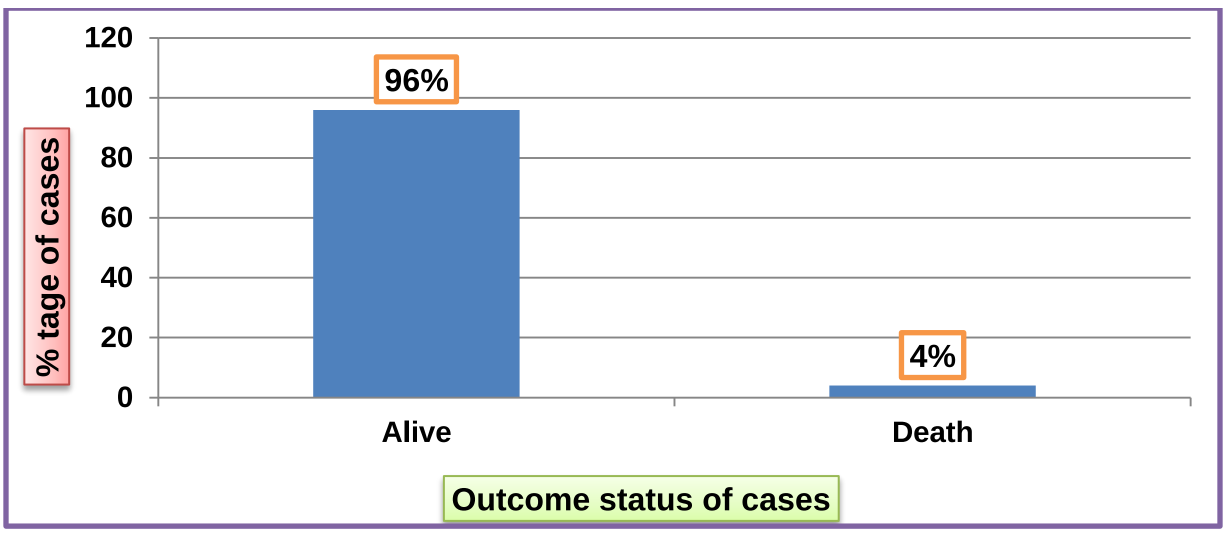


Figure 1.2.9: Distributions of Measles Cases by Outcome Status in Limmu Seka Woreda, Jimma Zone, Oromia Region, Ethiopia, February 2017 G.C.

Vaccination statuses of cases recorded on line list were assessed during measles outbreak investigation in Limmu Seka Woreda. Accordingly 35 (46.67%) of them had unknown vaccination status whereas 26 (34.66%) did not get any dose of measles vaccination.

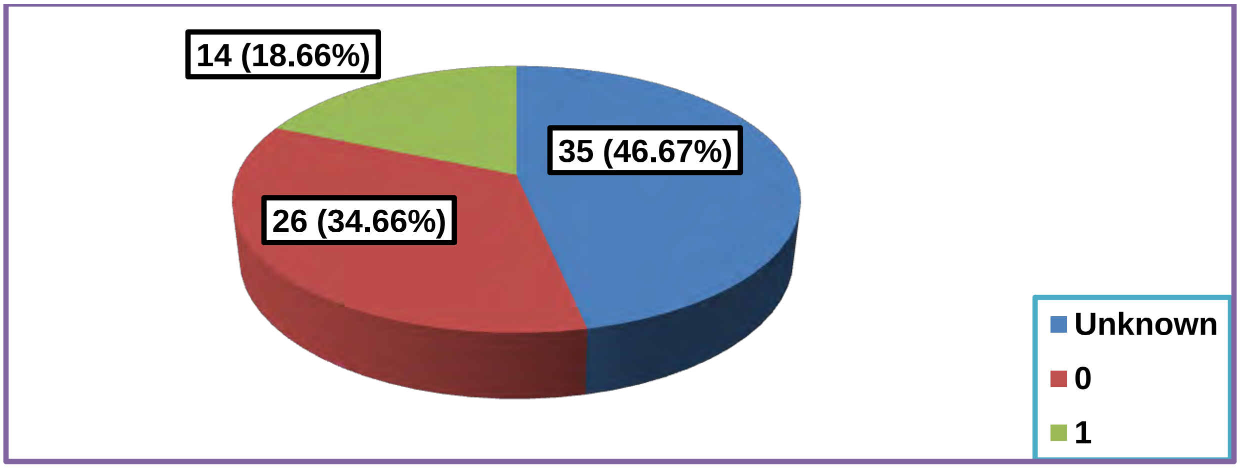


Figure 1.2.10: Distributions of Measles Cases by Vaccination Status in Limmu Seka Woreda, Jimma Zone, Oromia Region, Ethiopia, February 2017 G.C.

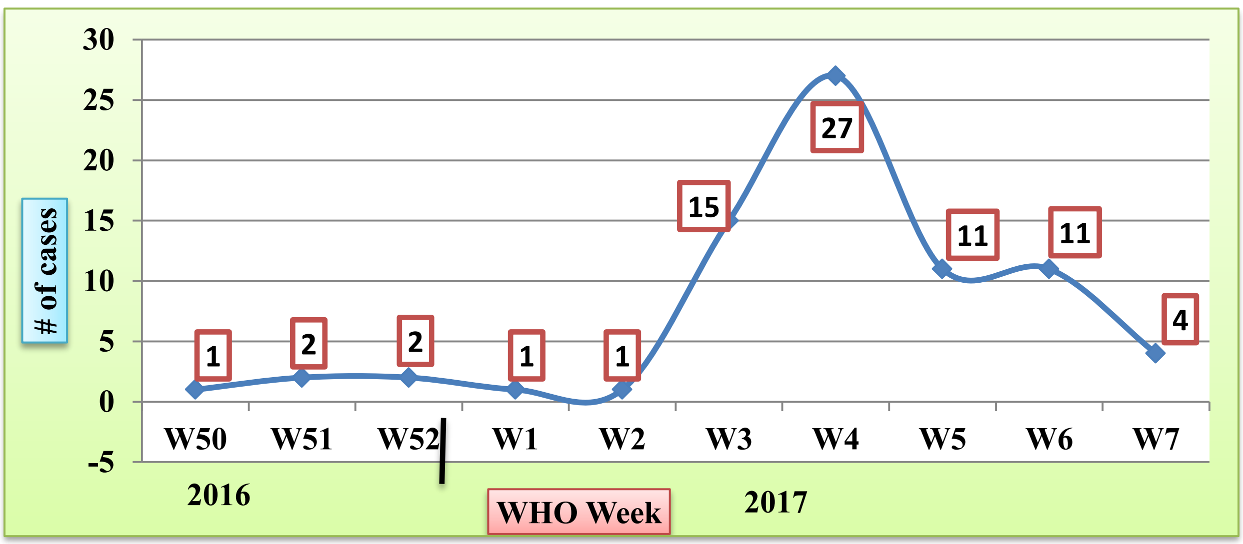


Figure 1.2.11: Distributions of Measles Cases by WHO Week in Limmu Seka Woreda, Jimma Zone, Oromia Region, Ethiopia, February 2017 G.C.

Measles cases were started to visit both Bontu Health Post and Atinago Health Center from WHO week 50/ 2016 and reached peak at week four/2017, then after cases slightly decline started from week five. Index case of this outbreak was 12 years old male with unknown vaccination and had no travel history outside of the woreda [Figure 1.2.11].

Limmu Seka Woreda notified Jimma Zone after a period of one month from the index case. The zone sent line list of cases to Oromia Regional Health Bureau (ORHB) after a period of two weeks. Both zone and woreda were too late to notify the outbreak because measles cases were often reported from the woreda. As we tried to discuss with both zone and woreda to know reason for late report of line list, the zone claimed that the line list sent by the woreda was not legible and also not contain necessary variables on line list form. So, they returned it back to the woreda for correction and re sent it again.

After the zone notified the region, ORHB deployed a team to support prevention and control activities, searching for active cases, verifying data quality and reporting systems, monitoring case management activities and eventually conducting outbreak investigation in the woreda. After the team arrived at the woreda (on 24 January 2017), more than half of measles cases were obtained by active case search and referred to health posts and health centers based on their severity. At the same time control and prevention activities performed and the outbreak came to end at the middle of February 2017 G.C.

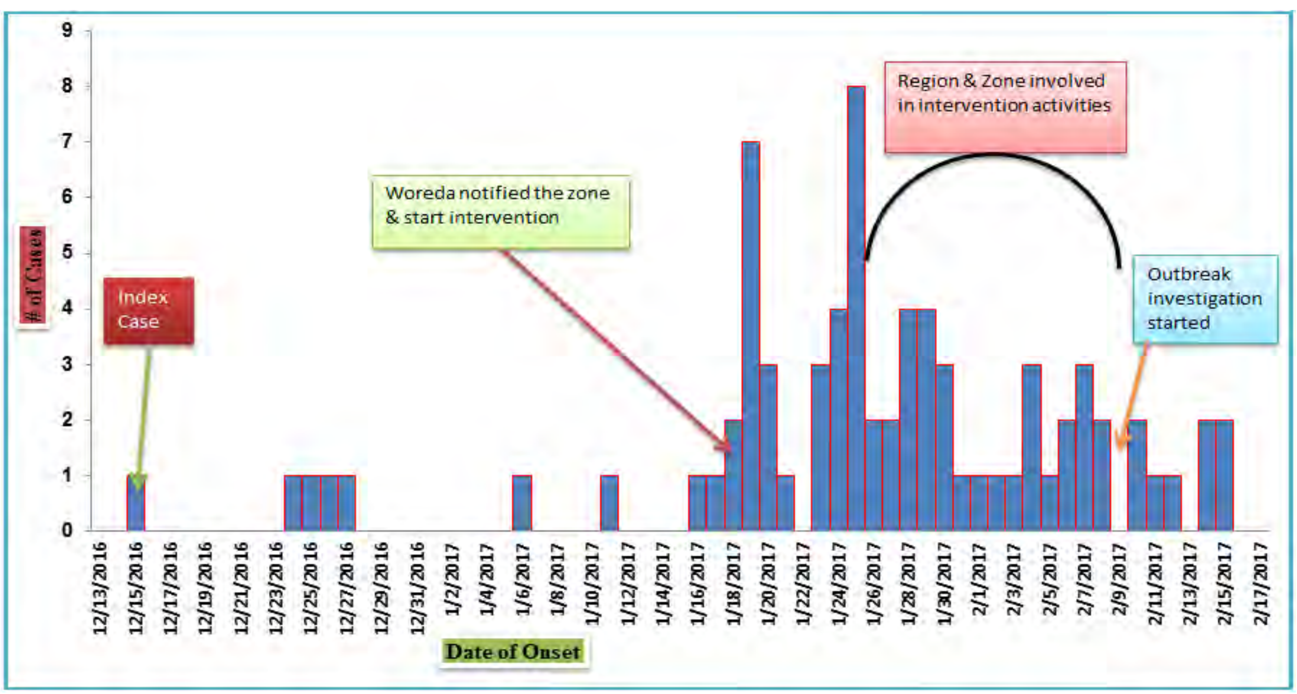


Figure 1.2.12: Distribution of Measles Cases by Onset of rash, Limmu Seka Woreda, Jimma Zone, Oromia Region, Ethiopia, February 2017 G.C

1.2.4.2 Laboratory result of the outbreak

Five blood samples were collected from suspected measles cases at Atinago health center, in Limmu Seka Woreda on day 01/29/2017 and sent to the EPHI for confirmation. All 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.

1.2.4.3 Interventions taken

During last week of January 2017, one team was deployed from ORHB to support control and prevention activities and then conducting outbreak investigation in Limmu Seka Woreda. We incorporated other additional team members both from Jimma Zone Health Department (PHEM focal person) and Limmu Seka Woreda Health Office in order to identify and characterize the measles outbreak in the woreda. We discussed with all staffs of woreda health office, staffs of catchment health center (Atinago Health Center) and health extension workers (HEWs) of respective kebeles. And also discussion was held with woreda and kebele administrates to get more focus and other administrative supports. Technical assistance was given for health workers on case management, on line list recording (to verify incorporation of all necessary variables and reporting situation in place. We tried to review measles vaccination coverage (MVC) of the woreda and kebele with high case load (Bontu Kebele) and we found that MVC of 2015/2016 were 86% and 57% respectively. Measles vaccination coverage of this kebele was very low, which might be the cause for higher proportion of case load in the woreda.

Cases were treated to prevent further spread and reduce morbidity and mortality related to measles both at health post and health center. Even treatment was given at house hold level for those obtained during active case search and unable go health facility on foot. Routine surveillance was enhanced and overall activities were closely followed at each level on a daily bases.

We gave health education for the community members and students in areas where the community are mostly assembled like, 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 as measles is vaccine preventable disease and it may not be their threat if they immunize their children following the schedule of outreach vaccination program. Active surveillance has been conducted in neighboring kebeles of the woreda.

Fortunately, there was nationwide supplementary immunization campaign for measles on last week of February 2017. Therefore, it was conducted in Limmu Seka Woreda too for children of six months up to 14 years old. It may create good chance in preventing spread of the disease to other adjacent kebeles with previously affected ones.

1.2.4.4 Analytical study

A total of 32 cases and 64 controls were selected by simple random sampling and involved as study participants from the community. These participants were assessed for risk factors associated with measles outbreak in Limmu Seka Woreda of Jimma Zone. The mean age of the cases and controls were 8.4 ± 6.9 SD for cases and 9.4 ± 5.4 SD respectively. Both cases and controls were asked for their knowledge from where people get measles virus. Accordingly seventeen 53.12% of the cases didn‘t know from where people get infected of measles virus, whereas 47 (73.4%) of controls knew as people got measles virus from already infected with active measles virus. About 26 (81.25%) of cases and 43 (67.2%) of controls believed in that measles virus affects under five years old children.

Table 1.2.5 Measles cases presented with typical sign and symptoms of measles and those with complications during a period of 12/15/2016 to 02/22/2017, Limmu Seka Woreda, Jimma Zone, Oromia Region, Ethiopia, February 2017 G.C

S.NO	Sign and Symptoms	Case (No. & %)	Proportion got appropriate treatment
1	Fever	32 (100%)	26 (81.25%
2	Conjunctivitis (Eye redness)	32 (100%)	24 (75%)
3	Cough	28 (87.5%)	22 (68.75%)
4	Rash	32 (100%)	29 (90.63%)

All measles cases 32 (100%) included in study were presented to health facilities with fever, rash and eye redness whereas about 28 (87.5%) of cases were treated as pneumonia complication (Table 1.2.5). During unmatched case control study, 19 (59.38%) female and 13 (40.63%) male as cases and 43 (67.19%) male and 21 (32.81%) female as controls were involved. About 13 (40.63%) cases and 38 (59.38%) controls were between 5 -14 years old. About 18 (56.25%) of cases and 38 (59.38%) of controls were living with family members of less or equal to five. All the study participants were Oromo by their ethnicity and around 29 (90.63%) of cases and 58 (90.63%) of controls were Muslims in their religion (Table 1.2.6).

Table 1.2.6: Demographic characteristics of measles outbreak in Limmu Seka Woreda, Jimma Zone, Oromia Region, Ethiopia, February 2017 G.C

S.No	Variables	Category	Case (%)	Control (%)
1	Sex	Male	13 (40.63%)	43 (67.19%)
		Female	19 (59.38%)	21 (32.81%)
2	Age Group	1-4	12 (37.5%)	15 (23.44%)
		5-14	13 (40.63%)	38 (59.38%)
		15-24	6 (18.75%)	10 (15.63%)
		25-34	1 (3.13%)	1 (1.56%)
3	Family Size	≤ 5	18 (56.25%)	38 59.38%)
		>5	14 (43.75 %)	26 (40.63%)
4	Educational level of the family	Illiterate	19 (59.38%)	29 (45.31%)
		Literate	13 (40.63%)	35 (54.69%)
5	Religion of the family	Orthodox	3 (9.38%)	3 (4.69%)
		Muslim	29 (90.63%)	58 (90.63%)

S.No	Variables	Category	Case (%)	Control (%)
		Protestant	0	3 (4.69%)
6	Occupation of Case/Control	Student	11 (34.38%)	30 (46.88%)
		Not applicable	17 (53.13%)	21 (32.81%)
		Other Works	4 (12.5%)	13 (20.31%)
7	Marital Status of Case/Control	Single	1 (3.13%)	4 (6.25%)
		Married	2 (6.25%)	2 (3.12%)
		Not Applicable	29 (90.63%)	58 (90.63%)
8	Marital Status of the family	Married	32 (100%)	62 (96.88%)
		Single	0	2 (3.12%)
9	Occupation of the family	Farmer	27 (84.38%)	51 (79.69%)
		Housewife	1 (3.13%)	3 (4.69%)
		Daily Laborer	0	1 (1.56%)
		Merchant	1 (3.13%)	7 (10.94%)
		Employed	3 (9.38%)	2 (3.13%)

Table 1.2.7: Bivariate analysis of some variables for measles outbreak, Limmu Seka Woreda, Jimma Zone, Oromia Region, Ethiopia, February 2017 G.C

S.No	Variables	Category	Case	Control	OR (95%CI)	P-Value
1	Educational level of family	Illiterate	19 (59.38%)	29(45.3%)	1.76 (0.75-4.2)	0.196
		Literate	13 (40.63%)	35(54.7%)		
2	Presence of sick person in the house	Yes	23 (71.88%)	6 (9.4%)	24.7 (7.9-77.3)	0.000
		No	9 (28.13%)	58(90.6%)		
3	Being Vaccinated	Yes	9 (28.13%)	50(78.1%)	0.11 (0.04-0.29)	0.000
		No	23 (71.88%)	14(21.9%)		
4	Having travel history	Yes	22 (68.75%)	25(39.1%)	3.4 (1.4-8.4)	0.007
		No	10 (31.25%)	39(60.9%)		
5	Having contact with measles case	Yes	27 (84.38%)	27(42.2%)	7.4 (2.5-21.7)	0.000
		No	5 (15.63%)	37(57.8%)		
6	Having knowledge on mode of transmission	Yes	6 (18.75%)	45 (70.3%)	0.1 (0.04-0.28)	0.0001
		No	26 (81.25%)	19 (29.7%)	10.3 (3.6-28.9)	
7	Ventilation status of the house	Ventilated	8 (25%)	36 (56.25%)	0.26 (0.1-0.66)	0.005
		No	24 (75%)	28 (43.75%)	3.86(1.5-9.88)	0.005
8	Having knowledge as measles is vaccine preventable	No	12 (37.5%)	7 (10.94%)	7.2 (2.3-22.2)	0.001
		Yes	6 (18.75%)	43 (67.19%)		
		Don't know	14 (43.75%)	14 (21.88%)		
9	Having knowledge how people get measles virus	Don't know	18(56.25%)	17(26.56%)	3.56 (1.5-8.7)	0.005
		Contact with case	14 (43.75%)	47 (73.44%)		
10	What you do after you get sick?	Stayed at home	5 (15.6%)	1 (1.6%)	11.7(1.3-104.6)	0.028
		Visited health facility	27 (84.4%)	63 (98.4%)		

As it was displayed on the table three above, bivariate analysis of some independent variables was done. Accordingly, presence of sick person in the same house is identified as one of the statistically significant risk factors with odd ratio (OR) 24.7 [95% CI=7.9-77.3, P=0.000]. The action they take after got sick of measles also determined as associated risk factors for measles transmission with OR=11.67 [95% CI=1.3-104.6, P= 0.028]. Living in confined house condition of the study participants showed statistically significant association for the spread of measles outbreak in the area, OR=3.86 [95% CI =1.5-9.88, P=0.005]. Bivariate analysis of family‘s education and their knowledge on how people get measles virus identified as statistically significant association with OR=1.76 [95% CI of 0.75-4.2] and OR=3.56 [95% CI of 1.46-8.67, P= 0.005] respectively (Table 1.2.8).

Table 1.2.8: Multivariate versus bivariate analysis of some variables for measles outbreak investigation in Limmu Seka Woreda, Jimma Zone, Oromia, Ethiopia, February 2017 G.C

S.No	Risk Factors	Crude OR(95%CI)	AOR (95% CI)	P-Value
1	Presence of sick person in the house	24.7 (7.9-77.3)	9.67 (2.04-45.74)	0.004
2	Being Vaccinated	0.11 (0.04-0.29)	0.12 (0.02-0.68)	0.016
3	Having travel history	3.4 (1.4-8.45)	11.3 (1.35-94.7)	0.025
4	Having contact with measles case	7.4 (2.5-21.7)	6.6 (1.4-31.16)	0.017
5	Having knowledge on mode of transmission	0.1 (0.04-0.27)	0.15 (0.04-0.62)	0.009
6	Living in unventilated house	3.86(1.5-9.88)	1.07 (0.24-4.74)	0.93

1.2.5 Discussion

According to the national measles guide line, three or more laboratory confirmed cases were needed to declare an outbreak of measles. Therefore, we confirmed the existence of measles outbreak by collecting five blood samples and sent to national laboratory (EPHI) and all tested samples (100%) were IgM positive. This result is similar with study conducted in Zimbabwe (10).

Among measles cases registered on line list, majority 28 (37.3%) of cases were between age of 5-14 which was followed by 25 (33.3%) of 15-24 age and 19 (25.3%) of 25-34 age group. The mean age of the cases was 9 ± 5.9 SD. About 38 (50.7%) of cases were female population. This study is similar with studies results found in Ethiopia during 2014 and 2015, that 39% and 52.4% of confirmed measles cases were between ages of 5-14 respectively (6, 7). But finding of this outbreak was not similar with study conducted in North India; the proportion of the males in study areas were high (43, 62.3%) as compared to females (26, 37.7%) (11). Since travel history before onset of rash and contact with measles cases had significant association with odd ratio (OR) of 11.3 (95% CI=1.35-94.7, P=0.025) and 6.6 (95% CI= 1.4-31.16, P= 0.017) respectively, more affected group were school aged children which was again supported by our study that, among 32 cases assessed by case control 11 (34.38%) were student. Being student obvious will increase chance of contact with other children. And high proportion of female affected may be related to their high contact with measles cases in house as care giver.

Overall attack rate (AR) of the measles outbreak against woredas population was 0.4/1,000 population and age specific attack rate (ASAR) were 1/1,000 for under five children and 0.6/1000 population for under fifteen years children of the woreda. Gender AR rate was also calculated and it was 0.4/1,000 female population. Case fatality rate of this outbreak was as high as 4% which is slightly lower than the study conducted by WHO weekly epidemiologic record and Global Measles and Rubella strategic plan which showed that, in developing countries, case-fatality rates among young children may reach 5–10% and 5–6% respectively and exactly similar with study finding of Zimbabwe (1, 3, 10).

About 35 (46.67%) of cases caught by line list had unknown history of measles vaccination followed by 26 (34.66%) with zero vaccination status. This is also true for cases assessed by case control study that only 9 (28.13%) cases had history of measles vaccination, for which none of them were present card given for immunization. This study is similar with study conducted in Zimbabwe, 83.6% of cases were not vaccinated (10).

As the major expected complication of measles were pneumonia, diarrhea and ear discharging, 21 (65.63%) cases ruled out with pneumonia and managed accordingly.

In bivariate analysis, being vaccinated against measles OR 0.11 (95%CI 0.04-0.29, P= < 0.0001) and having knowledge on mode of transmission OR= 0.1 (95% CI 0.035-0.275, P= < 0.0001) had protective association with the outbreak while presence of sick person in the house, OR =24.7(95% CI, 7.9-77.3, P=<0.0001), having travel history two weeks before rash onset, OR=3.4

(95% CI, 1.4-8.4, P= 0.007) and contact with case OR= 7.4 (95% CI, 2.5-21.7, P= <0.0001) had statistically significant association with the measles outbreak in Limmu Seka Woreda. This implies that those cases having travel history and contact with other acute measles cases had 3.4 and 7.4 times more chance of getting measles virus than those who had not such history.

In multivariate analysis of measles outbreak investigation in Limmu Seka Woreda, being vaccinated for measles infection and having knowledge on mode of measles virus transmission were remain protective factor for developing the disease and statically significant with adjusted odd ratio (AOR) of 0.12[95% CI = 0.02-0.68, P= 0.016] and 0.15 [95% CI=0.04-0.62, P=0.009] respectively, which is similar with the study done in Dedesa Woreda and there was a significant difference between vaccinated and unvaccinated groups with AOR 0.13 [95% CI=0.05-0.37, P= 0.0001] (12). Travel history and contact with measles cases were also remain statistically significant independent risk factors found by this outbreak investigation with AOR of 11.3 [95% CI=1.35-94.7, P=0.025] and 6.6 [95% CI=1.4-31.16, P=0.017] which is again similar with study finding of Didesa Woreda and that of Zimbabwe which showed contact with a case AOR=41.14 [95%CI: 7.47-226.54] (10, 12).

1.2.6 Conclusion

Majority of the cases affected by the outbreak were 5-14 years old children. Lack of information on measles mode of transmission, contact with measles case and being unvaccinated were independent factors associated with the outbreak in the woreda.

1.2.7 Recommendation

Therefore, children less than fifteen years old in the woreda have to be targeted for identification and mass vaccination for measles. Similarly, continues awareness creation on mode of transmission, early detection and isolation family member who develop sign of measles and give advocacy as measles is one of the diseases that can be prevented by measles vaccine.

1.2.9 Reference

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Chapter-II Surveillance Data Analysis

2.1 Measles Surveillance Data Analysis, Guji Zone, Oromia Region, Ethiopia, 2011 to 2015.

Executive summary

Background: Measles is highly contagious virus infection. Despite the availability of a safe and highly effective vaccine, measles remains one of the leading causes of vaccine-preventable deaths in children of under five years of age worldwide, especially in developing countries; with up to 20% of these deaths occur in under one year. We analyzed five years measles data to identify morbidity and mortality trends in Guji Zone, Oromia Region. Guji Zone is one of the eighteen zones found in Oromia Regional State. The zone reported significant numbers of measles cases every year. The study was intended to analyze the magnitude and epidemiology of measles cases reported during the past five years, to understand its trends and propose recommendation.

Methods: We conducted cross sectional descriptive study by reviewing measles data from line list and case based registration of Guji Zone, Southeast Oromia from 24 February to 09 March 2016. We used Micro Soft Excel and Epi Info version 7.10 to analyze 2011 to 2015 measles data.

Result: A total of 4,319 measles cases were registered by surveillance system. Among these cases 163 (3.75%) were lab. Confirmed, 1605 (37.16%) were epidemiologic linkage, 2267 (52.49%) were clinically compatible, 192 (4.45%) were discarded cases and 93 (2.15%) cases were pending. The cumulative incidence rate was 2.5/1,000 persons. The most affected age group is under 5 years (ASAR: 951/100,000). Male constituted 51.35% of cases. The median age of cases was three years [range: 1 month- 60 years old]. About 2,074 (48%) were unknown vaccination status while 32.76% and 18.15% were never vaccinated and vaccinated with one dose respectively. Girja (8.2/1,000) and Hambela Wamena (8/1,000) were the most affected woredas during the study period.

Conclusion: Approximately equal numbers of cases were reported by gender and the most and the least affected age groups were 1-4 and ≥15 years respectively. Majority of cases were either not vaccinated or their vaccination status were unknown. To control anticipated outbreak and to achieve 2020 measles elimination goal, measles vaccination campaign for < 15 years children and strong surveillance activities should be maintained.

Keywords: Measles, Surveillance data, Guji, Oromia, Ethiopia

2.1.1 Introduction

Measles is a highly infectious viral disease caused by a Morbillivirus and for which humans are the only reservoirs. Transmission is primarily person-to-person via aerosolized droplets or by direct contact with the nasal and throat secretions of infected persons. In a non-immune person exposed to measles virus, after an incubation period of about 10 to 12 days (range 7-18 days), prodromal symptoms of fever, malaise, cough, coryza (runny nose), and conjunctivitis appear. Within 2 - 4 days of the prodromal symptoms, a rash made up of large, blotchy red spots (maculopapular 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. Individuals with measles are infectious 2 - 4 days before through 4 days after rash onset (1).

Measles is an acute contagious viral infection that usually affects children and young adults. It is a mild self-limiting illness that presents with fever, maculopapular rash, malaise and mild conjunctivitis. However, 20–50% of all rubella infections occurs without a rash, or is subclinical. Measles is transmitted by airborne droplets when infected people sneeze or cough (2).
The rash is caused by an allergic response due to the union of sensitized lymphoid cells and measles antibody with the virus in the skin. A similar reaction occurs in the epithelium, leading to conjunctivitis, stomatitis, pneumonitis and acute inflammation of the gastro-intestinal tract. This allergic reaction clears the virus and is followed by a period of anergy during which many immune responses are greatly diminished. This immuno-suppression, which may last for many weeks, results in increased susceptibility to other infections such as those caused by pneumococcus (3).

Measles is a highly infectious disease and may cause extensive epidemics. Despite the availability of a safe and highly effective vaccine, measles still remains one of the leading causes of vaccine-preventable deaths in children of under five years of age worldwide, especially in developing countries, with up to 20% of these deaths occurring in under one years of age (4).
Many children experience uncomplicated measles. However, in about a one third of the cases, measles is followed by at least one complication caused by disruption of epithelial surfaces and immunosuppression. 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 five years of age. Most measles deaths (98%) occur in developing countries, where vitamin A deficiency is common. The case fatality rates in developing countries are normally estimated to be 3-5%, but may reach 10-30% in some situations like epidemic time. This compares with 0.1% in many industrialized countries. Through synergy with measles infection, vitamin A deficiency contributes to the estimated 1 million childhood deaths from measles every year. Half of the childhood corneal blindness in developing countries is attributable to vitamin A deficiency and half to measles infection (1, 3).

Measles is one of the communicable diseases still causing preventable mortality and morbidity in the country.

In 2001, countries in the World Health Organization (WHO) African Region began accelerated measles control activities to reduce measles deaths by half by 2005 compared to the estimated number of measles deaths in 1999. Implementation of the recommended strategies led to a 75% reduction in estimated measles mortality in the African Region by 2005. Following this progress, in 2006 the African Region adopted a goal to achieve 90% measles mortality reduction by 2010 compared with the estimate for 2000. By 2008 in the African Region, reported measles cases decreased 93% and estimated measles mortality decreased 92% compared with 2000. The strategies include improving routine vaccination coverage, providing a second opportunity for measles vaccination through supplementary immunization activities (SIAs), improving measles-case management, and establishing case-based measles surveillance. Since 2002, Ethiopia adopted these regional goals and strategies and has been taking important steps to control measles. The Africa Region as well as Ethiopia is working towards measles elimination by 2020 (as indicated in Resolution AFR/RC61/WP/1: Measles elimination by 2020: A strategy for the African Region, 61st Regional Committee meeting 2011 (5).

The Ethiopian Ministry of Health (MOH) has started implementing an accelerated measles control strategy through supplemental immunization activities (SIAs) since 1998. Between 2002 and 2004, a series of emergency and catch-up measles immunization and vitamin A supplementation campaigns were conducted in phases throughout the country, with average national measles immunization coverage of 92%. Since 2005 sub-national level follow-up SIAs have been conducted in phases. Following these nationwide catch-up campaigns, case-based measles surveillance was initiated in 2003, for detection, investigation and control of small and/or limited outbreaks promptly, which can eventually lead to the elimination of measles altogether. Recently measles has been occurring with increased frequency in several areas of the country. In 2006, widespread outbreaks occurred in 74 districts and in ten of the 11 regions (6).

2.1.1.1 Significance of the study

Measles is a highly communicable infection. Despite the remarkable progress made in measles control with the introduction of measles vaccination, it is estimated that in 1997 nearly one million deaths from measles still occurred, half of them in Africa. Outbreaks of measles continue to occur even in highly vaccinated populations (3). Measles is of public health importance because of its teratogenic effect on the fetus if the mother is infected in early pregnancy or just before conception. In the World Health Organization (WHO) African region, routine measles vaccination is offered at nine months of age but about 15% of children vaccinated at this age will not develop protective immune response(7). In addition, not all children will receive measles vaccine (4). In the last five years there were significant numbers of measles outbreak in Ethiopia in general and Oromia Region in particular. In contrary to the control and elimination activities performed, there were a numbers of measles outbreaks in Ethiopia from year to year. In 2012, 146 outbreaks in 125 woredas, 243 measles outbreaks were confirmed in 2013 and 192 affected woredas, 302 outbreaks were registered and 249 woredas were affected by 2014 (8, 9).

As data obtained from regional PHEM core process indicated that, measles cases reported from case based by weekly IDSR during 2014 and 2015 were 2,125 and 19,028 respectively. Whereas reports of Guji Zone from case based by weekly IDSR during similar period showed 593 and 1,506 respectively. This data did not include measles cases reported by line list to the region. Due to these significant numbers of measles cases reported from Guji Zone and its surveillance data was never analyzed in previous year, we decided to conduct five years measles surveillance data analysis started from 2011. Similarly this study intended to come up with valuable recommendation to reduce measles related morbidity and mortality and other public health impact in the zone.

2.1.2 Objectives

2.1.2.1 General objective

To analyze the epidemiology of measles cases in Guji Zone, Oromia Regional State, Ethiopia, from 2011 to 2015 G.C

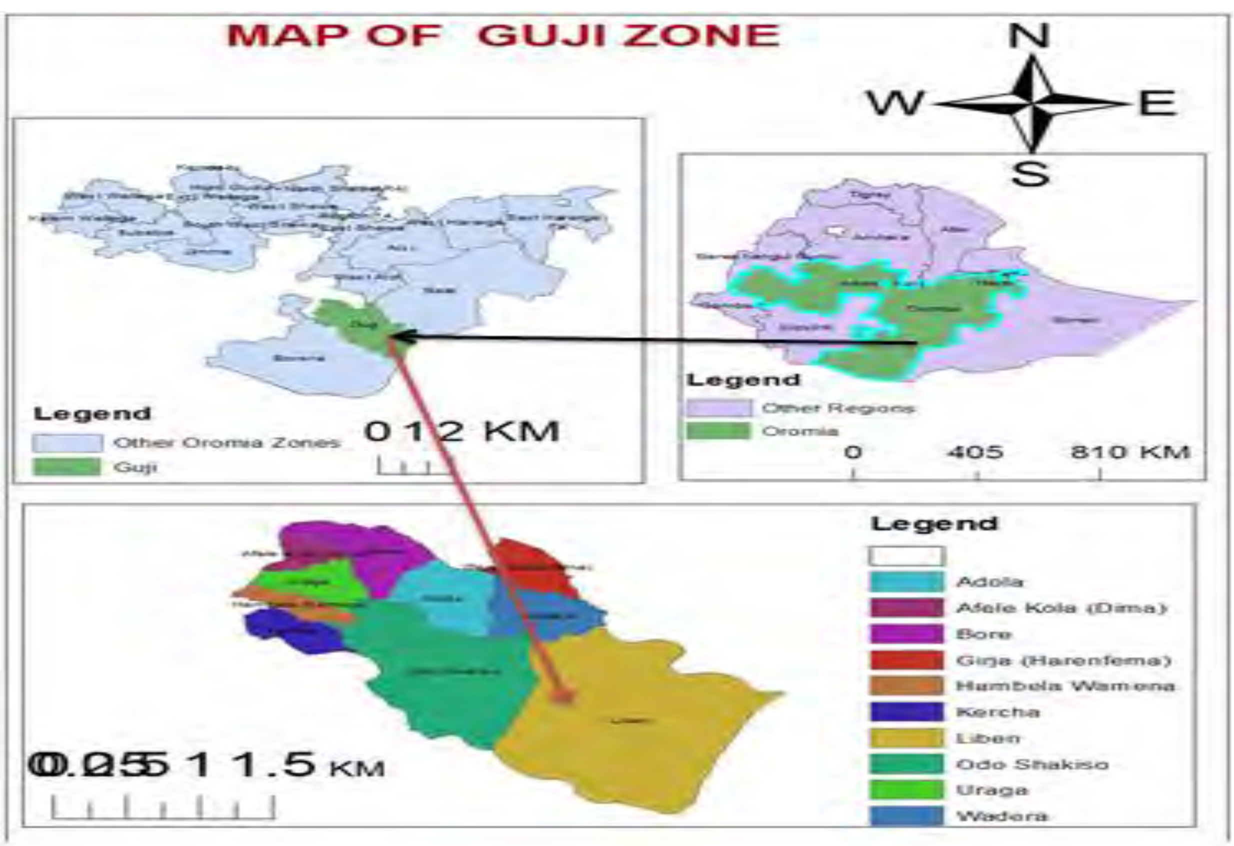
2.1.2.2 Specific objectives

- ✓ To describe the distribution of Measles Cases in terms of time, place and person in Guji Zone, 2011-2015 G.C.
- ✓ To assess socio-demographic characteristics of Measles Cases in Guji Zone, 2011-2015 G.C.
- ✓ To assess vaccination status of Measles Cases in Guji Zone during 2011 to 2015 G.C.
- ✓ To analyze geographical and time based trends of Measles Cases, from 2011 to 2015 G.C.

2.1.3 Methods and materials

2.1.3.1 Study area

We conducted a five years measles surveillance data analysis in Guji Zone, Oromia Region, Ethiopia, 2016. Guji Zone is one of the eighteen zones found in Oromia Regional State, and 600 KM far from Addis Ababa, the capital city of Ethiopia in the south direction. Its boundaries are Bale Zone in east, Somale Regional State in southeast, Borena Zone in southwest and SNNPR in north and northwest. Guji Zone has 13 woreda and three towns, 322 rural and 38 town kebeles. Liben, Goro Dola, Wadera, Girja and Saba Boru are totally pastoralist woredas. As estimation of 2007 population census, the total population of the zone by 2015/2016 was 1,839,605 of which male to female ratio is 1:1. Guji Zone has area of 35,454 square kilometers, and population density is calculated to be 52 persons per one square kilometer. Guji Zone is found at latitude of $4^{0}40'$- $6^{0}24'$N and longitude of $38^{0}40'$E and altitude of 500-3500 meters above sea level.



Annexes 2.1.3: Administrative Map of Guji Zone, Oromia Region, Ethiopia, February 2016 G.C

2.1.3.2 Study period

We collected secondary data of measles case reported from Guji Zone during the last five years from 24 February to 09 March, 2016 G.C.

2.1.3.3 Study design

We conducted descriptive cross –sectional study design to collect Measles Cases reported by line list and case based in Guji Zone, Oromia Region from 2011-2015 G.C.

2.1.3.4 Study subject

The study subjects were all Measles Cases registered and reported either as line lists or case based during a period of 2011 to 2015 G.C.

2.1.3.5 Inclusion criteria

Measles cases and deaths reported during 2011 to 2015 with required variables to be fully described enough.

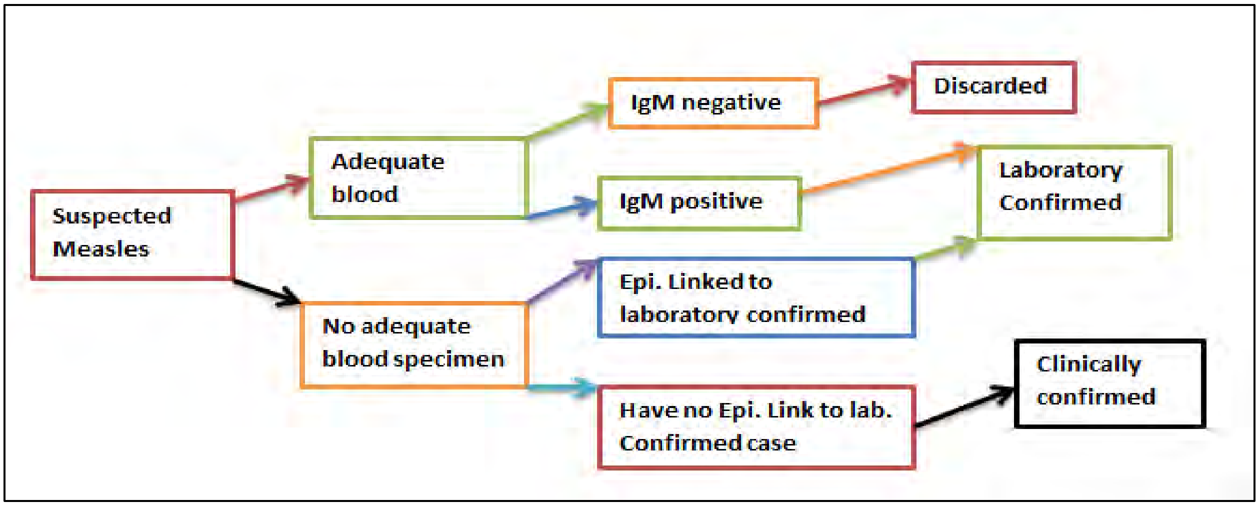
2.1.3.6 Exclusion criteria

Measles cases and deaths with incomplete variables when registered on line list or case based form.

2.1.3.7 Case definitions

Suspected measles case: Any person with generalized maculopapular rash and fever plus one of the following symptoms: cough or coryza (runny nose) or conjunctivitis (red eyes).

Laboratory confirmed case: A suspected case which has laboratory results indicating infection for IgM positive or isolated for a measles virus and linked epidemiologically to a laboratory-confirmed case.



Annexes 2.1.4: Laboratory confirmed flow chart in measles case definition.

Epidemiologically linked case: A suspected measles case that has not had a specimen taken for serologic confirmation and is linked (in place, person and time) to a laboratory confirmed case; i.e., living in the same or in an adjacent woreda/district with a laboratory confirmed case where there is a likelihood of transmission; onset of rash of the two cases being within 30 days of each other.

Measles death: For surveillance purposes, a measles death is defined as any death from an illness that occurs in a confirmed case or epidemiologically linked case of measles within one month of the onset of rash.

Clinically compatible case: A suspected measles case that has not had a blood specimen taken for serologic confirmation and is not linked epidemiologically to any lab confirmed case of measles. Suspected measles cases that have no definite proof of recent infection (measles IgM test indeterminate repeatedly) may also be classified as compatible.

Pending case: A suspected measles case that specimen has been collected but laboratory result not yet returned.

Discarded case: A suspected measles case that has been completely investigated, including the collection of an adequate blood specimen and it lacks serological evidence of measles virus infection.

2.1.3.8 Data collection methods

We reviewed and collected secondary data of measles cases for the last consecutive five years during 2011-2015 that documented on line lists and case based registration form in Guji Zone Health Department by using structured checklist. We also made interview and discussion with some responsible persons to get data of measles vaccination coverage, socio-demographic characteristics and other information about general background of the zone.

2.1.3.9 Data analysis

We used Epi Info 7.1.0.6 and Microsoft Excel 2010 to organize and analyze the data in descriptive epidemiology. The five years measles data organized by excel into appropriate variables and imported to Epi info for analysis.

2.1.3.10 Data dissemination and use

We prepared and shared the final written report of both hard and soft copies to Guji Zone Health Department, AAU School of Public Health, Oromia Regional Health Bureau and other stakeholders in order to create incentives for evidence-based decision making.

2.1.4 Result

Total measles case registered and reported during a period of 2011 to 2015 from Guji Zone were 4319. Among these cases 2218 (51.4%) were male and 2101 (48.6%) were female.

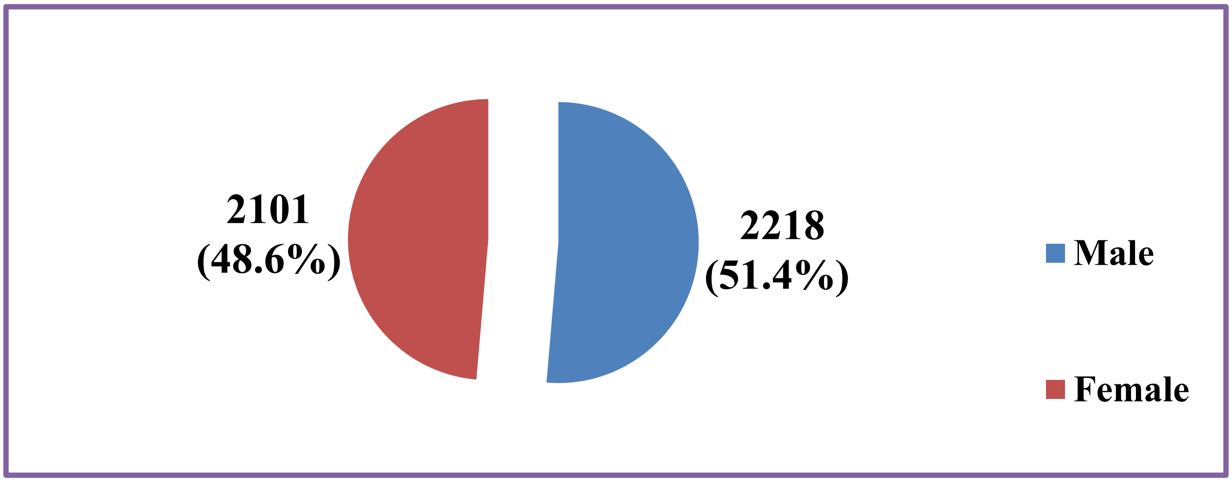


Figure 2.1.13: Distribution of Measles Cases by Sex during 2011 to 2015, Guji Zone, Oromia, Ethiopia, February 2016 G.C.

Table 2.1.9: Distribution and Proportion of Measles Cases by Age Group, during 2011 to 2015, Guji Zone, Oromia, Ethiopia, February 2016 G.C.

Age group	Male	Female	Total	% by age group
< 1 years	274 (12.36%)	214 (10.19%)	488	11.3
1-4 years	1120 (50.5%)	1059 (50.40%)	2179	50.45
5- 14 years	699 (31.53%)	633 (30.31%)	1332	30.48
15-29 years	114 (5.14%)	173 (8.23%)	287	6.65
30-44 years	9 (0.41%)	20 (0.95%)	29	0.67
≥45 years	2 (0.09%)	2 (0.1%)	4	0.09
Total	**2218 (51.4%)**	**2101 (48.6%)**	**4319**	**100**

Among the total measles cases reported during a period of 2011 to 2015, 2179 (50.45%) were 1-4 years of age. Thirty and above years of age constitute only 0.76% of all cases. The median age of the cases was three years (range: one month to 60 years).

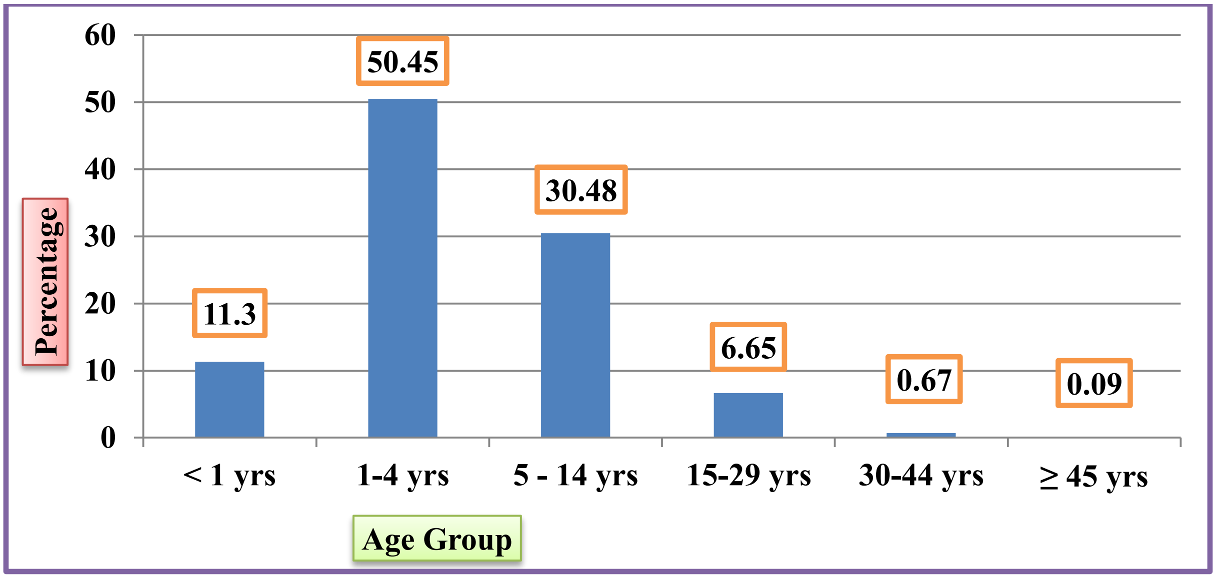


Figure 2.1.14: Distributions of Measles Cases by Age Group during 2011-2015, Guji Zone, Oromia, Ethiopia, February 2016 G.C.

Out of the total reported measles cases during 2011 to 2015 in Guji Zone, 1,768 (40.9%) were confirmed measles cases whereas, 2267 (52.49%) were clinically compatible.

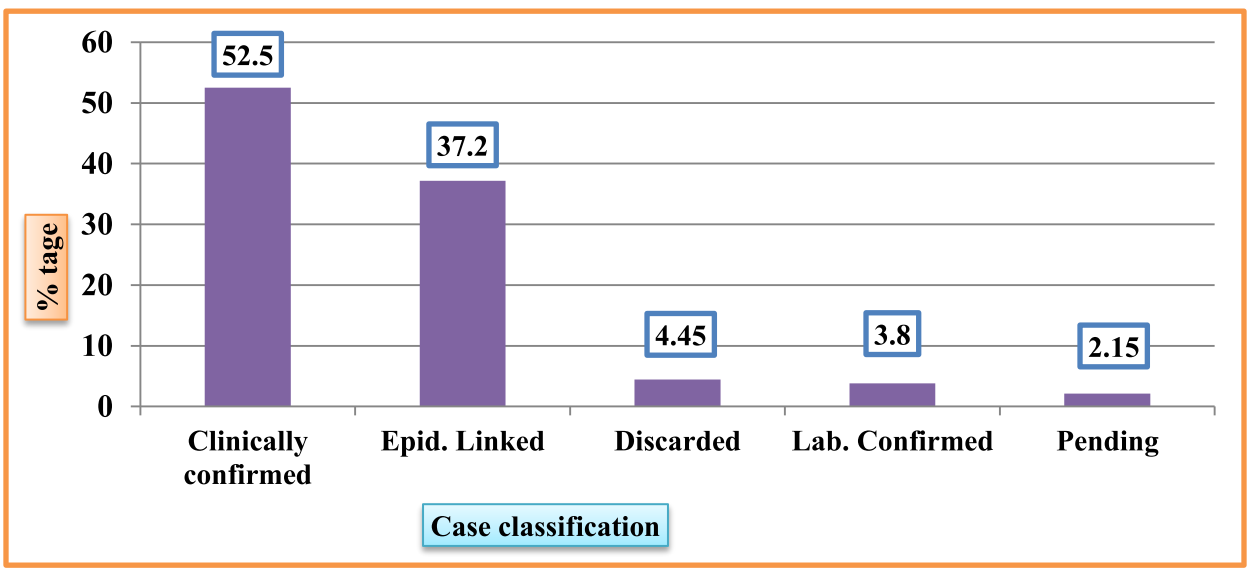


Figure 2.1.15: Final Classifications of Measles Cases during 2011-2015, Guji Zone, Oromia, Ethiopia, February 2016 G.C.

Out of laboratory confirmed measles cases during 2011 to 2015 in the study area, 66 (40.74%) were 5-14 years followed by 1-4 years 54 (33.33%) and 15-29 years 28 (17.28%) age groups.

The youngest and the oldest laboratory confirmed measles cases were a two months infant and a 30 years old man respectively.

Age specific incidence and case fatality rate (CFR) were determined during 2011 to 2015 separately. In 2011, the higher incidence of measles cases were found to be 3.4/100,000 and 2.3/100,000 among < 1 and 5-14 years of age groups respectively with no death. In 2012, the higher incidence of measles cases were found to be 8.1/100,000 and 3.4/100,000 among 1-4 and < 1 years of age groups respectively with no death. In 2013, the higher incidence of measles cases were found to be 38/100,000 and 30/100,000 among < 1 and 1-4 years of age groups with average CFR of 1.5%. In 2014, the higher incidence of measles cases were found to be 36/100,000 and 20/100,000 among 1-4 and < 1 years of age group respectively with no death report. In 2015, the higher incidence of measles cases were found to be 848/100,000 and 660/100,000 among 1-4 and < 1 years of age groups respectively with average CFR of 0.6% [Table 2.1.10].

Numbers of measles cases reported during 2011 to 2015 were 53 (1.2%), 39 (0.9%), 205 (4.7%), 209 (4.8%) and 3813 (88.3%) respectively in consecutive five years.

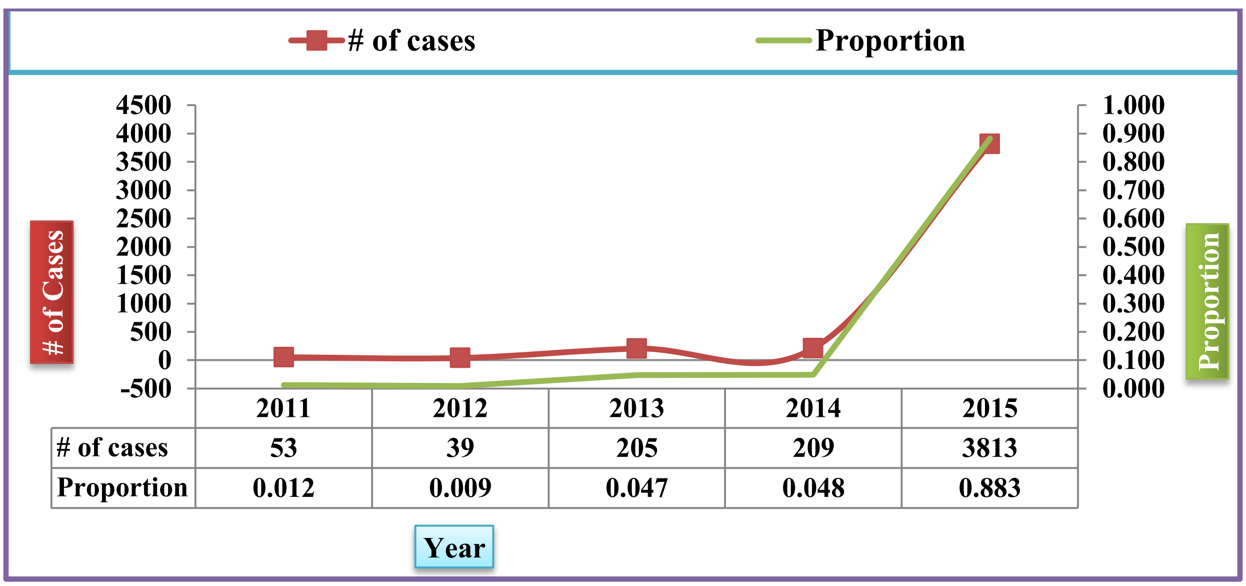


Figure 2.1.16: Numbers and Proportion of Measles Cases during 2011 -2015, Guji Zone, Oromia Region, Ethiopia, February 2016 G.C.

