Addis Ababa University, College of Health Sciences,

School of Public Health

Ethiopian Field Epidemiology Training Program (EFETP)

Compiled Body of Works in Field Epidemiology

By:

Birhanu Areda

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

April 2014

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Approval by Examining Board

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Examiner

Acknowledgment

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AAU	Addis Ababa University
AFI	Acute Febrile Illness
AFP	Acute Flaccid Paralysis
AFRO	Africa Regional Office
AIDS	Acquire immunodeficiency syndrome
ANC	Antenatal Care
AOR	Adjusted Odds Ratio
ART	Anti-Retroviral Therapy
AWD	Acute Watery Diarrhea
BCG	Bacille Calmette-Guerin
BPR	Business Process Re-reengineering
CBN	Community Base Nutrition
CC	Community Conversation
CDC	Communicable Disease Control
CFR	Case Fatality Rate
CHD	Community Health Day
CHP	community health pro
CHW	Community Health Workers
CI	Confidence Interval
CLTS	Community Leads Total Sanitation
CTC	Cholera Treatment Center
DALYS	Disability – Adjusted Life Year
Diag. Lab.	Diagnostic laboratory
DRC	Democratic Republic of Congo
DVM	Doctor of Veterinary Medicine
E.C	Ethiopian Calendar
EFETP	Ethiopia Field Epidemiology Training Program
EFY	Ethiopian Fiscal Year
EHNRI	Ethiopia Health and Nutrition Research Institute
EPHA	Ethiopian Public Health Association

EPI	Expanded Program on Immunization
EPRP	Emergency Preparedness and Response Plan
ETH BIRR	Ethiopian Birr
F.P.	Family planning
FDRE	Federal Democratic Republic Of Ethiopian
FMOH	Federal Ministry of Health
G.C	Gregorian calendar
G.P.	General practitioner
H.C	Health Center
H.E.W	Health Extension Workers
H.F	Health Facilities
H.H	House Hold
H.O.	Health Officer
H.P	Health Post
HDA	Health Development Army
HEW	Health Extension Worker
HEWs	Health Extension Workers
HIT	Health Information Technology
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
HSDP	Health Sector Development Plan
IDSR	Integrated Disease Surveillance and response
IgM	Immunoglobulin M
IHR	International Health Regulation
IRB	Institutional Review Board
IRS	Indoor Residual Spray
ITNs	Insecticide Treated Net
IV	Intra Venus
LP	Lumbar Puncture
M.F	Model Family
MAM	Moderate Acute Malnutrition

MCH	Maternal and child health
MCV	Measles Containing Vaccine
MDG	Millennium Development Goal
MMWR	Morbidity and Mortality Weekly report
MOH	Ministry of Health
MUAC	Middle Upper Arm Circumference
NGO	Nongovernmental Organization
NNT	Neonatal Tetanus
OPD	Out Patient Department
ODF	Open Defecation Free
OPV	Oral Polio Vaccine
OR	Odds Ratio
ORHB	Oromia Regional Health Bureau
ORS	Oral Rehydration Salt
OTP	Outreach Therapeutic Program
PCV	Pneumococcal Conjugative Vaccine
PHEM	Public Health Emergency Management
PITC	Provider Initiated Test and counseling
PLW	Pregnant and Lactating Women
PLWHA	People Living With HIV/ADS
PMTCT	Preventing Mather to Child Transmission
PNC	Post Natal Care
PPE	Personal Protective Equipment
PSNP	Productive Safety Net Program
PTB	Pulmonary tuberculosis
RDT	Rapid Diagnostic Test
RNA	Ribonucleic Acid
RRT	Rapid Response Team
SAM	Sever Acute Malnutrition
SARS	Severe Acute Respiratory Diseases
SC	Establishing Center

SFP	Supplementary Feeding Program
SIA	Supplementary Immunization Activity
SNNPR	Southern Nations and Nationality People's Region
SSA	Sub Saharan Africa
STD	Sexual Transmitted Disease
TB	Tuberculosis
TBA	Traditional Birth Attendant
TSF	Targeted Supplementary Food
TTBA	Trained Traditional Birth Attendant
UN	United Nations
UNICEF	United Nations International Children's Emergency Fund
UNOCHA	United Nations Office for Coordination of Humanitarian Affairs
USD	United States' Dollar
VCT	Voluntary Counseling Test
WASH	Water Sanitation and Hygiene
WAZHO	West Arsi Zone Health Office
WFP	World Food Program
WHo	Woreda Health office
WHO	World Health Organization
WHO/AFRO	World Health Organize/ Africa Regional Office
ZHD	Zonal Health Department

Executive summary

This compiled body of works has eight main chapters which all of them were done during the residency time of the program. These eight sections are expected outputs during the residency time; such as outbreak investigation, report of analysis of surveillance data, surveillance system evaluation, description of a health profile report, abstract submission in scientific conferences, writing protocol/proposal of epidemiologic research project and a summary of disaster situation visited/risk assessment.

