Addis Ababa University, College of Health Sciences, School of Public Health, Ethiopia Field Epidemiology Training Program (EFETP).

Compiled body of work in Field Epidemiology

By: - Mugzer Asnake (BSc)

Submitted to School of Graduate Studies of Addis Ababa University in Partial fulfillment for the degree of master of Public Health in field Epidemiology

June, 2017

Addis Ababa

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Advisors

Ms. Abigiya Wondimagegnehu (BSc,MPH)

Mr. Dagnachew Alemu (BSc,MPH)

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Approved by Examining Board

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Chair man, School Graduate Committee

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Advisor

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Examiner

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LIST OF ACRONYMS AND ABBREVIATIONS

AAU-Addis Ababa University

AIDS-Acquired Immune Deficiency Syndrome

ANC-Antenatal Care

API- Annual Parasite Index

AR-Attributable Risk

ART-Anti Retroviral Therapy

ASAR-Age Specific Attack Rate

AWD-Acute Watery Diarrhea

BCG- Bacilium Calmette Guerin

CBN-Community Based Nutrition

CDC-Center for Disease Prevention and Control

CDR-Crude Death Rate

CFR-Case Fatality Rate

CI-Confidence Interval

CTC-Case Treatment Center

DRMC-Disaster Risk Management Commission

DTP-Diphtheria-Teatnus-Pertussis

ECDPC-European Center for Disease Prevention and Control

EC-Ethiopian Calendar

EFETP-Ethiopian Field Epidemiology Training Program

ELISA-Enzyme Linked Immunosorbent Assay

EOS-Enhanced Outreach Strategy

EPHA-Ethiopian Public Health Association

EPHI-Ethiopian Public Health Institute

EPI-Expanded Program on Immunization

EPTB-Extra Pulmonary Tuberculosis

ETB-Ethiopian Birr

EU-European Union

FMOH-Federal Ministry of Health

GOE-Government of Ethiopia

HC-Health Center

HDA-Health Development Army

HEP-Health Extension Programme

HEWs-Health Extension Workers

HHs-House Holds

HIT-Health Information Technology

HIV-Human Immune Deficiency Virus

HMIS-Health Management Information System

HP-Health Post

HSDP - Health Sector Development Plan

HSTP-Health Sector Transformational Plan

IDSR-Integrated Disease Surveillance Report and Response

IgM- Immunoglobulin M

IMR-Infant Mortality Rate

IRS-Indoor Residual Spray

ITNs-Insecticide Treated Nets

KM-Kilo Meter

LLINs-Long Lasting Insecticidal Nets

MAM-Moderate Acute Malnutrition

MDG-Millennium Development Goal

MDSR-Maternal Death Surveillance Report

MIS-Malaria Indicator Survey

MMR-Maternal Mortality Ratio

MOW-Ministry of Water and Natural Resources

MUAC-Middle Upper Arm Circumference

NA-Not Applicable

NGO-Non-Governmental Organization

OPV-Oral Polio Vaccine

ORHB-Oromia Regional Health Bureau

OR-Odds Ratio

ORS-Oral Rehydrating Salt

OTP- Outpatient Therapeutic Program

OVC-Orphan and Vulnerable Children

PAB-Protected at Birth

PCV-Pneumococcal Conjugative Vaccine

PF-Plasmodium Falciparum

PHCU-Primary Health Care Unit

PHEM-Public Health Emergency Management

PICT-Provider Initiated Counseling and Testing

PLHA-People Living HIV/AIDS

PSNP- Productive Safety Net Program

PV-Plasmodium Vivax

RDT-Rapid Diagnostic Test

RHB-Regional Health Bureau

RRT-Rapid Response Team

RUTF-Ready to Use Therapeutic Food

RV-Rota Virus

SAM-Severe Acute Malnutrition

SC- Stabilization Center

SIAs-Supplementary Immunization Activities

SNNPR-Southern Nations Nationality and Peoples Region

TB- Tuberculosis

TSF-Targeted Supplementary Food

TTI-Teacher Training Institute

TVET-Technical and Vocational Education Training

UFMR-Under Five Mortality Rate

UNICEF- United Nation Children's Fund

VCT-Volunteer Counseling and Testing

WASH-Water Sanitation and Hygiene

WFP-World Food Program

WHO-World Health Organization

EXECUTIVE SUMMERY

This document contains a two year output of Field Epidemiology Training Program that to be submitted to the school of graduate studies of Addis Ababa University Partial fulfillment for the degree of master of Public Health in field Epidemiology.

The majority of the program (75%) contains field works that known as residency. This document includes the two year outputs including diseases outbreak investigations, surveillance data analysis, surveillance system evaluation, narrative summary of disaster situation report, manuscripts, abstracts and proposal for epidemiologic research project. The two years activities are summarized in to nine chapters.

Chapter One: We conducted two epidemiological investigations of two outbreaks. I conduct two outbreak investigations as principal and one out break as co-investigator.Both were investigated using case control study design based the outbreak investigation format (Abstract, background, methods and materials, results, and discussion). The first outbreak investigation was about measles outbreak in Wadera Woreda, Guji Zone, Oromia, Ethiopia in December 2016. The main factors contributing to this outbreak was the accumulation of large numbers of susceptible children over time in the Woreda.

We recommend the Ministry of health, Regional health Bureau and Zonal health department to use the second opportunity of SIAs and have conducted a catch up and several follow up campaigns to increase measles immunity by keeping data records at all levels. The second is Rota Virus outbreak investigation in Nono wopreda of West Shoa Zone,Oromia February 2017.being vaccinated, being breast feed and having knowledge of exclusive breast feeding has a protective factor for developing the disease while contact history with similar complaints was a risk factor.

Children less than five years of age were the most affected groups. The main cause of this outbreak was low vaccination coverage of Rota.

We recommend the Woreda health Office, Health Center and health post at kebele level actively strengthen the immunization activities both at statics and outreach based.

Chapter two: We used descriptive cross-sectional study design used Microsoft Excel to analyze the collected data.

In the last five consecutive years 130,666 total case of malaria were diagnosed. Among these 41,125(31.5%) of the cases were diagnosed clinically and the rest 89,444(68.5%) confirmed.

From the total confirmed malaria cases 18,376(78.9%), 4,358(18.7%) and 560(2.4%) of them were Plasmodium *PF, PV* and mixed of *PF* and *PV* respectively.

The number of deaths seems unrelated to the number of cases in each reporting year, which has an average of six deaths in each reporting year of the study.

Missing data value like malaria admissions by age and sex is the limitations identified.

Analysis of malaria by person, place and time should be strengthened and the data reported through PHEM could be able to have age and sex characteristics

Chapter three: Descriptive cross-sectional study was conducted in East Shoa Zone, Oromia region from October to November 2016. Zonal health office, 5 woredas, 10 health centers, 10 health posts and one Hospital were included in the study.

Standard case definitions for all prioritized diseases are available at Zonal, Hospital, 8 (80%) health centers and 7(70%) Health Posts in the zone. At zonal level, the Public Health emergency management officers analyze surveillance data by time, person and place and send its feedback to the lower level in quarterly bases but not at Woreda and health facility level. During the past six months, East Shoa zonal department were not conduct supportive supervision because of time constraints and security issues in the region.

Analysis of Surveillance data on time, place and person should be strengthening at all levels for prioritized diseases and Supportive Supervision also undertaken in routinely bases.

Chapter four: We collected, analyzed and interpreted all required health and health related data from 03 -19/06/2008 E.C. of Wolmera Woreda.

We conducted descriptive cross sectional study design using standardized checklist. We reviewed available hard and softcopies to generate different data.

The Woreda had a coverage of Pentavalent 3, PCV3 and Measles 64.2%, 63.9% and 58.8.% respectively. Compared to the national the Woreda achieved very low immunization coverage due to Low Community awareness and low health coverage. Those Pregnant mothers who should gave their birth at health facility was only 17% and those that attend at least once for Antenatal Care in Health Facility accounts only 76.3% of eligible mothers and focused Antenatal Care of the Woreda was only 28%.

Incomplete and inconsistency of some data (Latrine utilization, average income per year, yield agricultural product) is some of the limitations.

Chapter Five: contains manuscript for peer reviewed journal on Rota virus outbreak in Nono Woreda of West Shoa zone.

Chapter Six:-Two abstracts on measles outbreak investigation and Rota Virus outbreak investigation are included in the.

Chapter Seven: indicates about the disaster narrative situation of the meher assessment of three Zones of Oromia Region. Health and health related like outbreaks, nutrition, Water, Sanitation and Hygiene as well as preparedness of the Zone was documented.

Chapter Eight: one protocols/proposal for epidemiologic project was included. These protocols were about assessment of factors affecting the measles infection outbreak in Wadera Woreda of Guji Zone.

Chapter Nine: This chapter includes reports of additional works done during residency.AWD outbreak response activities done in Oromia region and some of epidemiologic Bulletin done was included.

Chapter –I Outbreak Investigation

1.1 Measles outbreak investigation in Wadera Woreda of Guji Zone, Oromia December 2016

EXECUTIVE SUMMARY

Introduction: Measles is a leading cause of childhood morbidity and mortality worldwide. An estimated 164,000 people died globally from measles in 2008 mostly children under the age of five.

In Ethiopia, the expected case-fatality rate is between 3% and 6%; the highest case-fatality rate occurs in infants 6 to 11 months of age, with malnourished infants at greatest risk.

The main aim of this outbreak investigation was to assess the magnitude and risk factor of measles infection in Wadera Woreda of Guji zone, Oromia Region, from 04-19/12/2016.

Method: Descriptive cross-sectional followed by case-control study design was used to identify the risk factors. Unmatched case-control sample size determination with a ratio of 1:2 for cases and controls.

Result: A total of 393 cases were reported. Six samples were taken and four of them were positive for measles. The Index case was female aged 20 years who was not vaccinated. We detected a period prevalence of 5.93/1000. In the variable analysis having previous measles infection and being vaccinated with measles vaccine has a protective factor with AOR=0.36,95%CI:0.16-0.76,P.value 0.008 and AOR;0.41,95%CI:0.17-0.97,P.value 0.043 respectively. while being under five years old and having contact history with measles cases are a risk factor for developing measles infection with AOR;2.83,95%CI(1.25-6.43),P. value 0.013 and AOR;6.75,95%CI(2.69-16.94),p. value < 0.0001 respectively.

Discussion: Periodic measles outbreaks occur when a large number of susceptible accumulate in a community. Susceptible accumulate through time even in the setting of high routine measles vaccination coverage.

Conclusion: The main factors contributing to this outbreak was the accumulation of large numbers of susceptible children over time in the Woreda..

Recommendation: Ministry of health, Regional health Bureau and Zonal health department to use the second opportunity of Supplementary Immunization Activities and have conducted a catch up and several follow up campaigns to increase measles immunity by keeping data records at all levels.

1.1.1. INTRODUCTION

Measles is an acute, highly contagious viral disease caused by measles virus. This highly contagious virus is transmitted primarily by respiratory droplets or airborne spray to mucous membranes in the upper respiratory tract or the conjunctiva(1). Measles is a leading cause of childhood morbidity and mortality worldwide. Despite the remarkable progress made in the control of the disease, measles continues to claim the lives of large numbers of children every year. The majority of these deaths occur in the world's poorest countries; particularly, in sub-Saharan Africa, where a combination of factors such as overcrowding, exposure at a younger age and malnutrition contribute substantially to higher case fatality rates(2).An estimated 164,000 people died globally from measles in 2008 mostly children under the age of five. Measles is a human disease and is not known to occur in animals(2).

The risk factors for measles virus infection include: infants who lose passive antibody before the age of routine immunization, children with vitamin A deficiency and immunodeficiency due to Human immune Deficiency Virus (HIV) or Acquired Immune Deficiency Syndrome (AIDS), leukemia, alkylating agents, or corticosteroid therapy, regardless of immunization status and children who travel to areas where measles is endemic or contact with travelers to endemic areas. Malnourished and young children are at higher risk of developing complications and mortality from measles infection(1).

The incubation period is approximately 10–12 days from exposure to the onset of fever and other nonspecific symptoms and 14 days (with a range of 7–18 days), from exposure to the onset of rash. Measles can be transmitted from four days before rash onset (i.e., one to two days before fever onset) to four days after rash onset. Infectivity is greatest three days before rash onset. Measles is highly contagious. Secondary attack rates among susceptible household contacts have been reported to be 75%– 90%. Due to the high transmission efficiency of measles, outbreaks have been reported in populations where only 3% to 7% of the individuals were susceptible. Whereas vaccination can result in respiratory excretion of the attenuated measles virus, person-to-person transmission has never been shown.(1)

The first sign of measles is usually a high fever, which begins about 10 to 12 days after exposure to the virus, and lasts 4 to 7 days. The incubation period ranges from 7 to 18 days but on average lasts for 14days. In the prodromal phase high grade cough, Runny nose (Coryza) and red eye (conjunctivitis) occur2 to 4 days after the onset of the prodromal symptoms a red, blotch (macula

popular) rash occurs, usually starting on the face and upper neck. Over about three days, the rash spreads, eventually reaching the hands and feet. The rash lasts for five to six days, and then fades in the order of appearance(2).

In developing countries, up to 75% of cases may have one or more complications. These include pneumonia, diarrhea, otitismedia, laryngo-tracheo-bronchitis (croup) or encephalitis. The 3 major causes of high case fatality are pneumonia, diarrhea and croup. Measles can lead to lifelong disabilities including blindness, brain damage and deafness. Low Vitamin A status is associated with a higher rate of complications and death from measles(3).

In Ethiopia, the expected case-fatality rate is between 3% and 6%; the highest case-fatality rate occurs in infants 6 to 11 months of age, with malnourished infants at greatest risk. These rates may underestimate the true lethality of measles because of incomplete reporting of outcomes of measles illness. In certain high-risk populations, case-fatality rates as high as 30% have been reported in infants aged less than 1 year of age(1).

In WHO Africa Regions, the only effective preventive measure is vaccination with two doses of measles-containing vaccine, usually administered as a measles-mumps-rubella (MMR) vaccine.

National vaccine uptake of at least 95% with two doses of MMR vaccine is considered to be necessary to achieve region-wide (4). However, a vaccination uptake of below 95% of the population in several European Union (EU) Member States has resulted in an accumulation of susceptible individuals. Thus measles has re-emerged in the region that resulted in an outbreak in sub-groups of populations with low vaccine uptake and then spread to the general population(3).

In Ethiopia, measles is a common cause of morbidity and mortality in children; this demonstrates the need for achieving high quality immunization coverage. The immunization strategy is to provide two opportunities for vaccination, one through the routine activities at 9 months, which reached 92% of under one year old children in 2015 (JRF 2015, Preliminary) and the second dose through scheduled preventive Supplementary Immunization Activities (SIAs). However, due to the low coverage and prevailing poor living conditions, measles outbreaks continue to occur frequently in different parts of the country(2).

After the report of the measles outbreak from Wadera Woreda of Guji Zone, team was deployed for investigation. The main aim of this outbreak investigation was to assess the magnitude and risk factor of measles infection in Wadera Woreda of Guji zone, Oromia Region, from 04/12/-19/12/2016 and make recommendations of the future.

1.1.2. OBJECTIVES

1.1.2.1. GENERAL OBJECTIVES

- To assess the magnitude and risk factor of measles infection in Wadera Woreda of Guji Zone, Oromia Region, December 2016.

1.1.2.2. SPECIFIC OBJECTIVES

- To confirm and determine the extent of measles outbreak
- To describe the magnitude of measles infection
- To determine the risk factors for the measles infection
- To recommend appropriate intervention measures against measles disease transmission and prevent future recurrence.

1.1.3. METHODS

1.1.3.1. Study Area and Period

Wadera Woreda is one of the 13 Woredas of Guji Zone, Oromia Regional state. Administratively the Woreda is divided in to 19 rural kebels and one town. The Woreda has a total population of 66,288(32,481 male and 33,807 female). It is located at a distance of 90 K.M from the Zonal town (Negele) and 520K.M from regional town (Addis Ababa).

The woreda shares boundaries with Girja Woreda of Guji Zone to the north, Gorodola Woreda of Guji Zone to south, Sabba Boru Woreda of Guji Zone to the east and Adola Rede Woreda of Guji Zone to the west. The ethnic compositions of the Woreda are 89% Oromo, 8% Amhara and 3% others. Concerning religious composition, 47% Muslim, 51% Christian & the rest 2% are followers of other religions.The study was conducted from 04/12/-19/12/2016 .

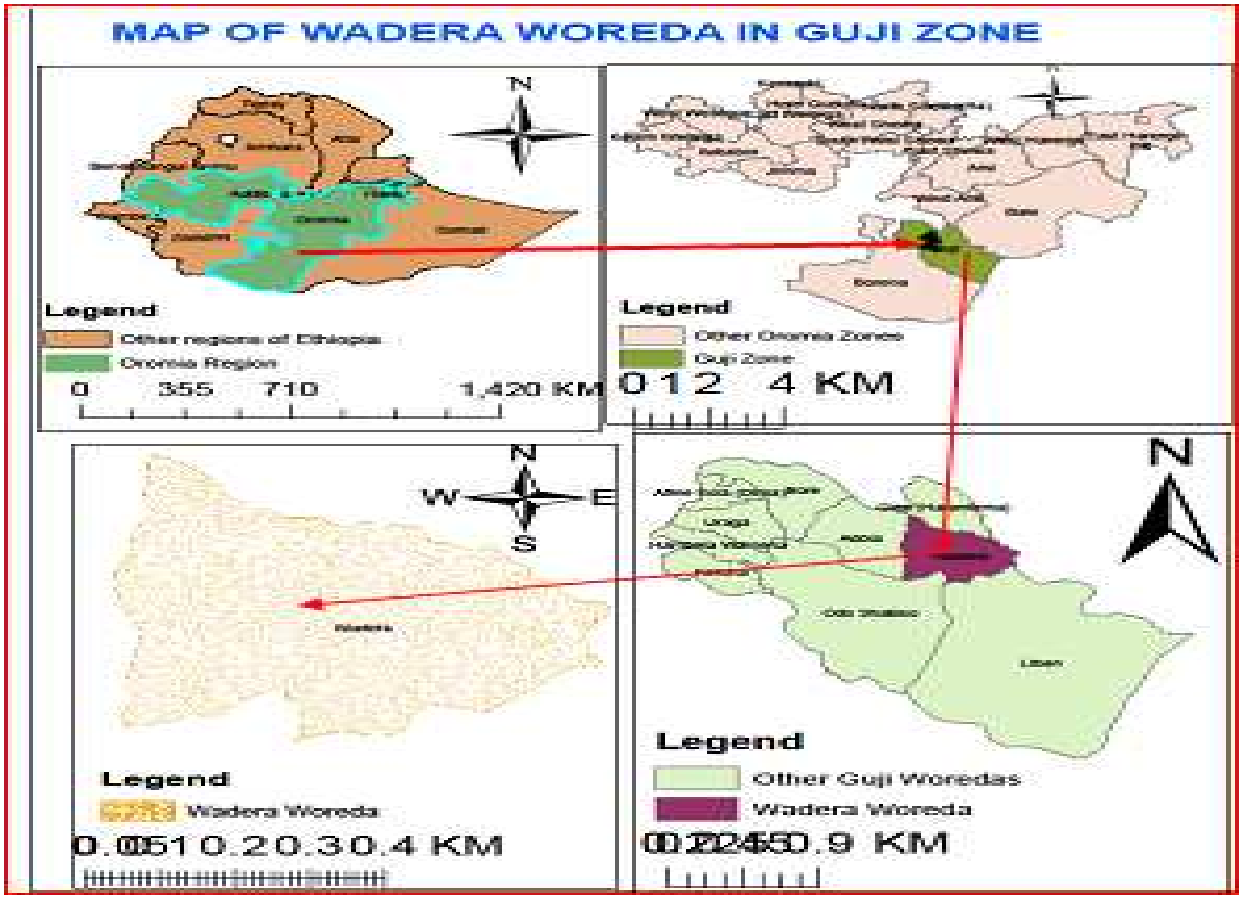

Figure 1.1.1:-Map of measles affected kebeles of Wadera Woreda, Guji Zone, Oromia, December 2016.

1.1.3.2. Case Definition

1.1.3.2.1. Measles suspected cases at community level:

A community member should report any person with ***rash*** and ***fever*** to a health worker and also advise the person to go to a health facility.

1.1.3.2.2 Suspected measles case:

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

1.1.3.2.3. Confirmed measles case:

A suspected case with laboratory confirmation (positive IgM antibody) or epidemiologically linked to confirmed cases in an outbreak.

1.1.3.2.3. 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.

1.1.3.2.4. 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.

1.1.3.3. Inclusion criteria

Cases: Any residents of Wadera Woreda who had symptoms of measles

Controls: Any resident of Wadera Woreda who was a neighbor to a case and who did not develop signs and symptoms of measles was included.

1.1.3.4. Exclusion criteria

Cases: Those who are unconscious were excluded

Controls: Those who are family member from the same household.

1.1.3.5. Study design

We used descriptive cross-sectional and case-control study design to identify the risk factors for the occurrence of measles infection.

1.1.3.6. Sampling Method

The cases were selected by Simple Random Sampling (SRS) by using line list as the sampling frame and controls were selected from neighbors.

1.1.3.7 Sample Size

We used unmatched case-control sample size determination with a ratio of 1:2 for cases and controls.

The assumption taken from previous study indicates that, proportion of controls exposed was 10% with an OR of 3.5 and a power of 80% were used to calculate the sample size using the epi info 7 stat cal-sample sizes and power formula and we found a total of 182 samples of which 61 were cases and 121 controls (Fleiss w/CC column).

1.1.3.8. Data Collection Tools and Procedure

Prior to conducting the investigation, structured questionnaire which include characteristics or variables for investigating measles outbreak in the Woreda were developed .A questionnaire specifically designed for the case control part of the study was completed during an interview. The interview was conducted in the local language and with the subjects' parents, mostly mothers, present. The principal investigator, Woreda PHEM focal person and nurses from health centers were participated in data collection.

1.1.3.9. Variable Specification

1.1.3.9.1 Dependent Variable

- Measles Infection

1.1.3.9.2. Independent Variable

- Measles vaccination status
- Over-crowding
- Travel history
- Contact history
- Awareness on mode of transmission of measles infection
- Awareness on prevention/control of measles infection
- Nutritional status

1.1.3.10. Data Entry and analysis

Data entry template was designed in Epi-Info version 7.3.1. Data entry and cleaning was also done by principal investigator. Then, the data analysis was done using Epi Info 7.3.1 and Microsoft Excel and presented using descriptive statistical methods; with frequency distribution tables, percentages and graphs.

1.1.3.11. Ethical Consideration

The Woreda health office has accepted for the investigation of measles outbreak through the formal letter of Oromia Regional Health Bureau (ORHB). All the respondents as well as the parents were well informed about the objectives of study and we got oral consent from them.

1.1.4. RESULTS

1.1.4.1. Descriptive Analysis

A total of 393 cases were reported by both passive and active case search surveillance approach in Wadera Woreda from 23 October 2016 to 31 December 2016. From the total cases 41(10.4%) of the cases were reported from the nearby kebeles (Deka Kela,Erba Muda and Kelada)of the surrounding Woreda. To confirm these out-break six samples were taken to Ethiopian Public Health Institute (EPHI) and performed. Among the samples taken, four were confirmed measles cases.The Index case was female aged 20 years who was not vaccinated against measles from Heba Hida kebele of Wadera Woreda. A week before the onset of rash 15 October 2016, the child had travelled to Kerjul Kebele, Mada Walabu Woreda of Bale Zone for market and had contact with infected child. The zonal health department notifies the outbreak on 11/19/2016 after 27 days that was not timely.

1.1.4.1.1Description of Measles Cases by Time

At the time of the outbreak investigation, the duration of the outbreak reaches one month and seven days. The epidemic curve showed that propagated (person-to-person) type of an outbreak which had multiple peaks of onset of rash which lasted from 23 October to 31 December 2016.

The outbreak starts during the WHO Epidemiologic week 43.The highest peak of the outbreak was during the WHO epidemiologic week of 47 followed by week 50(Fig1.1.3).

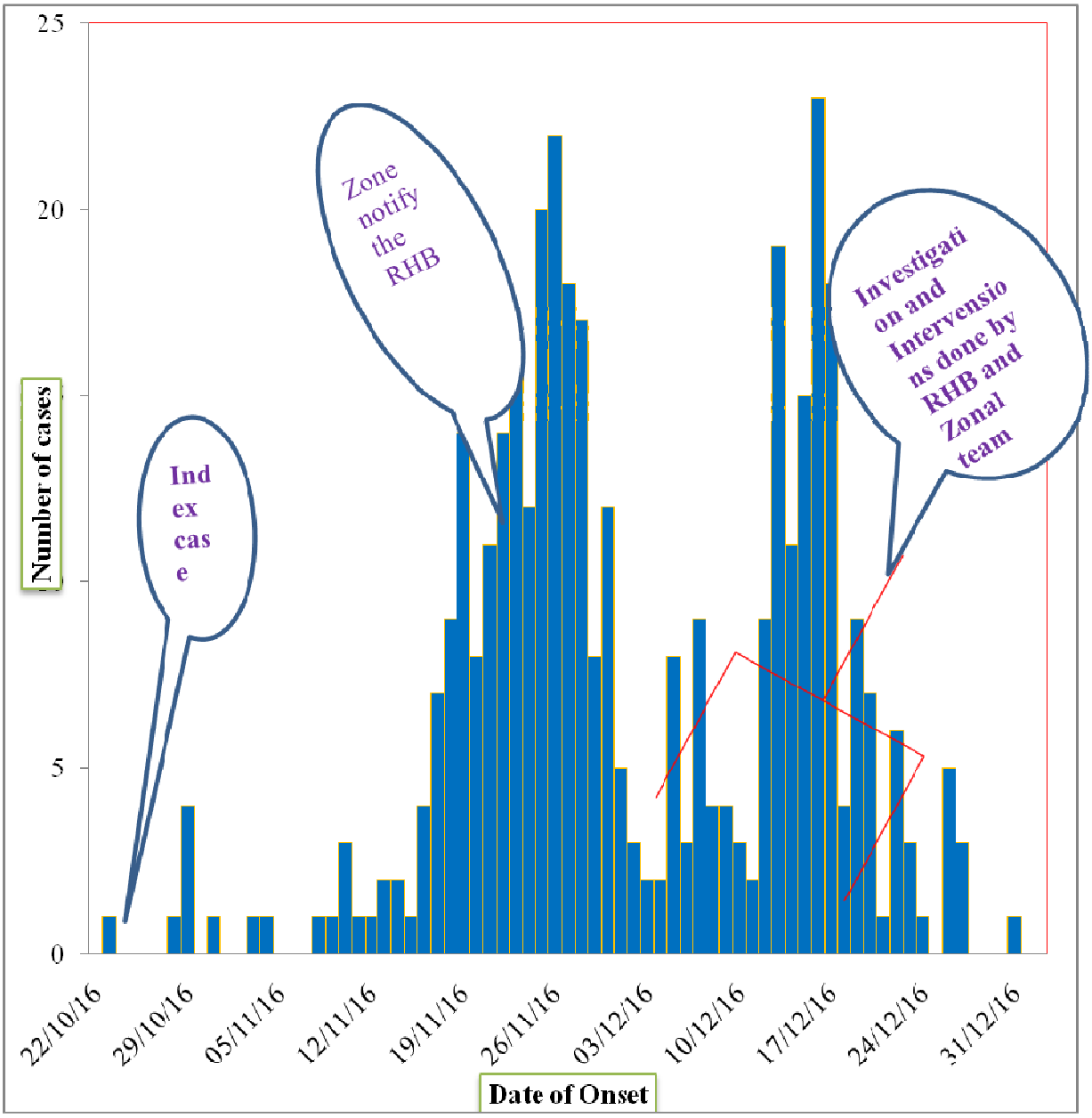

Figure1.1.2:- Epi-curve of Measles outbreak of Wadera Woreda, Guji Zone,Oromia December 2016

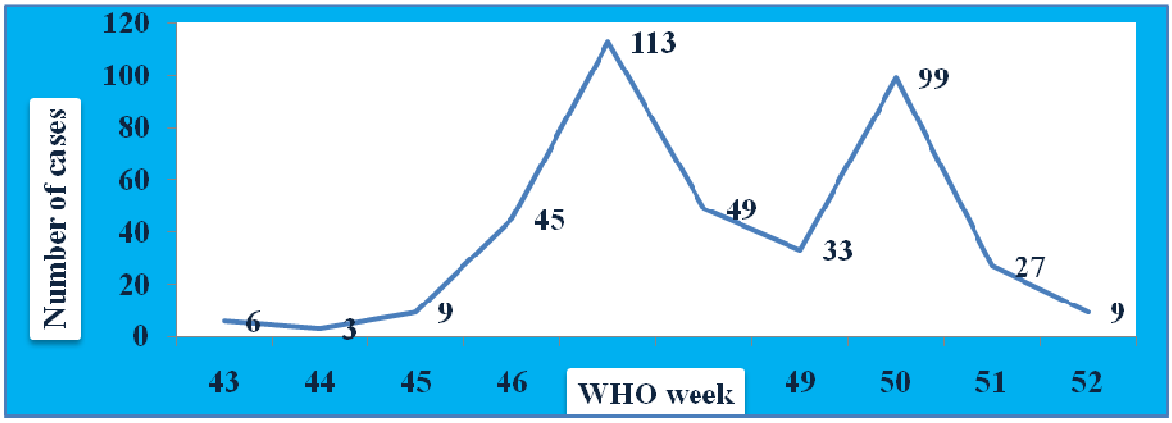

Figure1.1.3:- Distribution of measles cases by WHO weeks in Wadera Woreda of Guji Zone, Oromia Region, Ethiopia December 2016.

1.1.4.1.2 Description of Measles Cases by Place and Person

Between 23 October 2016 and 31 December 2016, we detected a period prevalence of 5.93/1000 with 66.6% laboratory confirmed measles cases. Majority of the cases were from Derba Hida Dima 99(25.2%),Hanchoka 96 (24.4%),Heba Hida 91(23.2%), and the others as shown in figure below(Fig1.1.4).

The overall attack rate was 5.13 per 1000 population with variation among kebeles; highest 35.16 per 1000 population in Derba Hida Dima, and lowest in Chalo kebele 0.37 per 1000 population.

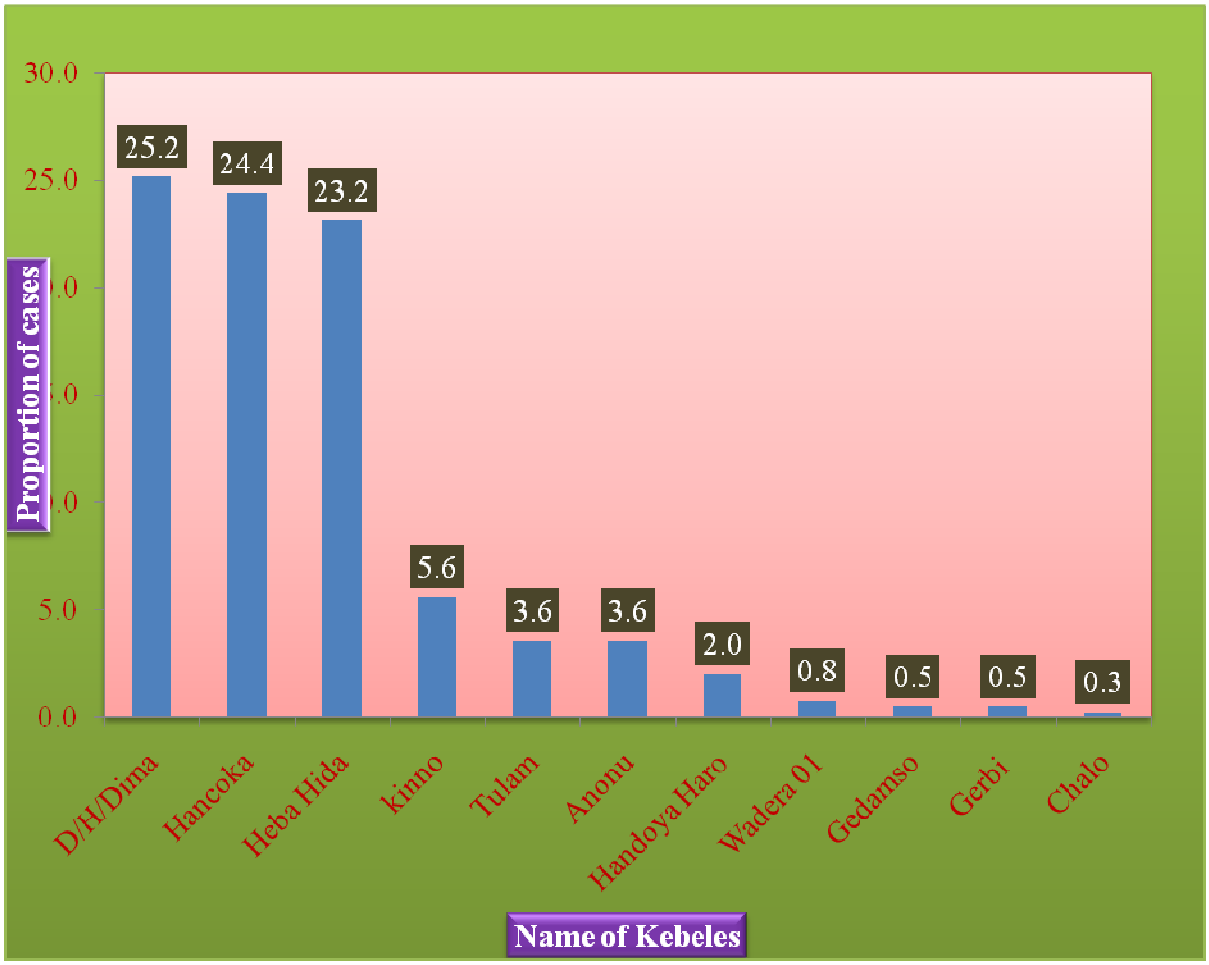

Figure1.1.4:- Proportion of measles cases by place in Wadera Woreda of Guji Zone, Oromia Region, Ethiopia December 2016.

From the total kebeles affected by the outbreak ASAR was highest among age group of 5-14 among variation in kebeles. ASAR among under one population was highest in Gedamso Kebele(14.5) followed by Chalo(11.6),Wadera 01(10.1) and Handoya kebelers of Wadera Woreda.ASAR of Kinno (17.4) and Ananu kebeles was higher among 5-14 and 15-24 age group respectively.

Table 1.1.1:- ASAR for measles infection of Wadera Woreda of Guji Zone, Oromia Region, Ethiopia 2016.

S.No	Name of Kebeles	Total Population at risk	Under one			1-4			5-14			15-24		
			Total P.(3.17%)	No.of cases	ASAR/1000	Total P. (13.23%)	No.of cases	ASAR/1000	Total P. (27.31%)	No.of cases	ASAR/1000	Total P.(20.04%	No.of cases	ASAR/1000
1	Hanchoka	2890	92	3	32.7	382	42	109.8	789	32	40.5	579	19	32.8
2	Heba Hida	4861	154	2	13.0	643	31	48.2	1328	40	30.1	974	18	18.5
3	D/H/Dima	2816	89	3	33.6	373	42	112.7	769	47	61.1	564	7	12.4
4	Kinno	2737	87	1	11.5	362	6	16.6	747	13	17.4	548	2	3.6
5	Tulam	3183	101	1	9.9	421	5	11.9	869	8	9.2	638	0	0.0
6	Ananu	2661	84	0	0.0	352	3	8.5	727	6	8.3	533	5	9.4
7	Handoya Haro	4082	129	1	7.7	540	3	5.6	1115	2	1.8	818	2	2.4
8	Wadera 01	6255	198	2	10.1	828	1	1.2	1708	0	0.0	1254	0	0.0
9	Gedamso	2175	69	1	14.5	288	1	3.5	594	0	0.0	436	0	0.0
10	Gerbi	2996	95	0	0.0	396	2	5.0	818	0	0.0	600	0	0.0
11	Chalo	2727	86	1	11.6	361	0	0.0	745	0	0.0	546	0	0.0
12	Neighbour Kebeles(Deka Kela,Erba Muda,Kelada)			2			8			19		0	12	
Total Woreda Population		66288	2101	17	8.1	8770	144	16.4	18103	167	9.2	13284	64	4.8

The proportion of cases was higher in male (53%) compared to female 47%

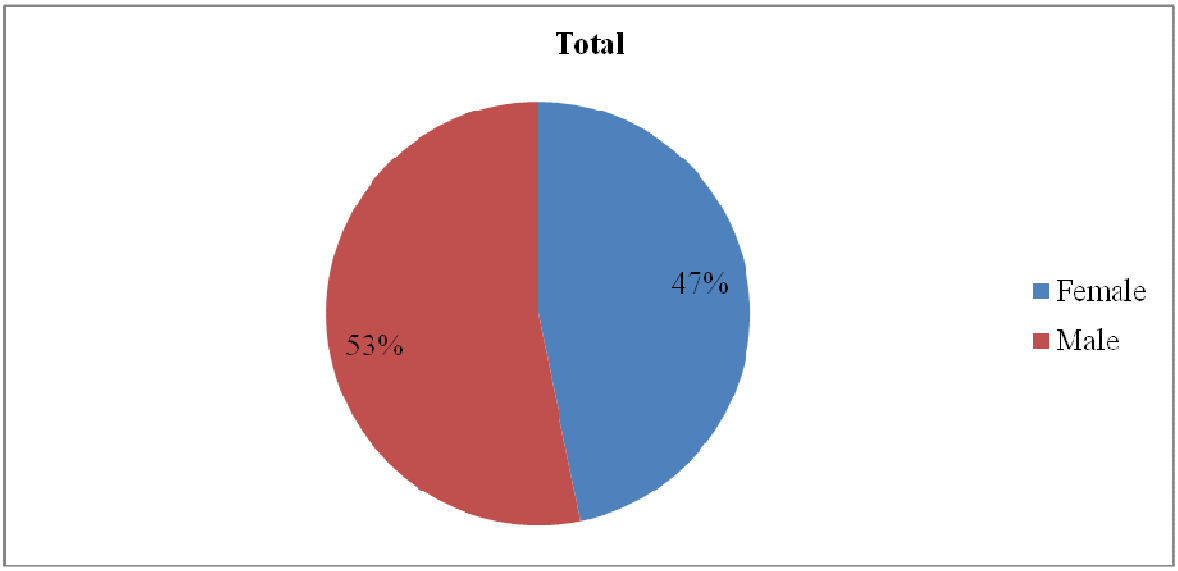

Figure1.1. 5:- Proportion of measles cases by sex in Wadera Woreda of Guji Zone, Oromia Region, Ethiopia December 2016.

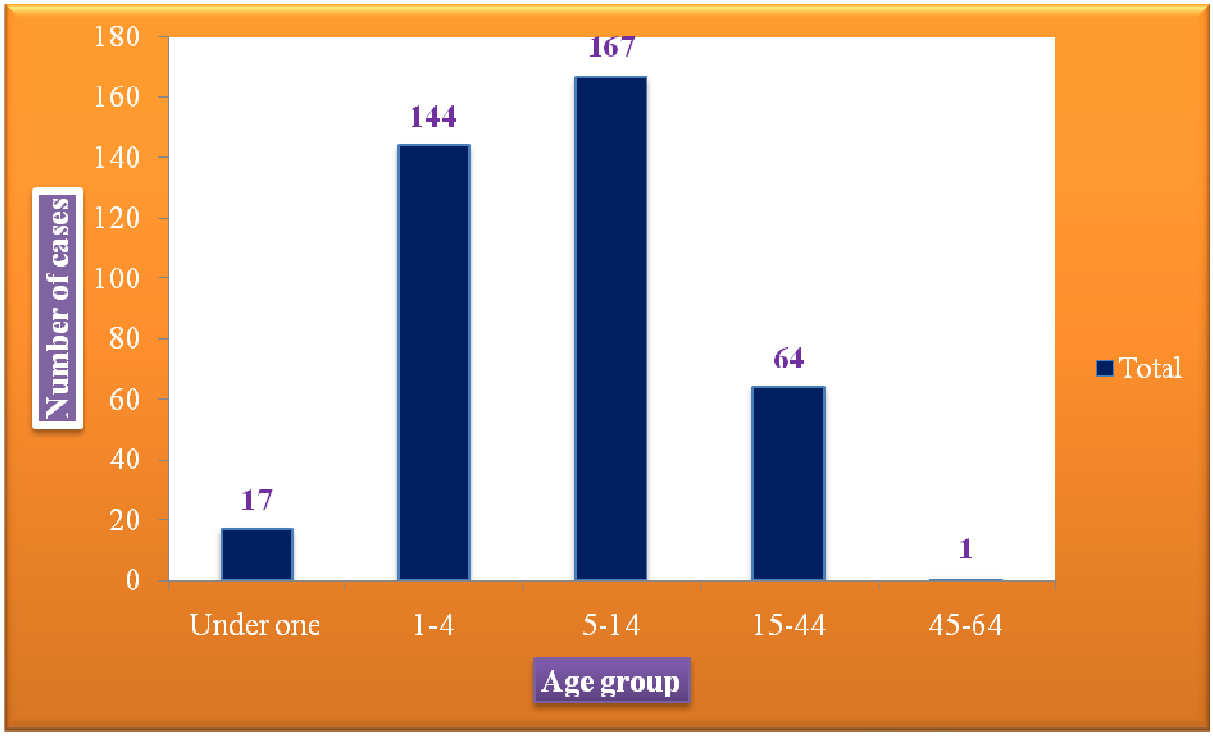

Figure1.1.6- :- Proportion of measles cases by age group in Wadera Woreda of Guji Zone, Oromia Region, Ethiopia December 2016.

Of the total measles cases included in the case control study, 211(54%) of the cases were unvaccinated against measles, 134 (34%) of the cases received only one dose and 16 (4%) of the cases received two or more doses and 12(3%) of the cases were not applicable (NA) for vaccination. The vaccination status of 20 (5%) measles case was unknown. The last two year (2007-2008E.C) measles coverage of the Woreda was reported to be 96.6% and 98.7% respectively.