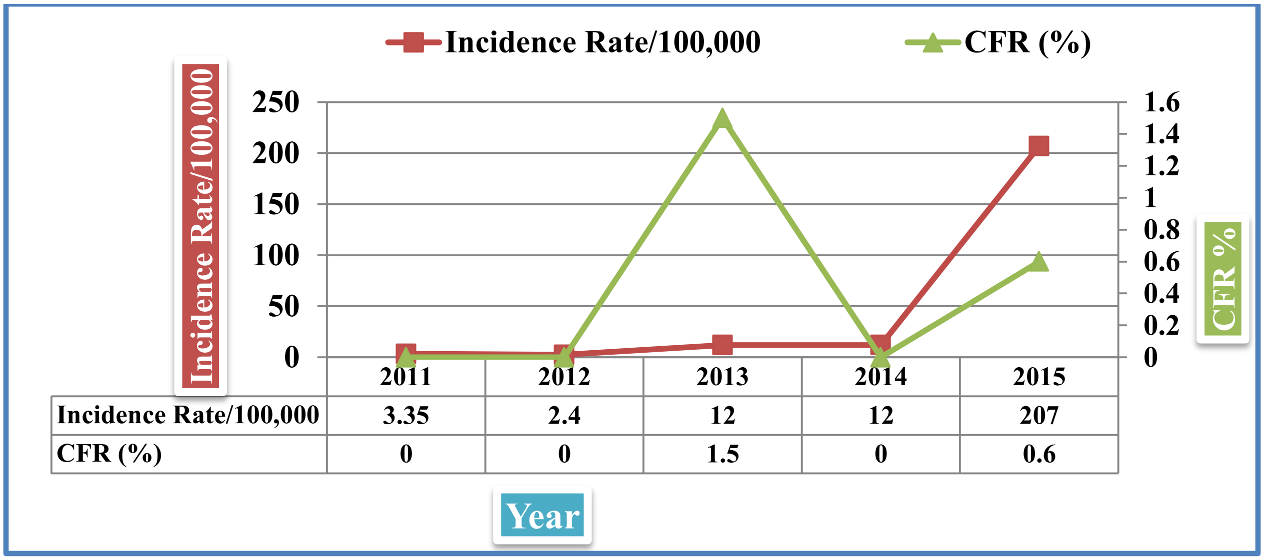


Figure 2.1.17: Trends of Incidence and Case Fatality Rate of Measles Cases by Year, Guji Zone, Oromia Region, Ethiopia, February 2016 G.C

Table 2.1.10: Age Specific Incidence and Case Fatality Rate of Measles Cases during 2011-2015, Guji Zone, Oromia Region, Ethiopia, February 2016 G.C.

Year	Age group	Population	# of cases	% of cases	Incidence Rate/100,000	# of Measles Death	CFR (%)
2011	<1	56,990	13	24.53	2.28	0	0
	4-Jan	202,789	16	30.19	8	0	0
	14-May	494,069	17	32.08	3.44	0	0
	>=15	829,518	7	13.21	0.84	0	0
	Sub-total	**1,583,366**	**53**	**1.23**	**3.35**	**0**	**0**
2012	<1	59,141	2	5.13	3.38	0	0
	4-Jan	210,442	17	43.56	8.1	0	0
	14-May	512,717	15	38.46	2.92	0	0
	>=15	860,825	5	12.82	0.58	0	0
	Sub-total	**1,643,125**	**39**	**0.9**	**2.4**	**0**	**0**
2013	<1	60,856	23	11.22	38	1	4.34

Year	Age group	Population	# of cases	% of cases	Incidence Rate/100,000	# of Measles Death	CFR (%)
	4-Jan	216,545	65	31.71	30	0	0
	14-May	527,585	73	35.61	14	2	2.74
	>=15	885,789	44	21.46	5	0	0
	Sub-total	**1,690,775**	**205**	**4.75**	**12**	**3**	**1.5**
2014	<1	64,359	13	6.22	20	0	0
	4-Jan	229,012	83	39.71	36	0	0
	14-May	557,960	90	43.06	16	0	0
	>=15	936,786	23	11.01	2.45	0	0
	Sub-total	**1,788,117**	**209**	**4.84**	**12**	**0**	**0**
2015	<1	66,226	437	11.46	660	2	0.5
	4-Jan	235,653	1998	52.4	848	14	0.7
	14-May	574,140	1137	29.82	198	6	0.53
	>=15	963,953	241	6.32	25	1	0.41
	Sub-total	**1,839,972**	**3813**	**88.28**	**207**	**23**	**0.6**
Total average	<1	61,514	488	11.3	793	3	0.61
	4-Jan	218,888	2179	50.45	996	14	0.64
	14-May	533,295	1332	30.84	250	8	0.6
	>=15	895,374	320	7.4	36	1	0.31
	Total	**1,709,071**	**4319**	**99.99**	**253**	**26**	**0.6**

Table 2.1.11: Distribution of Measles Cases reported during 2011 to 2015 by Woreda in Guji Zone, Oromia Region, Ethiopia, February 2016 G.C.

S. No.	Woreda	# of Case reported	Average Population	Incidence Rate/1,000
1	Adola Rede	327	130,909	2.50
2	Ana Sora	371	114,259	3.2
3	Bore	174	252,223	0.69
4	Dama	365	67,998	5.37
5	Girja	489	59,906	8.16
6	Goro Dola	92	95,927	0.96
7	Hambela Wamena	1001	125,248	7.99
8	Kercha	726	272,592	2.66
9	Liben	88	165,443	0.53
10	Negelle Town	11	49,385	0.22
11	Odo Shakiso	280	252,591	1.11
12	Saba Boru	26	64,010	0.4
13	Uraga	331	211,293	1.57
14	Wadera	34	61,143	0.56
15	Wama Hagalo	4	43,686	0.09
Total		**4319**		

The five years prevalence of measles cases were calculated by affected woredas. Accordingly Girja and Hambela Wamena were found to have high prevalence of measles cases during 2011 to 2015 G.C. Negelle Town and Liben Woreda were found to have low prevalence of measles cases during 2011 to 2015.

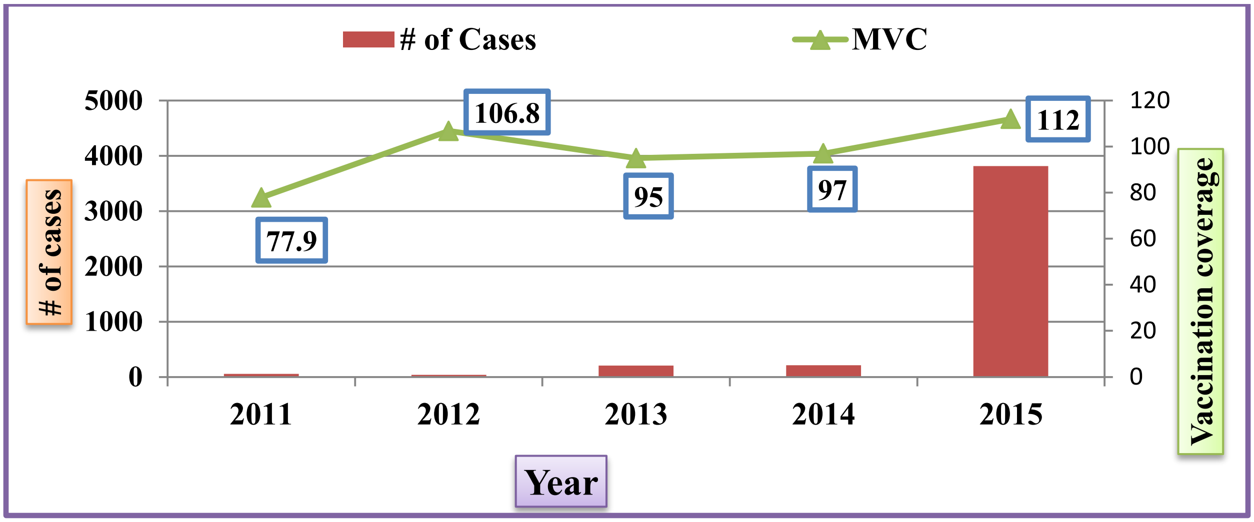
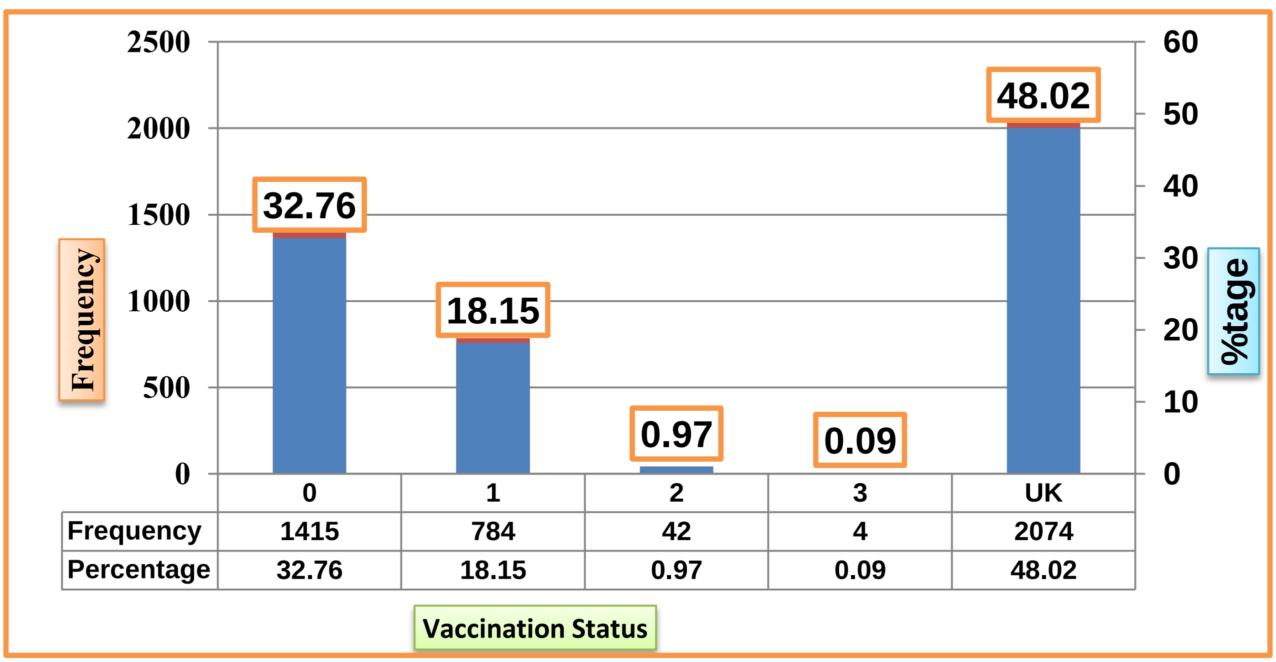


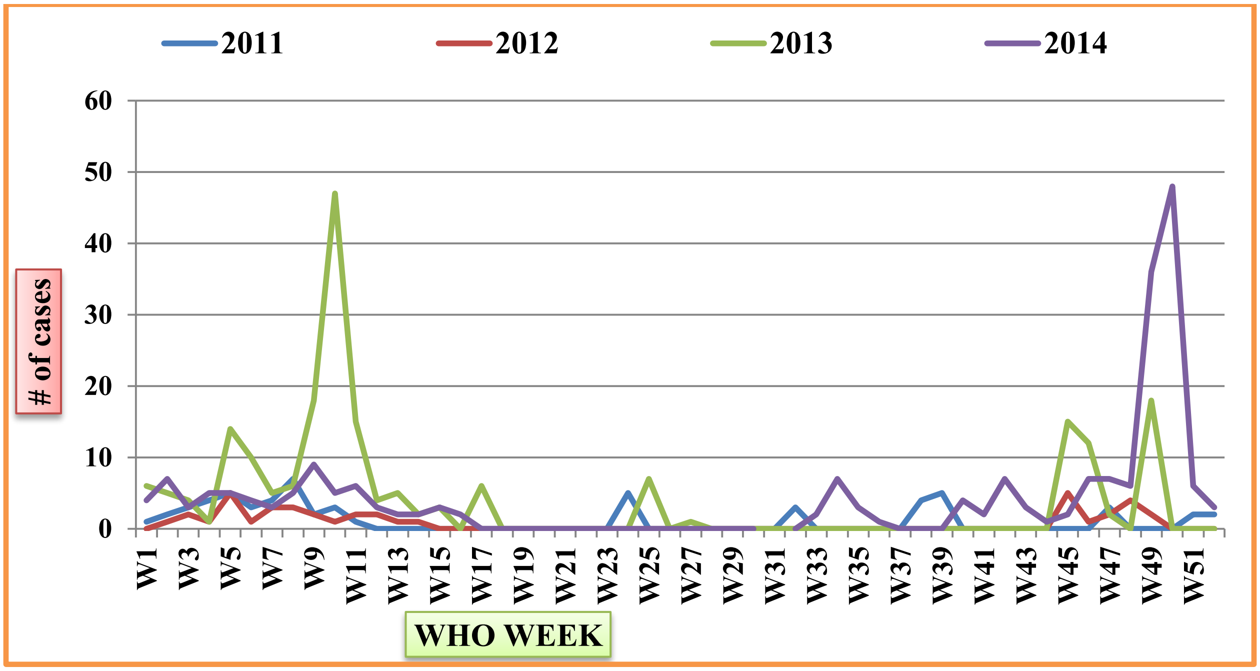
Figure 2.1.18: Measles Cases and Measles Vaccination Coverage during 2011-2015, Guji Zone, Oromia, Ethiopia, February 2016 G.C

Vaccination status of measles cases assessed during the study period. Among measles cases reported from Guji Zone during 2011 to 2015, number of cases not vaccinated and unknown vaccination status were 1415 (32.76%) and 2074 (48.02%) respectively.



	0	1	2	3	UK
Frequency	1415	784	42	4	2074
Percentage	32.76	18.15	0.97	0.09	48.02

Figure 2.1.19: Vaccination Statuses of Measles Cases during 2011-2015 in Guji Zone, Oromia, Ethiopia, February 2016 G.C



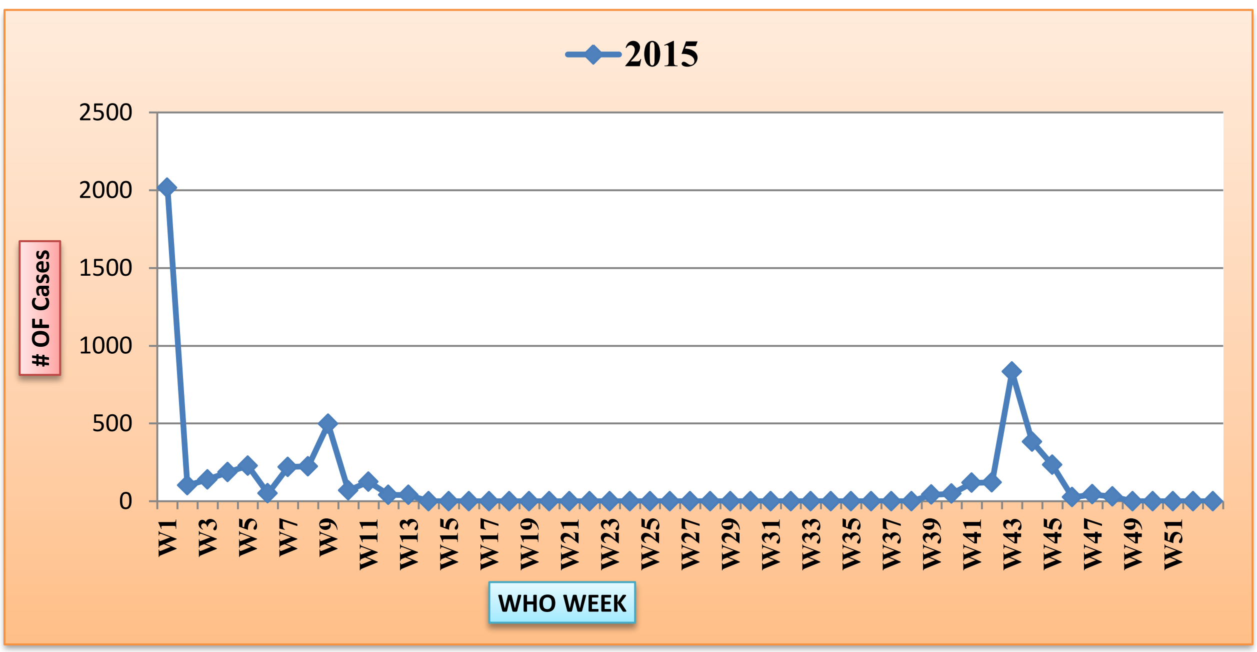


Figure 2.1.20: Trends of Measles Cases reported during 2011 to 2015 by WHO Week, Guji Zone, Oromia Region, Ethiopia, February 2016 G. C

During 2011 to 2015 period, trends of measles cases by WHO week were identified. As shown on figure 8 above, high numbers of measles cases were reported during the first and the last 10-12 weeks of the years.

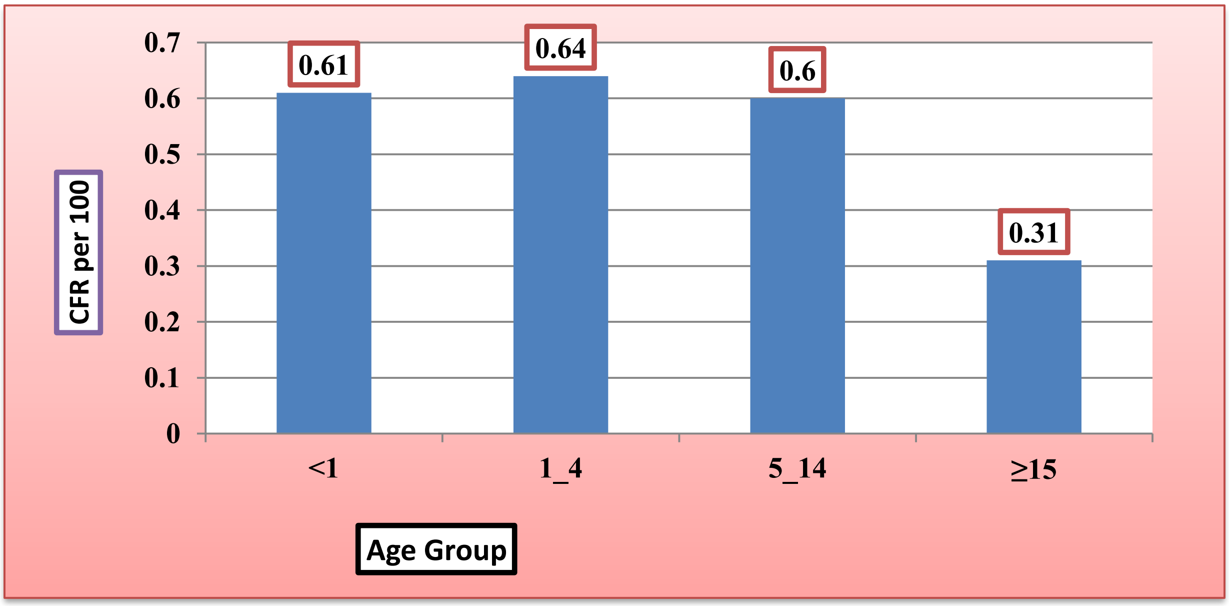


Figure 2.1.21: Measles Case Fatality Rate of by Age Group, during 2011 to 2015 in Guji Zone, Oromia Region, Ethiopia, February 2016 G.C.

During the five years period of time, case fatality rate was higher in under five years of age. And the least case fatality rate was recorded in greater than fifteen years of age.

2.1.5 Discussion

A total of 4,319 measles cases were reported during 2011 to 2015 and proportion of male to female affected was almost 1:1. This result was similar with national measles surveillance data analysis conducted in Ethiopia from 2005 to 2009 and that of Italy, which showed 51.9% and 53.1% of cases were male respectively (7, 10). Zonal cumulative incidence rate was 253 per 100,000 populations (average population of the five years). This study result was almost proportional to study conducted in Italy [range: 0.2-246.6/100,000] and much higher than that of Ethiopian national measles data analysis 7.6/100,000 populations (7, 10).

In an elimination program, the goal of the measles surveillance system is to conduct a complete epidemiological investigation on every reported suspected measles case and to have as few clinically confirmed measles cases as possible. Of the total confirmed measles cases, at least 80% should show laboratory confirmation of measles infection. Overall, 163 (3.75%) cases were laboratory confirmed, 1605 (37.16%) were confirmed by epidemiologic linkage, 2267 (52.49%) were clinically compatible.

Data of age and age group distribution were available for all 4319 measles cases. The higher proportions of age groups affected during a period of 2011 to 2015 were 1-4 years followed by 5-14 years of age with 2,179 (50.45%) and 1,332 (30.48%) respectively. Under five years of age contribute about 2,667 (61.75%) of the measles cases. Thirty and above years of age constitute only 33 (0.76%) of all cases. The median age of cases was three years old [range: one month to 60 years old]. This finding had similar proportional with study conducted in Ethiopia during 2005 to 2009 period; the age group 1 to 4 years old constitutes 41.7 % (7323) of the total suspected and 34.4% (1032) of the confirmed cases by laboratory measles IgM antibody (10). Incidence of measles cases by age group was also calculated in this assessment. The highest incidence (996/100,000) was seen in the age group of 1-4 followed by 793/100,000 in under one years of age. This result was different from study done in Italy that found; the highest incidence 1,130 (38.5%) was seen in the age group 15–19 years followed by the age group under one year with 181 (32.6%). Sixty-two per cent of cases were aged 15–44 years. The median age was 18 years (range: two months–78 years) and that of South Africa obtained the highest cumulative incidence in children aged <1 year (603/100,000 population), distributed as follows: <6 months (302/100,000), 6 to 8 months (1083/100,000) and 9 to 11 months (724/100,000). Cumulative incidence decreased with increasing age to low levels (2/100,000) in person ≥40 years (4, 7). And also South Africa study showed, children <5 years accounted for 52% (9,035/17,530) of cases, with 35% (6,122/17,530) aged <1 year which is proportional with our finding.

Among 4,319 measles cases studied, cases not vaccinated, vaccinated once, vaccinated twice, vaccinated ≥ 3 doses, and unknown vaccination status were 1415 (32.76%), 784 (18.15%), 42 (0.97%), 4(0.09%), and 2074 (48.02%) respectively. This study was similar with study conducted in Italy, (90.3%) were unvaccinated, 272 (5.5%) had received only one dose of measles-containing vaccine, 36 (0.7%) were vaccinated with two doses, and 172 cases (3.5%) had received at least one dose but the number of doses was unspecified. Among unvaccinated cases, 164 were too young to be vaccinated routinely (aged less than one year) but in our study

1-4 years cases account highest number among unvaccinated cases (6). Again this finding was proportional with study conducted in Ethiopia during the five years of reporting period that only 6.4% (1120) of cases get two or more vaccine doses, 31.3% (5490) get one dose, 26.9% (4718) not vaccinated and 35.3% (6192) with unknown vaccination status. During the five years period (2011-2015) measles case incidence was increased from 3.35 to 207/100,000 in Guji Zone. The highest (1.5%) case fatality rate was recorded during 2013 followed by 0.6% during 2015. Age specific case fatality rate was also determined during a period of 2011 to 2015. Accordingly the highest (0.64%) CFR was occurred in 1-4 age groups. The lowest (0.31%) CFR was occurred in cases of ≥ 15 years old. During 2011 to 2015, about fourteen woredas and one town were affected by measles case in Guji Zone. Among these affected woredas both proportions and incidence rate were higher in Girja (, 8.16/100,000) and Hambela Wamena (, 8/100,000). During these five years period, distribution of measles cases by WHO weeks was assessed in this zone. In all five years periods, high measles cases load were recorded in months of December, November, January and February. Measles vaccination coverage showed increment during 2011 to 2015 from 77.9 to > 100%, but still proportion cases were higher during 2015 which needs further assessment to answer this contradiction.

2.1.6 Conclusion

Approximately equal numbers of cases were reported by gender during the five years period. Both proportion and incidence rate of measles cases were occurred in 1-4 age groups. Above half of the cases were categorized as clinically compatible and only 3.8% cases were confirmed by laboratory. During these five years period, most cases (23%) were reported from Hambela Wamena followed by Kercha and Girja Woredas. Totally 80.78% of cases were either not vaccinated or their vaccination status were not known. Case fatality rate was higher in 1-4 years of age group and overall CFR of the zone found to be 0.6%. The highest CFR was occurred during 2013 compared to other four years period.

2.1.7 Recommendation

Since high proportions of cases were occurred in children of under five years of age, they should be targeted for mass vaccination. Those woredas with high proportions and incidence rate of measles cases should be identified and prioritized for appropriate measures such as strengthening surveillance and follow up their immunization activities. The zonal health department and woreda health offices should strengthen routine EPI programs and SIAs in order to reach unvaccinated children and susceptible groups in the zone. Since high percent of measles cases had unknown history of measles vaccination, recording at health facility levels and awareness creation at community levels in order to keep immunization card with them.

2.1.9 Reference

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Chapter –III Public Health Surveillance System Evaluation

3.1 Evaluation of Public Health Surveillance System, South West Shoa Zone, Oromia, Ethiopia February 2017 G.C

Executive summary

Introduction: Public health surveillance is the ongoing systematic collection, analysis, and interpretation of health-related data timely dissemination of these data for action and program evaluation. Conducting surveillance system evaluation is crucial for monitoring efficacy and effectiveness of interventional programs in health care system. This study is intended to evaluate surveillance system of Malaria and Measles detection, reporting, prevention and control activities in South West Shoa Zone.

Method: We conducted descriptive cross-sectional study to assess all activities related to Measles and Malaria surveillance activities, review of secondary data and interview was conducted in all selected facilities from February 1-22/2017. By using convenient sampling methods we selected zonal health department, five woredas, ten health centers and ten health posts were included in the study.

Result: National PHEM guideline and other manuals for case management of some prioritized diseases are available at zonal and at some visited woredas. At all visited sites, there was no written epidemic preparedness and response plan. As evidence obtained from central laboratory (EPHI) there were about 23 Measles laboratory results sent from different woredas of South West Shoa Zone during 2016/2017 only.

Majority (88.5%) of the respondents agreed as filling and reporting of these priority diseases not time consuming and they said averagely it took about 15-30 minutes.

Conclusion: Public health surveillance system in the assessed zone was represented by rural population as majority of the population living in rural area. Absence and/or shortage of different resources like budget, vehicles, computer and printer, network service and even megaphone for awareness creation may affect stability of surveillance system. In all visited sites written feedback were not given on regular and timely base. Due to different challenges mentioned in discussion part supportive supervision were not conducted according the schedule they prepared in a period of six months. Shortage of trained staffs on surveillance activities were observed in visited woredas of South West Shoa Zone, whereas health extension workers were never trained on basic PHEM activities.

3.1.1 Introduction

Public health surveillance is defined as the ―ongoing, systematic collection, analysis, interpretation, and dissemination of health data to help guide public health decision making and action". Reasons for conducting public health surveillance can include the need to assess the health status of a population, establish public health priorities, and reduce the burden of disease in a population by appropriately targeting effective disease prevention and control activities. Before data can be used for public health action, health related data must be collected by the public health system, analyzed, and disseminated to those responsible for taking action. The purpose of evaluating public health surveillance systems is to ensure that problems of public health importance are being monitored efficiently and effectively (1).

An effective health system is characterized by services that meet the health care needs of the population it serves. Sound health information systems are critical to measure the population‘s needs and to monitor the system performance. Notifiable disease surveillance plays an important role in health care service delivery as it is entails ongoing data collection, collation and analysis of data on priority diseases within a geographic area and in so doing guide public health planning and intervention.

Public Health surveillance is defined as the ongoing and systematic collection, collation and analysis of data and the prompt dissemination of the resulting information so that action can result. Communicable disease surveillance systems provide the information needed for public health planning, implementation of those plans and monitoring and evaluation of programmes as well as generating hypotheses that will, in turn, stimulate public health research. Surveillance can be either passive or active. Passive surveillance requires health providers to notify public health authorities of cases of disease when they are diagnosed in the course of health care. Active surveillance of a disease or condition entails the active search by health authorities, for the occurrence of the disease or condition in a defined population. This includes the search for the disease (or condition) in people in the general population who do not necessarily seek health care. Active surveillance thus places the onus of searching for cases and generation of information on the health authorities.

Every disease surveillance system should be analyzed and re-evaluated periodically to ensure that it addresses the current priority diseases within the region in which it operates and to improve performance where necessary. A communicable disease surveillance system should remain efficient and utilize opportunities for the integration and harmonization of activities between parallel chains of information flow (1).

The Ethiopian ministry of health has designed a new system to ensure rapid detection of any public health threats, preparedness related to logistic and fund administration and prompt response to and recovery from various public health emergencies. The system is fully integrated, adaptable, all-hazards and all health approach national preparedness and response system. The system comprised of four major components which are: Public Health Emergency Preparedness, Early Warning, Response, and Recovery. The major component of the early warning is surveillance of diseases (1).

The Objectives of the surveillance system in Ethiopia are:

- To detect epidemics/outbreaks so that they can be controlled in a timely manner,
- To predict epidemics so that health services can plan to respond, prevent where possible, treat and control priority diseases,
- To monitor trends of priority diseases in order that changing trends inform policy decision,
- To evaluate an intervention so that effective and efficient actions/policies are identified and supported.

The evaluation of surveillance systems should promote the best use of public health resources by ensuring that only important problems are under surveillance and that surveillance systems operate efficiently.

Ethiopia had introduced Integrated Disease Surveillance (IDS) in 1996, focusing on 17 priority communicable diseases. Two years later, in 1998, the 48th WHO Regional committee for Africa adopted a resolution on integrated disease surveillance of communicable diseases. It is aimed to assist health workers to detect and respond to diseases of epidemic potential, diseases of public health importance, and diseases targeted for eradication and/or elimination through the available effective control and prevention interventions. Recognizing and addressing the problem of vertical disease surveillance systems, member states adopted Integrated Diseases Surveillance and Response (IDSR) as a regional strategy for early detection and effective response to priority communicable diseases in the African region.

Federal Ministry of Health had prioritized 21 notifiable diseases which are prone for epidemic, had international concern and diseases on eradication and elimination programs in Integrated Disease Surveillance and Response activities. These diseases are categorized as immediate and weekly reportable diseases. Of selected diseases in this study, malaria is classified under weekly reportable diseases whereas measles is categorized as immediately reportable disease (2).

Malaria

A malaria surveillance system consists of the tools, procedures, people and structures that generate information on malaria cases and deaths, which can be used for planning, monitoring and evaluating malaria control programmes. An effective malaria surveillance system enables programme managers to:

- identify the areas or population groups most affected by malaria;
- identify trends in cases and deaths that require additional intervention, e.g. epidemics; and
- assess the impact of control measures.

With this information, programmes can direct resources to the populations most in need and respond to unusual trends, such as epidemics or the absence of a decrease in the number of cases despite widespread implementation of interventions. As a result, progress in malaria control can be accelerated and wastage of resources avoided.

The design of malaria surveillance systems depends on two factors: (i) the level of malaria transmission and (ii) the resources available to conduct surveillance. In the initial phase of control, there are often so many malaria cases that it is not possible to examine and react to each confirmed case individually: rather, analysis is based on aggregate numbers, and action is taken at a population level. As transmission is progressively reduced, it becomes increasingly possible, and necessary, to track and respond to individual cases (3).

Ethiopia operates under a federal system of government. Administratively, the country is divided into regional states, zones, districts (woredas), and communities/municipalities (kebeles). There are about 700 districts with substantial malaria risk in Ethiopia, with an estimated at-risk population of 57.3 million people. The best available proxy for local malaria transmission risk in Ethiopia is household altitude below 2,000 meters (above sea level), since malaria is rarely transmitted at higher elevations (unless there are widespread epidemics). Many districts have variable topographical features, with some households within communities located above and other households located below 2,000 meters. Due in part to household locations at various altitudes and distances from efficient malaria vector breeding sites, malaria risk is unevenly distributed within many districts and kebeles (4).

Malaria is ranked as the leading communicable disease in Ethiopia, accounting for about 30% of the overall Disability Adjusted Life Years lost. Approximately 57.3 million (68%) of the 84.3 million population of Ethiopia live in areas at risk of malaria. According to the FMOH, malaria was the leading cause of outpatient visits and health facility admissions in 2010/2011, accounting for 15% of reported outpatient visits and nearly 15% of admissions. Malaria also was among the ten leading causes of inpatient deaths among children less than five years of age. Because of a weak (but rapidly improving) malaria disease surveillance system and the inability of the Health Management Information System (HMIS) to capture all necessary malaria related indicators, official estimates of the true burden of malaria in Ethiopia are imprecise, and the completed HMIS surveillance reports are often more than one year old when published (4).

Despite the low malaria parasite prevalence compared to many African countries, malaria remains the leading communicable disease seen at health facilities in Ethiopia. Historically, malaria has forced people to inhabit the less agriculturally productive highlands. Given that the country‘s economy is based on agriculture and peak malaria transmission coincides with the planting and harvesting season, this has placed a heavy economic burden on the country.

As stated previously, malaria is the leading cause of outpatient consultations and of health facility admissions. About 75% of the geographic area of the country has significant malaria transmission risk (defined as areas <2,000 m), with about 68% (57.3 million) of the country‘s total population living in these areas.

The FMOH estimates that there are about 12 million suspected malaria cases each year. The FMOH reported a total of 3,384,589 malaria cases from July 2011-June 2012, with 1,793,832 (53.0%) of these laboratory confirmed, with 1,061,242 (59.2%) *P. falciparum* and 732,590 (40.8%) P. *Vivax*. Ethiopia reported 936 malaria deaths in 2011, according to the 2012 World Malaria Report (4).

Malaria is one of the leading causes of morbidity and mortality in Ethiopia. An estimated 55.7 million people (68% of the population) are at risk for malaria and approximately 80% of the 736 *woredas* (districts) in Ethiopia are considered ―malarious". Malaria transmission is generally seasonal and unstable, though patterns and intensity of transmission vary throughout the country due to differences in altitude, rainfall and population movement. Protective immunity in Ethiopian populations is relatively low due to unstable transmission and, unlike large parts of sub-Saharan Africa; all age groups are at risk of infection and disease. *P. falciparum* accounts for 65-75% of infections, while *P. Vivax* accounts for 25-35%. *P. ovale* and *P. malariae* are rare.

The goals of the 2010-2015 National Strategic Plan for Malaria Prevention, Control and Elimination in Ethiopia are:

1. By 2015, achieve malaria elimination within specific geographical areas with historically low malaria transmission.
2. By 2015, achieve near zero malaria transmission in the remaining malarious areas of the country. The specific strategies to achieve these goals are summarized below. Key components of malaria control program are implemented by different units in the Federal Ministry of Health (5).

The system provides information on malaria trends, morbidity and mortality. Case definitions are well understood by participants. All Malaria focal persons (MFPs) were willing to continue using the system. Standardized data collection tools are available in 91% of Health Facilities (HF). The system was rated flexible by 91% of MFPs. The system was however not representative because data were essentially from public health facilities only. The system has an average timeliness of 37.7% and completeness of 59.4%, both parameters were below the State's 80% target. About 91% MFPs had refresher training, while 78% MFPs received supportive supervision. Main challenges identified were lack of commodities in all HFs, and inadequate mobile facilities in 70% of HFs (6).

Measles

Measles is a well-known vaccine preventable disease causing significant morbidity and mortality among children worldwide especially in developing countries like Ethiopia. A surveillance data was analyzed to describe measles cases epidemiologically and identify locations where case loads are high for further investigations. The National Measles/World Health Organization (WHO) guideline was used for case definitions and the final classification of cases.

In Ethiopia, 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 (southern) Regions where the density of the population is relatively high . The number of confirmed measles cases steadily increased from 73 in 2003 to a peak of 3,511 in 2008, following which there was a decline to 1,944 cases in 2009. Even though measles incidence rate has showed significant increase in the country since 2010 a dramatic increase is observed from 2012 up to 2014 (7).

In Oromia Region, started from WHO week 43/2016 to week 7/2017 there were more than six measles outbreaks. During this period about 715 measles cases were reported to the region by line list. The distribution of these cases by zone were: Guji Zone 442 (61.8%), Bale Zone 125 (17.5%), Jimma Zone (Limmu Seka Woreda) 75 (10.5%), West Shoa Zone 73 (10.2%). About 369 (51.6%) of the cases were not vaccinated for measles immunization and majority of them were 328 (46%) under five years of age. About 24 samples were taken to Ethiopian Public Health Institutes (EPHI) for confirmation and sixteen of them were positive for measles IgM. Even though significant numbers of measles cases were reported from South West Shoa Zone by IDSR between the periods of WHO week 43/2016 to week 7/2017, this figure did not include measles cases and outbreaks in zone. This is one triggering point to evaluate public health surveillance of measles in this zone.

3.1.1.1 Rationale

The purpose of evaluating surveillance of these diseases is to monitor their trends and trigger public health action as they are shown increased. Enhancing surveillance system of these diseases is also crucial for reducing their magnitude, morbidity and mortality. Malaria and measles are the major diseases of the South West Shoa Zone with high frequency of epidemic and public health concern. But there is a delay in detection and reporting system. For example, measles outbreak in Adadi Kebele of Kersa Malima, and Mande Tuffisa Kebele of Bacho Woredas were not reported at all but presence the outbreaks were recognized during data collection for system evaluation and it was not scientifically investigated. We believe that these two diseases could be used as proxy indicators of the surveillance system of the zone. Generally, use of the collected data at the local level as evidence for public health decision making is not well known and also evaluation of surveillance system is not done in the zone and little is known about the effectiveness and efficiency of the system.

3.1.2 Objectives

3.1.2.1 General objective

- To describe and evaluate public health surveillance system of malaria and measles in the area and assess the key attributes of surveillance to determine the effectiveness and efficiency of the surveillance system and make appropriate recommendations to stakeholders for its improvement in South West Shoa Zone of Oromia Region.

3.1.2.2 Specific objectives

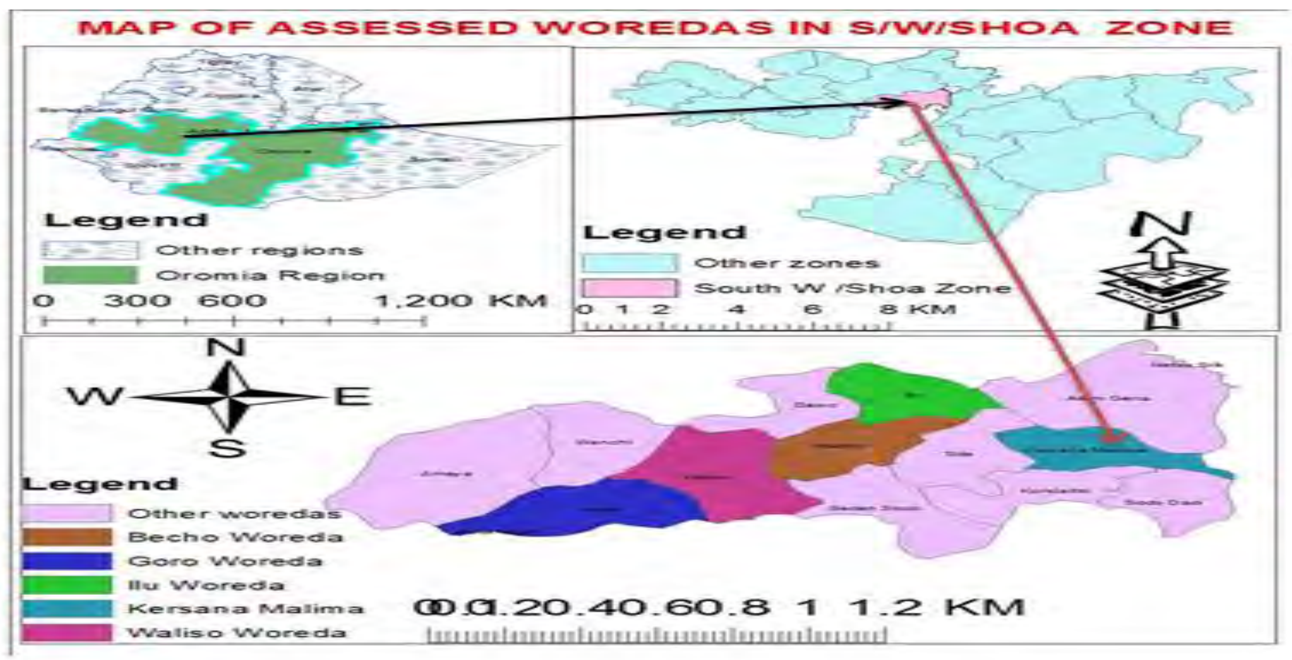
- ✓ To assess and describe key attributes of the surveillance system mainly on prioritized diseases in South West Shoa Zone.
- ✓ To know how well the intervention programs were met its intended purpose and objectives.
- ✓ To identify strengths and challenges of the current surveillance system in this zone.
- ✓ To understand effectiveness of the system in detecting and management of an outbreak of selected diseases.
- ✓ To assess the availability of the resources in a surveillance activities in the zone.

3.1.3 Methods and materials

3.1.3.1 Study area

We selected this zone for the reason that no recent surveillance system evaluation was conducted and the relative low performance of surveillance activities in 2015/2016 (Completeness and timeliness) report as well as repeated occurrence of outbreaks. Again the zone reports measles cases throughout the year and high number of malaria cases. It has 12 woredas with a total population estimated to be 1,141,287 with relatively one to one gender ratio.

South West Shoa Zone of Oromia Region is one and known area in which different outbreaks like Measles, Malaria and last year Acute Watery Diarrhea (AWD) were occurred in the zone.



Annexes 3.1.5: Administrative map of woredas for Public Health Surveillance System Evaluation, South West Shoa Zone, Oromia Region, Ethiopia, February 2017 G.C

3.1.3.2 Study design

We conducted cross-sectional descriptive study during this evaluation in South West Shoa Zone, Oromia Region. Surveillance data flow from lower (Health Post) to national level was observed.

3.1.3.3 Sample size and sampling

From the total woredas in the zone, we selected five woredas with high number of measles and malaria cases they reported during the last one year. From each selected woreda, we selected two health centers randomly. From the catchment health posts under each selected health center, we selected one health post (HP) randomly. Finally a total of 16 sites were assessed during the study period. This constitutes around 42% of woredas found in South West Shoa Zone.

3.1.3.4 Data collection technique

We collected the data using semi-structured questionnaire, qualitative interview, observation of documents and copy of reports for surveillance and other secondary data review.

3.1.3.5 Data analysis

We entered and analyzed the data using the Microsoft Office Excel.

3.1.3.6 Data quality control

We cross checked the obtained data at different levels (i.e. regional health bureau, zone health department, woreda health offices and health facilities) before summarizing at each level for its accuracy and consistency.

3.1.3.7 Data dissemination

We prepared and shared the written report of both hard and soft copies to Addis Ababa University/School of Public Health, Oromia Regional Health Bureau, South West Shoa Zone Health Department and all visited woreda health offices, Ethiopia Public Health Association (EPHA) and Ethiopia Field Epidemiology Training Program mentor, resident advisors and coordinator.

3.1.4 Results

3.1.4.1 Involvement of stakeholders

During selection of assessment area (South West Shoa Zone), discussion was held with Regional PHEM Core Process Head (Field Supervisor) and other staff members. Based on facts that, the zone reported high number of measles (271) and confirmed malaria cases (8,138) in the last six months of 2009 E.C and reports of diseases under surveillance in the zone were not evaluated in last few years. In this assessment, PHEM staffs of Regional Health Bureau and Zonal Health Office, PHEM focal persons of selected woredas health offices and health facilities were participated.

3.1.4.2 Overview of PHEM

Public health emergency is the process of anticipating, preventing, preparing for, detecting, responding to, controlling and recovering from consequences of public health threats in order that health and economic impacts are minimized. Regional PHEM unit is working with different stakeholders towards different needs and expectation. According to Business Processing and Re-Engineering reform that its implementation was started in 2008, Regional PHEM process has two sub-process namely; Early Warning, preparedness, Response and Recovery and Health research.

At zonal level, the PHEM structure and task is the same as Regional level. Two health professionals are assigned on zonal structure for PHEM activities. At woreda level, there is one PHEM focal person. Similarly, at health center level there is one surveillance focal person working on PHEM activities.

We assessed these different health structures in the zone, started from zonal health department office. The zone has twelve woredas with 270 health posts, fifty six health centers, two hospitals; one governmental and one non-governmental and eleven other private health facilities, totally about three hundred and thirty nine facilities that were expected to report both any immediately and weekly reportable diseases included in surveillance system. Five woredas health office in the zone with two health centers and two health posts from each these selected woredas were assessed. We focused on presence of different updated guidelines, availability of standard case definitions especially for those selected diseases (Measles and Malaria), presence of different clinical registrations, capacity of laboratory service they have, availability of outbreak (if any), presence of preparedness plan and their trends of response activities, different supervision conducted and any feedback given, resource available for surveillance activities and different attributes of surveillance system.

Table 3.1.12: Total population under surveillance in all visited sites of South West Shoa Zone, February 2017 G.C

S.No	Assessed Sites	Total Population	<1 population	<5 Population	Catchment Facility
1	South West Shoa Zone	1,149,175	39,072	188,809	12 Woredas
2	Bacho Woreda	99,295	3,376	16,314	21 kebeles/4 PHCU
3	Tulu bolo H/C	39,235	1,263	6,446	7 kebeles
4	Soyyama HP	4302	139	707	One kebele
5	Awash Bune H/C	23,550	801	3,869	5 kebeles
6	Awash Bune HP	8282	281	1361	One kebele
7	Ilu Woreda	82,169	2,646	13,500	20 kebeles/3 PHCU
8	Taji H/C	30,171	1047	4,957	7 kebeles
9	Alango Tulu HP	5091	173	837	One kebele
10	Asgori H/C	28,014	902	4,603	7 kebeles
11	Kata Asgori HP	3,277	112	538	One kebele
12	K/Malima Woreda	106,436	3,427	17,487	5 PHCUs
13	Lemman H/C	38,347	1,234	6,300	13 kebeles
14	Lemman Town HP	9465	322	1555	One kebele

S.No	Assessed Sites	Total Population	<1 population	<5 Population	Catchment Facility
15	Adadi H/C	18,170	585	2,985	5 kebeles
16	Adadi HP	5041	172	828	One kebele
17	Woliso Woreda	183,429	6,365	30,137	5 PHCUs
18	Cirecha Wanbari H/C	18,602	597	3,056	4 kebeles
19	Cirecha Wanbari HP	2,954	104	485	One kebele
20	Hopi H/C	22,608	728	3,714	5 kebeles
21	Hopi Koji HP	6,042	205	993	One kebele
22	Goro Woreda	59,826	1,926	9,829	21 kebeles
23	Goro H/C	12,904	416	2,123	6 kebeles
24	Adami Odesa HP	2,890	102	475	One kebele
25	Gurura H/C	21,608	696	3,550	6 kebeles
26	Lemman Abo HP	7,907	267	1,299	One kebele

Table 3.1.13: List of Priority Diseases under surveillance in Ethiopia, February 2017

S.No	Priority Diseases	Reporting Period
1	Acute Flaccid Paralysis (AFP)	Immediately
2	Anthrax	Immediately
3	Avian Human Influenza	Immediately

4	Cholera	Immediately
5	Dracunculiasis (Guinea worm)	Immediately
6	Dysentery	Weekly
7	Malaria	Weekly
8	Malnutrition	Weekly
9	Maternal Death	Weekly
10	Measles	Immediately
11	Meningitis	Weekly
12	Neonatal Tetanus	Immediately
13	Pandemic Influenza	Immediately
14	Rabies	Immediately
15	Relapsing Fever	Weekly
16	Severe Acute Respiratory Syndrome(SARS)	Immediately
17	Small Pox	Immediately
18	Typhoid Fever	Weekly
19	Typhus	Weekly
20	Viral Hemorrhagic Fever	Immediately
21	Yellow Fever	Immediately

The evaluation assessed the surveillance system of one immediately reportable (Measles) and one weekly reportable disease (Malaria). In all visited health facilities and health offices, the surveillance system structures of these diseases exist but implementation of surveillance activities like early detection and response were still poor.

3.1.4.3 Core activities

A. Case definition: -In most of the health facilities and districts standard case definitions of the selected disease are available

3.1.4.4 Standard case definition

Malaria: Any person with fever or fever with headache, rigor, back pain, chills, sweats, myalgia, nausea, and vomiting, or a person diagnosed clinically as malaria

Measles: Any person with fever and maculopapular generalized rash and cough, coryza, or conjunctivitis, or any person in whom a clinician suspects measles

3.1.4.5 Community case definition

Community case definitions are a simplified version of standard case definition used to aware the community to notify any suspected cases and also to make them aware for early diagnosis of the priority diseases under surveillance. These are sensitive (loose) case definitions that increases case detection rate.

Malaria: Any person with fever, or fever with headache, back pain, chills, sweats, muscle pain, nausea and vomiting

Measles: Any person with fever and rash starts from face.

Malaria

About 3.2 billion people (nearly ½ of the world's population) – are at risk of malaria. In 2015, Africa region was home to 89% of malaria cases and 91% of malaria deaths. Increased prevention and control measures have led to 37% reduction of malaria incidence & 60% reduction in malaria mortality rates globally since 2000. Ethiopia is among the few countries with unstable malaria transmission. Consequently, malaria epidemics are serious public health emergencies. In Ethiopia, malaria has been the leading cause of morbidity and mortality. About 75% of the country is malarious and 68% (over 58 million) of the total population is at risk of malaria. According to Health and Health Related Indicators (2003 E.C), 857,134 confirmed cases reported, of which 57% were *P.* falciparum. During this assessment we found that, 50.6% of malaria cases in the zone were plasmodium falciparum.

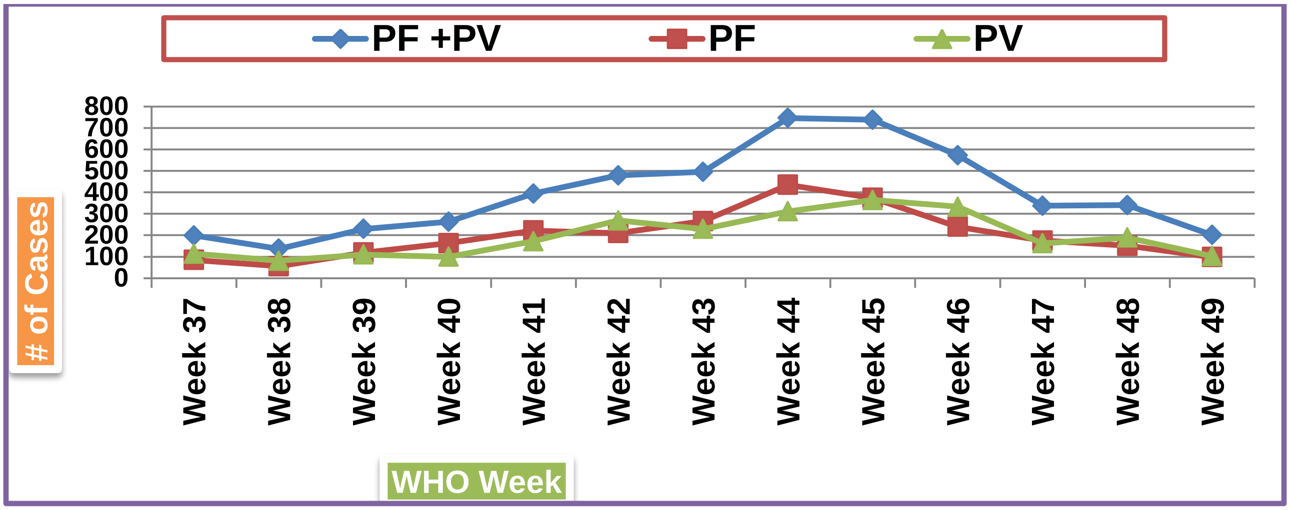


Figure 3.1.22: Trends of Confirmed Malaria cases of the last three months in South West Shoa Zone from WHO Week 37-49/2016 G.C

In evaluation of malaria surveillance in South West Shoa Zone we tried to determine positivity rate, among tested and became positive for malaria specious either Vivax or falciparum. We considered a period of three months from September to November when malaria cases were increasing in the zone. Based on this, the lowest (11.9%) and the highest (29.5%) positivity rate were occurred during WHO week 37 and 44/2016 respectively.

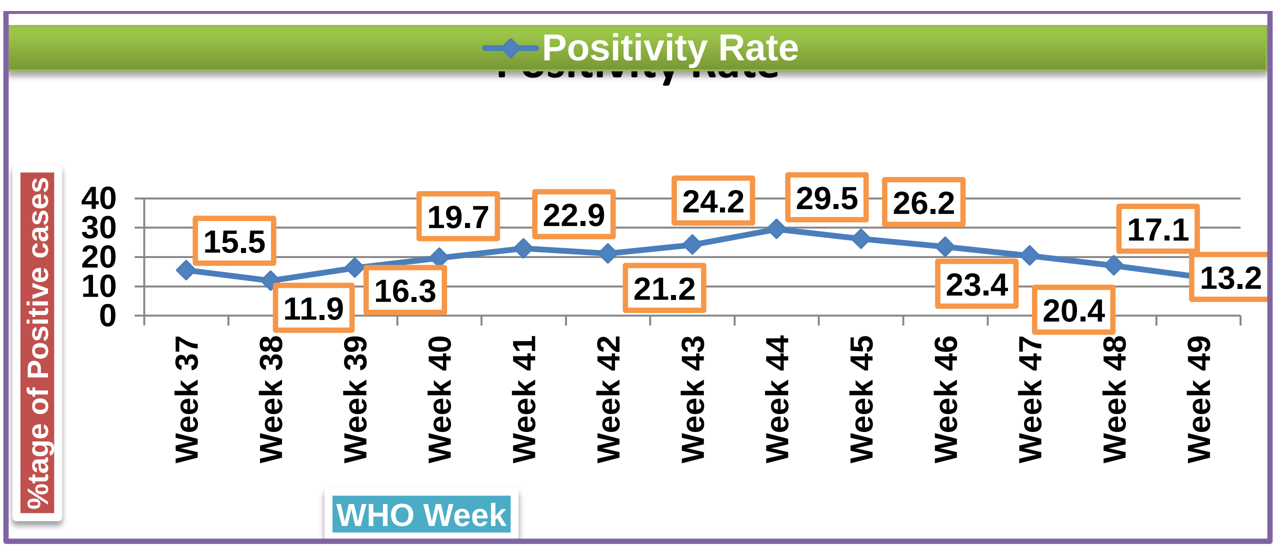


Figure 3.1.23: Trends of Malaria Positivity Rate by WHO Week in the last three months, South West Shoa Zone, 2016 G.C

In some woreda there was data discrepancy among confirmed malaria cases reported from health facility and woreda health office. In reality, aggregated data reported from woreda health office is the sum total of cases from all reporting health facilities in the woreda. But, data obtained from Goro Woreda Health Office (WoHO) was not similar with this reality i.e. reported malaria cases from woreda (all four PHCUs) should have to be greater or equal to reports of the two visited PHCUs within the same reporting period. For example, confirmed malaria cases of Gurura PHCU reporting week 40, 44, 46, 47 and 48 were exceed than the aggregated data of confirmed malaria cases reported from woreda health office (Figure below).

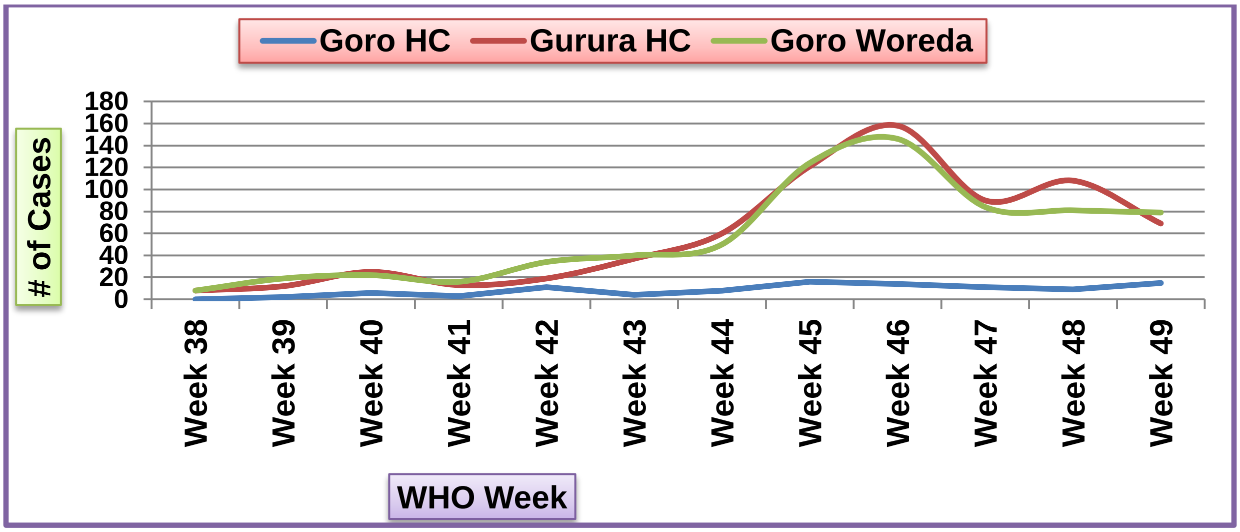


Figure 3.1.24: Comparison of Confirmed Malaria trends using data obtained from Woreda Health Office and two visited health facilities from WHO Week 38-49/2016 G.C.

Measles

It is anticipated that, measles outbreaks will affect all parts of the country based on surveillance data, seasonal patterns, areas affected and also the low population immu nity due to sub optimal immunization coverage ,<95% coverage of routine immunization and Supplementary Immunization Activities. The El-Niño drought effects resulted further increase the risk of measles outbreaks in high-risk areas (8).

In Oromia Region, started from WHO week 43/2016 to week 7/2017 there were more than six measles outbreaks. During this period about 715 measles cases were reported to the region by line list.

During our assessment in South West Shoa Zone, we found about 271 measles cases reported to zonal health department through line list and case based reporting system during the last eight month started from July, 2016 to February 2017 G.C. In the last six months (WHO week 37/2016 to 6/2017), there were about 199 measles cases were reported to the zone of which majority (58.8%) of them were from St. Luke Hospital followed by Kersa Malima Woreda (44.5%) where measles outbreak was ongoing during this assessment.

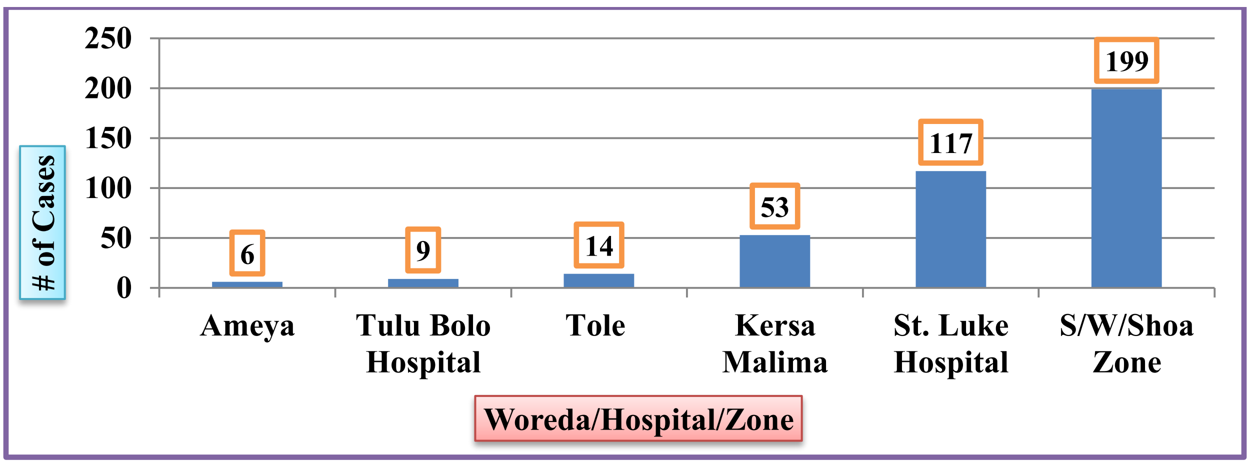


Figure 3.1.25: Measles cases by place in South West Shoa zone during the last six months only (September 2016 to February 2017 G.C)

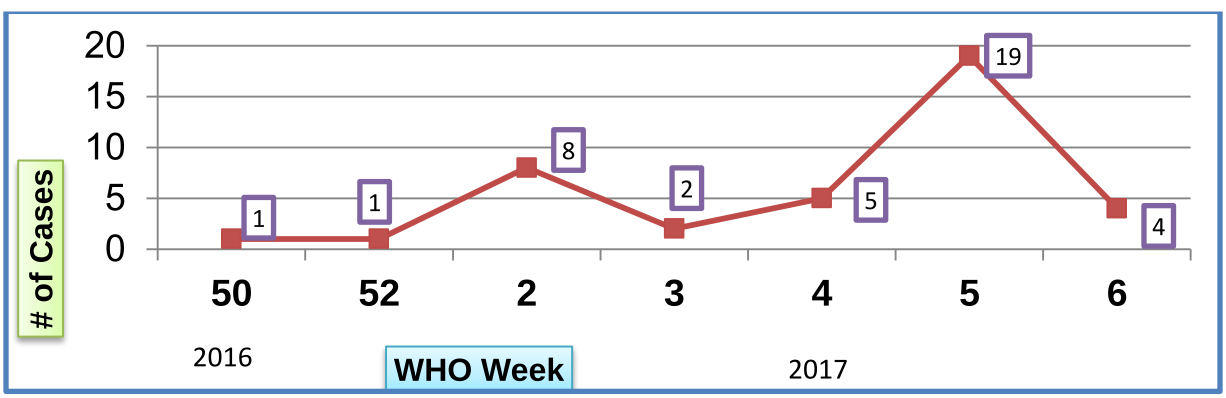


Figure 3.1.26: Trends of Measles Cases by WHO Week in Kersa Malima sent by line list 2016/2017 G.C

3.1.4.6 Availability of national PHEM guideline

In visited health facilities of South West Shoa Zone, we tried to assess for availability of PHEM guideline, National Malaria Guideline and Measles Guideline. As per questionnaires guides we were not simply focus on ―Yes or No" answer but we tried to observe whether the guidelines were physically present or not in near access to use it in place. According to this finding, only 27% of facilities tried to access national PHEM guideline during the assessment period. They claimed that high turnover frequency of responsible person in their facilities leads them to loss of these guidelines. But there were numerous PHEM guidelines in zonal health department store. About 31% of assessed facilities had Measles Guidelines separately and around 42% of facilities involved in the study had National Malaria Guidelines in their work place.

3.1.4.7 Case detection, registration and case definitions

Standard case definitions for some prioritized diseases are available at those facilities visited during the assessment period. Those priority diseases with their case definition posted at visible area like outpatient department (OPD) were Neonatal Tetanus (NNT), Measles, Acute Flaccid Paralysis (AFP), Maternal Death and Malaria in few facilities. Even zonal health department had no any case definition of those priority diseases posted at visible place rather they do have guidelines. Bacho, Ilu and Kersa Malima Woreda Health Offices were among facilities assessed with no both Measles and Malaria case definition at visible place in their offices. But all PHEM focal persons and other responsible staffs including health extension workers working in those assessed facilities were correctly responded as per guideline for both Measles and Malaria. Among twenty six facilities assessed for surveillance activities of Measles and Malaria about 58% and 38.5% of them had Measles and Malaria case definitions respectively.

3.1.4.8 Standard case definitions of Measles and Malaria

Malaria: - Any person with fever or fever with headache, rigor, back pain, chills, sweats, myalgia, nausea, and vomiting diagnosed clinically as malaria.

Measles: - Any person with fever and maculopapular (non -vesicular) generalized rash and cough, coryza or conjunctivitis (red eyes) or any person in whom a clinician suspects measles.

3.1.4.9 Community case definitions

Malaria: - Any person with fever or fever with headache, back pain, chills, rigor, sweating, muscle pain, nausea and vomiting or suspected case confirmed by RDT.

Measles: - Any person with fever and rash starts from face.

3.1.4.10 Data reporting

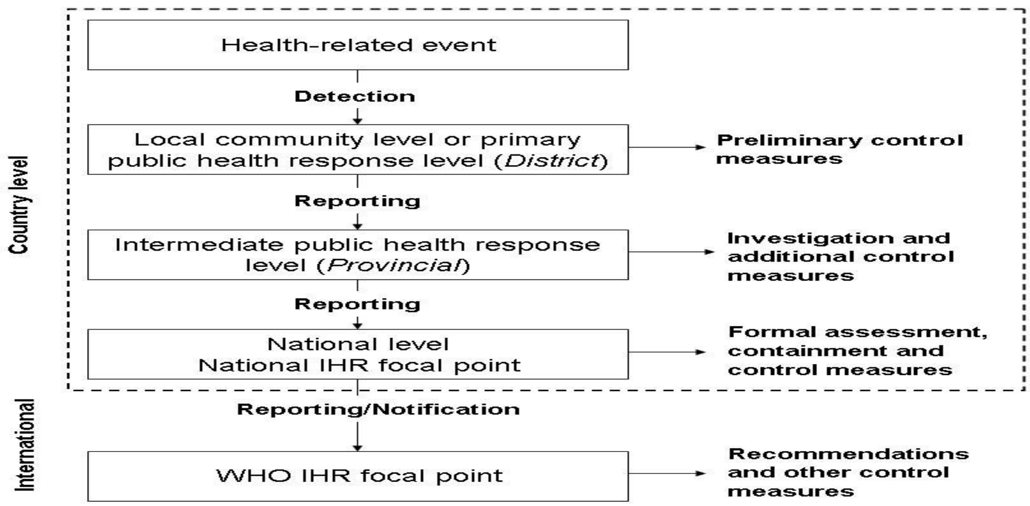


Figure 3.1.27: National and International Surveillance of Communicable Diseases according to the International Health Regulations.

Table 3.1.14: Means of Communications and reporting date currently used in the South West Shoa Zone during 2016 G.C

S.NO	Reporting facility	Means of report	Reporting time
1	Health Post to Health Center	Phone call	Monday Afternoon
2	Health Center to Woreda Health Office	Phone call and/or Hard copy based on how their distance	Monday Afternoon
3	Woreda Health Office to Zonal Health Department	Phone Call	Tuesday Afternoon
4	Zonal Health Department to Regional Health Bureau	Email	Wednesday Afternoon

Federal Ministry of Health and its stakeholders are responsible for designing and preparing of PHEM reporting formats. Zonal health office has provided these formats through Regional Health Bureau and Partners working with the region. During the last six months, shortage of weekly PHEM reporting pad was seen in majority of health facilities visited. Weekly PHEM reporting pad was available only in eleven (44%) of visited facilities (Tulu Bolo Health Center, Awash Bune Health Center, Adadi Health Center, Goro Woreda Health Office, Goro Health Center, Gurura Health Center, Soyyama Health Post, Awash Bune Health Post, Adami Odesa Health Post and Lemman Abo Health Post). However, those woredas and health facilities with no reporting pad solved their problem by copying and manually preparing the formats. Among assessed health facilities 8 (31%) of them reported the higher level by hard copy because close to their receipt. Only zonal health department used mail to report surveillance weekly reports and line lists if there was any outbreak. For reporting of any surveillance related rumor the zone used phone call to the higher level body (Regional Health Bureau). There were shortage of Rumor log book and case based report formats.

3.1.4.11 Data analysis

Even though, there were measles case reports and outbreak (Kersa Woreda) in South West Shoa Zone, none of assessed health facilities practiced trend of measles data analysis. In majority 15 (58%) of assessed health facilities, there was Malaria Monitoring Chart (MMC) to follow trends of malaria cases in their catchment area. Even at zonal level, there was computer based weekly malaria monitoring and trend analysis by place and time, but it updated up to 37/2016 WHO week. Many of the respondents believed in that responsible person for analysis of Integrated Diseases Surveillance and Response (IDSR) data was PHEM focal person. PHEM focal persons at woreda health office and responsible persons at health facilities working on surveillance activities had no information about use of analyzed data example, Kersa Malima, Adadi health center, Gurura health center.

3.1.4.12 Existence of action threshold levels

Action threshold level was available at Zonal and seven of visited health facilities on National PHEM Guideline. Even though, there are thresholds of 20 prioritized diseases on National PHEM guideline but some health facility focal persons did not know/understand it properly. This exhibited that utilization of surveillance manuals and guidelines is not good at district and health facility levels.

3.1.4.13 Outbreak investigation

During 2016/17 Measles, Malaria, Scabies, Rota Virus, Anthrax, Food Poison and Acute Watery Diarrhea (AWD) outbreaks were reported from different zones of Oromia Region. In South West Shoa Zone, only Acute Watery Diarrhea and Measles outbreaks were occurred in 2016/17. AWD affected Soddo Dachi, Kersa Malima, Tole, Goro and Woliso Rural Woredas whereas Measles outbreak was reported from Kersa Malima Adadi catchment kebeles. None of these outbreaks were scientifically investigated but regional PHEM staffs; zonal and health facilities staffs were participated in prevention and control activities of AWD. Line list of Measles outbreak in Kersa Malima Woreda was sent to regional health bureau after a period of one month but zonal and woreda staffs were involved for prevention and control of the outbreak in Adadi catchment area. Adadi, Goro Gabriel and Harbu Wanbar were kebeles affected by Measles outbreak in Kersa Malima Woreda and Golole Tamsa'a and Alle Kechin Kebeles from Tole Woreda. But the zone didn't declare Measles outbreak in Tole Woreda.

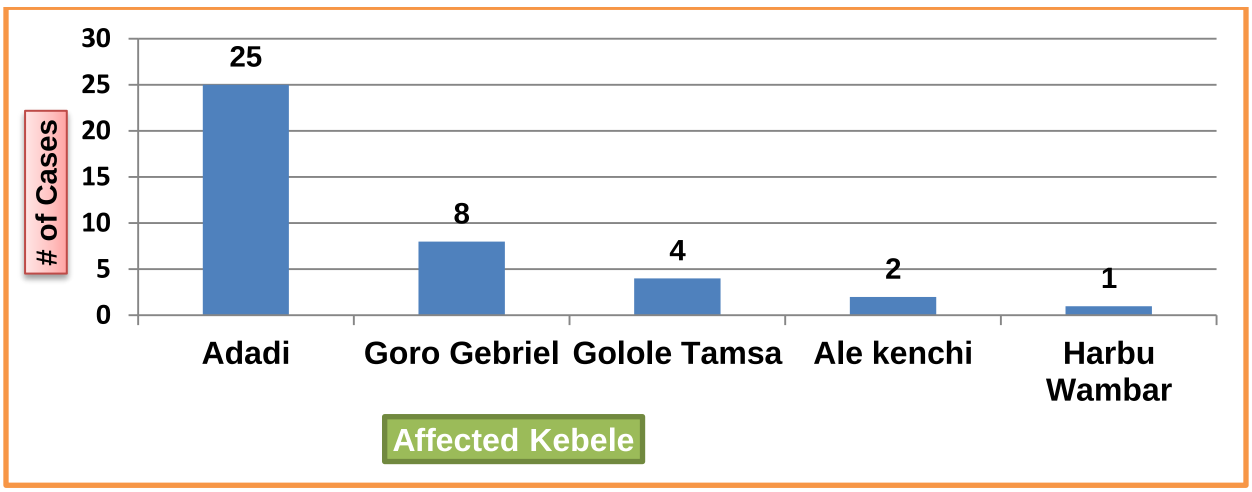


Figure 3.1.28: Distribution of Measles outbreaks by affected kebele in Kersa Malima Woreda, South West Shoa Zone, Oromia 2016/2017 G.C

3.1.4.14 Epidemic preparedness and management

There was no written epidemic preparedness and response plan at all visited health facilities including zonal health department level. All visited facilities responded as, there was no shortage of emergency drugs and supplies in the past one year despite that there were no separately secured contingency drugs and budget for emergency cases. Because, they used drugs and medical supplies that supplied from regional health bureau for preparedness when AWD outbreak was ongoing in Addis Ababa city and other zones and towns of the region. They responded that there was a plan during AWD outbreak but not in regular basis for other epidemic prone diseases.

Regarding existence and activities of epidemic management committee, there were established committees at zonal and visited facilities. During this assessment, it was identified that established committee at those levels was not working regularly and not formulated with all necessary disciplines. There is no budget line for epidemic response at zonal and majority of the woredas assessed during this study period. Nevertheless, they use from others budget sources and supported by regional health bureau during epidemic.

3.1.4.15 Availability of budget and resources for surveillance activities

There is budget allocated from government source for PHEM activities at regional level. Similarly, there is allocated budget from government source for public health emergency activities at zonal level for active case search during outbreak and for review meeting activities. Ilu and Goro woredas health office, out of five woredas visited during this assessment were responded as they had budget for surveillance activities. But budget allocated for PHEM activities at zonal level is not enough for all surveillance activities and most of the time they faced shortage of budget. Due to this reason, woreda PHEM focal persons were becoming demotivated for surveillance activities. Even though all visited woreda had computers and its accessories, there were no separate computers for PHEM activities. Stationery is not enough at some health posts. In addition shortage of hygiene and sanitation materials was observed at some health facilities. All visited woreda health office and health centers had electric power service except Cirecha health center that use solar power. Even though all woredas and health facilities we assessed use telephone service, majority of them used their personal mobile phone for which expenditure not refunded for them.

3.1.4.16 Feedback

Many woredas give written feedback for health facilities with integration of other activities that consists few indicators of surveillance activities quarterly. Among woredas and health facilities assessed 17 (65.4%) of them received feedback from zonal health department and woreda health office respectively. Because, the zone use integrated checklist to supervise woredas and health facilities, there is no separate schedule, budget and checklist for visiting and for giving supportive supervision to their reporting sites on PHEM and surveillance activities. In Kersa Woreda, where Measles outbreak is ongoing there were no written feedback from zonal health department and similarly woreda health office didn‘t give written feedback of supervision conducted for the two visited health centers. Therefore, this finding showed as supervision activities and giving written feedback was not regularly done for all woredas at this level. In other hand, PHEM focal persons at zonal and woreda levels, responded that as they have been giving feedback for health facilities orally and writing on their registration book during their field visit.

3.1.4.17 Supportive supervision

During the past six months, zonal health department conducted supportive supervision two times as quarterly base by using integrated checklist that contained small portion on surveillance activities. Shortage of vehicle, budget and logistics were attributed for incapability of conducting regular supportive supervision at zonal level. All visited health centers had supervised at least one time during the past six months by higher levels. Many woredas have conducted integrated supportive supervision for health facilities with limited number of surveillance indicators. For all visited health centers and health posts, integrated supportive supervision was conducted 1-2 and 2-14 times respectively. Reporting system, active case searches and other surveillance activities were reviewed in supervised woredas and health facilities.

Table 3.1.15: Achievement of supportive supervision conducted by health centers staffs during the last six months, July to December 2016 G.C

S.No	Health Facilities	Target of six months	Achievement	% Conducted
1	Soyyama HP	24	10	41.67

S.No	Health Facilities	Target of six months	Achievement	% Conducted
2	Awash Bune HP	24	14	58.3
3	Alango Tulu HP	24	9	37.5
4	Cirecha Wanbar HP	24	11	45.83
5	Lemman Town HP	24	2	8.3
6	Kata Asgori HP	24	3	12.5
7	Lemman Abo HP	24	3	12.5
8	Hopi Koji HP	24	8	33.3
9	Adadi HP	24	2	8.3
10	Adami Odesa HP	24	5	20.8
11	Tulu Bolo HC	168	50	29.8
12	Awash Bune HC	120	89	74.2
13	Taji HC	168	61	36.3
14	Asgori HC	168	23	13.7
15	Lemman HC	312	14	4.5
16	Adadi HC	120	15	12.5
17	Cirecha HC	96	43	44.8
18	Hopi HC	120	43	35.83
19	Goro HC	144	30	20.8
20	Gurura HC	144	15	10.4

3.1.4.18 Training of surveillance activities

During 2016/2017, regional PHEM unit in collaboration with partners like WHO have conducted training for zonal and woreda PHEM focal persons on basic Integrated Disease Surveillance and Response for five days. Similarly, regional health bureau also gave three day training on Maternal Death Surveillance and Response (MDSR) for PHEM focal persons, for health centers head and midwiferies working in health centers. In addition, regional PHEM and Malaria department conducted training for zonal PHEM focal person on malaria. During this assessment period, there were six health centers and one woreda health office had no trained manpower on basic IDSR, because there were turnover of previously trained PHEM focal persons from that health facilities. As evidence obtained from South West Shoa Health Department during 2016/2017 there were about 70 health professionals working in the zone trained on basic IDSR. Among visited woredas and health centers in the zone four woreda health offices; Bacho, Ilu, Kersa Malima and Woliso and four health centers; Taji, Asgori, Goro and Gurura responded as they had trained manpower. However, none of health extension workers were trained on surveillance activity.

3.1.4.19 Case confirmation and laboratory capacity of woreda and health facilities

All visited woreda had guidelines of specimen collection, handling and transportation. Therefore, they had capacity to transport specimens to higher levels for confirmatory test. This can be explained by that there were trained personnel on this and enough cold chain equipment at this level. Laboratory of all visited health centers had ability to collect and diagnose sputum, stool and blood specimen except Cirecha health center with no laboratory service.

3.1.4.20 Attributes of the surveillance system

3.1.4.20.1 Usefulness

All visited woredas and health facilities, including zonal health department were agreed as the current surveillance system in place is helpful for early detection of outbreaks, to estimate the magnitude of morbidity, mortality and factors related to these diseases. It also used to evaluate the effectiveness of prevention and control program that applied for those priority diseases. This was confirmed during recent outbreak of AWD in the zone, that the system was well enough in disease detection and control activities through data generated by surveillance system. Government and non-government organizations have used surveillance data to make decisions and support necessary resources. However, surveillance guidelines did not distributed uniformly in all health facilities and there was poor utilization of guidelines at different level. Respondents at all levels believed that the system is good enough to detect occurrence of any unusual cases, to closely follow diseases that are prone to epidemic, diseases that are under elimination and eradication program. The system also allowed them to secure budget and drugs surveillance activities and for outbreak anticipated diseases respectively. However, late result report from central laboratory on measles specimen sent for confirmatory test raised as challenge in early detection and management of outbreaks. Some respondents, including zonal PHEM focal person argued that no need of sending measles samples to central laboratory for confirmation because measles are well known endemic disease in the zone.

3.1.4.20.2 Simplicity

All respondents at zonal, district and health facility agreed that case definitions of selected diseases (measles and malaria) are easy and applicable for case detection by all level professionals. In addition, they believe that community case definitions are easy to understand at community level since malaria and measles are endemic to South West Shoa Zone. In all health facilities, 100% of asked health professionals were responded correctly for case definitions of selected diseases. All respondents at each level were familiar with reporting period and for whom report will send. PHEM focal persons at zonal and woreda levels believed that additional data collection on cases are not time consuming. Respondents at all levels told that, the estimated time consumed to fill weekly reporting format on morbidity and mortality of priority disease was more than fifteen minutes except Awash Bune, Asgori and Lemman health centers responded as it took only 10-15 minutes. Similarly, respondents at zonal and woreda levels agreed that the report took about 10 minutes to disseminate weekly reports through phone though it depends on availability of networking.

3.1.4.20.3 Flexibility

As the current reporting format contains additional spaces at the end for both weekly and immediately reportable diseases with namely as ―others specify" it can accommodate newly occurring health events/disease to fill on without any difficulty. Also, weekly reporting format can be modified based on current situation and different concerns. Existing reporting format was updated in 2009 to include newly emerged diseases such as Avian Influenza, Pandemic Influenza and SARS. In May 2013, the national Maternal Death Surveillance and Response (MDSR) were launched. Originally a stand-alone parallel data collection and analysis system as for 2014, MDSR has been integrated in to the existing the public health emergency management (PHEM) system, and has been added as 21^{st} national notifiable and conditions within IDSR. Zonal and woreda levels respondents agreed that implementation of National PHEM guideline did not difficult with changes in existing procedure of case detection, case definition and report forms.

3.1.4.20.4 Data quality

Reporting formats of weekly and immediately reportable diseases are well understood at zonal, woreda and health center levels. But, due to lack of training some health extension workers were observed to be confused with this format. Even though training has been conducted at regional and zonal level for PHEM officers on data quality management, some problems were occurred because no practice of cascading what PHEM focal persons trained on surveillance activities and how to manage data quality in reporting system that resulted from lack of attention. Major problems identified at different levels on filling reporting format are stated as follow:

1. Reporting sites and data collectors did not supervised regularly.
2. In some woreda private facilities that participated as reporting sites encounter with some data quality problems (e.g. Acute Febrile Illness (AFI) Vs Malaria)
3. Some reporting sites overlap the reporting date i.e. usually they overlap the last date of the previous report with the first date of the next report.
4. Date of sent and received, reporter and receiver information did not written on reporting formats
5. Blank spaces that should be filled with zero (0) number but not were observed at district and health facility level. This problem is insignificant at regional and zonal level.
6. Duration of activity report (week at which activities were performed) is missed during report compiling mainly at health post level.

7. Documenting copies of report in sequential manner is poor at woredas and some reports were missed in some health facilities, for example during this assessment we lacked copies of one month and two months at Awash Bune health center and Adadi health center respectively.
8. Reports from most health posts were conducted by phone call and it was difficult to get hard copies to check its quality.

3.1.4.20.5 Acceptability

Active participation of different individuals, organizations and agents in reporting system of surveillance activities in regular pattern is a major attribute for acceptability of the system. In most of visited woreda and health centers, in absence of PHEM focal person other staff members can fill and reported all surveillance activities. But some private health facilities were not actively participates in collecting and on time reporting of their surveillance activities. This can be due to lack of understanding the relevance of data by these facilities and poor monitoring system of governmental organizations. Also, some governmental institutions did not send a report timely and completely. This may arise from weak communication system, lack of reporting formats, poor working motivation and considering surveillance activities as additional work by some woredas PHEM focal persons. For example, Kersa Malima and Ilu Woreda responded that there was no other staff participated on reporting of surveillance activities because they understood it as the responsibility of PHEM focal person. Different stakeholders like WHO, UNICEF, CDC and Addis Continental Institute of Public Health (ACPH) are participating in strengthening surveillance system in collaboration with regional and zonal health offices.

3.1.4.20.6 Representativeness

Representativeness can be evaluated by access to health services and health seeking behavior of the populations. Following implementation of health extension program, majority of the population are accessed to basic health services. Many health posts were constructed since implementation of this program. Over the last 20 years, the country has successfully implemented its strategy of expanding and rehabilitating primary health care facilities. To this effect, 16,440 health posts, 3,547 health centers and 311 hospitals have been constructed (9).

Regionally, there are more than 6667, 1347 and 59 health posts, health centers and hospitals respectively. Similarly, in South West Shoa Zone there are 270 health posts, 54 health centers, one governmental hospital and one non-governmental hospital and eleven private health facilities participating in surveillance activities. Health service coverage of South West Shoa Zone by health center is estimated to be 100%. Similarly health service coverage all visited woreda reached 100% by health center except Ilu Woreda which is 91.3%. Health seeking behavior of the population is improved after intensive efforts have been made from regional to household levels. Health seeking behavior of the populations in the zone were relatively good except residents in Adadi catchment of Kersa Malima Woreda resist for measles vaccination and treatment by modern medicine after they develop measles infection. As National PHEM guideline, surveillance system is to be implemented nationwide with full involvement of all stakeholders. Since majority of the population in the zone are living in the rural, surveillance activities of the zone were more represented by rural population. Due to lack of working place and in some town lack of health extension workers, health posts in the towns were not participating in IDSR weekly report. As evidence obtained from Goro, Ilu and Kersa Malima Woredas, because of the reasons they did not expect report from health post in the towns. For example, Goro Woreda has 19 rural and 2 town kebeles, Ilu Woreda has 18 rural and 2 town kebeles and Kersa Malima Woreda has 31 rural and three town kebeles, but they received weekly report from 19, 18 and 31 health post only respectively.

3.1.4.20.7 Timeliness and completeness

Timely report of surveillance data is important for early public health interventions. Timeliness is a speed between steps in a public health surveillance system. As per standard of National PHEM the expected level of report timeliness is 80% and above. Early case detection is another key attribute of timeliness assessment.

It was unable to describe weekly PHEM report timeliness for visited woredas since date of sent and received were not filled properly at zonal level. In South West Shoa Zone, annual average report completeness and timeliness were **79% and 66%** respectively**,** which is below National minimum expected level **(80%)** in 2015/16**.**

Table 3.1.16: Completeness of some reporting sites (woreda and PHCU) of the last three months in South West Shoa Zone 2016 G.C.

S.No	Health Facilities	Expected report (3 months)	Reported in three months	Completeness (%)
1	Tulu Bolo HC	96	65	67.7
2	Awash Bune HC	72	62	86.1
3	Bacho Woreda	300	254	84.6
4	Taji HC	96	65	67.7
5	Asgori HC	96	52	54.2
6	Ilu Woreda	252	138	54.8
7	Lemman HC	156	119	76.3
8	Adadi HC	60	Incomplete data	
9	Kersa Malima Woreda	408	322	78.92
10	Cirecha HC	60	47	78.3
11	Hopi HC	72	72	100
12	Woliso Woreda	540	396	73.3
13	Goro HC	72	68	94.4
14	Gurura HC	72	29	40.3
15	Goro Woreda	276	213	77

3.1.4.20.8 Sensitivity/predictive value of positive [PVP]

Sensitivity is the proportion of cases of a disease (or other health-related event) detected by the surveillance system. It also can be explained as the ability of the system to detect outbreaks over time. It was difficult to evaluate sensitivity of the system at each level, without knowing false negatives. Because it is the proportion of true positive cases detected by surveillance system out of all present conditions whether they are detected by the system or not. Even though there are false positives those are confirmed as negative by Gold Test/Microscope/ in malaria cases, there are no false negatives identified by system and later confirmed by Gold test as true negative. However, it is possible to assess predictive value positive or proportion of reported cases that actually have the diseases under surveillance. In assessing of predictive value positive (PVP) primary focus is placed on case confirmation and records might be of investigations prompted by information obtained from the system. Based on this, among 7,993 suspected malaria cases in South West Shoa Zone, 7,984 (PVP 99.9%) of them were confirmed as positive for malaria in the last seven months (July-December/2016).

3.1.4.20.9 Stability

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. Some lines of budget are available at regional level from donors which enhance PHEM activities. Availability of PHEM focal persons at zonal, woreda and health facility level is a good opportunity for running surveillance system even with limited resources. Shortage of budget and logistics is hindering supervision and capacity building activity at zonal and woreda level. However, supportive supervision is conducting with integration of other programs. Even though PHEM unit of many districts did not have some data management resources such as computer and printer, they are using other department's resource for data entry, compilation, analysis and dissemination. During this assessment, we found some gaps that can be challenge for the stability of the system:

1. Shortage of budget allocated for surveillance activities
2. Shortage of manpower, professionals acting as PHEM focal persons handle surveillance activities as additional program
3. In some health facilities due attention is not given from organizational heads
4. Private health facilities are not actively participating on weekly report as they participate on monthly report.

5. Gap filling training was not conducted timely and it was never given for HEWs.
6. Resources like computer and printer used for data entry and analysis not supplied for surveillance activities like other programs separately.
7. Shortage of transportation
8. Interruption of different updated reporting formats including uniform line list.

3.1.5 Discussion

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 (10). Based on this fact, we conducted this study with collaboration of zonal and woredas PHEM focal persons because they were voluntary to know their gaps on surveillance activities mainly focus on malaria and measles surveillance system in their setting. Surveillance system evaluation is a periodic assessment of effectiveness and efficiency program toward its purposes and objectives. Collaborative and integrated assessment of public health surveillance system is important for resource minimization, comprehensive skill, anticipatory and organizes feedback. It is possible to conduct repeated evaluations with similar objectives, or implement a series of evaluations with differing objectives and assessing different components of the surveillance system (11). Since established of PHEM as core process at federal and regional levels through Business Re-engineering significant achievements were recorded on surveillance activities. In Oromia Region surveillance system evaluations were done by Ethiopian Field Epidemiology Training Program (EFETP) residents during the past six years in different zones. Findings of those assessments were used as inputs in filling gaps and strengthening of surveillance activities. Even though there are some resource limitation and shortage of human power at some woredas, PHEM focal persons are working well on surveillance interventions.

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 (11). At all levels, there is no well-organized epidemic preparedness and response plan. There is no written epidemic and preparedness and response plan at all visited woredas including zonal health department. This may cause weak case detection and lead to late response during epidemics. The aim of preparedness is 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(12). During this assessment we found that rapid response team (RRT) is formed and become functional only during outbreak as it was seen during AWD outbreak in the zonal.

According to this assessment, majority of the population under surveillance is rural population. Among the five visited woredas in South West Shoa Zone 128 (90.8%) of them were rural kebeles. Feedback is a key function of public health surveillance system. At majority of visited levels there were written feedbacks but similar feedback throughout the last six months. Currently the region prepare and disseminate weekly bulletin to every reporting zones can be taken as a good starting point to strength feedback system. Due to shortage of budget, human power, vehicle and logistics supportive supervision did not conducted in the last six months of 2016 as per schedule set at each level. Because, during this assessment we identified that there were schedule of supportive supervisions to be given for catchment kebeles at least once per week. Absence of budget line either from government or non-governmental organizations for surveillance activities at zonal and woreda level was remained as major challenges to run activities under PHEM towards their objectives. Additionally shortage of stationery, computer and printer for data management was seen as a bold challenge to generate and disseminate PHEM reports timely through maintaining their quality. Because none of visited health facilities and woredas were analyzed the data they collected through surveillance system and used it for action.

All visited woredas and health centers (except Cirecha) had a capacity to collect, handle and transport specimen of measles and acute flaccid paralysis (AFP) to central laboratory which is an opportunity for early case detection and management. As evidence obtained from central laboratory (EPHI) there were about 23 Measles laboratory results sent from different woredas of South West Shoa Zone during 2016/2017 only.

A public health surveillance system has attributes that characterize its role in public health action. Credible evidence of the system‘s performance includes quantitative and qualitative indicator data that determine strengths and weaknesses. The interdependence of the system‘s attributes reflects the public health mission of the system and some attributes might be more important than others. Surveillance system attributes can include simplicity, flexibility, data quality, acceptability, sensitivity, predictive value positive, representativeness, timeliness and stability(10).

As the results obtained from all respondents during this assessment, there is no difficult part on collecting and filling of all priority diseases. Majority (88.5%) of the respondents agreed as filling and reporting of these priority diseases not time consuming and they said averagely it took about 15-30 minutes. It was agreed by all respondents that the existing surveillance system is flexible for newly occurring health and health related events and even it can accommodate for any change of procedures in case detection and reporting. Despite that, reporting formats of priority diseases are easy and clear to fill for data collectors at zonal level and some visited facilities, still there were some observed gaps on quality of reporting system at woreda and health facility levels. This problem is high at health post level since health extension workers did not get any training on surveillance activities. These data quality problems can be solved through strengthening of supportive supervision on regular basis by giving more focus on surveillance activities.

As representativeness of public health service system can be explained by health service coverage and health seeking behavior of the community, based on this facts we found that health service coverage (HSC) of all assessed woredas (except Ilu with 91.3%) reached 100% by health center. Information collected from zonal health department and all assessed woredas, majority of the communities living in the zone had awareness to visit health facilities for any health care services, but communities living around Adadi catchment area of Kersa Malima Woreda exhibited poor awareness on immunizing their children, this may be the reason why measles outbreak occurred in the area with over all attack rate of 3/1000 population.

Timeliness and completeness of report is important for timely public health interventions. Timeliness in public health surveillance system reflects the time interval that connecting occurrence of events and their recognition by reporting source, time between events reported to surveillance system and any prevention and control activities taken with feedback to stakeholders (10). When we see experiences of South West Shoa Zone, they reacted actively for malaria surveillance for any unusual number observed on weekly report. This may be because of their data monitoring system using malaria monitoring chart and again malaria program is supported by different partners like Center for Disease Prevention and Control (CDC) and Addis Continental Institute for Public Health (ACPH) in the zone. Except in some districts and health facilities, the average annual completeness of weekly report at zonal level is below expected national level (80%). Due to poor handling and management of data, it was unable to get timeliness of woreda at zonal levels.

All most all woredas (except Sadden Soddo) found in South West Shoa Zone were malarious. The ability of the system to capture true cases regarding malaria disease was assessed in this evaluation. On this basis, predictive value positive for malaria by case definition was as high as 99.9% in malarious woredas of the zone. This may be explained as health professionals working in the zone were developing on job experience of malaria cases detection and they were familiar with standard case definition of malaria on the national PHEM guidelines and national malaria guideline. But, in case of measles though they do have ability to identify measles cases by using standard case definition from PHEM guideline, they did not report it to the higher level because of unknown reason. For example, if we see measles cases in Kersa Malima and Bacho Woreda only, there were about nineteen IgM +ve for measles were reported from central laboratory based on the specimen sent from these woredas in a period of 1/09/2017-02/11/2017. As information obtained from Kersa Malima Woreda Health Office and evidenced by line list, the first measles case seen at Adadi Health Center was 29 December 2016, then after three weeks (possibility after one incubation period of measles virus) three cases visited this health center at 22 January 2017. But, this measles line list was not sent to regional health bureau until this assessment was conducted during February 7-22/2017 G.C

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 (10). According to this assessment there were many shortages that can be challenge for the stability of public health surveillance system in South West Shoa Zone. These include shortage budget allocated for surveillance activities, high turnover rate of trained health professionals, lack of giving training for health extension workers on surveillance system, shortage of human power working on surveillance activities because they handle PHEM activities as additional job and they may not give priority for surveillance activities and in all visited woredas there were no computer and printer that separately assigned for surveillance activities for data entry and analysis.

3.1.6 Conclusion

Availability and utilization of national PHEM guideline, Measles and Malaria guidelines were not uniform in woredas and health facilities found in South West Shoa Zone during a period of this assessment. Standard case definitions of measles and malaria were found only in some visited woredas posted at visible place. Majority of the health centers in South West Shoa Zone had laboratory services and capacity to collect, handle and transport specimen to higher level laboratory. Except two woredas, all visited woredas encountered shortage of surveillance reporting pads and case based reporting formats in the last six months. Report completeness of all visited woredas (except Bacho Woreda) was less than the national target during the last three months. Majority of the sites that report public health surveillance activities were using phone call except few of them that near to their receivers. Even though majority of the respondents in the visited agreed on the importance surveillance data analysis none of them performed it. During this assessment no woreda with written epidemic preparedness and response plan including zonal health department. In all visited sites written feedback were not given on regular and timely base. Due to different challenges mentioned in discussion part supportive supervision were not conducted according the schedule they prepared in a period of six months. Shortage of trained staffs on surveillance activities were observed in visited woredas of South West Shoa Zone, whereas health extension workers were never trained on basic PHEM activities. Absence and/or shortage of different resources like budget, vehicles, computer and printer, network service and even megaphone for awareness creation may affect stability of surveillance system. During this assessment we found no difficult part of the reporting formats but still there were data quality problems in reporting sites. Public health surveillance system in the assessed zone was represented by rural population as majority of the population living in rural area.

3.1.7 Limitations

During the period of assessment, there was meeting of post evaluation for National Measles Immunization Campaign conducted just before a week that made difficult to get PHEM focal persons of the first two woredas at the time of visit, but there were formally represented individuals. Due to poor data handling and management, it was unable to get some important data such as report timeliness from some woredas and health facilities. There were time constraint and shortage of vehicle for transportation to visit more additional woredas and health facilities.

3.1.8 Recommendations

Since measles cases and outbreaks are reported from majority of the woredas in the zone intensive and systematic strategy should put in place in prevention of the disease in collaboration with regional health bureau and other stakeholders. Training should be given for health extension workers and other staff who work on surveillance activities to improve active case search and data quality in reporting system. Data quality assessment should be conducted at all levels on regular bases as many problems were identified on reporting system during this evaluation. Oromia Regional Health Bureau in collaboration with partners working in the region should avail different updated surveillance activities reporting pads and formats. Even though they detected any disease outbreak (e.g. Measles) in earlier time, they should have to announce it for higher level and other concerned stakeholders as soon as for better intervention and for scientific investigation to solve possible related risk factors. During this assessment, some woredas‘ PHEM focal persons were working on surveillance activity as additional job rather than routine works. So, all concerned bodies including regional health bureau should give due attention to assign trained individual who can work on it with full responsibility and accountability at all districts. Computer and its accessories have to be allocated for surveillance activities and data analysis for prioritized diseases at all levels should be performed regularly. Utilization of National PHEM guideline and different manuals for management of prioritized diseases should be optimized at all levels. Strong supportive supervision and feedback should be maintained in regular basis according to their schedule and its implementations should be followed intensively for at all levels.

3.1.10 Reference

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Chapter-IV Health Profile Description

4.1 Health profile description of Tiyo Woreda, Arsi Zone, Oromia Region, Ethiopia, January 2016 G.C

Executive Summary

Health profile is a system of collecting and summarizing health and health related events, demographic, socio-economic, political and cultural aspect of a particular woreda. Summarizing and analyzing health and health related data of a woreda is important to prioritize public health data and determine diseases burden. We conducted health profile description in Tiyo Woreda of Oromia Region to understand overall health and health related events.

Standard questionnaire was used during data collection, which was undertaken from 28 January to 08 February 2016. In addition to woreda health office, different sectors found in the woreda such as education, water, agriculture, finance and economic development were interviewed using designed questionnaire. Microsoft Excel software was used during data compile and analysis.

Tiyo Woreda has divided into 21 kebeles of which 18 are rural and three are urban kebeles. The total population of a woreda is estimated to be 108,112, among which 54,131 (50.07%) are males and 53,981 (49.93%) are females. From the total population, 98,895 (91.5%) lives in rural part of the woreda. Acute febrile illness was a top leading cause of outpatient morbidity in the woreda that constitutes 1609 (21.08%) of top ten diseases during 2014/2015 G.C. In this woreda, there were four type B health centers and 21 health posts. Concerning maternal and child health, 100% vaccinated for pentavalent 3, 100% for measles and 100% were fully immunized. In this woreda, 3,815 (102%) of pregnant women attended ANC4 service and among which 87% (3,260) of them got delivery service by skilled attendants. During the assessment period, latrine utilization and safe water coverage of the woreda were 92% and 57% respectively. A total 141 all forms of TB cases were identified with cure rate of 97.8%. The prevalence of HIV/AIDS in the woreda was 0.06.

Acute febrile illness and Acute Upper Respiratory Infection were the leading causes of morbidity in Tiyo Woreda. Potential health service coverage of the woreda was 100% but still there was shortage of health professionals including HEWs. Since there were no essential vital statistics those uses for program evaluation and trend analysis in the woreda, it is better to collect and compile these indicators at each level.

4.1.1 Introduction

4.11.1 Background: - Health profile or Impact assessment is the estimation of different factors of health and health related conditions of some defined population. It is the tool for describing detail about the area on historical background, climatic conditions, administrative structures, health coverage and educational coverage. It is also a system of collecting, organizing and summarizing health and others health related events to describe health and others health related conditions, demographic, socioeconomic, political, cultural and others aspect of a particular geographic areas of interest. A health impact assessment involves the examination of a policy, programme or project in terms of its potential effects on the health of a population, and the distribution of those effects within the population. It is both quantitative and qualitative description of health status of citizen and factors affecting their health (1, 2).

The preparation of a profile provides a lively, scientifically and evidence based account of health in the woreda; it can stimulate public interest and political commitment; and it also can identify targets for the future and monitor progress towards them. Data generated from health profile has very crucial role in priority setting, resource allocation, identifying gaps of health event and future planning.

As study done in Malawi showed, the Malawi country health profiles provide an overview of the situation and trends of priority health problems and the health systems profile, including a description of institutional frameworks, trends in the national response, key issues and challenges. They promote evidence-based health policymaking through a comprehensive and rigorous analysis of the dynamics of the health situation and health system in the country (3).

The South African country health profiles provide an overview of the situation and trends of priority health problems and the health systems profile. They promote evidence-based health policymaking through a comprehensive and rigorous analysis of the dynamics of the health situation and health system in the country (4).

The Ethiopia country health profiles provide an overview of the situation and trends of priority health problems and the health systems profile, including a description of institutional frameworks, trends in the national response, key issues and challenges. They promote evidence-based health policymaking through a comprehensive and rigorous analysis of the dynamics of the health situation and health system in the country. Objective of this study is to assess health, health related events and health determinants of the woreda's population and to identify health issues of public concern and the gaps to take possible interventions (1, 2).

1.1.1.2 Significance of the study

The health profile description helps to know the existing health service coverage, the developmental activities, social services, the major health problems, risk factors and indicates areas that should be given due attention or focus to improve the health status of the specifically identified community or population. This activity also used to describe available infrastructures and other facilities that can directly or indirectly affect health of the people. Therefore, to revise or design new policies and projects to improve the health and social services of a given population, description of the impacts of the existing policies and programmes is important. Therefore, we conducted this study to generate Tiyo Woreda health information which helps the woreda and other stakeholders such as local and international NGOs working in the woreda as well, to improve the public health.

4.1.2 Objectives

4.1.2.1 General objective

To assess and describe health and health related data and also to identify health related problems for priority setting in Tiyo Woreda, Arsi Zone from July 2014 to July 2015 G.C.

4.1.2.2 Specific objectives

-To summarize a one year, health and health related profile of Tiyo Woreda from 08/07/2014 to 07/07/2015 G.C.

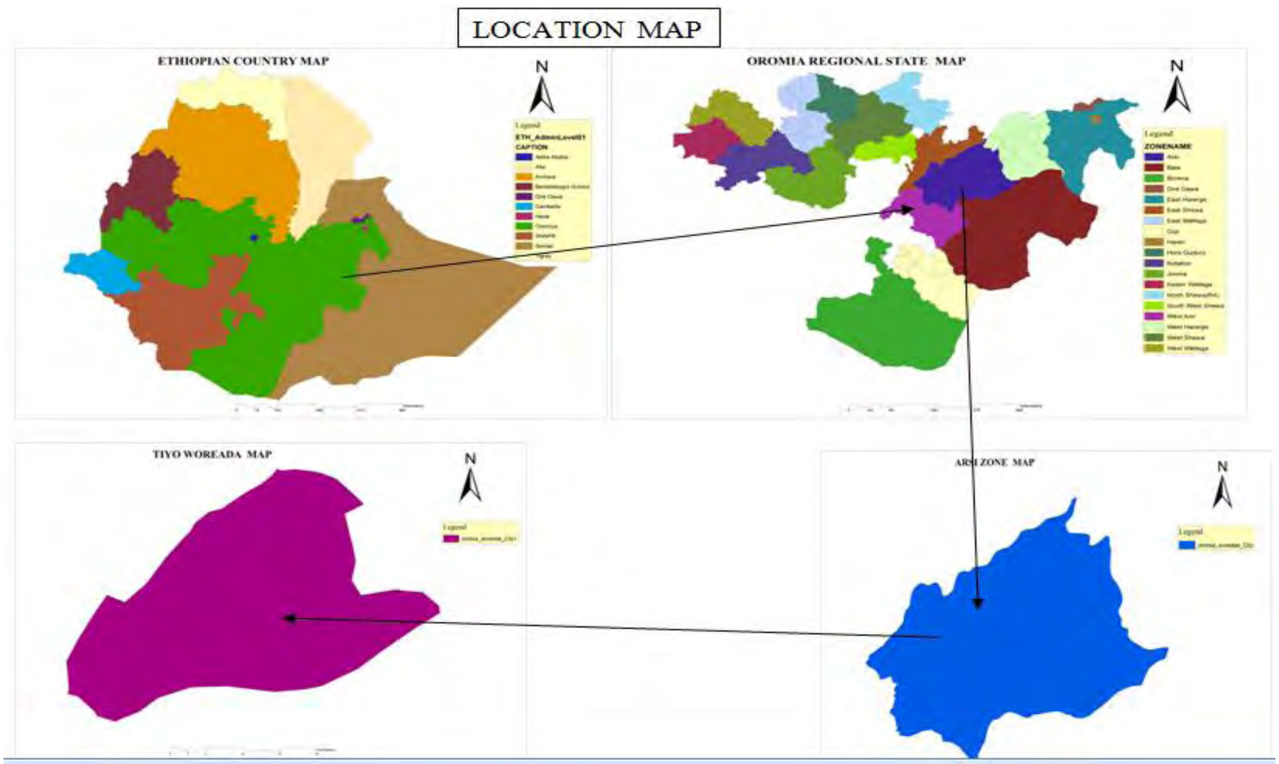
-To assess potential health coverage and health related impacts for the woreda's population.

-To describe basic infrastructures available in the woreda from July 2014 to 2015 G.C.

4.1.3 Methods and materials

4.1.3.1 Study area

We did health profile assessment of Tiyo Woreda, Arsi Zone, Oromia Region, Ethiopia. Tiyo Woreda is one of the twenty five woreda in Arsi Zone and it is located 75 KM far from Addis Ababa in southeast direction.



Annexes 4.1.6: Administrative map of Tiyo Woreda, Arsi Zone, Oromia Region, Ethiopia, February 2016 G.C

4.1.3.2 Study period

We collected health and health related data of one year, socio-economic, administrative setup and cultural aspects from 28/01/2016- 08/02/2016 G.C.

4.1.3.3 Study design

We conducted descriptive cross sectional study and reviewed both hard and soft copies of secondary data to generate different data. In addition, we also interviewed and made discussion with concerned bodies in different sectors of the woreda.

4.1.3.4 Data collecting tools and procedures

We used semi-structured questionnaire to collect data from all relevant sectors in the woreda. Support letter was written to all concerned bodies to cooperate during the data collection period. We visited and asked health, agriculture, finance, education, water sectors and the woreda administration to fill the questionnaires that relates to their respective sector. In all the offices, we interviewed expertise and persons in charge for more elaboration of the data obtained from them.

4.1.3.5 Data analysis procedures

We compiled and analyzed the collected data using 2010 Microsoft Excel Software.

4.1.3.6 Data dissemination and use

We presented, disseminated and shared hard and soft copies of the compiled result for all concerned bodies (Tiyo Woreda Health Office, AAU School of Public Health, Oromia Regional Health Bureau) and if necessary for other stakeholders and creation of incentives for evidence-based decision making.

4.1.4 Results

4.1.4.1 Historical background

Tiyo Woreda is one of the woreda found in Arsi Zone, Oromia Region. It is one of the twenty five woreda administered in the zone which was separated from Asella Town in July, 2014 to June 2015 G.C and established its own woreda structure. Tiyo Woreda has natural and man-made historical place that can attract tourists. These including Chilalo Mountain, Bosha Hill, St. John Holly water, Ujuba Gerado and Keter Water fall.

4.1.4.2 Geography and climate

Tiyo Woreda is 75 kilometers away from capital city, Addis Ababa in southeast direction. The area of the woreda is 65,000 hectares and having geographical location of $7^{0}57$'N and $39^{0}7$'E. The woreda is surrounded by five different other woredas namely Hetosa in the north and east, Digalu and Tijo in the south, Zeway Dugda and Munesa in the west. The altitude of the woreda ranges 3000-4343 meters above sea level. The climatic condition of the woreda is 33% Dega, 43% Woyina Dega and 24% Kola. Annual temperature is estimated to be between 15^{0c} and 22^{0c}. Annual range of rainfall is found to be 700-900 mm mainly during Belgi/ Spring and Summer seasons.

4.1.4.3 Administrative and political structure

Tiyo Woreda has 18 rural and three urban kebeles with all sector offices concentrated in Asella Town, capital of the zone. There are about 525 and 2570 developmental army and one-five network organization respectively.

4.1.4.4 Demographic information

In 2014/2015, Tiyo Woreda has an estimated total population of 108,112, among which 54,131 are males and 53,981 are females. Male to female ratio of the woreda population is 1:1. From the total population of the woreda, under one years old children constitutes 3482 (3.22%), under five 17,763(16.43%), women of child bearing age 23,925 (22.13%), pregnant women 3,752 (3.47%), and non-pregnant women are 20,141(18.63%). From the total population, 98,895(91.5%) lives in rural part of the woreda. Regarding the ethnic composition in the woreda, multiple ethnic groups are residing of which Oromo is the dominant, followed by Amhara, Gurage, Tigre, Walayita and others. Regarding religious distribution, most woreda‘s population is Orthodox followed by Muslim, Protestant, Traditional believers, Catholic and others.

Table 4.1.17: Estimated population by kebeles and age categories, Tiyo Woreda, Arsi Zone, July 2014 to June 2015 G.C.

S. no	Name of kebeles	Popn. total	Total HH	<1 years (3.2%)	6-59 M 15%	<5 years (16.4%)	<15 years (47.61%	>65 years (4.74%)	Women 15-49 years (22.13%)
1	Keter rural	2775	578	89	416	455	1332	132	614
2	Alko	6903	1438	221	1035	1132	3313	327	1528
3	Borera	3339	696	107	501	548	1603	158	739
4	Murkicha	3484	726	111	523	571	1672	165	771
5	Tulu Chabi	9872	2057	316	1481	1619	4739	468	2185
6	Keter town	2418	504	77	363	397	1161	115	535
7	Dosha	4596	958	147	689	754	2206	218	1017
8	T/Kuche	3273	682	105	491	537	1571	155	724
9	Burka Chilalo	3089	644	99	463	507	1483	146	684
10	Chabi H	2556	533	82	383	419	1227	121	566
11	Haro Bilalo	7590	1581	243	1139	1245	3643	360	1680
12	Oda Daweta	8294	1728	265	1244	1360	3981	393	1835
13	Dhankaka	8052	1678	258	1208	1321	3865	382	1782
14	Gora silingo	6609	1377	211	991	1084	3172	313	1463
15	Kubate	6064	1263	194	910	994	2911	287	1342
16	Dugda	3610	752	116	542	592	1733	171	799

S. no	Name of kebeles	Popn. total	Total HH	<1 years (3.2%)	6-59 M 15%	<5 years (16.4%)	<15 years (47.61%	>65 years (4.74%)	Women 15-49 years (22.13%)
	Ukulo								
17	Gonde 01	6151	1281	197	923	1009	2952	292	1361
18	Waji Barity	5094	1061	163	764	835	2445	241	1127
19	Bore Chilalo	5502	1146	176	825	902	2641	261	1218
20	Shala chebaty	3827	797	122	574	628	1837	181	847
21	Kulumsa	5014	1045	160	752	822	2407	238	1110
Total		**108,112**	**22,523**	**3,460**	**16,217**	**17,730**	**51,894**	**5,125**	**23,925**

4.1.4.5 Productivity and income

The main income of the woreda was agricultural products, which include farming land and animal products. The agricultural density of the woreda was 25,134 hectares of the total land in 2014/15 G.C. About 468.03 hectares in Tiyo Woreda was used for scientific research of crops like Barley and Wheat. Again 3,959 hectares of the woreda was covered by forest, bushes and other big old trees and around 9,683 hectares was used for cattle grazing. The major annual crops grown in the woreda were cereals like, Barley, Pea, and Wheat, and cash crops like Onion, and Potatoes were widely cultivated products by irrigation in the woreda. The average monthly or yearly income of individual in the woreda was not known.

4.1.4.6 Education

In 2014/2015 G.C, there were four non-governmental kindergartens, 47 primary schools (1-8), four secondary schools (9-10), and one preparatory (11-12) school in Tiyo Woreda. However, there were no governmental or non-governmental colleges. Proportion of female to male students showed decrement from primary to preparatory school. There were 692 primary, 89 secondary, and 14 preparatory schools teachers in the woreda. The teacher to student ratio is 1:31, 1:14, 1:3 in primary, secondary and preparatory schools respectively. Educational coverage of the woreda was 97% in July, 2014 to June, 2015 G.C. Evidence taken from woreda education office showed, out of students registered for school in September, 2014 G.C, 1.55% students were dropout of school due to different reasons like illness, lack of support, migration to other areas and death.

Table 4.1.18: Number of enrolled students and the teachers by sex in the Tiyo Woreda, Arsi Zone, Oromia from July 2014 to June 2015 G.C

Type of school	**Number of Students**			**Number of Teachers**			**Number of school**
	Male	**Female**	**Total**	**Male**	**Female**	**Total**	
Kindergarten(KG)	190	167	357	-	-	-	3-(NGO)
Primary School (1-8)	11,090	10,352	21,442	377	315	692	47
Secondary School (9-10)	727	528	1255	75	14	89	4
Preparatory (11-12)	24	16	40	13	1	14	1

4.1.4.7 Facilities and infrastructures

Tiyo Woreda has 53.34 kilometers of dry-weather and 108.76 kilometers all-weather totally 162.10 kilometers road in the woreda, for an average road density of 1.82 kilometers per 1,000 square kilometers by population and 290.92 km/1,000 square kilometers by area of land. Among 18 rural kebeles and three towns of the woreda, all towns and 11 kebeles have road transportation access to woreda town in all weathers and the rest seven kebeles were access to transportation only in dry season.