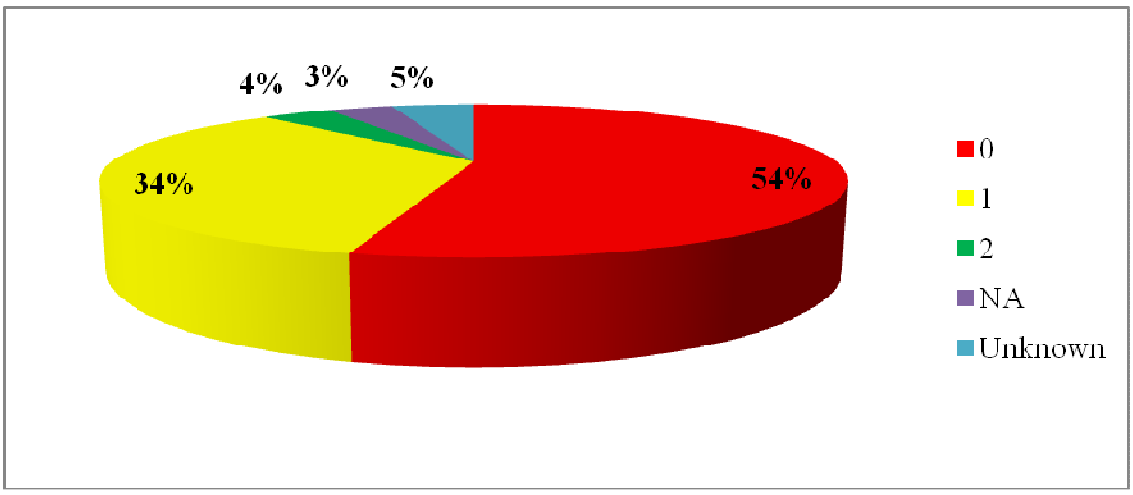

Figure1.1.7:-Vaccination status of measles cases in Wadera Woreda of Guji Zone, Oromia Region, Ethiopia December 2016.

1.1.4.2. Analytical Epidemiology

A total of 61 cases and 121 controls were selected from the community to identify the risk factors for measles outbreak in affected kebeles of Wadera Woreda,Guji Zone.The median age of the participants was nine year(Q1=4yrs,Q3=15yrs). All measles cases has a history of rash and fever 48 % had conjunctivitis, 84% had coroyza(runny nose), 98% had cough, 30% diarrhea,49% vomiting,5% ear discharge and 29.5% had lower respiratory infections(pneumonia). The socio- demographic characteristics of the study participants and risk factors for measles outbreak were described in table below

Table1.1.2:-Demographic characteristics of Measles case and control study in Wadera Woreda, Guji Zone, Oromia Region, Ethiopia December 2016

S.No	Variables		Case		Control		Total
			No	%	No	%	
1	Age group	<1	2	3.28	2	1.65	4
		1-4	21	34.43	26	21.49	47
		5-4	25	40.98	59	48.76	84
		15-24	12	19.67	19	15.70	31
		25-44	1	1.64	15	12.40	16
2	Occupational status of the case/control	Farmer	0	0.00	8	6.61	8
		House wife	6	9.84	8	6.61	14
		Student	22	36.07	55	45.45	77
		Unemployed	1	1.64	3	2.48	4
		Daily laborer	0	0.00	2	1.65	2
		Merchant	0	0.00	1	0.83	1
		NA	32	52.46	44	36.36	76
3	Occupational status of respondent	Farmer	50	81.97	101	83.47	151
		House wife	11	18.03	17	14.05	28
		Student	0	0.00	1	0.83	1
		Daily laborer	0	0.00	2	1.65	2
4	Religions	Orthodox	0	0.00	1	0.83	1
		Muslim	61	100.00	119	98.35	180
		Protestant	0	0.00	1	0.83	1
5	Ethnic groups	Oromo	60	98.36	121	100.00	181
		Others	1	1.64	0	0.00	1
6	Educational Level of Case/Control	Illiterate	3	4.92	8	6.61	11
		Read and write	4	6.56	12	9.92	16
		Elementary	22	36.07	54	44.63	76
		Secondary	0	0.00	3	2.48	3
		Above Secondary	0	0.00	1	0.83	1

		NA	32	52.46	43	35.54	75
7	Educational Level of family/care taker	Illiterate	35	57.38	63	52.07	98
		Read and write	18	29.51	53	43.80	71
		Elementary	8	13.11	4	3.31	12
		Secondary	0	0.00	1	0.83	1
		Above Secondary	0	0.00	0	0.00	0
8	Marital Status of Cases/Control	Single	5	8.20	10	8.26	15
		Married	7	11.48	19	15.70	26
		Divorced	0	0.00	1	0.83	1
		NA	49	80.33	91	75.21	140
9	Family Size	Crowded	38	62.30	69	57.02	107
		Normal	23	37.70	52	42.98	75

By Bivariate analysis, having previous measles infection and being vaccinated by measles vaccine were a protective factor for developing the disease and statistically significant with an Odds Ratio (OR) of 0.52(95%CI=0.28-0.98, P=0.042) and 0.23(95%CI=0.11-0.48,P=0.0001) respectively.

In addition being under five years, history of traveling prior to two weeks of onset and having contact history with measles case were a risk factor for developing the disease and statistically significant with (OR=2.01, 95% CI: 1.03-3.92), P=0.041),2.97(95%CI=1.52-5.72,P=0.001) and (OR=7.2,95%CI:3.61-14.36,P.Value <0.0001) respectively. However family size, family education status, Knowledge of Modes of transmission, house condition, distance from house to health institution, and sex has no significant association.

Table1.1.3:-Bivariate analysis of measles outbreaks in Wadera Woreda, Guji Zone, Oromia Region, Ethiopia December 2016

S.No	Variables		Case No.(%)	Control No.(%)	Crude OR(95%CI)	P-Value
1	Age Group	<5 yrs	23(37.70)	28(23.14)		
		>5 yrs	38(62.30)	93(76.86)	2.01(1.03-3.92)	0.041
2	Sex	Male	33(54.10)	72(59.50)		
		Female	28(45.90)	49(40.50)	0.8(0.43-1.49)	0.486
3	Family Education status	Illiterate	35(57.38)	63(52.07)		
		Educated	26(42.62)	58(47.93)	1.24(0.67-2.30)	0.497
4	Knowledge of Modes of transmission	yes	26(42.62	56(46.28)		
		No	35(57.38)	65(53.72)	0.86(0.46-1.60)	0.639
5	Previous Measles infection	Yes	24(39.34)	67(55.37)		
		No	37(60.66)	54(44.63)	0.52(0.28-0.98)	0.042
6	House condition	Ventilated	13(21.31)	36(29.75)		
		Not Ventilated	48(78.69)	85(70.25)	0.64(0.31-1.32)	0.223
7	Distance from house to HC	<5Km	38(62.30)	76(62.64)		
		>5Km	23(37.70)	45(37.36)	0.98(0.52-1.85)	0.946
8	Do you Know measles is vaccine preventable	Yes	40(65.57)	80(66.94)		
		No	21(34.43	41(33.06)	0.94(0.49-1.80)	0.853
10	Vaccination status	Yes	12(19.67)	62(51.24)		
		No	49(80.33)	59(48.76)	0.23(0.11-0.48)	0.0001
11	Travel History	Yes	28(45.90)	27(22.31)		
		No	33(54.10)	94(77.69)	2.97(1.52-5.72)	0.001
12	Contact history	Yes	44(72.13)	32(26.45)		<0.0001
		No	17(27.87)	89(73.55)	7.2(3.61-14.36)	
13	Crowdedness(family size)	Normal	23(37.70)	52(42.98)		
		Crowded	38(62.30)	69(57.02)	0.80(0.43-1.51)	0.495

By multivariate analysis, having previous measles infection and being vaccinated with measles vaccine has a protective factor with AOR=0.36,95%CI:0.16-0.76,P.value 0.008 and AOR;0.41,95%CI:0.17-0.97,P.value 0.043 respectively. while being under five years old and having contact history with measles cases are a risk factor for developing measles infection with AOR;2.83,95%CI(1.25-6.43),P. value 0.013 and AOR;6.75,95%CI(2.69-16.94),p. value < 0.0001 respectively.

Table1.1.4:-Bivariate Vs Multivariate analysis of selected variables associated with measles outbreaks in Wadera Woreda, Guji Zone, Oromia Region, Ethiopia December 2016

S.No	**Risk Factors**	**Crude OR(95 CI)**	**Adjusted OR(95%CI)**	**P. Value**
1	Having previous measles infection	0.52(0.28-0.98)	0.36(0.16-0.76)	0.008
2	Being vaccinated	0.23(0.11-0.48)	0.41(0.17-0.97)	0.043
3	Having travel history prior to two weeks of onset	2.97(1.52-5.72)	1.04(0.44-2.46)	0.929
4	Being under five age group	2.01(1.03-3.92)	2.83(1.25-6.43)	0.013
5	Having Contact History with same complaints	7.2(3.61-14.36)	6.75(2.69-16.94)	<0.0001

1.1.5. DISCUSSION

According to the guideline on measles surveillance and outbreak management of Ethiopia, Occurrence of three or more laboratory confirmed measles cases in one month in a defined geographic area such as a kebele, woreda or health facility catchment area declare confirmed measles outbreak. Therefore, we confirmed the existence of measles outbreak with a prevalence of 5.93/1000 and 66.6 IgM positive among a total of six clinically suspected measles case in Wadera Woreda from 23/10-31/12/2016. In this outbreak the ASAR was higher in the age groups 5-14 followed by under one years of age. This coincides with similar study done on measles outbreak investigated in Didesa Woreda of Iluababora Zone; Oromia Ethiopia that laid the ASAR was higher in the age groups of 5-14.(5)

When children are correctly administered 0.5 ml of potent live attenuated measles vaccine subcutaneously, serologic studies have demonstrated that measles vaccines induce sero-conversion of 85% at 9 months and above 95% after 12 months of age(1). Report of European Center for Disease prevention and Control (ECDPC) until 31 January 2016 showed that Vaccination status was known for 88.9% (3524/3964) of the cases with known age. Of these 3524 cases, 84.8% (2988) were unvaccinated,10.1% (356) had received one dose of measles vaccine, 3.6% (127) had received two or more doses, and 1.5% (53) had received an unknown number of doses(6).in this out break investigation the vaccination status was known for 373(95%).of these 211(54%) were un vaccinated,134(34%) received one dose,16(4%) received two dose and the rest 12(3%)were not applicable(NA).

Periodic measles outbreaks occur when a large number of susceptible accumulate in a community. Susceptible accumulate through time even in the setting of high routine measles vaccination coverage (1).

This study identified several factors that were associated with contracting measles in Wadera Woreda of Guji zone. As multivariate analysis of this outbreak investigation shows, being vaccinated for measles infection and previous measles infection were protective factor for developing the disease and statically significant which is similar with the study done in Didesa Woreda of Iluababora Zone, Oromia Ethiopia with being vaccinated is a protective factor (5)

Having Contact with measles case was a risk factor for contracting measles. This is also supported by the ministry of health of Zimbabwe, which states that children who live in crowded places are at high risk of contracting measles, and that a person with measles can infect others for

several days before he/ she develops symptoms. Measles spreads easily in places were children gather for example schools (7).

Another study done on a measles outbreak propagated by children congregating at water collection points in Mayuge district, Eastern Uganda in October 2016 showed that children under five years were the most affected of all age groups(8).in this study being under five years of age is a risk factor for developing measles infection.

1.1.6. LIMITATION

- Absence of child immunization card and immunization diploma at household level was made difficult to get exact date of vaccination and other relevant information.
- As soon as the outbreaks occurs the Woreda and Zonal health department did not notify the RHB.
- Data like cold chain monitoring card, five year immunization coverage, EPI monitoring chart and vaccine stock balance card were not found in Woreda health office and observed health centers.

1.1.8. CONCLUSION AND RECOMMENDATION

The main factors contributing to this outbreak was the accumulation of large numbers of susceptible children over time in the Woreda. The second opportunity for measles immunization is required to protect those children who have never been vaccinated and those who were vaccinated but did not develop the immunity.

Hence Ethiopia has not reached over 90% coverage on the first dose of measles for three consecutive years, we recommend the Ministry of health, Regional health Bureau and Zonal health department to use the second opportunity of SIAs and have conducted a catch up and several follow up campaigns to increase measles immunity by keeping data records at all levels.

In addition the Woreda health office has to improve routine and outreach immunization activities and public health education were instituted as a prevention and control measure in the population in collaboration with stakeholders to prevent spread of an outbreak.

1.1.9 ACKNOWLEDGEMENT

I grateful thank PHEM staff at regional and Zonal level in their valuable support in data collection, analysis and intervention of the outbreak.I would like to thank the Wadera Woreda health office and Heba Hida health center staff for their transportation support and participation in data collection and interventions of the outbreaks.

Finally my appreciation goes to my mentors Ms Abigiya Wondimagegnehu and Mr Dagnachew Alemu who achieved their successful mentorship responsibility.

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Annex1.1. 1:-Questionnaires for Measles outbreak Investigation, Oromia Regional health Bureau

A name of outbreak _____Unique ID_____

Hello, my name is _____.I work for ORHB. We are doing an investigation of a measles outbreak. The purpose of these questions is to get information for public health action. Would you be willing to participate?

If yes ask screening questions. If no, thank the person for their time (finished).

***Case status**

1. Case _____, Control_____

Patient / Control Name_____, Date of Data collection_____

Region_____ Zone_____ Woreda_____ Kebele _____ Got _____ Phone_____

Location: Longitude: _____ Latitude: _____

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	Farmer House wife Student Unemployed Daily laborer Merchant Government employee Not applicable (NA) Others specify_____
1.4	Family Occupations'	Farmer House wife Student Unemployed Daily laborer

		Merchant Government employee Others specify_____
1.5	Religion	Orthodox Muslim Protestant Catholic Others(specify)
1.6	Ethnic group	Oromo Amahara Tigre Others(specify)_____
1.7	Educational level of case/control	Illiterate Read and write Elementary Secondary Above secondary NA
1.8	Educational Level of family	Illiterate Read and write Elementary Secondary Above secondary
1.9	Marital status	Single Married Divorced Widowed NA
1.10	Family size	_____
1.11	Is there any rash person with rash, fever, running nose/conjunctivitis	1.Yes 2.No

	(illness)? In the family?	
1.12	If yes, number of sick person	_____

Clinical History of Diseases

2.1	What was the symptom?	Fever Rash Cough Coryza(runny nose) Conjunctivitis(red eyes) Ear discharge Pneumonia Vomiting Others _____
2.2	Only if complication	a) Pneumonia: yes no b) Cornea: yes no c) Blindness : yes no d) Convolution yes no e) Otitis media (ear discharge): yes no f) diarrhea : yes no g) Feeding problem yes no
2.3	Date of rash	_____/_____/_____
	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. Anti pyretic 7. Others given_____
2.7	Location when rash started	Distict _____kebele_____

2.8	Status of the case patient after treatment	1. cure 2. partially 3. deteriorated/disabled 4. death
2.9	Did you visit health facilities? □ yes no □, if yes date	___/____2016
3.0	Illness' duration before visiting the health facility	_____in days/hours

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	patient recall_____ dd/mm/yy vaccination card_____ dd/mm/yy
3.2	Number of vaccine dose received	1. one dose 2. two dose 3. three and above
3.3	Age of vaccination at first vaccinated	_____
3.4	If not vaccinated why?	lack of knowledge about vaccination campaign, absence during vaccination campaign, other, specify
3.5	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 _____
3.6	Did you contact with a person with measles symptoms within the last 2-3 weeks?	□ yes □ no
3.7	Do you have any travel history four days	1. Yes

	before and after rash onset	2. No If yes where _____
3.8	Do you have any contact history with someone else four days before and after rash onset	1. Yes 2. No If yes where _____
3.9	If yes to question 3.5 place of travel	1. School 2. Neighbor 3. Market 4. Other_____
3.10	Do you know modes of transmission for measles?	1. Yes 2. No 3.Ifyes specify_____
3.11	Did you ever have measles infection?	1. Yes 2. No 3. Don't know
3.12	Nutritional status of the cases	1. Normal 2. Moderate 3. Severely malnourished
3.13	What is the estimated area of the house?	_____
3.14	House condition?	□ ventilated □ not-ventilated
3.15	Distance from house to HC?	□ greater than 5 km □ equal or less than 5 km
3.16	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)_____
3.17	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)

3.18	Do you Know measles is vaccine preventable?	1. Yes 2. No 3. Don't Know
3.19	Whom do you think can be affected by measles?	1. Children of aged less than 5 years 2. Children of aged less than 18 years 3. Women of any ages 4. Any age groups of both male and women 5.Other (specify):_____
3.20	How do you think measles can be cured?	Using modern medicine Using traditional Medicine Holly water By feeding nutritious foods Keeping the sick person indoor Other(Specify)_____

1.2 Rota outbreak investigation in Nono Woreda of West Shoa, Oromia, February 2017

EXECUTIVE SUMMARY

Introduction: Rotavirus is ubiquitous and infects nearly all children worldwide by 5 years of age. Infection causes an acute onset of diarrhea, nausea, vomiting, and abdominal cramps, especially in children. The incidence of rotavirus infection in developing countries is similar to that of developed countries, where water quality or hygiene/sanitary conditions have been shown to have an effect in controlling the infection. However, case-fatality in the poorest countries is higher, due to malnutrition and barriers to accessing health services in a timely manner.

Ethiopia is one of five countries with the greatest rotavirus burden worldwide and accounts for six percent of all rotavirus deaths globally. It is estimated that 28% of all under-five diarrheal disease hospitalizations in Ethiopia are caused by rotavirus.

The main aim of this investigation was to identify its causative agent and to assess the magnitude and risk factor of the outbreak in Nono Woreda, Oromia Region, from 23/1/-10/2/2017.

Method: Descriptive cross-sectional followed by case-control study design with 60 cases and 120 controls was used.

Result: We detected a period prevalence of 7.74/1000 and 0.59% Case Fatality Rate. being vaccinated, being breast feed and having knowledge of exclusive breast feeding has a protective factor for developing the disease with an adjusted (OR) of 0.37[95%CI:0.16-0.86,P:0.021],0.11[95%CI:0.03-0.36,P:0.0002] and 0.30[95%CI:0.14-0.67,P:0.003], respectively while contact history with similar complaints was a risk factor with an (OR) 5.7[95%CI:2.23-14.60,P:0.0003.

Discussion: Children less than five years of age were the most affected groups. The main cause of this outbreak was low vaccination coverage of Rota.

Recommendation: The Woreda health Office, Health Center and health post at kebele level actively strengthen the immunization activities both at statics and outreach based.

1.2.1. INTRODUCTION

Rotavirus is ubiquitous and infects nearly all children worldwide by 5 years of age. However, compared with rotavirus disease in industrialized countries, disease in developing countries occurs at a younger age, is less seasonal, and is more frequently caused by uncommon rotavirus strains. Moreover, because of suboptimal access to hydration therapy, rotavirus is a leading cause of diarrheal death among children in the developing world, with the highest mortality rates among children in sub-Saharan Africa and southern Asia(1). Rotaviruses cause human infantile gastroenteritis, a very common disease. In fact, rotaviruses account for approximately 50% of all cases of diarrhea in children requiring hospitalization because of dehydration (70,000 cases per year in the United States; 500,000 to 600,000 deaths per year worldwide). Rotaviruses are even more of a problem in underdeveloped countries, where before the development of vaccines they were responsible for at least 1 million deaths each year from un controlled viral diarrhea in undernourished children(2).

There are seven major groups of rotavirus (A through G); human illness is caused primarily by group A and, to a much lesser extent, by groups B and C. Two outer-capsid proteins, VP7 (G-protein) and VP4 (P-protein), determine serotype specificity, induce neutralizing antibodies, and form the basis for binary classification of rotaviruses (G and P types). The segmented genome of rotavirus allows genetic re assortment (i.e., exchange of genome segments between viruses) during co-infection—a property that may play a role in viral evolution and has been utilized in the development of reassortant animal-human rotavirus–based vaccines(1).

Norwalk and related viruses cause symptoms similar to those caused by the rotaviruses. Infection causes an acute onset of diarrhea, nausea, vomiting, and abdominal cramps, especially in children .Bloody stools do not occur. Fever may occur in as many as a third of patients. The incubation period is usually 12 to 48 hours, and the illness usually resolves within 1 to 3 days without problems but can last up to 6 days(1, 2). However, the infection may prove fatal in infants who live in developing countries and who are malnourished and dehydrated before the infection(1). Neonatal infections are common but are often asymptomatic or mild, presumably because of protection from maternal antibody or breast-feeding. First infections after 3 months of age are likely to be symptomatic, and the incidence of disease peaks among children 4–23 months of age. Re infections are common, but the severity of disease decreases with each repeat infection(2). The incidence of rotavirus infection in developing countries is similar to that of

developed countries, where water quality or hygiene/sanitary conditions have been shown to have an effect in controlling the infection. However, case-fatality in the poorest countries is higher, due to malnutrition and barriers to accessing health services in a timely manner. In developing countries, the highest infection rates occur in children aged 3-11 months, while in developed countries infection rates peak in the second year of life(3).

Rotaviruses are passed from person to person by the fecal-oral route**.** Maximal shedding of the virus occurs 2 to 5 days after the start of diarrhea but can occur without symptoms. The virus survives well on fomites (e.g., furniture and toys) and on hands because it can withstand drying. Although domestic animals (e.g., cows) are known to harbor serologically related rotaviruses, they are not a common source of human infection. Outbreaks occur in preschools and day-care centers and among hospitalized infants(2).

Rotaviruses are acquired very early in life. Their ubiquitous nature makes it difficult to limit the spread of the virus and infection. Hospitalized patients with disease must be isolated to limit spread of the infection to other susceptible patients(2).

Efforts to develop rotavirus vaccines were pursued because it was apparent given the similar rates in less-developed and industrialized nations—that improvements in hygiene and sanitation were unlikely to reduce disease incidence. The first rotavirus vaccine licensed in the United States in 1998 was withdrawn from the market within 1 year because it was linked with intussusceptions, a severe bowel obstruction. In 2006, promising safety and efficacy results for two new rotavirus vaccines were reported from large clinical trials conducted in North America, Europe, and Latin America(1).

Ethiopia is one of five countries with the greatest rotavirus burden worldwide and accounts for six percent of all rotavirus deaths globally. It is estimated that 28 percent of all under-five diarrheal disease hospitalizations in Ethiopia are caused by rotavirus(4).

Nono Woreda of West Shoa Zone reported Diarrheal diseases of unknown causative agent and they suspected Acute Watery Diarrhea (AWD) on 03/01/2017.

After the report of the unknown cases from Nono Woreda of West Shoa Zone, team was deployed for investigation. The main aim of this investigation was to identify its causative agent and to assess the magnitude and risk factor of the outbreak in Nono Woreda, Oromia Region, from 23/1/-10/2/2017 and make recommendations of the future.

1.2.2. OBJECTIVES

1.2.2.1 General Objectives

- To assess the magnitude and risk factor of Rota Virus infection in Nono Woreda of West Shoa Zone, Oromia Region, February 2017

1.2.2.2 Specific Objectives

- To confirm the existence of Rota virus outbreak
- To describe the magnitude of Rota Virus infection
- To determine the risk factors for the Rota Virus infection
- To implement the appropriate prevention strategy of the outbreak

1.2.3. METHODS

1.2.3.1 Study area and period

Nono Woreda is one of the 24 woredas of West Shoa Zone, Oromia Regional state.

Administratively the woreda is divided in to 33 rural kebels and two towns. The woreda has a total population of 109,745 (99,420 Rural and 10,325 Urban).The Woreda has a total of 22,864 House holds,3808 children under one year's age,10,250 under three children and 18,031 under five children. The capital town of the Woreda (Silkamba) is located at a distance of 102 K.M from the Zonal town (Ambo) and 227 from regional city (Addis Ababa). All kebeles are affected by the outbreak of Rota Virus. The woreda shares boundaries with, Woredas of Sothern Nation, Nationality Peoples Region (SNNPR) to the South and west, Dano and, Jibat Woreda of West Shoa to the north and east respectively.

The ethnic compositions of the woreda are 95% Oromo, 5% Amhara and others. Concerning religious composition, 48% Christian 45% Muslim, and the rest 2% are followers of other religions. The woreda has 32 health posts with 68 health extension workers (HEWs), one temporal clinic and three health centers that provide service currently. The potential health service coverage of the woreda is 91%. The study was conducted from 23 January to 10 February 2017.

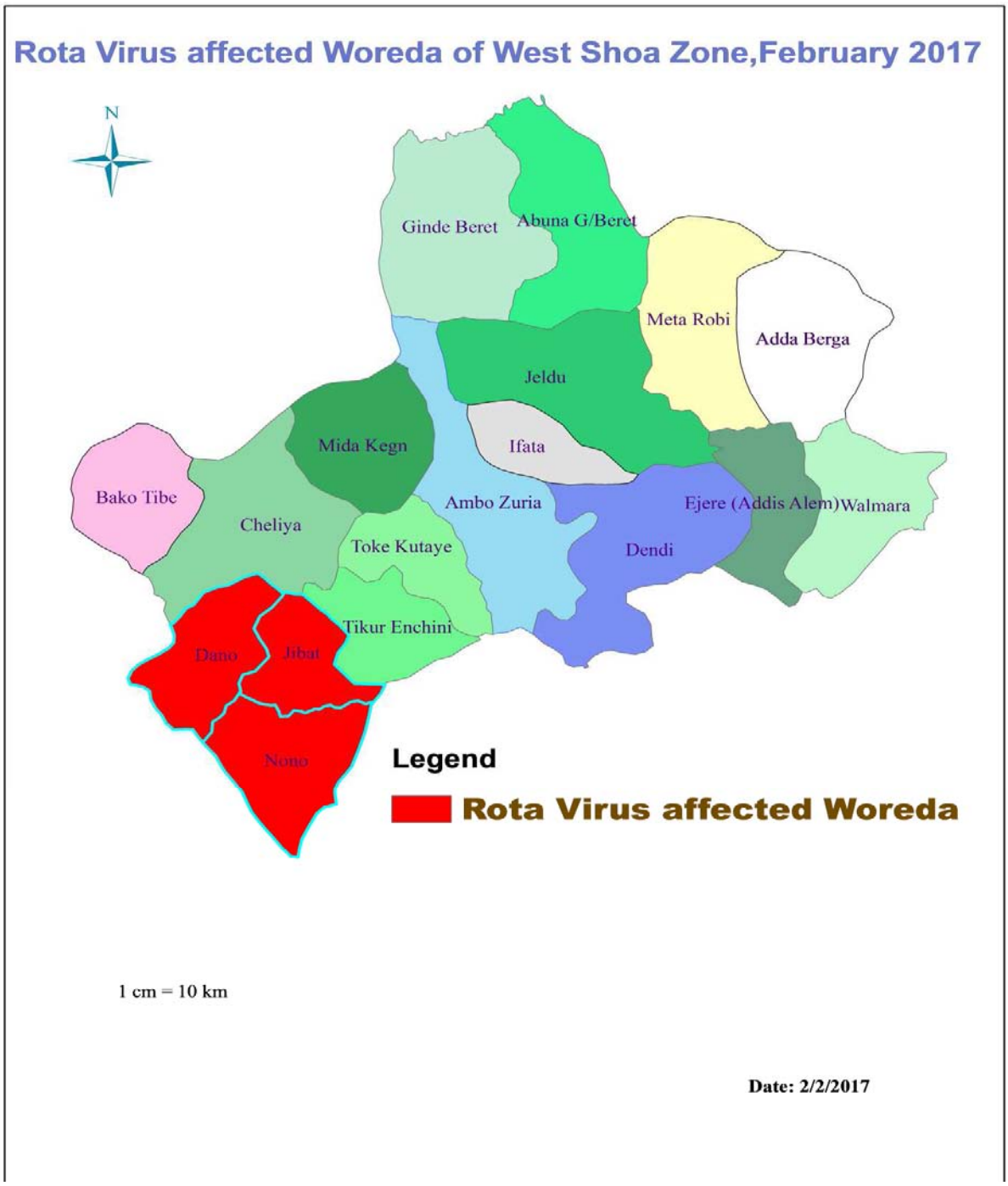

Figure1.2.8: -Map of Rota virus affected Woredas, West Shoa Zone, Oromia, February 2017

1.2.3.2 Case Definitions

1.2.3.2.1 Suspected case

- Every child aged less than five years hospitalized for acute diarrhea(3).

1.2. 3.2.2 Confirmed case

- Suspect case for which there is a timely stool sample and the lab results are positive for rotavirus. Outbreaks are confirmed when an epidemiological link is established with a laboratory-confirmed case(3).

1.2. 3.2.3 Inadequately investigated case

- Suspect case in which test results were not available and no epidemiological link has established with a laboratory-confirmed case in outbreaks(3).

1.2.3.2.4 Discarded case

- Suspect case with a timely stool sample, in which the lab result negative for rotavirus(3)

1.2.3.3 Inclusion Criteria

- *Cases:* Any residents of Nono Woreda whose age is below five years and had symptoms of Vomiting and diarrhea.
- *Controls:* Any residents of Nono Woreda whose age is below five years, Neighbor of the case and had no symptoms of Vomiting and diarrhea.

1.2.3.4 Exclusion Criteria

- Those with the following criteria were excluded
  - Prolonged diarrhea (lasting >14 days)
  - Hospitalization for another reason, although diarrhea present
  - Stool sample collected more than 48 hours after hospital admission, due to the risk of it being a hospital infection
  - Referral to sentinel hospital from another health center, where patient had been hospitalized more than 24 hours earlier for symptoms of the current case of diarrhea

1.2.3.5 Study Design

We used descriptive cross-sectional and case-control study design to identify the risk factors and describe the magnitude of the occurrence of Rota Virus.

1.2.3.6 Sampling method

The cases were selected by Simple Random Sampling (SRS) by using line list as the sampling frame and controls were selected from neighbors.

1.2.3.7 Sampling Size

We used unmatched case-control sample size determination with a ratio of 1:2 for cases and controls.

3.8 Data Collection Tools and Methods

Prior to conducting the investigation, structured questionnaire which include characteristics or variables for investigating Rota outbreak in the Woreda were developed .Questionnaire specifically designed for the case control part of the study was completed during an interview. The interview was conducted in the local language and with the subjects' parents, mostly mothers, present. The principal investigator, Woreda health office technical staff and nurses from health centers participated in data collection.

1.2.3.9 Variable specification

1.2.3.9.1 Dependent Variable

- Rota Virus Infection

1.2.3.9.2. Independent Variable

- Rota vaccination status
- Level of Education of parents
- Travel history and contact history
- Awareness on mode of transmission of Rota infection
- Awareness on prevention/control of Rota infection
- Availability of Toilet
- Hand washing practice

1.2.3.10 Data Processing and Analysis

Data entry template was designed in Epi-Info version 7.3.1. Data entry and cleaning was also done by principal investigator. Then, the data analysis was done using Epi Info 7.3.1 and Microsoft Excel and presented using descriptive statistical methods; with frequency distribution tables, percentages and graphs.

1.2.3.11 Ethical Consideration

The Woreda health office has accepted for the investigation of Rota Virus outbreak through the formal letter of Oromia Regional Health Bureau (ORHB). All the respondents as well as the parents were well informed about the objectives of study and we got oral consent from them.

1.2.4. RESULTS

1.2.4.1 Descriptive Analysis

A total of 849 cases were reported by both passive and active case search surveillance approach in Nono Woreda from 15 December 2016 to 04 February 2017.To confirm these out breaks efforts has been made by zonal health departments, first during the first weeks of the outbreak occurrence it suspected as Acute Watery Diarrhea (AWD) and samples were taken for bacteriological test and the result were found to be negative for Vibrio Cholera. Another team composed of ORHB, Adama regional lab and zonal health departments deployed on 20 January 2017 for further investigation and 16 samples were taken to Ethiopian Public Health Institute (EPHI) for viral examination. Among the samples taken, 15 (93.75%) were confirmed positive for Rota virus infection. The Index case was female aged seven months who was not vaccinated against Rota from nearby Woreda (Tolay) of Oromia region. Two days before the onset of vomiting and diarrhea the child had a history of travel to Walga Health Center of South Nation Nationality Peoples Region (SNNPR) where the first case of the outbreak was reported for the first time.

1.2.4.1.1Description of Rota Virus Cases by time

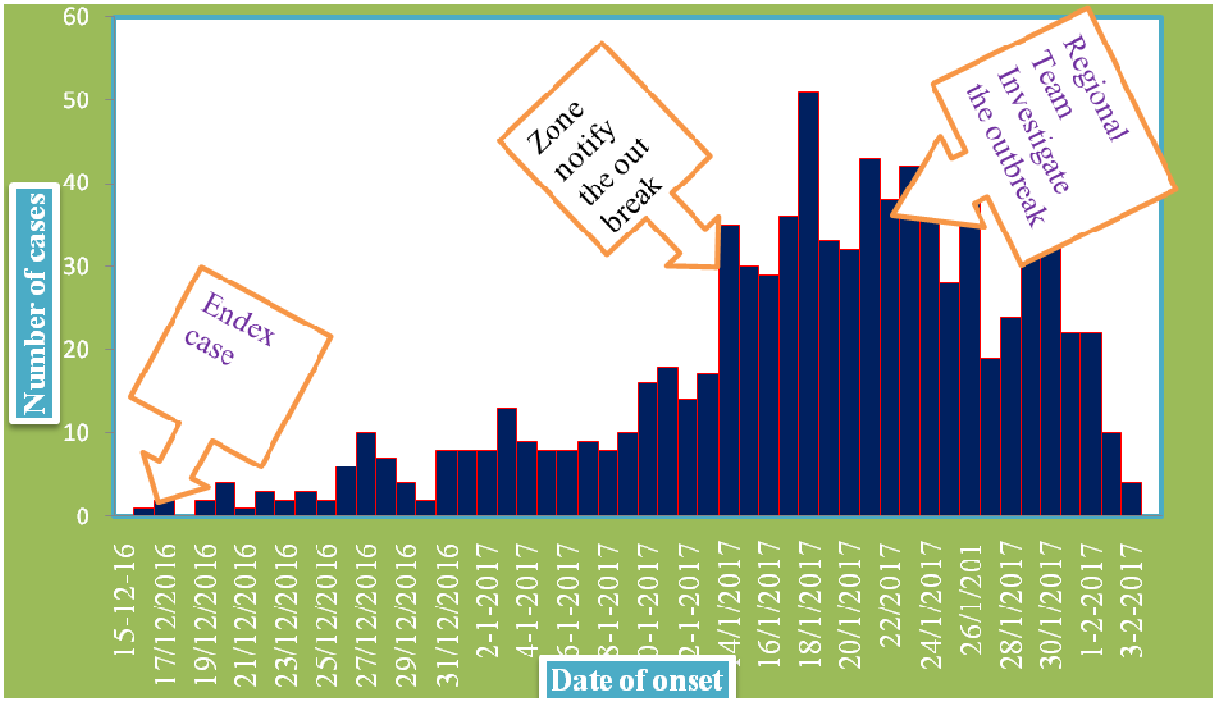

Figure1.2.2.9:-Epi-curve of RV outbreak of Nono Woreda, West Shoa Zone,Oromia February 2017

1.2.4.1.2 Description of Rota Virus Cases by Place and Person

Between 16 December 2016 and 4 February 2017, we detected a period prevalence of 7.74/1000 with 93.75 %(15 sample positive out of 16 sample) laboratory confirmed RV cases. The Case Fatality Rate (CFR) of the case was 0.59%. Majority of the cases were reported from Silkamba 141(16.7. %), followed by Metu Silase 86 (10.13) %),Hurumu Korke 69(8.13),Diko Shumo 61(7.2%) and others kebeles as showed in (Fig.3). All kebeles(35)of the Woreda were infected and nine(1.1%) of the cases were from nearby kebeles of the surrounding Woreda(Jibat Woreda of West Shoa).

The overall attack rate was 7.74 per 1000 population with variation among kebeles; highest 27.50 per 1000 population in Silk-amba, lowest 1.26 per 1000 population in H/Dinki kebele.

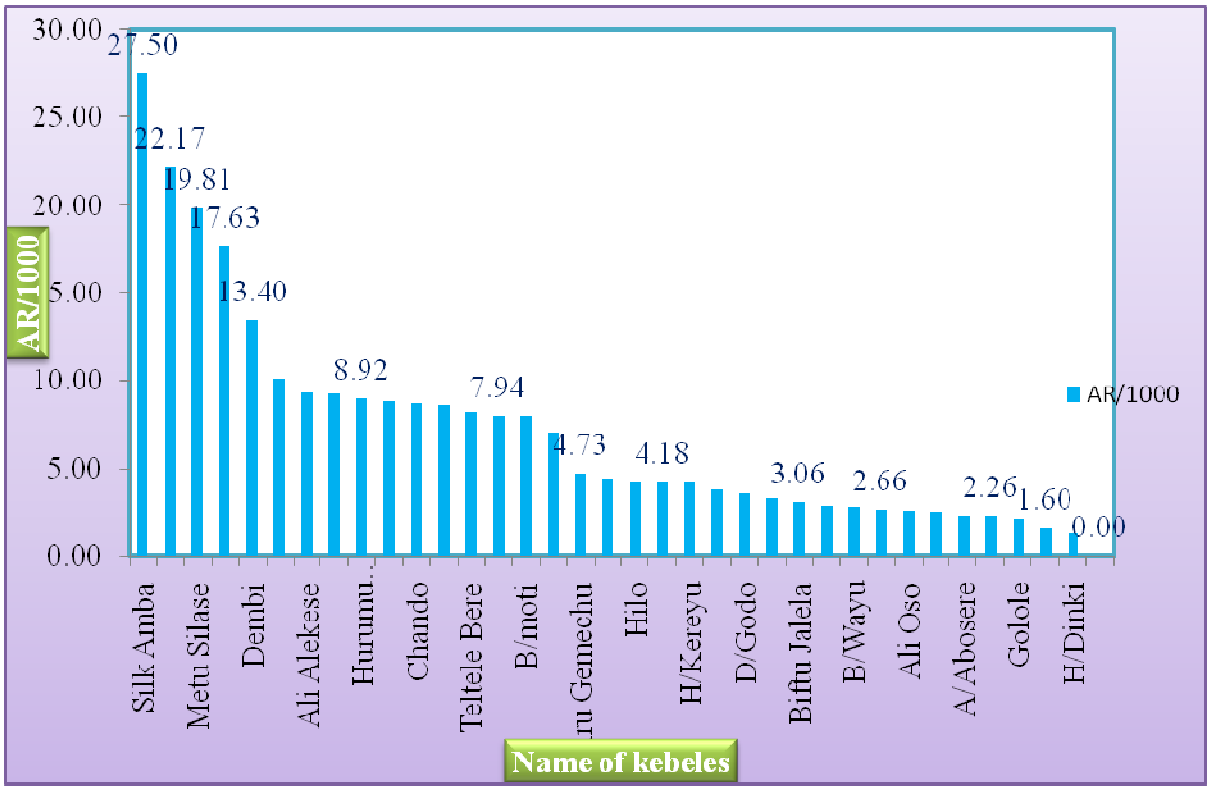

Figure1.2. 3:- Rota Virus AR/1000 by Kebele of Nono Woreda of West Shoa Zone, Oromia Region, Ethiopia February 2017.

Figure1.2.3.10:-Rota Virus AR/1000 by Kebele of Nono Woreda of West Shoa Zone, Oromia Region, Ethiopia February 2017.

As this study showed male (55%) is more affected than female (45%)

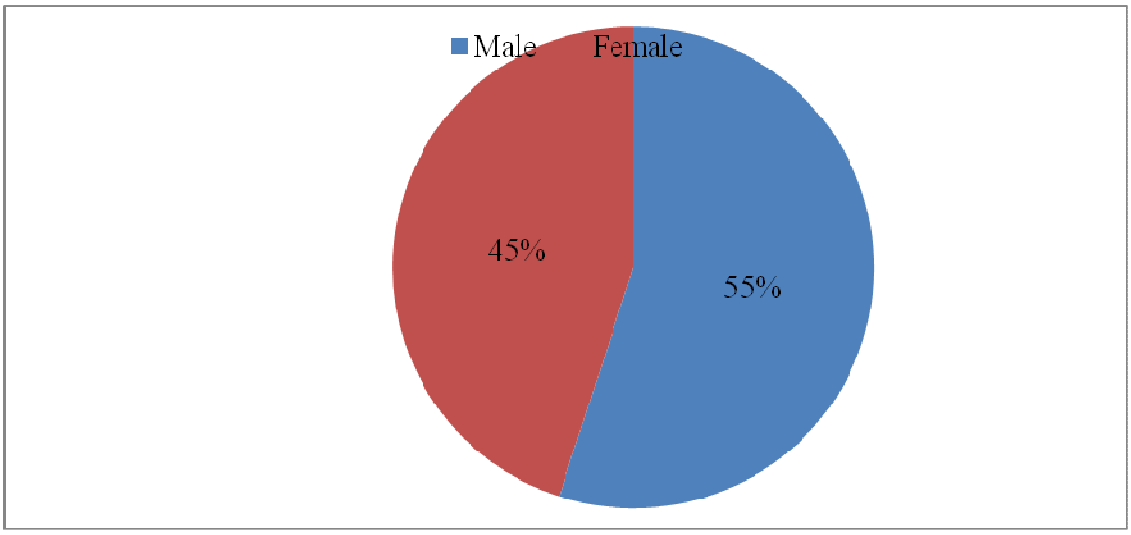

Figure1.2.4.11:-Proportion of Rota cases by sex in Nono Woreda of West Shoa Zone, Oromia Region, Ethiopia, February 2017.

Immunization Activities

During the data collection process of these out break we observed that for the last six months out of the four health centers serving the communities two (50%) of the HC does not provide immunization activities. lack of kerosene for refrigerators, functionality of the available refrigerators and negligence of the health workers including the health extension workers are the problems identified for not providing. The Woreda has one room used for cold chain that serves both for Silkamba health center and Woreda health office. The cold chain monitoring is good at the town level only. The last year EPI performance data immunization card, Immunization diploma for those completed the immunization were not provided due to different unrelated reasons. During the data collection of this study the last year EPI performance were not found.

Table1.2.1.5:- Six month EPI performance of Nono Woreda of West Shoa Zone, Oromia, Ethiopia, February 2017.

S. No	Antigen	Annual Plan of the 2009E.C	Six month plan	Six Month performance	
		No	No	No	%
1	BCG	3808	1904	1393	73
2	Penta 1	3534	1767	1526	86
3	Penta 3	3534	1767	1316	74
4	PCV 1	3534	1767	1526	86
5	Rota 1	3534	1767	1232	70
6	Rota 2	3534	1767	1062	60
7	PCV 3	3534	1767	1316	74
8	OPV 1	3534	1767	676	38
9	OPV 3	3534	1767	556	31
10	Measles	3534	1767	1184	67
11	Fully vaccinated	3534	1767	1147	65

1.2.4.2. Analytical Epidemiology

A total of 60 cases and 120 controls were selected from the community to identify the risk factors for Rota virus outbreak in affected kebeles of Nono Woreda, West Shoa Zone. The mean age of the participants was 18 months (SD=11month). Of the cases we assessed (84.5%) has a history of Vomiting and (95%) diarrhea.