Telecommunication is one of effective mode of communication in today‘s world. Urban areas of the woreda have supplied with wave satellite type of telecommunication and rural kebeles didn‘t have any functional satellite or wireless telecommunication service. Only one health center (Bilalo) had fixed wireless telephone. There was a mobile network working in all kebeles and towns of Tiyo Woreda.

In this woreda, all health centers and the three towns had supplied with electricity power. Out of the four health centers in the woreda three of them had water supply, no health posts the woreda had water supply during this assessment.

4.1.4.8 Woreda health systems

4.1.4.8.1 Organization of woreda health office (Oregano gram)

The currently revised woreda health office structure after business processing and re-engineering (BPR) was organized in to five technical and two supportive teams. These technical teams were plan and supervision, training and administration, communicable disease control, family health and health extension worker and health services quality regulation teams. The two supportive teams at woreda health office were secretary and recording and documentation.

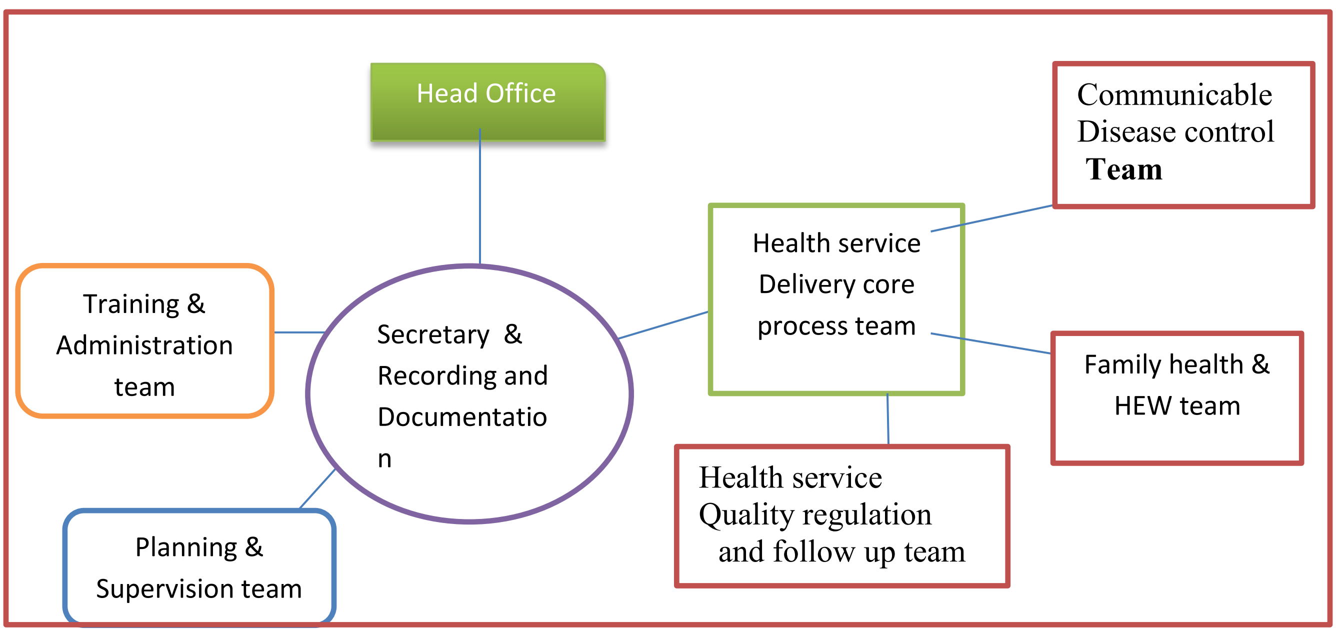


Figure 29 Oregano gram of Tiyo Woreda Health Office, 2014/15 G.C.

4.1.4.8.2 Health facilities and their services

Regarding health facilities, there are four type ―B" functional health centers namely Barety, Bilalo, Gonde, and Golja, and 18 rural and three town health posts in the woreda. Health posts in the town had no their own post but using the health center in their town as their post. During the study period, there were 12 private clinics among which eleven were lower and one is medium clinic and four drug stores and one rural drug vendor. The road connecting seven health posts are difficult at rainy season, which accounts for 33% (53.34 km) of the woreda roads.

Health service coverage of the woreda was 100% both by Health Center and Health Posts. But, none of the health post had fixed telecommunication service, and water supply and only two health posts out of 21 had electric power supply. Water supply coverage by health center was 75% while woreda safe water supply was still 34% by virtue of availing clean water by 1 km radius for the community. There were about 42 small scale factories and 135 houses giving food and drinking services as a cafeteria in the woreda.

4.1.4.8.3 Primary health care unit

The recently implemented BPR of the health sector has introduced a three-ties health care delivery system which is characterized by a first level woreda/district hospital serves 60,000 to 100,000 population, one health center serves 15,000 to 25,000 population, and their satellite health posts serve 3,000-5,000 population per one health post. Primary health care unit is a system designed by Federal Ministry of Health (FMOH) to enhance the linkage between health center and health posts. In this system all health center staffs are expected to support technically, the health posts found in their catchment area. According to the principle of primary health care unit one health center should support at least five satellite health posts under it, based on the availability of health center in the woreda.

Table 4.1.19: List of health centers with their respective satellite health posts in Tiyo Woreda, Arsi Zone, Oromia from July 2014 to June 2015 G.C.

S.no	Nucleus Health center	Type	Number of satellite	Remark
1	Gonde	B	5 **	There are two town health posts
2	Golja	B	5 *	One town health post is there
3	Bilalo	B	5	
4	Barity	B	3	

NB: * represent one town health post

Gonde Health Center had seven health posts namely Chafe Misoma, Dhankaka, Dugda Ukulo, Gora Silingo, Oda Daweta, Gonde and Kulumsa Towns. Health posts included under Bilalo Health Center were Burka Chilalo, Chabi Haro, Dosha, Haro Bilalo and Tulu Kuche. The six satellite health posts supported by Golja Health Center were Alko, Borera, Keter rural, Keter Town, Murkicha and Tulu Chabi. Barity Health Center supported three health posts namely Bore Chilalo, Shala Chabity and Waji Barity.

4.1.4.8.4 Cold chain system

Good cold chain system management is essential for vaccine efficacy and to prevent occurrence of an outbreak in vaccine preventable diseases. All vaccines are thermo-sensitive and need to be properly stored and distributed within an efficient cold-chain. To ensure the quality of the cold chain in the WHO European Region, WHO/Europe supports the assessment of national cold chain and logistic systems. These assessments may include specific training workshops on the management of vaccine stock, the monitoring of storage procedures, cold chain maintenance, equipment requirements, and other topics related to vaccine and cold chain management (5).

In Tiyo Woreda all four (100%) health centers and only (16.67%) health posts including woreda health office had functional refrigerators. All these refrigerators are working both by kerosene and electricity power. There were also two non-functional refrigerators in the woreda.

4.1.4.8.5 Health indicators and vital statistics

Health indicators and vital statistics are important to estimate and/or evaluate performances of health activities and to set strategies as per needed. There was no data of some vital statistics like Infant Mortality Rate (IMR), Maternal Mortality Rate (MMR), Under Five Mortality Rate, and Crude Death Rate (CDR).

Table 4.1.20: Population and vital statistics of Tiyo Woreda, Arsi Zone, Oromia from July 2014 to June 2015 G.C

S.no	Indicators	Number	Percentage (%)	Remark
1	Total population	108,112	100	Baseline
2	Male	54,131	50.07	
3	Female	53,981	49.93	
4	Urban	9217	8.5	
5	Rural	98,895	91.5	
6	Total live births	3751	3.47	
7	Under 1 years old	3482	3.22	
8	Under 5 years old	17,763	16.43	
9	Women 15-49 years	23,925	22.13	
10	Pregnant women	3752	3.47	
11	Infant mortality rate/1000	ND	-	ND=no data
12	Neonatal mortality rate	ND	-	ND=no data
13	Under 5 years mortality rate	ND	-	ND=no data
14	Maternal mortality rate/100,000	ND	-	ND=no data
15	Crude birth rate/1000	ND	-	ND=no data
16	Crude death rate	ND	-	ND=no data

4.1.4.8.6 Maternal and child immunization coverage

The expanded programme on immunization was launched in 1980 with the objective of increasing the coverage by 10% annually (6). This Expanded Program on Immunization (EPI) is focused on vaccine preventable diseases, and nowadays there are ten types of vaccines that intended to prevent ten different diseases. Tiyo Woreda has 22 static and 30 outreach vaccination sites that give EPI service. In this woreda, 3,745 (100% of the total births) of them were vaccinated for BCG during 2014/2015 G.C. Similarly, 3,816 (>100%) of them were vaccinated for both oral polio vaccine (OPV1) and Penta one vaccines and 3,663 (106%) children were vaccinated for Penta3, with dropout rate of 153 (4%). In this year 3,650 (105%) of children under one year were vaccinated for measles and 3,621 (104%) fully immunized. Of a total 3482 under one year children, all (100%) of them were protected at birth. Among 10,247 planned non-pregnant women to vaccinate with TT2 an above, 11,579 (113%) of them were vaccinated during July 2014 to June 2015 G.C.

Table 4.1.21: Achievement of child and maternal health in Tiyo Woreda, Arsi Zone, Oromia from July 2014 to June 2015 G.C

Facility Name	FP all types	LAFP	ANC4	Skilled delivery	PNC	PMTCT
Barity PHCU	3914 (102%)	1520 (40%)	633 (89%)	558(78%)	1332 (187%)	1443 (200%)
Bilalo PHCU	5170 (139%)	2014 (54%)	784 (113%)	1151 (166%)	1535 (221%)	1338 (193%)
Golja PHCU	5927 (111%)	1160 (22%)	860 (86%)	718 (72%)	1155 (116%)	1433 (143%)
Gonde PHCU	8560 (118%)	7650 (38%)	1538 (114%)	833 (62%)	2278 (169%)	2155 (160%)
Tiyo woreda	**23,571 (117%)**	**7650 (38%)**	**3815 (102%)**	**3260 (87%)**	**6401 (171%)**	**6369 (170%)**

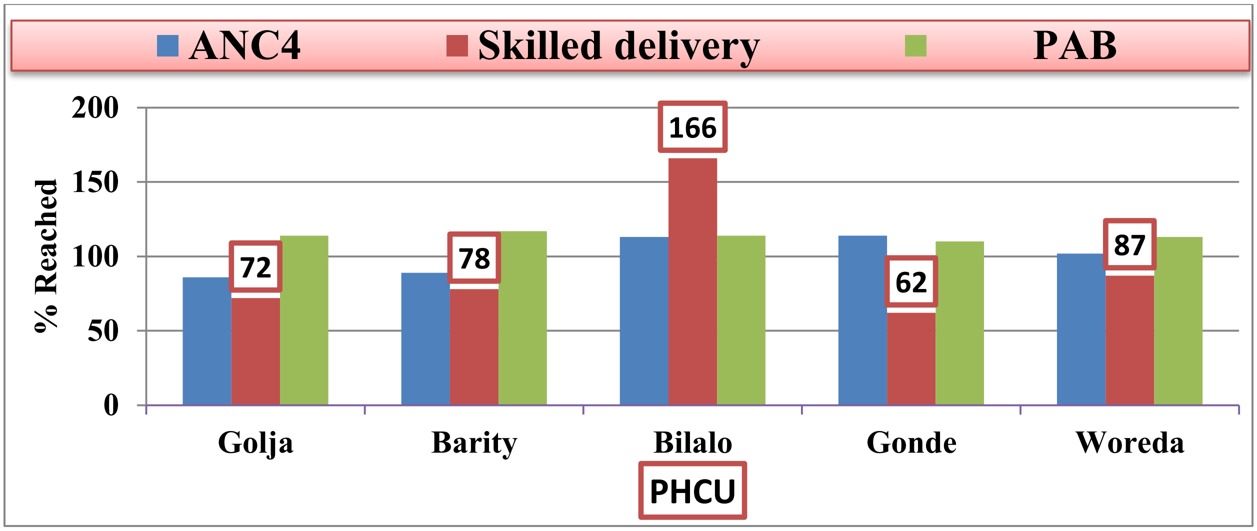


Figure 4.1.30: Comparison among performance of ANC4, Skilled Delivery and PAB by PHCU in Tiyo Woreda, Arsi Zone, Oromia from July 2014 to June 2015 G.C.

4.1.4.8.7 Water supply and sanitation

According to data obtained from Tiyo Woreda Water Resource Office, of the total rural population of the woreda, 57% was supplied with potable water within 150 KM radius during July 2014 to June 2015 G.C. In this woreda, there are 18 protected springs, 13 unprotected spring, three protected deep well, 22 stand pipes of water sources in 2014/15 G.C. Out of the three protected deep well found in the woreda, two of them were used for both human and animals.

4.1.4.8.8 Latrine coverage and utilization

There were 22,523 households living in Tiyo Woreda among which 20,943 (93%) had latrine of all types and 14,243 (63%) of them had standard latrine. Latrine utilization coverage of the woreda during July 2014 to June 2015 was 20,781 (92%). Seven kebeles of the woreda were registered as open defecation free (ODF) and all households in these kebeles were using their latrine properly.

Table 4.1.22: Latrine and its utilization coverage in Tiyo Woreda, Arsi Zone, Oromia during July 2014 to June 2015 G.C

PHCU	Total household	Constructed latrine (N, %)	Latrine all type (N, %)	Standard latrine (N, %)	Utilization (N, %)
Bilalo	4164	1966(94%)	3964(95%)	3163(76%)	3964(95%)
Gonde	8079	2803(92%)	7207(89%)	3912(48%)	7137(88%)
Golja	5998	2772(92%)	5638(94%)	2957(49%)	5554(92%)
Barity	4282	2089(98%)	4136(96%)	3942(92%)	4126(96%)
Tiyo woreda	**22,523**	**9630(85%)**	**20,943(93%)**	**14,243(63%)**	**20,781(92%)**

Table 4.1.23: Open Defecation Free (ODF) kebeles, Tiyo Woreda, Arsi Zone, Oromia during July 2014 to June 2015 G.C.

S.no	Kebele	Total Popn	Household (HH)	Newly constructed latrine	Total latrine by kebele	Utilization (%)
1	Haro Bilalo	6475	1349	11	1349	100
2	Dosha	4594	957	19	957	100
3	Waji Chilalo	7882	1642	11	1642	100
4	Tulu Kuche	3274	682	4	682	100
5	Chafe Misoma	3609	752	18	752	100
6	Dugda Ukulo	6062	1263	11	1263	100
7	Tulu Chabi	9874	2057	15	2057	100
Total	**7**	**41,770**	**8,702**	**89**	**8,702**	**100**

4.1.4.8.9 Top ten leading causes of outpatients visit (Morbidity)

Acute febrile illness was a top leading cause of outpatient morbidity in the woreda that contributes 1609 (21.08%) of top ten diseases during 2014/2015 G.C. Acute upper respiratory infection, Typhoid fever, and Pneumonia are among top ten diseases that cause outpatient morbidity in adult whereas Pneumonia, Non-bloody diarrhea, Dysentery and Diarrhea with dehydration were the commonest diseases that cause morbidity in under-five children in Tiyo Woreda during the assessment period. Typhoid fever, Malaria all cases, Urinary tract infection and Non-bloody diarrhea were among top ten diseases that cause inpatient admission and no death was reported throughout the year.

Table 4.1.24: Top ten leading causes of OPD visit in Tiyo Woreda, Arsi Zone, Oromia during July 2014 to June 2015 G.C.

Rank	Disease type	# of cases	% tage
1	Acute febrile illness (AFI)	1609	21.08
2	Acute upper respiratory tract infection	1301	17.04
3	Typhoid fever	1142	14.96
4	Pneumonia	1002	13.13
5	Single spontaneous delivery	619	8.11
6	Helminthiasis	505	6.62
7	Dyspepsia	422	5.53
8	Urinary tract infection	405	5.31
9	Infection of skin and sub cutaneous tissue	390	5.11
10	Diarrhea	325	4.26
Total		**7720**	**100**

4.1.4.8.10 Endemic diseases

4.1.4.8.10.1 Malaria

In Tiyo Woreda there were six malarious kebeles with estimated 26,897 populations at risk. During July 2014 to June 2015 G.C, indoor residual spray was done for 2,761 houses in three kebeles (Chafe Misoma, Dugda Ukulo and Murkicha), which was 100% coverage by population. As evidence obtained from expert of communicable disease insecticide treated bed nets (ITNs) was not distributed in this budget year but they supplied it just before a year during 2013/2014 G.C. A total of 89 malaria cases (of which 18 were under-five) with no death were reported during July 2014 to June 2015 G.C. During the same year, there was no shortage of malaria supplies such as Coartem, rapid diagnostic test (RDT) and other laboratory reagents in the woreda.

4.1.4.8.10.2 Tuberculosis and Leprosy

All forms of tuberculosis (TB) cases registered and reported during July 2014 to June 2015 were 141, among which 51 were smear negative for tuberculosis and fifty five cases were pulmonary tuberculosis (PTB) confirmed (smear +ve) with woreda case detection rate of 50%. During this year, the TB cure rate and treatment success rate were found to be 97.8% and 98% respectively. In Tiyo Woreda, there was no any defaulter and only one death was reported among smear +ve PTB on treatment. In the same year, about 139 TB patients were screened for HIV/AIDS. There were two cases of leprosy patients during 2014/2015 in this woreda.

Table 4.1.25: Performance of TB related activities by PHCU in Tiyo Woreda, Arsi Zone, Oromia during July 2014 to June 2015 G.C.

PHCU	TB detection rate (CDR)	# of TB patient	Treatment success rate (TSR)	Cure rate (CR)	Community TB (separate TB suspected)
Gonde	47 (46.5%)	22	21 (95.5%)	21(95.5%)	373 (88.8%)
Golja	29 (38.7%)	13	13 (100%)	13(100%)	90 (29%)
Bilalo	33 (63.5%)	5	5 (100%)	5 (100%)	212 (96.4%)
Barity	32 (59.3%)	6	6 (100%)	6 (100%)	132 (60%)
Woreda Total	**141 (50%)**	**46**	**45 (97.8%)**	**45 (97.8%)**	**807 (69%)**

4.1.4.8.10.3 HIV/AIDS

In Tiyo Woreda 13,831 people were screened for HIV/AIDS during July 2014 to June 2015 G.C. Among these clients, there was no data that showing confirmed positive for HIV test, therefore incidence rate of HIV/AIDS in the woreda was unknown, but prevalence of HIV/AIDS was found to be 0.06 per 100 populations. There were seventy people living with HIV/AIDS (PLWA) in the woreda. Only two clients were on ART service at Golja health center. As HIV/AIDS expert said, since Asella hospital is found in the center of the woreda, all the rest of the clients with the virus get ART service from the hospital. Community conversation is undertaking in all kebeles of the woreda to enhance awareness of the community on prevention and control of HIV/AIDS.

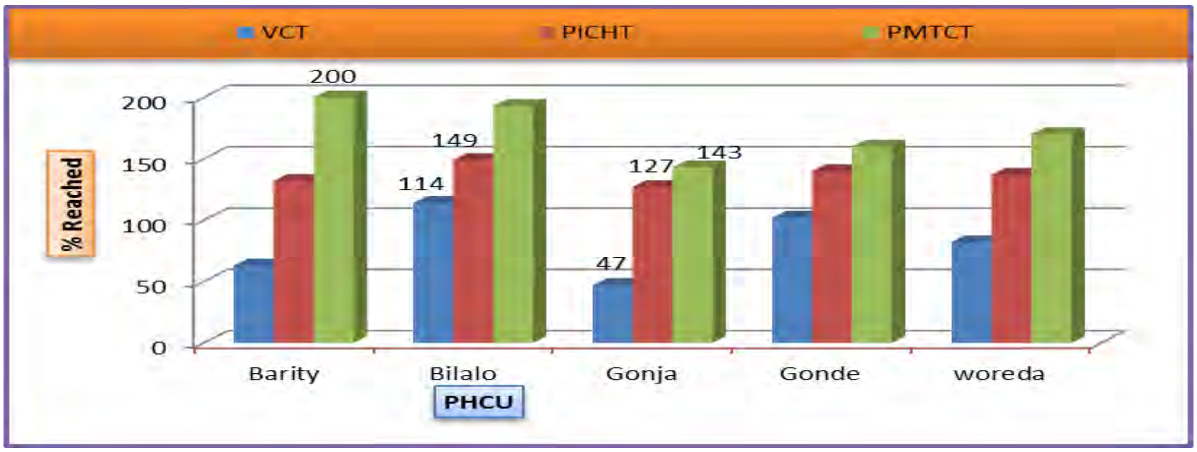


Figure 4.1.31: Comparison of VCT, PICHT and PMTCT performed in Tiyo Woreda, Arsi Zone, Oromia during July 2014 to June 2015 G.C.

4.1.4.8.10.4 Severe acute malnutrition (SAM)

During the study period, there were 22 Outpatient therapeutic Program (OTP) and four (SC) sites in Tiyo Woreda. In these available sites, 293 malnutrition cases were admitted to OTP throughout the year. Only a total of three admission cases were admitted at the SC sites (two cases were at Bilalo and one case was at Golja health center respectively). There was Community Based Nutrition (CBN) program in Tiyo Woreda working on nutritional activities. Components of CBN are Growth Monitoring and Promotion (GMP), Community Conversation (CC) and Technical Supportive Supervision (TSS). During 2014/2015 G.C, Tiyo Woreda reached 67% by GMP participation. There were no Targeted Supplementary Feeding (TSF) and Productive Safety Net Program (PSNP) in the woreda.

4.1.4.8.11 Outbreak and other disaster situations

In Tiyo Woreda, there were no outbreak or disaster situations that happened/occurred during July 2014 to June 2015 G.C

4.1.4.8.12 Budget allocation for woreda health office

In July 2014/2015 G.C budget year, 7,707,225 ETB was allocated for the Woreda Health Office. Of this total budget, the woreda had allocated 90% for salary and 10% for running different routine activities. Only 4% was allocated for purchasing of drugs and pharmaceutical supplies for all health facilities in the woreda. During the same year, 543,857 ETB sourced from different donors were distributed to this woreda from Oromia Regional Health Bureau for different activities like prevention and control of HIV/AIDS, Malaria, Meningitis, Hygiene and Sanitation, Supplemental immunization (like polio campaign) activities and others.

Table 4.1.26: Government budget allocated for Tiyo Woreda, Arsi Zone in consecutive four years from 2012 to 2015 G.C.

Year	Woreda budget	Woreda health budget	Proportion of health budget	Variation of budget by year
2012/13	37,311,371	3,282,837	8.8	Base line
2013/14	45,499,511	4,431,497	9.74	0.94
2014/15	69,891,342	7,707,225	11.03	2.23
2015/16	81,571,577	9,591,263	11.8	3

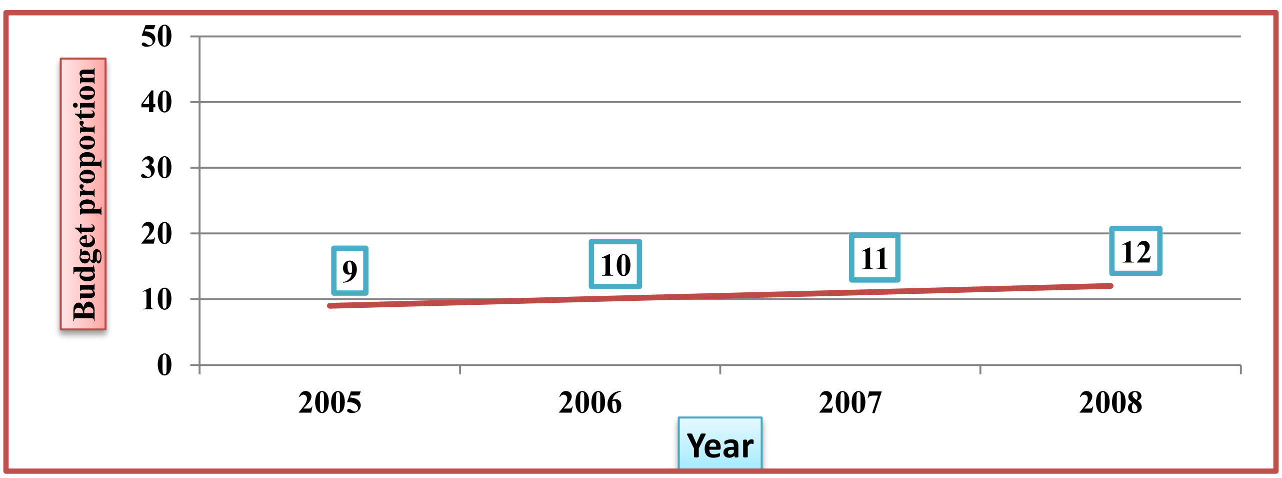


Figure 4.1.32: Trends of Tiyo Woreda health budget from July 2013 to 2015 G.C.

4.1.4.9 Human resources

In Tiyo Woreda, ninety nine health professionals, 34 health extension workers (HEWs), 51 supportive staffs, one IT and one emergency technician have been working in the woreda health office and different governmental health institutions.

Table 4.1.27: Distribution of human resources of all categories in the Tiyo Woreda Health Office, Arsi Zone, Oromia during July 2014 to June 2015 G.C

S. no	Profession category	Quantity	Ratio of profession to population
1	Pharmacist	0	-
2	Laboratory Technologist	1	1 : 108,112
3	Health Officer/HO	7	1 : 15,445
4	Nurses (degree + Dip)	59	1 : 1,832
5	Midwifery (degree + Dip)	14	1 : 7,722
6	Health Education and Promotion	4	1 : 27,028
7	Environmental health	4	1 : 27,028
8	Druggist	4	1 : 27,028
9	Laboratory Technician	6	1 : 18,019
10	HEWs	34	1 : 3,180
11	Supportive Staffs	51	1 : 2,120
12	IT technician	1	1 : 108,112
13	Emergency technician	1	1 : 108,112

4.1.5 Discussion

Acute febrile illness (21.08%), Acute Upper Respiratory Infections (17.04%) and Typhoid fever (14.96%) in adult whereas Pneumonia (36.68%), Non-bloody diarrhea (31.59%), Dysentery (11.14%) and Diarrhea with dehydration (8%) in pediatrics were common diseases that cause morbidities in Tiyo Woreda. Even though, the number of malaria case reported throughout the year were only 89 (two Falciparum & 87 Vivax cases), 1.17% of the total patients seen on OPD, it was the leading cause of admission next to Typhoid fever 1142, (which contributes 14.96% of

OPD cases). EDHS, 2011 showed that, there is a remarkable decline both in Infant mortality rate decreased by 42% i.e. from 101/1000 live birth to 59/1000 and Under five mortality rate decreased by 47% i.e. from 166/1000 to 88 death/1000 live birth. Under-five mortality rate showed fast declining trend from 187.8 deaths per 1000 live births in 2000 to 132 in 2005 and again to 88 deaths per 1000 live births in 2011(1). Compared to national survey data, there was no death report both in adult and under five children in Tiyo Woreda during the assessment period.

Since launched in 1980 EPI coverage in the first 20 years was very low although during the 1990‘s good progress was observed through Universal Child Immunization (UCI). The reaching every district (RED) approach has been implemented in Ethiopia since 2004 in districts with poor immunization coverage and high dropout rates. As a result, the coverage showed marked improvement. DPT3 coverage increased from 52% in 2003 to 87% in 2014. Then reaching every district strategic approach is recast to reaching every children/community strategic approach in order to deal with inequities within districts (6). Performance related to family health and child immunizations of Tiyo Woreda were almost above 100% which was encouraging health services delivery system. Family planning coverage, ANC, proportion of skilled delivery, and PNC were 117%, 102%, 87% and 171% respectively. All these achievements were by far more than national survey. This may be due to activities like community conversation and women one to five networking, especially increasing community awareness by community participation. But there was report repetition on new and repeat of women that using family planning, normally one mother should reported only once per year. The national data in HSDP III showed that, family planning coverage reached 60%, contraceptive acceptance rate 56.2%, ANC coverage was 43% by 2008/9 and 68% by 2011 survey. Proportion of skilled delivery and PNC coverage reached 32% (6% in SNNP, 84% in AA) and 34% respectively (1). Especially, postnatal services were almost double of those women that give birth under the assistance of skilled professionals. This indicates that, even though, visiting of mothers after delivery was conducted both by technical staffs on health centers and HEWs, still there were double report of one mother both by HEWs and health centers.

As 2011 EDHS showed, vaccination of children at appropriate age and in general vaccination coverage increased from time to time. Survey collected in 2011 showed that, Measles 76.6%, Penta 82% and fully vaccination coverage was 65.5%. By virtue of this concept, the achievement of Tiyo Woreda health sector in 2014/2015 was more than the national target i.e. BCG 100%, Penta3 106% (with dropout rate of 4%), Measles 105%, and Fully vaccinated were 104%. These over achievements may be explained as there were population movements from surrounding woredas and from Asella town, who got service in health facilities of the woreda.

Though Tiyo Woreda Health Office mentioned, as they had constraint of budget in 2014/2015 budget year, budget allocated for health sector was increased from 3,282,837 (2013 G.C) to 9,591,263 (2016 G.C) which showed three fold increment in the last five years. This might pave the way for those achievements stated at above.

The recently implemented BPR of the health sector has introduced a three-ties health care delivery system which is characterized by a first level woreda/District hospital serves 60,000 to 100,000 population, one health center serves 15,000 to 25,000 population, and their satellite health posts, serve 3,000-5,000 population (2). Potential health service coverage is the population covered in percentage based on the existing health centers and health stations in catchment's area. In 2000 the national potential of health service coverage was 51.2%. In 2005 it improved to 72.1 percent. This further has risen to 92.1 percent coverage in 2011. The national potential health service coverage difference between 2000 and 2011 was 40.9 percentage points which accounts for 79.9 percent of that of the 2000 PHSC (7). Compared to this standard, Tiyo Woreda's potential health coverage reached 100% both by health centers and health posts. But this woreda had a scarcity of man power working in these facilities. For example, 21 health posts need at least 42 HEWs but there were only 34 HEWs in 2014/2015 G.C. There was only one laboratory technologist and no pharmacist personnel at all, who can play a crucial role in pharmaceutical supply consistence and supervising cold chain management both at storage and transportation root.

According to Ethiopian HSDP VI, as national wide ratio of HEWs and laboratory personnel to population were 1:2,544 and 1:25,961 respectively and as Oromia Region HEWs to population ratio showed 1:2,075 whereas that of Tiyo Woreda were 1:2,574 for HEWs and 1:108,112 for laboratory personnel respectively. Therefore, this result indicated that there was shortage of health professionals in the woreda during assessment period (2).

According to WHO report of 2014 on TB program in Ethiopia, Ethiopia is one of the 22 high burden countries (HBCs) and TB remains one of the leading causes of mortality due to communicable diseases in the country. The prevalence and incidence of all forms of TB were 211 and 224/100,000 populations, respectively (8). According to National objective on prevention and control of Tuberculosis, efforts are invested to reduce the prevalence of TB to 156 per 100,000 populations in 2015. According to the Global Report 2009 by WHO, Ethiopia ranked as 7th among the TB high burden countries in the world, with an estimated incidence of all forms of TB of 378 new cases/100,000 pop/year and 163 new smear positive cases/100,000 pop/year; the estimated prevalence of all forms of TB is 579/100,000 population and 286/100,000 pop as far as smear positive TB is concerned (2009 estimate for 2007). As far as the TB control program is concerned, the country achieved 100 % geographical and above 92 % health facility DOTS coverage. Despite the extensive expansion of DOTS service in the country, the program performance indicators remain unsatisfactory, especially the case detection rate. In 2007/2008 the country achieved a case detection rate of smear positive TB of 34.5%, beside a treatment success rate of 84% (9). In relation to this national findings, Tiyo Woreda‘s prevalence of TB was 130/100,000 population of the woreda which is less than the national target. During 2014/2015 G.C, all forms of TB were 141 that are below expected level. This exhibited that, activities were undertaken well to prevent TB cases, but in another way TB detection rate of the woreda was 50% which may be related to the shortage of laboratory personnel. However, during the study period the treatment success rate and cure rate 98% shows good practice of DOTS and patient drug adherence.

Globally over 2.5 billion people are still without access to improved sanitation. In 2010, 15% of the population still practice open defecation. In developing regions almost half of the population does not have access to the sanitary facilities, an estimated 1.1 billion people practice open defecation, exposing themselves and their communities to major health risks. According to Ethiopia Demographic and Health Survey 2011 report, 62% of households have toilet facility, 84% urban and 55% rural households (HHs). The majorities of HHs, 82% (91% rural and 54% urban) use non-improved latrine facilities (1). Study conducted in Adigrat district showed that, 57.3% of latrine utilization rate was practiced in rural communities(10). In Tiyo woreda, which consisting of 18 rural and 3 town kebeles, there were seven rural kebeles (8702 HHs) that totally free of open defecation. In 2014/2015 G.C, the latrine coverage of the woreda reached 85% (all types), 93% (standard latrine) and 92% by utilization coverage. Even though, safe water supply coverage of the woreda was low (57%), Tiyo Woreda‘s achievements on environmental health, sanitation and hygiene near to hundred percent, which may in turn plays a great role in preventing communicable disease in the woreda.

4.1.6 Conclusion

Pneumonia and non-bloody diarrhea were among the leading causes of morbidity in under five outpatient visit of the woreda. Only less than ten percent of the woreda‘s populations live in urban. Tiyo Woreda had four health centers and 21 health posts by which woredas potential health service coverage was 100%. None of health posts had water supply and fixed telephone services instead the use their own mobile phone. Electric power supply is crucial for quality service and especially for cold chain management, but only two health posts had electric power supply in Tiyo Woreda during assessment period. All achievement related to family health were greater than hundred percent except skilled delivery service. There was no outbreak of disease and any other natural disaster during the assessment period in the woreda. All most all governmental health facilities found in Tiyo Woreda had OTP service. Budget allocated for health sector was gradually increased in the last five years. TB detection rate was low and there was no data that shows incidence rate of both TB and HIV/AIDS in 2014/2015 G.C. Activities performed on environmental health and sanitation, especially fruitful trial to make kebeles of the woreda free of open defecation showed as it was on a good truck to prevent communicable diseases in the woreda.

4.1.7 Limitations

- Vital statistics such as Infant mortality rate, neonatal mortality rate, under-five mortality, and maternal mortality rate were not available either at woreda health office or health institutions level.
- Some sectors in the woreda have no relevant data in complete documentation. For example, woreda culture and tourism office, Agricultural office etc.

- At woreda level, top leading diseases that cause outpatient morbidity were not identified by age and sex categories.
- The woreda did not conduct data quality assessment at health posts and health centers level to verify some performances like number of non-pregnant women versus contraceptive coverage, skilled delivery versus postnatal care.

4.1.8 Recommendations

- Important health indicators and vital statistics should be organized at all levels.
- At health facilities, top leading causes of outpatient morbidity should be complied with important variables such as age and sex category.
- Maximum efforts have to be taken to increase TB detection rate in the woreda by equipping health facilities by man power and necessary reagents and kits.
- Even though only 1/3 of the woreda‘s kebele were malarious, still malaria case takes the second rank out of top ten admission cases during the study period. Therefore, special attention should have to be given to communities practices on ITN utilization and measures taken to sprayed houses by health extension workers.
- Refrigerators should to avail for those health posts far from health center and non-functional refrigerators on some kebeles should be maintained to improve cold chain management.
- Infrastructure facilities coverage like telecommunication service, transportation access, electric power and safe water supplies need great effort to scale up the health sector performance. Therefore, concerned sectors in the woreda and any other organization should play their role to increase the coverage of these services.

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Chapter–V Scientific manuscript for peer reviewed Journals

5.1 Measles Outbreak Investigation -Limmu Seka Woreda, Jimma Zone, Oromia, Ethiopia, February 2016 G.C

Executive summary

Introduction: Measles is a highly contagious viral infection caused by a Morbillivirus and it is a public health problem that causes high morbidity and mortality worldwide. Limmu Seka is one of the twenty districts found in Jimma Zone, usually reporting measles cases. During 2015/2016, the district reported 396 measles cases. In February 2017, Limmu Seka district reported 75 measles cases and three deaths. We decided to investigate the outbreak to determine the magnitude and interfere with the ongoing morbidity and mortality and to identify associated risk factors for the outbreak.

Method: We conducted both descriptive and unmatched case-controls analytical studies with 32 cases and 64 controls in Limmu Seka district from February 9-22/2017. We used StatCalc of Epi Info 7.10 to calculate sample size. We used WHO standard case definition. Control was any neighbor to a case but without symptoms during the study period. Cases were selected by simple random sampling technique and controls were selected from neighbors. We used Micro Soft Excel, Epi Info and SPSS for data analysis.

Results: Seventy five confirmed measles cases were identified during the outbreak. About 38 (50.7%) cases were female. Around 28 (37.3%) were 5-14 years followed by 1-4 years 25 (33.3%) and 15-24 years 19 (25.3%). Attack rate of the outbreak was 0.04 % with CFR of 4%. About 35 (46.67%) of the cases were unknown vaccination status followed by zero vaccination status 26 (34.66%). Contact with measles case showed statistically significant associated with AOR of 6.6 [95% CI=1.4-31.16, P=0.017]. Having knowledge on mode of transmission and being vaccinated for measles were found to be protective independent factors significantly associated with AOR 0.15 [95% CI=0.04-0.62, P=0.009] and 0.12 [95% CI=0.02-0.68, P=0.016] respectively.

Conclusion: Majority of the cases affected by the outbreak were 5-14 years old children. Children less than fifteen years old in the woreda have to be targeted for mass vaccination for measles. Continues awareness creation on mode of transmission and advocacy as measles is one of the vaccine preventable diseases if family immunizes their children following the schedule.

Key words: Measles outbreak, Limmu Seka Woreda, case control

5.1.1 Introduction

Measles is an acute viral illness caused by a RNA virus in the family of paramyxovirus, genus Morbillivirus. It is a highly contagious viral disease and remains an important cause of death among young children globally, despite the availability of a safe and effective vaccine. It is an enveloped, single-stranded RNA virus that has globally retained its monotypic antigenic structure for decades. The genome encodes 8 proteins, including the haem-agglutinin (H) and the fusion (F) proteins. The lifelong immunity that follows infection is attributed to neutralizing antibodies against the H protein. Sequencing of the measles virus genome has so far identified 23 different genotypes that can be used to track transmission (1).

Measles is characterized by a sign and symptoms of fever (as high as 105°F) and malaise, cough, coryza, and conjunctivitis, followed by a maculopapular rash. The rash usually appears 14 days after exposure and spreads from head to trunk to lower extremities.

Measles is usually a mild or moderately severe illness. The severity of measles varies widely, depending on a number of host and environmental factors. The risk of developing severe or fatal measles increases for those aged <5 years, living in overcrowded conditions, who are malnourished (especially with vitamin A deficiency), and those with immunological disorders, such as advanced HIV infection. In developing countries, case-fatality rates among young children may reach 5–10%. In industrialized countries, deaths from measles are rare, although severe forms of the disease and even death may occur in previously healthy individuals (1).

There are three stages of illness.

Prodrome: Measles has a distinct prodromal stage that begins with a mild to moderate fever and malaise. Usually within 24 hours, there is an onset of conjunctivitis, photophobia, coryza (sneezing, nasal congestion, and nasal discharge), an increasingly severe cough, swollen lymph nodes (occipital, post auricular and cervical at the angle of the jaw), and Koplik‘s spots (seen only for a day or two before and after onset of rash). These spots are seen as bluish-white specks on a rose-red background appearing on the buccal and labial mucosa usually opposite the molars.

Rash: The rash begins with flat, faint eruptions of upper lateral parts of the neck, behind the ears, along the hairline and on the posterior parts of the cheeks. The rash may appear from 1–7 days after the onset of the prodromal symptoms, but usually appears within 3–4 days. Individual lesions become more raised as the rash rapidly spreads over the entire face, neck, upper arms and chest. In severe cases, the lesions may become confluent. In mild cases, the rash may be macular and more nearly pinpoint, resembling that of scarlet fever.

Fever: Fever is mild to moderate early in the prodrome, and goes up when the rash appears. Temperatures may exceed 40°C (104°F), and usually fall 2–3 days after rash onset. High fever persisting beyond the third day of the rash suggests that a complication (e.g., otitis media) may have occurred (2).

Modes of Transmission: Virus is spread directly from person to person by inhalation of suspended droplet nuclei or by contact with infective nasopharyngeal secretions. It can also be transmitted indirectly by objects (fomites) contaminated with nasopharyngeal secretions. Measles virus is labile. Half the infectivity is lost every 2 hrs at 37^0 C. So it depends on the initial number of viral particles in the droplet. It does not survive drying on a surface, so it has a short survival time on contaminated fomites. It is effectively spread as an aerosol. The virus survives drying in micro-droplets in the air relatively well, as opposed to drying on a flat surface. Measles is one of the most contagious of all infectious diseases, with >90% attack rates among susceptible close contacts.

Incubation Period: The incubation period ranges from 7–18 days (average 10–12 days) from exposure to the onset of prodromal symptoms. The interval from exposure to rash onset is usually 14 days (range 7–18 days), rarely as long as 19–21 days. The administration of IG early in the incubation period may extend this period to 28 days.

Period of Communicability: As acutely infected humans are the only reservoirs of measles virus, persons infected with measles are infectious 4 days before rash onset through 4 days after rash onset. Immunosuppressed persons might have a longer period of communicability (2).

5.1.1.1 Literature review of measles

Measles is one of the most infectious human diseases and can cause serious illness, lifelong complications and death. Prior to the availability of measles vaccine, measles infected over 90% of children before they reached 15 years of age. These infections were estimated to cause more than two million deaths and between 15 000 and 60 000 cases of blindness annually worldwide.

In the year 2000, the World Health Organization (WHO) estimated that 535, 000 children died of measles. The majority of them were in developing countries and this burden accounted for 5% of all under five mortality. In some developing countries, case-fatality rates for measles among young children may still reach 5–6%. In industrialized countries, approximately 10–30% of measles cases require hospitalization, and one in a thousand of these cases among children results in death from measles complications.

Improving measles vaccination coverage and reducing measles-related deaths is a global imperative, particularly as it relates to the United Nation‘s Millennium Development Goal 4 (MDG4), which aims to reduce the overall number of deaths among children by two-thirds between 1990 and 2015 (3).

The measles vaccine has been in use since the 1960s. It is safe, effective and inexpensive. WHO recommends immunization for all susceptible children and adults for whom measles vaccination indicative. Reaching all children with two doses of measles vaccine, either alone, or in a measles-rubella (MR), measles-mumps-rubella (MMR), or measles-mumps-rubella-varicella (MMRV) combination, should be the standard for all national immunization programs (4).

Measles is almost eliminated in most parts of the world, but measles outbreaks are still among the common epidemics contributing to high mortality and morbidity in sub-Saharan Africa, especially among children with malnutrition. The accelerated measles control strategy that began in 1998 introduced case based surveillance activity that was built upon the acute flaccid paralysis (AFP) surveillance infrastructure and closely linked to IDSR principles. This has brought the disease burden and mortality due to measles to a significantly low level. However small and infrequent measles outbreaks continue to occur due to low immunization coverage and gaps in surveillance activities. In 1999, of approximately 871,000 deaths from measles worldwide, 61% occurred in sub-Saharan Africa. In 2004, of the 1,590 districts under case-based surveillance, 80 (5%) reported outbreaks of measles. In 2005, 47(2.5%) districts reported outbreaks out of 1,850. In 2006, 178 (6%) of 2,923 districts reported outbreaks, which spanned across 29 countries. The most affected countries were: Democratic Republic of Congo 62,933 cases/868 deaths, Nigeria 2,919 cases/18 deaths, Ethiopia 1,665 cases/0 deaths and Tanzania 1, 606 cases/8 deaths (5).

Measles immunization activities in Ethiopia from 1993-2002

Measles coverage increased from 44% in 2003 to 55% in 2004. The coverage survey done in 2006 and 2012 disclosed that the measles coverage was 54.3% and 68.2% respectively. The improvement of performance mainly attributed to, implementation of the Reaching Every District (RED) approaches initiated in 2004. The DHS, 2011 and the 2012, National immunization coverage survey results have showed a big discrepancy with the national administrative report of FMOH, in that the administrative report claim, national measles vaccination coverage of 81% in 2011 as compared to DHS and coverage survey report of 56% and 68.2 % in the same year respectively (6).

Global measles elimination initiative

Routine measles vaccination giving one dose of vaccine to infants began in developing countries in the mid -1970s. Many industrialized and several developing countries since added a second dose given to children between one and seven years of age (depending on the country). By 2000, 72% of the world‘s children were receiving at least one dose of measles vaccine (verses 16% 1980); annual reported cases had dropped by 80% (from 4.2 million in 1980 to 853,000); and annual estimated deaths had dropped by 70% (from 2.5 million in 1980 to 750,000). By 2002, WHO‘s entire Americas region had eliminated measles (i.e. had no indigenous cases, as distinct from imported cases, for more than 12 months). Despite these results, in 2000, measles was still the leading cause of vaccine preventable deaths in children, and the fifth leading cause of death from any cause in children under five years old. Responding to this situation, in 2001, the American Red Cross, UNICEF, the united nation foundation, the CDC and WHO launched measles initiative aimed at reducing the death rate from measles in Africa where nearly 60% of measles deaths were occurring. Supplementary mass immunization campaign were to be conducted periodically, targeting all children between nine months and 14 years of age, with follow up campaigns every two to four years targeting children between 9 months and under five years of age. Increased emphasis was also placed on laboratory backed surveillance of new measles cases and monitoring of vaccination coverage (6).

Measles is the commonest vaccine preventable diseases that occur in Ethiopia; and mothers recognized as a self-limiting common childhood illness of which no medical care is often sought. A response of the mothers in rural setting (during one of studies done in 2000) for the question about measles was ‗how can you ask me about the existence of measles and whether I know it or not .you can't suggest I do not know it, since it attacks children everywhere' and is too common. This statement indicates how measles is a very common disease in rural Ethiopia. Traditional homecare remedies of different kinds are available in different ethnic and cultural groups to facilitate rapid recovery and reduce severity.

A combination of poor quality of record keeping, failure to identify epidemics and proper filing as well as failure of mothers to bring children affected by measles to health facilities for treatment are among other contributing for under reporting. In 2013, measles incidence was 7.2 cases per 100,000 populations. A total of 243 measles outbreaks were confirmed in 2013 compared to 146 in 2012 with a total of 192 affected woredas (districts) in 2013 compared to 125 in 2012.

Based on the epidemiology of measles in Ethiopia and burden of disease modeling, it is estimated that more than 1.5 million cases of measles (all age) and 70,000 deaths (assuming 4% case fatality ratio) would occur in Ethiopia annually. For many years the average number of measles cases reported to the Ministry of Health by the region ranged from 500-2000 annually. In Ethiopia, 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 (6).

Case based measles surveillance in a few selected administrative zones of Ethiopia in 2002 revealed that a shift of measles cases from children under five to those above five years of age. A total of 931 measles cases were registered during the surveillance period, of which 52.4% were children 5 to 14 years and the remaining 42.5% being children under five years. This indicates the effectiveness of the vaccination campaigns which mainly focused on providing and boosting immunization in under five children. Based on this fact subsequent measles supplemental immunization activities broadened the age range to children under 15 years of age.

Measles outbreaks continue to occur in most parts of the country with nearly 70% of the reported cases among children less than 15 years. 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 (6).

Ethiopia adopted the regional measles mortality reduction goal in 2002 and has been implementing the recommended strategies which include increasing the coverage of the first dose of measles vaccine, providing a second opportunity through SIAs, implementing sensitive disease surveillance, and improving case management. Localized measles outbreak investigation and response activities in different parts of the country were implemented. A total of 302 outbreaks were registered with 6,401 confirmed ―outbreak associated" cases, and 249 woredas were affected. 67% of measles cases were above 5 years old. An external assessment of the recurrent measles outbreaks was done in SNNPR. Based on the findings, the main ICC chaired by the State Minister of Health decided to plan for an under 15 measles campaign in 2015 (7).

During 2014, a total of 16,702 clinically suspected cases were reported through the system of which 5,418 (33%) of the cases are reported through measles case based surveillance, while the rest 10,789(67%) are through line lists. Of the cases reported in 2014, a total of 13,301 cases are confirmed cases including 2,373(18%) laboratory confirmed, 5,692(43%) epi-linked cases and 5,236(39%) clinically compatible cases. The number of reporting woredas has shown an increasing trend with exception of 2014 where 80% of the woredas have reported at least one case with blood specimen. The measles incidence showed an increasing trend from 2002 to 2011. From 2012 onward it showed a declining trend. On the contrary, the positivity rate has increased for the last two years reaching 35% and 53% in 2013 and 2014 respectively. Additionally, the number and extent of epidemics has increased greatly particularly for the last two years including the number of woredas affected. In 2013 and 2014, a total of 243 and 302 outbreaks were registered, while

192 and 249 woredas were affected respectively (7).

As of 31 May 2016, 4,395 measles cases had been reported, including 3,597 confirmed cases (469 Lab confirmed, 2,889 epi--linked and 239 clinically compatible).

Addis Ababa in Gulele Sub-city, Afar (Afar 5 zone, Semu Robi woreda), Amhara (East Gojjam zone, Debra Markos Town; and Wag Himra zone, Sekota Woreda) and Oromia (North Shoa Zone and Dera Woreda).

All regions are affected by the outbreak of which the top three are; SNNPR (49%), Oromia (29%) and Somali region (8%). Children under five (53% of all cases) are the most affected age group, followed by children 5-14 years (34%). It is anticipated that, measles outbreaks will affect all parts of the country based on surveillance data, seasonal patterns, areas affected and also the low population immunity due to sub optimal immunization coverage ,<95% coverage of routine immunization and Supplementary Immunization Activities. The El-Niño drought effects resulted further increase the risk of measles outbreaks in high-risk areas (8).

5.1.1.2 Statement of the problem

WHO set reduction of measles mortality rate at least by 95% by 2015 compared to 2000 estimates and to achieve measles and rubella elimination in at least five WHO regions by the end of 2020 G. C.

The African Region of the WHO is comprised of 46 Member States with a total population estimated at 850 million in 2012. The African Region adopted the measles mortality reduction goal since 2001, and has been implementing the WHO UNICEF recommended strategies ever since.

The Expanded Programme on Immunization (EPI) was established by the World Health Organization in 1974 to control vaccine preventable diseases. In Ethiopian, EPI programme was launched in 1980 with the objective of achieving 100% immunization coverage of all children under two years old by 1990. In 1986, the coverage target was reset to 75% and the target age group was changed to less than one year old but progress in increasing coverage has been slow. With the introduction of new approaches known as Reaching Every Districts (RED) and Sustainable Outreach Services (SOS) for immunization in 2003, improvement has been documented (9).

In contrary to the control and elimination activities performed, there were a numbers of measles outbreaks in Ethiopia from year to year. In 2012, 146 outbreaks in 125 woredas, 243 measles outbreaks were confirmed in 2013 and 192 affected woredas, 302 outbreaks were registered and 249 woredas were affected by 2014 and as of 31 May 2016, 4,395 measles cases had been reported (6-8).

In Oromia Region, started from WHO week 43/2016 to week 7/2017 there were more than six measles outbreaks. During this period about 715 measles cases were reported to the region by line list. The distribution of these cases by zone were: Guji Zone 442 (61.8%), Bale Zone 125 (17.5%), Jimma Zone (Limmu Seka Woreda) 75 (10.5%), West Shoa Zone 73 (10.2%). About 369 (51.6%) of the cases were not vaccinated for measles immunization and majority of them were 328 (46%) under five years of age. About 24 samples were taken to Ethiopian Public Health Institutes (EPHI) for confirmation and sixteen of them were positive for measles IgM.

5.1.1.3 Significant of the study

Measles outbreak is still a public health problem in different Ethiopian regions including Oromia. From WHO week 43/2016 to week seven 2017, 715 measles cases were reported from four different zones to Oromia Regional Health Bureau. About 125 cases from Bale (Herena Buluk and Meda Walebu Woredas), 442 cases from Guji (Ana Sora, Wadera, Liben, and Goro Dola Woredas), 73 cases from West Shoa (Danno Woreda) and the rest 75 cases were reported from Jimma Zone.

As evidence obtained from Jimma Zone Health Department and Limmu Seka Woreda Health Office, there were histories of measles outbreaks in the woreda every two years. By this year (2009 E.C) Limmu Seka Woreda reports 75 measles cases. As data obtained from line list showed, increment of cases was started from WHO week 3 (16/01/2017). Then bureau deployed one team for intervention activities, confirmation of outbreak and for conducting investigation in order to identify sorts of risk factors for the recurrent measles outbreak in the area from 9 February to 22/2017 G.C. The result of this finding will be used for appropriate planning and further interventional activities in the woreda.

5.1.3 Methods and materials

5.1.3.1 Laboratory investigation

Five blood samples were collected from suspected measles cases and sent to Central Laboratory for IgM confirmatory test.

5.1.3.2 Case definitions

Standard case definition of measles: -
Suspected: Any person with fever and maculopapular (non-vesicular) generalized rash, and cough, coryza or conjunctivitis (red eyes) OR any person in whom a clinician suspects measles.

Confirmed: A suspected measles case that is investigated, including the collection of an adequate blood specimen (5 ml), and has serological confirmation of recent measles virus infection (IgM positive) and those having epidemiological linkage with laboratory confirmed case.

Community case definition of measles: - Any person with fever and rash starts from face.

5.1.3.3 Descriptive epidemiology

The previous two years data of EPI coverage was reviewed and collected from the woreda. Similarly, this data was collected from health facilities for data quality assurance. Also, data was gathered on current cold chain status and magnitude of malnutrition. Magnitude of the disease was described by sex, age, kebeles, date of onset, vaccination status and other variables from measles line list.

5.1.3.4 Analytical epidemiology

We conducted unmatched 1:2 ratio of case-control study in Limmu Seka Woreda. Case-patients were those who suspected to have measles by health facility workers before the study and active cases for suspected measles cases by investigation team at the community level. Neighborhood controls were involved in the study. Selected case-patients and controls were interviewed with standard and identical questionnaire. Different risk factors including vaccination status, contact history, housing condition, knowledge of the family, and nutritional status were assessed during this study, condition, knowledge of the family, and nutritional status were assessed during this study.

5.1.3.5 Environmental assessment

During this investigation, environmental factors that may contribute for the occurrence of measles outbreak and its magnitude were looked for. These factors include area of living house and ventilation status of the house for both selected case-patients and controls.

5.1.3.6 Data processing and analyzing

Data entered and summarized using Microsoft Excel. Analysis of different risk factors/exposures was done by using Epi info version 7.1 Software and SPSS. Epi-curve, magnitude and frequency of a disease was presented in figure and table forms. Measles attack rate and case fatality ratio were calculated among total cases and deaths. Additionally, estimated odds ratio and 95% confidence interval were determined through bivariate analysis.

5.1.4 Result

5.1.4.1 Laboratory result of the outbreak

Five blood samples were collected from suspected measles cases at Atinago health center, in Limmu Seka Woreda on day 01/29/2017 and sent to the EPHI for confirmation. All 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 70 cases were managed as measles in the woreda.

5.1.4.2 Descriptive epidemiology analysis

We identified seventy five measles cases during the outbreak. About 38 (50.7%) of them were female. Over all attack rate (AR) of this outbreak was 0.04%. Sex specific attack rate of the outbreak was calculated and found to be 0.04%.

We tried to determine distributions of cases by age group during this outbreak investigation. The highest proportions of measles cases were occurred in 5-14 years 28 (37.3%) whereas the lowest proportions 1 (1.3%) were under one age group. The mean age of the cases was 9 with SD ± 5.9. Age specific attack rate (ASAR) was also identified and found to be 0.1% in under five and 0.06% in under fifteen years of age. The woreda reported three deaths of measles cases; that indicated case fatality rate (CFR) of 4%.

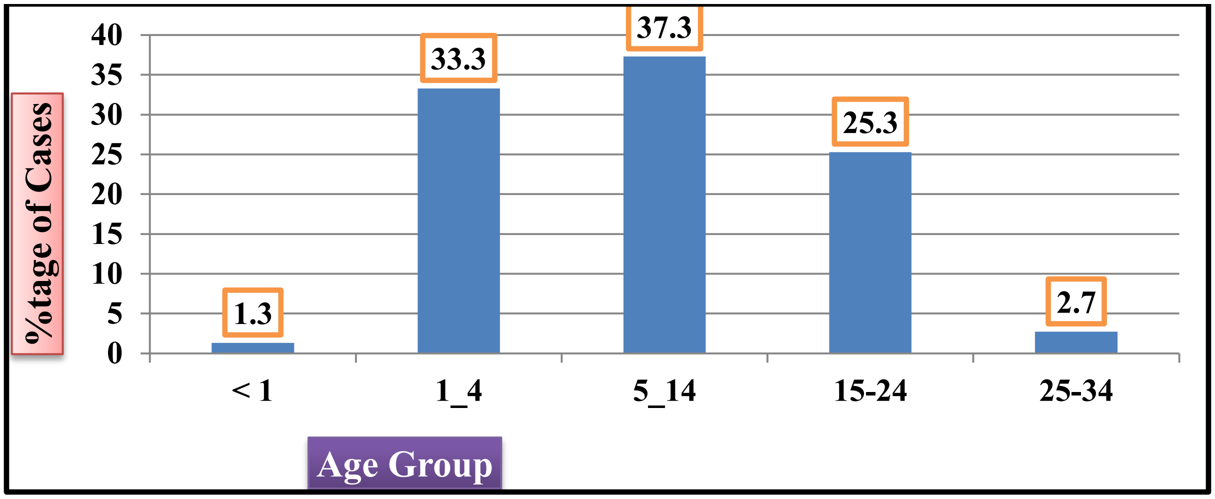

Figure 5.1.33: Distributions of Measles Cases by Age Group in Limmu Seka Woreda, Jimma Zone, Oromia Region, Ethiopia, February 2017 G.C.

Accordingly to vaccination status assessment 35 (46.67%) of them had unknown vaccination status whereas 26 (34.66%) did not get any dose of measles vaccination.

Measles cases were started to visit both Bontu Health Post and Atinago Health Center from WHO week 50/ 2016 and reached peak at week four/2017, then after cases slightly decline started from week five. Index case of this outbreak was 12 years old male with unknown vaccination and had no travel history outside of the woreda.

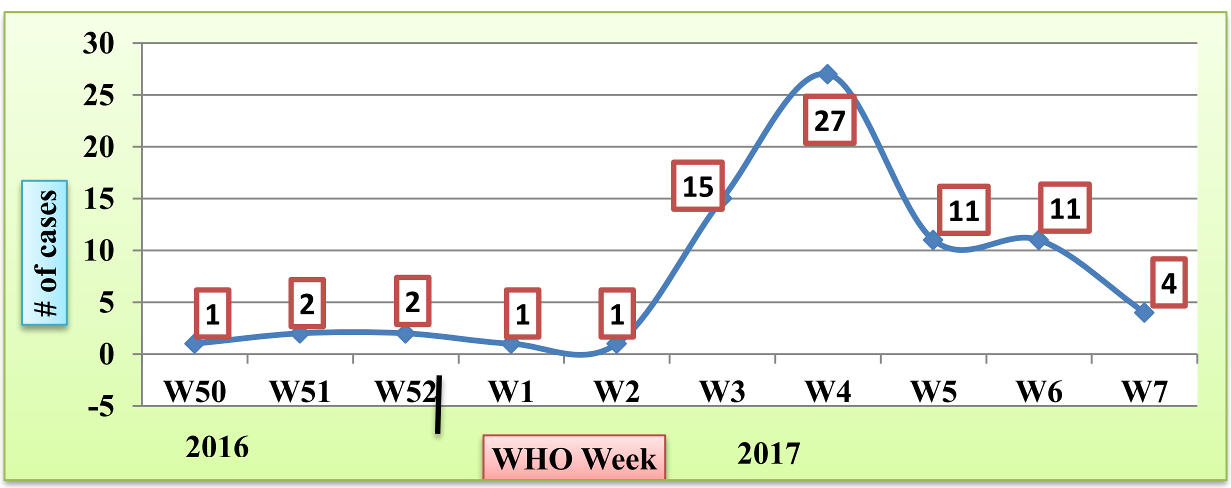

Figure 5.1.34: Distributions of Measles Cases by WHO Week in Limmu Seka Woreda, Jimma Zone, Oromia Region, Ethiopia, February 2017 G.C.

Limmu Seka Woreda notified Jimma Zone after a period of one month from the index case. The zone sent line list of cases to Oromia Regional Health Bureau (ORHB) after a period of two weeks. Both zone and woreda were too late to notify the outbreak because measles cases were often reported from the woreda. As we tried to discuss with both zone and woreda to know reason for late report of line list, the zone claimed that the line list sent by the woreda was not legible and also not contain necessary variables on line list form. So, they returned it back to the woreda for correction and re sent it again.

After the zone notified the region, ORHB deployed a team to support prevention and control activities, searching for active cases, verifying data quality and reporting systems, monitoring case management activities and eventually conducting outbreak investigation in the woreda. After the team arrived at the woreda (on 24 January 2017), more than half of measles cases were obtained by active case search and referred to health posts and health centers based on their severity. At the same time control and prevention activities performed and the outbreak came to end at the middle of February 2017 G.C.

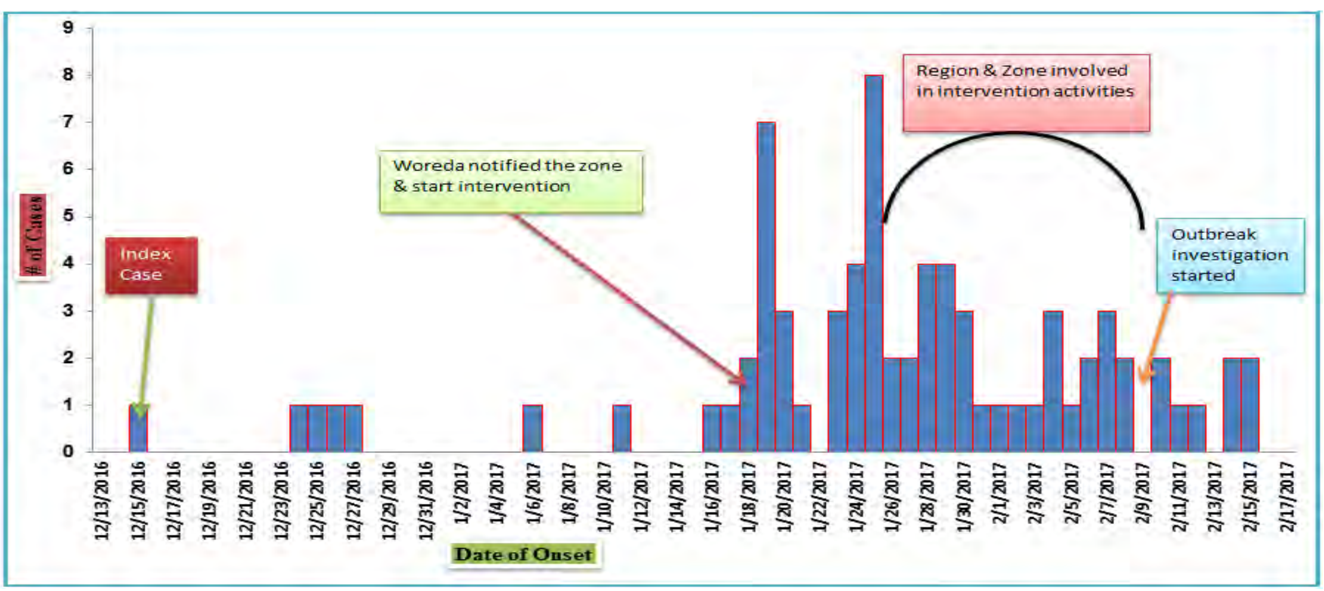

Figure 5.1.35: Distribution of Measles Cases by Onset of rash, Limmu Seka Woreda, Jimma Zone, Oromia Region, Ethiopia, February 2017.

5.1.4.3 Interventions taken

During last week of January 2017, one team was deployed from ORHB to support control and prevention activities and then conducting outbreak investigation in Limmu Seka Woreda. We incorporated other additional team members both from Jimma Zone Health Department (PHEM focal person) and Limmu Seka Woreda Health Office in order to identify and characterize the measles outbreak in the woreda. We discussed with all staffs of woreda health office, staffs of catchment health center (Atinago Health Center) and health extension workers (HEWs) of respective kebeles. And also discussion was held with woreda and kebele administrates to get more focus and other administrative supports. Technical assistance was given for health workers on case management, on line list recording (to verify incorporation of all necessary variables and reporting situation in place. We tried to review measles vaccination coverage (MVC) of the woreda and kebele with high case load (Bontu Kebele) and we found that MVC of 2015/2016 were 86% and 57% respectively. Measles vaccination coverage of this kebele was very low, which might be the cause for higher proportion of case load in the woreda.

Cases were treated to prevent further spread and reduce morbidity and mortality related to measles both at health post and health center. Even treatment was given at house hold level for those obtained during active case search and unable go health facility on foot. Routine surveillance was enhanced and overall activities were closely followed at each level on a daily bases.

We gave health education for the community members and students in areas where the community are mostly assembled like, 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 as measles is vaccine preventable disease and it may not be their threat if they immunize their children following the schedule of outreach vaccination program. Active surveillance has been conducted in neighboring kebeles of the woreda.

Fortunately, there was nationwide supplementary immunization campaign for measles on last week of February 2017. Therefore, it was conducted in Limmu Seka

Woreda too for children of six months up to 14 years old. It may create good chance in preventing spread of the disease to other adjacent kebeles with previously affected ones.

5.1.4.4 Analytical study

A total of 32 cases and 64 controls were selected by simple random sampling and involved as study participants from the community. These participants were assessed for risk factors associated with measles outbreak in Limmu Seka Woreda of Jimma Zone. The mean age of the cases and controls were 8.4 ± 6.9 SD (Q1= 1 & Q3= 30) for cases and 9.4 ± 5.4 SD (Q1= 1 & Q3= 25) respectively. Both cases and controls were asked for their knowledge from where people get measles virus. Accordingly seventeen 53.12% of the cases didn‘t know from where people get infected of measles virus, whereas 47 (73.4%) of controls knew as people got measles virus from already infected with active measles virus. About 26 (81.25%) of cases and 43 (67.2%) of controls believed in that measles virus affects under five years old children.

Table 5.1.28: Measles cases presented with typical sign and symptoms of measles and those with complications during a period of 12/15/2016 to 02/22/2017, Limmu Seka Woreda, Jimma Zone, Oromia Region, Ethiopia, February 2017 G.C

S.NO	Sign and Symptoms	Case (No. & %)	Proportion got appropriate treatment
1	Fever	32 (100%)	26 (81.25%
2	Conjunctivitis (Eye redness)	32 (100%)	24 (75%)
3	Cough	28 (87.5%)	22 (68.75%)
4	Rash	32 (100%)	29 (90.63%)
	Complication identified when they visited health facility		
1	Diarrhea	13 (40.63%)	100%
2	Pneumonia	21 (65.63%)	100%

All measles cases 32 (100%) included in study were presented to health facilities with fever, rash and eye redness whereas about 28 (87.5%) of cases were treated as pneumonia complication (Table 1). During unmatched case control study, 19 (59.38%) female and 13 (40.63%) male as cases and

43 (67.19%) male and 21 (32.81%) female as controls were involved. About 13 (40.63%) cases and 38 (59.38%) controls were between 5 -14 years old. About 18 (56.25%) of cases and 38 (59.38%) of controls were living with family members of less or equal to five. All the study participants were Oromo by their ethnicity and around 29 (90.63%) of cases and 58 (90.63%) of controls were Muslims in their religion (Table 2).

Table 5.1.29: Demographic characteristics of measles outbreak in Limmu Seka Woreda, Jimma Zone, Oromia Region, Ethiopia, February 2017 G.C

S.No	Variables	Category	Case (%)	Control (%)
1	Sex	Male	13 (40.63%)	43 (67.19%)
		Female	19 (59.38%)	21 (32.81%)
2	Age Group	1-4	12 (37.5%)	15 (23.44%)
		5-14	13 (40.63%)	38 (59.38%)
		15-24	6 (18.75%)	10 (15.63%)
		25-34	1 (3.13%)	1 (1.56%)
3	Family Size	≤ 5	18 (56.25%)	39 59.38%)
		>5	14 (43.75 %)	26 (40.63%)
4	Educational level of the family	Illiterate	19 (59.38%)	29 (45.31%)
		Literate	13 (40.63%)	35 (54.69%)
5	Religion of the family	Orthodox	3 (9.38%)	3 (4.69%)
		Muslim	29 (90.63%)	58 (90.63%)
		Protestant	0	3 (4.69%)
6	Occupation of Case/Control	Student	11 (34.38%)	30 (46.88%)
		Not applicable	17 (53.13%)	21 (32.81%)
		Other Works	4 (12.5%)	13 (20.31%)
7	Marital Status of Case/Control	Single	1 (3.13%)	4 (6.25%)
		Married	2 (6.25%)	2 (3.12%)
		Not Applicable	29 (90.63%)	58 (90.63%)
8	Marital Status of the family	Married	32 (100%)	62 (96.88%)
		Single	0	2 (3.12%)

S.No	Variables	Category	Case (%)	Control (%)
9	Occupation of the family	Farmer	27 (84.38%)	51 (79.69%)
		Housewife	1 (3.13%)	3 (4.69%)
		Daily Laborer	0	1 (1.56%)
		Merchant	1 (3.13%)	7 (10.94%)
		Employed	3 (9.38%)	2 (3.13%)

Table 5.1.30: Bivariate analysis of some variables for measles outbreak, Limmu Seka Woreda, Jimma Zone, Oromia Region, Ethiopia, February 2017 G.C

S.No	Variables	Category	Case	Control	OR (95%CI)	P-Value
1	Educational level of family	Illiterate	19 (59.38%)	29(45.3%)	1.76 (0.75-4.2)	0.196
		Literate	13 (40.63%)	35(54.7%)		
2	Presence of sick person in the house	Yes	23 (71.88%)	6 (9.4%)	24.7 (7.9-77.3)	0.000
		No	9 (28.13%)	58(90.6%)		
3	Being Vaccinated	Yes	9 (28.13%)	50(78.1%)	0.11 (0.04-0.29)	0.000
		No	23 (71.88%)	14(21.9%)		
4	Having travel history	Yes	22 (68.75%)	25(39.1%)	3.4 (1.4-8.4)	0.007
		No	10 (31.25%)	39(60.9%)		
5	Having contact with measles case	Yes	27 (84.38%)	27(42.2%)	7.4 (2.5-21.7)	0.000
		No	5 (15.63%)	37(57.8%)		
6	Having knowledge on mode of transmission	Yes	6 (18.75%)	45 (70.3%)	0.1 (0.04-0.28)	0.0001
		No	26 (81.25%)	19 (29.7%)	10.3 (3.6-28.9)	
7	Ventilation status of the house	Ventilated	8 (25%)	36 (56.25%)	0.26 (0.1-0.66)	0.005
		No	24 (75%)	28 (43.75%)	3.86 (1.5-9.88)	0.005
8	Having knowledge as measles is vaccine preventable	No	12 (37.5%)	7 (10.94%)	7.2 (2.3-22.2)	0.001
		Yes	6 (18.75%)	43 (67.19%)		
		Don‘t know	14 (43.75%)	14 (21.88%)		
9	Having knowledge how people get measles virus	Don‘t know	18(56.25%)	17(26.56%)	3.56 (1.5-8.7)	0.005
		Contact with case	14 (43.75%)	47 (73.44%)		

S.No	Variables	Category	Case	Control	OR (95%CI)	P-Value
10	What you do after you get sick?	Stayed at home	5 (15.6%)	1 (1.6%)	11.7 (1.3-104.6)	0.028
		Visited health facility	27 (84.4%)	63 (98.4%)		

As it was displayed on the table three above, bivariate analysis of some independent variables was done. Accordingly, presence of sick person in the same house is identified as one of the statistically significant risk factors with odd ratio (OR) 24.7 [95% CI=7.9-77.3, P=0.000]. The action they take after got sick of measles also determined as associated risk factors for measles transmission with OR=11.67 [95% CI=1.3-104.6, P= 0.028]. Living in confined house condition of the study participants showed statistically significant association for the spread of measles outbreak in the area, OR=3.86 [95% CI =1.5-9.88, P=0.005]. Bivariate analysis of family's education and their knowledge on how people get measles virus identified as statistically significant association with OR=1.76 [95% CI of 0.75-4.2] and OR=3.56 [95% CI of 1.46-8.67, P= 0.005] respectively (Table 3).

Table 5.1.31: Multivariate versus bivariate analysis of some variables for measles outbreak investigation in Limmu Seka Woreda, Jimma Zone, Oromia, Ethiopia, February 2017 G.C

S.No	Risk Factors	Crude OR(95%CI)	AOR (95% CI)	P-Value
1	Presence of sick person in the house	24.7 (7.9-77.3)	9.67 (2.04-45.74)	0.004
2	Being Vaccinated	0.11 (0.04-0.29)	0.12 (0.02-0.68)	0.016
3	Having travel history	3.4 (1.4-8.45)	11.3 (1.35-94.7)	0.025
4	Contact with measles case	7.4 (2.5-21.7)	6.6 (1.4-31.16)	0.017
5	Having knowledge on mode of transmission	0.1 (0.04-0.27)	0.15 (0.04-0.62)	0.009
6	House condition	3.86(1.5-9.88)	1.07 (0.24-4.74)	0.93

5.1.5 Discussion

According to the national measles guide line, three or more laboratory confirmed cases were needed to declare an outbreak of measles. Therefore, we confirmed the existence of measles outbreak by collecting five blood samples and sent to national laboratory (EPHI) and all tested samples (100%) were IgM positive. This result is similar with study conducted in Zimbabwe (10).

Among measles cases registered on line list, majority 28 (37.3%) of cases were between age of 5-14 which was followed by 25 (33.3%) of 15-24 age and 19 (25.3%) of 25-34 age group. The mean age of the cases was 9 ± 5.9 SD. About 38 (50.7%) of cases were female population. This study is similar with studies results found in Ethiopia during 2014 and 2015, that 39% and 52.4% of confirmed measles cases were between ages of 5-14 respectively (6, 7). But finding of this outbreak was not similar with study conducted in North India; the proportion of the males in study areas were high (43, 62.3%) as compared to females (26, 37.7%) (11). Since travel history before onset of rash and contact with measles cases had significant association with odd ratio (OR) of 11.3 (95% CI=1.35-94.7, P=0.025) and 6.6 (95% CI= 1.4-31.16, P= 0.017) respectively, more affected group were school aged children which was again supported by our study that, among 32 cases assessed by case control 11 (34.38%) were student. Being student obvious will increase chance of contact with other children. And high proportion of female affected may be related to their high contact with measles cases in house as care giver.

Overall attack rate (AR) of the measles outbreak against woredas population was 0.4/1,000 population and age specific attack rate (ASAR) were 1/1,000 for under five children and 0.6/1000 population for under fifteen years children of the woreda. Gender AR rate was also calculated and it was 0.4/1,000 female population. Case fatality rate of this outbreak was as high as 4% which is slightly lower than the study conducted by WHO weekly epidemiologic record and Global Measles and Rubella strategic plan which showed that, in developing countries, case-fatality rates among young children may reach 5–10% and 5–6% respectively and exactly similar with study finding of Zimbabwe (1, 3, 10).

About 35 (46.67%) of cases caught by line list had unknown history of measles vaccination followed by 26 (34.66%) with zero vaccination status. This is also true for cases assessed by case control study that only 9 (28.13%) cases had history of measles vaccination, for which none of them were present card given for immunization. This study is similar with study conducted in Zimbabwe, 83.6% of cases were not vaccinated (10).

As the major expected complication of measles were pneumonia, diarrhea and ear discharging, 21 (65.63%) cases ruled out with pneumonia and managed accordingly.

In bivariate analysis, being vaccinated against measles OR 0.11 (95%CI 0.04-0.29, P= < 0.0001) and having knowledge on mode of transmission OR= 0.1 (95% CI 0.035-0.275, P= < 0.0001) had protective association with the outbreak while presence of sick person in the house, OR =24.7(95% CI, 7.9-77.3, P=<0.0001), having travel history two weeks before rash onset, OR=3.4 (95% CI, 1.4-8.4, P= 0.007) and contact with case OR= 7.4 (95% CI, 2.5-21.7, P= <0.0001) had statistically significant association with the measles outbreak in Limmu Seka Woreda. This implies that those cases having travel history and contact with other acute measles cases had 3.4 and 7.4 times more chance of getting measles virus than those who had not such history.

In multivariate analysis of measles outbreak investigation in Limmu Seka Woreda, being vaccinated for measles infection and having knowledge on mode of measles virus transmission were remain protective factor for developing the disease and statically significant with adjusted odd ratio (AOR) of 0.12[95% CI = 0.02-0.68, P= 0.016] and 0.15 [95% CI=0.04-0.62, P=0.009] respectively, which is similar with the study done in Dedesa Woreda and there was a significant difference between vaccinated and unvaccinated groups with AOR 0.13 [95% CI=0.05-0.37, P= 0.0001] (12). Travel history and contact with measles cases were also remain statistically significant independent risk factors found by this outbreak investigation with AOR of 11.3 [95% CI=1.35-94.7, P=0.025] and 6.6 [95% CI=1.4-31.16, P=0.017] which is again similar with study finding of Didesa Woreda and that of Zimbabwe which showed contact with a case AOR=41.14(95%CI: 7.47-226.54) (10, 12).

5.1.6 Conclusion

Majority of the cases affected by the outbreak were 5-14 years old children. Lack of information on measles mode of transmission, contact with measles case and being unvaccinated were independent factors associated with the outbreak in the woreda.

5.1.7 Recommendation

Therefore, children less than fifteen years old in the woreda have to be targeted for identification and mass vaccination for measles. Similarly, continues awareness creation on mode of transmission, early detection and isolation family member who develop sign of measles and give advocacy as measles is one of the diseases that can be prevented by measles vaccine.

5.1.8 Reference

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Chapter–VI Abstracts for Scientific Presentation

Authors: Tarekegn D. Gutema[1]

Co-authors: D. A. Hurisa[2], T. Debela[3], A. Belachew[4]

Address: 1- EFETP, School of Public Health, Addis Ababa University, Cohort VII Resident, 2 & 3- Oromia Regional Health Bureau, PHEM and Research core processes, 4- Addis Ababa University, School of Public Health, Epidemiology Department.

Name of EFETP: Ethiopian Field Epidemiology Training Program

Email Address[1]: tare27052015@gmail.com, **Tel:** +251 921 089 479

Email Address[2]: Dagnachewalemu7@gmail.com, **Tel:** +251912239730

6.1 Measles Outbreak Investigation and Response, Limmu Seka Woreda, Jimma Zone, Oromia Region, Ethiopia, February 2017 G.C

Abstract

Introduction: Measles is a highly contagious viral infection caused by a Morbillivirus and causes high morbidity and mortality worldwide. Limmu Seka is one of the twenty woredas found in Jimma Zone, usually reporting measles cases. During 2015/2016, the woreda reported 396 measles cases. In February 2017, Limmu Seka Woreda reported 75 measles cases and three deaths. We decided to investigate the outbreak to determine the magnitude and interfere with the ongoing morbidity and mortality and to identify associated risk factors for the outbreak.

Method: We conducted both descriptive and unmatched case-controls analytical study with 32 cases and 64 controls in Limmu Seka Woreda from February 9-22/2017. We used StatCalc of Epi Info 7.10 to calculate sample size from previous study. A case was any resident of the woreda developing fever and macula papular rash and control was any neighbor to a case but without symptoms during the study period. We used Micro Soft Excel, Epi Info and SPSS for data analysis.

Result: The outbreak was confirmed for measles IgM antibody. Among 75 measles cases**,** 28 (37.3%) and 25 (33.3%) were 5-14 and 1-4 years old respectively. Attack rate of this outbreak was 0.4/1,000 population with case fatality rate of 4%. About 35 (46.67%) of them were unknown vaccination status. Contact history with sick and travel history were statistically significantly factors with adjusted odds ratio (AOR) of 6.6 [95% CI=1.4-31.2, P=0.017], and 11.3 [95% CI=1.35-94.7, P=0.025) respectively. Having knowledge on mode of transmission and being vaccinated for measles were found to be protective independent factors with AOR of 0.15 [95% CI=0.04-0.62, P=0.009] and 0.12[95% CI = 0.02-0.68, P= 0.016].

Conclusion: Majority of the cases were under fifteen years old. Information gap on measles mode of transmission, contact with measles case and being unvaccinated were independent factors associated with the outbreak in the woreda. Awareness creation on mode of transmission and mass vaccination for measles for under fifteen children were possible solution.

Key words: Measles outbreak, case control, Limmu Seka, Ethiopia

Word count: 316

Authors: Tarekegn D[1], Dagnachew A[2], Abdulnasir A[3] , Ayele B[4].

Address: - 1-EFETP-School of Public Health, AAU. 2- ORHB, 3- AAU, School of Public Health, EFETP Resident Advisor, 4- AAU, School of Public Health, Epidemiology Department.

Name of FETP: Ethiopian FETP.

Email Address: Tare27052015@gmail.com

6.2 Measles Surveillance Data Analysis, Guji Zone, Oromia Region, Ethiopia, 2011 to 2015

6.2.1 Abstract

Background: Measles is highly contagious virus infection and ranked among a leading cause of childhood morbidity and mortality in Africa. Despite the availability of a safe and highly effective vaccine, measles still remains one of the leading causes of vaccine-preventable deaths in children, 5 years of age worldwide, especially in developing countries, with up to 20% of these deaths occurring in those, 1 year . We analyzed five years measles data to identify morbidity and mortality trends in Guji Zone, Oromia Region. This study is intended to analyze the magnitude and epidemiology of measles cases reports of this zone to understand its trends and propose recommendation.

Methods: We conducted descriptive study by reviewing measles case data (line list and case based registration) of Guji Zone, South East Oromia from February 24/2016- March 09/2016.

Result and Discussion: A total of 4,319 measles cases were registered by surveillance system. The cumulative incidence rate was 253/100,000 persons. The most affected age group is under 5 years (ASAR: 951/100,000). Both male and female sex was equally affected (51.35%, 48.65%). The median age of cases is three years. Among all cases 48.02% were unknown vaccination status while 32.76% were never vaccinated followed by 18.15% were vaccinated with one dose. Hambela Wamena, Kercha and Girja were the most affected woredas during the study period.

Conclusion and Recommendation: Approximately equal numbers of cases were reported by gender and the most and the least affected age groups were 1-4 and ≥15 years respectively. Majority of cases were either not vaccinated or their vaccination status were not known. To control anticipated outbreak and to achieve 2020 measles elimination goal, measles vaccination campaign and strong routine vaccination should be maintained for < 15 years children.

Keywords: Measles, Surveillance, Guji.

Word count: 278

Chapter–VII

Narrative Summary of Disaster Situation

7.1 Emergency Need Assessment Report of Health and Nutrition in South East Oromia Region, Ethiopia, November 2016

Abstract

Among 23 teams established at Federal level for Meher assessment, four of them were assigned in Oromia Region in selected ten zones. Our team (team 8) was assigned in Borena, Guji and West Guji Zones. These zones are among twenty zones administered under Oromia Regional State and found in southeastern part of the country. This assessment is intended to investigate the extent, types, magnitude, severity and likelihood of different risks in the most ―vulnerable" Woredas and develop response plan based on identified findings.

Visited woredas were selected by discussing with zonal Epidemic Preparedness Task Force and considering woredas those were selected by Regional DRMC. The same procedures were done at woreda levels to select visited kebeles, health facilities and villages. Following this, three woredas (Wachille, Teltelle and Moyale) from Borena and (Goro Dola, Gumi Eldalo and Liben) from Guji and Dugda Dawa and Melka Soda from West Guji Zones were assessed from November 20 to December 4, 2016. At each level interview and discussion were conducted with concerned bodies including community members by using prepared checklists. Additionally, review of documents was done at zonal and woreda levels.

Even though they did not have regular meeting there are functional multi-sectorial coordination forum at all zonal levels. There was no ongoing outbreak in all the three zones during assessment, there was AWD outbreak in the past six months. There were a shortage of emergency drugs and supplies at all visited woredas. There was poor latrine coverage and utilization, poor coverage of drinking water in all visited woredas of the zones. Due to lack of drinking water in the coming six months, AWD outbreak is anticipated to be re-emerged in some woredas.

Multi-sectorial coordination forum should be strengthened at all levels in Borena, Guji and West Guji Zones. Medical supplies for emergency management should be adequately maintained at zonal, woredas and health facility levels.

7.1.1 Introduction

Disaster Risk Management is defined as the systematic process of using administrative and organizational directives, operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impact of hazards (phenomena or substances that have the potential to cause disruption or damage to humans and their environment) and the possibility of disaster. In order to implement DRM, countries will require an enabling environment (policy and legislation; information and communication; training; research and funding). Certain capacities also need to be built, namely capacities for: coordination in the health and other sectors; risk assessment; making health facilities safer; minimizing the event impact (preparedness and response); post-disaster rebuilding of the health system (recovery); and strengthening local resilience (community support). The foregoing underscores the need to develop a regional strategy that comprehensively addresses DRM.
Disaster Risk Management (DRM) encompasses both Preparedness ―the knowledge and capacities developed by health system and communities to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions” and Response ―the provision of emergency services and public health assistance during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected”. These two are covered by the 1997 strategy. In addition to these however, DRM encompasses an element of prevention by enhancing the ability of the health system, community or society exposed to hazard to resist or absorb the effects of a hazards through interventions based on risk analysis (1).
Humanitarian need assessment or community risk assessment is a participatory process for assessing hazards, vulnerabilities, risks, ability of the community to cope, preparing coping strategies and finally formulating a risk reduction options implementation plan by the local community and government also. Humanitarian need assessments use scientific information and predictions and participatory discussion to identify, analyze and evaluate risk environment of a particular community, reach on an agreement amongst the community on actions that are needed to manage the risks (2).

Good assessment practice is about having enough relevant information in order to make sound analysis and judgment. The data then informs decision-making in relation to four main questions:

whether to intervene; the nature and scale of the intervention; prioritization and allocation of resource; and program design and planning. Formal needs assessments may also aim to force a decision by others, to influence the nature of others‘ decisions, or to verify or justify decision already taken. Humanitarian need assessment is a way of achieving a more consistent and accurate picture of the scale and nature of the problems people actually face in humanitarian crises, and how to ensure that decisions about response are properly informed by that understanding (2).

The government of Ethiopia has been conducting emergency health and nutrition assessment in the past years to address the emergency health and nutrition need of the country. The assessment is conducted twice in a year following harvesting seasons (Belg and Meher) and lead by National Disaster and Risk Management Commission (NDRMC) and Food Security Coordination Office in collaboration with MOH, MOW, NMA, NGOs and UN Agencies like (WHO, FAO, UNICEF and WFP) and in 2016 Meher assessment International Organization for Migration (IOM) was also participated to assess humanitarian need for internally displaced peoples (IDPs).

At the end of 2015, several food crises were triggered by extreme climate events due to the El Niño phenomenon. Severe droughts affected several countries in the Horn of Africa, southern Africa, eastern and southern Asia, South America, Central America and the Caribbean. During the 2015 summer period, drier-than-average conditions were also recorded in the Pacific Islands. Heavy rains and floods affected some areas of Southeast Asia and the Pacific Islands. The impact of the drought due to El Niño is forecast to continue throughout 2016, particularly in Southern Africa and in Southern and Central America. Countries of the Central American Dry Corridor (Honduras, Guatemala, Nicaragua, El Salvador) and Haiti and Cuba are among those most affected by drought in Central America and the Caribbean. A large part of southern Africa was hit by a severe drought at the beginning of the 2015-2016 crop seasons, which led to a state of emergency in several provinces of South Africa, in Zimbabwe and Lesotho. Malawi, Angola and Namibia were also badly affected, as were the southern parts of Mozambique and Madagascar (3).

According to this study result, over 10 million people faced critical food insecurity problems in horn of Africa. Food and nutrition security in the Horn of Africa are threatened by one of the strongest El Niño weather phenomena ever seen in the past 20 years. Over 15 million people in the region are food insecure, including about two million internally displaced persons (IDPs) and

1.7 million refugees. Among them, about 10.2 million and 3.2 million people are in need of emergency food assistance in Ethiopia and Somalia, respectively. Drier-than-average conditions are also affecting food security in Sudan, Eritrea, Somalia and eastern South Sudan. The March to September rains were the lowest (in 50 years in central and eastern Ethiopia (3).

Ethiopia, the second most populous country in Africa, has achieved impressive economic growth over the past decades. However, failed spring/*Belg* (mid-February-May 2015) rains compounded by the El Niño weather conditions that affected summer /Kiremt (June-October 2015) rains caused devastation on planting and livestock production across the country, and resulted in a severe drought. This created a major problem for agriculture, which generates about half of the country's income. The hardest-hit areas are Afar, the Sitti (Shinile) zone of the Somali region, Southern Tigray, Eastern Amhara, East of the Southern Nations, Nationalities and People‘s (SNNP) region, East and West Hararge, Arsi and West Arsi; and lower Bale zones of the Oromia regions. Pastures and water resources are also unusually low in the central and eastern Oromo region, and in the northern Tigray and Amhara woredas.

7.1.1.1 Food security situation

The El Niño-driven drought has greatly expanded food insecurity and malnutrition, and devastated livelihoods of the poorest and vulnerable people across the country, including those in areas such as Arsi and West Arsi Zones in the Oromia Region that normally produce a surplus. The government of Ethiopia has recently appealed to its international partners for emergency food assistance to feed 10.2 million people and for special nutritional programmes for more than 2.1 million, including 400,000 severely malnourished children. In addition, over 8 million vulnerable and food-insecure people receive support under the Productive Safety Net Programme (PSNP). According to UN reports, the number of people in need of emergency food assistance may reach 15 million by 2016. The number of areas in need of urgent humanitarian support (hotspot priority 1: IPC Phase 3 and above) have quadrupled from 40 woredas in February to 186 woredas in December 2015, reflecting the deteriorated humanitarian context.

According to OCHA (October – December reports), following drought-driven crop failure, market prices have already started to shift, with the price of food staples such as lentils 73% higher than at the same time last year (Addis Ababa, August 2015). By contrast, the price of livestock has fallen by as much as 80% (northern Somali region, August 2015). As a result of these price changes, the purchasing power of drought-affected smallholder farmers is threatened as they can buy less and less with the money that they have.

Water shortages are affecting an important part of the population in the woredas that were affected by drought in 2015. According to the Humanitarian Requirement Document (Government of Ethiopia and Partners, December 2015), the 10.2 million food-insecure people are also affected by water shortages (3).

7.1.1.2 Nutrition security situation

The number of children with Severe Acute Malnutrition (SAM) admitted into therapeutic feeding programmes at national level in 2015 was higher than that of year 2014, and as of June 2015 the admissions were increasing every month, reaching 29 722 in April 2015.

The most affected regions are Oromia and the SNNPR, with Oromia accounting for 47% of the Community-Based Management of Acute Malnutrition (CMAM) admissions and SNNPR for 37%. As of June 2015, the trend of admissions was increasing in both regions. The most affected zones from the Oromia region are Arsi, Bale, Borena, East Hararghe, West Hararghe and West Arsi, while the most affected zones of the SNNPR are: Hawassa Zuria, Gedeo, Gurage, Hadiya, Kembata Tembaro, Segen Hizboch, Sidama, Silte and Halaba Special woreda (3).

7.1.1.3 Main factors in food and nutrition insecurity

Drought due to the poor Belg (first rainy season) and Meher (second and main rainy season) rains caused by El Niño, followed by crop failure and animal death, are the major factors contributing to food and nutrition insecurity in the country. El Niño also caused local flooding in some parts of the country. The events result in high staple food prices, but adversely affected livestock prices. The shortage of water also compromises the correct functioning of emergency and sustainable Water, Sanitation and Hygiene (WASH) services, resulting in outbreaks of water-borne diseases that further deteriorate the nutrition situation.

The influx of refugees from South Sudan and Somalia further fuelled the food insecurity situation in the country. Since the outbreak of violence in mid-December 2013, approximately 209,000 South Sudanese refugees have entered the country, bringing the total number of refugees and asylum seekers in Ethiopia to nearly 700,000. In addition, congestion in the

Djibouti port, the main entry point for goods into landlocked Ethiopia, is also slowing the timely distribution of food aid to beneficiaries (3).

7.1.1.4 Rationale of the assessment

Providing response on the basis of early warning and disaster assessment information enables resources allocated for response to be properly utilized for the intended purposes and, in the event of a disaster, to save lives and livelihoods by providing timely and appropriate response by properly identifying areas and people in need of emergency relief assistance. In addition, such an approach of provision of response allows to properly implementing recovery and rehabilitation interventions to help bring the affected population as well as social, infrastructure, and economic activities back to normal condition and build them back better as required to reduce future disaster risk (4). Therefore being it is a national program in order to evaluate the production of the *Meher* and pastoral season and its impact on food and nutrition security and livelihoods in Ethiopia‘s cropping and pastoral areas, our team was deployed to Borena, Guji and West Guji Zones;

- To identify *woredas* which as the result of the hazard induced disasters will need relief assistance and in those *woredas* estimate the size of the population in need and duration of assistance required.
- To evaluate emergency agricultural interventions including seeds, livestock feed, livestock medicines and vaccine, destocking – commercial and slaughter, including type, size and duration of intervention
- To evaluate emergency and early recovery agricultural, health and water interventions including seeds, livestock vaccine, medicines, and feed support as well as health and water requirements – including type, size and duration of intervention
- To identify and anticipate any major outbreaks of human diseases and verify any data on malnutrition in order to compare it with previous years in type and numbers of health services existing, their distance from villages, the number and qualification of staff at work, and the types and quantity of drug available.

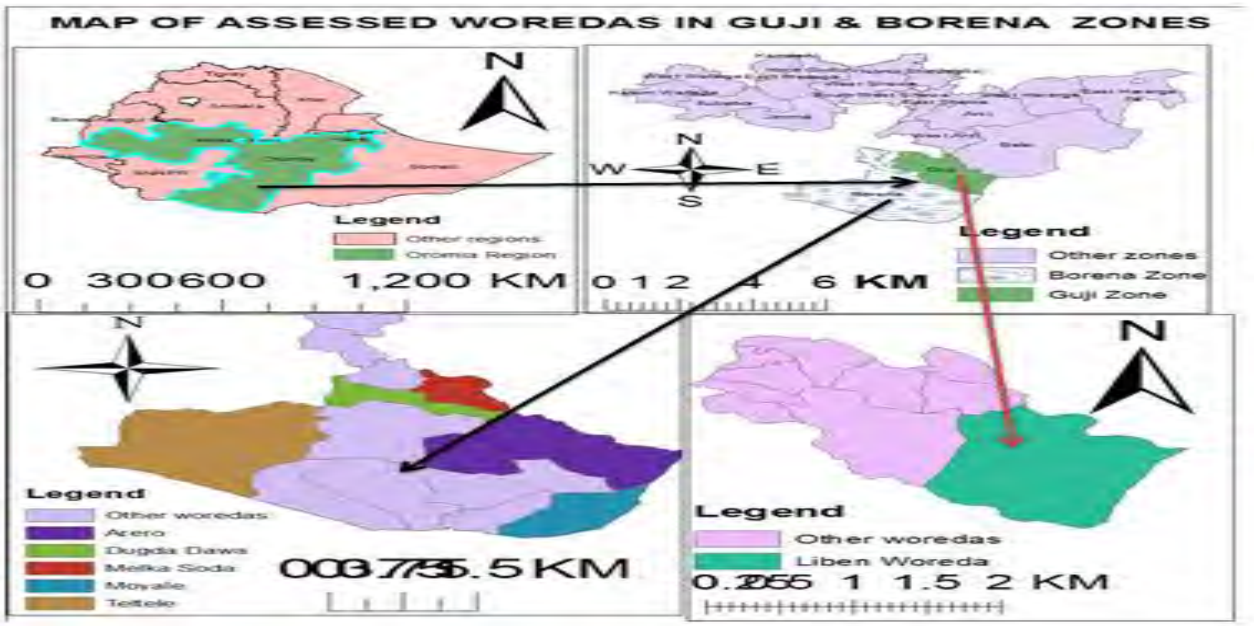
7.1.2 Objectives

- ❖ To assess the extent, type, magnitude and likelihood of different risks in the most ―vulnerable" woredas of Borena, Guji and West Guji Zones during November 2016.
- ❖ To assess the existing capacity of the health system to handle those risks;
- ❖ To determine gaps in the capacity of the health system to knob anticipated/impending risks and existing threats.
- ❖ Based on the findings, to develop possible recommendation

7.1.3 Methods

Nationally about 53 zones were selected to be assessed for any risk of food problem, human and animal health problem, shortage of water for human and livestock and other related factors by this Meher assessment. Again in Oromia Regional State, ten zones were to be assessed for this Meher by four different teams. From selected zones, our team assigned to visit Borena, Guji and West Guji Zones in Southeast part of Oromia Regional. These three zones shared border with each other and again shared with Kenya in the south, Somale in the east, SNNRP in the west and Bale Zones in north direction. The team had ten members from different governmental and non-governmental organizations including UN agencies. We used the followed methods to collect necessary information based on our objectives.

- ✓ We made meeting with zonal preparedness and response taskforces and they presented summary of their zone current situation
- ✓ We selected woredas to be visited by the team based on their severity after brief report
- ✓ We used semi-structured questionnaire to collect the required information.
- ✓ We reviewed documents and reports from woredas and zonal health offices.
- ✓ We held meetings and discussions with selected woredas' preparedness and response taskforces, officials and program managers.
- ✓ We visited fields in selected woredas and kebeles to discuss with community and lower level government administrative bodies to verify data and information collected from zone and woredas.



Annexes 7.1.7: Administrative maps of Emergency need assessment zones, Guji and Borena, Oromia, Ethiopia, November 2016.

7.1.4 Results

Table 7.1.32: Socio-demographic distribution of zones and woredas visited during Meher assessment November 2016 G.C

Zone/Woreda visited	Total Population	Under five children	Women 15-49 Years	Pregnant Women (PW)	Total Kebele	Hot spot kebele
Goro Dola	95,927	15,761	21,229	4620	21	13
Gumi Eldalo	39,450	6,482	8,730	1026	5	5
Liben	79,322	13,033	17,554	2,758	13	6
Guji Zone	1,432,527	234,934	317,018	49,709	272	75
Moyale	156,846	25,770	34,710	No Data	20	11
Teltelle	74,584	12,254	16,505	2,588	20	6
Wachille	44,382	7,292	9,822	1,540	6	6
Borena Zone	774,243	31,744	171,340	26,866	168	168
West Guji Zone	1,295,472	206,114	286,688	44,952	196	85

7.1.4.1 Coordination

There was a functional multi-sectoral PHEM coordination forum in all of addressed woredas including zonal health departments. Also there were public health emergency preparedness plan in all visited zones and woredas but there was no budget in all assessed woredas. Even though there was no a contingency budget for emergencies at the woreda levels, cabinet discussed on the problems and allocated some budget form other program. There were forum among all addressed woredas, zonal health department, NGOs and UN agencies to respond timely whenever emergency occurs.

7.1.4.2 Top five Morbidities in visited zones and woredas

Top five diseases in Guji zone among adults were; Acute Upper Respiratory Tract Infection, Dyspepsia, AFI, Dysentery and Malaria respectively. Whereas, top five diseases in under five OPD in Guji Zone were Pneumonia, Intestinal parasites, Diarrhea (non- bloody), Malaria and Skin infection. Similarly, in Borena Zone, top five diseases among adults were acute upper respiratory tract infection (AURTI), Dysentery, Malaria, urinary tract infection (UTI) and Dyspepsia. But in under five children Pneumonia was the leading cause of morbidity followed by Diarrhea and intestinal parasites.

Table 7.1.33: Top five causes of morbidity in under five children in visited woreda of Borena, Guji and West Guji zone, from May to October 2016 G.C.

Zone	Woreda	**Top Five causes of morbidity in under five years children**				
		1	2	3	4	5
Borena	Moyale	ARTI	Pneumonia	Diarrhea	AFI	I/P
	Teltelle	Malaria	AFI	Pneumonia	Diarrhea	AURTI
	Wachile	Pneumonia	Diarrhea	URTI	Helminthiasis	AFI
Guji	G/Dola	Pneumonia	Diarrhea	Malaria	I/P	Malnutrition
	Gumi Eldalo	AURTI	Diarrhea	Pneumonia	I/P	AOM
	Liben	AWD	Malaria	Pneumonia	Skin Infection	I/P
W/Guji	Dugda Dawa	Malaria	Pneumonia	Diarrhea	I/P	Otitis Media

Table 7.1.34: Top five causes of morbidity in above five years in visited woreda of Borena, Guji and West Guji Zones, from May to October 2016 G .C.

Zone	Woreda	Top Five causes of morbidity in under five years children				
		1	**2**	**3**	**4**	**5**
Borena	Moyale	Rheumatoid Arthritis	Bronchitis	Gastritis	Malaria	Dysentery
	Teltelle	Helminthiasis	Malaria	UTI	Trauma	Dyspepsia
	Wachile	Pneumonia	Dysentery	Dyspepsia	*I/P*	UTI
Guji	G/Dola	AURTI	Dysentery	Malaria	Typhoid Fever	I/P
	Gumi Eldalo	UTI	Dyspepsia	AFI	Skin Infection	Helminthiasis
	Liben	Gastritis	AURTI	Rheumatoid Arthritis	Bronchitis	STI
W/Guji	Dugda Dawa	Malaria	Pneumonia	UTI	I/P	Dyspepsia

7.1.4.3 Cases and deaths of major epidemic prone diseases

During the past six months (May-October 2016), there were confirmed cases and deaths of acute watery diarrhea (AWD) in all the three visited zones. Accordingly, in Borena Zone there were 356 cases and one death with case fatality rate (CFR) of 0.3, in Guji Zone 345 cases and seven deaths with CFR of 2 and in West Guji Zone 331 cases and four deaths with CFR 1.2. There was no Meningitis cases reported in all visited woredas. However, seven suspected Measles cases were reported from Moyale Woreda of Borena Zone in July and August 2016. Totally about 2,296 confirmed Malaria Cases were reported from visited woreda of the three zones. Borena Zone shared 1122 (49%) followed by West Guji (33.9%) and Guji Zone 17.1%. This constitutes 20% of Malaria cases reported from all woredas of the three zones, because as data obtained from the three zones indicated, there were about 11, 525 confirmed Malaria cases reported to regional health bureau in the period of six months (May to Oct/2016). When we compared visited woredas within their zones, Teltelle Woreda shared 90.5% from Borena Zone, Goro Dola shared 52% from Guji Zone and Melka Soda shared 72% of confirmed Malaria cases from West Guji Zone.

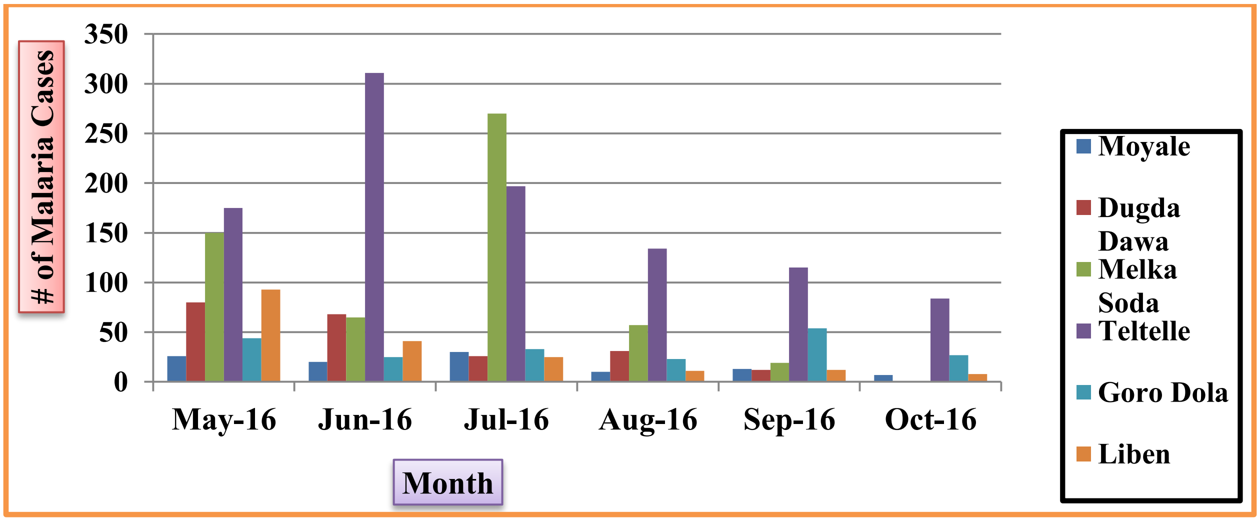


Figure 7.1.36: Number of Malaria Cases in Borena, Guji and West Guji Zones by Woredas from May to Oct/2016 G.C

7.1.4.4 Existence of outbreaks

During this assessment epidemic prone diseases secondary to drought were assessed. Based on secondary data and information obtained from zonal health departments, woreda health offices, health facilities and community during field visit there were no other outbreak except acute watery diarrhea (AWD). There was AWD outbreaks in all the three zones during the past six months. Totally about 1032 AWD cases were reported and their distribution by woreda was displayed in table below.

7.1.4.5 Preparedness and availability of drugs and medical supplies

Shortage of emergency drugs and supplies was a major problem at all the three zones. According to the finding of this assessment all the three zones faced a shortage of Anti-Malaria drugs, AWD Kits, Oily CAF, ORS, Clinical Delivery Assistance kit PART A and B and nutritional supplies. Mainly in Moyale Woreda of Borena and Gumi Eldalo Woreda of Guji Zone, this problem were identified as very critical. In visited woredas of West Guji Zone, drugs and other medical supplies that were supplied by Pharmaceuticals Fund and Supply Agency (PFSA) did not coincide with the need woredas.

Table 7.1.35: Requirement, availability and gaps of drugs and medical supplies in Guji Zone, Oromia, December 2016.

Drugs and Medical Supplies		Unit	Total Requirement	Available	Gaps
Drugs	Coartem all types	Box	300	0	300
	Artesunate Rectal	Strip	500	0	500
	Artesunate Injection	Vial	200	0	200
	Quinine 300 mg tab	Box	5	0	5
	Chloroquine 250 mg	Tin	4	0	4
	Ceftriaxone 1 gm inj.	Vial	3600	0	3600
	Oily CAF 1gm inj	Vial	1000	0	1000
	Doxycycline 100 mg	Box	600	0	600
	Ringer Lactate soln	Bag	10,000	0	10,000
	ORS	CTN	50	0	50
	Vitamin A	Tin	500	0	500
Nutrition Supplies	F 100	CTN	100	9	91
	F 75	CTN	150	10	140
	RUTF	CTN	4200	0	4200
	Resomal	Box	500	0	500
	Amoxicillin 125 mg/5 ml suspension	Bottle	200	0	200
	Amoxicillin 250 mg dispersible tablet	Tin	50	0	50
	Ampicillin 500 mg inj	Vial	500	0	500
	Mebendazole 100 mg	Tin	100	0	100
Laboratory Supplies	RDT (Malaria)	Test	9000	0	9000
	LP Set	Pack	50	0	50
Medical Supplies	Disposable Glove	Box	100	0	100
	Disposable Syringe	Box	150	0	150

Table 7.1.36: Requirement, availability and gaps of drugs and medical supplies in Borena Zone, Oromia, December 2016.

Drugs and Medical Supplies		**Unit**	**Total Requirement**	**Available**	**Gaps**
Drugs	Coartem all types	Box	172	11	161
	Artesunate Rectal	Strip	0	0	0
	Artesunate Injection	Vial	2903	200	2703
	Quinine 300 mg tab	Box	19	0	19
	Chloroquine 250 mg tab	Tin	116	33	83
	Ceftriaxone 1gm inj.	Vial	8943	0	8943
	Oily CAF 1gm inj	Vial	4065	0	4065
	Doxycycline 100 mg cap	Box	82	20	62
	Ringer Lactate soln	Bag	4,088	750	3,258
	ORS	Sachet	13,627	0	13,627
	Vitamin A	Tin	258	0	258
Nutrition Supplies	F 100	CTN	510	8	502
	F 75	CTN	523	18	505
	RUTF	CTN	5,260	900	4,360
	Resomal	Box	32	0	32
	Amoxicillin 125 mg/5 ml suspension	Bottle	6,388	0	6,388
	Amoxicillin 250 mg dispersible tablet	Tin	2,144	101	2,043
	Ampicillin 500 mg inj	Vial	100	0	100
	Mebendazole 100 mg tab	Tin	319	102	217
Laboratory Supplies	RDT (Malaria)	Test	15,969	150	15,819
	LP Set	Pack	6	0	6
	Pastorex (Meningitis)	Test	44	0	44
	Tran-Isolate (TI) Bottle	Each	15	0	15
Medical	Disposable Glove	Box	1,980	200	1780

Drugs and Medical Supplies		Unit	Total Requirement	Available	Gaps
Supplies	Disposable Syringe	Box	92	0	92
	CTC Kit	Each	15	10	5
	PPE	Each	260	30	230
	Individual Clean Delivery Kits	Each	44	0	44

There was no data that showed requirement, availability and gaps of drugs and medical supplies in West Guji Zone during this assessment. And we discussed with head of zonal health department and PHEM focal person at presence of zonal administrative and they agreed to assess their store and report it as soon as possible.

Table 7.1.37: Availability of enough emergency drugs and supplies for one month in visited Woredas of Borena, Guji and West Guji Zones, Oromia Region, December 2016 G.C

Drugs and Medical Supplies	**Is it adequate for the coming one month (Yes/No)**						
	Borena			**Guji**			**West Guji**
	Moyale	**Teltelle**	**Wachille**	**Goro Dola**	**Gumi Eldalo**	**Liben**	**Dugda Dawa**
Ringer Lactate (to treat AWD cases)	No	No	Yes	Yes	No	No	Yes
ORS (to treat AWD cases):	No	No	Yes	Yes	No	No	No
Doxycycline *(to treat AWD cases)*:	No	No	Yes	No	No	No	Yes
Consumables : Syringes, Gloves (for AWD management):	No	No	Yes	No	No	No	Yes
Amoxil susp (measles)	No	No	Yes	No	No	No	No
Tetracycline ointment	No	No	Yes	yes	No	No	No

Drugs and Medical Supplies	Is it adequate for the coming one month (Yes/No)						
	Borena			**Guji**			**West Guji**
	Moyale	**Teltelle**	**Wachille**	**Goro Dola**	**Gumi Eldalo**	**Liben**	**Dugda Dawa**
(measles)							
Vit. A (measles)	No	Yes	Yes	No	No	No	No
Coartem for Malaria	No	Yes	Yes	Yes	No	No	Yes
Artesunate (rectal) for Malaria	No	No	No	No	No	No	No
Artesunate (Injection) for Malaria	No	No	No	No	No	No	No
Artemether IM for Malaria	No	No	No	No	No	No	No
Quinine (PO) for Malaria	No	No	No	No	No	No	No
Chloroquine for Malaria	No	No	No	No	No	No	No
Ceftriaxone (Meningitis)	No	No	No	No	No	No	No
RDT for Malaria	No	Yes	Yes	Yes	No	No	Yes
RDT (Pastorex) for Meningitis	No	No	No	No	No	No	No
LP set	No	No	No	No	No	No	No
Number of CTC kit available: (for AWD)	No	No	No	No	No	No	No
Clinical Delivery Assistance kit PART A: Reusable Equipment	No	No	No	No	No	No	No
Clinical Delivery Assistance kit PART B:	No	No	No	No	No	No	No

7.1.4.6 Risk Factors

7.1.4.6.1 Malaria

Malaria cases were decreasing in all visited woredas of the three zones when compared with the same period of last year. More than 90% kebeles of visited woredas in all the three zones were malarious areas. In Borena Zone, about 168 kebeles consisting 774,243 populations were living in malarious area and there were malaria breeding sites in the zone, due to this they conducted environmental management activities towards prevention and control seasonal mosquito breeding. Long lasting insecticides treated bed nets (LLITs) coverage of Borena Zone was 79% and in 2008 EFY they conducted Indoor Residual Spray (IRS) to 91% coverage in which about 99,481 people were protected. Similarly, in Guji Zone 180 kebeles comprising 968,725 populations were malarious areas whereas their LLITs and IRS coverage reached 89% and 80% respectively. Despite that, there was no compiled data that showed LLITs and IRS coverage, 491,137 peoples living in 87 kebeles were living in malarious areas in West Guji Zone.