Table1.2.2.6:- Demographic characteristics of Rota virus cases and control study in Nono Woreda, West Shoa Zone, Oromia Region, Ethiopia February 2017

S. No	Variables		Case	Control
			No (%)	No (%)
1	Age group	<1yr	20(33.33)	37(30.83)
		1-4yr	39(65)	81(67.5)
		5-9yr	1(1.67)	2(1.67)
2	Sex	Male	38(63.33)	56(46.67)
		Female	22(36.67)	64(53.33)
3	Occupation of the respondents	Farmer	45(75)	67(55.83)
		Merchant	2(3.33)	11(9.17)
		Student	0(0)	1(0.83)
		House Wife	6(10)	30(25)
		Un employed	0(0)	1(0.83)
		Gov. Employee	6(10)	5(4.17)
		Daily laborer	1(1.67)	5(4.17)
4	Religion	Orthodox	31(51.67)	56(46.67)
		Protestant	20(33.33)	32(26.67)
		Muslim	8(13.33)	31(25.83)
		Others	1(1.67)	1(0.83)
5	Marital Status of the respondents	Single	1(1.67)	4(3.33)
		Married	59(98.33)	105(87.50)
		Widowed	0(0)	2(1.67)
		Divorced	0(0)	8(6.67)
		NA	0(0)	1(0.83)
6	Educational Level of Mother	Illiterate	44(73.33)	75(62.50)
		Read and write	4(6.67)	19(15.83)
		Elementary	5(8.33)	17(14.17)
		Secondary	3(5)	8(6.67)
		Tertiary	4(6.67)	1(0.83)

		Illiterate	39(65)	48(40)
		Read and write	7(11.67)	21(17.5)
		Elementary	4(6.67)	27(22.5)
	Educational Level of	Secondary	4(6.67)	21(17.5)
7	Father	Tertiary	6(10)	3(2.5)
		Oromo	49(81.67)	99(82.50)
8	Ethnicity	Amahara	11(18.33)	21(17.50)

On variable analyses being vaccinated, being breast fed, having knowledge of exclusive breast feeding, child feces defecation in toilet and living within 1 Km of the health facility were a protective factor for developing the disease with an (OR) of 0.41[95%CI:0.22-0.78,P:0.006],0.20[95%CI:0.07-0.55,P:0.002], 0.35[95%CI:0.18-0.66,P:0.001], 0.53[95%CI:0.28-0.99,P:0.046] and 0.26[95%CI:0.09-0.76,P:0.014] respectively. while contact history with similar complaints and illiteracy of the father were a risk factor with an (OR) 6.16[95%CI:2.74-13.84,P:<0.0001and2.59[95%CI:1.29-5.22,P:0.007] respectively.

Table1.2.3.7:- Variable analysis of Rota virus outbreaks in Nono Woreda, West Shoa Zone, Oromia Region, Ethiopia February 2017

S.No	**Variables**		**Case No.(%)**	**Control No.(%)**	**Crude OR(95%CI)**	**P-Value**
1	Sex	Male	38(63.33)	56(46.67)	1.97(1.04-3.73)	0.036
		Female	22(36.67)	64(53.33)		
2	Crowdedness	Normal	24(40)	59(49.17)	0.7(0.37-1.29)	0.246
		Crowded	36(60)	61(50.83)		
3	Educational level of mother	Illiterate	48(80)	93(77.50)	1.16(0.54-2.49)	0.701
		Educated	12(20)	27(22.50)		
4	Educational level of Father	Illiterate	46(76.67)	67(55.83)	2.59(1.29-5.22)	0.007
		Educated	14(23.33)	53(44.17)		
5	Day Care attendance	Yes	1(1.67)	1(0.83)	2.02(0.12-32.82)	0.622
		No	59(98.33)	119(99.17)		
6	Knowledge of whether Rota is a vaccine preventable disease	Yes	15(25)	47(39.17)	0.52(0.26-1.03)	0.061
		No	45(75)	73(60.83)		
7	Knowledge of Rota Vaccine Schedule	Yes	29(48.33)	62(51.67)	0.87(0.47-1.63)	0.673
		No	31(51.67)	58(48.33)		
8	Distance of HC to home	<=1 Km	50(83.33)	114(95)	0.26(0.09-0.76)	0.014
		>1 Km	10(16.67)	6(5)		
10	Vaccination status	Yes	26(43.33)	78(65)	0.41(0.22-0.78)	0.006
		No	34(56.67)	42(35)		
11	Is she /he has history of Contact with same complaints?	Yes	23(38.33)	11(9.17)	6.16(2.74-13.84)	<0.0001
		No	37(61.67)	109(90.83)		
12	Is the child breast feed	Yes	5(8.33)	37(30.83)	0.20(0.07-0.55)	0.002
		No	55(91.67)	83(69.17)		
13	Knowledge of Exclusive breast feeding(Time)	Yes	24(40)	79(65.83)	0.35(0.18-0.66)	0.001
		No	36(60)	41(34.17)		

14	Child Feces defecation	Toilet Open Field	23(38.33) 37(61.67)	65(54.17) 55(45.83)	0.53(0.28-0.99)	0.046
15	Experience of Hand Washing After Toilet	Yes No	34(56.67) 26(43.33)	66(55) 54(45)	1.07(0.57-1.99)	0.832
16	Experience of Hand Washing Before Food	Yes No	59(98.33) 1(1.67	109(90.83) 11(9.17)	5.95(0.75-47.25)	0.091
17	Experience of Hand Washing After cleaning child	Yes No	29(48.33) 31(51.67)	67(55.83) 53(44.17)	0.74(0.39-1.38)	0.342
18	Experience of Hand Washing Before Preparing Food	Yes No	39(65) 21(35)	92(23.33) 28(76.67)	0.56(0.29-1.11)	0.099
19	Experience of Hand Washing Before Feeding Child	Yes No	18(30) 42(70)	31(25.83) 89(74.17)	1.23(0.62-2.44)	0.554
20	History of premature birth	Yes No	4(6.67) 56(93.33)	4(3.33) 116(96.67)	2.1(0.50-8.59)	0.315
21	Age Group	under 5 Above 5	59(98.33) 1(1.67)	118(98.33) 2(1.67)	1.00(0.09-11.25)	1.000

By multi variable analysis being vaccinated, being breast feed and having knowledge of exclusive breast feeding has a protective factor for developing the disease with an adjusted (OR) of 0.37[95%CI:0.16-0.86,P:0.021],0.11[95%CI:0.03-0.36,P:0.0002] and 0.30[95%CI:0.14-0.67,P:0.003], respectively while contact history with similar complaints was a risk factor with an (OR) 5.7[95%CI:2.23-14.60,P:0.0003.

Table1.2.4.8:- Variable Vs Multi variable analysis of selected variables associated with Rota Virus outbreaks in Nono Woreda, West Shoa Zone, Oromia Region, February, 2017

S.No	Variables	Crude OR(95%CI)	Adjusted OR(95%CI)	P- Value
1	Educational level of father	2.59(1.29-5.22)	2.0(0.87-4.62)	0.101
2	Being vaccinated	0.41(0.22-0.78)	0.37(0.16-0.86)	0.021
3	Contact with similar complaints	6.16(2.74-13.84)	5.7(2.23-14.60)	0.0003
4	Being breast feed	0.20(0.07-0.55)	0.11(0.03-0.36)	0.0002
5	Having knowledge of exclusive breast feeding	0.35(0.18-0.66)	0.3(0.14-0.67)	0.003
6	Living within 1Km of Health facility	0.26(0.09-0.76)	0.39(0.11-1.40)	0.15
7	Defecating child feces in Toilet	0.53(0.28-0.99)	0.72(0.32-1.59)	0.411

Water Sanitation and Hygiene

This study showed 93(51.11%) of the households use open field to defecates their children's feces and 87(48.89) of them were use toilet. The most reasons mentioned for using open field are no toilet59 (63.44%) followed by culture 14(15.05%), bad odor 1(1.08%), toilet is too far 4(4.30) and physically damaged tolilet11 (11.83%).

Regarding source of water, 84(46.93%) of the households get water from pipe line, 52(29.05%) hand dug well, 36(20.11%) river and 7(3.91%) from spring.

Interventions Taken

Technical working group at the zonal and Woreda level was established and planned to control the outbreaks. Emergency drugs were procured and distributed to affected area at the national level. Technical assistance was given for health workers on case management, recording and reporting situation. Cases were treated to prevent further spread and reduce morbidity and mortality attributed to RV using medications (ORS, Zinc, Vitamin A) both at house hold and health facility level. Staff from health center, Woreda health office, and zonal health department including the investigation team participated in home to home service like health education, active case search, treatment for mild cases. Routine surveillance was enhanced and the situation was closely followed at each level on a daily bases. The most activities targeted to implement during the home to home services are latrine construction and its utilization, hand washing

practices at critical time ,assessing the immunization of RV and treatment of water at the source and home based. The zone has started closely working with the affected and the entire neighboring Woredas to prevent/control the outbreak from spreading to other areas, and alarming the community, health extension worker and community leader to strength the local surveillance system. The Woreda cabinet allocate budget for emergency drug and control the intervention activities on daily bases in collaboration with the team.

Water sample was taken from three different sources (Hurumu,Silkamba and Kersa) to EPHI for bacteriological analysis and the result showed as the source of water from kersa area was positive for Ecoli and it was not potable.

1.2.5. DISCUSSION

In Rota Virus sentinel surveillance indicators conducted in Black Lion, Yekatit 12 and Betezata Hospitals of Ethiopia (2007-2014) Percent (positivity rate) of ELISA Rota Virus confirmed cases were 19% in 2010 and 2011, 31% in 2012, 32% in 2013 and 20% in 2014(6) while this study showed 93.75% confirmed Rota Virus.

Babies who are breastfed are generally healthier and achieve optimal growth and development compared to those who are fed formula milk. If the vast majority of babies were exclusively fed breast milk in their first six months of life – meaning only breast milk and no other liquids or solids, not even water – it is estimated that the lives of at least 1.2 million children would be saved every year. If children continue to be breastfed up to two years and beyond, the health and development of millions of children would be greatly improved. Multi variable analysis of this study also ensures being vaccinated, being breast feed and having knowledge of exclusive breast feeding has a protective factor for developing the disease.

The use of rotavirus vaccines should be part of a comprehensive strategy to control diarrheal diseases with the scaling up of both prevention (promotion of early and exclusive breastfeeding for six months, vitamin A supplementation, hand-washing, improved water supply and sanitation) and treatment services(5). In case of Nono Woreda the vaccination status was not well known in case based line list. Additionally from a total study participants a large proportion of the cases 34 (56.67%) as compared to controls 42 (35%) were not received any dose of Rota vaccination. Report of Nono Woreda indicates six month performance of Rota 1 and Rota 2 vaccination coverage of the Woreda was 70% and 60% respectively.

The virus is highly infectious and very stable in the environment: it can survive for hours on hands and even days on hard surfaces, and it remains stable and infectious in human stool for up to 1 week. Individuals with rotavirus excrete significant quantities of viral particles before they begin showing symptoms of the disease, throughout the course of the diarrhea, and, in one-third of the cases, up to 1 week after the symptoms disappear. Many people excrete the virus without experiencing diarrhea(3).In case of Nono Woreda from the total study participants 93(51.11) practiced to defecates child feces in open fields because 63.44% of them don't have toilet and the other complain bad odor, culture, distance of the toilet and physically damaged of toilet. Having contact with sick child are a risk factor for developing RV and statistically significant in Bivariate and multivariate analysis of this study.

1.2.6. LIMITATION

- Line list of the outbreak is not fully recorded (vaccination status)
- Absence of child immunization card and immunization diploma at household level was made difficult to get exact date of vaccination and other relevant information.
- As soon as the outbreaks occurs the Woreda and Zonal health department did not notify the RHB.
- Similar or related studies were not found.

1.2.7. CONCLUSION

We confirmed the presence of Rota virus outbreak in Nono Woreda of West Shoa Zone that affects all of its kebeles. Children less than five years of age were the most affected groups. The result of this outbreak documented that contact history of same complaints is a risk factor for the occurrence of the outbreak. Being vaccinate, breast feeding and having knowledge of exclusive breast feeding are a protective factor and significantly associated with the outbreak. The main cause of this outbreak was low vaccination coverage of Rota.

1.2.8. RECOMMENDATION

- The Woreda health Office, Health Center and health post at kebele level actively strengthen the immunization activities both at statics and outreach based.
- Community awareness on exclusive breast feeding and child feeding practices should be strengthened by health extension workers.
- Supportive supervision for health extension workers and health providers at facility level should strengthen especially in areas of data quality, cold chain management, supply of vaccine and others logistics, monitoring charts and providing EPI card and Immunization diploma for those who are targeted.
- Routine awareness creation in hand washing practices at critical time should be implemented at community level.

1.2.9. ACKNOWLEDGMENT

I grateful thank PHEM staff at regional and Zonal level in their valuable support in data collection, analysis and intervention of the outbreak. I would like to thank Nono Woreda health office and Silkamba,Metusilase,Dikoshumo and Chando Health Center staffs for their participation in data collection and interventions of the outbreaks.

Finally my appreciation goes to my mentors Ms Abigiya Wondimagegnehu and Mr Dagnachew Alemu who achieved their successful mentorship responsibility.

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Annex 2:- Data collection tool for Rota virus outbreak investigation, Oromia Region Ethiopia, 2017

	Question	Coding Classification
Demography		
	Status	1. Case 2. Control
	Interviewer name	_____
	Place Of Interview	Health Center/Hospita__2.Home___Others _____specify
	Date of Interview	----/----/--*Date/Month/Year*
	Address	Region **Oromia** Zone **West Shoa** Woreda_____ Kebele_____ Gott/_____House No_____
	GPS coordinate of the house	Latitude_____ Longitudes_____
	Age of the case/control	_____ Year (s) _____Month(s)
	Sex of the case/control	Male 2. Female
	How are you related to the child?	1. Mother 2. Father 3. Other relative 4. Guardian
	Ethnicity	1.Oromo 2.Somale 3.Tigre 4.Gurage 5.Amhara 6.Wolayita7.Sidama 8.Other(Specify)_____
	Occupation	1. Farmer 2. Merchan 3. Student 4. House wife 5.Unemployed 6. Pastoralist 7. Gov't Employee 8.Private Employee 9. Daily Laborer10. NA 11.Other_____
	Religion	1. Orthodox 2. Protestant 3. Muslim 4. Catholic 5.Wakefata 6. other_____
	What is your marital status?	1. Single 2. Married 3.Widowed 4.Divorced 5. NA
	Level of Education of Mother	1.Illiterate 2.Read and writing only 3.Elementary school (1-8) 4.Secondary School (9-12) 5.Tertiary School (college+)

	Question	Coding Classification
	Level of Education of Father	1.Illiterate 2.Read and writing only 3.Elementary school (1-8) 4.Secondary School (9-12) 5.Tertiary School (college+)
	How many rooms in the house are used for sleeping?	_____
	In total, how many people, including children, regularly sleep in the house at night?	_____
	In the past month, has the child attended a daycare or school for more than 2 days per week?	☐Yes ☐No ☐ Don't know
	Did the child receive any oral rehydration solution (ORS) before presenting to the Health Center?	☐Yes ☐No ☐ Don't know
Knowledge of Rota Virus		
	There is a vaccine that can prevent Rota. Did you know about this vaccine?	☐Yes ☐No ☐ Don't know
	What is the routine age for a child to be vaccinated with Rota vaccine, or do you not know?	☐at births ☐ 6 weeks ☐ 9 months ☐Other _____ ☐ Don't know
	Has s/he ever been vaccinated?	☐Yes ☐No ☐ Don't know ***if no, or don't know, skip to question 2.6***
	What is the number of Rota vaccine doses received? (refer to card if possible)	☐ NONE ☐One Age of first dose _____☐ Card validated ☐Two Age of second dose ____ ☐ Card validated
	Where did He/ She get these vaccines? Was it… (READ ANSWERS)	☐Routine vaccination at health facility ☐ Not at a health facility (HEW visit or at a site)

	Question	Coding Classification
		☐Or did you forget or don't know ☐ Another way? ____
	If child was not vaccinated, what is the reason for not vaccinating?	1 Vaccination center or clinic too far away 2 No vaccine at the vaccination site 3. Sick child at home 4. Fear of vaccine side effects 5. Shortage of money 6. Lack of awareness
	How long does it take you to go to the health facility from your house?	1. < 10 minutes 2. 10-30 minutes 3. 30 minutes – 1 hr. 4. >1 hr.
	Since birth, has the child been admitted to the hospital overnight for diarrhea [DO	☐Yes ☐No ☐ Don't know
Past History of Rota Virus (Exposure)		
	Did he/she have contact with a sick person with a Vomiting and diarrhea (Rota)? (CASES: 1-3 days before onset of illness?) (CONTROLS: In the last 1-3 weeks?)	☐ Yes ☐ No ☐ Don't know **If no skip to 3.3**
	Where did H/she have contact with this person?	District: _____Kebele: _____
	Was s/he breastfed at all?	☐Yes ☐No ☐ Don't know ***if no, or don't know, skip to question 3.5***
	For how long (i.e., until what age) did the child receive breast milk as the ONLY source of milk (i.e., no formula milk was given)?	_____months and_____ weeks ☐ Don't know
	At what age did the child completely stop receiving breast milk?	_____months and_____ weeks ☐ Don't know
	Does the child have a history of premature birth?	☐Yes ☐No ☐ Don't know
Clinical Pictures(Current infection)		

	Question	Coding Classification
	Did the child have vomiting?	☐Yes ☐No ☐ Don't know ***if no, or don't know, skip to question 4.4***
	During this illness, what was the maximum number of vomiting episodes in 24 hours?	_____☐ Don't know
	How many days before admission did the vomiting begin?	_____☐ Don't know
	Did the child have Diarrhea?	☐Yes ☐No ☐ Don't know ***if no, or don't know, skip to question 4.8***
	During this illness, what was the maximum number of diarrhea episodes in 24 hours?	_____☐ Don't know
	What antibiotics did you take?	_____ 2. I don't know
	How many days before admission did the diarrhea begin?	_____☐ Don't know
	On arrival or admission (i.e., before rehydration), what was the child's general Condition?	1 Well, alert 3. Lethargic or unconscious 2 Restless, irritable 4 Don't know
	On arrival, admission, or during the hospital visit, did the child have sunken Eyes?	☐Yes ☐No ☐ Don't know
	On arrival or admission (i.e., before rehydration), what was the child's thirst status?	1. Drank normally, not thirsty 3. Drank poorly, or not able to drink 2. Thirsty, drank eagerly 4. Don't know
	Did the child receive IV fluids for rehydration during the hospital stay?	☐Yes ☐No ☐ Don't know
WASH		
	Where do you discard your child's Feces?	1. Toilet 2. open field
	If the answer to question number **5.1** is	1. No toilet 2. Culture 3.Bad odor 4. 5. Too

	Question	Coding Classification
	Open Field, can you tell me the reason?	far from my house 6.Physically damaged (toilet 7.Other(specify)_____
	Do you wash your hands at critical time?	1.After toilet ☐Yes ☐No 2.Before food ☐Yes ☐No 3.After cleansing child ☐Yes ☐No 4.Before preparing food ☐Yes ☐No 5.Before feeding child ☐Yes ☐No
	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) _____

Chapter –II Surveillance Data Analysis

2.1 Malaria Surveillance Data Analysis of Guji Zone, Oromia, Ethiopia 2016

Executive Summary

Introduction: Malaria is a protozoan disease caused by parasites of the genus Plasmodium. It is one of the leading causes of illness and death in the world. It is the leading cause of death in children under the age of 5 years and pregnant women in developing countries.

There were large reductions in the number of malaria cases and deaths between 2000 and 2015. In 2000, it was estimated that there were 262 million cases of malaria globally (range: 205–316 million), leading to 839 000 deaths (range: 653 000–1.1 million).

Ethiopia has achieved remarkable progress in the fight against malaria during the most recent decade through strong preventive and case management interventions with large engagement of the Health Extension Workers and the Health Development Army volunteers providing community based care at the household level. In children under five years of age, malaria admissions and deaths fell by 81% between 2001 and 2011 and 73% respectively. The country is also one of the few Sub-Saharan countries that have shown progress in the fight against malaria and in attaining the Millennium Development Goals 6c: halt and begin to reverse the incidence of malaria and other major diseases by 2015. This surveillance data analysis is initiated to analyze the five- year trend of malaria in Guji zone, Oromia region 2003-2007.

Method: We used descriptive cross-sectional study design used Microsoft Excel to analyze the collected data.

Result: In the last five consecutive years 130,666 total case of malaria were diagnosed. Among these 41,125(31.5%) of the cases were diagnosed clinically and the rest 89,444(68.5%) confirmed. From the total confirmed malaria cases 18,376(78.9%), 4,358(18.7%) and 560(2.4%) of them were Plasmodium *PF*, *PV* and mixed of *PF* and *PV* respectively.

The number of deaths seems unrelated to the number of cases in each reporting year, which has an average of six deaths in each reporting year of the study.

Missing data value like malaria admissions by age and sex is the limitations identified.

Recommendation: Analysis of malaria by person, place and time should be strengthened and the data reported through PHEM could be able to have age and sex characteristics.

2.1.1. INTRODUCTION

Malaria is a protozoan disease caused by parasites of the genus Plasmodium. It is one of the leading causes of illness and death in the world. It is the leading cause of death in children under the age of 5 years and pregnant women in developing countries(1, 2). Malaria in humans is caused by five species of parasites belonging to the genus *Plasmodium*. Four of these – *P. falciparum, P. vivax, P. malariae* and *P. ovale* – are human malaria species that are spread from one person to another via the bite of female mosquitoes of the genus *Anopheles*. There are about 400 different species of *Anopheles* mosquitoes, but only 30 of these are vectors of major importance. In recent years, human cases of malaria due to *P. Knowles have* been recorded – this species causes malaria among monkeys in certain forested areas of South-East Asia. Current information suggests that *P. knowlesi* malaria is not spread from person to person, but rather occurs in people when an *Anopheles* mosquito infected by a monkey then bites and infects humans (zoonotic transmission)(3).

There were large reductions in the number of malaria cases and deaths between 2000 and 2015. In 2000, it was estimated that there were 262 million cases of malaria globally (range: 205–316 million), leading to 839 000 deaths (range: 653 000–1.1 million). By 2015, it was estimated that the number of malaria cases had decreased to 214 million (range: 149–303 million), and the number of deaths to 438 000 (range: 236 000–635 000). These figures equate to an 18% decline in estimated malaria cases and a 48% decline in the number of deaths during this period. Most cases in 2015 are estimated to occur in the WHO African Region (88%), followed by the WHO South-East Asia Region (10%) and the WHO Eastern Mediterranean Region (2%). Similarly, it is estimated that in 2015 most deaths (90%) were in the WHO African Region, followed by the WHO South-East Asia Region (7%) and the WHO Eastern Mediterranean Region (2%)(3).

P. falciparum and *P. vivax* malaria pose the greatest public health challenge. *P. falciparum* is most prevalent on the African continent, and is responsible for most deaths from malaria(3).

Plasmodium falciparum and Plasmodium vivax are the two predominant malaria parasites, distributed all over the country and accounting for 60% and 40% of malaria cases, respectively. Reports indicate that clinical malaria accounts for 10%-40% of all out patient consultations, with corresponding proportional morbidity among under 5 children is 10% - 20% (4).

Ethiopia has achieved remarkable progress in the fight against malaria during the most recent decade through strong preventive and case management interventions with large engagement of

the Health Extension Workers (HEWs) and the Health Development Army (HAD) volunteers providing community based care at the household level. In children under five years of age, malaria admissions and deaths fell by 81% between 2001 and 2011 and 73% respectively. The country is also one of the few Sub-Saharan countries that have shown progress in the fight against malaria and in attaining the MDG(Millennium Development Goals) 6c: halt and begin to reverse the incidence of malaria and other major diseases by 2015(4).

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. 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(5).

Based on the 2014 report over 50 million (60%) of Ethiopian population of live in malarias areas in which elevations below 2,000 meters above sea level. In 2014, the Federal Ministry of Health's Global Fund Concept Note, Ethiopian malaria transmission risk within 835 districts by population (%) and by annual parasite incidence per thousand (API) were as follow: High (>100/1000, 11 million (13%); Medium (5 to 99.9/1000; 28.1 million (34%), Low (0.1 to 4.9/1000; 11.1 million (13%), and Malaria-Free (~0, 33.6 million (40%)). According to the FMoH, in 2011/2012, malaria was the leading cause of outpatient visits, accounting for 17% of all outpatient visits, and 8% of health facility admissions among all age groups. According to the health Management Information System (HMIS) data malaria is one of the top ten causes of inpatient deaths in both under five children and adults. In 2012/2013, there were 57,503 public sector malaria hospitalizations, 4,984,266 malaria outpatient cases, and 2,942,031 laboratory-confirmed *PF* outpatient malaria cases, and 1,258,131 *PV* cases according to the annual micro-plan(5).

Prevention and control activities of malaria in Ethiopia are implemented as guided by the National Strategic Plan to ultimately reduce the burden of malaria to a level where it is no longer a public health problem. Four major intervention strategies that are being applied in Ethiopia to combat malaria were: early diagnosis and prompt treatment, selective vector control that involves use of Indoor Residual Spraying (IRS), Insecticide-Treated mosquito Nets (ITNs) and environmental management [9]. A major challenge for malaria epidemiologists is to evaluate the

strengths and weaknesses of both methods in estimating malaria incidence and time trends, especially as malaria control programmes are intensified worldwide (6).

The number of malaria deaths in children aged under 5 years is estimated to have decreased from 723 000 globally in 2000 (range: 563 000–948 000) to 306 000 in 2015 (range: 219 000–421 000). The bulk of this decrease occurred in the WHO African Region, where the estimated number of deaths fell from 694 000 in 2000 (range: 569 000–901 000) to 292 000 in 2015 (range: 212 000–384 000). While malaria remains a major killer of children, taking the life of a child every 2 minutes, the progress made in reducing deaths in children aged less than 5 years has been substantial, particularly in sub-Saharan Africa(3).

Oromia is one malaria epidemic regions in the country. Among 304 Woredas, 75 of them were identified as hot spot area for malaria disease. More than 23 million peoples are living in high malarias area. In this Oromia region malaria epidemic occurs from September to December and the peak is between October and November (7).

Therefore, this surveillance data analysis is initiated to analyze the five- year trend of malaria in Guji zone, Oromia region 2003-2007.

2.1.1.1. Significance of the study

Even though tremendous efforts had been made to control and prevent malaria, including establishing strategies, preparing guidelines and collaboration of stockholders malaria is still a major challenge which brought burden on health facilities in the country. Malaria is a major challenge to Ethiopia and African countries due to climate changes and global warming. Continuous surveillance and data analysis is an important measure to evaluate the trends of malaria related to intervention measures in controlling and preventing of the disease.

Routinely analysis of surveillance data is a key function for detecting/identifying outbreaks, monitoring disease trends, and evaluating the effectiveness of disease control programs and policies. Results from data analysis can improve public health action when incidence of diseases increasing.

2.1.2. OBJECTIVES

2.1.2.1. General Objective

- To analyze five years (2003 – 2007 E.C.) data of Malaria, in Guji Zone, Oromia Region, Ethiopia,2016

2.1.2.2. Specific Objectives

- To describe malaria morbidity and mortality by type in each Woreda, in Guji Zone, Oromia, Ethiopia.
- To characterize the incidence of malaria in different type of health institutions in each Woreda of Guji Zone, Oromia, Ethiopia.
- To illustrate trend of malaria over time, in Guji Zone, Oromia, Ethiopia.

2.1.3. METHODS AND MATERIALS

2.1.3.1. Case definitions

2.1.3.1.1. Malaria Suspected Case Definition:-

- Any person with fever or fever with headache, rigor, back pain, chills, sweats, myalgia, nausea, and vomiting diagnosed clinically as malaria(8).

2.1.3.1.2. Malaria Laboratory confirmed Case Definition: -

- A suspected case confirmed by microscope or RDT for Plasmodium parasite(8)

2.1.3.1.3. Malaria outbreaks: -

- Crossing the norm line OR doubling the number of malaria cases compared to the prior year of reported WHO epidemic week.

2.1.3.2. Study Area

Malaria Surveillance data analysis was conducted in Guji Zone of Oromia Regional state which is found in the Southern part of Ethiopia at the distance of 600KM from Addis Ababa. Its boundaries are Bale Zone in East, Somale Regional State in South East, Borena Zone in South West, SNNPs in North and North West. Guji Zone has 13 Woredas and three Towns. Guji zone has atotal of 369 kebeles of which 323(87.5%) of them were rural.From the total woredas found in the zone Liben, Goro Dola, Wadera, Girja and Sabba Boru are nomadic. As 2007 Ethiopian census, the total population of the zone was estimated to be 1,787,760 of which male estimated to 901,031 that makes male to female ratio 1:1. Area of the zone is 35,454 square kilometers, and population density is estimated to be 52 persons per one square kilometer. Guji Zone is found latitude of $4^0$40'N, $6^0$24'N and longitude of $38^0$40' and altitude of 500-3500 meters above sea level.

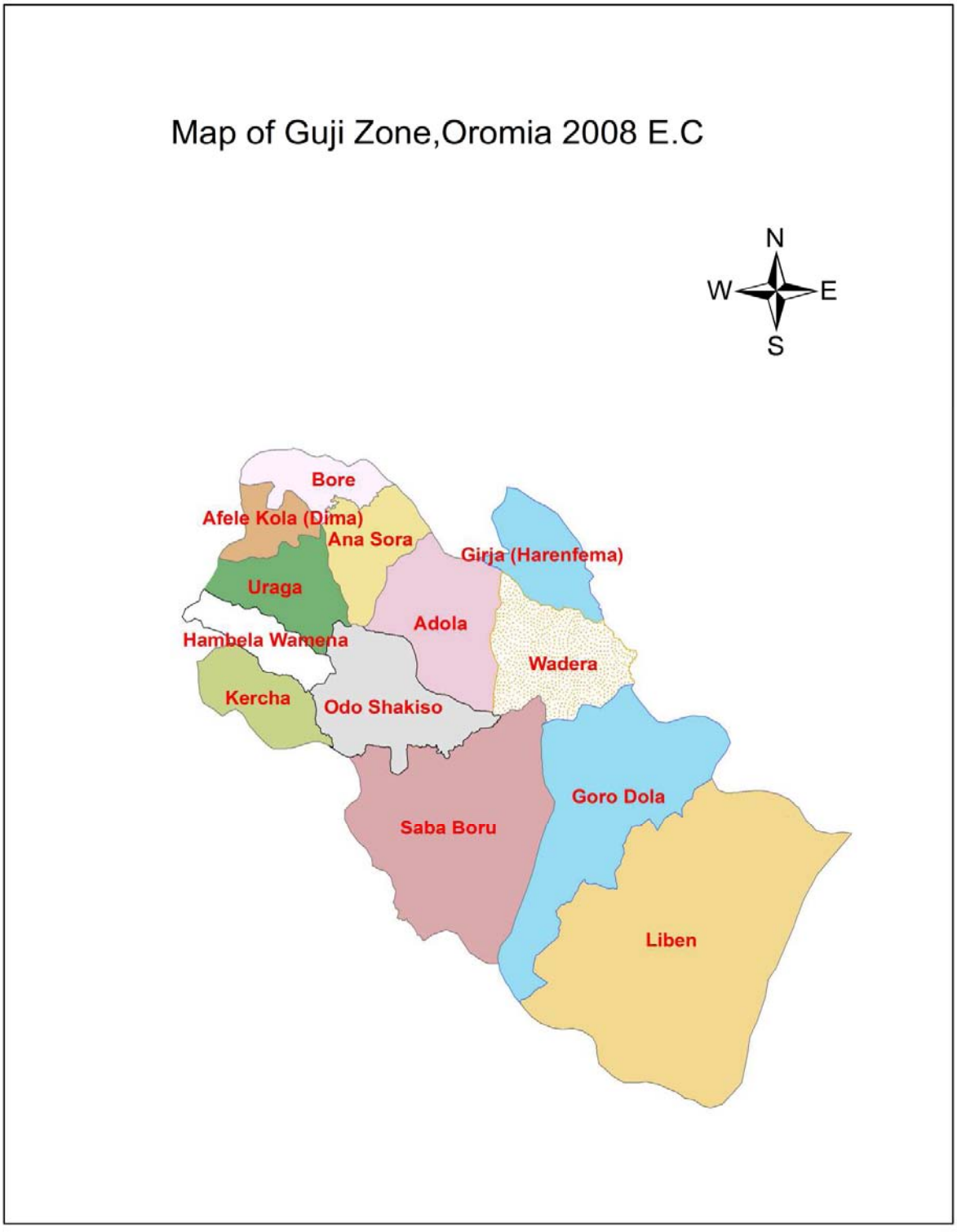


Figure2.1.1. 12:- Administrative Map of Guji zone, Oromia, Ethiopia 2016

2.1.3.3. Study Period

Secondary data of malaria for the past five years (2003-2007 E.C) was collected, analyzed and interpreted from March 06-20/2016.

2.1.3.4. Study Design

We used Descriptive cross-sectional study design.

2.1.3.5. Data Collection Procedure

The principal investigator collects and reviewed secondary data of malaria for the last consecutive five years from Zonal PHEM and malaria prevention and control core process.

3.6. Data Analysis Procedure

The collected data was analyzed by using Microsoft Excel.

3.7 Ethical Clearance

The Zonal health department has accepted for the analysis of Malaria morbidity and mortality through the formal letter of Oromia Regional Health Bureau (ORHB).

3.8. Data Dissemination

The study finding was prepared to share with AAU/School of public health/Department of Preventive medicine Ethiopian Field Epidemiology Training Program (EFETP) Coordinators and mentors, ORHB and Guji Zonal Health Department in both hard copy and electronic soft copy.

2.1.4. RESULT

According to the data obtained from Guji zonal health department 130,666 total case of malaria were diagnosed during the last five consecutive years (2003-2007E.C).Among these malaria cases 41,125(31.5%) of the cases were diagnosed clinically and the rest 89,444(68.5%) confirmed by microscopy and Rapid Diagnostic Test (RDT).The proportion of cases confirmed by microscopy out of confirmed malaria cases were74, 374 (83.1%) the rest by RDT.

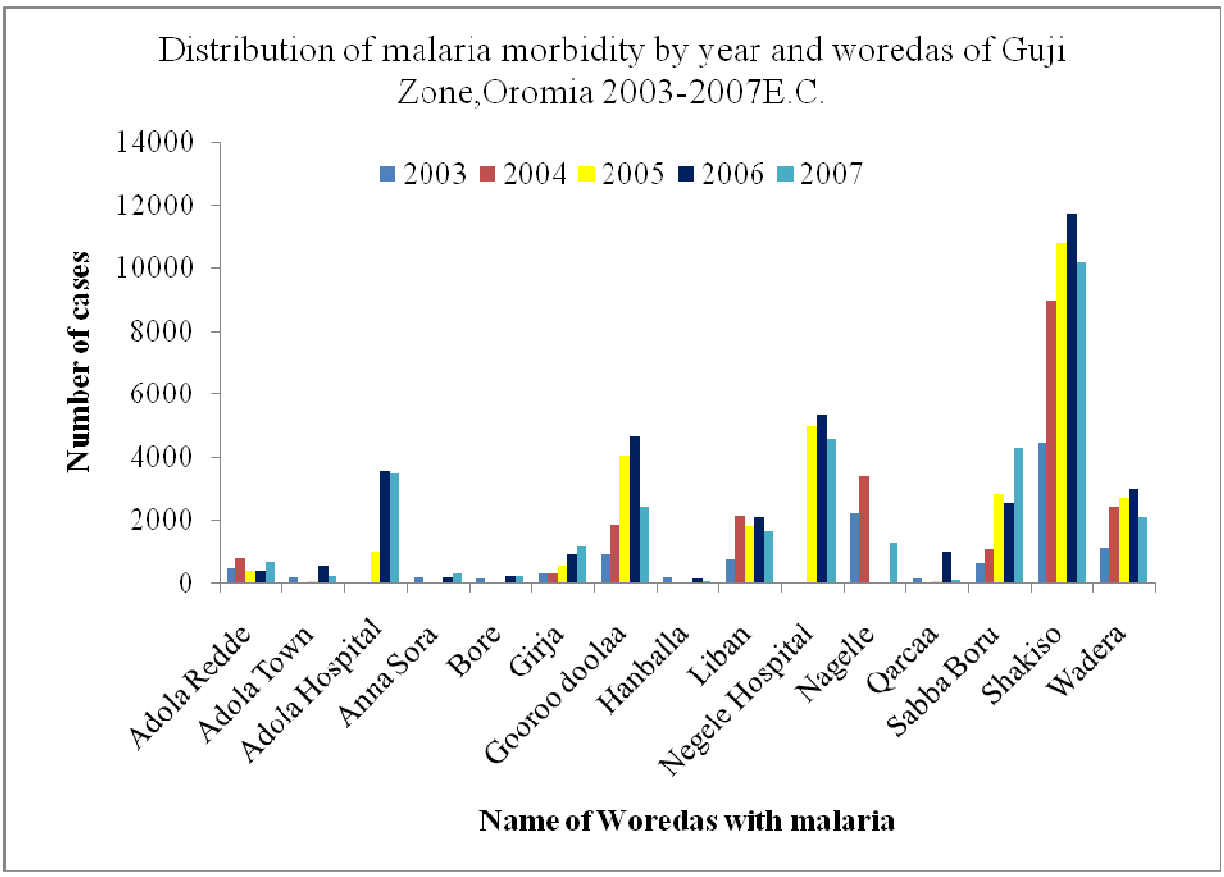


Figure2.1.2. 13:- Distributions of malaria morbidity by year and reporting Woredas/ Hospital of Guji zone, Oromia 2003-2007E.C.

According to the data collected, there was a substantial increment in the number of malaria cases in the first four (2003E.C. – 2006E.C.) years in the zone. The year with the most reported malaria cases was 2006E.C.with malaria morbidity of 36,296(27.7% of total cases and a slit decrease in 2007 E.C.

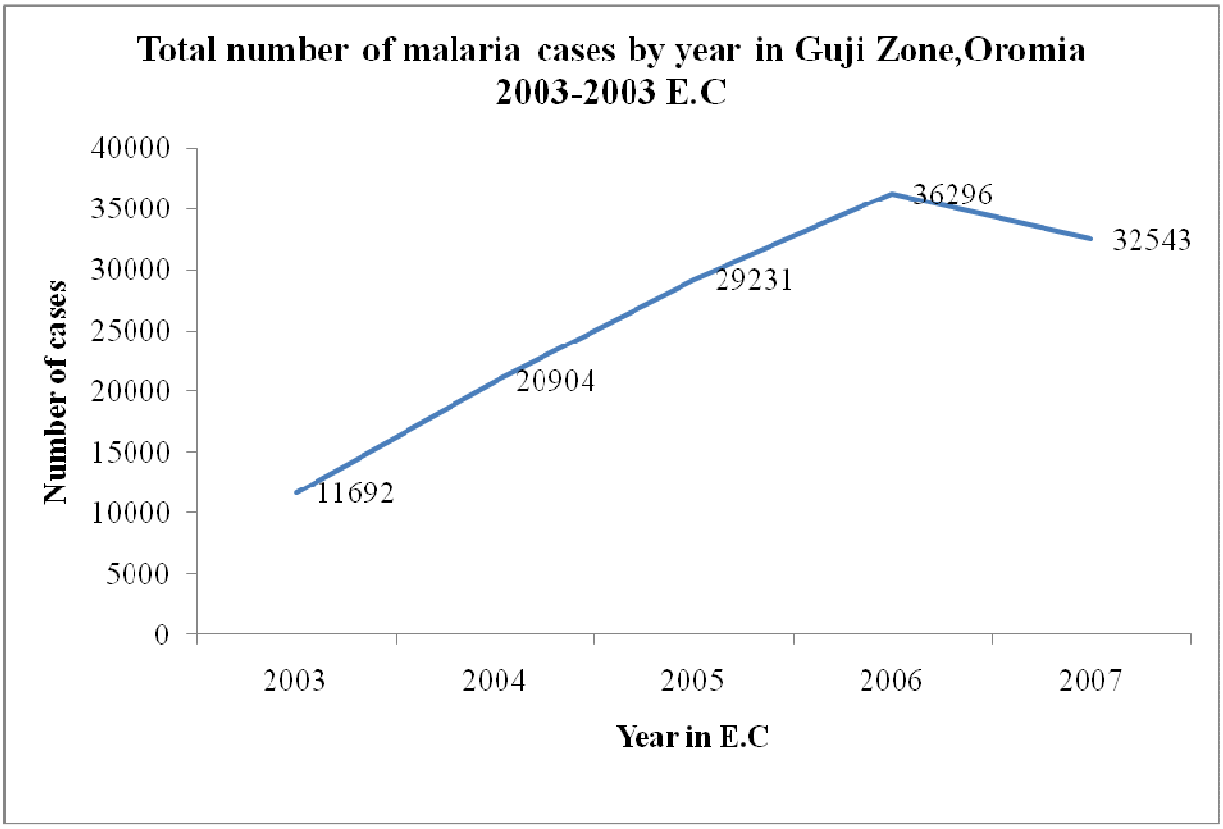
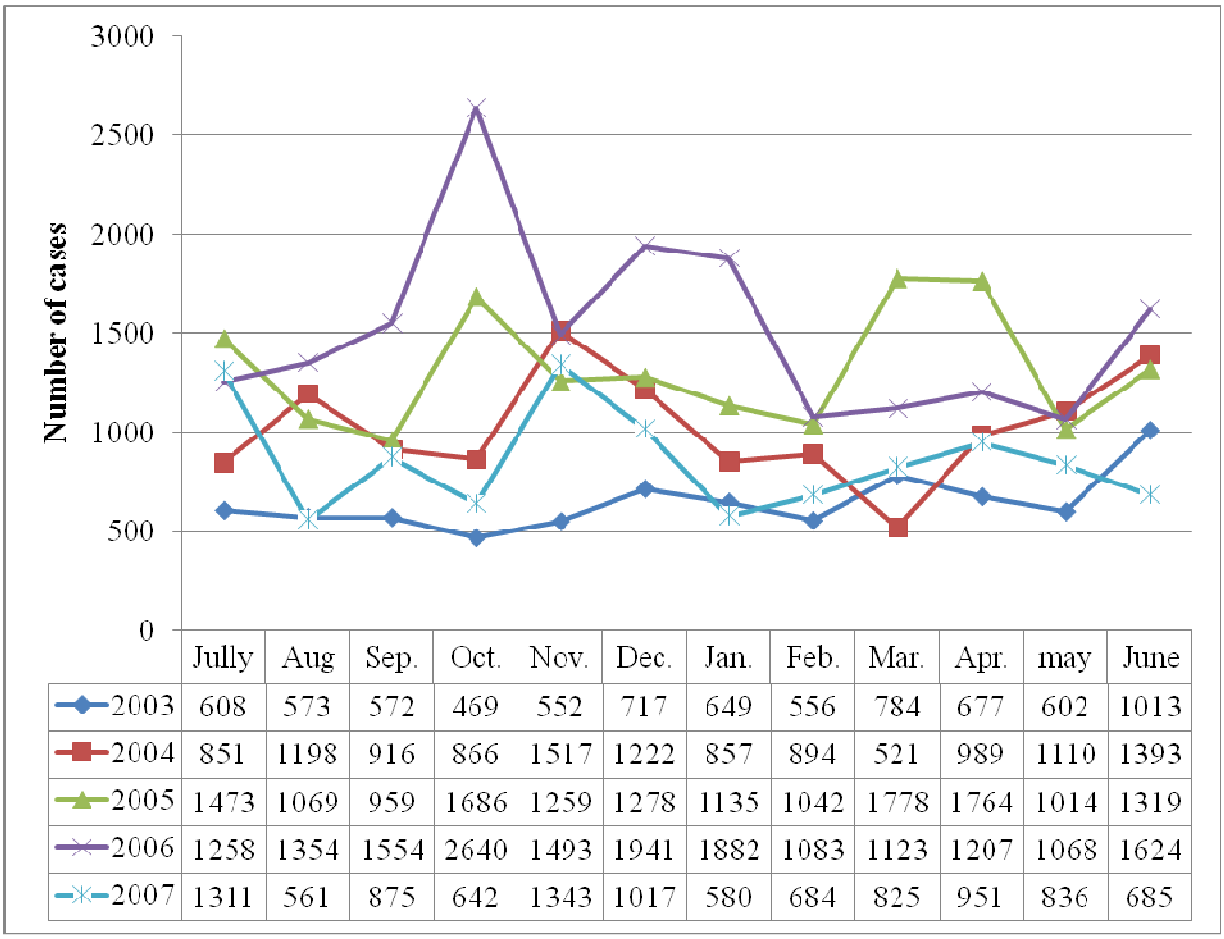


Figure 2.1.3:-Trends of malaria cases by year of Guji zone, Oromia 2003-2007E.C.