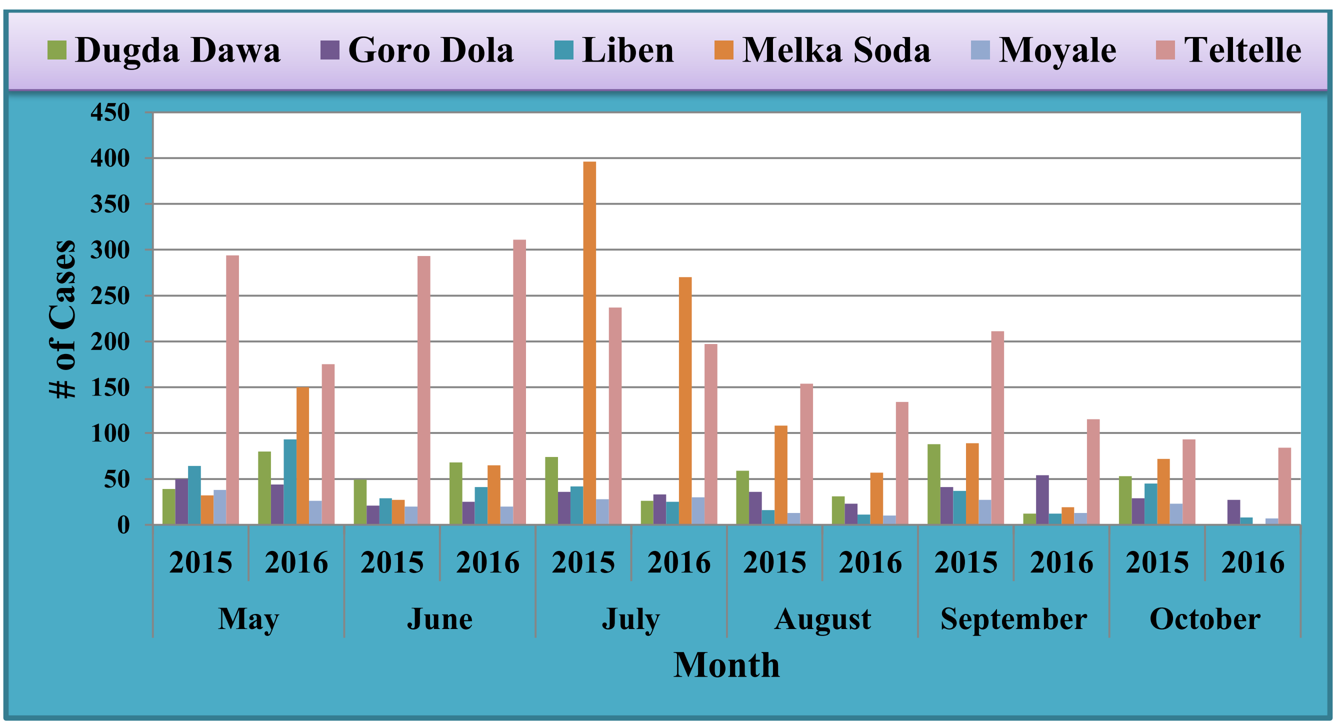


Figure 7.1.37: Comparison of Malaria cases distribution among similar months of 2015 & 2016 in visited woredas of Borena, Guji and West Guji Zones, Oromia, Ethiopia December 2016 G.C

Table 7.1.38: Percentage reduction of Malaria Cases in visited woredas of Borena, Guji and West Guji Zones, Oromia in similar period (May-October) 2015 and 2016 G.C

Woreda	2015	2016	Difference	% Reduction
Moyale	149	106	43	28.9
Dugda Dawa	362	217	145	40.1
Melka Soda	724	561	163	22.5
Teltelle	1282	1016	266	20.7
Goro Dola	213	206	7	3.3
Liben	233	190	43	18.5
Total	**2963**	**2296**	**667**	**22.5**

7.1.4.6.2 Meningitis

During the last three years, there was no Meningitis epidemic in all the three assessed zones. In Borena Zone, Meningitis vaccination was conducted for 957,219 (100%) of 1-29 years old peoples during 1-12/11/2004 EFY. There were no data showed Meningitis vaccination coverage for Guji and West Guji Zones.

7.1.4.6.3 Acute watery diarrhea (AWD)

There was AWD outbreak in five, seven and two woredas of Borena, Guji and West Guji Zones. Among the visited woredas index case was reported Moyale Woreda in November 2015, then after AWD cases were distributed to other Oromia zones. In many woredas of Borena and Guji Zones, ponds were dried due to early withdrawal of ―Gana" rain. There were about 340 water schemes in Borena Zone, only 29 (8.5%) of them were nonfunctional. Similarly there were 1670 and 441 water schemes, of which 84 (5%) and 120 (27.2%) of them were nonfunctional in Guji and West Guji Zones respectively. For example in Wachille Woreda of Borena Zone only few motorized and mechanized schemes are working. Similarly, there was no functional water scheme in Gumi Eldalo Woreda of Guji Zone. Latrine coverage and utilization of many Woredas in all the three zones were very low. In addition, the coverage of potable water is very low in many woredas of the zones. In some visited kebeles/villages of both zones, communities are drinking pond water without making any treatment for this water. So that, AWD and other water borne diseases are expected to be a public health problem in the coming months in these zones.

Table 7.1.39: Distribution of AWD by Woredas in Borena, Guji and West Guji Zones, Oromia, December, 2016.

S.No	Zone	Woreda	Number of AWD Cases
1	Borena	Arero	9
		Dhas	13
		Dirre	4
		Moyale	324
		Yabello Town	6
	Total		**356**
2	Guji	Adola Rede	16
		Girja	24
		Goro Dola	22
		Liben	114
		Negelle Town	122
		Seba Boru	4
		Wadara	43
	Total		**345**
3	West Guji	Abaya	278
		Gelana	53
	Total		**331**
	Grand Total		**1032**

Table 7.1.40: Latrine coverage, utilization and save water coverage of visited woredas in Borena, Guji and West Guji Zones, Oromia, from May to October 2016 G.C

Zone	Woreda	Latrine Coverage (%)	Utilization Coverage (%)	Safe Water Coverage (%)
Borena	Moyale	67	65	50
	Teltelle	70	No Data	50.5
	Wachille	No Data	No Data	No Data
	Zonal	75	72	78
Guji	Goro Dola	No Data	No Data	No Data
	Gumi Eldalo	89	77	Zero
	Liben	46	46	31
	Zonal	89	89	54
West Guji	Dugda Dawa	No Data	No Data	34
	Melka Soda	No Data	No Data	49
	Zonal	No Data	No Data	45

7.1.4.6.4 Measles

There was no measles outbreak in the three zones during the last six months May to October 2016. Measles vaccination coverage of Borena and Guji Zones were 93% and 100% respectively. Even though Measles vaccination coverage data was not found in most visited woredas during this assessment, Liben from Guji and Moyale from Borena Zones were 96% each. In all visited woredas of both zones, measles guideline is distributed for all health facilities and there were trained health workers on measles management. Supplementary Immunization Activities (SIA) was conducted in all assessed zones 21-28 April 2016 G.C. Due to poor cold chain system management and less availability of functional refrigerators at health post level, Borena and Guji Zones had fear of measles outbreak in some woredas.

7.1.4.6.5 Challenges in responding epidemics

During epidemic management, shortage of transportation and emergency drugs are main challenges that faced many woredas of the three zones. Lack of budget and logistics were others challenge of woredas in epidemic control activities. Particularly in Borena Zone coordination among sectorial teams was poor; there was critical shortage of emergency drugs, safe drinking water, water treatment chemicals and operational cost.

7.1.4.7 Nutrition

As data obtained from the assessment area showed, there was no unusual trend of malnutrition in all the three zones. However, OTP and third round CHD screening data indicate that there are still cases of malnutrition in most of visited woredas. This year, SAM cases were decreased in some woredas of Borena Zone Compared to similar period of last year; whereas increased SAM admission in many woredas of Guji Zone especially from May to August then after it seems decrement after September but their screening coverage was low compared to previous months. Poor dietary habit of the community and low income sources rather than products of livestock, were contributed for SAM increment in Guji Zone. In the coming months, cases of malnutrition are expected to be increased in many woredas of all the three zones due to milk reduction and significant loss of crop production secondary to drought.

Table 7.1.41: Facilities with SAM management in the last six months of visited woredas in Borena and Guji Zones, Oromia, December 2016 G.C

Name of assessed Woreda	Month	Total # of HC	Total # of HP	# of SC	# of OTP	Total # of OTP/SC Reported
Goro Dola	May-16	4	20	4	24	24
	Jun-16	4	20	4	24	24
	Jul-16	4	20	4	24	24
	Aug-16	4	20	4	24	24

Name of assessed Woreda	Month	Total # of HC	Total # of HP	# of SC	# of OTP	Total # of OTP/SC Reported
	Sep-16	4	20	4	24	24
	Oct-16	4	20	4	24	24
Gumi Eldalo	May-16	2	5	2	7	7
	Jun-16	2	5	2	7	7
	Jul-16	2	5	2	7	7
	Aug-16	2	5	2	7	7
	Sep-16	2	5	2	7	7
	Oct-16	2	5	2	7	7
Liben	May-16	3	13	2	15	17
	Jun-16	3	13	2	15	17
	Jul-16	3	13	2	15	17
	Aug-16	3	13	2	15	17
	Sep-16	3	13	2	15	17
	Oct-16	3	13	2	15	17
Guji Zone	May-16	70	328	29	344	250
	Jun-16	70	328	29	344	311
	Jul-16	70	328	29	344	289
	Aug-16	70	328	29	344	240
	Sep-16	57	272	29	344	326
	Oct-16	57	272	29	344	323
Moyale	May-16	7	23	7	30	30
	Jun-16	7	23	7	30	30
	Jul-16	7	23	7	30	30
	Aug-16	7	23	7	30	30
	Sep-16	7	23	7	30	30
	Oct-16	7	23	7	30	30
Teltelle	May-16	4	19	4	19	21

Name of assessed Woreda	Month	Total # of HC	Total # of HP	# of SC	# of OTP	Total # of OTP/SC Reported
	Jun-16	4	21	4	21	24
	Jul-16	4	22	4	22	24
	Aug-16	4	23	4	23	23
	Sep-16	4	23	4	23	23
	Oct-16	4	23	4	23	24
Borena Zone	May-16	66	259	52	275	317
	Jun-16	66	259	52	275	314
	Jul-16	66	259	52	275	284
	Aug-16	66	259	52	275	278
	Sep-16	44	168	35	197	2015
	Oct-16	44	168	35	197	167

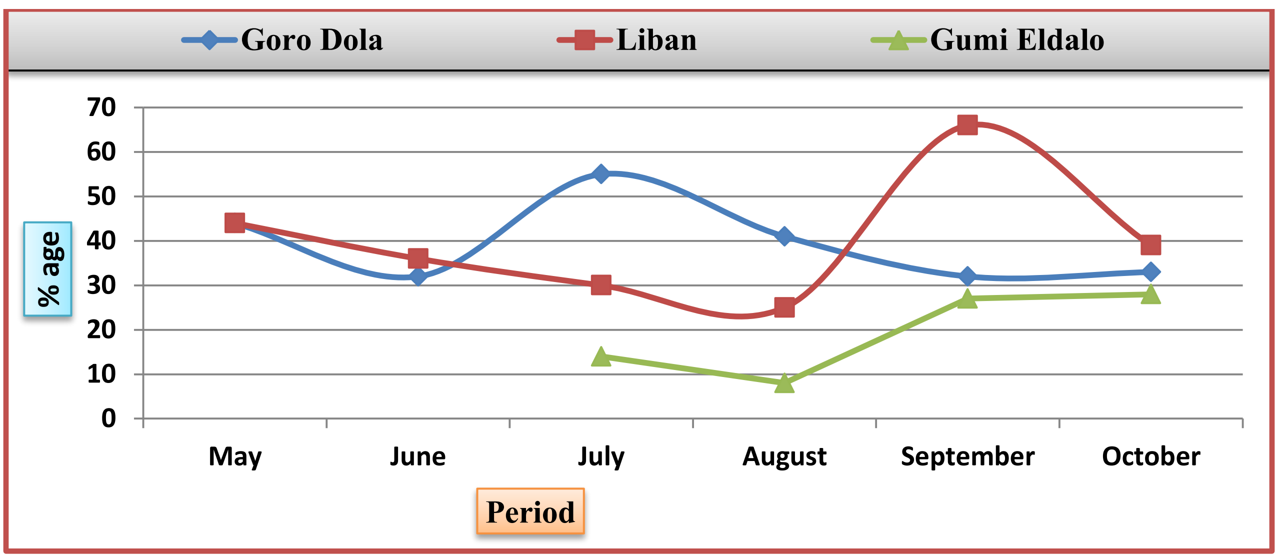


Figure 7.1.38: Trends of total SAM admissions in assessed woredas of Guji Zone, Oromia Region, May to October 2016 G.C

NB. We could not get total SAM admission of other assessed woreda during the assessment period because they did not have backup copies of the last six month.

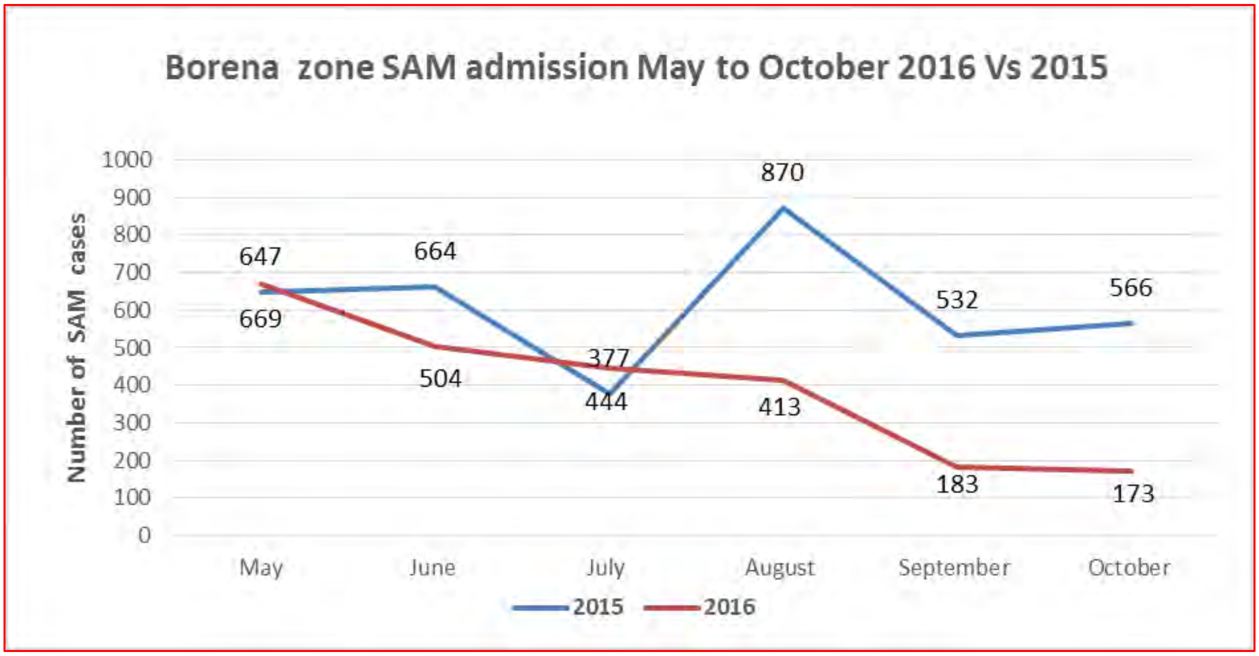


Figure 7.1.39: Comparing trends of SAM admission in similar months of 2015 and 2016 in Borena Zone, Oromia, December 2016 G.C

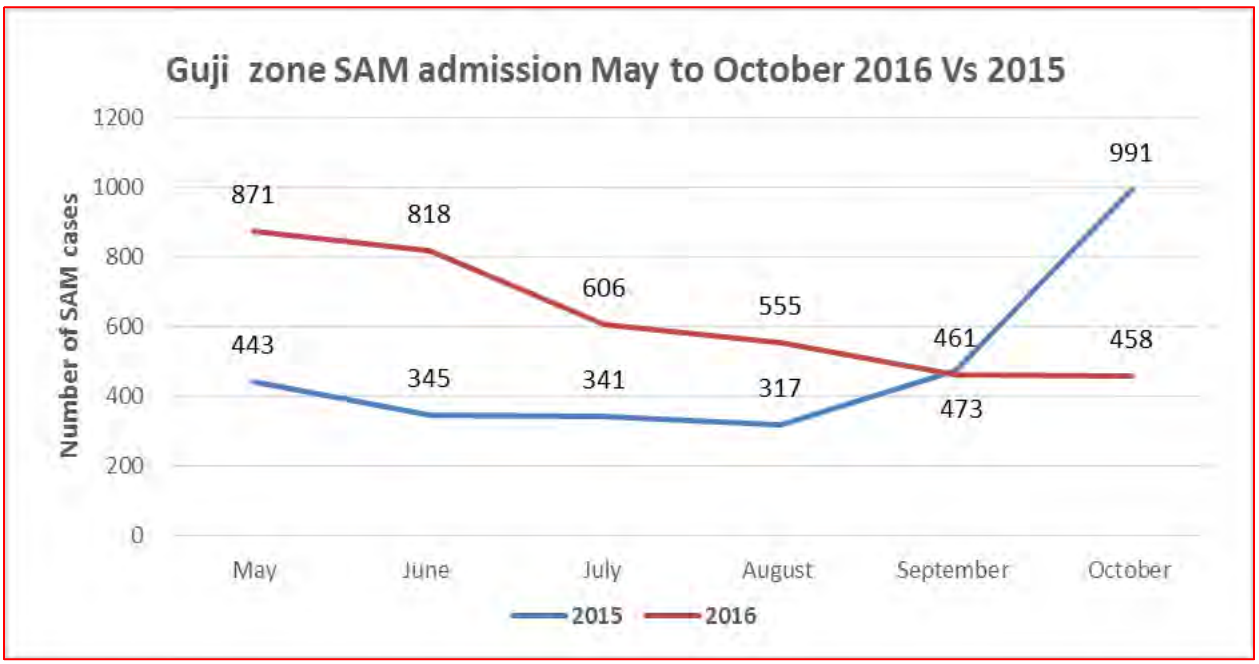


Figure 7.1.40: Comparing trends of SAM admission in similar months of 2015 and 2016 in Guji Zone, Oromia, December 2016 G.C

7.1.5 Conclusion

The health related issues in the Meher assessment program was carried out in selected zones, woreda health offices, health centers and health posts; there is a functional Emergency Public Health Management Coordination forum with Epidemic Preparedness and Response plan in all visited zones and woreda Health offices.

In all visited zones the top five reported diseases in under five clinics were Pneumonia followed by Diarrhea and intestinal parasites. Acute Upper Respiratory Tract Infection (AURTI) followed by Dyspepsia and Dysentery were being reported as priority diseases in above five clinics.

A Rapid Epidemic Response Team (RRT) was in place in all visited sites dealing with disease control & prevention activities. In all visited sites formally trained persons on outbreak management were found. Even though there was no going disease outbreak during assessment, Acute Watery Diarrheal disease outbreak was reported from all the three zones. The fact that the assessed areas are facing food shortage, erratic rain fall, with low latrine coverage, poor sanitation practice and inadequate clean water supply, there could be risk of nutrition emergency situations like Measles, Malaria, Meningitis, Malnutrition and Acute Watery diarrheal disease.

7.1.6 Recommendation

- ✓ Multi-sectorial PHEM coordination forum and Rapid Response Team established at all level should work regularly. In addition, this team should to implement emergency preparedness and response plan and supported by fund.
- ✓ Enhancing routine surveillance activities should be in place in an area of priority in detecting and management of possible outbreaks.
- ✓ Inventory should be conducted on standardized latrine and its utilization in some woredas that are under risk of AWD outbreak.
- ✓ Continuous and sustainable provision of emergency drugs and medical supplies by regional health bureau and other supporting agencies should be encouraged.
- ✓ Monitoring of nutritional situation particularly in priority 1 woredas and Provision of timely emergency food in full basket for the identified population.

- ✓ To strengthen Moderate Acute Malnutrition (MAM) supplies zones and woredas should submit Community Health Day (CHD) screening result for both children and PLW to the region as per the agreed schedule.
- ✓ Regional government should capacitate zone and woreda level sector offices on credible and real time data management.
- ✓ Emergency drugs and supplies, mainly for malaria and AWD should be maintained adequately.
- ✓ To solve nutritional problems of many woredas, awareness should be given for communities on good feeding habit.
- ✓ Zonal offices should mobilize and work with NGOs and UN agencies those are working around there on nutrition, family health, water sanitation and hygiene and other health and health related activities.
- ✓ Even though water treatments were supplied for communities in few kebele, they are drinking without treating the water. So that, awareness rising of communities on utilizing of these treatments should be critical job of respective bodies.

7.1.8 Reference

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Chapter-VIII Epidemiologic Research Project Protocol/Proposal

8.1 Assessment of prevalence and determinant factors affecting childhood measles vaccination status in Limmu Seka Woreda, Jimma Zone, Oromia Region, Ethiopia 2017

8.1.1 Introduction

8.1.1.1 Background

The Expanded Programme on Immunization (EPI) was established by the World Health Organization in 1974 to control vaccine preventable diseases. In Ethiopian, EPI programme was launched in 1980 with the objective of achieving 100% immunization coverage of all children under two years old by 1990. In 1986, the coverage target was reset to 75% and the target age group was changed to less than one year old but progress in increasing coverage has been slow. With the introduction of new approaches known as Reaching Every Districts (RED) and Sustainable Outreach Services (SOS) for immunization in 2003, improvement has been documented.

Immunization services are provided in most of the health facilities and as an outreach service for communities residing beyond 5 km from the static health facilities. Currently, almost all of the public health facilities provide immunization services, and some districts in developing regions are supported by mobile health care teams.

Populations at risk of missing immunization services are Pastoralist communities throughout Ethiopia particularly in Afar, Gambella and Somali regions, have very low routine immunization coverage. In pastoralist areas where the health infrastructure is weak and populations tend to be sparse other approaches Measles SIAs:

In 2011, the impact of prevailing drought in the horn of Africa followed by influx of refugees from Somalia (mostly unvaccinated), increased incidence of measles with shift of age group above the age of five. The increased measles incidence coupled with the sub-optimal routine EPI coverage at zonal level (only 17% with at least 95% measles coverage by the end of 2010) initiated the need of emergency response with SIAs. However, measles outbreaks continue to occur in most parts of the country with nearly 70% of the reported cases among children less than 15 years. 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 (1).

8.1.1.2 Statement of the problems

Measles ranks as one of the leading causes of childhood mortality in the world. Before measles vaccine became available, virtually all individuals contracted measles with an estimated 130 million cases each year. Humans are the only natural host. Measles is a highly communicable infection. Despite the remarkable progress made in measles control with the introduction of measles vaccination, it is estimated that in 1997 nearly one million deaths from measles still occurred, half of them in Africa. Outbreaks of measles continue to occur even in highly vaccinated populations (2).

Measles is a highly contagious disease caused by a virus and transmitted through the air, and mainly affects children. There is no specific treatment and most people recover after 3 weeks. However, particularly in malnourished children and people with reduced immunity; measles can cause severe neurological sequelae. Measles can be effectively prevented through vaccination, and the recent increase in vaccination coverage globally successfully reduced the mortality of the disease by 74%, accounting for about a quarter of overall child mortality from 1990 to 2008. In 2010, the World Health Organization (WHO) defined three main objectives for the eradication of measles by 2020: 90% vaccination coverage in children under one year of age; reducing and maintaining the annual incidence of measles to less than five cases per million; and reducing measles mortality by 95% in 2015 com-pared with 2000 (3).

Generally, measles outbreaks follow a cyclic pattern and occur every 3–4 years as a result of buildup of the susceptible. As the coverage increases, inter epidemic interval increases as well as focus shifts towards older age groups as observed in Limmu Seka Woreda. Other research conducted in Tigray region.

This is on account of high measles immunization (>95%) in Himachal Pradesh that the incidence of the measles cases have gone down from 19 to 8/lac from 2001–2003.

Despite high immunization rate, outbreaks of measles were reported in hilly areas of Himachal Pradesh in 2006. Two reported outbreaks of measles in highly immunized hilly areas were investigated under two sub centers, namely, Sailli and Sarah. In the same year, an outbreak of rubella was also detected and investigated in the Shahpur-Samote blocks of Kangra district (4).

The expanded programme on immunization (EPI) was established in 1974 by the World Health Organization (WHO) with the mandate of ensuring full accessibility of the routine vaccines by all children. However, in spite of all the improvements in global coverage of routine vaccinations in children especially Diphtheria-Pertussis-Tetanus Toxoid (DPT3) containing vaccine—third dose (which is a key indicator of immunization programme performance) coverage from 5% in 1974 to 83% in 2011 globally, almost one-fifth of the world‘s children had not received the DPT3 series during their first year of life. Most of these unvaccinated children live in developing countries, particularly Nigeria with a teeming population of about 167 million people, and an annual population growth rate of 2.7%. Receipt of vaccines at the recommended ages and intervals will ensure that children are adequately protected from target diseases at all time. This will help to fast-track achievement of the Millennium Development Goals (5).

8.1.3 Literature review

There were different studies conducted to dig out factors contributing for childhood low vaccination coverage. As study conducted in Europe believed vaccination for child has get priority due to the following reasons:

Vaccine-preventable diseases still pose a risk

Due to effective vaccination programmes, most people in industrialized countries have never experienced the devastation of vaccine-preventable diseases. Many people believe that these diseases no longer pose a threat, as they are not as visible as they once were. In fact, some consider the vaccine to be more dangerous than the disease.

In some countries these misperceptions have led to a decline in coverage and a resurgence of contagious diseases, including measles, pertussis, diphtheria and rubella.

Immunization is cost-effective

Immunization is undoubtedly one of the most cost-effective public health achievements of modern times. It costs very little, but offers huge benefits for the health and well-being of populations.

Immunization has significant, broader economic impact in addition to savings on cost of treatment. It protects against the long-term effects of a disease on a person‘s physical and mental well-being and thereby his or her ability to complete education or training and to carry out work. In this way, the protection provided by immunization offers immeasurable individual and societal benefits in terms of earning capacity, productivity and growth.

In other words, immunization prevents death and disability at a fraction of the cost of treatment, to the benefit of both the individual and society as a whole. Effective health policies and related expenditure must be seen as an investment, not a cost. Good health boosts economies while illness drains them.

Children depend on health systems to provide safe, effective and inexpensive immunization

Successful immunization interventions over time have resulted in formidable achievements and a significant decline in suffering and death. Still, across the Region, 10.6 million babies are born each year and need to be immunized in order to sustain the success of immunization. For example, while measles vaccine coverage in the Region is high (>94%), the pool of susceptible children accumulates over time and these children must be reached and vaccinated.

Strong and sustainable immunization programmes can ensure that every child receives the –right vaccine in the right place and at the right time” (Project Optimize, 2010). Countries must maintain high quality surveillance and response systems and be able to identify and reach their vulnerable populations. In addition, they must be ready for the challenges of introducing new vaccines. A special focus is placed on activities to reach vulnerable and susceptible groups – promoting the core message that immunization of every child is vital to prevent diseases and protect life.

Every child needs to be vaccinated

Think that you do not have to vaccinate your child because every other child is vaccinated?

It is believed that community immunity can only occur if about 95 percent of people are vaccinated – and every person who is not vaccinated increases the chance that they and others will come down with the disease in question.

Tetanus, a vaccine-preventable disease, cannot be protected through community immunity as it is not a contagious disease. If your child is not vaccinated against tetanus it does not matter if everyone else is he or she still will not be protected against it.

The concept of community immunity can lull parents into a false sense of security – which can lead them to skip vaccinations. Not only dies that pattern decrease the effectiveness of any community immunity, but each non-immunized child increases the risk that these contagious diseases can spread. After all, it takes just one non-immunized person to get a disease and then spread it to others who are not immunized (6).

Study done in rural Nigeria in March 2011 implied that Expanded Program on Immunization (EPI) aims at delivering the primary immunization series to at least 90% of infants (Challenges in global immunization and the Global Immunization Vision and Strategy, 2006 to 2015). However, inadequate levels of immunization against childhood diseases remain a significant public health problem in resource-poor areas of the globe. Nonetheless, the reasons for incomplete vaccination and factors for missed opportunities are poorly understood. Childhood vaccines do much to provide lifetime immunity to certain diseases, but for other diseases, such as pertussis, additional doses of vaccine are now recommended to protect individuals with waning immunity.

This study also concluded that, mothers play an important role in immunization of their children. A target of 95% immunization coverage is necessary for the sustained control of vaccine preventable diseases. Partial immunization coverage against vaccine preventable diseases is a significant public health problem especially in rural areas in Nigeria. The reasons for partial immunization and factors responsible for missed opportunities are poorly understood and little data is available to explain the phenomenon that could support the decision making. This study aimed at finding out the reasons for partial immunization and factors responsible for missed opportunities for immunization in children less than one year of age. Mothers of children within one year of age were the study subjects using a cross-sectional study design. The immunization card was utilized to check for completeness and correctness of immunization schedule, and also for identifying the appropriate use of all available opportunities for immunization. About two third (62.8%) of the children were not fully immunized by one year of age, 33.4% had experienced a missed opportunity for immunization and 36.4% were partially and incorrectly immunized. Parents objection, disagreement or concern about immunization safety (38.8%), long distance walking (17.5%) and long waiting time at the health facility (15.2%) are the most common reasons for partial immunization. Missed opportunities for immunization and partial immunization need to be avoided in order to enhance the fully immunized percentage for those children who reach the health facility, especially in rural areas where the immunization coverage is below the expected national coverage (minimum 80%) (7).

Other study conducted in Africa in line with Eradication of measles in Africa- what went wrong?

Measles is a major cause of child mortality in developing countries. Case fatality ratios of up to 20% have been found in community studies in West Africa. Measles has also been reported to increase morbidity and mortality and to worsen nutritional status for several months after the acute episode. Vitamin A treatment of measles reduces acute case fatality a striking reduction in measles burden in 19 sub-Saharan African countries after wide-age-range mass measles campaigns.

Factors affecting eradication of vaccine preventable diseases such as measles in Africa

Although debate on the possible negative effect of mass vaccination campaigns on routine health services has gone on for decades reports points to an overall positive effect. High-quality mass campaigns usually achieve high vaccination coverage because of high-level political commitment and adequate planning and monitoring of vaccination activities.

The high infectiousness of measles

Measles is highly infectious and has a very high attack rate and thus it would be extremely difficult to eradicate the virus altogether through vaccination.

Limited number of related vaccine strains

Protection against measles could be incomplete as a result of limited number of related vaccine strains. This may subject the measles virus to considerable immunological pressure.

Low vaccination age

Low vaccination age is known to adversely affect measles vaccine efficacy, mainly due to the presence of maternal antibodies, and this is regarded as primary vaccine failure.

Low vaccination coverage (by increasing non immune population), including factors contributing to low coverage

Protection against measles could also be incomplete as a result of low vaccinations rates may subject the measles virus to considerable immunological pressure.

Low vaccine coverage resulting into low levels of population immunity favored the selection, transmission and emergence of wild measles and vaccine derived variants with biological properties indistinguishable from those of wild measles in countries such as Nigeria. Routine immunization coverage is far too low in Nigeria while the quality of the mass immunization is not high enough to wipe out the wild viruses. Measles has continued to circulate and affect Nigerian children because a substantial number of the children are not immunized or are under-immunized

Use of low potency measles vaccines

Protection against measles could also be incomplete as a result of vaccine failure identified use of low potency measles vaccines as the major cause of primary vaccine failures among vaccinated children in Nigeria. Also, in a similar study by Onoja et al. in 1992 identified improper vaccine handling and break in the cold chain were found to be the major causes of low or non-sero conversions among vaccinated children in Nigeria.

Lack of potent measles antigen

A readily available measles HA antigen is lacking in most laboratory in Nigeria. A readily available measles HA antigen will be a very valuable and useful tool for monitoring the progress of measles sero conversion following immunization in Nigeria. Up till now, this measles antigen is still being imported at very expensive amount into Nigeria. Also to import the foreign brands of this measles antigen into Nigeria takes s very long time and often a time, they arrive having lost their potency or very close to their expiry date.

Fast rate of waning

Secondary vaccine failures, however, are largely attributed to the waning of primary antibody response over time; it is evident that the Nigerian child is born with solid anti measles antibody obtained from the mother. However two biological factors adversely affect these antibodies.

The rate of waning of these maternal antibodies is so fast that a large proportion of these children are left unprotected before the age of the first dose. Also, in a study by 58% of Nigerian children will lose their protective measles maternal antibodies by the age of 4 months while only 3 % are protected between the ages of 6 and 9 months.

If immunity is waning, we would expect to see a higher occurrence of a high-avidity response with increasing time since vaccination. This was the case in our study, where measles reinfection due to secondary vaccine failure significantly increased with increasing age. Almost all cases of measles reinfection (99%) were seen in the > 10 years age group, indicating that vaccine-induced immunity could wane after about 10 years and for achieving good performance in measles virus elimination a further dose of vaccine for 10-year-old children should be recommended.

Population densities and malnutrition

Increasing worldwide population density and urbanization (particularly in developing countries) do not favor measles eradication. Low rates of vaccine coverage coupled with overcrowding is said to be one of the main risks factors for reemergence of wild and emergence of vaccine associated measles.

Human attitudes and error

Human attitudes toward vaccination for example, false rumors in 2003, that the polio vaccine was unsafe leading to the shutdown vaccination campaigns in northern Nigeria, this likely contributed to the outbreak of vaccine preventable diseases such as circulating vaccine-derived poliovirus (cVDPV).

Cultural and religious objections

Many Nigerians are blaming the outbreak on vaccination efforts; an attitude expert‘s fear may ruin previous gains in eradicating vaccine preventable disease in the country. Cultural and religious objections under vaccinations efforts are resulting in persistently low immunity in the population and consequently, a high incidence of emerging vaccine-derived viruses and re-emergence of wild viruses.

Ignorance

In the last measles outbreak in Borno state, Nigeria, the people are presently appeasing their gods. It is surprising that most of them are looking unto God to save them from this disease rather than a solution in the sphere of medical science. But to someone who understands their beliefs and philosophies, it would not be a surprise, because it is culturally believed that it is an attack from the gods as a result of infidelity on the part of the parents, especially mothers.

Government negligence

The inability of the Nigerian government to acknowledge the risk involved in vaccination however negligible raises doubt about the sincerity of the government, and positions the boycotts of polio vaccination proponents as a more reliable source of information. The government does not appear to have positioned itself as a credible authority to implement immunization programs. No vaccine is fully safe, a perfectly potent and without risk of administering error.

WHO recommended post-immunization surveillance for any nations that implement national immunization programmes to evaluate the performance and plan for the future.

Lack of risk communication

Lack of risk communication is one of the factors affecting polio eradication especially in Nigeria. Although, the boycott of immunization is no longer in effect, low participation during vaccination may persist reflecting a failure to implement risk communication.

Lack of good road network

Of the targeted 29 million children, 4 million reside in impoverished and hard-to-reach settlements across the Niger Delta Region.

Absence of a follow-up vaccination campaign

The absence of a follow-up vaccination campaign, in addition to low routine vaccination coverage, may have contributed to the outbreak of measles in the state of São Paulo, Brazil in 1997. However, factors not directly related to implementation of the measles control strategy (e.g., in-migration of susceptible young adults from rural areas, high population density, and independent adult transmission) may also have influenced the course of the outbreak. Analysis of the São Paulo experience supports the idea that elimination strategies are unlikely to succeed if they are not implemented completely throughout a country or region.

Poor attitude of vaccination record keeping

There is a poor attitude of record keeping among Nigerians as it was practically impossible to obtain the vaccination records of the youths and students screened in a study by. Finally, measles infection is also an urban problem and control efforts will continually be faced with difficulties as long as there is overcrowding in our cities and illiteracy among our people. Vaccines should be educated in all immunization programs to keep their vaccination cards for future reference. Virology Laboratories also should be equipped with adequate test facilities to monitor post vaccination sero conversion among subjects.

Other factors that do not favor eradication include

1. Logistics questions, including the use of needles and syringes
2. The potential competition for resources with other ongoing eradication efforts (that is, efforts to eradicate polio and Guinea worm)

Current dimensions in eradication of measles in Africa

The measles disease has been eliminated in countries that have maintained high vaccine coverage rates and 4 out of 6 WHO regions now have measles elimination goals. Forty-eight percent (48%) reduction in measles death was recorded within 1994-2004. More than 47% of measles death continues to occur in the African Region of WHO (8).

As assessment conducted in low vaccination coverage of Sweden community, some barriers that contributing for low vaccination coverage were identified as follows.

Groups with low vaccination coverage

Reasons for not becoming vaccinated are often complex and varying in nature. Among them there are factors such as lack of knowledge, poor education, and lack of opportunities, marginalization, past experiences, concerns about vaccine safety issues, priorities, culture, lifestyle, and faith.

The European Disease Control Authority (ECDC) has defined categories of populations with low vaccination coverage:

Hard-to-Reach: At the present time there is no universal definition of hard- to-reach populations. Hard-to-reach groups, however, have generally been de-fined within the context of the health care system. The term refers to people who do not seek or are not reached by the vaccination services because they have limited or no access to public health care. Hard-to-reach groups include individuals from different minority groups in terms of religion, ethnicity, and origin, and these can be difficult to reach or unknown to local vaccinators and public health agencies. Individuals in these groups are often less integrated in society, and the size of the hard-to-reach groups is, therefore, difficult to estimate.

Hard-to-Convince: Vaccine sceptical groups include people who are generally very similar to the general population in terms of socio-economic status, culture, language, and literacy. Group members also often have the same access to health care and social services as the general population, yet they have a cautious attitude to vaccinations. They might, for various reasons, either wait to vaccinate their children or refrain from vaccinating their children.

More recently, the concept has been reformulated from hard-to-reach to under-served or poorly served regarding groups that are hard to reach because of socio-economic factors or marginalization. Therefore, vaccination programmes need to be viewed in a larger context and need to include aspects of education, transportation, registration, and health care policy for vulnerable groups.

Reasons for low vaccination coverage

Scepticism and critical voices against vaccinations have always existed, but the un-certainty about vaccination and vaccines might increase as we see less of the serious and contagious diseases we vaccinate against. Lately there have been several publications that highlight vaccination resistance or scepticism, the reasons that parents decline vaccination, and the barriers they face in accessing vaccines.

Several studies have highlighted the issue of the determinants of individuals‘ attitudes and final decisions regarding vaccinations. There are also several models of vaccine acceptance and vaccine hesitancy, most of which focus on parents‘ decision-making processes. Common for these models is that attitudes to vaccination are seen as a continuum ranging from an active demand for vaccines to a complete refraining from all vaccines (9).

Literatures in Ethiopia summarize causes of low vaccination coverage for measles could be one or all of the following factors. Summary of reasons/factors linked to un/under-vaccinated children:

Living in rural area and distance to health clinic linked to low vaccine uptake, mothers with limited education and socio-economic capital placing children at-risk for vaccine preventable diseases. Some major reasons identified were:

Immunization Systems:

Distance to health care center/facility and Residing in rural area linked to low vaccine uptake

Family Characteristics:

Children born to rural-rural migrant woman, low level of mother's education and limited social/economic capital of mothers linked to low vaccine uptake.

Parental Attitude and Knowledge:

Low level of health care seeking behavior among mothers linked to low vaccine uptake and Mother has limited role in family decision making linked to low vaccine uptake (10).

The appropriate target age for vaccination is a tradeoff between age-specific morbidity, mortality, role in measles transmission, and available resources. Measles incidence is lowest for children 0- to 5-months-old due to residual maternal antibody. Incidence then increases rapidly for older children though their mortality is lower. School-age children appear to be important sources of infection to younger siblings at higher risk, however (11).

Ethiopia adopted the regional measles mortality reduction goal in 2002 and has been implementing the recommended strategies which include increasing the coverage of the first dose of measles vaccine, providing a second opportunity through SIAs, implementing sensitive disease surveillance, and improving case management. In 2012, Ethiopia adopted the regional measles elimination goal and developed a National Measles Strategic Elimination Plan, 2012-2020. Several efforts have been made to implement the elimination. Country wide measles vaccination coverage was increasing gradually from 2003 onward. But, measles vaccination coverage of Ethiopia by 2011, 2012, 2013 and 2014 were 81, 80, 80 and 74 respectively, this indicate decreasing vaccination coverage during these year.

In May 2016, about 4,395 measles cases were reported by line list, which indicate that still there are measles infection in our community, even though measles elimination program by 2020 left with only three years (12).

8.1.1.4 Significant of the study

In Ethiopian, EPI programme was launched in 1980 with the objective of achieving 100% immunization coverage of all children under two years old by 1990. In 1986, the coverage target was reset to 75% and the target age group was changed to less than one year old but progress in increasing coverage has been slow.

Immunization services are provided in most of the health facilities and as an outreach service for communities residing beyond 5 km from the static health facilities. Currently, almost all of the public health facilities provide immunization services, and some districts in developing regions are supported by mobile health care teams (1).

Even though different strategies were applied to enhance childhood immunization to ≥ 95% for guarantee of herd immunity in the community, still there were measles outbreaks in the country (12).

Children ages 12-23 months are the youngest cohort to have reached the age by which a child should be fully immunized. Data show that 39 percent of children ages 12-23 months have received all basic vaccinations. Sixteen percent of children in this age group have not received any vaccinations. There is little difference in the vaccination coverage rates between male and female children. However, full vaccination coverage is much higher in urban than rural areas (65 percent versus 35 percent). Full vaccination coverage is highest in Addis Ababa (89 percent) and lowest in Afar (15 percent). Vaccination coverage increases with mother‘s education. About 3 in 10 (31 percent) of children whose mothers have no education are fully vaccinated compared with more than 7 in 10 (72 percent) of children whose mothers have more than a secondary education. Similar patterns are observed by household wealth (13).

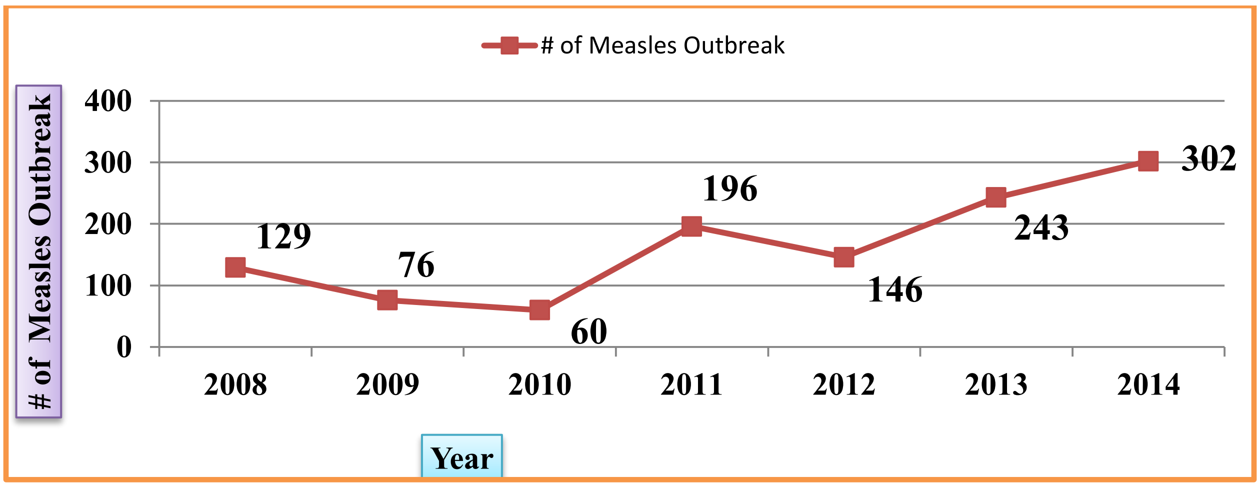

Figure 8.1.41 Number of Measles outbreaks ever occurred in Ethiopia from 2008-2014 G.C

And similarly in three consecutive years from 2015-2017 up to WHO week 13, significant numbers of measles cases were reported from Limmu Seka Woreda, 243, 153 and 178 respectively. This data and other unpublished study indicate there were accumulations of susceptible children in the woreda. Woreda‘s measles vaccination coverage (MVC) of the last two years from 2015 and 2016 were 84% and 86% respectively. These coverage seems somewhat high but still less than the guarantee for herd immunity in the community and again even by 2017 there was measles outbreak that show low vaccination coverage. This is why I decided to identify contributing factors for low vaccination coverage and put appropriate solutions.

8.1.2 Objectives

8.1.2.1 General objective

To assess magnitude and determinant factors affecting childhood measles vaccination status in Limmu Seka Woreda, Jimma Zone, Oromia Region, Ethiopia.

8.1.2.2 Specific objectives

- To assess prevalence of measles vaccination status of the children in selected kebeles of Limmu Seka Woreda, Jimma Zone.
- To determine socio-demographic and economic factors contributing for child to be not vaccinated.
- To assess the knowledge of mothers/caretakers on immunization service and vaccine-preventable diseases.
- To identify health service and infrastructure related factors that may influence childhood vaccine intake in the woreda.

8.1.3 Method and materials

8.1.3.1 Study area

Limmu Seka is one of twenty woredas of Jimma Zone found in western part of Oromia Region. The woreda is 445 KM far from Addis Ababa in the west and 110 KM far from Jimma Town in north direction. According to population projection from 2007 census, 2009 E. C, estimated total population of Limmu Seka Woreda is 173,575, of which 88,523 (51%) of them were female. Only 11.469 (6.6%) of the people were living in urban. Under one, under five and women of 15-49 years of age are 5,589, 28,518 and 38,412 respectively. Limmu Seka Woreda has 38 rural and two town kebeles and shared bounders with East Wollega Zone in the North, Nonno Benga in the East, Limmu Kosa in the South and Illu Aba Bora Zone in the West direction. The woreda has six health centers, 38 health posts, 64 health extension workers and a total of 69 different health professionals. Health service coverage of the woreda was 98 % and 92% by health centers and health posts respectively.

8.1.3.2 Study design

Cross sectional descriptive study involving mothers/caregivers and health facility based interview and observation.

8.1.3.3 Study period

Data collection will be started on September 10, 2017 and ends on September 30, 2017. The study will be completed in December 30, 2017 G.C.

8.1.3.4 Source population

All households with 12-23 months children in Limmu Seka Woreda will be the source population

8.1.3.5 Study population

All mothers/caretakers with 12-23 months age children that living in selected five kebeles of the woreda will be study population.

8.1.3.6 Sample population

A total of 865 mothers/caretakers with at least one child of 12-23 months age selected by systematic random sampling methods from randomly selected five kebeles with fifteen clusters will be study participants.

8.1.3.7 Sample size determination

The sample size will be calculated using Ethiopian Demographic Health Survey (EDHS) 2016 estimation for fully vaccinated children. Overall, 39 percent of Ethiopian children are fully vaccinated, while 16 percent have not received any vaccination. Following this, the proportion of fully immunized children of 12-23 months for Oromia Region in 2016 was 24.7% and 22% got no vaccination with 95% confidence interval and absolute precision of 4%. The design effect will be 2 as common for immunization cluster survey.

$$\text{Number of Sample Size} = \frac{(1.96)2 \text{ X P (1-P) X Design Effect}}{d\ 2} = \mathbf{824}$$

Where: - d = Absolute precision = 4%

P = Estimated prevalence with no vaccination = 22%

Z= 1.96

In addition, 41(5%) of the calculated sample size for non-respondents will be added, i.e. a total of **865** mothers/caretakers will be study participants.

8.1.3.8 Sampling procedure

Systematic random sampling followed by clustering will be used. Firstly, all 18 rural kebeles and 2 town of the woreda will be listed alphabetically. Then five kebeles (25%) will be selected systematically by every 4^{th} kebele from the list frame. The first kebele will be selected from 1-4 kebeles by lottery method. Then each selected kebele will be divided into three zones. Therefore, there are fifteen zones in five selected kebeles. Then 58 households will be visited from each zone by simple random sampling to assess all sample size. The first household will be selected randomly. Additionally, if the selected household is identified with no child of 12-23 months age, the nearest household with 12-23 months children will be selected.

8.1.3.9 Data collection procedure

The questionnaire is developed in English and will be translated to local language (Afan Oromo). Also the Afan Oromo version will be translated back to English to assess consistency of the questionnaire. The questionnaire includes, vaccination histories of children (12-23 months), information on socio-demographic characteristics of mothers, economic status of the family/caretakers, sex of the child, ANC follow up, child place of delivery, maternal immunization, accessibility and availability of vaccination service, family size and knowledge of mothers or immediate caretakers on immunization. During data collection, child measles vaccination history will be filled based on child vaccination card or mothers/caretakers recall in the absence of the card. Data on vaccination histories and sex category of all 12-23 months age children found in selected household will be collected. Selected 10 health professionals for data collection will be trained on the designed questionnaire for two days. The training will include overall content of the questionnaire, how to select households to be interviewed and other related issues. The questionnaire will be pre-tested in 60 households of selected neighbor kebele for its applicability, completeness, reliability and updates.

8.1.9.10 Operational definitions applied in the Study

Vaccination: - The administration of a vaccine to stimulate a protective immune response that will prevent disease in the vaccinated person if contact with the corresponding infectious agent occurs subsequently.

Immunization: - If vaccination is successful, it results in immunization: the vaccinated person has been immunized.

Fully vaccinated:- A child between 12-23 months old who received one BCG, at least three doses of Pentavalent, three doses of OPV, three doses of PCV, two doses of Rota Virus and a measles vaccine**.**

Unvaccinated: a child who didn‘t receive first dose of measles vaccine.

Coverage by card only: coverage determined on documented vaccine and dose without those vaccinated by oral history. Coverage by card plus history: coverage assessed based on documented vaccines on the card and caregivers (recall) history.

Immunization coverage: - proportion of children took measles vaccination.

Immunization status: - being vaccinated or unvaccinated for first dose of measles.

Immunization service: - Activities delivered to mothers and children that contain full package of vaccination at health facilities or outreach sites.

Availability of immunization service: - The presence or absence of immunization services in studied area.

Accessibility of immunization services: - Opportunity to get immunization services with in short radius (less than 5 KM for health center).

Coverage by card only: - Coverage calculated with numerator based only on documented dose, excluding from the numerator those vaccinated by history.

Coverage by card plus history: - Coverage calculated with numerator based on card and mother‘s report.

8.1.3.11 Inclusion criteria

All households with at least one child of 12-23 months old will be included in the study.

8.1.3.12 Exclusion criteria

This study will not include households with no child who aged 12-23 months.

8.1.3.13 Variables of the Study

Dependent variables

- ✓ Childhood measles vaccination status.

Independent variables

- ✓ Socio demographic characteristics of mothers/caretakers
- ✓ Knowledge of mothers/caretakers on benefit of immunization

- ✓ ANC follow up of mothers/caretakers
- ✓ Place of delivery
- ✓ Family size
- ✓ Family income
- ✓ Autonomy of mothers/caretakers
- ✓ Number of 12-23 months children in the home
- ✓ Sex of children
- ✓ Vaccination history of the children
- ✓ Birth order of the children
- ✓ Time of travel to reach the nearest health facility

8.1.3.14 Data entry and analysis procedures

Data will be entered and analyzed by Microsoft Excel, Epi info version 7.1 and SPSS after having encoded each data per respondent. Prevalence of childhood vaccination status will be described by percentage and number for different independent variables. Binary logistic regression will be undertaken to determine the odds ratio for both multivariate and bivariate analysis.

8.1.3.15 Data quality management

The questionnaire that will be used for the study is adopted from Ethiopian Demographic and Health Survey (EDHS) and other studies conducted in different countries on assessment of factors associated with childhood vaccination status. During data collection every questionnaire filled by data collectors will be checked by field supervisors for their completeness and if responses filled correctly in daily basis. Unfilled questions on the questionnaire will be completed by revisiting those households. Data collectors will be supposed to fill information on child vaccination history based on vaccination card (if available) and give a time for mothers/caretakers to bring this card. Additionally, the principal investigator will check filled questionnaire and give feedback for field supervisors every day prior to data entry.

8.1.3.16 Ethical clearance

Ethical clearance of the study will be obtained from Addis Ababa University, School of Public Health Institutional Review Board. Upon approval of this project proposal, support letter will be written for respective Oromia Regional Health Bureau. Then, we will obtain support to conduct the study and participate in the study from Oromia Regional Health Bureau, Jimma Zone and Limmu Seka Woreda. The willingness of all study participants will be asked to be a part of the study by using prepared consent form. The English version of participant consent form that will be translated to Afan Oromo is annexed to this document.

8.1.3.17 Dissemination of findings

The result of this study will be disseminated for Addis Ababa University School of Public Health, Ethiopian Field Epidemiology Training Program, Federal Ministry of Health, Ethiopian Public Health Institute and Oromiya Regional Health Bureau. Also Jimma Zone and Limmu Seka Woreda Health Offices will be the recipients of the study result. Additionally, findings of the study will be presented on different seminars, workshops and conferences held at National and International level.

8.1.3.18 Expected outcomes

This study will able to document child vaccination coverage of Limmu Seka Woreda and identify factors affecting childhood vaccination status that could help towards improvement of immunization service in the area as particular and in the region in general. Due to improvement of vaccination coverage, outbreaks of vaccine preventable diseases will be dramatically decreased and strategy plan set for measles elimination by 2020 will be achieved in the woreda. This project will cost **78,028 ETB**.

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Chapter – IX
Other Additional Outputs

9.1 Rapid need assessment and post malaria epidemic mitigation activity report, Abaya Woreda, Borena Zone, Oromia during June 2016.

9.1.1 Introduction

9.1.1.1 Background about assessment area

Abaya Woreda is one of highly malarious woredas of Borena Zone, in Oromia Regional State. The estimated population of the woreda during 2016 was 133,718. There are 26 rural and 3 urban kebeles. The woreda has achieved universal health service coverage (100%) as there are 6 health centers and 27 health posts.

The major malaria transmission season in the woreda is from April to June. Only 18 kebeles were classified as malarious before 2008 E.C.; however, malaria cases were reported from all 29 kebeles in 2008 E.C. Abaya Woreda identified 12 hotspot kebeles targeted for indoor residual spray (IRS) intervention.

Abaya Woreda is highly malaria epidemic prone area due to; its geography (Abaya River, intermittent water, ponds), investment schemes (irrigations, road constructions, Gidabo Dam, etc. are found in the woreda. Abaya woreda is also known by food insecurity, so there are high numbers of malnourished cases susceptible for malaria (1).

9.1.1.2 Overview of Malaria situation in Ethiopia

Malaria is ranked as the leading communicable disease in Ethiopia, accounting for about 30% of the overall Disability Adjusted Life Years lost. Approximately 68% of the total population of 84.3 million lives in areas at significant risk of malaria. According to the FMOH, in 2010/2011, malaria was the leading cause of outpatient visits, accounting for 15% of all visits, and health facility admissions, with 15% of all admissions. Malaria is one of the top ten causes of in-patient deaths among children less than five years of age and adults [2]. The most recent Malaria Indicator Survey (MIS), in 2011, showed that the prevalence of malaria parasitemia was approximately one percent, and that long-lasting insecticide treated net (LLIN) ownership had dramatically increased from the baseline in 2000, but was still below target levels. Historically, Ethiopia has experienced cycles of malaria epidemics every five to eight years, with the last nationwide epidemic in 2003.