	Jully	Aug	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	may	June
2003	608	573	572	469	552	717	649	556	784	677	602	1013
2004	851	1198	916	866	1517	1222	857	894	521	989	1110	1393
2005	1473	1069	959	1686	1259	1278	1135	1042	1778	1764	1014	1319
2006	1258	1354	1554	2640	1493	1941	1882	1083	1123	1207	1068	1624
2007	1311	561	875	642	1343	1017	580	684	825	951	836	685

Figure 2.1.4:-Five years' trends of malaria morbidity by month and year of Guji zone, Oromia 2003-2007E.C.

Zonal reports show different magnitude of highest recording malaria cases in different woredas or reporting institute in the last five years. Shakiso woreda, Negele hospital, Gorodola woreda, reported the greatest number of malaria cases.

Table2.1.1.9:-Total number of cases by reporting institutions and year of Guji zone, Oromia, Ethiopia 2003-2007E.C.

S.N	Name of Woreda or reporting institutions with malaria	Year					
		2003	2004	2005	2006	2007	Total
1	Shakiso	4412	8927	10815	11689	10173	46016
2	Negele Hospital	0	0	5005	5345	4538	14888
3	Gooroo doolaa	906	1873	4030	4658	2390	13857
4	Sabba Boru	648	1062	2801	2539	4283	11333
5	Wadera	1100	2429	2702	2964	2090	11285
6	Liban	750	2121	1831	2103	1655	8460
7	Adola Hospital	0	0	979	3549	3460	7988
8	Nagelle	2203	3404	0	0	1276	6883
9	Girja	313	302	556	909	1157	3237
10	Adola Redde	458	786	411	415	658	2728
11	Qarcaa	159	0	40	1001	75	1275
12	Adola Town	178	0	32	537	214	961
13	Anna Sora	201	0	5	191	310	707
14	Bore	152	0	0	243	234	629
15	Hanballa	212	0	24	153	30	419
16	Total of the zone	11692	20904	29231	36296	32543	130666

From the total confirmed malaria cases 18,376(78.9%), 4,358(18.7%) and 560(2.4%) of them were Plasmodium *PF*, *PV* and mixed of *PF* and *PV* respectively. Among confirmed malaria cases 6,918(29.7%) of them were under five children and the rest 16,376(70.3%) are adults. Additionally, there were 324 pregnant mothers with malaria morbidity and 29 total malaria deaths were reported to the zone from different reporting entities.

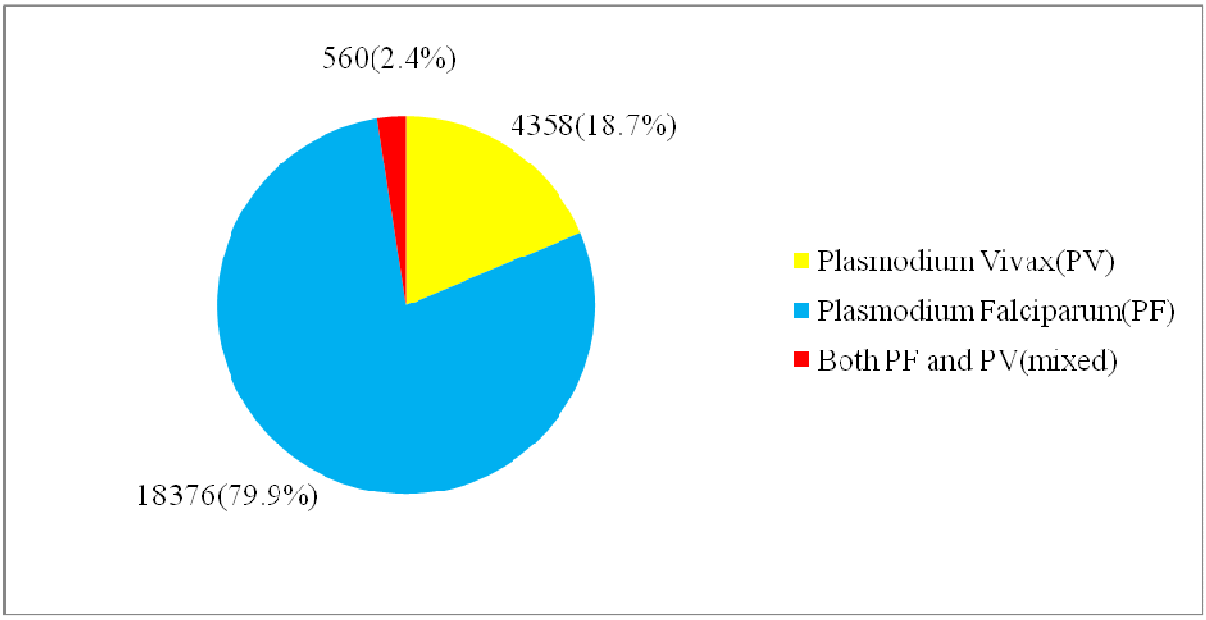


Figure2.1.5. 14:-Total number of malaria cases by plasmodium species of Guji zone, Oromia 2003-2007E.C.

In the period 2003 – 2007E.C. there were 29 malaria deaths in the zone. The mean number of malaria deaths per year was six. The total consecutive five year malaria admission was 383.

Table2.1.2.10:-Total number of cases by species, age group, and year of Guji zone, Oromia, Ethiopia 2003-2007 E.C.

S.N	Disease/Species	Number of cases by year					Total
		2003	2004	2005	2006	2007	
1	PF	897	3000	4887	5694	3898	18376
2	PV	272	302	577	1367	1840	4358
3	mix	0	0	62	233	265	560
4	Lab. Conformed <5 years	217	787	1866	2073	1975	6918
5	Lab. Conformed ≥5 years	952	2515	3660	5221	4028	16376
6	Malaria in pregnancy	27	97	92	72	36	324
7	Malaria Death	0	0	9	7	13	29
8	Malaria admission	0	0	93	151	139	383

The overall five-year average of zonal confirmed and clinically reported malaria incidence was 15.3 per 1000. The trends of confirmed and clinically malaria incidence proportion increase in the year 2006E.C, and become declining in the next year (2007E.C).

Table2.1.3.11:-Five year malaria incidence and mortality proportion, Guji zone, Oromia region, Ethiopia 2003-2007 E.C

Year	Total Population of the year	Total malaria Cases	Incidence proportion /1000	Total malaria death	Mortality proportion/1000 cases
2003	1594585	11692	4.87	0	0
2004	1640828	20904	7.52	0	0
2005	1688412	29231	9.34	9	0.31
2006	1737376	36296	10.49	7	0.19
2007	1787760	32543	5.77	13	0.40
	Average	26133	15.3	6	0.22

2.1.5. DISCUSSION

A survey conducted between 1980-2011 G.C in Oromia region showed that, of a total of 122812 individuals examined there were 4006(3.3%) individuals were positive, of which 2954 (74%) and 1052(26%) individuals positives with **PF** and *PV* respectively (14). This study also showed that there were 78.9% of PF, 18.7% PV and 2.4%of mixed (P F and PV).

In Guji Zone of Oromia region the proportion of malaria diagnosis clinically and microscopy indicated that among 130,666 total malaria cases 41,125(31.5%) of the cases were Diagnosed clinically and the rest 89,444(68.5%) confirmed by microscopy and Rapid Diagnostic Test (RDT).The proportion of cases confirmed by microscopy out of confirmed malaria cases were74, 374 (83.1%) where as the malaria Indicator Survey(MIS) conducted in 2015 showed that, the total number of laboratory-confirmed plus clinical malaria cases was 2,174,707. Of those cases, 1,867,059 (85.9 percent) were confirmed by either microscopy or rapid diagnostic tests (RDTs) out of which 1,188,627 (63.7 percent) were *PF* and 678,432 (36.3 percent) were *PV(9)*.

According to the health and health related indicators bulletin report of EPHI, malaria is one of the top 10 outpatient diseases since long time, which is almost having the same magnitude of malaria cases in this study (10). The report shows increasing of magnitude of malaria from year to year like the PHEM report. But it seems unlikely to the ground of the practical trends of malaria in this country. It may be due to the improvement of reporting system rather than increasing of the malaria cases. Completeness of the PHEM report shows significant improvement, that is, from the list of about 18.9 % in 2009 to the peak of 91.9% in 2016(10).

2.1.6. CONCULUSION

Generally the strategy for control and preventive of malaria had been on the right track, that results significant decline of morbidity and mortality, including decreasing the burden of malaria case in health facilities.

The number of deaths seems unrelated to the number of cases in each reporting year, which has an average of six deaths in each reporting year of the study.

2.1.7. LIMITATIONS

- Missing data value like malaria admissions by age and sex.
- The case data availability did not incorporate in the network for all health facilities like private sectors and organization like MOD (ministry of defense), police and NGO (non-governmental organization) health services. This may underestimate the malaria cases.

2.1.8. RECOMMENDATIONS

- Analysis of malaria by person, place and time should be strengthened and the data reported through PHEM could be able to have age and sex characteristics.
- MOH should give stress in strengthening of continuous surveillance, that is an important issue to overcome effective control programs, funding budgets and expenditures for the distribution of commodities and to clinical and epidemiological outcomes
- RHB should able giving great attention regarding to have continuous surveillance and strengthening of building knowledge and strengthening of surveillance expansion to the health centers and health posts as well as to the communities.
- Every step of administrative including MOH, EPHI and RHB should take the responsibilities in improving laboratory diagnosis of malaria cases that helps to overlook other disease that are masked by malaria and to reach the diagnosis on suspected diseases in order to improve the overestimation by clinical cases.

2.1.9. ACKNOWLEDGMENTS

On behalf of my surveillance data analysis work, I grateful my mentors (Dagnachew Alemu and Abigiya Wondimagegnehu), who achieved their successful mentorship responsibility.

I would like to thank the PHEM staff and malaria control core process staff of Guji Zonal Health Department, Ethiopia Public Health Association, Addais Ababa University, School of Public Health and Oromia regional Health Bureau Public Health Emergency Management staffs for their unlimited contribution during this surveillance data collection and analysis.

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Chapter –III Evaluation of Public Health Surveillance System

3.1 Surveillance System Evaluation of East Shoa Zone, Oromia, November 2016

EXECUTIVE SUMMARY

Introduction: Public health surveillance is an ongoing systematic collection, analysis, interpretation and dissemination of data regarding a health related event for use in public health action to reduce morbidity and mortality, and to improve health. The public health system is continually challenged by recurrent and unexpected disease outbreaks and is facing the challenge of managing health consequences of natural and human made disasters, emergencies, crisis, and conflicts. This study is intended to evaluate surveillance system in East Shoa Zone mainly focusing on Malaria and malnutrition prevention and control activities.

Method: Descriptive cross-sectional study was conducted in East Shoa Zone, Oromia region from October to November 2016. Zonal health office, 5 woredas, 10 health centers, 10 health posts and one Hospital were included in the study. Semi-structured questionnaire for surveillance system evaluation was used.

Result: National Public Health Emergency Management guideline and manuals for management of some prioritized diseases are available at zonal and all visited Woredas. Standard case definitions for all prioritized diseases are available at Zonal, Hospital, 8 (80%) health centers and 7(70%) Health Posts in the zone. At zonal level, the Public Health emergency management officers analyze surveillance data by time, person and place and send its feedback to the lower level in quarterly bases but not at Woreda and health facility level. During the past six months, East Shoa zonal department were not conduct supportive supervision because of time constraints and security issues in the region.

Recommendation: Analysis of Surveillance data on time, place and person should be strengthening at all levels for prioritized diseases and Supportive Supervision also undertaken in routinely bases.

3.1.1. INTRODUCTION

3.1.1.1. Background

Public health surveillance is an ongoing systematic collection, analysis, interpretation and dissemination of data regarding a health related event for use in public health action to reduce morbidity and mortality, and to improve health(1). Data disseminated by a public health surveillance system can be used for immediate public health action, program planning and evaluation and formulating research hypothesis(1).

The public health system is continually challenged by recurrent and unexpected disease outbreaks and is facing the challenge of managing health consequences of natural and human made disasters, emergencies, crisis, and conflicts. These problems continue to disrupt the health care system, while successful detection and response to these challenges is becoming increasingly complicated(2). In order to combat with the challenges that are ever growing, the way working processes are organized and its capacities should also be changed. Based on this fact the health sector has identified Public Health Emergency Management (PHEM) as one of the seven core processes to be reengineered by Federal Ministry of Health and its Agencies. The National PHEM guideline developed in 2012 is prepared to give guidance to all public health officers, stakeholders and development partners who take part in public on how to implement the PHEM activities in a standardized way. The information and activities in PHEM guideline are intended for use by health managers and health staff at all levels of the health system (Federal, Regional, Zonal, and Woreda and health facilities). These include; - Public health /Health management teams, PHEM staff, Surveillance officers/focal points, Health facilities. The evaluation of public health surveillance addresses the relevance of the Public Health Offices surveillance function, including the continued need for the surveillance function, its alignment with the priorities of the national PHEM guideline, the role and responsibility of Regional PHEM process, Zonal Health Department, Woreda Health Offices and Health Facilities.

These systems vary from a system collecting data from a single source to an electronic system that receive data from many sources in multiple formats to complex surveys. This system is useful if it contributes to the, measure the burden of a disease (or other health-related event), including changes in related factors, the identification of populations at high risk, and the identification of new or emerging health concerns, monitor trends in the burden of a disease (or other health-related event), including the detection of epidemics (outbreaks) and pandemics;

guide the planning, implementation, and evaluation of programs to prevent and control disease, injury, or adverse exposure; evaluate public policy; detect changes in health practices and the effects of these changes; prioritize the allocation of health resources; describe the clinical course of disease; and provide a basis for epidemiologic research (1)**.**

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. Insofar as possible, the evaluation of surveillance systems should include recommendations for improving quality and efficiency, e.g., eliminating unnecessary duplication. Most importantly, an evaluation should assess whether a system is serving a useful public health function and is meeting the system's objectives(3).

Because surveillance systems vary widely in methodology, scope, and objectives, characteristics that are important to one system may be less important to another. Efforts to improve certain attributes--such as the ability of a system to detect a health event (sensitivity) may detract from other attributes, such as simplicity or timeliness. Thus, the success of an individual surveillance system depends on the proper balance of characteristics, and the strength of an evaluation depends on the ability of the evaluator to assess these characteristics with respect to the system's requirements. In an effort to accommodate to these objectives, any approach to evaluation must be flexible. With this in mind, the guidelines that follow describe many measures that can be applied to surveillance systems, with the clear understanding that all measures will not be appropriate for all systems(3).

The FMOH of Ethiopia identified 21 top priority diseases which are epidemic prone, of international concern and diseases that have eradication and elimination programs for surveillance activities. These diseases are monitored by a designated bodies through available means of communication- telephone, paper based reporting etc. These diseases are mandatory notifications which are immediately reportable diseases and routine surveillance reported weekly **(2).**

Malaria and malnutrition are two of these 21 priority diseases reported on the weekly bases. Oromia is one of the regions prone for malaria epidemic in the country. Among 304 Woreda, 75 of them were identified as hot spot area for malaria disease. More than 23 million population of the region are living in risk area for malaria infection. In Oromia region malaria occurs in epidemic forms from September to December and peaking in October and November(2).

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

3.1.1.2. Rationale

Surveillance system evaluation is a tool for monitoring surveillance activities; disseminate feedbacks and inputs for improvement of intervention programs. Enhancing this evaluation is very important to control communicable diseases mainly those that has public health importance. Malaria is one of communicable disease, which is under surveillance activities and poses major public health problem in Oromia Region. In East Shoa Zone, Oromia Region selected diseases like Malaria and Malnutrition are remaining major public health problem. Recently, East Shoa Zone is one Zone in Oromia region that monitored malaria and malnutrition as a hot spot area. In this year most of the PHEM Report showed that there was an increment of malaria cases in the zone.

This study is intended to evaluate surveillance system in East Shoa Zone mainly focusing on Malaria and malnutrition prevention and control activities. Additionally, findings of this evaluation may lead decisions and use as an input for strengthening public health surveillance activities.

3.1.2. OBJECTIVES

3.1.2.1General objective

- To ensure that selected diseases under surveillance specifically Malaria and Malnutrition are being monitored efficiently, effectively in East Shoa Zone, Oromia, Ethiopia 2016.

3.1.2.2 Specific objectives

- To assess and describe key attributes of the surveillance system mainly on prioritized diseases.
- To identify core functions of the current surveillance system in the zone
- To assess the availability of the resources in a surveillance activities in East Shoa Zone

3.1.3. METHODS AND MATERIAL

3.1.3.1. Study area

Surveillance system evaluation was conducted in East Shoa Zone of Oromia region, Ethiopia, 2016

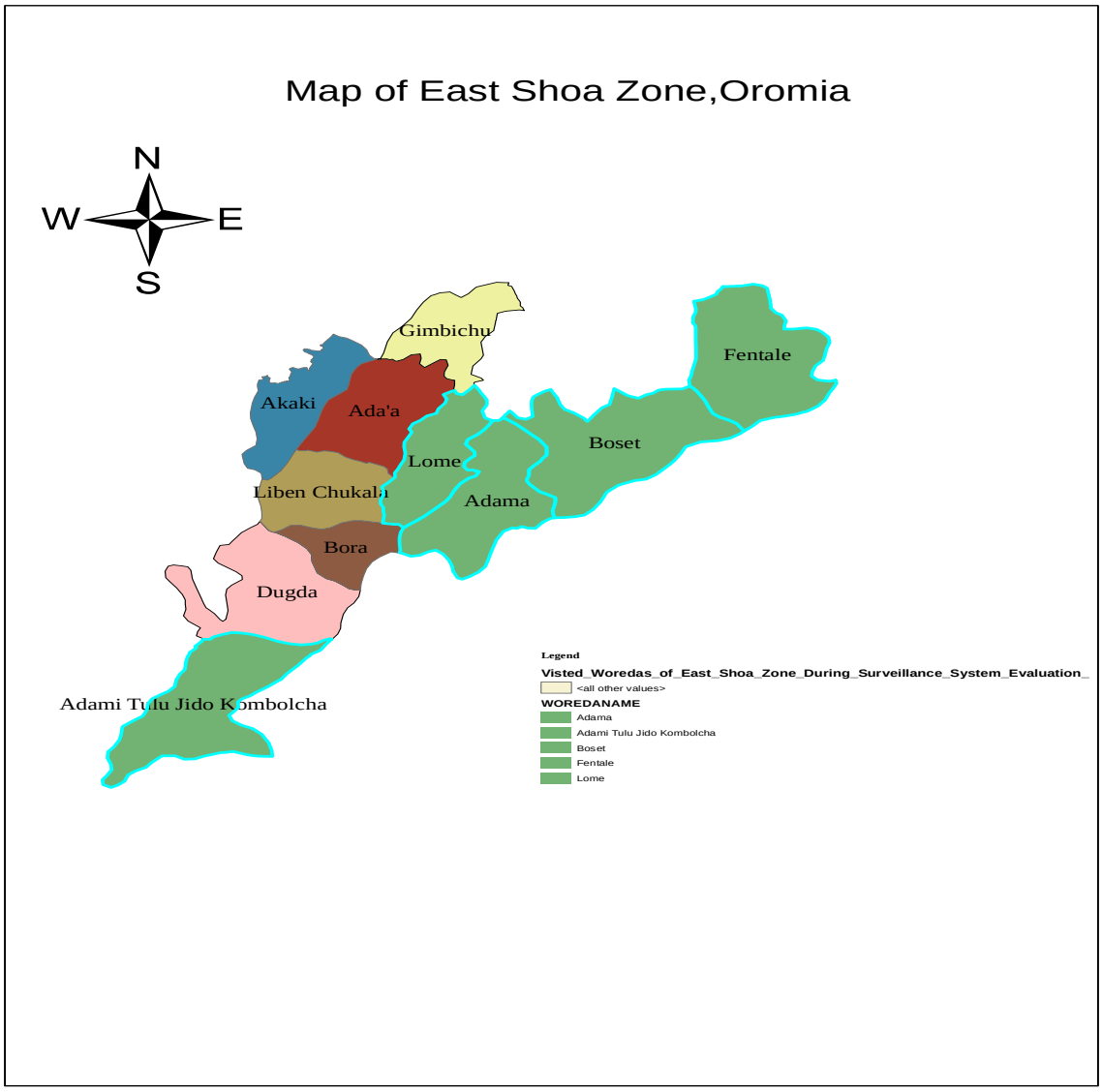

Figure3.1.1.15:-Map of Visited Woredas of East Shoa Zone, Oromia 2016.

3.1.3.2. Study Period

The evaluation period was 2016 year Surveillance activities, specifically the surveillance of Malaria and malnutrition which was conduct from October 28/ 2016 to November 20, 2016.

3.1.3.3. Study Subjects:

The evaluation was addressed the Surveillance system of East Shoa PHEM department, Olanchiti Hospital, Fentale,Boset,Adama,Lume and Adami Tulu Gido Komblcha Woreda Health Offices and their selected health center and health posts..

3.1.3.4. Study Design

Descriptive Cross-sectional study design was used for the evaluation of malaria and malnutrition surveillance at Zonal, Woreda and Health facility level in East Shoa Zonal Health Department, Oromia region.

3.5. Sample Size and Technique

East Shoa Zone is one the Zone in Oromia Region that reported the highest number of malaria cases to the region this year. We purposely selected to conduct the surveillance system evaluation in this zone.

A total of 27 sites were selected for the study. A total of 5 (50%) Woredas and one (50%) hospital are selected by convenient sampling method based on their malaria weekly report case load and surveillance performances. From each selected Woredas two Health Center (10HC) and from each selected HC one Health Post(10HP) were selected by using (Simple Random Sampling)SRS method.

3.1.3.6. Data Collection Tools and Procedures

Semi-structured questionnaire, adopted from WHO (World Health Organization) and CDC (Center for Disease Control and Prevention) standard questionnaire for surveillance system evaluation, was used during data collection at all levels. Zonal, Woreda and Health Facility PHEM focal persons and other responsible bodies was interviewed with this questionnaire. Surveillance data flow from peripheral to Zonal level was observed. In addition, Tasks undertaken at different level was assessed. Data on attributes of the surveillance system (usefulness of the surveillance system, simplicity of the system, flexibility, quality of the data, acceptability, representativeness, timeliness, and stability of the surveillance system) at different level was assessed.

3.1.3.7. Data Analysis Tools

The collected data was organized and analyzed using Microsoft Excel.

3.1.3.8. Data Dissemination

Written report (both hard and soft copies) was prepared and shared to the visited Zone and health facilities, Addis Ababa University/School of Public Health, Oromia Regional Health Bureau, and Ethiopia Field Epidemiology Training Program (EFETP).

3.1.4. RESULT

3.1.4.1. Meeting with stakeholders

The principal investigator conducted a brief meeting with responsible persons (Head of institution, PHEM focal person) before assessing the objective of the study and its significance, and highlighted information after assessment, at all level. This meeting was also an important first step for assessment and recommendations; which will help for the implementation of recommendations and betterment of the surveillance and response of the major priority diseases of the evaluated zone.

3.1.4.2 Description of Selected Diseases (Malaria and Malnutrition) in surveillance System Evaluation.

3.1.4.2.1 Malaria

There were large reductions in the number of malaria cases and deaths between 2000 and 2015. In 2000, it was estimated that there were 262 million cases of malaria globally (range: 205–316 million), leading to 839 000 deaths (range: 653 000–1.1 million) (Table 2.1). By 2015, it was estimated that the number of malaria cases had decreased to 214 million (range: 149–303 million), and the number of deaths to 438 000 (range: 236 000–635 000). These figures equate to an 18% decline in estimated malaria cases and a 48% decline in the number of deaths during this period. Most cases in 2015 are estimated to occur in the WHO African Region (88%), followed by the WHO South-East Asia Region (10%) and the WHO Eastern Mediterranean Region (2%). Similarly, it is estimated that in 2015 most deaths (90%) were in the WHO African Region, followed by the WHO South-East Asia Region (7%) and the WHO Eastern Mediterranean Region (2%)(4).

In Ethiopia, malaria is highly seasonal in many communities, but may have nearly constant transmission in some other areas; at the district level, malaria outpatient caseloads may vary several-fold from year to year in an “unstable” epidemic-prone transmission pattern. Peak malaria transmission occurs between September and December in most parts of Ethiopia, after the main rainy season from June to August. Certain areas experience a second minor malaria transmission period from April to June, following a short rainy season from February to March.

January and July typically represent low malaria transmission seasons in most communities. Since peak malaria transmission often coincides with the planting and harvesting season, and the majority of malaria burden is among older children and working adults in rural agricultural areas, there is a heavy economic burden in Ethiopia. Although historically Ethiopia has been prone to periodic focal and widespread malaria epidemics, malaria epidemics have been largely absent since 2004, after the scale up of malaria control interventions(5).

Additionally, malaria in Ethiopia is characterized by widespread epidemics occurring every five to eight years, with the most recent epidemic occurring in 2003/2004(6).

In 2016, PHEM data have shown an increase in malaria transmission relative to previous years. According to the most recent Epidemiological Bulletin from the Ethiopian Public Health Institute (EPHI), malaria cases are trending upwards and in fact have surpassed 2014 and 2015 case levels. Moreover, EPHI reports this trend will likely continue throughout the year due to combination of drought and flooding(5).

Malaria Indictor Survey (MIS) conducted in Ethiopia in 2015 indicated that There was a reduction in malaria prevalence by RDT in 2015 (1.2 percent) compared to the results in 2011 (4.5 percent). Similarly, when comparing the microscopy results, malaria prevalence in 2015 is lower than that of 2007 and 2011(6).

IDSR reports of 2015 showed that1, 307,112 total malaria fever cases examined by RDT or Microscopy regionally. Of which 205,019 are confirmed malaria cases. Out of confirmed malaria cases, plasmodium falciparum 120,235(58.6%) and plasmodium vivax 84,784(41.4). During same year East Shoa Zone also reported 213,398(16.3% of the region) total malaria cases examined by RDT or Microscopy, of which 34856 are confirmed. The highest number of confirmed malaria cases reported from East Shoa Zone (34,856(17%) followed by West Wollega 22,414(10.9%), Borena 15220(7.4%), East Wollega 13,547(6.6%) and others zone and towns of the region.

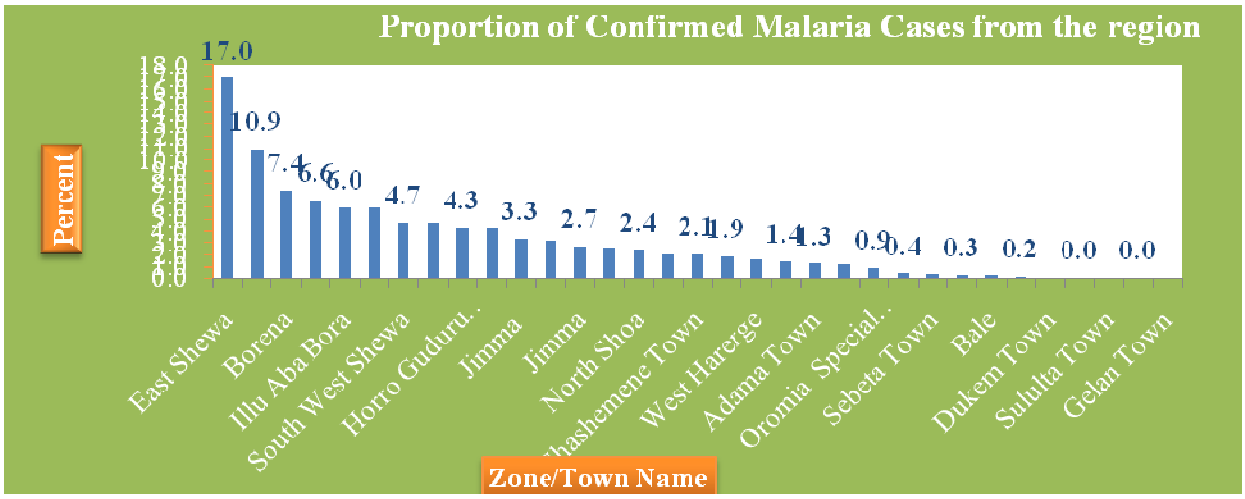

Figure3.1.2.16:- Proportion of Confirmed Malaria Cases by Reporting Zone and Towns of Oromia Region, Ethiopia 2016.

The 2016 IDSR report also showed 30,600 confirmed malaria cases were reported up to WHO week 44. From these 17947(58.6%) and 12653(41.4%) were plasmodium falciparum and plasmodium vivax respectively.

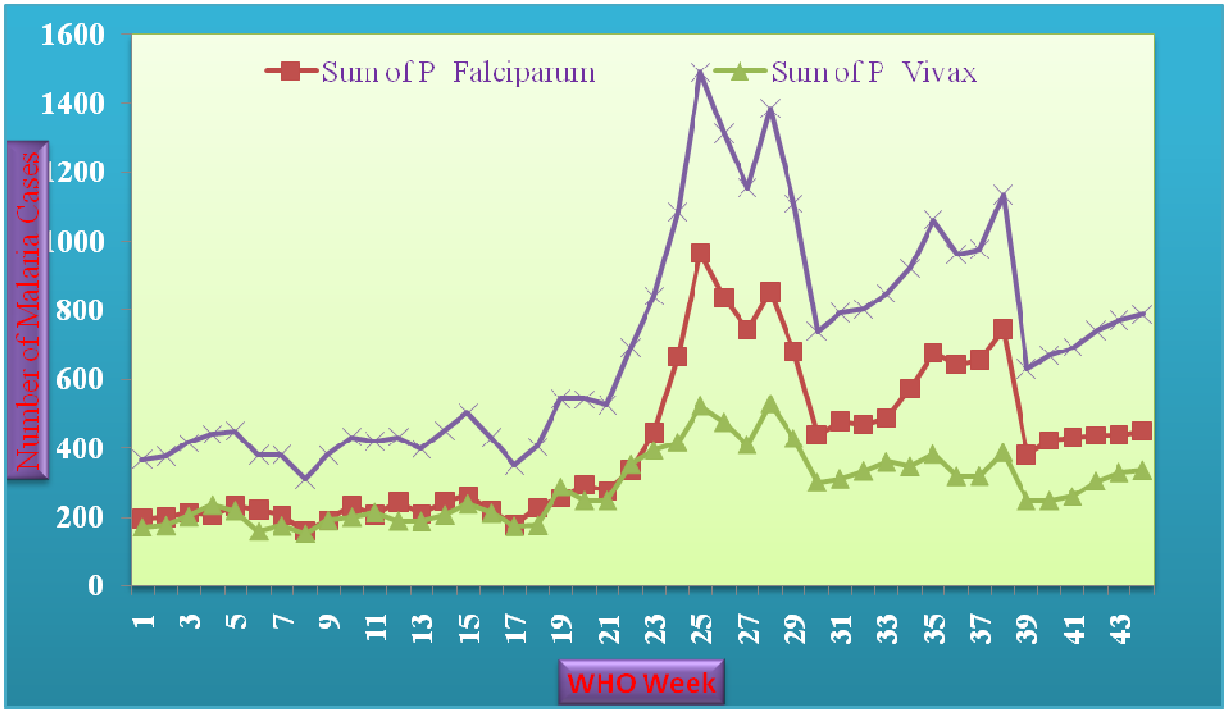

Figure3.1.3.17:-Trends of Confirmed malaria cases by species and WHO Epidemiologic week of East Shoa Zone, Oromia. 2016

3.1.4.2.2 Malnutrition

Malnutrition is a pathological state resulting from a relative or absolute deficiency or excess of one or more essential nutrients. The number of possible underlying causes of malnutrition are seems endless and their interrelationships complex. However, one way of identifying these causes is to identify the three positive conditions necessary for adequate nutrition or, more precisely, necessary for adequate dietary intake and absence of disease. These are: - adequate access to food (household food security); adequate care of children and women: adequate access to health services & a healthy environment. In many Countries, nutrition policy and intervention is aimed at young child, pregnant and lactating women (7). Acute malnutrition is a devastating public health problem of epidemic proportions. Worldwide, about 55 million under five children suffer from acute malnutrition and an estimated 26 million of them had severely acute malnourished, most of who live in sub-Saharan Africa and South Asia. Every year, 3.5 million children die of malnutrition related causes. Among this, severe acute malnutrition contributes to 1 million deaths of children annually(8).

In Ethiopia, child malnutrition is one of the most serious public health problem and among the highest in the world(9).

The poor nutritional status of children and women continues to be a serious problem in Ethiopia. The health sector has increased its efforts to enhance good nutritional practices through health education, treatment of extremely malnourished children, and provision of micronutrients to mothers and children. The government's Health Sector Development Plan IV (2010/11-2014/15) continues to improve the nutritional status of mothers and children through the following programmes: Enhanced Outreach Strategy (EOS) with Targeted Supplementary Food (TSF) and Transitioning of EOS into the Health Extension Programme (HEP), Health Facility Nutrition Services, Community Based Nutrition (CBN), and Micronutrient Interventions and Essential Nutrition Actions/Integrated Infant and Young Feeding Counseling Services(10).

In Oromia Region 124,342 total of malnutrition cases and 54 deaths were reported through IDSR in 2015.Severe Acute Malnutrition (SAM) accounts 13,377(10.7%).The highest number of cases were reported from East Harerghe Zone 28,162(22.6%) followed by West Harerghe Zone 24,911(20.0%),Arsi 10,046(8.1%),West Arsi 8,057(6.5%),Bale 7,913(6.4%),Guji 4,714(3.8%),East Shoa 4,626(3.7%) and other Zones of Oromia Region.

Until WHO epidemiologic week 44, 2016 East Shoa Zonal Health Department reported 3492 malnutrition cases through IDSR report. The highest cases reported from Adami Tulu Jido

Kombolcha Woreda 832(23.8%) followed by Dugda 547(15.7%) and Fantale Woreda 493(14.1%).

In East Shoa Zone, malnutrition has been a priority health issue repeatedly for several years.

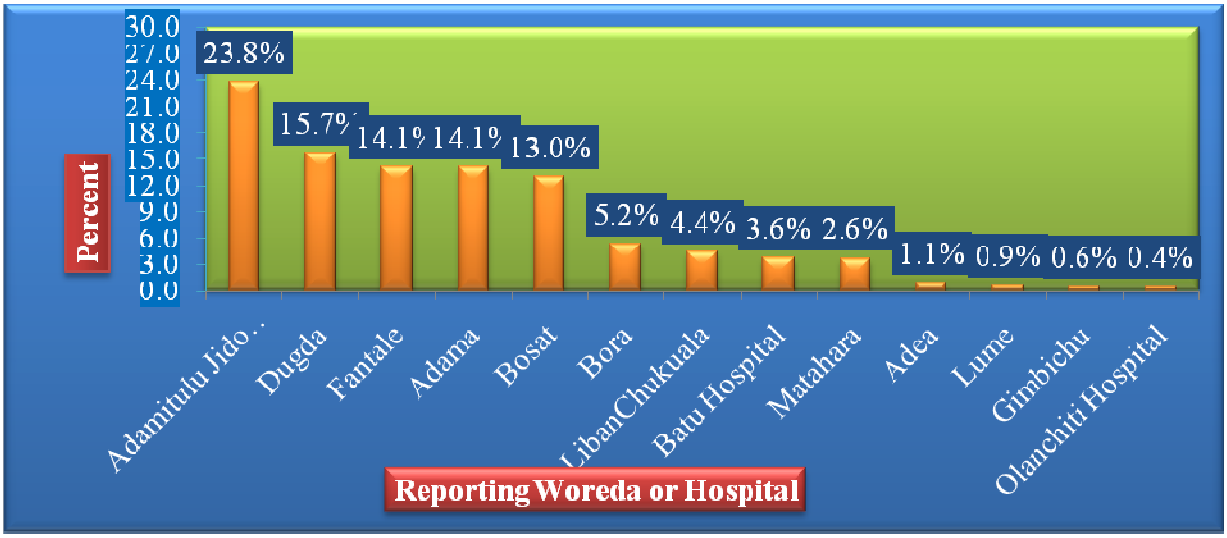

Figure 3.1.4.18:- Proportion of Malnutrition Cases by Reporting Woreda and Hospital of East Shoa Zone, Oromia 2016.

3.1.4.3 Availability of National Surveillance Manual

We found the new Public Health Emergency Management Guideline 2002 Ethiopia in all visited Woredas of East Shoa Zone including Olanchiti Hospital and Zonal Health Department. In addition, health centers were supplied with PHEM guidelines. However, some health centers did not have National PHEM guideline during this assessment. Among 10 visited health centers one (Algae HC of Fantale Woreda) of them did not have this guideline. Except in three health post in Fentale,Lume and adami Tulu Jido Kombolcha Woredas, the rest seven health posts did not have National PHEM guideline.

3.1.4.4 Case Detection and Registration

Standard case definitions for all prioritized diseases are available at Zonal, Hospital, 8 (80%) health centers and 7(70%) Health Posts in the zone. At visited Woredas and health facilities, recent outbreak was detected within less than two days after date of onset of first case (AWD outbreak). At all visited health facilities, there is clinical registration. In addition, it was identified that diseases are correctly filled in it except in one health post (Shara Health Post of Lume Woreda).

3.1.4.4.1 Standard Case Definition

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

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

Suspected SAM: - Children age from 6 months to 5 years with MUAC less than 11cm and/or children with bilateral edema regardless of their MUAC.

Confirmed SAM: - Children with MUAC less than 11cm and/or children with bilateral edema regardless of their MUAC.

3.1.4.4.2 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.

Sever Acute Malnutrition (SAM): - Children age 6 months to 5 years with MUAC less than 11cm and bilateral leg edema or Children age 6 months to 5 years with bilateral leg edema.

3.1.4.5 Population under Surveillance

A population under surveillance includes all residents in Oromia Regional State, East Shoa Zone and Visited Woredas by 2016.

Table3.1.1. 12:-Population under Surveillance of East Shoa Zone and Visited Woredas 2016

S.No	Zone/Woreda Name	Total Population	Male	Female
1	East Shoa Zone	1,788,258	912,184	876,074
2	Fentale Woreda	107,759	56,651	51,108
3	Bosat Woreda	184,668	95,513	89,155
4	Adama Woreda	201,110	101,656	99,454
5	Lume Woreda	162,192	79,988	77,987
6	Adami Tulu Jido Kombolcha	182,157	91,372	90,784

3.1.4.6 Data Reporting

Federal Ministry of Health and its stakeholders are responsible for designing and preparation of PHEM reporting formats. Regional Health Bureau and NGOs has provided this format through Zonal Health Department to lower levels. During this assessment shortage weekly PHEM reporting formats was observed in all Woredas and Health Facilities we assessed except at Lume Woreda health office. However, these districts and health facilities solved their problem by copying and manually preparing the formats. East Shoa zone is using mail to report weekly

surveillance activities to next level. All visited Woredas are using both mail and telephone to report for zonal health department. Among ten observed health posts 9 (70%) use both telephone and hard copy reporting format the other use telephone to report for the next level.

3.1.4.7 Data Analysis

At zonal level, the PHEM officers weekly analyze surveillance data by time, person and place and send its feedback to the lower level in quarterly bases. At all visited Woredas and health institutions data is not described by person, place and time. But in all Woredas we assessed malaria trend analysis was conducted. The reason of the respondents for failing to analyze the surveillance data by place, person and time was due to they had no any awareness regarding the analysis and its uses.

3.1.4.8 Availability of defined threshold

Action threshold level is available at Zonal and four visited Woreda level on National PHEM Guideline. In addition, in 80% of health centers there are action threshold levels for all selected diseases.

3.1.4.9 Outbreak Investigation

By the time of this surveillance system evaluation assessment there is no malaria out break reported except AWD. Four Woredas of East Shoa zone reported AWD out break to zonal health department but no one investigated.

4.10 Epidemic Preparedness and Management

There is written epidemic preparedness and response plan at zonal level. However, shortage of emergency drugs and supplies were encountered in the past one year at this level. This problem was mainly observed during epidemic of AWD in the zone. In four Woredas there is a written epidemic preparedness plan except Adama Woreda of East Shoa zone but this plan is not in regular basis. In addition, there was a shortage of medical drugs and supplies for emergency management in some Woredas during the past one year.

Regarding existence and activities of epidemic management committee, there is established committee at zonal and visited Woredas. During this assessment, it was identified that established committee at these levels is working regularly and formulated with all necessary disciplines because of the current AWD outbreak at zonal level but it is not similar at Woreda level.

There is no budget line for epidemic response at zonal and district level. Nevertheless, they use from others budget sources and supported by regional health bureau during epidemic. In addition there is epidemic rapid response team at all visited sites.

3.1.4.11 Availability of Budget and Resources for Surveillance Activities

There is budget allocated from government source for PHEM activities at regional level. Unlikely, there is no allocated budget from government source for public health emergency activities at zonal and Woreda level. Even though all visited districts had computers and its accessories, they did not use for PHEM activities separately rather they use it for all activities. Stationery is not enough at some health centers and health posts.

Table 3.1.2 13:-Availability of Resources for surveillance activities at zone, Woreda and health facility level, East Shoa Zone, 2016.