Epidemic Surveillance / Monitoring and Evaluation: With malaria prevalence low and decreasing in some places, improved data and information management for operations in Ethiopia, tracking both the focal malaria burden and the local status of malaria related commodities and operations will be of great importance. To improve routine surveillance, PMI is assisting the FMOH in the enhancement of the newly updated Public Health Emergency Management system together with the Health Management Information System for routine collection of facility-based data, and is supporting a scalable epidemic detection system to capture indicators beyond routine surveillance data, and track morbidity and mortality to evaluate program progress and effectiveness.

Geographical focus and scale: PMI in Ethiopia primarily focused on Oromia during the first three years of program support in Ethiopia. Oromia is both the largest and, by many health indicators, the most underserved regional state in Ethiopia. PMI commodity and operations support from FY 2014 funding will continue to concentrate primarily in Oromia.

Entomological monitoring and insecticide selection: With support from PMI, Ethiopia has greatly expanded its capacity for entomological monitoring, including testing for insecticide resistance in anopheline mosquitoes. A network of Ethiopian institutions and entomologists has been established to sustain and coordinate entomological monitoring, which will provide an evidence basis for decision making on the use and deployment of indoor residual spraying (IRS) and long-lasting insecticide treated nets (LLINs).

9.1.1.3 Epidemiology malaria in Ethiopia

In Ethiopia, malaria transmission is largely determined by altitude and climate as affected by Indian Ocean conditions and global weather patterns, including *El Nino* and *La Nina*. Most of the malaria transmission occurs between September and December, after the main rainy season from June to August. Certain areas, largely in the western and eastern parts of the country, experience a second ―minor" malaria transmission period from April to May, following a short rainy season from February to March. Five main malaria eco-epidemiological strata are recognized:

• Stable, year round, transmission in the western lowlands and river basin areas of Gambella and Benishangul-Gumuz Regional States;

• Seasonal transmission in lowland areas <1,500 meters;

• Epidemic-prone areas in highland fringes between 1,500 – 2,500 meters;

• Arid areas where malaria is only found near semi-permanent water bodies; and

• Malaria-free highland areas >2,500 meters.

Malaria Vectors

Anopheles arabiensis, a member of the An. gambiae complex, is the primary malaria vector in Ethiopia, with An. funestus, An. pharoensis and An. nili secondary vectors. The sporozoite rate for An. arabiensis has been recorded to be as much as 5.4%. The host-seeking behavior of An. Arabiensis varies, with the human blood index collected from different areas ranging between 7.7 and 100%. An. funestus, a mosquito that prefers to feed on humans, can be found along the swamps of Baro and Awash rivers and shores of lakes in Tana in the North and the Rift Valley area. An. pharoensis is widely distributed in Ethiopia and has shown high levels of insecticide resistance, but its role in malaria transmission is unclear. An. nili can be an important vector for malaria, particularly in Gambella Regional State (2).

9.1.2 Objectives

- To verify the reported malaria epidemic in Abaya Woreda, Borena Zone, Oromia, Ethiopia.
- To support epidemic mitigation activities in the woreda.
- To identify potential risk factors for malaria epidemic in the woreda.

9.1.3 Methods

- ✓ Ministry of Health and Oromia Regional Health Bureau (ORHB) regularly following Malaria case situation in Abaya Woreda as malaria is endemic in the woreda.
- ✓ Due to the upsurge/increase of malaria cases in the woreda starting from week 5/2016 and reached peak at week 16/2016, Federal Ministry of Health formed one team from different stakeholders in order to assess, verify the data and support mitigation activities in the woreda.
- ✓ The team consists: nine members from [FMOH, ORHB (malaria team & PHEM), ZHD, WoHO, UNICEF, ACIPH]
- ✓ Checklist was developed at federal level based on Malaria Guideline.

Procedures followed by the team

- ✓ Discusses were held with Borena Zone Health Department, Abaya Woreda Health Office, Abaya Woreda Administrative Office, Health Centers and Health Post staffs.
- ✓ After discussion, we formed three sub-teams: Two sub-teams conducted assessment in health facilities and the third team conducted entomological assessment in mosquito breeding sites.
- ✓ Three health centers and five health posts were visited from Abaya Woreda based on their high case load reported.
- ✓ After assessing the epidemic situation, feedback was given to health facilities, Abaya Woreda Health Office and Administrative office and Borena Zonal Health Department.
- ✓ Action plan developed and feedback was given officially to all concerned stakeholders.
- ✓ Assessment period was from May 20-30/2016.

9.1.4 Findings

A total of 7,762 people were diseased with malaria during WHO week 1 to week 21. Among which 54% of patients were reported from health centers and 3571 (46%) were from health posts. Out of health centers reporting malaria cases, 30% of the patients were reported from Guangua Health Center and 12% of patients were from Debeka Debobesa Health Center. Health post with the highest and lowest case load were Odo Miqe Health Post (7%) from Guangua PHCU and Dibicha Health Post (2%) from Debeka Debobesa PHCU respectively.

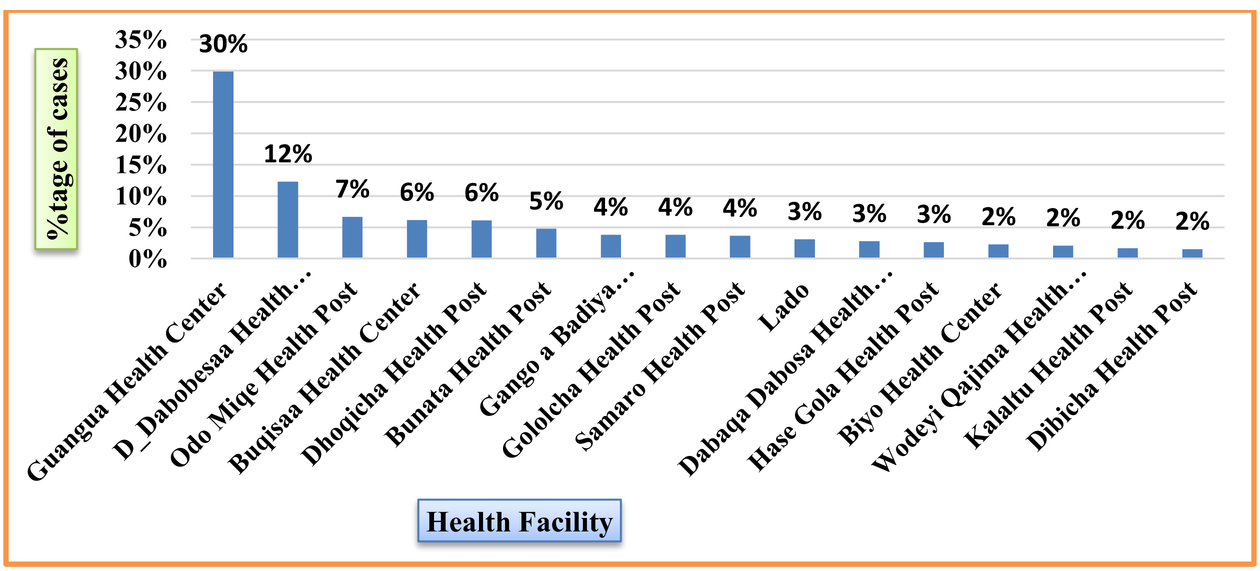

Figure 9.1.42: Distribution of malaria cases by health facility during week 1-21/2016, Abaya Woreda, Borena Zone, Oromia Region, Ethiopia June 2016.

During this assessment, majority 53% of malaria cases were reported from Guangua PHCU and the least cases 1.6% were reported from Shara PHCU.

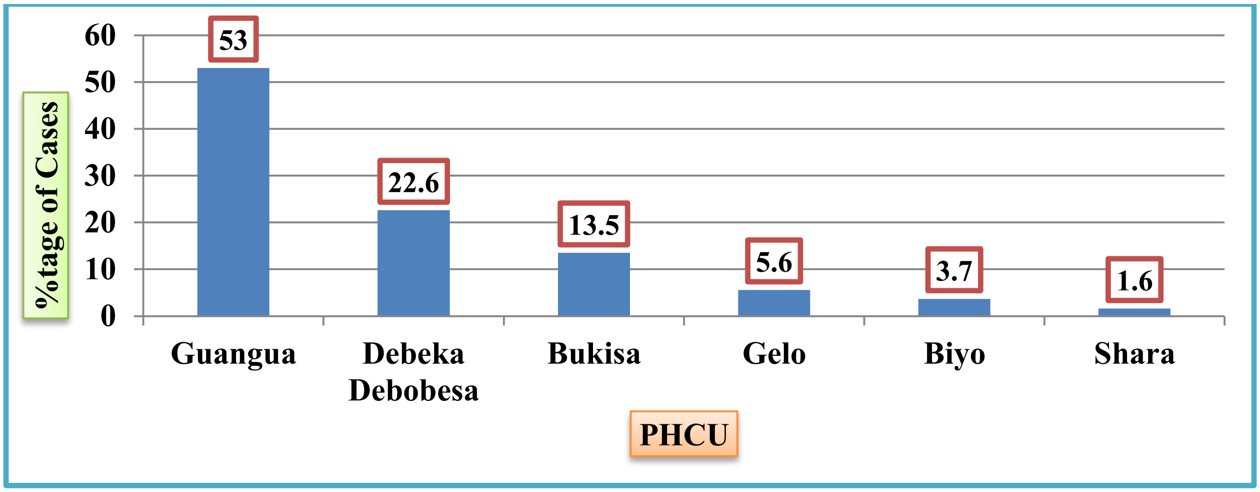

Figure 9.1.43: Distribution of malaria cases by PHCU, Abaya Woreda, Borena Zone, Oromia Region, Ethiopia, June 2016.

Malaria cases were extremely increased in 2008 E.C in Abaya Woreda when compared with 2007 during the same period. Confirmed malaria cases were increased by more than five folds.

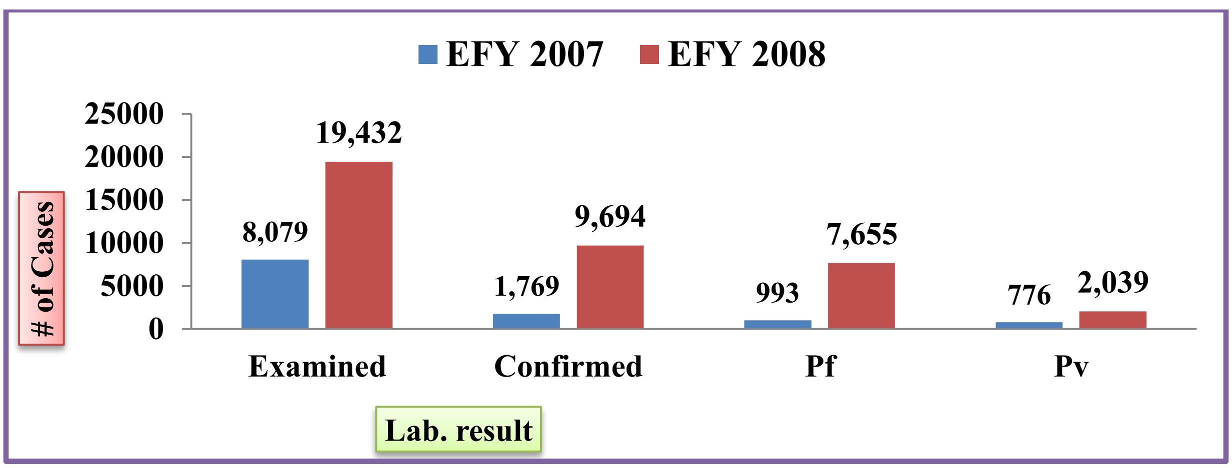

Figure 7.1.44: Trends of malaria cases during 2007 & 2008 E.C, Abaya Woreda, Borena Zone, Oromia, Ethiopia, June 2016.

Distribution of malaria cases increased gradually from WHO week one and reached peak at week seventeen.

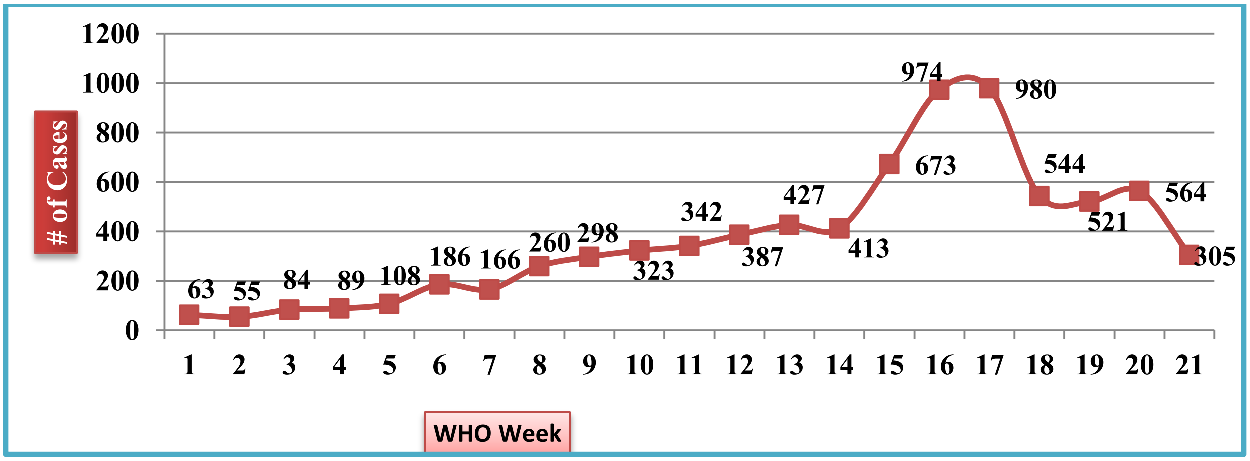

Figure 9.1.45: Trends of malaria cases by WHO week, 2016 in Abaya Woreda, Borena Zone, Oromia Region, June 2016.

Case increment started on week 5 and continued up to week 17, and then unconfirmed decrement was observed from week 18 to 21. The reduction in total cases is faster than the total positivity rate (TPR). But, in reality when numbers of cases were decreasing then TPR should be decreased that showing end of outbreak. We found some evidence on registration of cases: 106 cases in Bunata and 22 in Guangua rural health posts were not reported during WHO week 18. This week showed sharp decrement trend on figure [5] below.

There was from 44% to 31% reduction of cases between week 17 and 18, however the TPR showed only 11% reduction. The TPR increased between week 18 and 19. But the number of cases showed reduction from 4% to 22% which might be due to underreporting. The number of confirmed malaria cases increased by 8.2%, however the TPR reduced by 14.7% from week 19 to week 20, which was contradicting report.

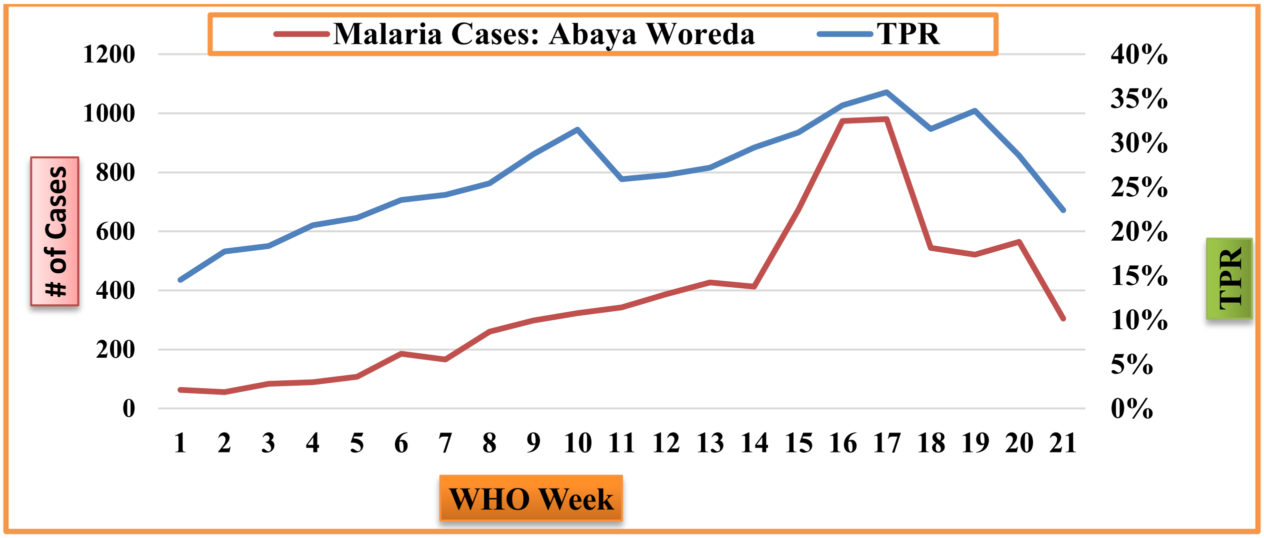

Figure 9.1.46: Number of malaria cases and total positivity rate (TPR) of the cases during week 1-21/2016, Abaya Woreda, Borena Zone, Oromia Region, June 2016 G.C

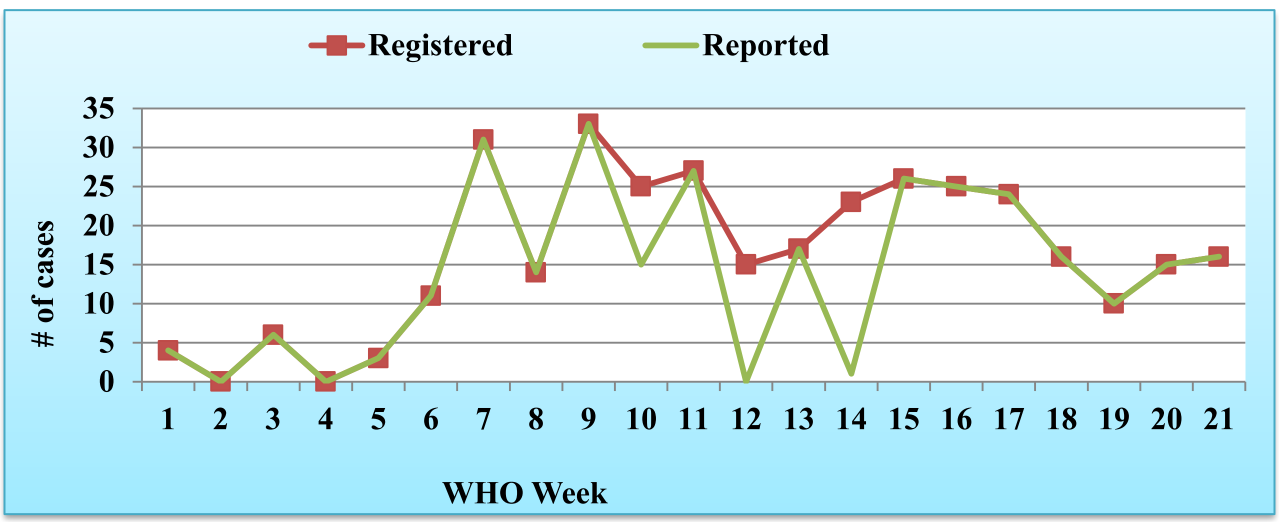

Figure 9.1.47: Malaria case data discrepancy in Gololcha Health Post, Abaya Woreda, Borena Zone, Oromia, Ethiopia, June 2016.

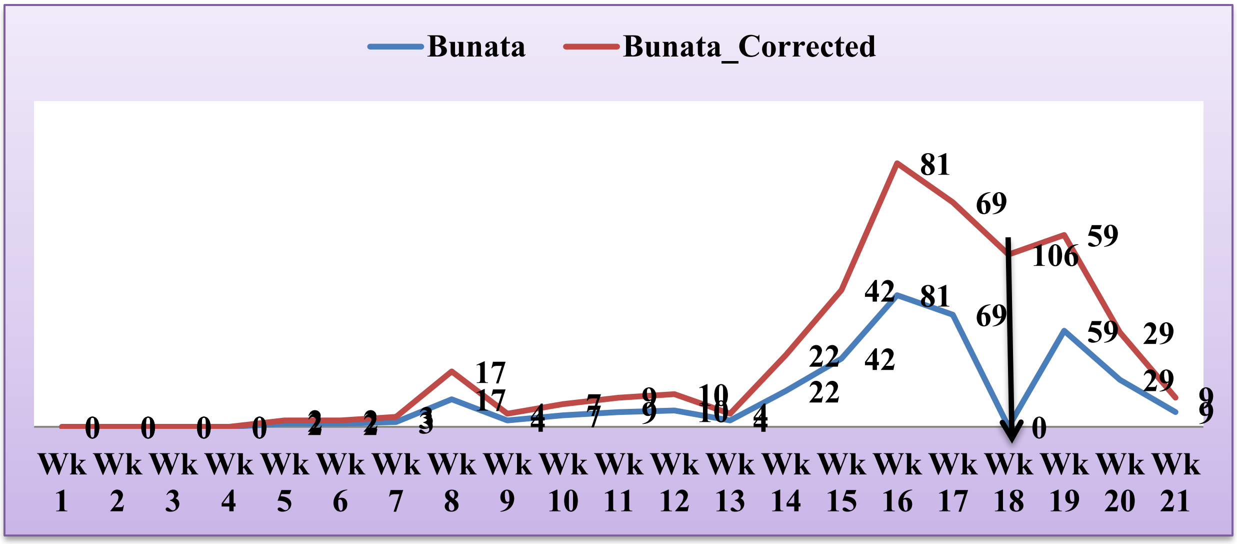

Figure 9.1.48: Malaria case data discrepancy in Bunata Health Post, Abaya Woreda, Borena Zone, Oromia, Ethiopia, June 2016.

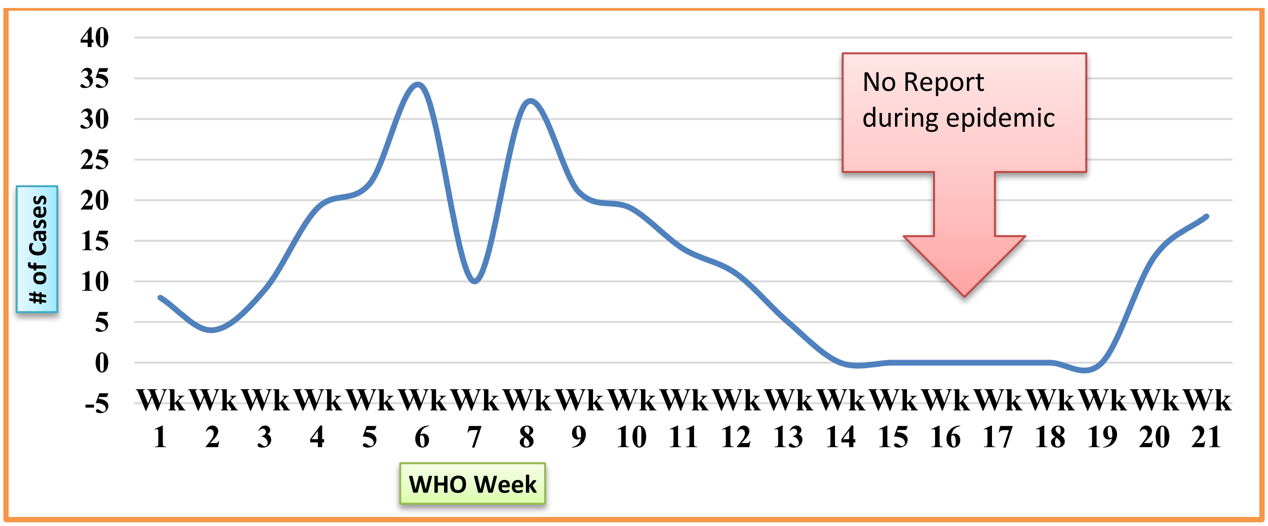

Figure 9.1.49: Absence of malaria case report during epidemic period in Lado Health Post, Abaya Woreda, Borena Zone, Oromia, Ethiopia, June 2016.

Interventions taken by woreda for epidemic response and period of implementation

About 30,900 LLINs distributed from week 15-17/2016, 14,226 (92%) unit structures of chemicals was sprayed from 15-20/2016 and 20,360 (68%) sources of mosquito breeding was destructed during a period of week 6-10/2016.

Targeted kebeles for LLINs were 20, and then they performed 18 kebeles by 2008 E.C. Two kebeles in Michicha and Gelo, LLINs were not distributed because of difficulty to reach these kebeles during rainy season.

Other additional activities performed by woreda were; Community participation: 5696(43%), Health Education: 21,008(70%), Mass fever treatment: 972 cases and Antimalarial medicines and RDTs distributed to HCs and HPs from woreda store in order to facilitate their accessibly.

Comparison of intervention against malaria case increment

- Most of intervention activities were done from 15 to 17 weeks, Source reduction activities (week 6- 10) and mass fever treatment (MFT) done at week 20.
- Malaria monitoring chart and Malaria case report showed reduction of cases following the interventions, however, malaria cases showed some increment in some kebeles: Guangua rural, Bukisa, Gololcha and Wodeyi Kejima HPs after intervention.
- For example in Guangua catchment kebeles, source reduction activities had no contribution in prevention and control of malaria epidemic in the woreda.

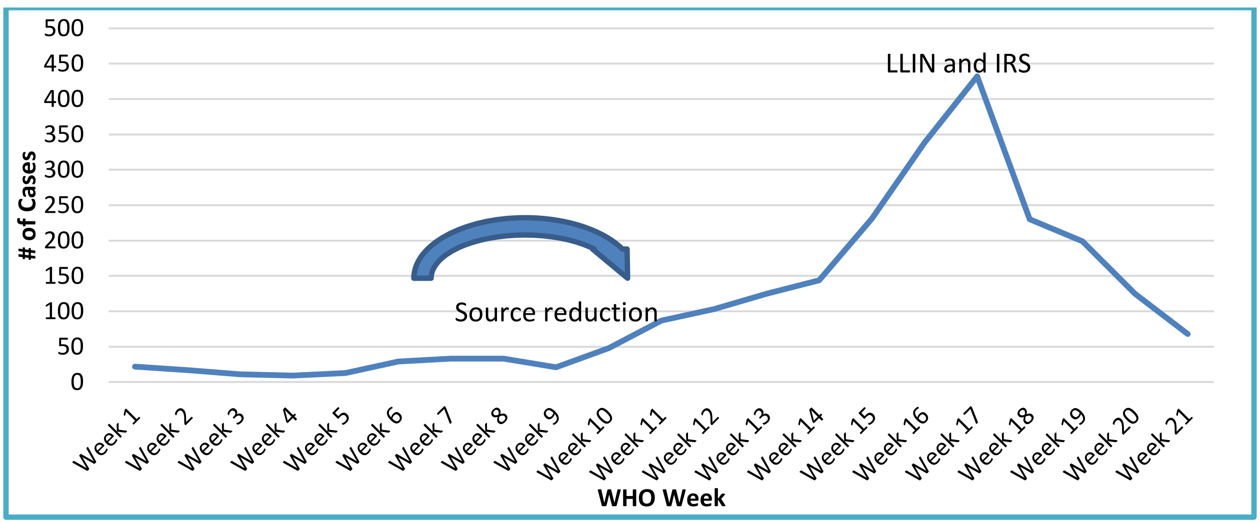

Figure 9.1.50: Comparison of intervention activities with malaria cases in Guangua PHCU, Abaya Woreda, Borena Zone, Oromia, June 2016.

9.1.5 Possible reasons identified by the team, for expansion of the epidemic in the woreda

There was weak malaria intervention activities identified as follows;

- LLINs distributed in 2008 during epidemic were not utilized properly because of poor housing condition.
- Shortage of IRS and abet chemicals in their store was already expired.
- Shortage of RDT and antimalarial medicines were observed during the epidemic.
- Environmental management and community participation were poor.

Less attention from woreda and kebele administrations

- Availability of favorable condition for larvae breeding in many kebeles.
- Development schemes: Irrigations, Dams and road construction were contributing risk factors for expansion of the epidemic found in the woreda.
- Presence of different Ponds, intermittent water flow, and False banana or ―Enset" in many kebeles of the woreda made favorable condition as mosquito breeding sites.
- Climate change (El nino) made irregular rainfall and temperature
- Accumulation of malnutrition in the woreda aggravates malaria related to malnutrition.
- Shortage of human resource in health facilities, including health extension workers (HEW)

Identified Mosquito breeding sites

9.1.6 Major gaps identified during assessment

1. **Regarding intervention activities**

- No distribution of LLINs for workers in Gidabo Dam/Arero zone,
- Inadequate supply of LLINs by ZHD/RHB/FMOH; additional 12,000 LLINs needed
- High risk kebeles are not fully sprayed
- Weak community participation and mobilization and Inadequate environmental management activities
- No malaria epidemic preparedness plan at woreda level
- Inadequate supply and reporting of antimalarial commodities using report and resupply form from catchment health facilities.

2. **Regarding data quality**

- Poor recording, reporting and discrepancy of data at woreda and health facilities
- Weak linkage between HC and HPs in Abaya Woreda during epidemic period.

- Weak plotting of malaria epidemic monitoring chart and utilization of data.

3. **Other**

- No meteorological data used for forecasting and early warning

9.1.7 Recommendations given based on assessment findings

- **Short term and Long term**
  - Apply all appropriate measures of malaria prevention and control activities for high risk kebeles by FMOH, RHB, ZHD, WoHO, HFs and communities.
  - Training of health workers on epidemic monitoring chart (EMC).
  - Immediate supply of 12,000 LLINs, RDTs and Chloroquine for health facilities.
  - Conduct source reduction activities in all identified larvae breeding sites.
  - Strengthen the linkage between HCs and satellite health posts
  - Conduct regular supervision and review meetings to follow data quality problems.
  - Prepare epidemic preparedness plan along with the annual woreda based malaria prevention and control plan with budget for epidemic preparedness, supervision and operational cost for IRS
  - Assign human resource at health center levels (especially in Guangua HC) where shortage of manpower observed during assessment.
  - Strengthen communications with metrology agency and use the information

9.1.8 Reference

1. Office AWH. Abaya Woreda Health Office and Borena Zone Health Department report. 2016.

2. President‘s Malaria Initiative Ethiopia. President‘s Malaria Initiative Ethiopia, Malaria Operational Plan. 2014.

9.2 Rapid needs assessment Pre AWD epidemic in Sebeta Town, Oromia, June 2016.

A. Findings

Sebeta Town is one of the 16 towns found in Oromia Regional State and bordered in North by Sebeta Hawas, in South by Finfinne city administrative, in West by Sebeta Hawas Woreda, in East and South East by Finfinne City Administration. The estimated population of the town by 2008 is about 126, 177 of which 51% are female. Sebeta Town has eight kebeles and one other kebele which is not structurally well established. There are four HC and no separated established HPs and there are about 79 private clinics, no data showing pharmacies and drug stories. There are about 16 government schools and no data showing private schools in Sebeta Town. These facilities have latrine but some of them have no water supply. Technical human resources available in Sebeta Town are: HO=14, Nurse all type= 36, Env'tal health=3, other health professionals=19 HEWs=22. Only PHEM focal personal trained on AWD management together with basic PHEM but no other health professionals trained on AWD case management.

B. Emergency preparedness situation

- There is trained PHEM focal person but no document that show emergency preparedness plan and its action plan
- There is RRT but no TOR and no minute showing their functionality
- Task force committee not established yet and no budget for emergency response
- No identified risk area, Factories, Institutions, food and drink facilities, development areas etc.
- There are religious institutions and Holly water (Arsema Tabal) in the town.
- There is Monterbo, but no Mini media and Mega phone for announcement and community awareness but still no plan with communication office to use media communication

C. Early warning and surveillance

- There is copy of IDSR report but no trend analysis (completeness, timeliness)
- No feedback given to health facilities that give health service and report to the office, even no plan to give feedback for private clinics that weekly IDSR

D. Environmental Health and Hygiene

- ✓ The town has three environmental health professionals but two of them not working by their professions.
- ✓ No document that show their action plan
- ✓ Latrine coverage is about 90%, but no data showing utilization coverage
- ✓ Safe water supply is about 60%, but water supply in the Town is irregular.
- ✓ There are community latrine but number is not clearly identified and no data showing water carriage latrine
- ✓ Dry waste disposal is practiced around Dallatti kebele which is not proper area and no data showing liquid waste disposal and community waste disposal technique/ mechanisms
- ✓ No data showing number of Food and Drink Establishment and their water supply and waste disposal mechanisms

E. Strength considered by our team

- ❖ They get information to start activities and inform HC and HEWs

F. Gaps identified by our team

- ➢ Risk area mapping is not well done and Need assessment is no started
- ➢ No Emergency preparedness plan and action plan supported by document
- ➢ No established Sebeta Town Task force Committee by coordinating other sectors
- ➢ Lack of information to establish other sub-committee like WASH and Regulatory, Logistic and Inspection committee containing pharmacy professionals
- ➢ Active case search not started yet
- ➢ Coordination of other sectors and preparing joint action plan is not started

G. Ways forward

- ✓ Immediate establishment of Task Force and Other sub-committee
- ✓ Start risk areas mapping and other aggravating factors identification
- ✓ Prepare detailed and categorized need assessment(short and long term need)
- ✓ Preparing comprehensive and joint action plan(short and long term)
- ✓ Develop/ set TOR for all committee that are going to be formed
- ✓ Setting means of active case searching and means of report communication.

9.3 AWD control and response activity report, Laga Tafo Town, Oromia, Ethiopia, during July –September 2016

9.3.1 Introduction

9.3.1.1 Background about study area

Laga Tafo Town is one the sixteen towns administrative found in Oromia Region. The town is found 15-20 KM far from Addis Ababa in northeast direction. In 2016, estimated total population of the town was 23, 507 will 1: 1 sex ratio. Laga Tafo Town has two broad kebeles. The index case reported from Laga Tafo Health Center, was at July 2/2016. The case had travel history to Addis Ababa for job before two days. Then totally 93 AWD cases were reported from this town until the end of outbreak, last case reported on September 20/2016.

9.3.1.2 Overview about AWD

Cholera is a diarrheal disease caused by infection of the intestine with the gram-negative bacteria *Vibrio cholerae*, either type O1 or O139. Both children and adults can be infected. It is one of the key indicators of social development and remains a challenge to countries where access to safe drinking water and adequate sanitation cannot be guaranteed.

About 20% of those who are infected develop acute, watery diarrhea, 10–20% of these individuals develop severe, watery diarrhea with vomiting. If these patients are not promptly and adequately treated, the loss of such large amounts of fluid and salts (more than 10-20 liters/day in severe forms) can lead to severe dehydration and death within hours. The case-fatality rate in untreated cases may reach 30–50%. Treatment is straightforward (basically rehydration) and, if applied appropriately, should keep the case-fatality rate below 1%.

Mode of Transmission: Cholera is transmitted by the fecal-oral route, exclusively by contaminated water or food. Transmission by contact, such as touching patients, is rare.

Water may be contaminated at its source. Surface water and water from shallow wells are common sources of infection. In addition, *Vibrio cholerae* can live for years in certain aquatic environments.

Moist grains, such as rice, millet, or sorghum, when served at room temperature or lightly warmed, are common vehicles for cholera transmission. Moist foods lightly contaminated after cooking and allowed to remain at room temperature for several hours, provide an excellent environment for the growth of *Vibrio cholerae*. Other foods which can transmit cholera include raw or undercooked seafood, particularly shellfish, and raw fruits and vegetables.

Acidifying foods with lemons, tomatoes, yogurt, or fermented milk helps to inhibit *Vibrio cholerae* growth.

Humans are the main reservoir of *Vibrio cholerae*. Asymptomatic (healthy) carriers and patients carry huge quantities of vibrio in feces and in vomit; up to 100,000,000 bacteria can be found in 1 ml of cholera liquid. Other potential reservoirs are water, some mollusks, fish, and aquatic plants. The infective dose depends upon individual susceptibility, but in general a 1000,000 dose is needed to cause the illness.

Risk Factors

Poor social and economic environment, precarious living conditions associated with:

– Insufficient water supply (quantity and quality)

– Inappropriate and poor sanitation and hygiene practices

– Inadequate food safety - this includes cultural influences on food preparation and storage at home, poor food safety during preparation and storage, inadequate/lack of food safety in markets and restaurants and by street vendors. During outbreak peel it, cook it or leave it.

– High population density: camps and slum populations are highly vulnerable.

Underlying diseases such as malnutrition, chronic diseases and AIDS are thought to increase susceptibility to cholera, but this has not been proven.

 Environmental and seasonal factors facilitate cholera transmission.

Cholera epidemics often start at the end of the dry season or at the beginning of the rainy season, when water sources are limited.

Incubation Period and Period of Infectivity

The incubation period is usually 1 to 3 days but can range from several hours to 5 days. Symptoms usually last 2 to 3 days, although in some patients they can continue up to 5 days.

Infected persons whether they are symptomatic or not, can carry and transmit vibrios during 1 to 4 weeks; a small number of individuals can remain healthy carriers for several months. Antibiotic therapy can decrease the duration of symptoms and the period of infectivity.

Cholera case definition

Suspected case: A case of cholera should be suspected when: in an area where the disease is not known to be present, a patient aged 5 years or more develops severe dehydration or dies from acute watery diarrhoea;

In an area where there is a cholera epidemic, a patient aged 5 years or more develops acute watery diarrhoea, with or without vomiting.

At the health post and at community levels, a suspected cholera case can be defined as follows: Any person 5 years of age or more with profuse acute watery diarrhea and vomiting.

Confirmed case: A suspected case in which *Vibrio cholerae* O1 or O139 has been isolated from their stool.

Note: Children under 5 years of age are excluded from the surveillance case definition because the majority of diarrhea due to any cause occurs in this age group. Including these patients in the reporting system would lead to many false reports of cholera. However, in terms of case management during cholera epidemics, persons aged 2 years or more should be treated for cholera when they develop acute, watery diarrhea.

9.3.3 Objectives

- ✓ To establish different committee involved in AWD outbreak prevention and control activities.
- ✓ To describe cases by person, place and time
- ✓ To identify possible risk factors, interventions gaps and recommend appropriate measures.

9.3.4 Methods

Discussion was held with different governmental and nongovernmental sectors. Field visit was conducted Line list was used for descriptive analysis using Microsoft Excel.

9.3.4.1 Intervention period

Intervention activities were done from 10 July to September 12/2016. Data analysis was performed every other day during intervention and summary of report written after the end of outbreak (September 20/2016).

9.3.5 Findings during intervention activities

9.3.5.1 Descriptive analysis

In Laga Tafo Town, there were about 93 AWD cases managed at Laga Tafo cholera treatment center (CTC) during a period of July 2 to September 20/2016. During the outbreak in the town there was one death which showed case fatality rate (CFR) of 1.07%. Overall attack rate (AR) of AWD in Laga Tafo Town was 0.4%. Compared to Cholera outbreak management guideline, CFR observed in Laga Tafo Town was in tolerable range (it indicates appropriate case management; CFR should be below 1%).

Proportions of sex and age group were determined during the outbreak in the town. Based on this about 63 (67.7%) of cases were male population. Concerning age group, 73 (78.5%) of cases were between age of fifteen to 44 years old. Under five cases managed as AWD during this outbreak in Laga Tafo Town were only three cases.

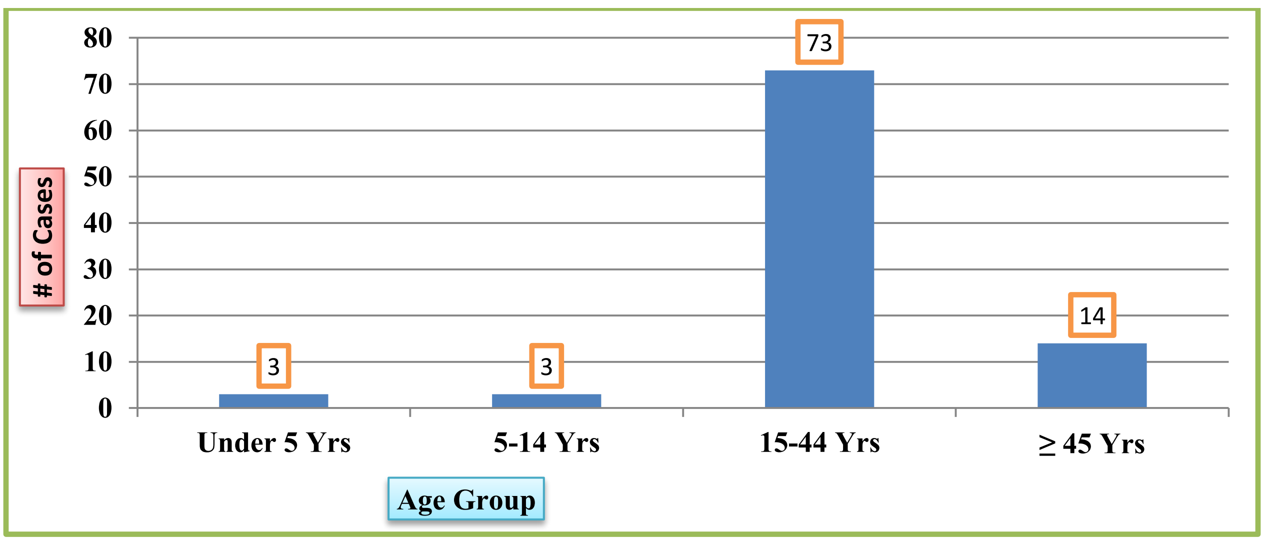

Figure 9.3.51: Distribution of AWD Cases by Age Group in Laga Tafo Town, Oromia, Ethiopia, 2016.

Majority of AWD cases 54 (58%) were from Laga Tafo Kebele 02 and followed by Laga Dadi Kebele 01 which contributed 16 (17.2%) of cases. About 89.3% of AWD cases in Laga Tafo Town were from Laga Tafo Kebele 01, 02 and Laga Dadi Kebele 01.

The index case was reported from Laga Tafo Health Center on July 2/2016. The case had travel history to Addis Ababa for job before two days. During the specified date, there was ongoing AWD outbreak in different sub-cities of Addis Ababa. Majority of the cases were showed the symptom between 20 July to August 20/2016.

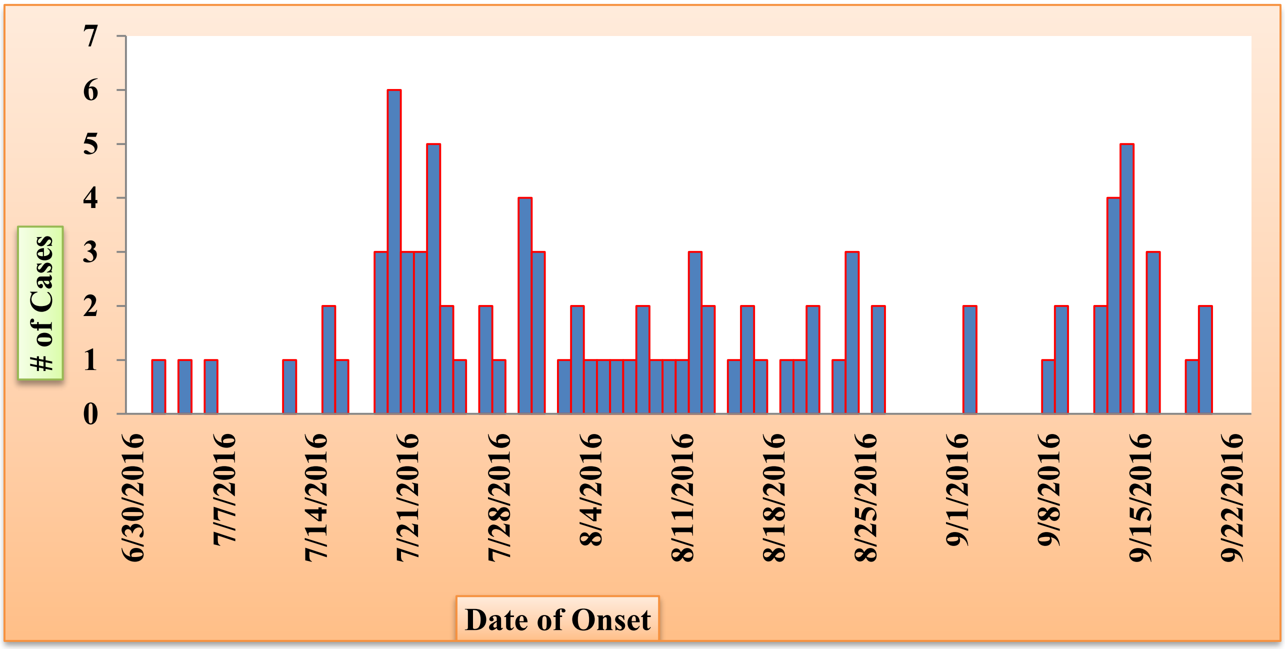

Figure 9.3.52: Distribution of AWD Cases by Date of Symptom Onset in Laga Tafo Town, Oromia, Ethiopia 2016.

We also assessed AWD cases by WHO week while we conducting intervention activities in the town. Accordingly the cases started to rise from week 28 and reached peak at week 29/2016. And the second peak observed during WHO week 37/2016, because during this week we identified contaminated water source in Laga Tafo Kebele 02.

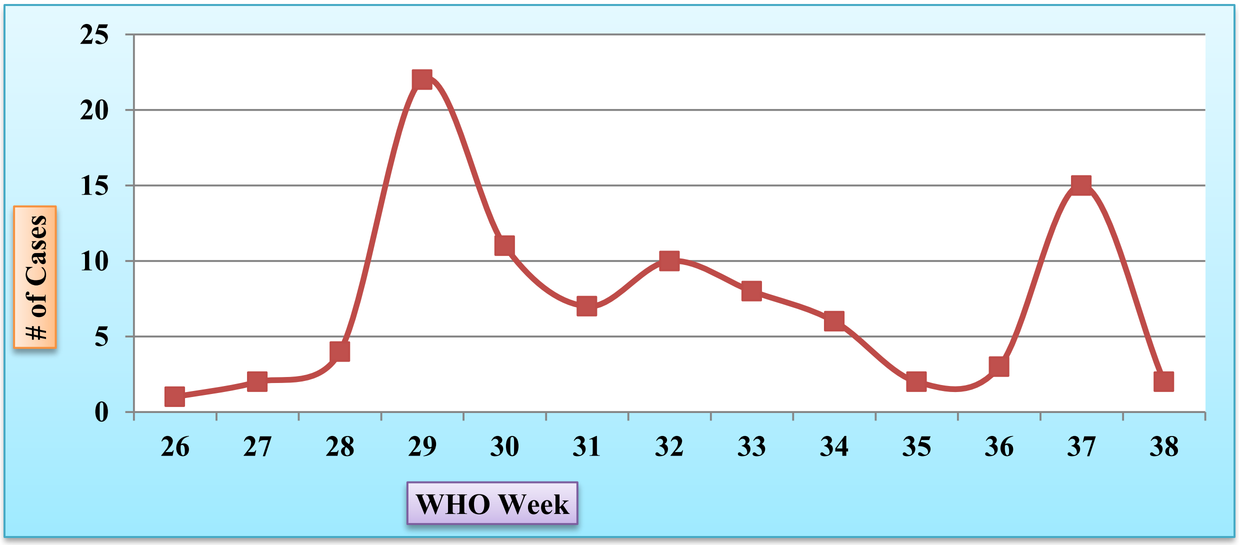

Figure 9.3.53: Distribution of AWD Cases by WHO week in Laga Tafo Town, Oromia, Ethiopia, 2016.

Dehydration statuses of AWD cases managed in Laga Tafo CTC were assessed in order to avail appropriate supplies. Accordingly 71% of cases were managed as some dehydration and severely dehydrated cases constitute 22 (23.6%).

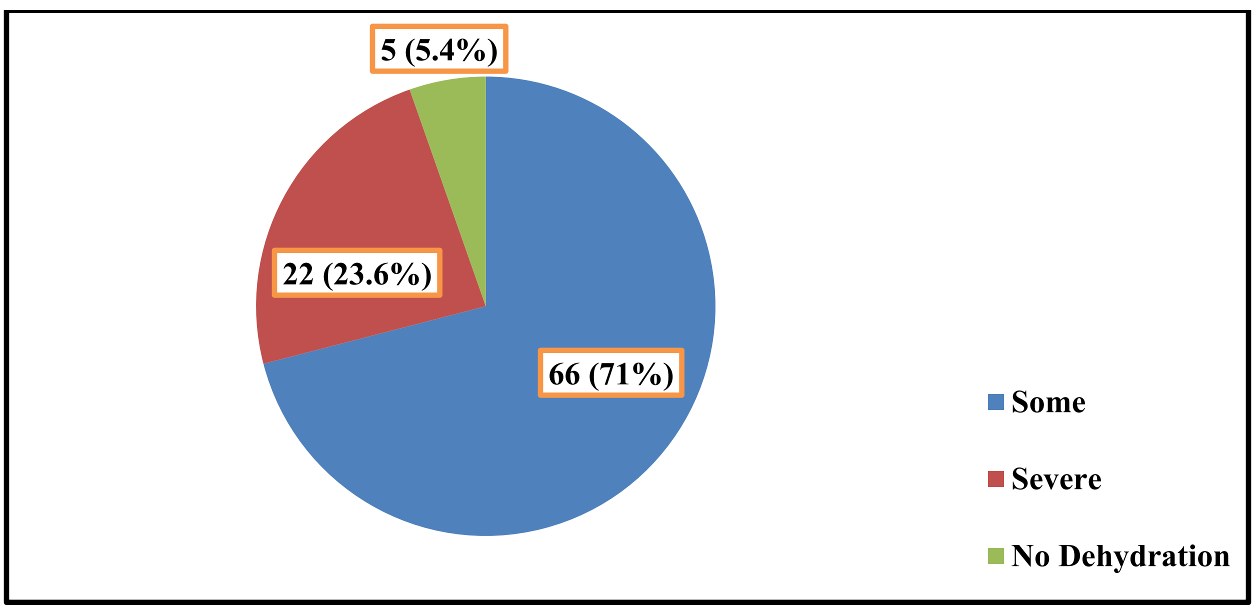

Figure 9.3.54: Distribution of AWD Cases by Dehydration status, in Laga Tafo Town, Oromia, 2016.

9.3.5.2 Laboratory findings

Out of 93 AWD cases 39 (42%) of them were tested for RDT, and all of them were treated as RDT positive. In addition to sample taken from cases, sample was taken from Holy water, portable water and meat from slaughterhouse and the result were positive too.

9.3.6 Gaps identified during intervention activities

1. Epidemic preparedness plan was not in place.
2. Different committee play crucial role in prevention and control of AWD were not established at town administrative level.
3. Case management and surveillance team established at health office level were weak.
4. Assessment of food history, occupation and travel history of the cases where not included in line list to set hypothesis about risk factors.
5. Social mobilization and community awareness were not performed from corner to corner.
6. There was large accumulation of dry waste substance here and there in the town.
7. Involvement of different governmental sectors was very weak.
8. Working with stakeholders such as factory owners and spiritual leaders was weak.
9. Assessment of latrine coverage and utilization was not done properly, especially in food and drink establishment and places where many peoples gathered like Holy water.
10. Working with bordering towns and woreda was not strong enough to stop the outbreak.

9.3.7 Major intervention activities conducted

1. Establish different committee both at health office and Town administrative level. Task force committee was established at town level that managed/lead by administrative whereas head of health office was secretory.
2. Case management and surveillance committee were established from health staff members for proper cases management and home to home active case search.
3. For infection prevention activities, chemical was sprayed and prophylaxes were given for peoples that have contact with cases.
4. Awareness creation and community mobilization were conducted mainly lead by communication office.

5. Latrine coverage and utilization was assessed by WaSH committee both at family and organizational levels.
6. In collaboration with EPHI, Laga Tafo health and water offices, samples of water and food item were taken and tested.
7. Different food and drinking establishments, factories and faith organization like place of Holy water were assessed for their hygiene and sanitation practice.
8. Waste substance produced by habitants and factories was disposed at appropriate place in collaboration with Laga Tafo Town municipality administrative.
9. Latrine was constructed at Medihaniyalem Holy water place for peoples came to use this Holy water from different corners of the country.
10. Rotto was bought for Abba Kiros Holy Water users to treat the Holy water.
11. Strong relation was established with the bordering towns administrative especially Yeka Sub-city of Addis Ababa for active surveillance activities.
12. Community surveillance was established to report any rumor related to AWD.

9.3.8 Recommendation

- Epidemic preparedness plan should always be prepared with annual plan.
- Different governmental and nongovernmental sectors should involve in prevention and control activities of the outbreak.
- Surveillance team should work actively on contact tracing and active case search.
- Case management team should work actively to prevent CTC occurred infection and in preventing CTC death.
- WaSH team in collaboration with Water Office and Town municipal should keep regular monitoring and checkup practice.
- Latrine coverage and utilization assessment should be continued until the town is free of open defecation.
- Working with bordering towns and woredas should keep up.

1.3.9 Reference

1. Laga Tafo Town health office report and line list.
2. EPHI, Ethiopia. Guideline on Cholera Outbreak Management May 2011.

9.4 Oromia Region PHEM weekly Bulletin, WHO week 34/2016

WEEKLY PHEM BULLETIN

Biiroo Eegumsa Fayyaa Oromiyaatti Adeemsa Hojii Ijoo Hoggansa Balaa Tasaa Fayyaa Hawaasaa Qu'annoo fi Qorannoo Fayyaa

Oromia Regional Health Bureau,

PHEM Core Process

WEEK 34, 2016

Highlights of the Week

- The Regional Surveillance report completeness is 87% and timeliness rate is 72%.
- Weekly Severe Acute Malnutrition (SAM) cases were decreasing at regional level and in majority of Hot spot zones
- Malaria cases are increasing in majority of known malarious' zones
- Measles cases are increasing
- AWD case load in all affected zones are increasing and numbers of newly affected zones and woredas are increasing.

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 and reporting trends of priority diseases and present response activities. It also provides feedback on surveillance activities for week 34, 2016 G.C.

II. Weekly Surveillance Report

Report completeness and timeliness of government health facilities were 87% & 72% respectively. Zones and Towns with below target set (80%)for both C&T were Bale(62%), Kellem Wollega (62%), Borana (73%) zones and Robe Town is Zero report.This low performance cotributed for low regional Completeness and Timelines.

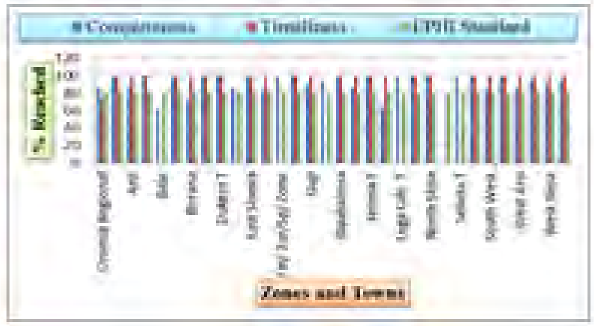

Figure 1: Report completeness and timeliness by place, Oromia, August, 2016.

Regional report completeness and timeliness of the past nine consecutive weeks were above the target except for timeliness of week 26,27, 29 and 34 which was 49%, 79%, 79% and 72% respectively (**Fig:2**). Hence, everybody of us need to work hard so as to improve this low report rate, because the quality of our report depends on improved report Completeness and Timelines.

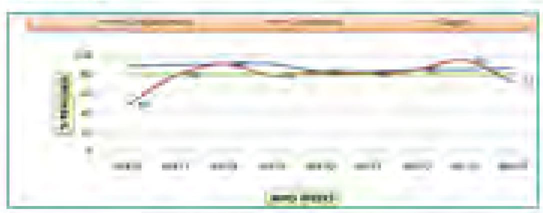

Figure 2: Trends of regional surveillance report completeness and Timeliness by Time, Oromia, August, 2016

PUBLIC HEALTH EMERGENCY   Weekly PHEM Bulletin, Oromia, 2016

III. Diseases condition

1.Malaria

In this week, a total of 4,437 clinical and confirmed malaria cases were reported. Among the total clinical and confirmed malaria cases 4,413 (99%) of them were confirmed cases. Of the total confirmed cases 2,785 (63%) of them were plasmodium falciparum. Confirmed malaria cases were increased by 430 (11%) as compared to week 33. A total of 26,400 cases were laboratory tested, yielding a positivity rate of 16.72%. The highest number of confirmed malaria cases was reported from East Shoa 922 (21%) followed by East Hararge 384 (8.7%), Borena 324 (7.34%), Kellem Wollega 274 (6.2%) and Arsi 267 (6%) Zones, among reported Zones, woredas reported high case load were Dugda 318(34.5%) from East Showa Zone, Haromaya 124(32.3%) from East Hararge Zone, Abaya 129 (40%) from Borena Zone were woredas' with high case loads which need attention. Trends of confirmed malaria cases of the seven consecutive weeks for some selected zones are indicated below:

Figure 3: Trends of confirmed malaria cases (Pv + Pf) of selected zones by Week , Oromia, August, 2016.