S.No	Resource	Zonal Level			Woreda Level			Health Center Level			Health Post Level		
		N	n	%	N	n	%	N	n	%	N	n	%
1	Computer	1	1	100	5	5	100	10	10	100	10	0	0
2	Printer	1	1	100	5	4	80	10	4	40	10	0	0
3	Photocopier	1	1	100	5	0	0	10	0	0	10	0	0
4	Stationary	1	1	100	5	5	100	10	7	70	10	7	70
5	Telephone Service	1	1	100	5	5	100	10	10	100	10	10	100
6	Fax	1	0	0	5	0	0	10	0	0	10	0	0
7	Electricity	1	1	100	5	5	100	10	9	90	10	4	40
8	Vehicles	1	1	100	5	5	100	10	0	0	10	0	0
9	Motor cycle	1	1	100	5	5	100	10	10	100	10	0	0
10	Bicycles	1	0	0	5	0	0	10	1	10	10	8	80

3.1.4.12 Feed Back

Feedback is a critical activity in strengthening surveillance system. At regional level 52 weekly bulletins on weekly reports has been prepared and disseminated for ministry of health, Zonal PHEM Offices and other stakeholders in 2015. However weekly bulletin were not prepared and disseminated at zonal level but written feed back in the form of letter prepared and disseminated for Woredas during their supportive supervision integrated with other activities. Many Woredas give written feedback for health facilities with integration of other activities that consists few indicators of surveillance activities quarterly. In majority of observed Woredas, producing and dissemination of written feedback for health facilities is very poor.

3.1.4.13 Supportive Supervision

During the past six months, East Shoa zonal department did not conduct supportive supervision because of time constraints and security issues in the region. Among 10 visited health centers 6 (60%) had not been supervised during the past 6 months by higher levels. Many Woredas have conducted integrated supportive supervision for health facilities with limited number of surveillance indicators last year however during the last six months this is not performed. Reporting system, active case searches and other surveillance activities were reviewed in supervised Woredas and health facilities.

3.1.4.14 Training of Surveillance Activities

This year, regional PHEM unit being with partners have conducted training for zonal and Woreda PHEM focal persons on MDSR. Additionally, there is at least one trained personnel at all visited health center. However, none health extension worker was trained on surveillance activity.

3.1.4.15 Attributes of the Surveillance System

3.1.4.15.1 Usefulness

At zonal level, all visited Woredas and health facilities, it was identified that the current surveillance system is helpful for early detection of outbreaks .Government and non-government organizations have used surveillance data to make decisions and take actions. However, surveillance guidelines did not distributed uniformly in all health facilities and there was poor utilization of guidelines at this level. Respondents at zonal, all visited Woredas and health facilities believe that the system is good enough to estimate magnitude of morbidity and mortality of selected diseases, identify factors associated with these diseases and able to evaluate its prevention and control programs.

3.1.4.15.2 Simplicity

All respondents at Zonal, Woreda and Health facility agreed that case definitions of selected diseases (malaria and malnutrition) are easy and applicable for case detection by all level professionals. PHEM focal persons at zonal and woreda level responded that additional data collection on cases are not time consuming rather it is important to deal with. Respondents at all level told that it takes greater than 15 minutes to fill weekly reporting format on morbidity and mortality of priority disease.

3.1.4.15.3 Flexibility

The previous IDSR system has been just now changed with the accomplishment of the current PHEM since 2009. This change has made the reporting format more flexible to report other newly occurring health event without much complication and the formats are assumed to be easy and complete e.g. maternal death. Currently, the woreda health offices and focal persons at facilities responded that as the system is flexible enough to add new health events without affecting other contents.

3.1.4.15.4 Data quality

The data quality was also assessed on the basis of completeness of the reporting format and the timeliness of the report as put in the guideline.

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 pertaining reporting system that resulted from lack of attention. Additionally, reporting sites and data collectors were not supervised regularly. At health post level, due to many health extension workers are not good in English they did not understand some variables and phrases on reporting formats.

3.1.4.15.5 Acceptability

Active participation of agents in reporting system of surveillance activities in regular pattern is a major attribute for system's acceptability. In East Shoa Zone, the engagement of the reporting agents and active participation in the case detection and reporting seems accepted by the health staffs with 89% reporting rate of the health facilities during WHO weeks (week 1-44/2016). The major reasons for some health staff for not regularly participating in the surveillance activity might be no feedback or recognition given by the higher bodies for their contribution; i.e.no dissemination of analysis data to reporting facilities and lack of understanding of the relevance of the data to be collected.

3.1.4.15.6 Representativeness

The representativeness of the surveillance system is related to the health service coverage, the reporting rate of the health facilities, the health seeking behavior of the community, and the technical capacity of the health care providers. The health service converges East Shoa Zone is 100% by Health center and 97% by PHCU (Primary Health Care Unit). The health seeking

behavior of the communities was also changed from time to time due to awareness creation by HEWs rounding house to house in all of the rural households

3.1.4.15.7 Timeliness and Completeness

The weekly reporting rate (completeness) of the health facilities in the zone was 91.1% during January 2016-October 2016.Woredas/Hospitals with highest completeness is Lume (100%)followed by Gimbichu (97.7%),Olanchiti Hospital (97.7%),Liben Chukala Woreda (97.2) while the least completeness report were reported from Batu Hospital (21.5%) and Metehara Town(25.7%).

The timeliness of East Shoa Zone was 82.3% with variation among Woredas and hospitals .The highest percentage of timeliness reported from Lume Woreda (90.7) and the least from Batu Hospital 18%.

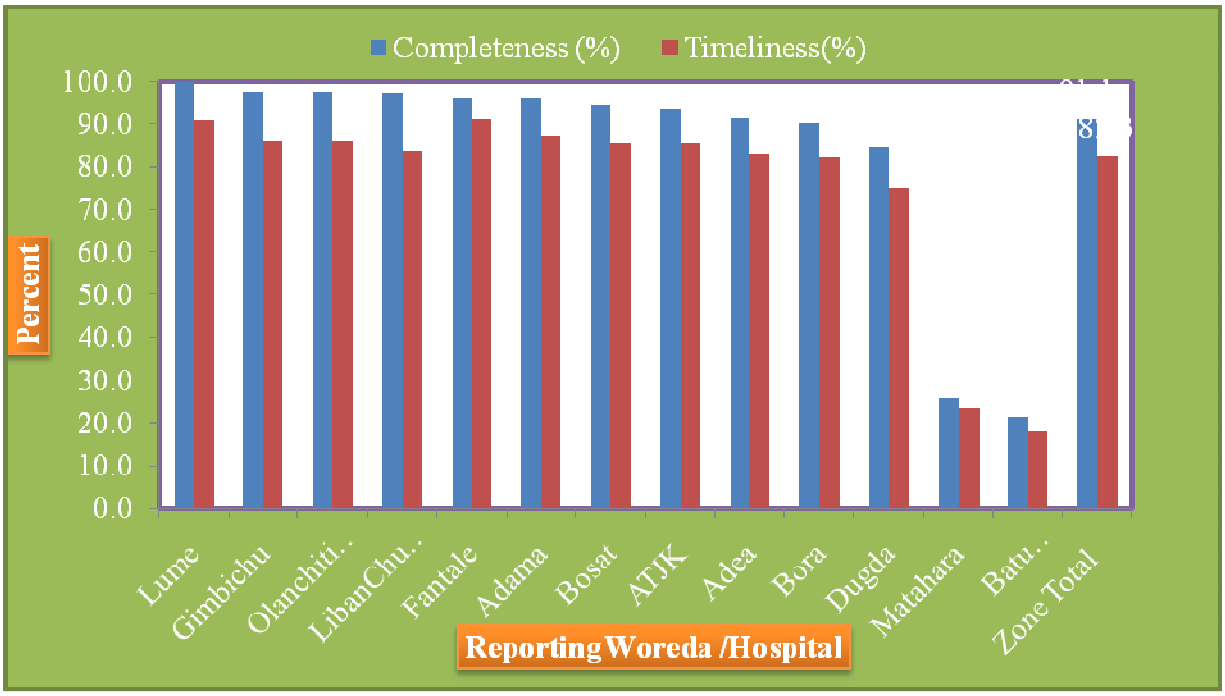

Figure3.1.5.19:- Average Report Completeness and Timeliness of WHO week 1-44 by Reporting Woreda and Hospital of East Shoa Zone, Oromia 2016.

3.1.4.15.8 Stability

Stability is consistency (the ability to collect, manage, and provide data properly without failure) and accessibility (the ability to be operational when it is needed) of the public health surveillance system. According to this attribute the surveillance system at the Woreda helps to collect manage and provide data properly and it was operational at any time, but the continuity of the system was

repeatedly variable depending on the presence or absence of the particular professional assigned to the PHEM unit. This makes the stability of the system to be questionable. The other thing that has a positive effect on the functionality of the surveillance system was the amount of the running cost allocated for the surveillance system, especially for emergency condition, for which the officers complain.

3.1.5. DISCUSSION

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 (1). 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 Woreda except during outbreak of AWD. This may cause weak case detection and 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 during the pre-emergency phase and ensuring their monitoring and evaluation(3).

The data analysis description might indicate who analyzes the data, how they are analyzed, and how often. This description could also address how the system ensures that appropriate scientific methods are used to analyze the data. Surveillance data collection was done weekly and/or immediately based on disease type. The collected data is not an end by itself. It should be analyzed, interpreted and used for decision making starting from lower level to the central level in order for the values of the data to be realized. PHEM data was analyzed regularly only at regional level on weekly basis for action. Zonal health department, Woreda health offices and health facilities didn't analyzed PHEM data to detect any irregularity in the reports on timely bases. But in some Woredas and health centers monitoring of malaria trends were conducted in quarterly bases.

There are no problems on the simplicity of the system regarding case definitions of selected diseases, reporting system and additional data collected on cases at all visited levels. It was agreed by all respondents that the surveillance system is flexible for newly occurring health and health related events. Even though reporting formats of priority diseases are easy and clear to fill for data collectors at zonal level and Woreda level some gaps were observed on quality of reporting system at health facility levels. This problem is high at health post level since health extension workers did not get any training on surveillance activities. Timeliness and

completeness of report is important for timely public health interventions. Except in Dugda Woreda,Metehara town and Batu Hospital , the average annual completeness of weekly report at zonal level is above expected national level (80%).

3.1.6. CONCLUSIONS

Periodic assessment of public health surveillance system is a key activity to identify strengths and weakness of the existing system. This will be more effective if it was done in collaboration with key stakeholders. At East Shoa Zone the surveillance system was not satisfactory and efforts should be exerted to improve the system mainly on supervisory activities, proper and timely feedback, data management and analysis of prioritized diseases.

It was identified that training of surveillance is mandatory for health extension workers since training was not given for HEW at all visited Health Posts. Following this, poor data management was observed at this level during the assessment. Regular monitoring and follow up of health extension workers from Woreda and Zonal PHEM unit is very weak. As identified in this evaluation, timeliness and completeness of weekly PHEM report at Dugda Woreda Batu Hospital were very low compared to expected national level.

3.1.7. RECOMMENDATIONS

Analysis of Surveillance data on time, place and person should be strengthening at all levels for prioritized diseases.

Training should be given for health extension workers on surveillance activities to improve active case search and reporting system.

Data quality assessment should be conducted at all levels as many problems were identified on reporting system during this evaluation.

Reporting was not timely distributed for health facilities. So that timely and adequately distribution of these formats for facilities will help to expedite and improve quality of the report.

Strong supportive supervision and feedback should be maintained in regular basis at all levels.

3.1.8. ACKNOWLEDGMENT

I grateful thank PHEM staff at regional, Zonal, Woreda and Health facility level in their valuable support in data collection and analysis during this surveillance system Evaluation.

My appreciation also goes to my mentors Ms Abigiya Wondimagegnehu and Mr Dagnachew Alemu who achieved their successful mentorship responsibility.

3.1.1.9 REFERENCE

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Chapter –IV Health Profile Description

4.1 Health Profile Description of Wolmera Woreda, Oromia Special Zone Surrounding Finfinne, Oromia 2016

Executive Summary

Introduction: Health profile is very imperative for prioritizing high-flying health and health related problems of the community at any level. It is basic for planning and undertaking appropriate public health interventions; and is doorway point for operational public health researches. Stake holders of health and health related issues will access evidence based information from well compiled health profile.

In Wolmera Woreda of Oromia Special Zone surrounding Finfinne, there was no organized and well documented community health profile. Different health and health related data were available at different departments of the woreda in disorganized situation. Even data of different programs in health sector were not compiled together during the assessment time.

Therefore, the main objective of this document is to present compiled information concerning physical and socio-economic condition of the Wolmera Woreda and its constraints.

We collected, analyzed and interpreted all required health and health related data of the 2007 Ethiopian Budget year of Wolmera Woreda from 03 -19/06/2008 E.C.

Method: Descriptive cross sectional study design using standardized checklist was used. Available hard and softcopies was also reviewed to generate different data. In addition, interviewed and discussed with concerned body.

We compiled and analyzed data using Microsoft Excel software.

Result: The Woreda had coverage of Pentavalent 3, PCV3 and Measles 64.2%, 63.9% and 58.8. % respectively. Compared to the national the Woreda achieved very low immunization coverage due to Low Community awareness and low health coverage. Those Pregnant mothers who should gave their birth at health facility was only 17% and those that attend at least once for Antenatal Care in Health Facility accounts only 76.3% of eligible mothers and focused Antenatal Care of the Woreda was only 28%.

Limitation: Incomplete and inconsistency of some data (Latrine utilization, average income per year, yield agricultural product) is some of the limitations.

Actively participate the community in health service utilization, and communicate the higher officials in planning the additional health facilities for the Woreda for performance of immunization activities and other health service.

4.1.1. INTRODUCTION

A community health profile is a comprehensive compilation of information about a community. The data in a profile reflects the health of a given community from many different angles. The information may include data already collected and published about a community or information collected by the organizations or individuals creating the profile. A community health profile includes both previously identified health issues and the identification of new, emerging issues. A comprehensive community health profile includes:-a narrative description of the given community, community strengths and challenges, demographic and economic data, health status data, community resources, including services, coalitions, and systems and interpretation of data presented, from both the perspective of the health council and the broader community.

Health profile is very imperative for prioritizing high-flying health and health related problems of the community at any level. It is basic for planning and undertaking appropriate public health interventions; and is doorway point for operational public health researches. Stake holders of health and health related issues will access evidence based information from well compiled health profile.

In Wolmera Woreda of Oromia Special Zone surrounding Finfinne, there was no organized and well documented community health profile. Different health and health related data were available at different departments of the woreda in disorganized situation. Even data of different programs in health sector were not compiled together during the assessment time.

Therefore, the main objective of this document is to present compiled information concerning physical and socio-economic condition of the Wolmera Woreda and its constraints.

The main sources of data used for the preparation of this document were from Wolmera Woreda offices (administration office, agriculture office, health office, educational office, water resource office, culture and tourism Office, and finance &development office). The document covers almost the data and activities of the 2007 E.C.

4.1.2. OBJECTIVES

4.1.2.1. General Objective

- To assess and describe the current health and health related data of Wolmera Woreda, Oromia Special Zone surrounding Finfinne, Oromia in 2007 E.C

4.1.2.2. Specific Objectives

- To summarize health and health related information relevant to the Wolmera Woreda Oromia Special Zone surrounding Finfinne, Oromia in 2007 E.C
- To identify major health problems of Wolmera Woreda, Oromia Special Zone surrounding Finfinne, Oromia in 2007 E.C
- To describe existing health infrastructure of Wolmera Woreda, Oromia Special Zone surrounding Finfinne, Oromia in 2007 E.C

4.1.3. METHODS AND MATERIAL

4.1.3.1. Study Area

We conducted this Health profile description in Wolmera Woreda, Oromia Special Zone Surrounding Finfinne Zone, Oromia Region, 2007E.C.

4.1.3.2. Study Period

We collected, analyzed and interpreted all required health and health related data of the 2007 Ethiopian Budget year of Wolmera Woreda from 03 -19/06/2008 E.C.

4.1.3.3. Study Design

We conducted descriptive cross sectional study design using standardized checklist. We reviewed available hard and softcopies to generate different data. In addition, we also interviewed and discussed with concerned body.

4.1.3.4. Data Collection Methods

We collected and reviewed health and others health related data of last year (2007 Ethiopian Budget year) from woreda health office, education office, water & energy office, woreda administrative office and culture and tourism office.

4.1.3.5. Data Analysis Procedures

During the data analysis, the data gathered from all source were crosschecked to assure its validity and reliability. Then after, the data was compiled and analyzed using the Microsoft Excel Software

4.1.3.6. Ethical Clearance/Ethical Consideration

Written ethical clearance was obtained from the Oromia Health Bureau (OHB). The purpose and objective of the study for which the data required was briefly explained to the Head of the Woreda Health Office and other concerned sectors organization prior to the interview and discussion.

4.1.4. RESULTS

4.1.4.1. Historical Backgrounds

Wolmera Woreda is one of the woreda found in Oromia Special Zone surrounding Finfinne at the direction of west from Addis Ababa .The capital town of the woreda was currently Holeta Town which is not governed by the woreda, the town administratively governed by its self under the Oromia Special Zone surrounding Finfinne Zone. According to the information obtained from elder people from the woreda,the woreda has named its name from the kebele known as "Wolmera Choke"which had been found on the bottom of "Foyeta Mountain," where people around were getting together and exchange their ideas, views, and play some cultural games. Likewise, the youth found in that area were coming to the place for playing and eating the seed of the local tree found in that area known as "*Harbu*". On the basis of this, one area's residing elder said that ***"Ijoolleen kun asumaawalmaraaoolu!"*** which mean "These youth are encircling to this area!".After this saying, people start to call this area as *"Wolmera"*

4.1.4.2. Geography and Climate

Wolmera Woreda is found at 29 Kilometers to the west of Finfinne City. The woreda is located at an attitude of 2060-3083meters above sea level. The area of the woreda is 755 km^2 or 80927 hectares. The Woreda shares a boundary with Burayu Town from east, Ejere woreda to the west, Sululta woreada and Mulo woreda to the north and Sebeta hawas woreda to the south. The climatic condition of the woreda is 39% Dega and 61% WoyinaDega. Annual temperature is estimated to be between $\mathbf{7^{0c}}$ and $\mathbf{27^{0c}}$.Additionaly the annual range of rainfall is 800 to 1100 mm.

4.1.4.3. Administrative and Political Structure

The woreda has a total of 26 kebeles from which three of them are urban and the rest 23 of them were rural kebeles. It has a total population of 103,981(one hundred three thousands nine hundred eighty one).

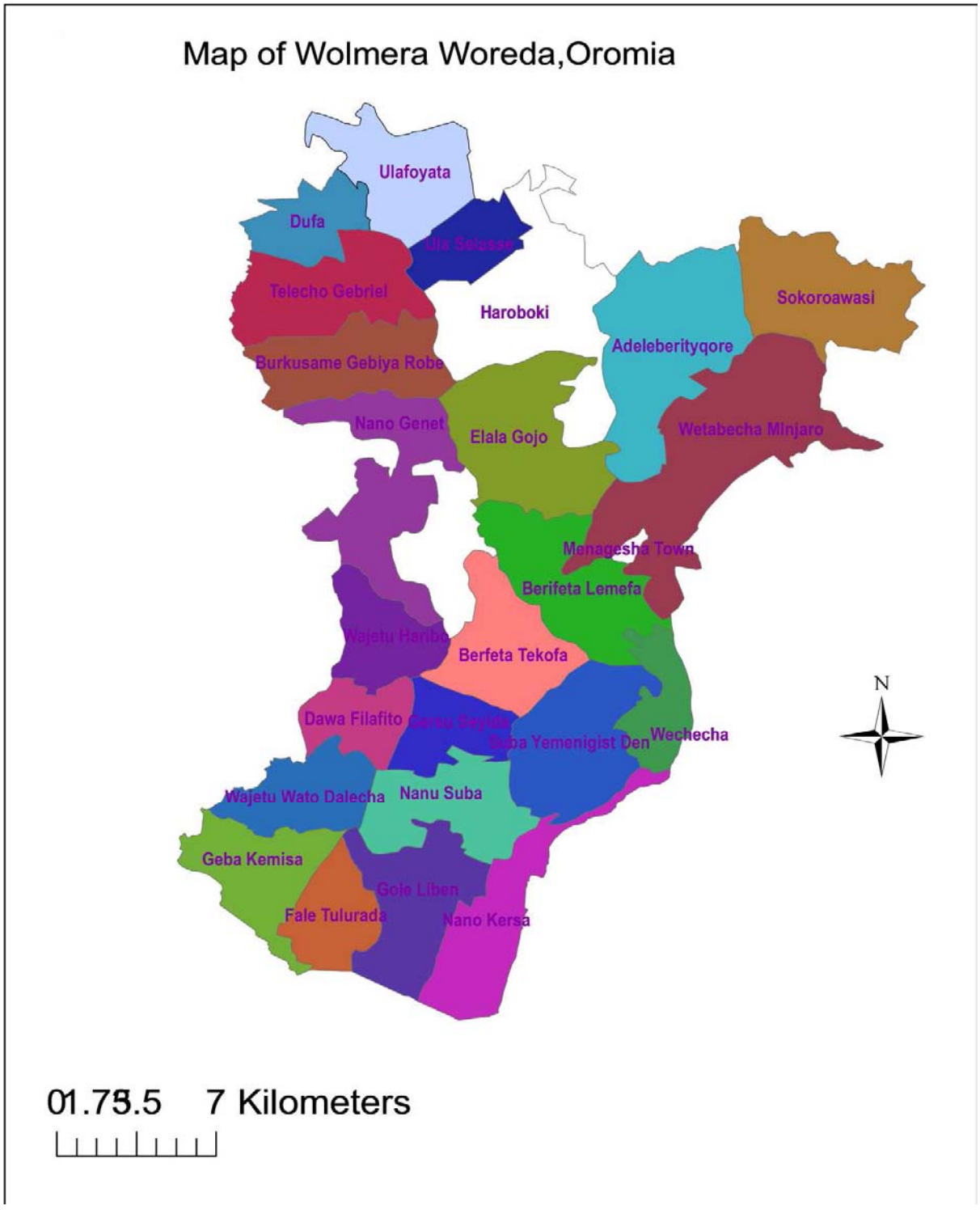

Figure 4.1.1.20: Administrative Map of Wolmera Woreda, Oromia Special Zone surrounding Finfinne, Oromia, 2007 E.C

4.1.4.4. Demographic Information

According to the wolmera woreda health office information which obtained from the 2007 census estimate it has a total population of 103,981 from this female accounts 51%(53,030) .Total live birth, surviving infant, under five children, pregnant mothers and non-pregnant mothers were estimated to be 3608(3.47%),3348(3.21%),17084(16.4%),3608(3.47%)and 19372((18.6%)respectively. Oromo, Amhara, and Guraghe are the dominant ethnics in the woreda. Regarding religion distribution, most woreda's populations are followers of Orthodox and Protestant. The following table illustrates the woreda population estimates in different age category according to the WHO age classification used for preparation of Woreda Based Health Development Plan.

4.1.4.5. Productivity and Income

The main income of the woreda Community was agriculture (95%) and trade &others (5%). Wheat, Teff, Barely,Bean and Potato were the main crops cultivated in the woreda. In addition, some cash crops such as Tomato, Onion, and Oilseeds like (*Nug* and *Telba*) are produced in the woreda. According to the data obtained from the woreda agricultural office the fertilization utilization was estimated to 67 kilogram per hectare. The land density of the woreda was 113person/hectare in 2007E.C.

4.1.4.6. Education

One of the sectors assessed in health profile description was education office. According to the information obtained from Wolmera woreda education office there were a total of 48 different schools. Of these six nongovernmental kindergarten (KG), 39 primary schools (eight 1st cycle (1-4):-and 31 2nd cycle (5-8), two secondary schools (9-10) and one preparatory school (11-12) are found. There was no college and TVET institution. But the community has a chance to attend in Holeta Town.

Table 4.1.114:-Number of schools available in Wolmera Woreda, Oromia Special Zone surrounding Finfinne, Oromia, 2007 E.C.

S.No	School Type	Number &Owner ship		Remark
		Government	Non-Government	
1	KG		06	
2	1-4	8		
3	5-8	31		
4	9-10	2		
5	11-12	1		
Total		42	06	

In 2007 E.C, from the total eligible children for education 11,025(51.3%) male and 10,457(48.7%) female students were expected to be enrolled for education. From these target children 9,932(46.3.1%) male and 8,195(38.1%) females with a total of 18,127(84.4%) students were enrolled in the year. The total number of teachers available in the woreda was 369 and this made the teacher to student's ratio 1:49.

Table 4.1.2.15:-Number of teachers works in Wolmera Woreda, Oromia Special Zone surrounding Finfinne, Oromia, 2007 E.C.

S.No	School Type	Number of teachers			Remark
		Male	female	Total	
1	TTI	3	11	14	
2	Diploma	134	156	290	
3	Degree	45	20	65	
Total		182	187	369	

According to the data obtained, from the total 18,127 students enrolled in the year 3.2% of them were drop their education due to residence transfer, and search of labor.

Wolmera Woreda had total education coverage of 84.3% of which male participation rate was 90% and female 78%.

There is only one school, Menagesha Kolobo secondary school which had separate latrine for female and male students. The other schools have latrine with no separation for male and females

which might contributed for low participation of female students. There is one governmental School (2.3%) Etaya –Yugozilaa with no latrine.

From the total 48 schools found in Wolmera Woreda 33(68.75%) of them had school HIV/AIDS Committee participating in HIV/AIDS prevention and control activities.

4.1.4.7. Facilities/Infrastructures

From the total 26 kebeles of the woreda all most all (100%) have access to transportation in dry season. Regarding the telecommunication coverage all (100%) health posts and two (66.7%) health centers had access to mobile communication where as one (33.3%) Kolobo Health center has both line and mobile communication.

All the three health center(100%) and eight(34.8%) health posts(Talacho,Bakusame Gaba Robi,Wajitu Arbu,Markos,Berfeta First,Gaba Kamisa,Ade Simbirie Kotu and Nano Kersa) have access to electric power.But the rest have not. Among the governmental health facilities in the woreda only Kolobo Health center has access to water supply and the rest have no access.

4.8. Woreda health system

4.8.1 Organizational structure of woreda health office (Oregano gram)

The currently revised woreda health office structure after Bussiness process and re-engineering (BPR) is organized in to five technical team and two supportive teams. These technical teams are 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 are secretary and recording and documentation.

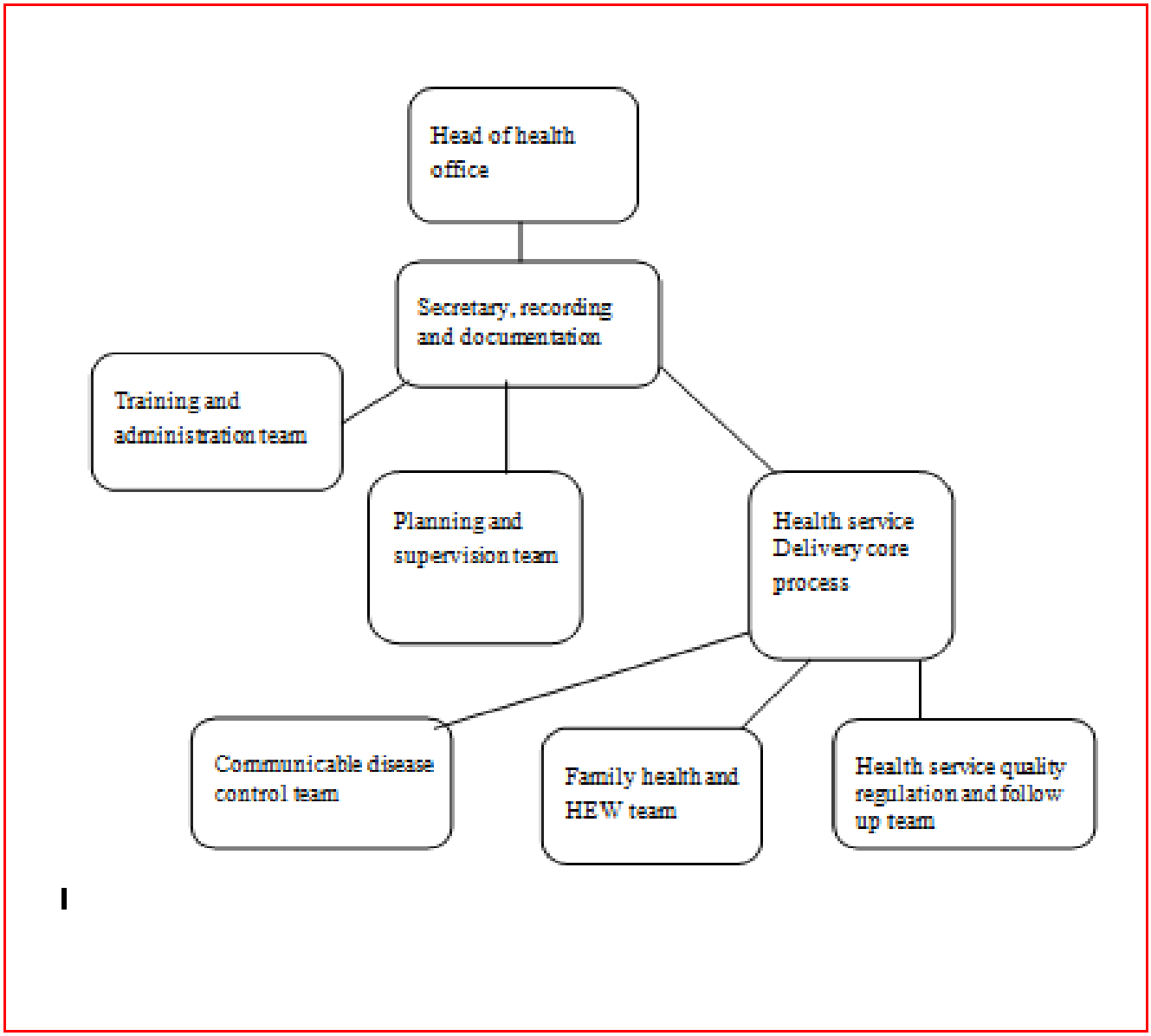

Figure 4.1.2.21Organization structure of Wolmera Woreda health office, Oromia Special Zone surrounding Finfinne, 2007 E.C

4.1.4.8.2. Health Facilities and their Services

There are a total of three health centers and 23 health posts serving the community in preventing disease and promoting health in the woreda. The health sector coverage of the Woreda was reached 72% by health center and 100% by health posts according to the one health center to 25,000 and one health post for 5,000 peoples plan. There is also a health institution that governed by Holeta town administration and serves the surrounding communities of the Woreda. .Additionally, five private small clinics found in the woreda.

Table 4.1.3.16:-Government health facility name and its catchment population of Wolmera Woreda, Oromia Special Zone surrounding Finfinne, Oromia 2007E.C.

S.No	Name of health Institution	Catchment population	Year of establishment	Remark
1	Kolobo Health Center	38932	2001E.C	
2	SokoruHawaso HP	4707	2002E.C	
3	Gudu HP	6252	1997E.C	
4	WatabajaMinjaro HP	5747	2002E.C	
5	HaroBoki HP	5182	2001E.C	
6	Wochocha HP	2485	2002E.C	
7	Markos HP	5182	2002E.C	
8	Wolmera Choke HP	4147	2002E.C	
9	Asgori Health Center	**44217**	2002E.C	
10	Nano Kersa HP	5663	2000E.C	
11	Falle Tulu Rada HP	4180	2002E.C	
12	GoleLiban HP	5780	2002E.C	
13	GabaKamisa HP	5135	1996E.C	
14	Tulu WatoDalecha HP	4290	2001E.C	
15	Nano Suba HP	5622	2006E.C	
16	GarasuSida HP	3724	2002E.C	
17	WajituHarbu HP	2622	2002E.C	
18	BerfataTokofa HP	4347	1996E.C	
19	DahaLafto HP	2854	2000E.C	
20	Talacho Health Center	**20832**	2007E.C	
21	UlaSilase HP	2505	2001E.C	
22	UlaFoata HP	3891	2002E.C	
23	Dufa HP	2755	2002E.C	
24	Talacho HP	3696	1997E.C	
25	BakakaKoreOdo HP	2948	2002E.C	
26	BukasameGabaRobi HP	5037	1998E.C	

4.1.4.9 .Health Indicators and Vital Statistics

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

Table 4.1.4. 17:-Health indictors and vital statistics, Wolmera Woreda, Oromia Special Zone surrounding Finfinne, Oromia, 2007 E.C.

S.No	Indicator	Number (%)
1	Total Population	103981
2	Male Population	50951(49%)
3	Female Population	53030(51%)
4	Urban Population	8926(8.6%)
5	Rural Population	95055(91.4%)
6	Total live birth	3608(3.47%)
7	Total under three children	9712((9.34%)
8	Total under five children	17084(16.4%)
9	Women 15-49 old	23011(22.13)
10	Pregnant Women	3608(3.47%)
11	Infant Mortality Rate/1000	No Data
12	Neonatal Mortality Rate	No Data
13	Under 5 mortality rate	No Data
14	Maternal Mortality Rate	No Data
15	Crude Birth Rate	No Data
16	Crude Death Rate	No Data

4.1.4.10. Maternal and Child Immunization Coverage

4.1.4.10.1 Child Health

According to the data obtained from Health Management Information System (HMIS), from the total eligible children (3,608) only 1,876(52%) of children were immunized for Bacilium Calmette Guerin (BCG) vaccine. While the other activities considered under children immunization, from the total eligible children in the Woreda 2459(73.4%), 2149(64.9%), 1968(58.8%), 1869(55.8%) of children received penta-1,Penta-3, measles and fully

immunization(FI) respectively. Additionally 2189(65.3%) of the total eligible live births in the woreda are protected at birth (PAB) against tetanus.

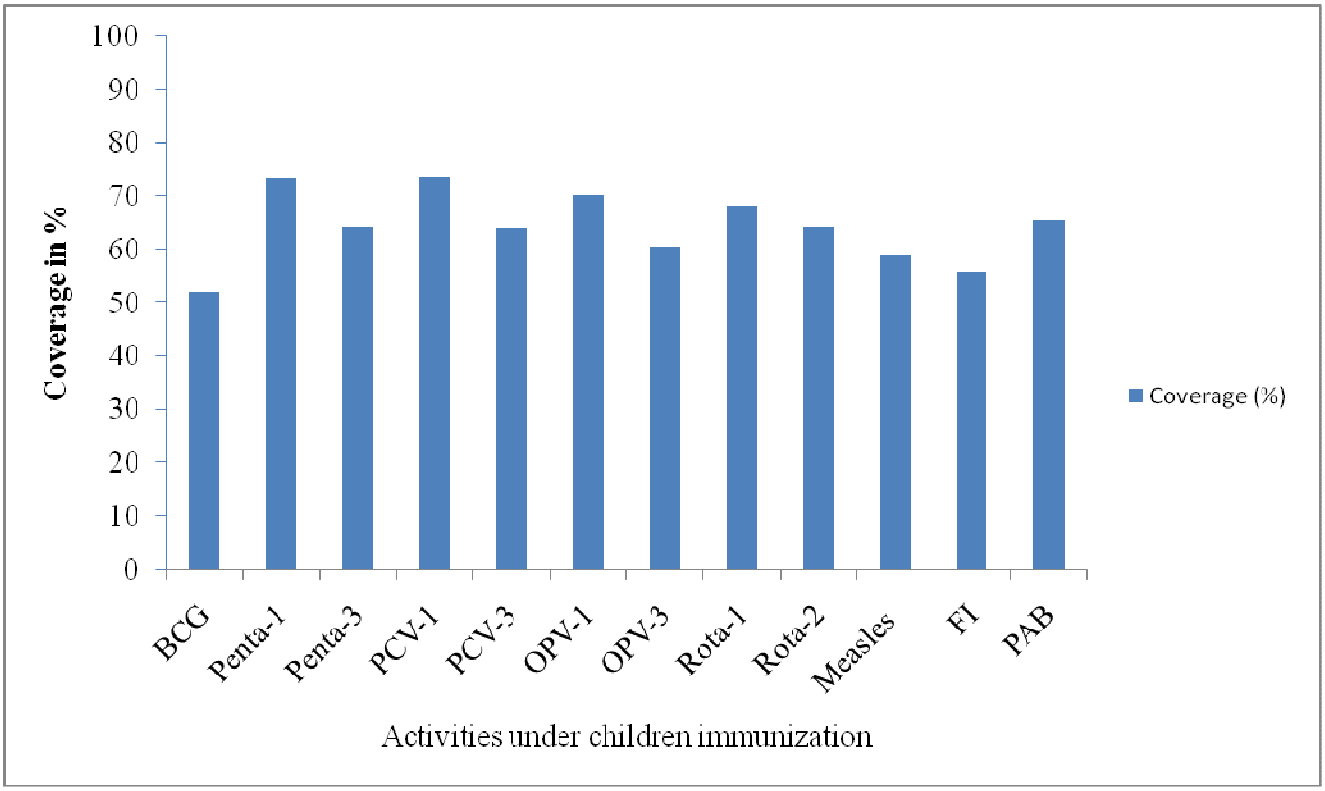

Figure4.1.3.22 Performance of EPI activities from eligible, Wolmera Woreda, Oromia Special Zone surrounding Finfinne, Oromia, 2007, E.C

4.1.4.10.2Maternal Health Activities

The most important activities planned to decrease maternal death are Antenatal Care (ANC), Delivery, Postnatal Care (PNC) and Family Planning (FP).Wolmera Woreda has also plan and achievements to implement these activities as shown below (Table 5).

Table 4.1.5.18:-Plan and performance of maternal health activities:-Wolmera Woreda, Oromia Special Zone Surrounding Finfinne, Oromia, 2007 E.C

S.No	Activities	Target	Achievement	%
1	ANC $_1$	3608	2754	76.3
2	ANC $_4$	3608	1011	28
3	Delivery attended by health workers	3608	596	17
4	Postnatal care	3608	777	21.5
5	Family planning (all method) total	19372	13115	68

4.1.4.11 Water Supply and Sanitation

According to data obtained from Wolmera `woreda water Resource office, 75% of the rural populations have potable water. In this woreda, there are 115 hand-dug wells, 65 shallow wells and 15 spring water sources in 2007 E.C. that serves the community.

4.1.4.12 Latrine Coverage and Utilization

From the total 20,545 households of the woreda, 14386 (70%) of them had latrine but the others not in 2007E.C. There is no clear data on utilization of latrine in the Woreda. There is no Open Defecation Free (ODF)kebele in these Woreda during the year 2007 E.C.

4.1.4.13Top Leading Cause of Outpatient Visits (Morbidity)

Acute respiratory infection is the top leading cause of morbidity in the woreda followed by diarroea (non bloody) shown in (figure 3) below.

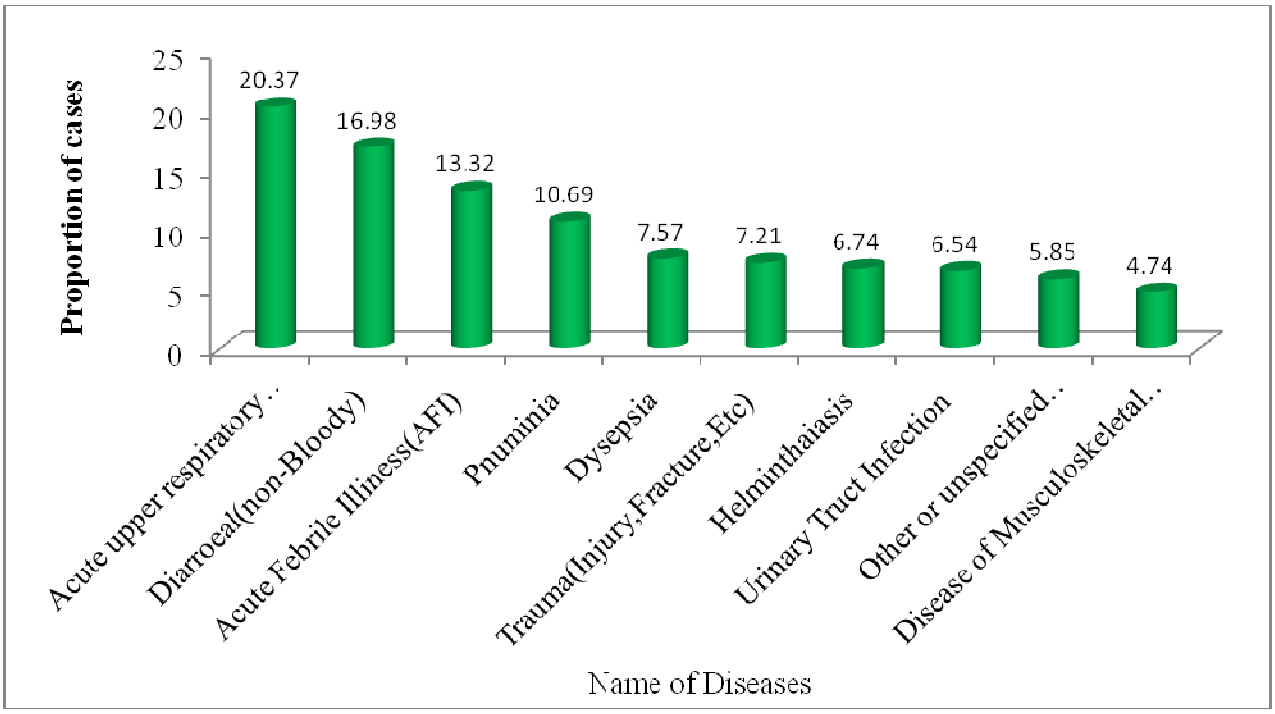

Figure 4.1.4.23:-Top ten leading causes of morbidity in Wolmera Woreda, Special Zone Surrounding Finfinne, Oromia, 2007E.C

4.1.4.14 .Endemic Diseases

4.1.4.14.1. Malaria

Wolmera woreda has five malarious keebeles namely:- Falle Tulu Rada,Gaba Kamisa,Gole Liben,Nano Kersa and Tullu Wato Dalacha with at risk population of 50096 (48.2%).Indoor Residual Spray(IRS)took place in five kebeles for 5,219 households with

Deltamethrin.Additionally, for all households 5,219(100%)in malarias kebeles Insecticide Treated Net(ITN) was distributed and planned to replace the old one. A total of 189 total malaria cases were treated in government health facility with no death in 2007 E.C.

4.1.4.14.2. Tuberculosis and Leprosy

A total of 81 all forms of tuberculosis (TB) cases were reported in 2007 E.C. From the total all forms of TB cases, 25(30.9%) (15 male and ten females) were Pulmonary Tuberculosis (PTB) positive, 16(19.8%) PTB negative and 40(49.4) Extra Pulmonary Tuberculosis (PTB were reported. Number of bacteriologic ally confirmed new Pulmonary Tuberculosis (PTB) detected in the year were 25(15 male and 10 female).Number of clinically diagnosed new pulmonary negative TB cases detected in the year were 16(9 male and 7 female).TB detection rate of the woreda reached 36.2% in 2007 E.C. During this year, the TB cure rate and treatment success rate were reported to be 68%and 83% respectively. In this Woreda, there was no treatment defaulter. In 2007 E.C., 35(43.2%) TB patients were screened for Human Immune Deficiency Virus (HIV). There was no case of leprosy identified during 2007 E.C. in the woreda.

4.1.4.14.3. HIV/AIDS

There are 119 cases that are currently on Anti Retroviral Therapy (ART) and 20 cases were newly enrolled in pre-ART care services. There are also 1,216 HIV positive person receiving co-trimoxzazole prophylaxes. There is one (33.3%) health centers that provide ART services in the Woreda.

In2007 E.C. about 1,554 pregnant mothers were tested and know their result and 156 pregnant mothers tested and know their results during labor and delivery. Of this mothers who were tested for HIV six of them were positive.

There are a total of 5,708 individuals who have been tested for HIV and received their result in the year2007 through Voluntary Counseling and Testing (VCT) and Provider Initiated Counseling and Testing (PICT) clinics. Of the total individuals tested, 41(0.72%) of them were positive for HIV.

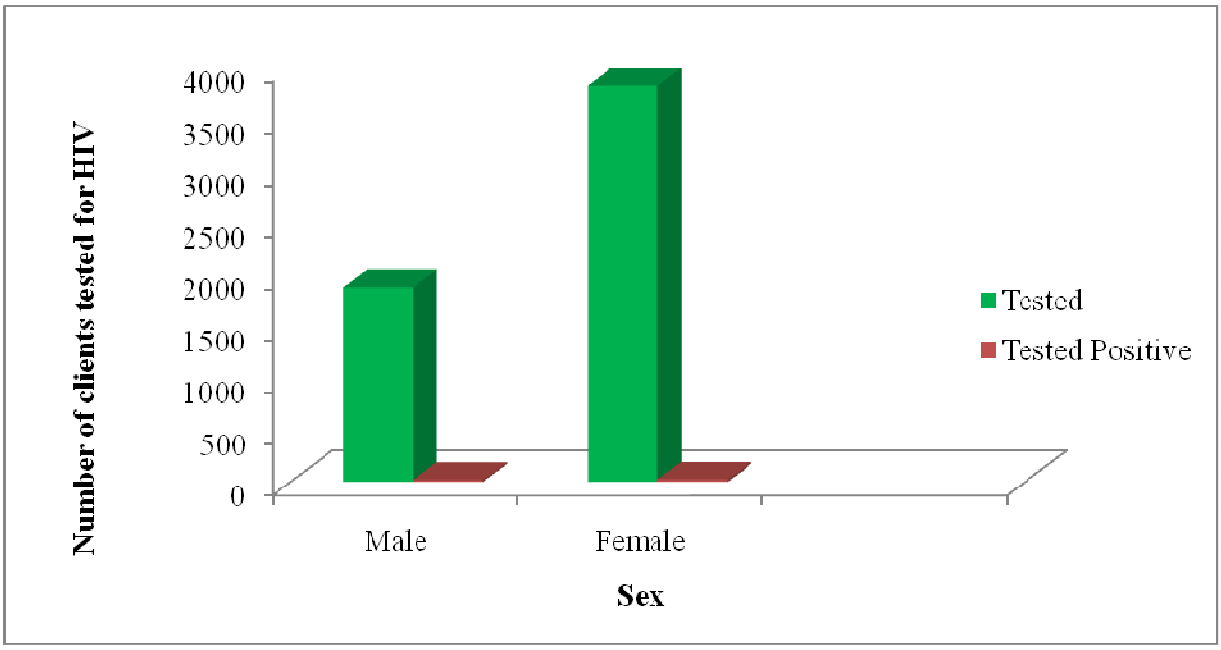

Figure 4.1.5.24:- Number of clients tested for HIV and received their result by sex, Wolmera Woreda, Special Zone Surrounding Finfinne, Oromia 2007E.C

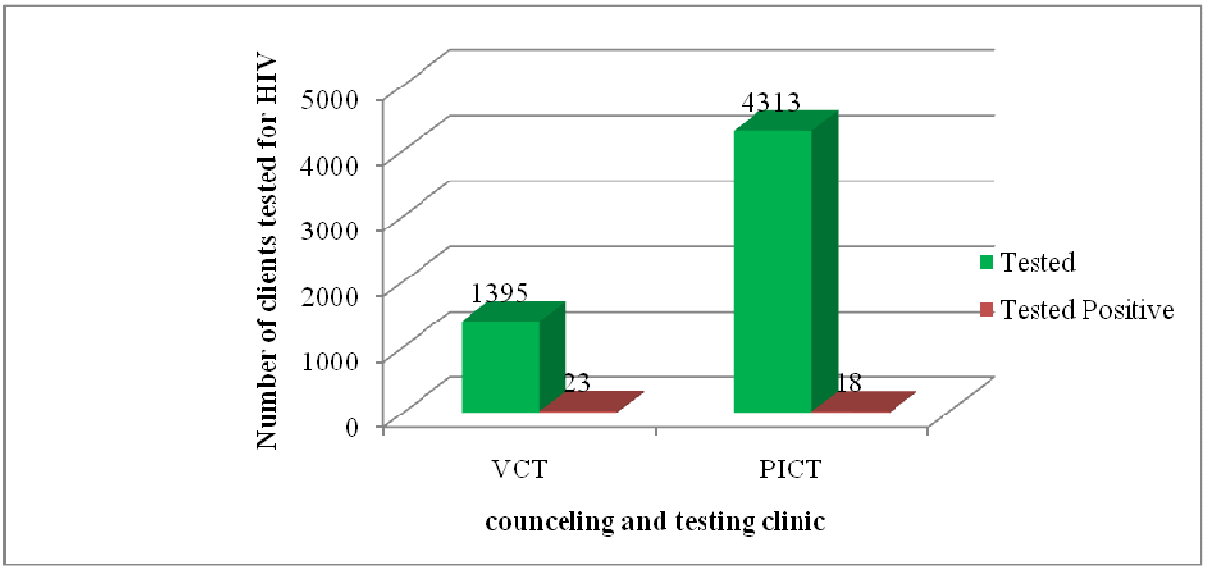

Figure4.1.6. 25:- Number of clients tested for HIV and received their result through VCT and PICT, Wolmera Woreda, Special Zone Surrounding Finfinne, Oromia 2007E.C

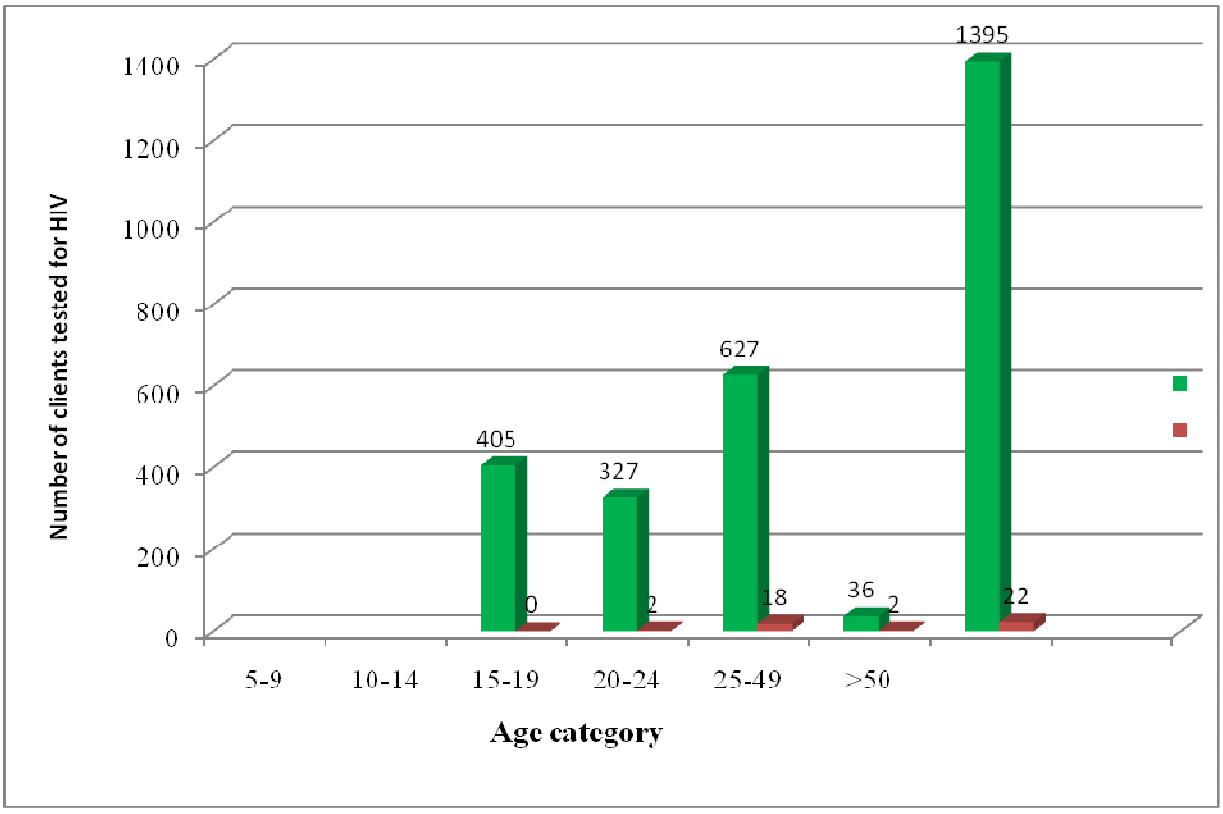

Figure 4.1.7.26:- Number of clients tested for HIV and received their result by age category, Wolmera Woreda, Special Zone Surrounding Finfinne, Oromia 2007E.C

The other HIV/AIDS control program activities implemented in the woreda was HIV mainstreaming and Care and support program. In this program 128 person living with HIV/AIDS were supported with the total Ethiopian Birr of 64,000.00(Sixty-four thousands), each 500 birr. In addition there are about 352 orphans and vulnerable children (OVC) supported for education with 12 Exercise Books, ten pens and 300 Birr per individual in the year 2007 E.C. This budget was contributed from all government offices in the woreda of their 2% recurrent budget in the same year. According to the information obtained this activity that supports the OVC and PLHA individuals was sustainable support in their life time. Additionally there was 3,410 male condoms were distributed for most at risk and vulnerable peoples.

4.14.4 Sever Acute Malnutrition (SAM)

Severe acute malnutrition is not a major public health problem of the woreda. Six Outpatient Therapeutic Program (OTP) sites were established. There is only one Stabilization Center (SC) site in this woreda. Total admission to OTP was 33cases in 2007E.C. There were no (Targeted

Supplementary Food (TSF), Community Base Nutrition (CBN), Productive Safety Net Program (PSNP) and other programs working on nutritional activities in the woreda.

4.1.4.14.5 Outbreak and Other Disaster Situations

There were no outbreak or disaster situations that happened/occurred during the last three years in the woreda

4.1.4.15 Budget Allocation

In 2007 E.C the woreda allocated a total budget of 60,695,770.00(sixty million six hundred ninety five thousand and seven hundred seventy) Ethiopian Birr of which 5,749,696.00 (five million seven hundred forty nine thousand six hundred ninety six) was allocated for woreda health office that accounts 9.47% of the total budget.

4.1.4.16 Human Resources

There were a total of 130 human resources working technically and administratively in the woreda health office and different health institutions.

Table 4.1.6.19:-Human Resources of Wolmera Woreda Health Office, Oromia Special Zone Surrounding Finfinne, Oromia 2007 E.C

S.No	Category	Number		
		Male	Female	Total
1	Health Officer	5	5	10
2	Bsc Nurse	1	2	3
3	Mid Wife	1	5	6
4	Bsc Laboratory Tch.	3	0	3
5	Clinical Nurse(Diploma)	10	6	16
6	Public Nurse(Diploma)	1	1	2
7	Lab Technician(Diploma	2	1	3
8	Druggist	2	2	4
9	Pharmacy	0	1	1
10	Environmental Health	3	0	3
11	HEP	3	0	3
12	HIT	3	0	3
13	Emergency Nurse(Ambulance)	1	0	1

14	HEW(urban)	0	2	2
15	HEW(Rural)	0	37	37
16	Other Administrative staff	16	17	33
Total		51	79	130

4.1.5. DISCUSSIONS

Proportion of girls enrolled in primary and secondary education has exceeded 45% in 2014 nationally as a direct result of the GoE's policy to empower women through enhancing girl's Education (1).The female enrollment of the Woreda was reached 45.2 % in 2007E.C (2014/2015).

The dramatic increase in immunization coverage has also significantly decreased fatalities associated with vaccine preventable diseases. Currently, Ethiopia is providing 10 antigens targeting major killer diseases during childhood. Four new vaccines (PCV, Rota and HepB1-Hib1) were introduced since 2007 in addition to the already existing six traditional antigens. The introduction of these new vaccines coupled with ICCM programs and expansion of the Health Extension Programme is expected to further lower childhood morbidity and mortality due to pneumonia and diarrhea. The recent HMIS report of EFY 2006 showed that the coverage of Pentavalent 3, PCV3 and Measles vaccines coverage have reached 91.1%, 85.7% and 86.5% respectively. Fully immunized children under one year of age also reached 82.9% in EFY 2006. Though the coverage is improving, the program is challenged with dropouts, shortage of supplies, vaccine stock out and cold chain breakages(1).The Woreda had a coverage of Pentavalent 3, PCV3 and Measles 64.2%, 63.9% and 58.8.% respectively. Compared to the national the Woreda achieved very low immunization coverage due to Low Community awareness and low health coverage.

All pregnant women are encouraged and supported to deliver in health facilities with skilled attendants. The HSDP IV's target for skilled delivery was 62% and as of the nine months HMIS report of 2007 EFY, the coverage has reached 55% where as Those Pregnant mothers who should gave their birth at health facility was only 17% and those that attend at least once for Antenatal Care in Health Facility accounts only 76.3% of eligible mothers and focused Antenatal Care of the Woreda was only 28%.

Tuberculosis (TB) remains a major public health problem throughout the world. According to the WHO global TB report 2014, Ethiopia is one of the 22 high burden countries with 201,914 new TB cases equivalent to incidence of 224 per 100,000 populations per year. According to the 2007 E.C (2014/2015) health and health indicators of Federal Ministry of health, Tuberculosis is the sixth leading cause of death in Ethiopia(2).The estimated TB prevalence and incidence reached 480 and 419 per 100,000 populations respectively in 1995, which was mainly due to a rise in

HIV infection in Ethiopia. It has now declined to a prevalence and incidence of 211 and 224 TB cases/100,000 populations respectively in 2014([1]) having this in mind the Woreda was expected to detect 224 TB cases of all forms per their population, but the Woreda detected 81 cases of all forms of TB in the Woreda.

4.1.6 CONCLUSIONS

In education sector, the female enrollment of the Woreda was reached 45.2 % in 2007E.C (2014/2015)

Regarding the immunization coverage of the Woreda, Pentavalent 3, PCV3 and Measles were 64.2%, 63.9% and 58.8% respectively. Compared to the national the Woreda achieved very low immunization coverage due to Low Community awareness and low health coverage.

Regarding the detection of tuberculosis the Woreda was detected 81 cases of all forms of TB which was below the standard.

4.1.7. LIMITATIONS

- Absence of background data regarding religion and ethnicity composition of the Woreda.
- Lack or absence of mortality related data at Woreda level (MMR, CMR, UFMR, etc).
- Incomplete and inconsistency of some data (Latrine utilization, average income per year, yield agricultural product).

4.1.8. RECOMMENDATIONS

Maternal and child health activities should actively planned and performed as per the program of the nation and its performance also calculated from eligible not from plan.

Actively participate the community in health service utilization, and communicate the higher officials in planning the additional health facilities for the Woreda for performance of immunization activities and other health service.

TB detection of all forms, TB cure rate and TB treatment success rate should be performed as per the standard.

4.1.9. REFERENCE

1. The Federal Democratic Republic of Ethiopia, Ministry of Health, Health Sector Transformational Plan (HSTP)
2. The Federal Democratic Republic of Ethiopia, guide line for the implementation of TB patient kits in Ethiopia, October 2015
3. Wolmera Woreda Based Plan of 2007 E.C

4.1.10 ACKNOWLEDGEMENT

I would like to thank Ato Terecha Kuma,Wolmera woreda administration head, Ato Teferi Wolmera woreda health office head, W/ro Dahara Hunde Wolmera woreda education office and all Health office staff for their cooperation.

Finally, I would like to thank Oromia Regional Health Bureau - PHEM process, AAU School of Public Health Department of EFETP and EPHA for their technical and financial support to conduct this health profile description.

Annex 3:-Data collection tool for health profile assessment wolmera Woreda, Oromia Special Zone Surrounding Finfinne, Oromia Region, 2008E.C

1. Historical Aspects of the area (Culture & Truism office).

1.1. Do the Woreda Has any historical area: where it is_____

1.2. The name (how& why) _____

1.3. How the Woreda was formed_____

1.4. Any other historical aspect_____

2. Geography and Climate (including map, altitudes, agro ecological zones etc…)

2.1. Woreda map_____

2.2. Location (distance and direction) _____ _____

2.3. Altitude _____

2.4. Annual rain fall (average)_____ Max_____Min_____

2.5. Annual temp(average)_____High _____Low_____

2.6. Climatic zones Highland_____% Midland _____% Lowland _____%

2.7. Accessibility to main roads_____

3. Administrative setup

3.1. Total no. of kebeles: _____ Rural_____Urban_____

3.2. Woreda boundaries North_____South_____East____ West_____

4. Demographic information

4.1. Population: Total_____ urban_____.rural_____

4.2. Male Popn _____Female Popn _____ sex ratio_____

4.3. < 1yrs_____, < 5 yrs_____, < 15 years_____, >64 years_____,

Women 15-49 yrs of age_____.Expected Pregnant Women

4.4. Ethnicity and Religion composition of the Woreda _____ _____

5. Economy (mainstay of the economy, average income levels etc)

5.1. Main source of the economy_____

5.1.1. Land density _____

5.1.2. Cultivated _____

5.1.3. Farming _____

5.1.4. Grazing _____

5.1.5. Main crops **_____, _____, _____, _____**

5.1.6. Fertilizer utilization _____

5.2. House hold income source (average)

5.2.1. Agriculture_____ (No.)

5.2.2. Different business_____(No.)

5.2.3. Employee_____(No.)

5.2.4. Jobless _____(No.)

5.2.5. Average income per HH/year_____

6. Education and school Health

6.1. Distribution of Schools:

6.1.1. Primary (1-8) ____1st Cycle (1-4)_____ 2ndCycle (5-8)____

6.1.2. Secondary (9-10)_____

6.1.3. Preparatory schools (11-12)_____,

6.1.4. TVET/colleges_____

6.1.5. K.G _____

6.2. **Educational status of the community**

6.2.1. Total School Age Children (target)_____

6.2.2. Total Enrolment _____(_____%)

6.2.3. School dropout in 6 months or year 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_____(_____%) , Telecommunication_____(_____%) ,Electric power_____(_____%) , Water supply _____(_____%)

7.2. How many of the health center shave access to transportation_____(_____%) , Telecommunication_____(_____%) ,Electric power_____(_____%) , Water supply _____(_____%)

8. Health delivery system (Woreda Health Structure/organogram)

8.1. Health Facility

S.No	Name of Health Institution	Type of Health Institution	Catchment population	Owner ship(Government, Private)	Establishment time	Remark
1						
2						
3						
4						
5						

8.2. Health institution to pop ratio:

8.3. Hospital: Pop _____. HC: Pop _____ HP: Pop _____

8.4. Health service coverage _____

8.5. Human resource for health (all type)

Type	Number	Remark
Physicians		
Health Officers		
Nurses		
Lab.		
Pharmacy		
Environmental Health		
HEWs		
Others		

Doctor: 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	**Adults**	**Pediatrics**
1		
2		
3		

4		
5		
6		
7		
8		
9		
10		

8.6.2. **Top ten causes of admissions**

Rank	**Adults**	**Pediatrics**
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

8.6.3. **Top ten causes of deaths (mortality).**

Rank	**Adults**	**Pediatrics**
1		
2		
3		
4		
5		
6		
7		
8		
9		

10		

8.7. **Vital Statistics and Health Indicators**

8.7.1. Infant Mortality Rate (IMR) _____ (total <1 yr deaths in 2007 EFY_____)

8.7.2. PMR_____ (The last year 2007 EFY)

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 2007EFY_____)

8.7.7. Crude Birth Rate_____

8.7.8. Crude Death Rate_____ (total deaths 2007EFY____)

8.7.9. Maternal Mortality Rate_____ (total maternal deaths in 2007EFY_____)

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 _____

8.7.17 Total PNC client's served_____

8.7.18 Number of clients served for Long acting Family planning (Implanon,_____,IUCD_____

8.7.19 Number of clients served for Short acting Family planning _____

9. Immunization Coverage;

9.1. BCG _____

9.2. OPV-0 _____OPV -1 _____ OPV-3 _____

9.3. Penta-1_____ Penta-3 _____

9.4. PCV-1 _____PCV2 _____ PCV3 _____

9.5 Rota 1_____Rota 2_____

9.6. Measles _____

9.7. Fully immunized_____

9.8. PW TT2+ _____, NPW TT2+ _____

10. Health budget allocation:

10.1. **Government**

10.1.1. Total budget allocated for the Woreda _____

10.1.2. Total budget allocated for health _____ (____ %)

10.2. **Funds from NGO**

10.2.1. Total _____ (purpose/programs) _____

11. Disaster situation in the Woreda

11.1. Was there any disaster (natural or manmade) in the Woreda in the last one year? _____

11.2. Any recent disease outbreak/other public health emergency_____

11.3. If yes, cases_____ and deaths_____

12. Community Health Services:

12.1. **Status of services provided by community health workers namely**

12.1.1. No. of TBAs/TTBA_____ and their responsibility _____

12.1.2. No. of CHWs/CHPs_____ 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 popn _____

12.3.4. Main source of water supply _____

12.3.5. Others_____

12.4. **Health education**_____

13. Endemic diseases; (in No & % for all questions)

13.1. **Malaria:**

13.1.1. Total malarias 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.House holds 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 (2007EFY)_____

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. If yes children in the program, _____ (No & %)

13.15. General food security condition_____

_____

_____.

13.16. Shortage of Essential drugs

_____

_____

_____

_____.

13.17. What do you think the major Health problem/s of the Woreda?_____

_____

_____

_____.

14. Discussion of the highlights and the main findings of the health profile Assessment and description_____

_____

_____

_____

_____

_____

_____.

15. Problem Identification and Priority Setting – set priority health problems based On the public health importance, magnitude, seriousness, community concern, feasibility etc,_____

Annex 4:-Estimated population by kebeles and age category of Wolmera Woreda, Oromia Special Zone surrounding Finfinne, Oromia, 2007 E.C.

S. No	Name of Kebele	Total Population	Total HH(20.83)	Live birth (3.47%)	Sur.Infant3.22%)	Child 6-59(15%)	Child 24-59(10.72%)	Under 5Y(16.43%)	Under 3Y9.34%)	WCBA (22.13%)	NPW (18.63%)	PW (3.47%)	6-11M (1.41%)
1.	Kolobo 01	3542	738	123	114	531	380	582	331	784	660	123	50
2.	SokoruHawaso	4707	980	163	152	706	505	773	440	1042	877	163	66
3.	Gudu	2317	483	80	75	348	248	381	216	513	432	80	32
4.	WatabajaMinjaro	5747	1197	199	185	862	616	944	537	1272	1071	199	80
5.	HaroBoki	5182	1079	180	167	777	556	851	484	1147	965	180	73
6.	Wochocha	2485	518	86	80	373	266	408	232	550	463	86	35
7.	Markos	5182	1079	180	167	777	556	851	484	1147	965	180	73
8.	Wolmera Choke	4147	864	144	134	622	445	681	387	918	773	144	58
9.	Asgori	1688	352	59	54	253	181	277	158	374	314	59	24
10.	Nano Kersa	5663	1180	197	182	849	607	930	529	1253	1055	197	79
11.	Falle Tulu Rada	4180	871	145	135	627	448	687	390	925	779	145	59
12.	GoleLiban	5780	1204	201	186	867	620	950	540	1279	1077	201	81
13.	GabaKamisa	5135	1070	178	165	770	550	844	480	1136	957	178	72
14.	Tulu WatoDalecha	4290	894	149	138	644	460	705	401	949	799	149	60

15.	Nano Suba	5622	1171	195	181	843	603	924	525	1244	1047	195	79
16.	GarasuSida	3724	776	129	120	559	399	612	348	824	694	129	52
17.	WajituHarbu	2622	546	91	84	393	281	431	245	580	488	91	37
18.	BerfataTokofa	4347	905	151	140	652	466	714	406	962	810	151	61
19.	DahaLafto	2854	594	99	92	428	306	469	267	632	532	99	40
20.	AddeSimbireKotu	3935	820	137	127	590	422	647	368	871	733	137	55
21.	UlaSilase	2505	522	87	81	376	269	412	234	554	467	87	35
22.	UlaFoata	3891	810	135	125	584	417	639	363	861	725	135	54
23.	Dufa	2755	574	96	89	413	295	453	257	610	513	96	39
24.	Talacho	3696	770	128	119	554	396	607	345	818	689	128	52
25.	BakakaKoreOdo	2948	614	102	95	442	316	484	275	652	549	102	41
26.	BukasameGabaRob	5037	1049	175	162	756	540	828	470	1115	938	175	71
	Woreda Total	103981	21659	3608	3348	15597	11147	17084	9712	23011	19372	3608	1456

Chapter-V Scientific manuscript for peer reviewed journals

5.1 Rota virus outbreak investigation in Nono Woreda of West Shoa Zone, Oromia February 2017

Abstract

Rotavirus is ubiquitous and infects nearly all children worldwide by 5 years of age. Infection causes an acute onset of diarrhea, nausea, vomiting, and abdominal cramps, especially in children. The incidence of rotavirus infection in developing countries is similar to that of developed countries, where water quality or hygiene/sanitary conditions have been shown to have an effect in controlling the infection. However, case-fatality in the poorest countries is higher, due to malnutrition and barriers to accessing health services in a timely manner.

Ethiopia is one of five countries with the greatest rotavirus burden worldwide and accounts for six percent of all rotavirus deaths globally. It is estimated that 28% of all under-five diarrheal disease hospitalizations in Ethiopia are caused by rotavirus.

The main aim of this investigation was to identify its causative agent and to assess the magnitude and risk factor of the outbreak in Nono Woreda, Oromia Region, from 23/1/-10/2/2017.

We used descriptive cross-sectional followed by case-control study, 60 cases with 120 controls.

We detected a period prevalence of 7.74/1000 and 0.59% Case Fatality Rate.being vaccinated, being breast feed and having knowledge of exclusive breast feeding has a protective factor for developing the disease with an adjusted (OR) of 0.37[95%CI:0.16-0.86,P:0.021],0.11[95%CI:0.03-0.36,P:0.0002] and 0.30[95%CI:0.14-0.67,P:0.003], respectively while contact history with similar complaints was a risk factor with an (OR) 5.7[95%CI:2.23-14.60,P:0.0003.

Children less than five years of age were the most affected groups. The main cause of this outbreak was low vaccination coverage of Rota.

The Woreda health Office, Health Center and health post at kebele level actively strengthen the immunization activities both at statics and outreach based.

Key words: Rota virus, outbreak, Nono, West Shoa, Oromia, Ethiopia

Word count: 268

5.1.1 Introduction

Rotavirus is ubiquitous and infects nearly all children worldwide by 5 years of age. However, compared with rotavirus disease in industrialized countries, disease in developing countries occurs at a younger age, is less seasonal, and is more frequently caused by uncommon rotavirus strains. Moreover, because of suboptimal access to hydration therapy, rotavirus is a leading cause of diarrheal death among children in the developing world, with the highest mortality rates among children in sub-Saharan Africa and southern Asia(1). Rotaviruses account for approximately 50% of all cases of diarrhea in children requiring hospitalization because of dehydration (70,000 cases per year in the United States; 500,000 to 600,000 deaths per year worldwide). Rotaviruses are even more of a problem in underdeveloped countries, where before the development of vaccines they were responsible for at least 1 million deaths each year from un controlled viral diarrhea in undernourished children(2).

Norwalk and related viruses cause symptoms similar to those caused by the rotaviruses. Infection causes an acute onset of diarrhea, nausea, vomiting, and abdominal cramps, especially in children .Bloody stools do not occur. Fever may occur in as many as a third of patients. The incubation period is usually 12 to 48 hours, and the illness usually resolves within 1 to 3 days without problems but can last up to 6 days(1, 2). However, the infection may prove fatal in infants who live in developing countries and who are malnourished and dehydrated before the infection(1). Neonatal infections are common but are often asymptomatic or mild, presumably because of protection from maternal antibody or breast-feeding. First infections after 3 months of age are likely to be symptomatic, and the incidence of disease peaks among children 4–23 months of age. Re infections are common, but the severity of disease decreases with each repeat infection(2). The incidence of rotavirus infection in developing countries is similar to that of developed countries, where water quality or hygiene/sanitary conditions have been shown to have an effect in controlling the infection. However, case-fatality in the poorest countries is higher, due to malnutrition and barriers to accessing health services in a timely manner. In developing countries, the highest infection rates occur in children aged 3-11 months, while in developed countries infection rates peak in the second year of life(3).

Rotaviruses are passed from person to person by the fecal-oral route**.** Maximal shedding of the virus occurs 2 to 5 days after the start of diarrhea but can occur without symptoms. The virus survives well on fomites (e.g., furniture and toys) and on hands because it can withstand drying. Although domestic animals (e.g., cows) are known to harbor serologically related rotaviruses, they are not a common source of human infection. Outbreaks occur in preschools and day-care centers and among hospitalized infants(2).

Ethiopia is one of five countries with the greatest rotavirus burden worldwide and accounts for six percent of all rotavirus deaths globally. It is estimated that 28 percent of all under-five diarrheal disease hospitalizations in Ethiopia are caused by rotavirus(4).

Nono Woreda of West Shoa Zone reported Diarrheal diseases of unknown causative agent and they suspected Acute Watery Diarrhea (AWD) on 03/01/2017.

After the report of the unknown cases from Nono Woreda of West Shoa Zone, team was deployed for investigation. The main aim of this investigation was to identify its causative agent and to assess the magnitude and risk factor of the outbreak in Nono Woreda, Oromia Region, from 23/1/-10/2/2017 and make recommendations of the future.

5.1.2 METHODS

Laboratory Investigation

Fifteen stool samples was collected from suspected case and transported to Ethiopian Public Health Institute and the result is positive for Rota virus.

Study Design

We used descriptive cross-sectional and case-control study design to identify the risk factors and describe the magnitude of the occurrence of Rota Virus.

Sampling method

The cases and controls were recruited by random sampling method irrespective of the variables.

Sampling Size

We used unmatched case-control sample size determination with a ratio of 1:2 for cases and controls.

Data Collection Tools and Methods

Prior to conducting the investigation, structured questionnaire which include characteristics or variables for investigating Rota outbreak in the Woreda were developed .Questionnaire specifically designed for the case control part of the study was completed during an interview. The interview was conducted in the local language and with the subjects' parents,

mostly mothers, present. The principal investigator, Woreda health office technical staff and nurses from health centers were participated in data collection.

Data Processing and Analysis

We used Epi- Info Statistical software version 7.3.1 for data entry and analysis

5.1.3 RESULTS

5.1.3.1 Descriptive Analysis

A total of 849 cases were reported by both passive and active case search surveillance approach in Nono Woreda from 15 December 2016 to 04 February 2017.To confirm these out breaks efforts has been made by zonal health departments, first during the first weeks of the outbreak occurrence it suspected as Acute Watery Diarrhea (AWD) and samples were taken for bacteriological test and the result were found to be negative for Vibrio Cholera. Another team composed of ORHB, Adama regional lab and zonal health departments deployed on 20 January 2017 for further investigation and 16 samples were taken to Ethiopian Public Health Institute (EPHI) for viral examination. Among the samples taken, 15 (93.75%) were confirmed positive for Rota virus infection. The Index case was female aged seven months who was not vaccinated against Rota from nearby Woreda (Tolay) of Oromia region. Two days before the onset of vomiting and diarrhea the child had a history of travel to Walga Health Center of South Nation Nationality Peoples Region (SNNPR) where the first case of the outbreak was reported for the first time.

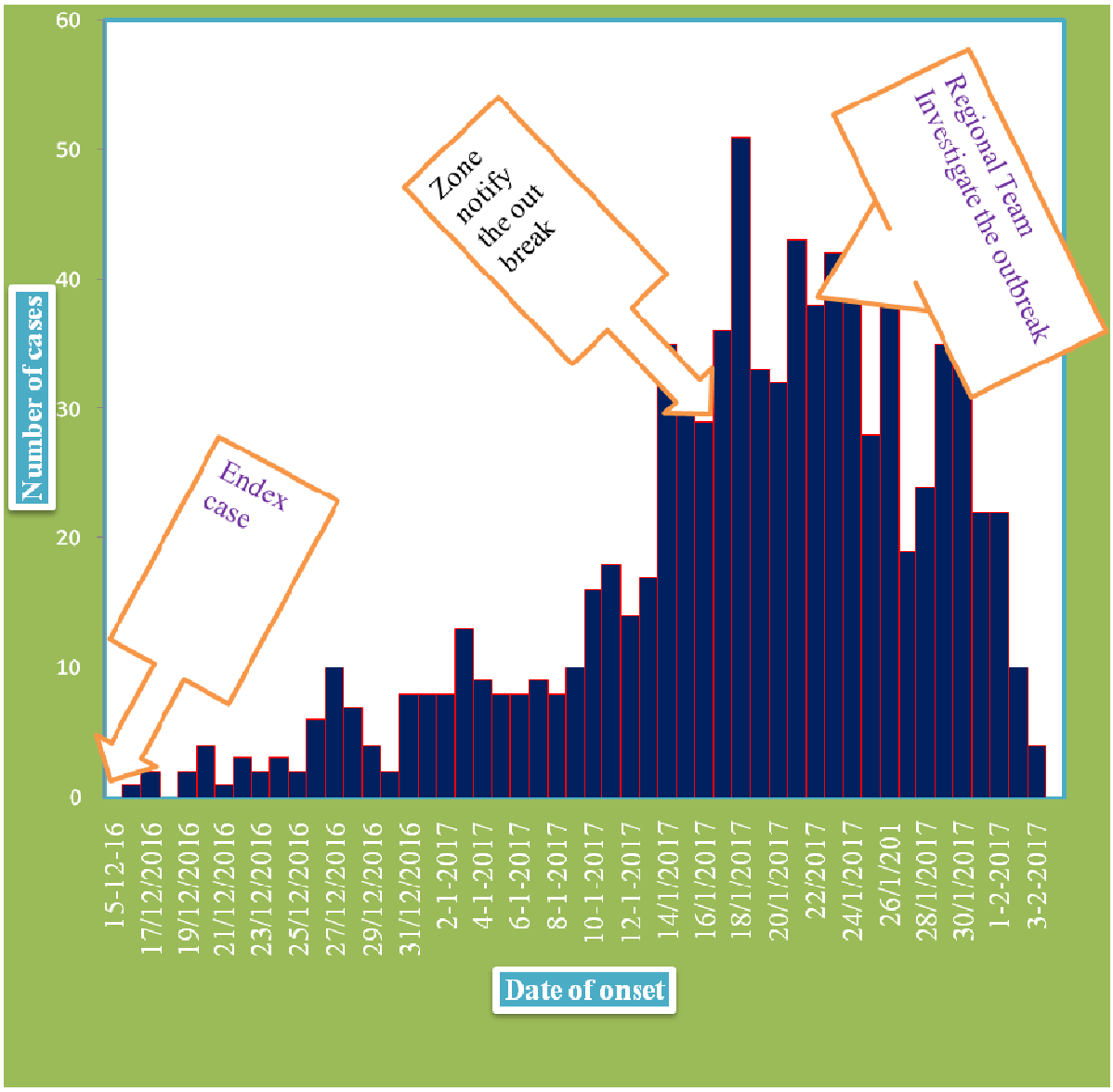

Figure5.1.1. 27:-Epi-curve of RV outbreak of Nono Woreda, West Shoa Zone, Oromia February 2017

4.1.2 Description of Rota Virus Cases by Place and Person

Between 16 December 2016 and 4 February 2017, we detected a period prevalence of 7.74/1000 with 93.75 %(15 sample positive out of 16 sample) laboratory confirmed RV cases. The Case Fatality Rate (CFR) of the case was 0.59%. Majority of the cases were reported from Silkamba 141(16.7. %), followed by Metu Silase 86 (10.13) %),Hurumu Korke 69(8.13),Diko Shumo 61(7.2%) and others kebeles as showed in (Fig.3). All kebeles(35)of the Woreda were infected and nine(1.1%) of the cases were from nearby kebeles of the surrounding Woreda(Jibat Woreda of West Shoa).

The overall attack rate was 7.74 per 1000 population with variation among kebeles; highest 27.50 per 1000 population in Silk-amba, lowest 1.26 per 1000 population in H/Dinki kebele.

5.1.3.2 Analytical Epidemiology

A total of 60 cases and 120 controls were selected from the community to identify the risk factors for Rota virus outbreak in affected kebeles of Nono Woreda, West Shoa Zone. The median age of the participants was 17 months (range: 2 months to 5 years). Of the cases we assessed (84.5%) has a history of Vomiting and (95%) diarrhea.

On variable analyses being vaccinated, being breast feed, having knowledge of exclusive breast feeding, child feces defecation in toilet and living within 1 Km of the health facility were a protective factor for developing the disease with an (OR) of 0.41[95%CI:0.22-0.78,P:0.006],0.20[95%CI:0.07-0.55,P:0.002], 0.35[95%CI:0.18-0.66,P:0.001], 0.53[95%CI:0.28-0.99,P:0.046] and 0.26[95%CI:0.09-0.76,P:0.014] respectively. while contact history with similar complaints and illiteracy of the father were a risk factor with an (OR) 6.16[95%CI:2.74-13.84,P:<0.0001and2.59[95%CI:1.29-5.22,P:0.007] respectively.

By multi variable analysis being vaccinated, being breast feed and having knowledge of exclusive breast feeding has a protective factor for developing the disease with an adjusted (OR) of 0.37[95%CI:0.16-0.86,P:0.021],0.11[95%CI:0.03-0.36,P:0.0002] and 0.30[95%CI:0.14-0.67,P:0.003], respectively while contact history with similar complaints was a risk factor with an (OR) 5.7[95%CI:2.23-14.60,P:0.0003.

Water Sanitation and Hygiene

This study showed 93(51.11%) of the households use open field to defecates their children's feces and 87(48.89) of them were

use toilet. The most reasons mentioned for using open field are no toilet59 (63.44%) followed by culture 14(15.05%), bad odor 1(1.08%), toilet is too far 4(4.30) and physically damaged tolilet11 (11.83%).

Regarding source of water, 84(46.93%) of the households get water from pipe line, 52(29.05%) hand dug well, 36(20.11%) river and 7(3.91%) from spring.

Interventions Taken

Technical working group at the zonal and Woreda level was established and planned to control the outbreaks. Emergency drugs were procured and distributed to affected area at the national level. Technical assistance was given for health workers on case management, recording and reporting situation. Cases were treated to prevent further spread and reduce morbidity and mortality attributed to RV using medications (ORS, Zinc, Vitamin A) both at house hold and health facility level. Staff from health center, Woreda health office, and zonal health department including the investigation team participated in home to home service like health education, active case search, treatment for mild cases. Routine surveillance was enhanced and the situation was closely followed at each level on a daily bases. The most activities targeted to implement during the home to home services are latrine construction and its utilization, hand washing practices at critical time ,assessing the immunization of RV and treatment of water at the source and home based. The zone has started closely working with the affected and the entire neighboring Woredas to prevent/control the outbreak from spreading to other areas, and alarming the community, health extension worker and community leader to strength the local surveillance system. The Woreda cabinet allocate budget for emergency drug and control the intervention activities on daily bases in collaboration with the team.

Water sample was taken from three different sources (Hurumu,Silkamba and Kersa) to EPHI for bacteriological analysis and the result showed as the source of water from kersa area was positive for Ecoli and it was not potable.

5.1.4 DISCUSSION

In Rota Virus sentinel surveillance indicators conducted in Black Lion, Yekatit 12 and Betezata Hospitals of Ethiopia (2007-2014) Percent (positivity rate) of ELISA Rota Virus confirmed cases were 19% in 2010 and 2011, 31% in 2012, 32% in 2013 and 20% in 2014(6) while this study showed 93.75% confirmed Rota Virus.

Babies who are breastfed are generally healthier and achieve optimal growth and

development compared to those who are fed formula milk. If the vast majority of babies were exclusively fed breast milk in their first six months of life – meaning only breast milk and no other liquids or solids, not even water – it is estimated that the lives of at least 1.2 million children would be saved every year. If children continue to be breastfed up to two years and beyond, the health and development of millions of children would be greatly improved. Multi variable analysis of this study also ensures being vaccinated, being breast feed and having knowledge of exclusive breast feeding has a protective factor for developing the disease.

The use of rotavirus vaccines should be part of a comprehensive strategy to control diarrheal diseases with the scaling up of both prevention (promotion of early and exclusive breastfeeding for six months, vitamin A supplementation, hand-washing, improved water supply and sanitation) and treatment services(5). In case of Nono Woreda the vaccination status was not well known in case based line list. Additionally from a total study participants a large proportion of the cases 34 (56.67%) as compared to controls 42 (35%) were not received any dose of Rota vaccination. Report of Nono Woreda indicates six month performance of Rota 1 and Rota 2 vaccination coverage of the Woreda was 70% and 60% respectively.

The virus is highly infectious and very stable in the environment: it can survive for hours on hands and even days on hard surfaces, and it remains stable and infectious in human stool for up to 1 week. Individuals with rotavirus excrete significant quantities of viral particles before they begin showing symptoms of the disease, throughout the course of the diarrhea, and, in one-third of the cases, up to 1 week after the symptoms disappear. Many people excrete the virus without experiencing diarrhea(3).In case of Nono Woreda from the total study participants 93(51.11) practiced to defecates child feces in open fields because 63.44% of them don't have toilet and the other complain bad odor, culture, distance of the toilet and physically damaged of toilet. Having contact with sick child are a risk factor for developing RV and statistically significant in Bivariate and multivariate analysis of this study.

5.1.5 LIMITATION

- Line list of the outbreak is not fully recorded (vaccination status)
- Absence of child immunization card and immunization diploma

at household level was made difficult to get exact date of vaccination and other relevant information.