2. Dysentery (Diarrhea with blood)

In this week, a total of 1759 dysentery cases were reported. Cases were decreased by 2 (0.11%) as compared to week 33. The highest number of cases was reported from East Showa 159(9%), North Shoa 140(8%), East Hararge 137 (8%) and West Shoa 117(7%) zones.
Trends of dysentery cases for the last seven consecutive weeks are shown below (fig: 5).

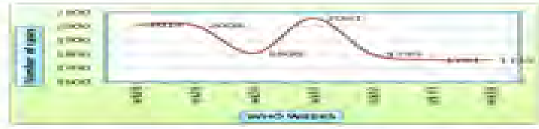

Figure 5: Trends of Dysentery cases by Time, Oromia August, 2016

3. Measles

In this week, a total of, 26 suspected measles cases were reported to the region. The cases were increased by 2(8.3%) as compared to week 33. Majority of the cases were reported from South West Showa zone 13(50%). Among the reported zone, St. Lukas Hospital 7(54%) and Ameya 5(38.5%) woreda are mentioned. Trends of the past six consecutive weeks of suspected measles cases are shown below (Fig: 6).

Figure 6: Trends of suspected measles cases by Time, Oromia, August, 2016

4. AFP/Polio

In this week, six suspected AFP cases were reported to the Region. The cases were reported from Jimma Zone (3), Guji (1), Horro G/Wollega (1), and North Shoa (1) Zones.

5. Malnutrition

In this week, a total of 2215 new SAM cases were reported to the region. SAM cases were increased by 337(18%) as compared to week 33 (fig: 8). Of the total cases, 252(11.4%) of them were treated at stabilization center. Majority of the cases were reported from west Hararge Zone 489(22%) followed by East Hararge 370(16.7%) and Bale 167(7.3%) zone. From Reported zones, Woredas with high case load were Chiro rural 71(14.3%) from West Hararge Zone, Chinaksen 47(12.7%) and Fedis 47(12.7%) from East Hararge Zone; Similarly, Sawena 61(36.3%) from Bale Zone. Trends of the past six consecutive weeks of SAM cases as of regional and zonal level are indicated below (Fig 7).

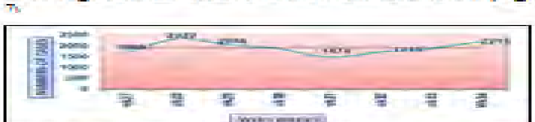

Fig: 7: Trends of SAM cases by Region, Oromia, August, 2016.

Fig: 8: Trends of SAM cases by selected zones of Oromia, August, 2016.

6. Meningococcal Meningitis

In this week a total of four suspected meningococcal meningitis cases were reported to the Region, from West Hararge, Gelemso Hospital, where cases are usually reported and need follow-up.

7. Rabies

In this week, only one suspected rabies case was reported to the region. The reported case was from Arsi Zone, Munesa woreda.

8. Anthrax

There were ten cases and two deaths of Anthrax reported to the region from Arsi Zone, Sire Woreda this week.

9. Relapsing Fever

In this week, a total of five relapsing fever cases were reported to the region, three from Asella Town and two from Guji Zone.

10. Maternal deaths

This week, a total of four suspected maternal deaths were reported to region through routine surveillance from West Arsi, East Wollega, Jimma zone, and Jimma Town.

11. AWD Cases

Regionally, since the occurrence of AWD outbreak, 3,358 suspected cases were reported up to WHO week 34. 12 zones, 12 administrative towns and 73 districts have been affected by this outbreak to date.

12. Guinea Worm (GW)

In this week no Guinea Worm case reported to the region.

IV. Response Activities

- Based on weekly surveillance report, feed-back is given to all zones and towns timely on regular base.
- Daily follow-up of rumors of epidemic prone diseases and other public health emergencies are followed on regular base.
- Health and nutrition taskforce meeting is usually conducted every two weeks with partners, in order to share ideas, discuss and agree on how to get involved in the current AWD and Nutrition problems.

Annexes 1.1.8: Questionnaires for AWD Outbreak Investigation used for Arkumbe Kebele, Limmu Woreda, East Wollega 2017 G.C

No.	Question	Classification
1.1	Status of respondent	1. Case 2. Control
1.2	Responder name	________________________________
1.3	Address	Region__________ Zone____________ Woreda____________ Kebele_________ Goti__________ House No_________
1.4	GPS coordinate of the house	Latitude______________ Longitude________________
1.5	Ethnicity	1. Oromo 2. Somale 3. Tigre 4. Gurage 5. Amhara 6. Walayita 8. Other(Specify)____________
1.6	Age	____________ Year (s) ________________Month(s)
1.7	Sex	2. Male 2. Female
2.1	Occupation	1. Farmer 2. Merchant 3. Student 4. House wife 5. Unemployed 6. Pastoralist 7. Gov't Employee 8. Private Employee 9. Daily Laborer 10. Not applicable 11. Other______________
2.2	What is your religious	1. Orthodox 2. Protestant 3. Muslim 4. Catholic 5. other______________
2.3	What is your marital status?	1. Single 2. Married 3. Widowed 4. Divorced 5. NA
2.4	Level of Education	1. Illiterate 2. Read and writing only 3. Elementary school (1-8) 4. Secondary School(9-12) 5. Tertiary School (college+) 6. NA
2.5	How many family members residing with you?	__________________
2.6	Do you know transmission means of AWD?	1. Yes 2. No
2.7	How do you think acute watery diarrheas transmit from person to persons (none proving)?	1. Contaminated food 2. Contaminated water 3. Contact with patient 4. Other(specify) ________
2.8	What are you doing when you face acute watery diarrhea (none proving)?	1. Go to health facility 2. Seek traditional healer 3. Use ORS 4. Use holy water 5. Stay at home 6. Other(specify)
2.9	Do you think AWD treatment center is source of infection/possible risk factor for AWD transmission?	1. Yes 2. No 3. I don't know
2.10	Do you think AWD is preventable disease?	1. Yes 2. No 3. I don't know
2.11	How do you prevent AWD (none proving)?	1. Using toilet 2. Eating cooked food 3. Using purified water 4. Hand washing 5. Vaccine 6. Other(specify) _______
2.12	How often do you wash your hands in a day?	1. Before eating 2. After visiting latrine 3. After washing child's defecation 4. After contact with dirty materials 5. others
2.13	Have you ever been sick of AWD?	1. Yes 2. No

No.	Question	Classification
2.14	How many times you were sick of AWD in the last one year?	1. Once 2. Twice 3. More than two times
2.15	Date and year of last sickness with AWD?	____________dd/mm/yyyy I don't know
2.16	Where did you get treatment (none proving)?	1. At health facility 2. At home 3. At holy water site 4. Traditional healer 5. Others,_________________
2.17	How long you were sick of the diseases?	_________________days
2.18	Was there sick family member of AWD in the past 5 years with the same complaints?	1. Yes 2. No 3. Not Applicable
2.19	Age and sex of family members affected.	1.___M/F __ 2 __M/F___ 3.__M/F____ 4. __M/F ____ 5.__M/F ____
2.20	Was there death in your family due to AWD in the past 5 years?	3. Yes 2. No
3.1	Do you have history of acute watery diarrheal disease recently?	1. Yes 2. No
3.2	When did the symptoms begin?	____________ dd/mm/yyy _______hour
3.3	Frequency of defecation per day	___________times
3.4	Do you have the following symptoms?	1. Watery diarrhea 2. Vomiting 3. General body weakness 4. Loss of consciousness 5. Muscle cramp 6. Other(specify)______________
3.5	Have you been treated with antibiotic for your recent complaints?	1. Yes 2. No
	What antibiotics did you take?	1. _________________ 2. I don't know
	Where did you take the antibiotics?	_____________________
	Where did you admit	1. CTC 2. Hospital 3. Private clinic 4. Others (specify), _______________
	Is there any sick other person in your house?	1. Yes 2. No
	If yes, is that before or after your symptoms began?	1. Before, 2. After 3. At the same time
	Is there AWD sick person in your village?	1. Yes 2. No 3. I don't know
	Did you have contact history with the same compliant in the past 5days before your symptoms onset	1. Yes 2. No
	2. **Travel and Exposure History**	
	Did you travel in the past 5 days outside of your village before your symptoms onset?	1. Yes 2. No
	If, yes where	______
	Did you participate in funeral ceremony of AWD death	1. Yes 2. No
	When did you participate in funeral ceremony of AWD death	______________________dd/mm/yyy
	Where did you participate in funeral ceremony of AWD death	_______________________________________
	Did you attend other public ceremonies /events(weeding, religious, bather , telethon)	1. Yes 2. No
	h. What kind of food did you served at the	

No.	Question	Classification
	ceremonies/ event?	
	What kind of drink did you served at the ceremonies/ event? (if water mention sources)	____
	Where do you defecate?	1. Toilet 2. Open field
	If answer to Q6.1 is ―toilet" who own it?	1. Private `2. Communal 3. Public
	show me the toilet	1. Clean 2. Unclean 3. Ventilated 4. Sign of utilization
	If the answer to question number 6.1 is OFD, can you tell me the reason?	1. No toilet 2. Culture 3. Bad odor 4. Fear of falling down 5. Too far from my house 6. Physically damaged (toilet) 7. Other(specify)______
	Is there facility to wash your hand after defecation near toilet?	1. Yes 2. No
	When do you wash your hand (none proving)?	1. After toilet 2. Before food 3. After cleansing child 4. Before preparing food 5. Before feeding child 6. Other(specify) _________
	What items are you using for hand washing?	1. Plain water 2. Soap 3. Ash 4. Other(specify)__________
	What is the water source for your house hold for drinking purpose?	1. Pipe water 2. Spring 3. Hand dug well 4. Deep well 5. Pond 6. River 7. Lake 8. Bottled water 9. Other(specify) _____
	What is the water source for your house hold for washing utensils?	1. Pipe water 2. Spring 3. Hand dug well 4. Deep well 5. Pond 6. River 7. Lake 8. Other(specify)___
	What is the water source for your house hold for cooking food?	1. Pipe water 2. Spring 3. Hand dug well 4. Deep well 5. Pond 6. River 7. Lake 8. Other(specify) _________
	How many hours/minutes will take you or your family to fetch water from the water source?	______hours ______minute I cannot estimate
	What type of container are you using to fetch water from the source?	1. Jerry cane 2. Bucket 3. Ensira (Gan) 4. Other(specify) _________
	What type of water container are you/your family is using in your house for storage?	1. Jerry cane 2. Bucket 3. Ensira (Gan) 4. Rotto 5. Other(specify) _________
	How was the water accessed from the storage container?	1. Pour 2. Dip with cup 3. Other specify___
	Does the container have cover/lid (observe)?	1. Yes 2. No
	Do you clean your water containers regularly?	1. Yes 2. No
	What materials do you use to wash your water containers?	1. Soap 2. Only water 3. Ash 4. Other(specify) _
	How often do you wash your water containers?	1. Every day 2. Every other day 3. Once per week 4. Other(specify) ____
	Do you think the water you are using is safe?	1. Yes 2. No
	Could you purify the water?	1. Yes 2. No
	What methods of water purification do you	1. Boiling 2. Filtration 3. Sedimentation

No.	Question	Classification
	use (none proving)?	4. Water chemicals 5. Other specify_____
	For what purposes do you purify water (none proving)?	1. For drinking 2. For cooking 3. For washing hand 4. For cleaning food utensils 5. Other(specify)_______
	Is there water purification chemical available in your community?	1. Yes 2. No
	What is the cultural food in your area?	1. Rice 2. Enjera with wot 3. Porridge 4. Bread 5. Other(specify) _____
	Do you eat raw/uncooked food?	1. Yes 2. No
	In the past 5 days of your symptoms onset what kind of uncooked food did you eat?	1. Raw meat 4. Raw green vegetables 2. Raw tomato 5. Raw fish meat 3. Raw milk 6. Other(specify) ____
	What kind of cooked food did you eat in the past 5 days of your symptoms onset?	1. Enjera with wot 2. Roasted meat 3. Other(specify) ___
	Do you re-heat cooked food if not eaten immediately?	1. Yes 2. No
	Where do you keep the cooked food?	1. Room temperature 2. Refrigerator 3. Other(specify)____
	What are you doing with the leftover foods (none proving)?	1. Reheat and eat 2. For domestic animals 3. Giving for beggars 4. Street children 5. Dump in waste substance 6. Other(specify) _____
	Is there fish supply in your village?	1. Yes 2. No
	Do you eat raw fish?	1. Yes 2. No
	Did you eat food from other house in the past 5 days of your symptoms	1. Yes 2. No

Annexes 1.2.9: Questionnaires for Case - control study on Measles outbreak in Limmu Seka Woreda, Jimma Zone, and Oromia Region

A name of outbreak- ***Measles Outbreak in Limmu Seka* Woreda**

Unique ID_______

***Respondent status:** Case ________, Control_________

Name of Case/Control______________________________, Date of data collection___________

Region______ Zone_______ Woreda______ Kebele_______ Gare_______ Phone___________

Location: Longitude: __________________ Latitude: ________________________

H. Socio-demographic characteristics

S.No	**Questions**	**Alternatives**
1.1	Sex	1. Male 2. Female
1.2	Age	Year---------Month--------
1.3	Occupations of cases/control	1. Farmer 2. House wife 3. Student 4. Unemployed 5. Daily laborer 6. Merchant 7. Government employee 8. Others specify____________
1.4	Family Occupations‘	1. Farmer 2. House wife 3. Student 4. Unemployed 5. Daily laborer 6. Merchant 7. Government employee 8. Others specify____________
1.5	Religion	1. Orthodox 2. Muslim 3. Protestant 4. Catholic 5. Others(specify)

1.6	Ethnic group	1. Oromo 2. Amhara 3. Tigre 4. Others(specify)______
1.7	Educational level of case/control	1. Illiterate 2. Read and write 3. Elementary 4. Secondary 5. Above secondary
1.8	Educational Level of family	1. Illiterate 2. Read and write 3. Elementary 4. Secondary 5. Above secondary
1.9	Marital status	2. Single 3. Married 4. Divorced 5. Widowed
1.10	Family size	_________
1.11	Is there any person with rash, fever, running nose/conductivities illness in the family?	1. Yes 2. No
1.12	If yes, number of sick person	________

II. Clinical History of Diseases

2.1	What was the symptom?	1. Fever □ Yes No □ 2. Rash □ Yes No □ 3. Cough □ Yes No □ 4. Coryza(runny nose) □ Yes No □ 5. Conjunctivitis(red eyes)□Yes No □ 6. Ear discharge □ Yes No □ 7. Pneumonia □ Yes No □ 8. Vomiting □ Yes No □ 9. Others ________
2.2	Date of rash	_____/_____/______

2.3	Duration of rash _______	
2.4	Date seen at health facility	______/______/_______
2.5	Did he/she take treatment?	1. Yes 2. No
2.6	If yes, treatment taken	1.ORS 2. Antibiotics 3. Vitamin A 4. Supplementary food 5. TTC ointment 6. Antipyretic 7. Others given_______
2.7	Status of the case patient after treatment	1. cure 2. partially 3. deteriorated/disabled 4. death

II. **Risk factor and Knowledge question**

3.1	Did you ever vaccinated for measles?	1. Yes 2. No 3. Unknown 4. Not applicable
	If yes last vaccination date	1. patient recall_________ dd/mm/yy 2. vaccination card________ dd/mm/yy
3.2	Number of vaccine dose received	1. one dose 2. two dose 3. three and above
3.3	If not vaccinated why?	➢ lack of information about vaccination campaign schedule, ➢ absence during vaccination campaign, ➢ other, specify
3.4	Did you have any travel history 7-18 days to areas with active measles cases before onset of symptoms?	1. Yes 2. No If Yes where _____________
3.5	Do you have any travel history four days before and after rash onset	1. Yes 2. No

		If yes where _______________
3.6	Do you have any contact history with someone else four days before and after rash onset	1. Yes 2. No If yes whom _______________
3.7	If yes to question 3.5 place of travel	1. School 2. Neighbor 3. Market 4. Other________
3.8	Do you know modes of transmission for measles?	1. Yes 2. No 3. If yes specify________________________
3.10	Did you ever have measles infection?	1. Yes 2. No 3. Don‘t know
3.11	Nutritional status of the cases	1. Normal 2. Moderate 3. Severely malnourished
3.12	What is the estimated area of the house?	______________
3.13	House condition?	□ ventilated □ not-ventilated
3.14	Distance from house to HC?	□ greater than 5 km □ equal or less than 5 km
3.15	Where did you go first when you get ill?	1. Health Facility 2. Traditional Healers 3. Holy Water 4. Stayed at home 5. Other :(Specify)________________
3.16	How do you think people get measles?	1. Contact with a virus from ill person 2. From God 3. Bad attitude of other people 4. Other(Specify)
3.17	Do you Know measles is vaccine preventable?	1. Yes 2. No 3. Don‘t Know

Annexes 2.1.10: Checklist of Measles Case Surveillance Data Analysis, in Guji Zone, Oromia region, Ethiopia.

I. Historical aspect of the area (culture & Truism office)

1. Geographic and Climate (map, altitudes, agro- ecological zones etc.)
2. Map of Zone________________________
3. Location (distance and direction)____________________

II. Political and Administration structure

1. Total no. of woreda -----------------# of kebele_____________
2. Total population of the zone ------------------- urban -------------rural -------------
3. Boundaries of the zone, north---------------------, south---------------------, west----------- and East------------------

III. Demographic information

1. Population ,total_____________, urban---------------, rural--------- -----
2. Male popn. --------------------------- Female popn----------------------------
3. < 1 year--------------------- ,< 5 years-----------------------, < 15 year------------, >15 years-------------------, total household of the zone----------------------, average children by HH------

IV. Measles specific questionnaires

4. Total measles case registered from 2003 E C on ward___________________.
5. Among total cases male_____________ female ____________ proportion ______.

AGE group if relevant/available_______________

Age group	Male	Female	Total	Proportion	Remark
< 1 years					
1-3 yrs.					
< 5 years					
5- 14 yrs.					

15-29 yrs.					
30-44 yrs.					
>45 years					

1. Out of suspected case report #_______lab. Confirmed, #_______confirmed by epidemiologic linkage_________, #________clinically compatible, # __________discarded case.
2. Age Specific Incidence and Case Fatality Rate of Measles in Guji Zone, Oromia Region, 2011-2015 GC.

Year	Age group	Population	# of case	% of case	Incidence Rate/100,000	Death	CFR
2011	<1						
	1-4						
	5-14						
	>15						
	Sub-total						
2012	<1						
	1-4						
	5-14						
	>15						
	Sub-total						
2013	<1						

	1-4						
	5-14						
	>15						
	Sub-total						
2014	<1						
	1-4						
	5-14						
	>15						
	Sub-total						
2015	<1						
	1-4						
	5-14						
	>15						
	Sub-total						
Total average	<1						
	1-4						
	5-14						
	>15						
	Total						

3. Out of woreda in the Guji Zone measles case reported from

S.	Woreda	Year	# of case reported	Proportion	# vaccinated out

No.					of cases
1					
2					
3					
4					
5					
6					
7					

4. Measles vaccination coverage by year, 2011 to 2015------------------------
5. Routine immunization coverage by month in the zone

Year in G. C	Eligible children for immunization	# of children immunization	Measles vaccination coverage
2011			
2012			
2013			
2014			
2015			

6. Trends of vaccination status of children with the measles case in the zone
   # of cases not vaccinated____________, # of case vaccinated once_________, # of cases vaccinated twice___________, # of cases vaccinated >2___________, unknown_______
7. Trends of measles case report by WHO week in the last five years from 2011 to 2015.

Year									
2011									

2012									
2013									
2014									
2015									

8. Outcome of Measles case in Guji Zone, Oromia Region, 2011-2015 G.C.

Year	# of case	# Cured	# Death	Proportion
2011				
2012				
2013				
2014				
2015				

9. Age specific attack rate (ASAR) of measles cases by their age group, Guji zone, Oromia region, Ethiopia, 2011-2015.

Age group	# of case in 5 years	Average case per year	Average total population of the five year	Average total cases of the five year

Annexes 3.1.11: Woreda (Intermediate Level) Questionnaire for public health system evaluation

Woreda___________________________

Respondent__________________________

Date ______________________________

Interviewer ______________________

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 woreda have the **capacity** to transport specimens to a higher level lab? Yes/No

If No, Reason _________________

3. Does the woreda 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 30 minutes 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, Observe description of data by age and sex

i) Is description of data by place (locality, village, work site etc.)? Yes / No

If yes, Obs. description of data by Place

j) 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

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 woreda in the past 6 months? Yes/No

If yes, number investigated_______ (Observe reports and take copies if possible)

Epidemic preparedness

17. Dose the woreda epidemic preparedness plan? Yes/No

If, yes,**(Obs)** a written plan of epidemic preparedness and response.

18. Has the woreda 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 woreda 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 woreda 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 woreda 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 woredas within 48 hours of notification of most recently reported outbreak?_______

Feedback

25. How many feedback written reports has the woreda produced in the last year?______________

Obs Observed the presence of a written report that is regularly produced to disseminate

Supervision

26. 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)

27. If No, the most usual reasons for not making all required supervisory visits.

(Text)

Reason 1____

Reason 2____

Reason 3____

Training

28. Have you trained PHEM/IDSR disease surveillance? Yes/No

If yes, specify when, where, how long, by whom? ______________________.

29. What percent of your staffs in the woreda trained on PHEM/IDSR surveillance?____%

Resources

30. Logistics Available a) Bicycles Yes/No b) Motor cycles Yes/No

c) Vehicles Yes/No d) Stationery Yes/No e) Computer & Printer Yes/No

31. Communication available

a) Telephone service Yes/No b) Fax Yes/No

c) Radio Yes/No d) Computers that have modems Yes/No

32. 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 an IDSR focal person in the woreda 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 woreda under surveillance_____________

43. How many cases and deaths reported in the woreda from the following disease past 6 months?

a) Malnutrition cases _________Deaths ________

b) Measles cases _________Deaths ________

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- 10-15 minutes 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, **Obe:** 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)? ________

53. **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 woreda? _____%

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?____________________________.

Annexes 4.1.12: Operational definition of some words used in health profile description

1. All type latrine: Latrine including both pit latrine and standard latrine.
2. Standard Latrine: Latrine with 2 m x 2 m well, having super structure and hand washing facility and any people can use day and night.
3. Stand Pipe : is a type of rigid **water** piping which is built into multi-story buildings ... near a road or driveway so that a fire engine can **supply water** to the system
4. Protected spring: is any natural situation where **water** flows from an aquifer to the Earth's surface. It is a ... Still other **springs** are the result of pressure from an underground **source** in the earth, in the form of volcanic activity.
5. Protected Deep Well: obtain water from aquifers below at least one impermeable layer. A deep well must be constructed so as to exclude subsoil water and contamination from above. It should be watertight down to a point slightly below the level of the deep supply.

Annexes 4.1.13: Data collection tools for health profile description, Tiyo Woreda, Arsi Zone, Oromia, Ethiopia

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 temperature (average)_________High __________Low_____________

2.6. Climatic zones Highland_______% Midland ____________% Lowland ___________%

2.7. Accessibility to main roads____

3. **Political and Administrative structure**

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. < 1 years_________, < 5 years_________, < 15 years______, >64 years____________,

Women 15-49 years of age ___________.

4.4. Total population by kebele (each kebele pop)____________Ethnic composition/language

______________ __________________ ___________________

5. Economic status (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) ________ 2nd Cycle (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 2004 ______________

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_________(______%) , 7.2. Telecommunication__________(________%) ,Electric power______________(________%)

7.3. Water supply ______________(______%)

7.2. How many of the **health centers** have access to transportation_________(______%) ,

7.2.1 Telecommunication__________(________%) ,Electric power______________(________%)

7.2.2 Water supply _____________________(________%),

8. **Health delivery system (Woreda Health Structure/organogram)**

8.1 Health Facility

Type		Number	Average distance from Woreda town
Hospital			
Health center			
Private HFs	Clinic		
	Drug store		
	lab		
Health post			

8.2 Health institution to pop ratio :_________________________(health coverage)

8.3 Hospital: Pop _________. HC: Pop __________ HP: Pop _____________

8.4 Health service coverage ___________________

8.5 Human resource for health (all type)

S.no	Type of profession	Educational level	Number		
			Male	Female	Total
1	Physician				
2	Pharmacist				
3	Laboratory Technologist				
4	Health Officer/HO				
5	Nurse	BSC			
		Dip			
6	Midwifery	BSC			
		Dip			

7	Health Education and Promotion				
8	Environmental health				
9	Druggist				
10	Laboratory Technician				
11	HEWs				
12	Supportive Staffs	Degree			
		Dip			
		Certificate			

8.6 Doctor: pop ratio______, HO: pop ratio________, pharmacist: pop ratio_________ , Nurse: pop ratio_____, HEW: pop ratio______

8.6 Top causes of morbidity and mortality

8.6.1 Top ten leading causes of OPD visit (morbidity)

Rank	Adult	pediatric
1		
2		
3		
4		
5		

8.6.2 Top ten causes of admissions

Rank	**Diseases in Adult OPD**	**In Pediatric OPD**
1st		
2nd		
3rd		
4th		

8.6.3 Top ten causes of deaths (mortality).

Rank	In Adult OPD	In Pediatric OPD
1st		
2nd		
3rd		

8.7 Vital Statistics and Health Indicators

8.7.1. Infant Mortality Rate (IMR) __________ (total <1 yr. deaths in 2005 yr_______)

8.7.2. PMR_____ (The last year 2005 yr)

8.7.3. Total live births______

8.7.4. Total still births________

8.7.5. Total neonatal deaths______

8.7.6. Child Mortality Rate______________ (total <15 yr deaths in 2005 yr______)

8.7.7. Crude Birth Rate_________

8.7.8. Crude Death Rate__________ (total deaths 2005 yr____)

8.7.9. Maternal Mortality Rate___________ (total maternal deaths in 2005______)

8.7.10. Contraceptive Prevalence rate______________

8.7.11. Contraceptive acceptance rate _________

8.7.12. ANC rate (how many of the total expected pregnancies attended 1st ANC) ________

8.7.13. ANC rate (how many of the total expected pregnancies attended 4th ANC) ________

8.7.14. Percentage of deliveries attended by skilled birth attendants_________

8.7.15. Percentage of deliveries attended by HEWs__________

8.7.16. Percentage of deliveries attended by TBA ______________________

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. Measles ___________

9.6. Fully immunized____________

9.7. PW TT2+ ________________, NPW TT2+ _______________

10. **Health budget allocation:**

10.1. Government

10.1.1. Total budget allocated for the Woreda ______________

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 TBAs/TTBA________ and their responsibility _______________________

12.1.2. No. of CHWs__________ and their responsibility _______________________

12.1.3. Responsibility of HEWs____

12.1.4. 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 population ______________________

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 distribution) ______________________

13.1.4. Is there IRS this year (No of kebeles) ________________________

13.1.5. If yes, No of kebeles undertaking IRS_____________________

13.1.6. Population 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,____

Annexes 7.1.14: Rapid Meher assessment- Health and Nutrition Sector: Zone level Questionnaire

Interviewer name ________________________________
Interview Date: (dd) ____/(mm)________/2016_______
Main contact at this location: Name:_________________ Position:_________

Population: Woreda total population	M:___________	F:___________	Under 5_______
Special Population *(if any)*	Pastorals____	Refugees____	IDPs____
Water availability at health centers (HC)	No. of health centers ______	No. of HC with water access__________	

Is there a PHEM Officers at Regional level?
If yes how money________
Does the RHB/Zone Health Office regularly report PHEM report as scheduled dates?
Observe copies and comment _________________
Are there PHEM Officers/focal persons at Woreda and HC levels?
If yes how money are there in the woreda level______
If yes how money are there in the woreda level______
Do the Woredas, health facilities and HEWs regularly report PHEM report as scheduled dates?
Observe copies and comment ____
Are all relevant government, NGOs and UN agencies represented at Regional PHEM?
Is there a multi sector health coordination forum? If yes how frequently meet? -------------
Is there a Public Health Emergency preparedness and response plan?
Does it include reproductive health? Yes□ No□
Is there accessible emergency response fund for PHEM at regional level?
If yes how much allocated-------------

2.3. Mention anticipated epidemics (If yes please indicate Zone/Woreda at risk and risk population per anticipated risk: *(Use the back side)*
______________________,_______________________,____________________,

Health emergency Management

Is there a Public Health and Nutrition Emergency Preparedness and Response plan?
If yes, is the plan budgeted/ funded?

Is there a trained staff on PHEM basic level (Regional/Zonal/Woreda/HFs)
If yes specify number of trained personnel per level:
Region/Total: Female ______Male______, **Zone:** Female_______Male______, **Woreda**: Female_____Male_______

Description	Total requirement	Available	Gaps

Diseases	**Risk factors for epidemics to occur**
Malaria	Malaria endemic area Presence of malaria breeding site Interrupted or potentially interrupting rivers Unprotected irrigation in the area LLINs coverage <80 No_________%_____________ Indicate the coverage of IRS 2008 No_________%_____________ Was there any prevention and control activities Number of malarious kebeles and total population in these Kebeles
Meningitis	Was there Meningitis epidemic in the last 3 years (If yes specify date) Has vaccination been conducted in the past 3 years If yes : Indicate the date and number of people vaccinated Date________________ No__________
AWD	Was there AWD epidemic in the last three years (If yes specify date)________________ Latrine coverage number and parcentage . No_________%_____________ Latrine utilization No_________%_____________ Safe water coverage No_________%_____________
Measles	Is there ongoing measles outbreak What is the measles vaccination No and % coverage of 2008, less than one year No_____________ Percentage of coverage_________ Has SIA been conducted in 2008 EFY If yes, Indicate the month and number of children vaccinated including the age group Month------------------ No-----------------Age group---------------

Any other observations you made on health emergencies or any risks of epidemics?

____

What were the major challenges in your Epidemic response experience?

____

SECTION IV: NUTRITION – SAM and MAM Management in Region/Zone – May to October 2016

SAM Management

4.1 Facilities with SAM management in Region/Zone

Month	Total Number of hospitals	Total Number of Health centers	Total Number of Health posts	Number of SC.	Number of OTP.	Total Number of OTP/SC reported
May						
Jun						
Jul						
Aug						
Sep						
Oct						

4.2 Admission and performance of the therapeutic feeding programme for SAM management

Month	Total SAM Cases		% of SAM children cured		% of SAM children defaulted		% of SAM children died		% of SAM children non-respondent		% of SAM children other	
	2007 E.C.	2008 E.C.	2007 E.C.	2008 E.C.	2007 E.C.	2008 E.C.	2007 E.C.	2008 E.C.	2007 E.C.	2008 E.C.	2007 E.C.	2008 E.C.
May												
Jun												
Jul												
Aug												
	2008 E.C.	2009 E.C.	2008 E.C.	2009 E.C.	2008 E.C.	2009 E.C.	2008 E.C.	2009 E.C.	2008 E.C.	2009 E.C.	2008 E.C.	2009 E.C.
Sep												
Oct												

4.3. Availability of therapeutic supplies

	Yes	**No**
Is there sufficient supplies for 3 months of :		
RUTF		
F100		
F75		
2nd line drugs		
Is there sufficient woreda level storage for SAM treatment at woreda level?		
Water availability at stabilization center (SC)		
Others		

4.4. Reporting

Is there weekly SAM report? yes _____ No_______ (if yes observe)

4.5. Training

How many HWs have been trained on SAM management in Region/Zone? ______,______%
How many HEWs have been trained in SAM management? Number ______, _____%

MAM Management

4.6. TSFP programme in the woreda

Questions	**Yes**	**No**
Is this a priority 1 woreda?		
Was there a TSFP distribution last month?		
Is there sufficient TSFP supplies for the next 1 month (RUSF, CSB+/oil or CSB++) ?		
Is there woreda level storage of TSFP supplies for at least 2 months of supplies?		
Are children discharged from OTP referred to TSFP		
Is this a pilot (2^{nd} generation) TSFP woreda?		
Has the Woreda been supported by an NGO in the last 3 months?		

4.7. MAM admission

Month	Priority 1 woreda Y/N		Total MAM Cases		Total Number of Food Distribution point in the woreda
	2007 E.C.	2008 E.C.	2007 E.C.	2008 E.C.	
May					
Jun					
Jul					
Aug					
	2008 E.C.	2009 E.C.	2008 E.C.	2009 E.C.	
Sep					
Oct					

4.8. Screening

4.8.1. When was the last screening conducted in the woreda? _____

4.8.2. What screening modality is used in the woredas? EOS _____, CHD _______, Routine___________

4.8.3. Vitamin A coverage ________________ De-worming coverage ________________

4.9. Screening performance for children in the woreda

Month	Target Children 6-59 months	# of screened children	Screening Coverage (%)	# of Children with no odema and MUAC <11 cm			# of children with no oedema and MUAC 11 to 11.9CM	% Proxy GAM for children	% Proxy SAM for children
				#SAM			#MAM		
				MUAC <11 cm	odema	Total			

May 2008									
Jun 2008									
Jul 2008									
Aug 2008									
Sep 2009									
Oct 2009									

4.10. Screening performance for Pregnant and lactating Women (PLW) in the woreda

Month	Target PLW	# of screened PLW	Screening Coverage (%)	# of PLW MUAC below 23.0 cm*	% Proxy GAM for PLW
May 2008					
Jun 2008					
Jul 2008					
Aug 2008					
Sep 2009					
Oct 2009					

* Below 21.0 cm in Tigray up to August

4.11 Any other observations you made or any risks of emergency nutrition?

____

4.12 What were the major challenges in your emergency nutrition response experience?

____

SECTION V: FLOODING

1. Was there flood disaster in the last 6 months in the **Region /Zone**? Yes□ No□

1.1. If yes, How many woredas affected ______________,

1.2. Mention the names of woredas affected with flood ___________________,___________________, ____________________,___________________,___________________,___________________,

1.3. If yes, No of population affected__________

1.4. Human Death due to flooding______ Yes□ No□**,**

1.4.1. If yes how many in number__________

1.5. Are there displaced people due to flooding? Yes□ No□

1.5.1. If Yes , how many____________ PLW

1.5.2. Children <5 yrs_________<2 yrs) ________<6 months ________6-23 months_________

Was there outbreak in the flood affected area Yes□ No□

If yes , Type of outbreak _________________Number of cases _______Deaths ______(specify the time

period)_________
Type of outbreak ________________Number of cases _______Deaths ______(specify the time period)_________
Type of outbreak ________________Number of cases _______Deaths ______(specify the time period)_________
Type of outbreak ________________Number of cases _______Deaths ______(specify the time period)_________
Type of outbreak ________________Number of cases _______Deaths ______(specify the time period)_________

Any comment

____
____
____

Summary: Requirements/Needs/ 2016

Region/Zone	Type of Health and nutrition Emergency	Total estimated Beneficiaries[1]	Required finance

Region	Zone	Woreda at Risk	Type of Risk	At risk Population

Annexes 7.1.15: Rapid Meher assessment- Health and Nutrition Sector: Woreda level Questionnaire

Interviewer name ________________________________ Institution:____________________________

Interview Date: (dd) ____/(mm)________/2016_______ Region:______________________________

Zone:_______________Woreda____________

Main contact at this location: Name:_______________________ Position:__________ Tel:_______________

<table>
<tr><td colspan="5">SECTION I: SOCIO- DEMOGRAPHIC PROFILE</td></tr>
<tr><td rowspan="3">Population: Woreda total population</td><td colspan="2">M:___________F:___________</td><td>Under 5_______</td><td>Total:__________</td></tr>
<tr><td colspan="4">No. of women of reproductive age (age 15-49 yrs.) __________</td></tr>
<tr><td colspan="4">No. of pregnant women :_______________</td></tr>
<tr><td>Special Population (if any)</td><td>Pastorals____</td><td>Refugees____</td><td>IDPs____</td><td>Migrant Workers___</td></tr>
<tr><td colspan="5">Number of HCs_______ Number of HPs_______ Number of Mobile health teams _______Number of HEWs_______</td></tr>
<tr><td>Water availability at health centers (HC)</td><td>No. of health centers ______</td><td colspan="2">No. of HC with water access__________</td><td>No. of HC without water access__________</td></tr>
</table>

SECTION II: HEALTH PROFILE	
2.1. Coordination and management systems	
Is there a PHEM Officer at Woreda Health Office level? How money PHEM officers are there____________________	Yes□ No□
Is there RRT in Woreda health office	Yes□ No□
Are there RRTs at HCs? If yes no. _______	Yes□ No□
Are there PHEM Officers/focal persons at HCs? If yes No. ________	Yes□ No□
Does the Woreda Health Office regularly report PHEM report as scheduled dates? If yes, Observe copies and comment ____	Yes□ No□
Do the health facilities and HEWs regularly report PHEM report as scheduled dates? If yes, Observe copies and comment ____	Yes□ No□
Is there a multi sector Health Emergency/PHEM coordination forum? If yes how frequently meet?______________________	Yes□ No□
Is there a Public Health Emergency preparedness and response plan? Does it include reproductive health? Observe and comment (Observe and comment) ____	Yes□ No□
Is there accessible emergency response fund? If yes , How much is that _________________ If yes, how much allocated and/or by whom allocated______________________,___________________	Yes□ No□
2.2. Morbidity (List top 5 causes of Morbidity) in the year 2008 EC (2015-2016 GC)	

a. Morbidity below 5	b. Morbidity above 5	
1.	1.	
2.	2.	
3.	3.	
4.	4.	
5.	5.	

2.3. List number of cases/deaths from Ginbot 2008 to Tikimt 2008 (May 2016 –October 2016)

Month	AWD				Malaria				Measles				Meningitis				Other (specify)
	Cases		Deaths		Cases		Deaths		Cases		Death		Cases		Death		
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	
May																	
Jun																	
Jul																	
Aug																	
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	
Sep																	
Oct																	

2.4. Outbreak?

Was there any outbreak in the last 3 months? YES________ NO____________

If yes, specify the type of disease

Type of outbreak ________________Number of cases _______Deaths ______(specify the time period)_________

Type of outbreak ________________Number of cases _______Deaths ______(specify the time period)_________

Type of outbreak ________________Number of cases _______Deaths ______(specify the time period)_________

Type of outbreak ________________Number of cases _______Deaths ______(specify the time period)_________

Type of outbreak ________________Number of cases _______Deaths ______(specify the time period)_________

Is there any ongoing outbreak of any disease? YES________ NO____________

Type of outbreak ________________Number of cases _______Deaths ______(specify the time period)_________

Type of outbreak ________________Number of cases _______Deaths ______(specify the time period)_________

Type of outbreak ________________Number of cases _______Deaths ______(specify the time period)_________

2.5. Preparedness: Is there emergency drugs and supplies enough for 1 month? Or easily accessible on need?	**Comments**
Ringer Lactate (to treat AWD cases) Yes□ No□	

ORS (to treat AWD cases): Yes□ No□		
Doxycycline *(to treat AWD cases)*: Yes□ No□		
Consumables : Syringes, Gloves *(for AWD management):* Yes□ No□		
Amoxil susp (measles) Yes□ No□		
Tetracycline ointment (measl es Yes□ No□		
Vit A (measles) Yes□ No□		
Coartem for Malaria Yes□ No□		
Lab supply: RDT for Malaria Yes□ No□		
Lab supply: RDT (pastorex) for M eningitis Yes□ No□ LP set Yes□ No□		
Number of CTC kit available: (for AWD) Yes□ No□		
Are there emergency reproductive health kits in health facilities to provide Basic Emergency Obstetric and New Born Care? (If No, list the missing medicines and supplies)		Yes□ No□
Are there emergency medicines and supplies to support care of rape survivors? (Main shortage (if any): Specify)________________________________		Yes□ No□
Is budget allocated for emergency rapid response by the woreda? How much allocated_______________		Yes□ No□
SECTION III: RISK FACTORS		
Diseases	**Risk factors for epidemics to occur**	
Malaria	Malaria endemic area	Yes□ No□
	Presence of malaria breeding site	Yes□ No□
	Interrupted or potentially interrupting rivers	Yes□ No□
	Unprotected irrigation in the area	Yes□ No□
	LLINs coverage No_________%_____________	
	Indicate the coverage of IRS 2008. No_________%_____________	
	Was there any prevention and control activities. No_________%_____________	
	Number of malarious kebeles and total population in these Kebeles	Keb_____ Pop_____
Meningitis	Was there Meningitis epidemic in the last 3 years (If yes specify date) If yes, No_________%_____________	Yes□ No□
	Has vaccination been conducted in the past 3 years If yes, No_____________%_____________	Yes□ No□
	If yes : Indicate the date and number of people vaccinated Date ____________________No_________%_____________	
AWD	Was there AWD epidemic in the last three years (If yes specify date)	Yes□ No□
	Latrine coverage No_________%_____________	
	Latrine utilization No_________%_____________	
	Safe water coverage No_________%_____________	

Measles	Is there ongoing measles outbreak	Yes□ No□
	What is the measles vaccination coverage of 2008, less than one year No_____%_____	
	Has SIA been conducted in 2008 EFY	Yes□ No□
	If yes, Indicate the month and number of children vaccinated including the age group Month-------------- Number--------------- Age group-------------, coverage (%)------- -___	

Any other observations you made or any risks of epidemics?

What were the major challenges in your Epidemic response experience?

SECTION IV: NUTRITION– SAM and MAM Management in the woreda – May to October 2016
SAM Management
4.1. Facilities with SAM management in the woreda

Month	Total Number of Health centers/ hospitals	Total Number of Health posts	Number of SC.	% of health centers/ hospitals with a SC.	Number of OTP.	% of health posts with an OTP	Total Number of OTP/SC reported	% of OTP/SC who have reported
May								
Jun								
Jul								
Aug								
Sep								
Oct								

4.2 Admission and performance of the therapeutic feeding program for SAM management

Month	Total SAM Cases		% of SAM children cured		% of SAM children defaulted		% of SAM children died		% of SAM children non-respondent		% of SAM children other	
	2007 E.C.	2008 E.C.	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
May												
Jun												
Jul												
Aug												
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009
Sep												
Oct												

4.3. Availability of therapeutic supplies

	Yes	**No**
Is there sufficient supplies for 3 months of :		
RUTF		
F100		
F75		
2nd line drugs		
Is there sufficient woreda level storage for SAM treatment at woreda level?		
water availability at stabilization center (SC)		

4.4. Reporting
Is there weekly SAM report? yes _____ No_______ (if yes observe)

4.5. Training

How many HWs have been trained on SAM management in the Woreda? ______
How many HEWs are there in the woreda? No______, _____%
How many HEWs have been trained in MAM management? No ______, _____

4.6. MAM Management

TSFP programme in the woreda

Questions	Yes	No
Is this a priority 1 woreda?		
Was there a TSFP distribution last month?		
Is there sufficient TSFP supplies for the next 1 month (RUSF, CSB+/oil or CSB++) ?		
Is there woreda level storage of TSFP supplies for at least 2 months of supplies?		
Are children discharged from OTP referred to TSFP		
Is this a pilot (2nd generation) TSFP woreda?		
Has the Woreda been supported by an NGO in the last 3 months?		

4.7. MAM admission

Month	Priority 1 woreda Yes□ No□ I don't Know□		Total MAM Cases		Total Number of Food Distribution point in the woreda
	2007 E.C.	2008 E.C.	2007 E.C.	2008 E.C.	
May					
Jun					
Jul					
Aug					
	2008	2009	2008	2009	
Sep					
Oct					

4.8. Screening

When was the last screening conducted in the woreda? _____
What screening modality is used in the woredas? EOS _____, CHD ____, Routine____, vitamin A and
Screening coverage ________________ Vitamin A coverage De-worming coverage ______

4.9. Screening performance for children in the woreda

Month	Target Children 6-59 months	# of screened children	Screening Coverage (%)	# of Children with no oedema and MUAC <11 cm	# of children with no oedema and MUAC 11 to 11.9CM	% Proxy GAM for children	% Proxy SAM for children
				#SAM	#MAM		

				MUAC <11 cm	odema	Total			
May									
Jun									
Jul									
Aug									
Sep									
Oct									

4.10. Screening performance for Pregnant and lactating Women (PLW) in the woreda

Month	Target PLW	# of screened PLW	Screening Coverage (%)	# of PLW MUAC below 23.0 cm*	% Proxy GAM for PLW
May 2008					
Jun 2008					
Jul 2008					
Aug 2008					
Sep 2009					
Oct 2009					

* Below 21.0 cm in Tigray

4.11 Any other observations you made or any risks of emergency nutrition?

____

4.12 What were the major challenges in your emergency nutrition response experience?

____

SECTION V: FLOODING

4.1. Was there flood disaster in the last 6 months in the **Region /Zone**? Yes□ No□

4.1.1. If yes, how many Kebeles affected _____________,

4.1.2. Names of kebeles _____________,_______________,_______________,_________________

4.1.3. Population affected_________

4.1.4. Human death due to flooding Yes□ No□,

4.1.5. If yes how many in number_________

4.1.6 Are there displaced people due to flooding? Yes□ No□

4.1.7. If Yes , how many PLW___________

4.1.8 Children<5yrs________________<2 yrs ________ <6months________ 6-23 months _________

4.1.9. Was there outbreak in the flood affected area Yes□ No□

Any comments on flooding

____

Annexes 8.1.16: Implementation period of the project, Limmu Seka Woreda, Oromia, Ethiopia, 2017 G.C

S.No	Activities	Tentative Schedule				
		17-Aug	17-Sep	17-Oct	Nov-17	Dec-17
1	Translate consent Form and Questionnaires to Local Language (Afan Oromo)					
2	Obtain ethical Clearance from AAU, ORHB and others administrative					
3	Select data collectors and field supervisors					
4	Conduct training for data collectors and Field supervisors					
5	Pre-test of the questionnaires					
6	Data Collection					
7	Data Cleaning and entery					
8	Data analysis					
9	Report writing					
10	Report dissemination					

Annexes 8.1.17: Budget breakdown for research project, Limmu Seka, Jimma Zone, Oromia, 2017

S.N	Activities	Measurement	Quantity	Unit Cost (ETB)	Total Cost (ETB)
	Stationery				
1	Duplication paper	Pack	15	10	1500
2	Duplication of formats	Page	4500	1	4500
3	Pen	Each	40	5	200
4	Pencil	Each	20	2	40
5	Sharper	Each	20	15	300
6	Binder	Each	30	50	1,500
7	Flip Chart	Each	4	100	400
8	Marker	Each	24	10.5	252
	Training cost				
9	Principal investigator	Day	2	500	1000
10	Supervisor	Day	2	300	600
11	Data collectors (10)	Day	2	210	2,100
12	Data clerk	Day	2	210	420
	Transportation cost				
13	Car rent (1)	Day	15	1500	22,500
14	Fuel	Litre	450	20	9,000
	Perdium cost				
15	Principal investigator	Day	15	500	7,500
16	Supervisor	Day	12	300	3,600
17	Data collectors (10)	Day	8	210	16800
18	Data clerk	Day	10	210	2,100
	Total				**74,312**
	Contingency (5%)				**3715.6**
	Grand total				**78,028**

Annexes 8.1.18: Questionnaire for Assessment of prevalence and contributing Factors for low Childhood Vaccination coverage, Limmu Seka, Jimma, Oromia.

I. Socio- demography of caretaker and identifying information of children

1. Name of child/children 1.1 ___________________________________
   1.2 ___________________________________
   1.3 ___________________________________
   1.4 ____________________________________
   1.5 _____________________________________

2. Sex of children 2.1 Male Female
   2.2 Male Female
   2.3 Male Female

3. Birth Date of Children (E.C) 1. _____//___//_______ (D/ M/ Y)
   2. _____//___//_______ (D/ M/ Y)
   3. _____//___//_______ (D/ M/ Y)
   4. Don't Know

4. Birth Order of the Children 1. 1st, 2nd, 3rd (if other, specify _______)
   2. 1st, 2nd, 3rd (if other, specify _______)
   3. 1st, 2nd, 3rd (if other, specify _______)

5. Who is Primary caretaker for children?
   A. Mother
   B. Father
   C. Brother
   D. Sister
   E. Other relative
   F. Other specify

6. Age of the Primary caretaker 1. ___ years
   2. Don't know

7. Religion of the primary caretaker 1. Orthodox
   2. Muslim

3. Protestant
4. Catholic
5. Wakefata
6. Other

8. Occupation of the primary caretaker — 1. Farmer 5. Daily Labour 2. Pastoralist 6. House Wife 3. Agro-pastoralist 7. Student 4. Merchant 8. If other, specify

9. Educational status of the primary caretaker — 1. Illiterate 2. Read and Write 3. Primary 4. Secondary and Above 5. If other, specify

10. Family monthly income in ETB ______________________________

II. Child Immunization history

1. Is there vaccination card or family folder? 1. Yes / No
   2. Yes / NO
   3. Yes / No

1.1 If Yes observe the card

1.2 If No, did you ever received a card? 1. Yes 2. No 3. Don't remember

2. Fill the following vaccination history based on data recorded on the card or family planning **(ONLY** from card or family folder**)** — Date of Immunization (E.C) Day/Month/Year

	Child 1	Child 2	**Child 3**
1. Date of Birth as recorded	__ /__/____	__ /__/____	__ /__/____

__/__/____ __/__/____ __/__/____

2. BCG

__/__/____ __/__/____ __/__/____

3. Polio at Birth

__/__/____ __/__/____ __/__/____

4. OPV 1

__/__/____ __/__/____ __/__/____

5. OPV 2

__/__/____ __/__/____ __/__/____

6. OPV 3

__/__/____ __/__/____ __/__/____

7. Penta 1

__/__/____ __/__/____ __/__/____

8. Penta 2

__/__/____ __/__/____ __/__/____

9. Penta 3

__/__/____ __/__/____ __/__/____

10. PCV 1

__/__/____ __/__/____ __/__/____

11. PCV 2

12. PCV 3	__/__/____	__/__/____	__/__/____
13. Rota Virus 1	__/__/____	__/__/____	__/__/____
14. Rota Virus 2	__/__/____	__/__/____	__/__/____
15. Vitamin A	__/__/____	__/__/____	__/__/____

	Child 1	Child 2	Child 3
3. Number of doses received by the child those did not recorded (during routine Immunization or Campaign)	Penta __ PCV___ Rota___ Meas.__ Vit. A___	Penta __ PCV___ Rota___ Meas.__ Vit. A___	Penta __ PCV___ Rota___ Meas.___ Vit. A___

The following questions refer to your experience getting immunization services for this child during the past two years

2. Have you ever been at health facility for any purpose rather than vaccination? Yes/No/Don't know
3. How long time will take to the nearest health facility? ___________________

4. Sometimes vaccinations are given for children when they go to health facility for other purposes rather than vaccination. Have your children ever vaccinated in this situation so far?

   Yes/ No
5. Have you ever decided **NOT** to take your children to get vaccination? Yes/No
6. If yes, why did you not to take the child to vaccination? ________________________-
7. Was there any child you taken to a health facility for vaccination but not vaccinated then? Yes/No
8. If yes, why was the child not vaccinated? ______________________________-
9. Have you ever refused vaccination for this child? Yes/No
10. If you refused then, why? _______________________________

Assess awareness about vaccine

1. Do you think vaccinating your children is important to prevent diseases? Yes/No
2. Which round vaccination is important to prevent measles infection? ________________
3. From where have ever heard message about vaccination? ______________________
4. What messages have you heard about immunizations? ____.
5. When your child is sick, where would you take the child? _______________________
6. Usually, where do you prefer more to take your child when they sick? _______________

Assessment on maternal health care practice

1. Do you ever see anyone for pregnancy care during your pregnancy? Yes/No
2. Were you offered tetanus vaccination during the visit? (injection in the left upper arm) _________________________
3. Where did you deliver your last child? _____________________________
4. Who attend the delivery of your last child? _____________________________

Annexes 9.1.19: Action points developed by the team after conducting assessment in Abaya Woreda, Borena Zone, Oromia Region, June 2016.

Action plan to mitigate the epidemic in Abaya and Case build up in Gelana Woredas			
Thematic Areas	**Activities**	**Timeline**	**Focal Person(s)**
Federal and Regional Levels			
Program Management	Strengthen coordination and communication among FMOH, ORHB, PFSA and ZHD	Continuous	Dr. Kebede Etana (FMOH) Cellphone: 0911246874 Ato Tekola Workneh (ORHB) Phone: 0915746613
	Follow up allocation of budget for epidemic preparedness and response and IRS operational cost by WoHOs	Sine 01-30/2008 EFY	Ato Tekola Workneh (ORHB) Phone: 0915746613 Tarekegn Dissasa (ORHB-PHEM) Phone: 0921089479
	Use meteorological data to forecast the malaria situation and give early warning to Borena zone that may be affected by climate change	Continuous	Dr. Kebede Etana (FMOH) Cellphone: 0911246874 Tarekegn Dissasa (ORHB-PHEM) Phone: 0921089479
	Mobilize resource for supervision from Woreda and HC to HP and community	Continuous	FMOH, ORHB, ACIPH, UNICEF
Vector Control	Deliver 12,000 LLINs to fill the gap in Abaya and follow up the distribution to HHs	Ginbot 29-Sine 15/2008	Dr. Kebede Etana (FMOH) Cellphone: 0911246874 Tesfaye Asefa (ORHB) Phone: 0934431202
	Supply abate chemical and follow up the distribution	Meskerem 01-30/2009	Dr. Kebede Etana (FMOH) Cellphone: 0911246874 Ato Tekola Workneh (ORHB) Phone: 0915746613
	Monitor the implementation of environmental management activities	Continuous	Ato Tekola Workneh (ORHB) Phone: 0915746613
Case Management	Immediate supply of RDT, Chloroquine and ACT (6x1 and 6x2)	Ginbot 29-Sine 15/2008	Dr. Kebede Etana (FMOH) Cellphone: 0911246874 Tesfaye Asefa (ORHB) Phone: 0934431202 Meseret Aseffa (UNICEF) 0923052338
	Follow up of Printing and distribute of HP monthly Report and Resupply Form (RRF) to health facilities/Health posts	Ginbot 29-Sene 30/200	Dr. Kebede Etana (FMOH) Cellphone: 0911246874 Tarekegn Dissasa (ORHB-PHEM) Phone: 0921089479
Surveillance and M&E	Print and distribute Malaria EMC to region/zone	Sene 01-Sene 15/2008	Ashetu Hunduma (ACIPH) 0912768344 Tesfaye Asefa (ORHB) Phone: 0934431202
	Monitor data completeness and timeliness and give feedback to zones/woredas	Continuous	Tarekegn Dissasa (ORHB-PHEM) Phone: 0921089479
	Follow up of printing and distribution of PHEM weekly reporting format for Tore HC and Health posts in Abaya	Ginbot 29-Sene 30/2008	Dr. Kebede Etana (FMOH) Cellphone: 0911246874 Tarekegn Dissasa (ORHB-PHEM) Phone: 0921089479

Declaration

I, the undersigned, declare that, this my original work and never been presented by another person in this or any other university and that all the source material and reference materials used for this thesis have been acknowledged.

Name: **Tarekegn Disasa Gutema**

Signature: ---

Date: --

Date of submission: ----------------------------------

The thesis has been submitted for examination with my approval as a university advisor.

Name of Advisor 1: **Dr. Ayele Belachew**

Signature: -----------------------------

Date: -----------------------------------

Name of Advisor 2: **Mr. Dagnachew Alemu Hurissa**

Signature: ---------------------------------------

Date: ---