- As soon as the outbreaks occurs the Woreda and Zonal health department did not notify the RHB.
- Similar or related studies were not found

5.1.6 CONCLUSION

We confirmed the presence of Rota virus outbreak in Nono Woreda of West Shoa Zone that affects all of its kebeles. Children less than five years of age were the most affected groups. The result of this outbreak documented that contact history of same complaints is a risk factor for the occurrence of the outbreak. Being vaccinate, breast feeding and having knowledge of exclusive breast feeding are a protective factor and significantly associated with the outbreak. The main cause of this outbreak was low vaccination coverage of Rota.

5.1.7 RECOMMENDATION

- The Woreda health Office, Health Center and health post at kebele level actively strengthen the immunization activities both at statics and outreach based.
- Community awareness on exclusive breast feeding and child feeding practices should be strengthened by health extension workers.
- Supportive supervision for health extension workers and health providers at facility level should strengthen especially in areas of data quality, cold chain management, supply of vaccine and others logistics, monitoring charts and providing EPI card and Immunization diploma for those who are targeted.
- Routine awareness creation in hand washing practices at critical time should be implemented at community level.

5.1.8 REFERENCE

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Chapter- VI Abstract for scientific presentation

6.1 Measles outbreak investigation in Wadera Woreda of Guji Zone, Oromia, Ethiopia December 2016

Background

Measles is a leading cause of childhood morbidity and mortality worldwide. An estimated 164,000 people died globally from measles in 2008 mostly children under the age of five.

In Ethiopia, the expected case-fatality rate is between 3% and 6%; the highest case-fatality rate occurs in infants 6 to 11 months of age, with malnourished infants at greatest risk.

The main aim of this outbreak investigation was to assess the magnitude and risk factor of measles infection in Wadera Woreda of Guji zone, Oromia Region, from 04-19/12/2016.

Method

We used descriptive cross-sectional and case-control study design to identify the risk factors. We used unmatched case-control sample size determination with a ratio of 1:2 for cases and controls.

Result

A total of 393 cases were reported. Six samples were taken and four of them were positive for measles. The Index case was female aged 20 years who was not vaccinated. We detected a period prevalence of 5.93/1000. In the variable analysis having previous measles infection and being vaccinated with measles vaccine has a protective factor with AOR=0.36,95%CI:0.16-0.76,P.value 0.008 and AOR;0.41,95%CI:0.17-0.97,P.value 0.043 respectively. while being under five years old and having contact history with measles cases are a risk factor for developing measles infection with AOR;2.83,95%CI(1.25-6.43),P. value 0.013 and AOR;6.75,95%CI(2.69-16.94),p. value < 0.0001 respectively.

Conclusion and Recommendation

The main factors contributing to this outbreak was the accumulation of large numbers of susceptible children over time. The second opportunity for measles immunization is required to protect those children who have never been vaccinated and those who were vaccinated but did not develop the immunity.

We recommend the Ministry of health, Regional health Bureau and Zonal health department to use the second opportunity of SIAs and have conducted a catch up and several follow up campaigns to increase measles immunity by keeping data records at all levels.

Key words: Measles, Outbreak, Case control, Wadera, Guji 2016

Word count: 297

6.2 Rota Virus Outbreak Investigation in Nono Woreda of West Shoa Zone, Oromia February 2017

Back ground

Rotavirus is ubiquitous and infects nearly all children worldwide by 5 years of age. Infection causes an acute onset of diarrhea, nausea, vomiting, and abdominal cramps, especially in children. The incidence of rotavirus infection in developing countries is similar to that of developed countries, where water quality or hygiene/sanitary conditions have been shown to have an effect in controlling the infection. However, case-fatality in the poorest countries is higher, due to malnutrition and barriers to accessing health services in a timely manner.

Ethiopia is one of five countries with the greatest rotavirus burden worldwide and accounts for six percent of all rotavirus deaths globally. It is estimated that 28% of all under-five diarrheal disease hospitalizations in Ethiopia are caused by rotavirus.

The main aim of this investigation was to identify its causative agent and to assess the magnitude and risk factor of the outbreak in Nono Woreda, Oromia Region, from 23/1/-10/2/2017.

Method

We used descriptive cross-sectional followed by case-control study, 60 cases with 120 controls. We analyzed the collected data using Epi-Info.

Result

We detected a period prevalence of 7.74/1000 and 0.59% Case Fatality Rate.being vaccinated, being breast feed and having knowledge of exclusive breast feeding has a protective factor for developing the disease with an adjusted (OR) of 0.37[95%CI:0.16-0.86,P:0.021],0.11[95%CI:0.03-0.36,P:0.0002] and 0.30[95%CI:0.14-0.67,P:0.003], respectively while contact history with similar complaints was a risk factor with an (OR) 5.7[95%CI:2.23-14.60,P:0.0003.

Conclusion and Recommendation

Children less than five years of age were the most affected groups. The main cause of this outbreak was low vaccination coverage of Rota.

The Woreda health Office, Health Center and health post at kebele level actively strengthen the immunization activities both at statics and outreach based.

Key Words: Rota Virus, Outbreak, Case control, Nono Woreda, February 2017

Word count: 275

Chapter –VII Narrative Summary of Disasters

7.1 Emergency Need Assessment(Meher Assessment) Report of Health and Nutrition of West Arsi, North Shoa and East Shoa Zones of Oromia Region, Ethiopia 2016 .

7.1.1 INTRODUCTION

As human populations grow and societies become increasingly interconnected and complex, the damages from natural and human-induced disasters have become more and more extensive. Our vulnerabilities as societies have deepened the effects that disasters have on human health. Socioeconomic, political, cultural, geographical, and other factors combine and compound to increase the scope of a disaster's consequences(1).

Humanitarian need assessment/community risk assessment is a participatory process for assessing hazards, vulnerabilities, risks, ability to cope, preparing coping strategies and finally preparing a risk reduction options implementation plan by the local community. Humanitarian need assessments use scientific information and predictions and participatory debates to identify, analyze and evaluate risk environment of a particular community, reach consensus 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 Federal Disaster Risk Management Commissions(DRMC) in collaboration with Ministry of Health(MOH), Ministry of water and natural resources(MOW), NGOS and UN Agencies (WHO, UNICEF and WFP).

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7.1.2 OBJECTIVES

- To assess the extent, type, magnitude, severity and likelihood of different risks in the most “vulnerable” woredas;
- To assess the existing capacity of the health system to address those risks;
- To determine gaps in the capacity of the health system to address anticipated/impending risks and existing threats.
- Based on the findings, to develop response plans

7.1.3 METHODS

There were a one day briefing session at the national level organized by the DRMC after that the composed of different sectors from government and non governments participate to collect data through different methods from selected zones, specifically selected and visited Woreda. Due to time constraints, the team was forced to divide itself into two sub-teams to achieve the objectives. The methods used during the assessment were:

- Semi-structured questionnaire to collect the required information.
- Secondary data from documents
- Field visit of priority Woreda and kebeles
- Focus group discussions with Woreda, zonal preparedness and response task forces officials, and program managers.

7.1.4 RESULTS

7.1.4.1. Results of West Arsi Zone.

7.1.4.1.1 Background

This report asserts the current health and nutritional condition of the west Arsi Zone, oromia regional state. West Arsi zone is located on south-Western part of Addis Ababa and its capital Shashemene town is located at 250 KM from Addis. The zone is divided administratively in to 11woredas, two town administrations and 322 kebeles, with a total population of 2,591,152 of whom 1,280,051 are Male and 1,311,101 are female.

According to the zone health bureau there are 80health centers, 3 hospitals and322health posts. In the past six months there was a declined trend in the number of children admitted to out-patient therapeutic program as a result of up-sated reasons on the zone. The zonal water supply coverage is 47.7%. The major hygiene and sanitation related health problem that put the population at risk together with food insecurity is being Acute Watery Diarrheal (AWD) diseases. Based on the team assessment and observation post harvest loss will happen with food insecurity due to the untimely high rainfall and flooding before collection of crops in most part of the zone.

For a coherent and efficient humanitarian response, a multidisciplinary group had carried out a comprehensive Meher assessment in few but representatives' Woredas in West Arsi zone from November 24 to November 26/ 2016.

7.1.4.1.2. Health Profile

7.1.4.1.2.1 Coordination and Management Systems

There is no functional multi-sect oral PHEM coordination forum in all of addressed Woredas of West Arsi Zone but at the zonal level there is a functional multi sector health coordination forum that met together on monthly bases. At the zonal health departments there were three PHEM officers running the activities planned and only one health professionals acting on PHEM officers at all Woredas assessed. Even though the report completeness and timeliness were not accurate, all Woredas and health centers who are expected to report were reporting the weekly reports. Some of Woredas and health centers complain to the shortage of reporting format at all levels. All Woreda of the zone were anticipated for AWD, Measles and Malnutrition epidemics according the data obtained from zonal health departments.

7.1.4.1 2.2. Public Health Emergency Management

In West Arsi Zonal Health Departments there was a functional Rapid Response Team (RRT) who had plan and facilitate allocation of 400,321 ETB to for Epidemic Preparedness and Response activities particularly for AWD out breaks, but not similar at Woreda level. There were a trained staffs at all levels that were assessed during the assessment time. There are three male trained personnel at zonal level and 119 (18 female and 101 male) health personnel trained at Woreda level and also a trained staffs on emergency nutrition management at all level.

7.1.4.1.2.4 Diseases outbreak

There were an ongoing AWD out breaks in the zone that affects eight Woredas and 58 kebeles with a total of 262 cases and six deaths up to the date data collected (25/11/2016).the index cases of AWD cases was on 28/06/2016 that have a travel history of Borena Zone of Oromia region were the AWD cases seen for the first time in the region.

Currently there were rabies out break with two suspected deaths and five cases in Aje Health Center catchments of Shalla Woreda that was not reported on WHO week of 46 and ready to report on the coming week.

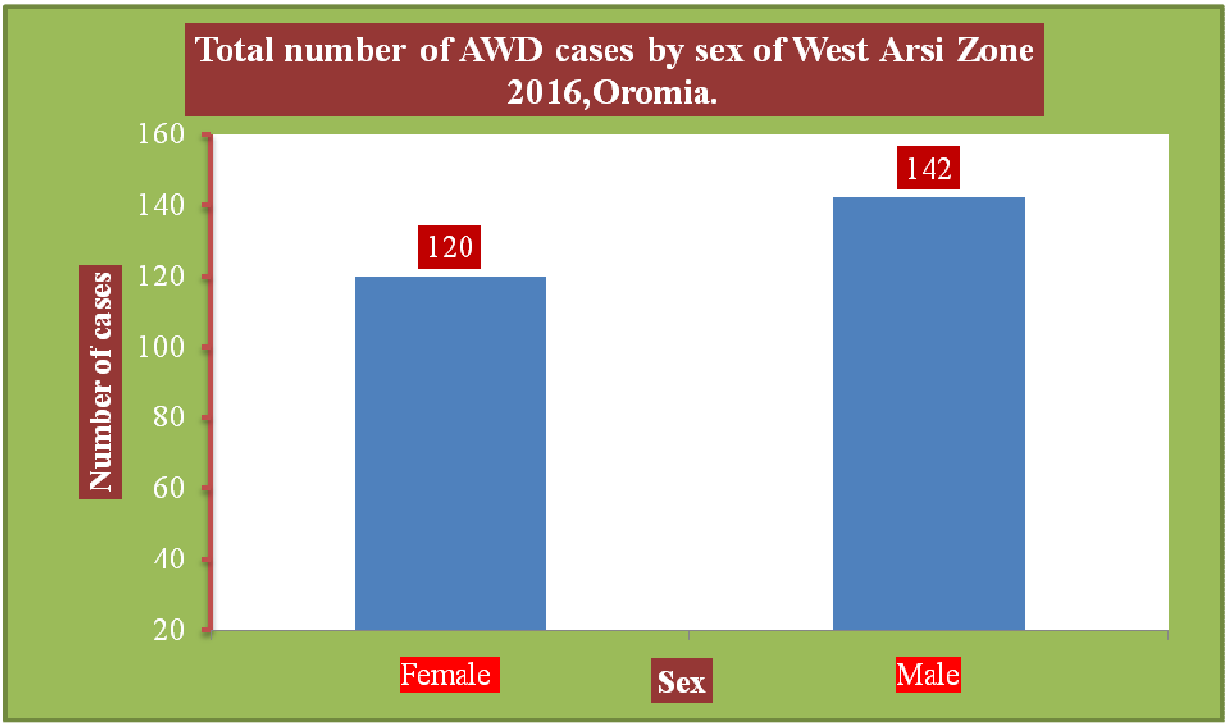

Figure7.1.1.28:- Total number of AWD cases of West Arsi Zone by sex Oromia, 2016.

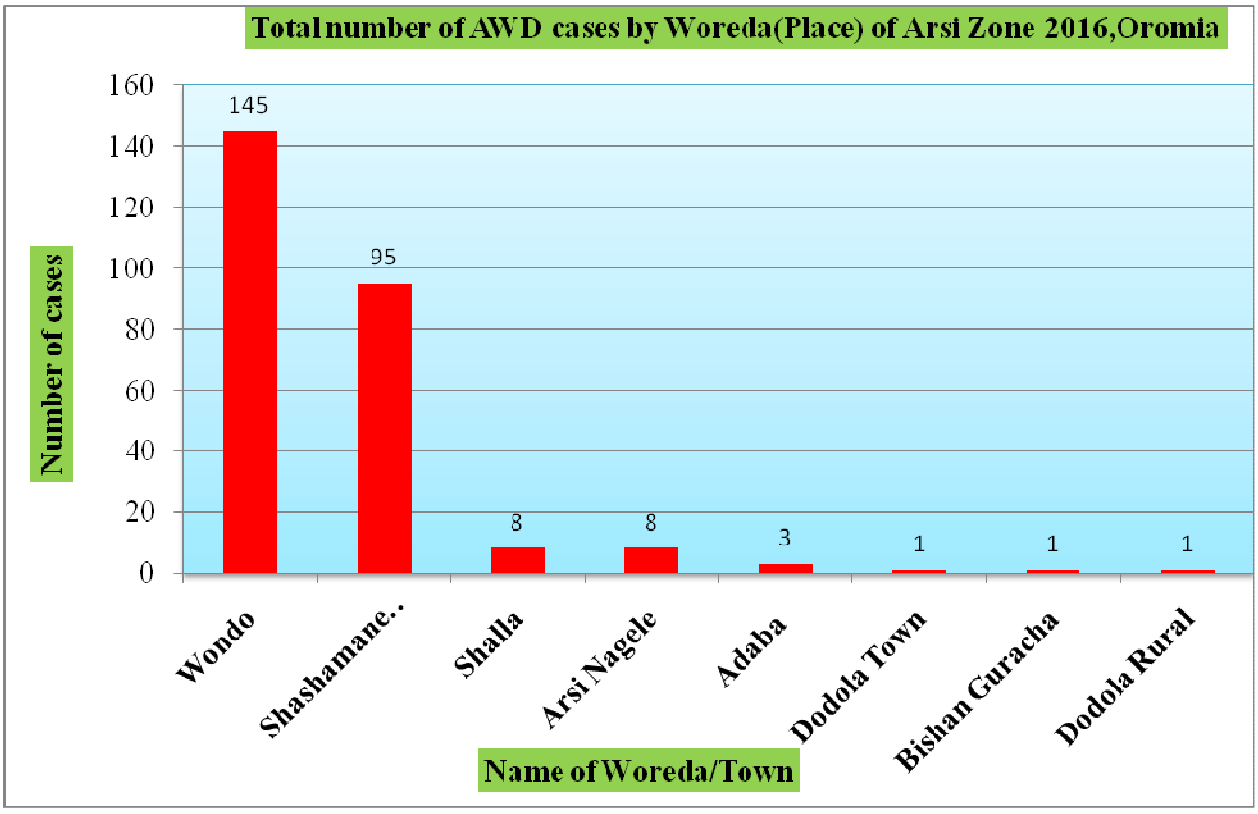

Figure7.1.2.29:- Total number of AWD cases of West Arsi Zone by Woreda (Place), Oromia, 2016

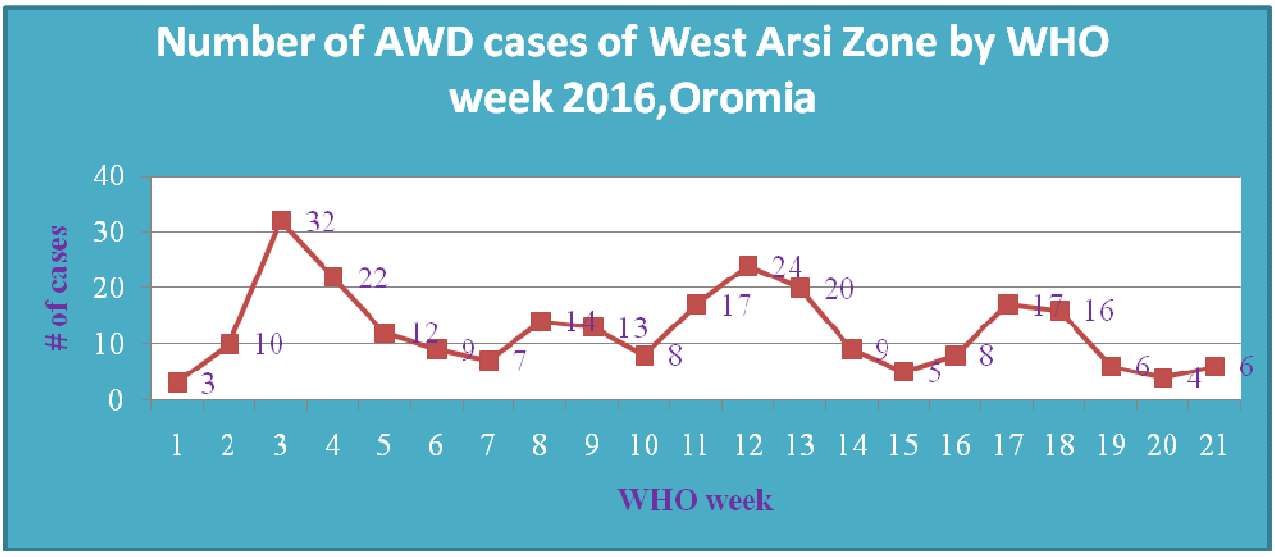

Figure 7.1.3:- Trends of AWD cases in West Arsi Zone by time, Oromia, 2016

Table7.1.1.20:-List of emergency drugs and supplies enough for one month(Y/N),West Arsi Zone, Oromia, 2016

No	Drugs and supplies	Assessed Woredas		
		Shalla	**Arsi Negele**	**A/T/J/Kombolcha**
1	Ringer lactate to treat AWD	No	Yes	Yes
2	ORS to treat AWD	No	Yes	No
3	Doxycycline to treat AWD	Yes	Yes	Yes
4	Consumables syringes, gloves for AWD management	Yes	Yes	Yes
5	Amoxil suspension (measles)	No	No	No
6	Tetracycline eye ointment measles	Yes	Yes	Yes
7	Vit A measles	Yes	Yes	Yes
8	Coartem for malaria	No	No	Yes
9	Lab supply: RDT for malaria	Yes	Yes	Yes
10	Lab supply: RDT(pastorex) for meningitis	No	No	No
11	CTC kits for AWD	Yes	Yes	Yes
12	Emergency reproductive kits in HC&HP	yes	yes	yes
13	Emergency reproductive health kits in hospitals	NA	NA	NA
14	Emergency medicines and supplies to support rape survivors(post pills)	No	No	No

7.1.4.1.3. Risk Factors

7.1.4.1.3.1 Malaria

Malaria is an endemic disease in all assessed Woreda of West Arsi Zone. There is malaria breeding sites in all Woreda we assessed but there is no interrupted and potentially interrupting rivers in the zone. Regarding the activities planned to control malaria, there were 82000(97.6%) LLINS coverage and 7242(85.5%) indoor residual spray (IRS) performed in Shalla Woredas of West Arsi Zone and there were also 7242(85.5%) LLINS coverage and 5580(99.6%) unit structures covered with indoor residual spray (IRS) performed in six kebeles under Aje Health Center of Shalla Woreda but we can't get similar data at zonal level.

7.1.4.1.3.2 Meningitis

There is no Meningitis epidemic during the last three years in West Arsi Zone. In 2013/2014 Meningitis vaccination were given for eligible population but the data were not available at both zonal level and Woreda level.

7.1.4.1.3.3 Acute watery Diarrhea (AWD)

Active AWD outbreaks were found in West Arsi Zone. Until the occurrence of the outbreak there were many efforts from all stakeholders of both government and non governments done to control the outbreaks.

There are 493,342 households (HHs) who had latrine and make 98% of latrine coverage and 473608 (96%) HHs was used latrine in West Arsi zone. Data of Safe water coverage was not found during the assessments in Zonal Health Departments.

7.1.4.1.3.4. Measles

There is no ongoing measles outbreak in West Arsi Zone. The Measles Vaccination coverage of the 2016 were 83411(106) at the zonal level. In April 2016 SIA has been conducted and 97% of under 15 were vaccinated at zonal level and 77789(95%) of the same age group were vaccinated in Shalla Woredas of West Arsi.

SAM and MAM management

There are 47 health institutions providing stabilizing center (SC) and 293 health posts that provide OTP services. But now during the assessment time the health post providing the OTP services was declining to 252 due to destruction during the public appraising period and a minor damage with looting of medical equipments had taken place in one health center of Gadab Asassaa Woreda.

The current zonal picture showed that there is a tendency in declining in the number of SAM and MAM cases comparing to the previous six month of 2007 and 2008 EFY period report.

According the data obtained from zonal health department there were sufficient supplies ready to use therapeutic feeding) RUTF, F100, F75 and second line drugs to treat SAM for three months

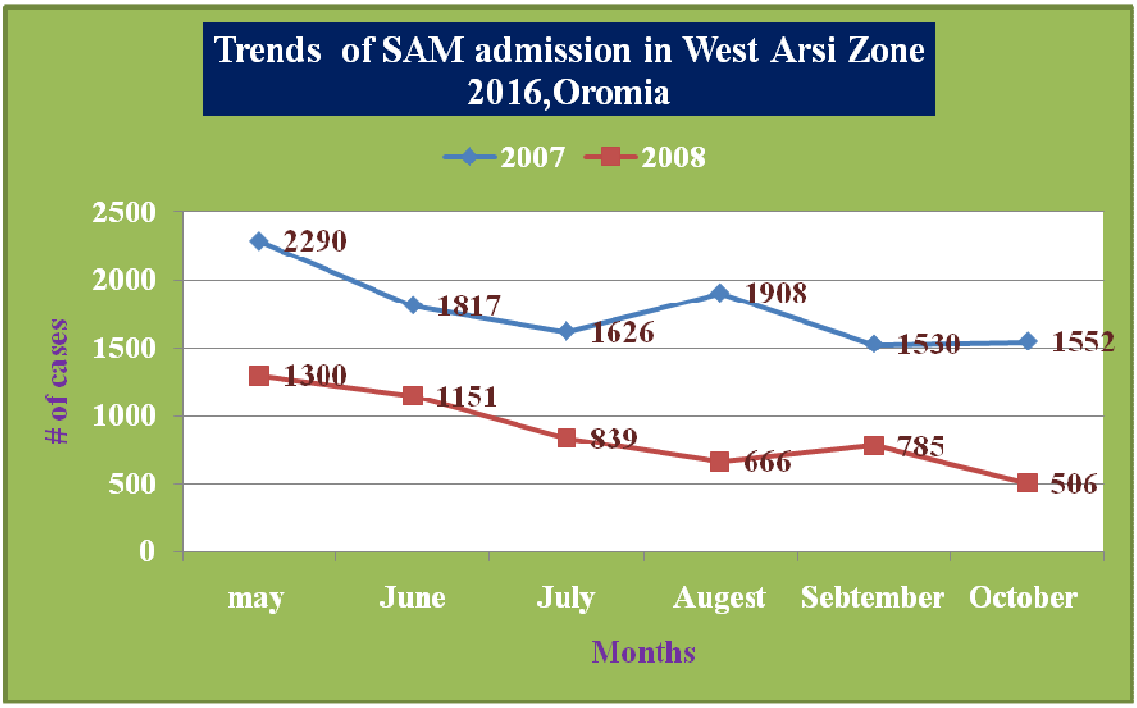

Figure7.1.4.30:-Trends of SAM cases at West Arsi zone, Oromia, 2016

7.1.4.2. Results of North Shoa

7.1.4.2.1Background

This report asserts the current health and nutritional condition of the North Shoa Zone, Oromia regional state. North Shoa Zone is located on Northern part of Addis Ababa and its capital Fitche town is located at 114 KM from Addis. The Zone has a total population of 1,540,674 of whom 771,203 are Male and 769,471 are female.

According to the zone health bureau there are 62 health centers, three hospital and268 health posts.

7.1.4.2.2. Health Profile

7.1.4.2.2.1 Coordination and Management Systems

There is no functional multi-sect oral PHEM coordination forum in all of addressed Woredas of North Shoa. At the zonal health departments there were three PHEM officers running the activities planned and only one health professionals acting on PHEM officers at all Woredas assessed. Even though the report completeness and timeliness were not accurate, all Woredas and health centers who are expected to report were reporting the weekly reports. All Woreda of the zone were anticipated for AWD, Measles and Malnutrition epidemics according the data obtained from zonal health departments.

7.1.4.2.2.2. Public Health Emergency Management

In North Shoa Zonal Health Departments there was no functional Rapid Response Team (RRT).There were a trained staffs at all levels that were assessed during the assessment time. There are two male trained personnel at zonal level and 16 (two female and 14 male) health personnel trained at Woreda level and also a trained staffs on emergency nutrition management at all level.

7.1.4.2.2.3 Diseases outbreak

There were an ongoing AWD out breaks in the zone with a total of 345 cases and eight deaths up to the date data collected (22/11/2016).There is no any outgoing outbreaks other than AWD in the Zone reported.

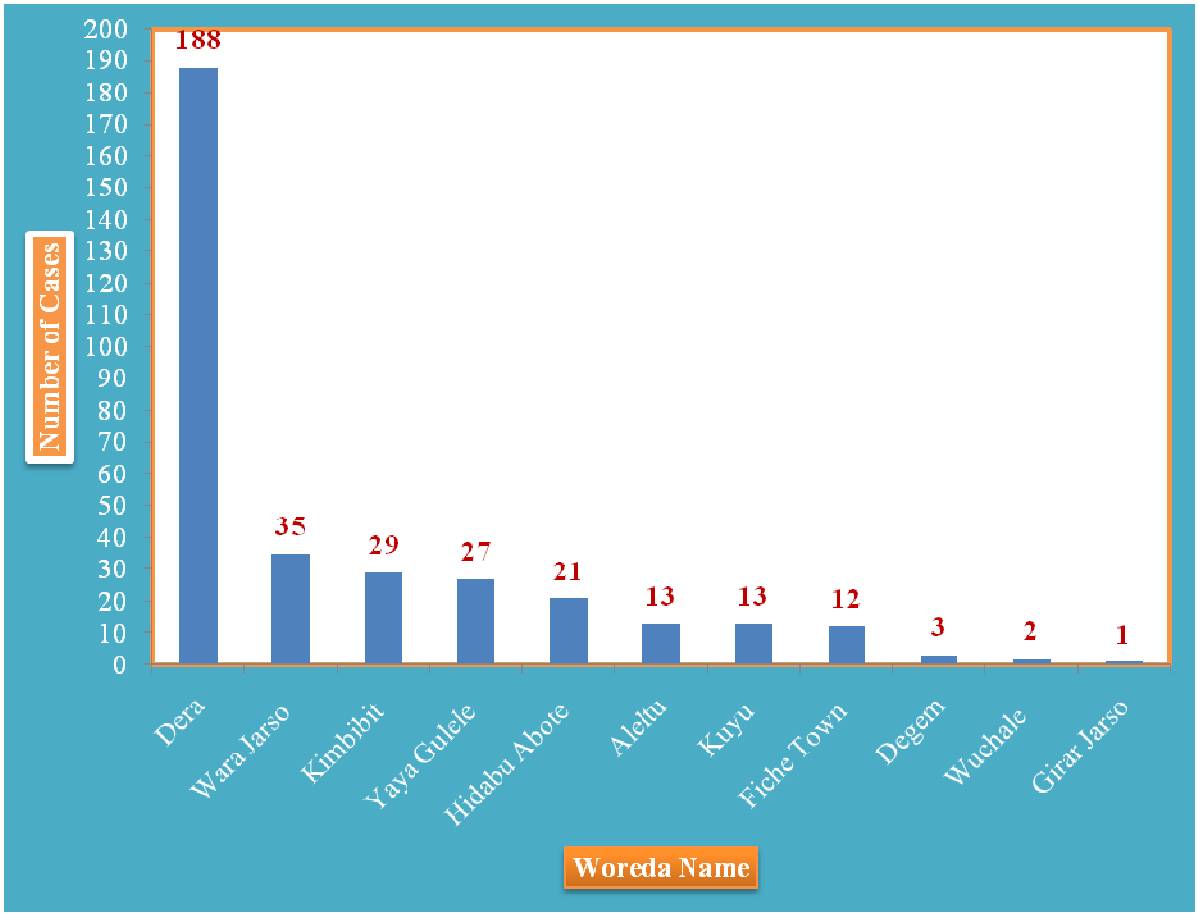

Figure7.1.5.31:- AWD cases of North Shoa Zone by Woreda, Oromia, December 2016

Table7.1.2.21:-list of emergency drugs and supplies enough for one month(Y/N), North Shoa, Oromia, 2016

No	Drugs and supplies	Assessed Woredas		
		Deb/ Lib	Girar jarso	Wuch ale
1	Ringer lactate to treat AWD	yes	Yes	Yes
2	ORS to treat AWD	yes	Yes	No
3	Doxycycline to treat AWD	Yes	Yes	Yes
4	Consumables syringes, gloves for AWD management	Yes	Yes	Yes
5	Amoxil suspension (measles)	yes	yes	No
6	Tetracycline eye ointment measles	Yes	Yes	Yes
7	Vit A measles	No	No	No
8	Coartem for malaria	No	No	No
9	Lab supply: RDT for malaria	No	No	No
10	Lab supply: RDT(pastorex) for meningitis	No	No	No
11	CTC kits for AWD	Yes	Yes	No
12	Emergency reproductive kits in HC&HP	No	No	No
13	Emergency reproductive health kits in hospitals	No	No	No
14	Emergency medicines and supplies to support rape survivors(post pills)	No	No	No

7.1.4.2.3. Risk Factors

7.1.4.2.3.1 Malaria

Malaria is endemic and one of the major public health problems in North Shoa Zone and a total of 491,630 population resided in 79 Kebeles at risk of malaria infection. There are potential mosquito breeding sites and interrupting rivers in different part of the zone. To mitigate the impact of malaria infection, early diagnosis and prompt treatment of malaria cases as well as vector control activities are ongoing in malaria endemic area of the zone. Accordingly, a total of 111,441 Long Lasting Insecticidal Nets (LLINs) were distributed with zonal average coverage of 70.4%.

7.1.4.2.3.2 Meningitis

There is no Meningitis epidemic during the last three years in North Shoa Zone. In 2013/2014 Meningitis vaccination were given for eligible population but the data were not available at both zonal level and Woreda level.

7.1.4.2.3.3 Acute watery Diarrhea (AWD)

Active AWD outbreaks were found in North Shoa Zone. Until the occurrence of the outbreak there were many efforts from all stakeholders of both government and non governments done to control the outbreaks.

There are 259,960 households (HHs) who had latrine and make 83% of latrine coverage and 40,185 (67%) HHs was used latrine in the zone. In North Shoa Zone there are 157,575 (50%) of the households that use safe and adequate water.

7.1.4.2.3.4. Measles

There is no ongoing measles outbreak in the Zone. The Measles Vaccination coverage of the 2008E.C were 47,001(96.7%) at the zonal level. In April 2008 E.C SIA has been conducted and 625,684(96%) of under 6-179 months were vaccinated at zonal level.

Nutrition-SAM and MAM Management

There are three hospitals and 36 health institutions providing stabilizing center (SC) and 268 health posts that provide OTP services.

The current zonal picture showed that there is a tendency in increasing in the number of SAM and MAM cases comparing to the previous six month of 2007 and 2008 EFY period report.

According the data obtained from zonal health department there were sufficient supplies ready to use therapeutic feeding) RUTF, F100, F75 and second line drugs to treat SAM for three months

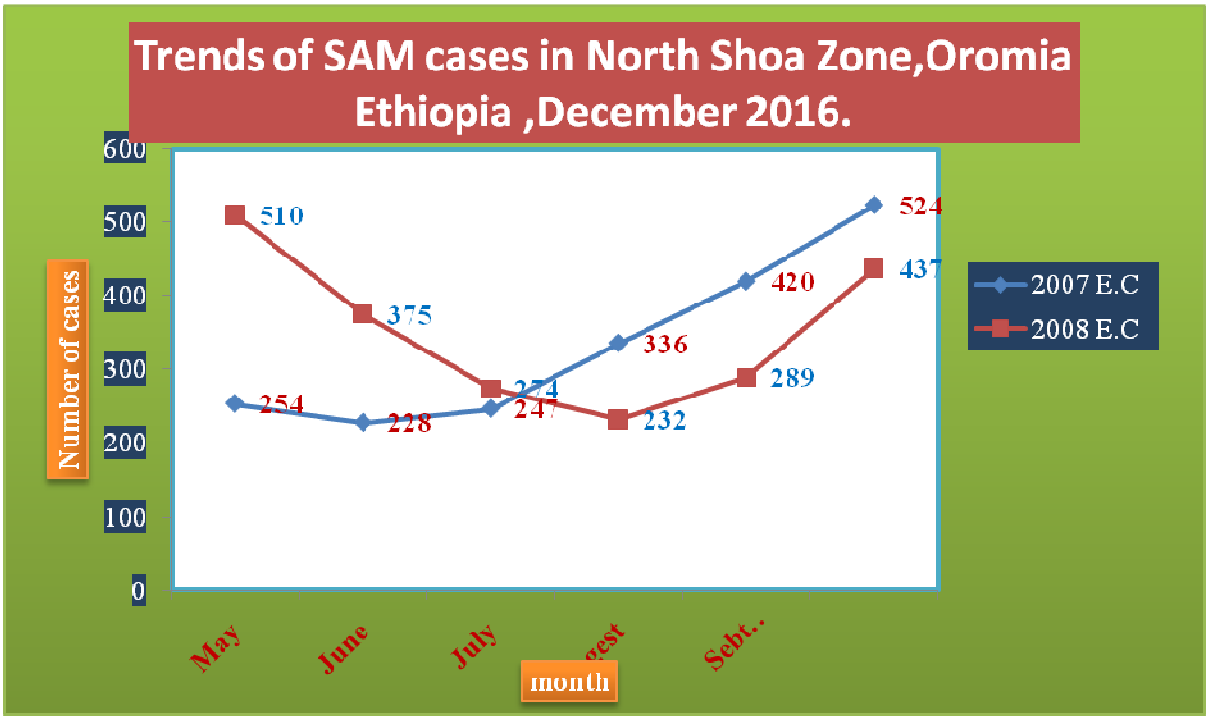

Figure7.1.6.32:-Trends of SAM cases in the last two consecutive years of North Shoa, Oromia, 2016

Table 7.1.3.22:-Screening performance of for children in North Shoa Zone, Oromia December 2016

Month	Target Children	#of screened children	Screening coverage	# of children with no Oedema and MUAC<11			# of children with no Oedema and MUAC11-11.9 CM	% Proxy GAM for children	% Proxy SAM for children
				SAM					
				MUAC< 11	Oedema	Total	#MAM		
May 2008	226311	213228	94.2	764	0	764	4731	2.6	0.4
June 2008	226311	166928	73.8	364	2	366	2925	1.97	0.2
July 2008	231101	79310	34	214	0	214	1395	2	0.26
Aug 2008	231101	76546	33	165	1	166	1471	2.14	0.2
Sep. 2009	231101	128288	56	440	0	440	4634	4	0.34
Oct. 2009	231101	131162	57	420	1	421	3114	2.7	0.32

Table 7.1.4.23:-Screening performance for Pregnant and Lactating Women (PLW) in North Shoa Zone, Oromia December 2016

Month	Target PLW	# screened PLW	Screening coverage (%)	# of PLW MUAC below 23.0 CM	% proxy GAM for {LW
May 2008	52,352	36,971	71	2988	8
June 2008	52,352	29,936	57	2780	9
July 2008	53,461	13,393	25	976	7
Aug 2008	53,461	12,659	24	798	6
Sep. 2009	53,461	19,431	36	2143	11
Oct. 2009	53,461	19,740	37	2800	14

7.1.4.3. RESULTS OF EAST SHOA

7.1.4.3.1. Health Profile

7.1.4.3.1.1 Coordination and Management Systems

There are PHEM officers at zonal, woreda and health center level, there is multi-sect oral emergency health and nutrition coordination committee at zonal and woreda level, there is epidemic preparedness and response plan at zonal level and visited woredas except Boset and there is no accessible emergency response fund at zonal level as well as in the visited woredas

All Woreda of the zone were anticipated for AWD, Measles and Malnutrition epidemics according the data obtained from zonal health departments.

7.1.4.3.2.2. Public Health Emergency Management

In East Shoa Zonal Health Departments there was a functional Rapid Response Team (RRT) who had no budget plan for Epidemic Preparedness and Response activities.. There were a trained staffs at all levels that were assessed during the assessment time.

7.1.4.3.2.3 Diseases outbreak

Currently, there is ongoing AWD epidemic in 9 woredas of the Zone and a total of 337 AWD cases and 3 deaths have been reported since the epidemic started in July 2008 E.C. The last AWD case was reported on November 17, 2016 from Boset Woreda. The establishment of CTC was difficult at the beginning of the AWD emergency response due to shortages of drugs, medical supply and budget.

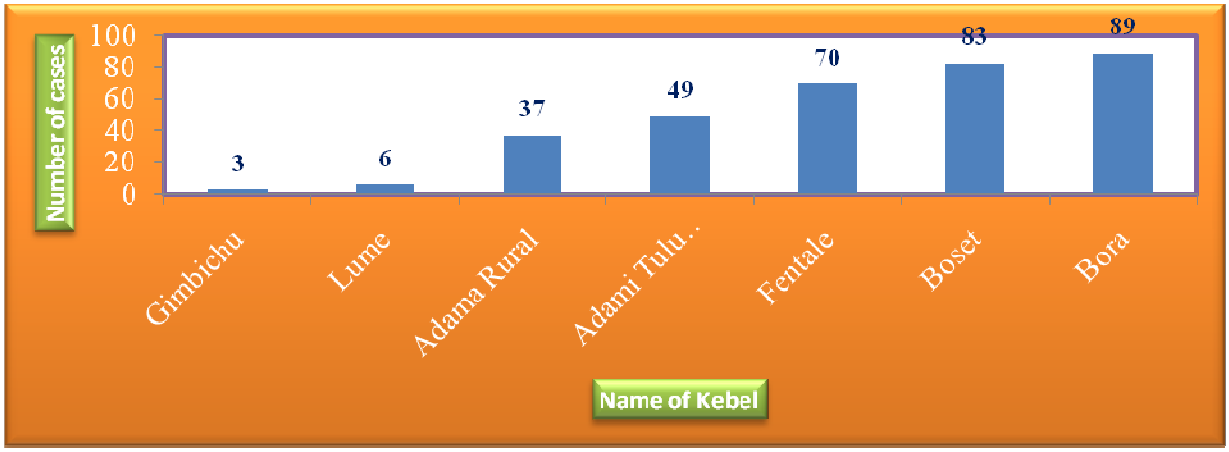

Figure7.1.6.33:- Trends of SAM cases in the last two consecutive years of North Shoa, Oromia, 2016

Table7.1.5.24:-list of emergency drugs and supplies enough for one month(Y/N) East Shoa, Oromia, 2016

No	Drugs and supplies	Assessed Woredas		
		Boset	A/T/J/K	Fentale
1	Ringer lactate to treat AWD	Yes	Yes	Yes
2	ORS to treat AWD	Yes	Yes	No
3	Doxycycline to treat AWD	Yes	Yes	Yes
4	Consumables syringes, gloves for AWD management	Yes	Yes	Yes
5	Amoxil suspension (measles)	Yes	No	No
6	Tetracycline eye ointment measles	Yes	Yes	Yes
7	Vit A measles	Yes	Yes	Yes
8	Coartem for malaria	No	No	Yes
9	Lab supply: RDT for malaria	Yes	Yes	Yes
10	Lab supply: RDT(pastorex) for meningitis	No	No	No
11	CTC kits for AWD	Yes	Yes	Yes
12	Emergency reproductive kits in HC&HP	yes	yes	yes
13	Emergency reproductive health kits in hospitals	NA	NA	NA
14	Emergency medicines and supplies to support rape survivors(post pills)	No	No	No

7.1.4.3.3. Risk Factors

7.1.4.3.3.1 Malaria

Malaria is endemic and one of the major public health problems in East Showa zone and a total of 1,080,108 population resided in 284 Kebeles at risk of malaria infection. There are potential mosquito breeding sites, such as irrigation and interrupting rivers in different part of the zone. To mitigate the impact of malaria infection, early diagnosis and prompt treatment of malaria cases as well as vector control activities are ongoing in malaria endemic area of the zone. Accordingly, a total of 700,050 Long Lasting Insecticidal Nets (LLINs) were distributed with zonal average coverage of 97.4% and a total of 170,331 unit structure was sprayed (IRS) in targeted area.

The overall malaria caseload of the first quarter (July to September) 2009 EFY showed decreasing trend compared to the same period of the previous four years. This is mainly due to ongoing prevention and control activities in the zone.

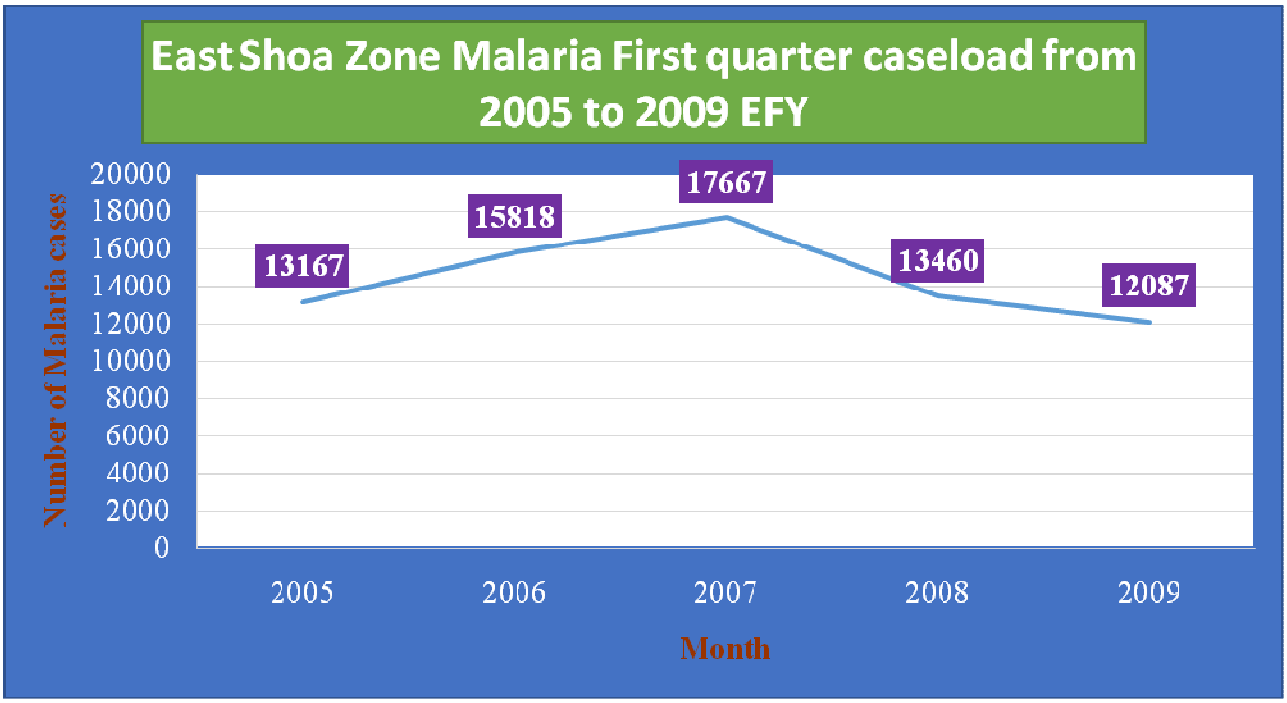

Figure7.1.8.34:- Malaria first quarter case load for five consecutive years, East Shoa Zone, Oromia December 2016.

7.1.4.3.3.2 Meningitis

There is no Meningitis epidemic during the last three years in East Shoa Zone. In 2013/2014 Meningitis vaccination were given for eligible population but the data were not available at both zonal level and Woreda level.

7.1.4.3.3.3 Acute watery Diarrhea (AWD)

Active AWD outbreaks were found in East Shia Zone. Until the occurrence of the outbreak there were many efforts from all stakeholders of both government and non governments done to control the outbreaks.

Data regarding the Water and sanitation Hygiene (WASH) of this zone were not obtained.

SAM and MAM management

The monthly nutritional screening data in this zone indicated that, on average 261,778 children per month were screened in the last six months with an average zonal coverage of 66%. Out of the screened children in the last six months, 1895 were identified as severely malnourished (63 oedematous and 1,832 with MUAC <11 cm) and 12,711 children were found to be moderately malnourished. The proxy GAM rate for <5 years children identified to be 2.4%, 2.1 and 1.9 in Adami Tulu Jidokombolcha, Boset and Fentale, woredas respectively. On average 35,132 pregnant and lactating women were screened per month in the last six months with azonal average coverage of 71%. Out of which, 9,573women were identified as malnourished. The proxy GAM rate for <5 years and PLW in East Showa zone is 1.5% and 4.6% respectively. The proxy GAM rate for PLW identified to be 2.7% in Boset and 2.6 in Adame Tulu Jidokombolcha woredas.

According to the data collected from the zonal family health department, Community Management of Acute Malnutrition (CMAM) service is provided in 292 Health posts, 56 Health centers and 4 Hospitals at an outpatient level; those who have medical complications and needs inpatient treatment are getting the service in the stabilization centers in 56 stabilization centers established at Health centers and Hospitals.

The overall SAM admission showed decreasing trend in this zone as compared to the same months of last year.This is mainly due to ongoing nutrition intervention in the area and improvement in crop production, availability of fodder and water in this year compared to last year. However, the number of acutely malnourished cases is expected to increase due to decreased household food security and shortages of water particularly in Fentale, Boset and Adame Tulu Jido kombolcha woredas of East Shoa zone.

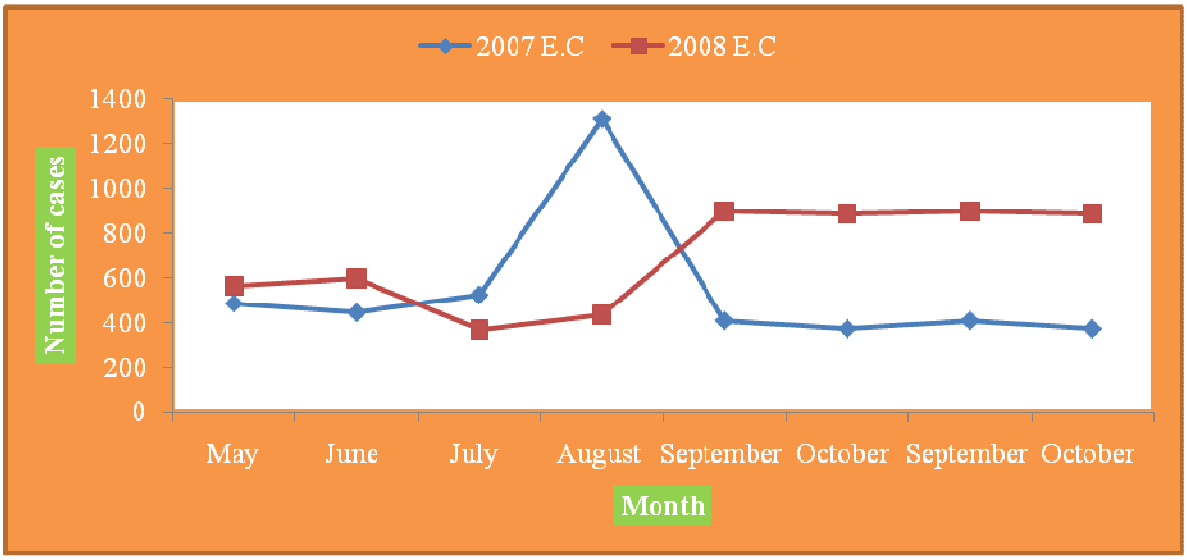

Figure7.1.9.35:- SAM admission of the last two year of East Shoa Zone, from the month may-October, December 2016.

7.1.5. REFERENCE

1.DC. Disaster Preparedness and ResponsTraining: Complete Course. Participant workbook. 2014 Atlanta(GA):170.

2.James Darcy C-AH. Humanitarian needs assessment and decision making. Humanitarian Policy Group at ODI. September 2003;13th.

Annex 5:-Rapid Meher assessment- Health and Nutrition Sector: Region/Zone level Questionnaire

Interviewername _____ Institution:_____

InterviewDate: (dd) ____/(mm)_____/2016_____ Region:_____

Zone:_____

Main contact at this location: Name:_____ Position:_____ Tel:_____

SECTION I: SOCIO- DEMOGRAPHIC PROFILE				
Population: Woreda total population	M:_____F:_____	Under 5____	Total:___	
	No. of women of reproductive age (age 15-49 yrs.) _____			
	No. of pregnant women :_____			
Special Population *(if any)*	Pastorals____	Refugees____	IDPs____	Migrant Workers___
Number of HCs_____Number of HPs_____Number of Mobile health and Nutrition teams __ Number of HEWs_____				
Water availability at health centers (HC)	No. of health centers _____	No. of HC with water access_____	No. of HC without water access_____	
SECTION II: HEALTH PROFILE				
2.1. Coordination and management systems				

Is there a PHEM Officers at Regional level? If yes how money_____	Yes□ No□
Does the RHB/Zone Health Office regularly report PHEM report as scheduled dates? Observe copies and comment _____	Yes□ No□
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_____	Yes□ No□
Do the Woredas, health facilities and HEWs regularly report PHEM report as scheduled dates? Observe copies and comment _____	Yes□ No□

Are all relevant government, NGOs and UN agencies represented at Regional PHEM?	Yes□ No□
Is there a multi sector health coordination forum? If yes how frequently meet? ---	Yes□ No□
Is there a Public Health Emergency preparedness and response plan? Does it include reproductive health? Yes□ No□	Yes□ No□
Is there accessible emergency response fund for PHEM at regional level? If yes how much allocated----------	Yes□ No□
2.3. Mention anticipated epidemics (If yes please indicate Zone/Woreda at risk and risk population per anticipated risk: *(Use the back side)* _____,_____,_____ **2.4. Public Health emergency Management**	Yes□ No□
Is there a Public Health and Nutrition Emergency Preparedness and Response plan?	Yes□ No□
If yes, is the plan budgeted/ funded?	Yes□ No□
Is there a trained staff on PHEM basic level (Regional/Zonal/Woreda/HFs)	Yes□ No□
If yes specify number of trained personnel per level: **Region/Total:** Female _____Male_____, **Zone:** Female_____Male_____, **Woreda**: Female_____Male_____	Yes□ No□
Is there a Regional/zonal trained Rapid Response team (RRT)?	Yes□ No□
Is there a trained staff on Emergency nutrition management at all level? If yes specify the no. : Total___ Male : ____Female :-___	Yes□ No□
2.5. Disease outbreaks	
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)_____				
Drugs and medical supplies				
Description		Total requirement	Available	Gap
Vaccines	Meningitis vaccine			
Drugs	Coartem			
	Artesunate (rectal)			
	Artesunate (Inj)			
	Artemether IM			
	Quinine (PO)			
	Quinine (IV)			
	Chloroquine			
	Ceftriaxione			
	Oily CAF			
	Doxcycline			
	Ringer lactate			
	ORS			
	Vit A.			
Nutrition supplies	F100			
	F75			
	RUTF			
	Resomal			
	Routine antibiotics at SC/OTP (the list can be annexed)			
Laboratory supplies	RDT (Malaria)			
	Pastorex (Meningitis)			

	LP set			
	TI bottle			
Kits	CTC Kit (AWD)			
Medical supplies	Gloves,			
	Syringe			
	PPE			
RH medical supplies/drugs	Individual Clean Delivery Kits			
	Emergency medicines and supplies to support care of rape survivors? (Main shortage (if any): Specify)			

SECTION III: RISK FACTORS			
Diseases	**Risk factors for epidemics to occur**	**Yes**	**No**
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 <80 No_____%_____		
	Indicate the coverage of IRS 2008 No_____%_____		
	Was there any prevention and control activities	Yes□	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)	Yes□	No□
	Has vaccination been conducted in the past 3 years	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)_____		

	Latrine coverage number and percentage. No_____%_____	
	Latrine utilization No_____%_____	
	Safe water coverage No_____%_____	
Measles	Is there ongoing measles outbreak	Yes□ No□
	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	Yes□ No□
	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 (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 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 Aug

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

Was there flood disaster in the last 6 months in the **Region /Zone**? Yes□ No□

If yes, How many woredas affected _____,

Mention the names of woredas affected with flood _____,_____,

_____,_____,_____,_____,

If yes, No of population affected_____

Human Death due to flooding_____ Yes□ No□**,**

If yes how many in number_____

Are there displaced people due to flooding? Yes□ No□

If Yes, how many_____ PLW

Children <5 yrs_____<2 yrs) _____<6months_____6-23months_____

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

_____

_____

_____

_____

Chapter-VIII Protocol/Proposal for Epidemiologic Research Project

8.1. Assessment of factors contributing for the occurrence of measles outbreak in, Wadera Woreda of Guji Zone, Oromia, March 2017.

Executive Summary

Introduction: Measles is an acute, highly contagious viral disease caused by measles virus. This highly contagious virus is transmitted primarily by respiratory droplets or airborne spray to mucous membranes in the upper respiratory tract or the conjunctiva(1, 2). Measles is a leading cause of childhood morbidity and mortality worldwide.

The risk factors for measles virus infection include: infants who lose passive antibody before the age of routine immunization, children with vitamin A deficiency and immunodeficiency due to Human immune Deficiency Virus (HIV) or Acquired Immune Deficiency Syndrome (AIDS), leukemia, alkylating agents, or corticosteroid therapy, regardless of immunization status and children who travel to areas where measles is endemic or contact with travelers to endemic areas. Malnourished and young children are at higher risk of developing complications and mortality from measles infection(1).

Method: Cross-sectional study design will be used during data collection at community and health facility level.

Multi stage cluster sampling with three stages will be used. firstly all 20 kebeles of the Woreda will be divided in to two strata based on measles case status (kebeles with measles case and kebeles with no measles case). A total of 735 mothers/care takers with at least on child of 5-59 month age selected by systematic random sampling methods from randomly selected six kebeles with 18 clusters.

The study team will consists of two field supervisors based on qualification that have BSc in health, one data clerk and twelve data collectors who have good experience of data collection with similar study experiences will be recruited.

Data entry template will be designed in Epi-Info version 7.3.1. Data entry and cleaning will be done by principal investigator. Then, the data analysis will be done using Epi Info 7.3.1 and Microsoft Excel and presented using descriptive statistical methods; with frequency distribution tables, percentages and graphs.

8.1.1. INTRODUCTION

8.1.1.1Back ground

Wadera Woreda is one of the 13 Woredas of Guji Zone, Oromia Regional state. Administratively the Woreda is divided in to 19 rural kebels and one town. The Woreda has a total population of 66,288(32,481 male and 33,807 female). It is located at a distance of 90 K.M from the Zonal town (Negele) and 520K.M from regional town (Addis Ababa).

The woreda shares boundaries with Girja Woreda of Guji Zone to the north, Gorodola Woreda of Guji Zone to south, Sabba Boru Woreda of Guji Zone to the east and Adola Rede Woreda of Guji Zone to the west. The ethnic compositions of the Woreda are 89% Oromo, 8% Amhara and 3% others. Concerning religious composition, 47% Muslim, 51% Christian & the rest 2% are followers of other religions.

8.1. 1.2 Statement of the Problem

Measles is an acute, highly contagious viral disease caused by measles virus. This highly contagious virus is transmitted primarily by respiratory droplets or airborne spray to mucous membranes in the upper respiratory tract or the conjunctiva(1, 2). Measles is a leading cause of childhood morbidity and mortality worldwide. Despite the remarkable progress made in the control of the disease, measles continues to claim the lives of large numbers of children every year. The majority of these deaths occur in the world's poorest countries; particularly, in sub-Saharan Africa, where a combination of factors such as overcrowding, exposure at a younger age and malnutrition contribute substantially to higher case fatality rates(3).An estimated 164,000 people died globally from measles in 2008 mostly children under the age of five. Measles is a human disease and is not known to occur in animals(3).

The risk factors for measles virus infection include: infants who lose passive antibody before the age of routine immunization, children with vitamin A deficiency and immunodeficiency due to Human immune Deficiency Virus (HIV) or Acquired Immune Deficiency Syndrome (AIDS), leukemia, alkylating agents, or corticosteroid therapy, regardless of immunization status and children who travel to areas where measles is endemic or contact with travelers to endemic areas. Malnourished and young children are at higher risk of developing complications and mortality from measles infection(1).

The incubation period is approximately 10–12 days from exposure to the onset of fever and other nonspecific symptoms and 14 days (with a range of 7–18 days), from exposure to the onset of

rash. Measles can be transmitted from four days before rash onset (i.e., one to two days before fever onset) to four days after rash onset. Infectivity is greatest three days before rash onset. Measles is highly contagious. Secondary attack rates among susceptible household contacts have been reported to be 75%– 90%. Due to the high transmission efficiency of measles, outbreaks have been reported in populations where only 3% to 7% of the individuals were susceptible. Whereas vaccination can result in respiratory excretion of the attenuated measles virus, person-to-person transmission has never been shown(1).

The first sign of measles is usually a high fever, which begins about 10 to 12 days after exposure to the virus, and lasts 4 to 7 days. The incubation period ranges from 7 to 18 days but on average lasts for 14days. In the prodromal phase high grade cough, Runny nose (Coryza) and red eye (conjunctivitis) occur2 to 4 days after the onset of the prodromal symptoms a red, blotch (macula popular) rash occurs, usually starting on the face and upper neck. Over about three days, the rash spreads, eventually reaching the hands and feet. The rash lasts for five to six days, and then fades in the order of appearance(3).

In developing countries, up to 75% of cases may have one or more complications. These include pneumonia, diarrhea, otitismedia, laryngo-tracheo-bronchitis (croup) or encephalitis. The 3 major causes of high case fatality are pneumonia, diarrhea and croup. Measles can lead to lifelong disabilities including blindness, brain damage and deafness. Low Vitamin A status is associated with a higher rate of complications and death from measles(4).

In Ethiopia, the expected case-fatality rate is between 3% and 6%; the highest case-fatality rate occurs in infants 6 to 11 months of age, with malnourished infants at greatest risk. These rates may underestimate the true lethality of measles because of incomplete reporting of outcomes of measles illness. In certain high-risk populations, case-fatality rates as high as 30% have been reported in infants aged less than 1 year of age(1).

In WHO Africa Regions, the only effective preventive measure is vaccination with two doses of measles-containing vaccine, usually administered as a measles-mumps-rubella (MMR) vaccine.

National vaccine uptake of at least 95% with two doses of MMR vaccine is considered to be necessary to achieve region-wide(5). However, a vaccination uptake of below 95% of the population in several European Union (EU) Member States has resulted in an accumulation of susceptible individuals. Thus measles has re-emerged in the region that resulted in an outbreak in sub-groups of populations with low vaccine uptake and then spread to the general population(4).

In Ethiopia, measles is a common cause of morbidity and mortality in children; this demonstrates the need for achieving high quality immunization coverage. The immunization strategy is to provide two opportunities for vaccination, one through the routine activities at 9 months, which reached 92% of under one year old children in 2015 (JRF 2015, Preliminary) and the second dose through scheduled preventive Supplementary Immunization Activities (SIAs). However, due to the low coverage and prevailing poor living conditions, measles outbreaks continue to occur frequently in different parts of the country(3).

8.1.1.3 Literature Review

Global progress in the past decade against measles has been stunning. As more countries immunize more children, measles deaths have been reduced by 71 per cent—from an estimated 548,000 in 2000 to 158,000 in 2011(2).

In addition to this, more than 40,000 laboratory-confirmed cases of measles were reported globally in 2011(9). According to official reports, the coverage of measles containing vaccine (MCV) throughout Iran was greater than 90% of the population since 2001 and during 2008 and 2009, and it was approximately 99% (6).

However, Measles Outbreak was occurred in Southeast Iran with a Vaccine effectiveness of approximately 74.2 %(95% CI, 10.2–92.6) based on the calculated OR for measles vaccination given twice versus no vaccination. The vaccination status among the study subjects was 8 (16.3%) for one dose and 26 (53.1%) for 2 dose .where as 15 (30.6%) of the total cases were not vaccinated and the persons who had a contact history with a confirmed measles cases was 10.93 times more likely to develop measles infection. In addition to this, a vaccination exposure was statistically significant as a protective factor against measles infection (i.e. 1 dose vs. no vaccination OR=0.74, 95%CI of 0.20–2.71 and for 2 doses vs. no vaccination, OR=0.26, 95%CI 0.07-0.90). (11) During Measles Outbreak in a Northern Pakistani Village a total of 139 children (25 %) have reported a history of measles prior to the 1990 outbreak (7). These outbreaks occurred in the AFRO region challenges to the recent successes against measles-mortality and to the goal of measles elimination, Even though the nationally coverage of MCV1 and MCV2 have increased by 27% and 26% from 68% and 57% in 2001 to 95% and 83% in 2010, respectively. Comparatively, SIA coverage has remained at high levels, around 90%, over the years 1996–2010(8).

A large outbreak of measles involving around 1700 cases occurred in South Africa between 2003 and 2005 following its introduction from Mozambique. And also there were an outbreak of measles from2009-2011, with the highest incidence among infants: 61 per 10 000 (95% CI: 59.3–62.4) .But ,he incidence in children aged 10 to 14 years and in those aged 15 to 19 years was higher than in those aged 5 to 9(9)

Kenya has reported an MCV1 coverage of 107% (5,995,049) in children targeted 9-59 months. Gabon has achieved 68% (168,749) in children targeted 6-59 months during 2012. (8) The WHO -UNICEF coverage estimates for measles vaccination for Ethiopia also indicate an increase from 37% in 2000 to around 80% in 2010(1)

8.1.2. OBJECTIVES

8.1.2.1 General objectives

- To identify factors associated with the occurrence of measles outbreak in Wadera Woreda, Oromia Region, March 2017

8.1.2.2 Specific objectives

- To identify the factors contributing for measles outbreak
- To assess community awareness for measles vaccination
- To assess cold chain management and vaccine handling

8.1.3. METHODS AND MATERIAL

8.1.3.1Study Area and Period

Wadera Woreda is one of the 13 Woredas of Guji Zone, Oromia Regional state. Administratively the Woreda is divided in to 19 rural kebels and one town. The Woreda has a total population of 66,288(32,481 male and 33,807 female). It is located at a distance of 90 K.M from the Zonal town (Negele) and 520K.M from regional town (Addis Ababa).

The woreda shares boundaries with Girja Woreda of Guji Zone to the north, Gorodola Woreda of Guji Zone to south, Sabba Boru Woreda of Guji Zone to the east and Adola Rede Woreda of Guji Zone to the west. The ethnic compositions of the Woreda are 89% Oromo, 8% Amhara and 3% others. Concerning religious composition, 47% Muslim, 51% Christian & the rest 2% are followers of other religions.The study will conduct from March 1- 15 May /2017.

8.1.3.2Study Design

Cross-sectional study design will be used during data collection at community and health facility level.

8.1.3.3 Sample Size Determination

According to the proportion sample size determination, we manipulated a total of 735 sample sizes by using a previous study done in Tanzania, 2012 in which the proportion of measles infection was 32% in one of the study wards. We also used a design effect of 2 to enlarge our sample size .The total sample will be proportionate to each selected strata's in relative to the existence of children's (9-59months age).Margin of error ε =5%

Sample size was calculated from the formula

$$\underline{N= z^2p\ (1-p)}$$

$$E^2 \text{ where } z= 1.96$$

$$N= \underline{1.96^2*0.32\ *0.68}$$

$$0.05^2$$

$$= 334*2(DEEF)$$

$$= 668 \text{ (plus 10\% non respondent of 67)}$$

$$\mathbf{=735}$$

8.1.3.4 Sampling Procedure

Multi stage cluster sampling with three stages will be used. firstly all 20 kebeles of the Woreda will be divided in to two strata based on measles case status (kebeles with measles case and kebeles with no measles case).According to this strata measles affected kebele will contain 11 and those with no measles case contain nine kebeles. Then three kebeles will be selected by simple random sampling from each stratum. After that each selected kebele will be classified in to three "Zone/Gott". By having this, we will have 18 clusters/zones from selected six kebeles. Finally 41 House Holds (HHs) with children 9-59 months old will be selected by systematic sampling methods from each cluster in every k^{th} .The first HH will be selected by lottery methods. Additionally, if the selected HH is identified with no child of 9-59 months the next HH with the 9-59 months will be selected.

Health Center serving the selected kebele will also purposively selected for assessing health workers related factors for measles infection.

8.1.3.5 Study Population

All mothers/care takers with 9-59 months age children randomly selected from six kebeles of the Woreda. These include children born exactly nine months to 59 months before the occurrence of measles outbreak.

8.1.3.6 Sample Population

A total of 735 mothers/care takers with at least on child of 5-59 month age selected by systematic random sampling methods from randomly selected six kebeles with 18 clusters.

8.1.3.7 Data collection tools and Methods

We will use a structured questionnaire to collect the required information composed of the socio-economic demography, the possible risk factors and the KAP of the community. The national measles guide line, national PHEM guide line, and camera will be fully available .the data will be collected through face to face interview with the respondents (the care takers and health workers) and we will use an observational check list to assess the cold chain management, administration of measles vaccine and vaccine status.

8.1.3.8 Data collection procedure

The study team will consists of two field supervisors based on qualification that have BSc in health, one data clerk and twelve data collectors who have good experience of data collection with similar study experiences will be recruited. Experienced data collectors preferably who

have health background will be recruited, trained for two days (theoretical and field training) and deployed at the site. The major sources of data will be health facilities, mothers or care takers in the community.

8.1.3.9 Inclusion Criteria

All HHs with at least one 9-59 months of age children and health facility serving the selected sample population will be included.

8.1.3.10 Exclusion Criteria

These study will not include HHs with no children aged 9-59 months and health facility not serving the selected sample population

8.1.3.11 Variable Specification

8.1.3.11.1 Dependent Variable

- Measles Infection

8.1.3.11.2 Independent variables

- Measles Vaccination Status
- Previous Measles Infection
- Nutrition Status
- Overcrowdings
- Travel History
- Knowledge Attitude and Practice (KAP) on measles Infection
- Cold chain management
- Vaccine Handling
- Vaccine Administration

8.1.3.12 Data Entry and Analysis

Data entry template will be designed in Epi-Info version 7.3.1. Data entry and cleaning will be done by principal investigator. Then, the data analysis will be done using Epi Info 7.3.1 and Microsoft Excel and presented using descriptive statistical methods; with frequency distribution tables, percentages and graphs.

8.1.3.13 Ethical consideration

We will submit the proposal to ORHB .Accordingly, the Woreda health office will be requested for permission using a formal letter of ORHB. After all, the respondents as well as the parents

will be well informed about the objectives of questionnaire and we should get consent from them.

8.1.3.14 Dissemination of findings

Results will be submitted to Ethiopia Field Epidemiology Training Program. To help in future interventions the result will be communicated to governmental and non-governmental bodies. These include the Wadera Woreda Health Office, Guji Zonal Health Department, Oromia Regional Health Bureau, Ethiopia Public Health Institute (EPHI), partners and others. One day conference will be arranged at woreda level to present the study results.

8.1.4. WORK AND BUDGET PLAN

Table:-Work plan

S.No	Activities	Time period												
		Weeks in March				Weeks in April				Weeks in May				Remark
		1	2	3	4	1	2	3	4	1	2	3	4	
1	Write up a proposal													
2	Submission to reviewers													
3	Procurement of Research material													
4	Training to data collectors and supervisors													
5	Data collection													
6	Data entry and analysis													
7	Write up research report													
8	Submission of first draft													
9	Submission of the final report													
10	Presentation of the final research report													
11	Disseminations of the final report													

Table :-Budget Plan

S.No	Budget category	Unit cost	Multiplying factor	Total cost(ETB)
10	Personal Cost	Daily Wage (including per Diem)	Number of staff days (Number of staff x Number of working days)	
	Perdium for Principal Investigator	290.00	1*15	4350.00
	Perdium for Supervisor	290.00	2*15	8700.00
	Data collectors	290.00	4*15	17400.00
	Total			**30450.00**
2	Transport cost	Cost per km	Number of days (no. vehicles x no. days x cost per vehicle/day)	
	Car rent		1*15*1500	22500.00
	Sub total			**22500.00**
3	Supplies	Cost per item	Number	
	Questionnaire duplication	2	350*4(pages)	2800.00
	Flip chart paper	25	10	250.00
	Pen	50	10	500.00
	Pencil	10	5	50.00
	Erasers	10	5	50.00
	Printing paper (pack)	500	5	2500.00
	Sub total			**6150.00**
4	Training cost	Cost per item	Number of days	
	Hall rent	1000	5	5000.00

	Tea/coffee	100 per participatory per day (100*5*9)	5	4500.00
	Sub total			**9500.00**
5	Total (1+2+3+4)			68600.00
	Contingency (5%*Total cost)			3430.00
	Grand total			**72030.00**

8.1.5. REFERENCES

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Annex 6:-Data collection tool for measles infection study in Wadera Woreada , Oromia Region 2017

Name_____ Date of Data collection_____

Region_____ Zone_____ Woreda_____

Kebelle_____ Got___

Respondent Status = Mother_____ Father_____ Other_____

Longitude: _____ Latitude: _____

Socio-demographic Characteristics

S.No	Question	Alternatives
1	Sex	1.Male 2.Female
2	Age	Year _____month_____
3	Occupation	Farmer House wife Student Unemployed Daily laborer Merchant Government employee Not applicable (NA) Others specify_____
4.	Educational Level	Illiterate Read and write Elementary Secondary Above secondary
5.	Marital status	Single Married Divorced Widowed NA
6.	Family size	_____

7.	Number of children <five years of age	_____
8	Is there any sick person with rash, Fever, running nose or conjunctivitis in your family	1.Yes 2.No
9.	If yes number of sick person	_____

2. Health Workers related factors for measles infection

S.No		
2.1	What is your profession	1. C/nurse 2. Health officer 3.HEW 4.pharmacy 5.lablatory technician 6.mid wife
2.2	Have you trained on EPI?	1.Yes 2.No
	If yes when	_____
2.3	Are immunization activities provided on daily bases? If no why?	1.Yes 2.No _____
2.4	Do you have an adequate stock of cards and immunization diploma?	1.Yes 2.No
2.5	Do you provide Immunization card and diploma to the mothers or care takers whose child competed the vaccine?	1.Yes 2.No
	If no why?	_____
2.6	Do you have adequate stock of vaccine and safety boxes?	1.Yes 2.No

2.9	Are mothers counseled for essential nutrition action and immunization services?	1.Yes 2.No
2.10	Is there functional outreach strategy for communities in at hard to reach areas?	1.Yes 2.No
2.11	Does the health workers trace the defaulters	1.Yes 2.No
2.12	Does the health worker dispose of the syringe in to safety boxes immediately after injection?	1.Yes 2.No
2.13	If yes to Q.2.12 how	1.With recapping 2.with out recapping
2.14	Does the health worker explain the possible side effects of the vaccine given?	1.Yes 2.No
2.15	Does the health worker explain when to return to the EPI visit?	1.Yes 2.No
2.16	Does the health worker provide vitamin A supplementation?	1.Yes 2.No
2.17	Does the health worker weigh the child?	1.Yes 2.No
2.18	If yes, do you plot his/her weight and height?	1.Yes 2.No
2.19	Does the health worker pass information concerning five EPI key messages?	1.Yes 2.No
2.20	Is the monthly EPI monitoring chart complete and updated?	1.Yes 2.No
2.21	Is a tally sheet being used?	1.Yes 2.No
2.22	Is there a check list for immunization services?	1.Yes 2.No
2.23	Is there a functional refrigerator?	1.Yes 2.No
2.24	If yes, what type?	1.electrical only 2.kerosen only 3.both
2.25	Are vaccines placed in appropriate compartments of the refrigerator?	1.Yes 2.No
2.26	Are all vaccines unexpired?	1.Yes 2.No
2.27	Is the open vial policy applicable?	1.Yes 2.No

2.28	Does the health worker check the VVM states of the vaccine before reconstituting the vaccine?	1.Yes 2.No
2.29	Is there a functional dial thermometer?	1.Yes 2.No
2.30	At what temperature should be stored for measles vaccine?	_____
2.31	Is a vaccine stock card control always available?	
2.32	How do you administer measles vaccine to child?	1. at 45^0 intradermal 2. At 90^0 intradermal 3. Others…
2.33	At what age does be given measles vaccine for the first time?	_____
2.34	For how many child do you give measles vaccine one vial?	_____
2.35	For how many days do you store measles vaccine at refrigerator?	_____
2.36	How many dose of measles vaccine should be given for child?	_____
2.37	What are the signs and symptoms of measles?	_____
2.38	What treatments should be given for measles infection?	_____

3.Community or care takers related risk factors

S.No	Question	Alternative variables
3.1	Did You ever vaccinated for measles?	Yes 2. No 3. Unknown 4. Not applicable
3.2	If yes last vaccination date	1._____/_____/___ by card 2._____/_____/____ by history
3.3	Number of vaccine dose received	1. one dose 2. two dose

		3. three and above
3.4	Did you ever have measles infection?	1. Yes 2. No 3. Don't know
3.5	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 _____
3.6	Did you have any contact with confirmed or suspected cases of measles	1. Yes 2. No 3. Don't know
3.7	If yes in Qe.3.6 ,How	1. living together 2.Sleeping together 3.Playing together 4. admitted with suspected measles cases
3.8	Did you contact with a person with measles symptoms within the last 2-3 weeks?	□ yes □ no
3.9	Do you have any travel history four days before and after rash onset	1. Yes 2. No If yes where _____
3.10	Do you have any contact history with someone else four days before and after rash onset	1. Yes 2. No If yes where _____
3.11	If yes to question 3.10 place of travel	1. School 2. Neighbor 3. Market 4. Other_____
3.12	Does the home you live have a window?	□ yes □ no
3.13	If yes, how often is it opened?	1.every day 2.some times

		3.Never Opened
3.14	How money rooms have your home?	_____
3.15	How many people sleeping together?	_____
3.16	What is the average area of your sleeping room?	_____
3.17	Do you know modes of transmission for measles?	
3.18	Do you know measles is vaccine preventable disease?	
3.19	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)_____
3.20	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)
3.21	Whom do you think can be affected by measles?	1. Children of aged less than 5 years 2. Children of aged less than 18 years 3. Women of any ages 4. Any age groups of both male and women 5.Other (specify):_____
3.22	How do you think measles can be cured?	Using modern medicine Using traditional Medicine Holly water By feeding nutritious foods

		Keeping the sick person indoor Other(Specify)_____
3.23	Do you know EPI outreach sites?	
3.24	Do you know EPI outreach programs?	
3.25	Do you know five key messages of EPI?	
3.26	If yes, what are?	_____

Chapter-IX: Additional out puts

9.1 Oromia regional Health Bureau Weekly PHEM Bulletin

We did six regional healths Bureau weekly PHEM Bulletin during my residency.

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 40, 2016

Highlights of the Week

- The Regional Surveillance report completeness is 83% and timeliness rate is 94%.
- Weekly Severe Acute Malnutrition (SAM) cases were decreasing at regional level and in majority of Hot spot zones
- Malaria cases are decreasing in majority of known malarious' zones.
- Measles cases are decreasing
- AWD case load is decreasing

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 40, 2016 G.C.

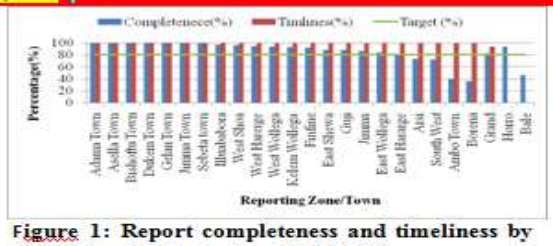

Figure 1: Report completeness and timeliness by place,Oromia, September, 2016 G.C.

Regional report completeness and timeliness of the past 13 consecutive weeks were above the target except for timeliness of week 29, 34, 35, 36and 38 which was 79%, 72%, 70% ,73%and 73% 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.

II. Weekly Surveillance Report

Report completeness and timeliness of government health facilities were 83% & 94% respectively. Zones and Towns with below target for completeness were Arsi(73%), South West Shewa (72%), Bale (46%),Ambo Town (40%), and Borena (40).Bale and Horo Gudru Wolega are zone that reported late cotributed for low regional Completeness and Timelines.

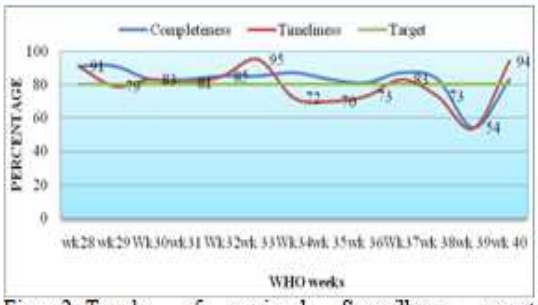

Figure2:-Trends of regional Surveillance report completeness and timeliness by time, Oromia, September, 2016 G.C.

III. Diseases condition

1.Malaria

In this week, a total of 3,587 clinical and confirmed malaria cases were reported. Among the total clinical and confirmed malaria cases 3,573 (99.6%) of them

PUBLIC HEALTH EMERGENCY Weekly PHEM Bulletin, Oromia_ 2016

were confirmed cases. Of the total confirmed cases 2,379 (66.6%) of them were plasmodium falciparum. Confirmed malaria cases were increased by 850(23.8%) as compared to week 39. A total of 19,910 cases were laboratory tested, yielding a positivity rate of 18%. The highest number of confirmed malaria cases was reported from East Shewa 672 (18.8%) followed by East Hararge 665 (18.6%), W/Wellega 315(8.8%) and Kelem Wolega Zone291 (8.1%). Among reported Zones, woredas reported high case load were Dugda 245(36.4%) from East Shoa Zone, Haromaya 372(56%) from East Hararge Zone, Mendi Town 59(18.8%) from W/Wellega, Gawo Kabe 114 (39.2%) from KelemWolega Zone were woredas' with high case loads that needs attention. Trends of confirmed malaria cases of the 13 consecutive weeks for some selected zones are indicated below.

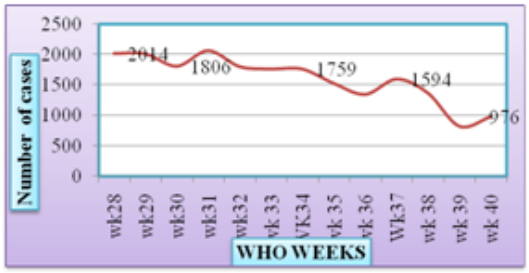

Figure 4: Trends of Dysentery cases by Time, Oromia September, 2016 G.C..

3. Measles

In this week, a total of, 10 suspected measles cases were reported to the region. The cases were increased by 1(10%) as compared to week 39. Majority of the cases were reported from Jima zone 4(40%),Kelem Wolega3(30%) and South west shewa 2(20%). Among the reported zone, Limu Seka woreda 4(40%) from Jima Zone and Hawa Galan Woreda 3(30%) of Kelem Wolega are mentioned. Trends of the past 13 consecutive weeks of suspected measles cases are shown below **(Fig: 5).**

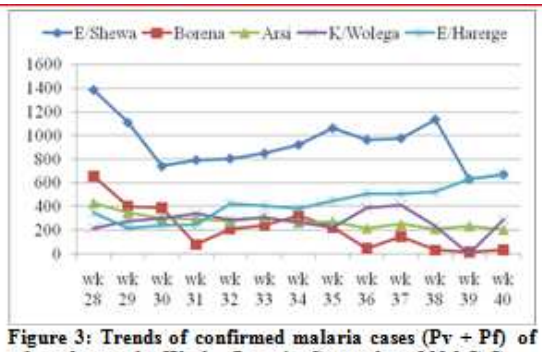

Figure 3: Trends of confirmed malaria cases (Pv + Pf) of selected zones by Week , Oromia, September, 2016 G.C.

2. Dysentery (Diarrhea with blood)

In this week, a total of 976 dysentery cases were reported. Cases were increased by 154 (15.8%) as compared to week 39. The highest number of cases was reported from West Shewa 113(15.6%), Jima 82(8.4%) and east Harerge Zones 78 (8%).

Trends of dysentery cases for the last 13 consecutive weeks are shown below **(fig: 4).**

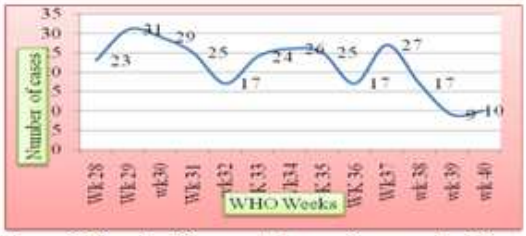

Figure 5: Trends of suspected measles cases by Time, Oromia,September, 2016 G.C.

4. AFP/Polio

In this week, two suspected AFP cases were reported to the Region. The cases were reported from Elu abbabora zone of Chora Woreda and Jima zone of Limu hospital.

5. Malnutrition

In this week, a total of 1,416 new SAM cases were reported to the region. Of the total cases, 156 (11%) of them were treated at stabilization center. SAM cases

were increased by 16(10.2%) as compared to week 39 (fig: 7). Majority of the cases were reported from West Hararge Zone 386(27.25%) followed by East Hararge 372(26.3%), Guji Zone 160(11.3%) and Jima 100(7.1%) Zones. From Reported zones, Woredas with high case load were Doba 35(9.1%),Girawa 49(13.2%),Urga30(18.75%) and Shabe 12(12%) from West Hararge ,East Harerge,Guji and Jima Zones of the region respectively.Trends of the past 13 consecutive weeks of SAM cases as of regional level are indicated below **(Fig: 6).**

Fig: 6: Trends of SAM cases by Region, Oromia, September, 2016.

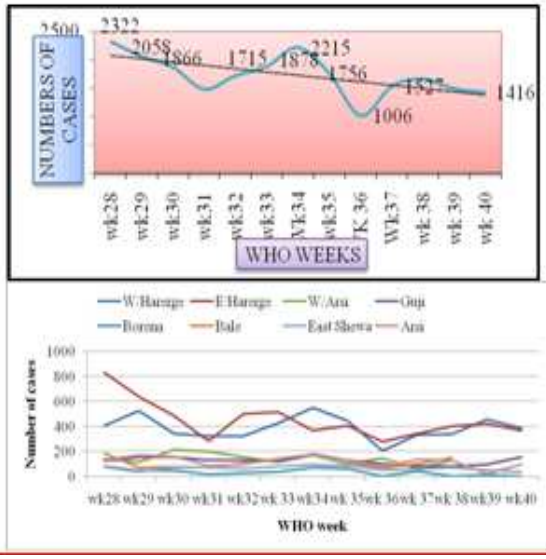

Fig: 7: Trends of SAM cases by selected zones of Oromia, September, 2016 G.C.

6. Meningococcal Meningitis

In this week a total of three suspected meningococcal meningitis was reported to the Region, from Jima town,West harerege Zone(Galmso Woreda) and Borena zone of Yabelo Hospital reported each one case.

7. **Rabies**

In this week, No suspected cases of rabies was reported to the region. One suspected rabies death was reported from Elu-Ababora zone of Matu Town.

8. **Anthrax**

There were no Anthrax cases and deaths reported to the region this week.

9. Relapsing Fever

In this week, a total of 15 relapsing fever cases were reported to the region, 11 from Guji Zone and three from Asella Town.

10. Maternal deaths

This week, Ten suspected maternal deaths were reported to region through routine surveillance from Elubabora Zone, Meko Woreda(2 cases),West Shewa Zone(Gedo and Guder Hospital) and the rest each one case from Borena Zone(Miyo),East Hararge Zone(Gursum),Jima Zone(Gera),South west Shewa(Tole),Horo Guduru Wolega(Abe Dongoro) and East Wolega(Gida Ayana) were reported.

11. AWD Cases

Regionally, since the occurrence of AWD outbreak, **4321** suspected cases were reported up to week 40 of WHO. 13 zones, 13 administrative towns and 106 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 basis.
- 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.

9.2 AWD outbreak response done in Oromia region Ethiopia October 2016- June 2017

AWD outbreak was occurred in Ethiopia in the year 2016.the index case of this outbreak was a case from Muyale of Borena zone Ethiopia in October 2016.until the occurrence if this outbreak 7020 AWD cases were reported to the region. In Oromia region 14(70%) zone and 13 towns were affected. currently Bale and East Harerghe zone of Oromia are with active outbreak. Until May 2017 out of 116 affected Woredas of the region 105 of them declared as free of the outbreak.

Activities done to intervene during this outbreak

- Case management and surveillance activities done
- Capacity building for health workers at Woreda and health facility level
- Community mobilization in water sanitation and hygiene activities at community level