Chapter One: -Two outbreak investigations were carried out. The first was conducted in Borena zone of Abaya Woreda and the other is in Gololcha Woreda of Arsi zone. A total of 498 and 357 measles suspected cases were identified in Abaya and Gololcha Woreda respectively. Both outbreaks were confirmed by using laboratory test. To identify the risk factors case-control study design was selected for both outbreak investigations. Recommendation was given for both based on the findings.

Chapter Two: -Conducting Surveillance data analysis is the other core competency for field epidemiology training program. Epidemiology of typhoid fever in West Arsi zone was conducted by using six years surveillance data. Descriptive study design was used.

Chapter Three: -Evaluation of surveillance system was conducted from May 28, 2013 – June 16, 2013 in Bale Zone. The evaluation of surveillance system was carried out on the selected three priority diseases of measles, malaria and AFP.

Chapter Four: -Health profile is a system of collecting and summarizing health and other health related events, demographic, socio-economic, political and cultural aspect of a particular district. Health and health related data was collected in Hetosa Woreda during February 25-March 15, 2012

Chapter Five: -Manuscript for journal review and two abstract for scientific submission was developed during this residency period. The manuscript was conducted on measles outbreak investigation report. Similarly the abstract was also drawn from outbreak investigation reports.

Chapter Six: -Narrative summary of disaster situation. Belg assessment was conducted in three zones of South-Eastern Oromia to identify humanitarian needs in drought affected areas from June 17 to June 26, 2013 in the selected woredas of Arsi, Bale and

East Shewa zones. Malnutrition was a major problem in the three visited zones. Also there was a measles outbreak in Bale and Arsi Zones.

Chapter Seven: -Epidemiologic project proposal was developed on latrine utilization and the influencing factor in Shashemene Woreda of West Arsi zone. The coverage of latrine utilization and influencing factors on the utilization of latrine in the community is not widely assessed. The main purpose of this study is to estimate latrine utilization coverage and identify the influencing factor in the woreda. Furthermore, as there is wide spread and recurring epidemic of acute watery diarrhea in Shashemene woreda of West Arsi zone, assessing the proper utilization of latrine and influencing factors will enable us discuss the correlation between them. Cross sectional study design will be used in Shashemene woreda from September to October 2014.

Chapter Eight:-Finally Training was given to Zonal and woreda PHEM focal persons from West Harerge, East Harerge, Finfine surrounding, West Shewa, North Shewa and South West Shewa zones. Training material was comprised of PHEM overview, public health surveillance, epidemiology of malaria, prevention and control of malaria, Acute Flaccid Paralysis (AFP) surveillance, measles surveillance, neonatal tetanus surveillance, meningitis surveillance, epidemiology of Acute Watery Diarrhea (AWD), AWD case management, hygiene and Cholera Treatment Center (CTC) establishment and water treatment was given.

Chapter I - Outbreak/Epidemic Investigations

1.1. Investigation of Measles outbreak -Abaya, Borena zone, South Eastern Oromia, Ethiopia 2013.

Abstract

Background: Measles is a highly contagious vaccine-preventable disease that resulted in an estimated 140,000 deaths worldwide in 2010.Measles out-break occurred in hard to reach kebeles of Abaya District, Borena Zone, Oromia region. I conducted investigation to identify risk factors contributing to the outbreak and to provide evidence based recommendations.

Methods: Matched case-control study was conducted from august to November, 2013 in Abaya District. Cases were identified by using WHO standard case definition. The outbreak was confirmed by using serological laboratory test. Pre-designed data collection instrument was used. Bivariate analysis was conducted using odd ratio (OR) with 95% confidence interval (C.I.) and P-value < 0.05 by using Epinfo 7.

Results: A total of 498 cases (AR 390/100,000) and two deaths (CFR 0.4%) were identified. Of the cases, 424 (84%) were less than 15 years of age. Vaccination coverage of the District in 2013 was 87%. On case-control study a total of 138 data were collected. The statistically significant variables are absence of health facility within 5km radius: OR 13 (5.7-31.5); malnutrition: OR 13 (3.5-48); family size above 4: OR 5.7 (1.3-25.8); educational status of the family: OR 5 (1.4-17.8); ventilation of the house: OR 3.5 (1.6-7.6); and vaccination status: OR 3.1 (1.5-6.5). All health posts had no functional refrigerator.

Conclusion and recommendation: Less than 15 years of age were primarily affected by the outbreak. Malnutrition, low community awareness, inadequate and poor cold chain management and low vaccination coverage of hard to reach kebeles were likely contributed to the outbreak. Undertaking supplementary immunization, maintaining routine vaccination coverage in hard to reach kebeles, increasing community awareness, expanding and improving cold chain management and managing malnourished cases can reduce measles outbreak.

Keywords: measles outbreak, Abaya, Ethiopia, 2013

1.1.1. Introduction

Measles has been, and remains, a major killer disease of children around the world. Despite the introduction of the measles vaccine in 1963, measles caused an estimated 2·6 million deaths in a single year as recently as 1980 (1). According to the Assessment result of the 2010 global measles mortality reduction goal: results from a model of surveillance data, estimate that, after more than 45 years of measles vaccine availability, the disease caused nearly 140 000 deaths in 2010 (2).

Measles is still a public health problem in many developing countries, particularly in parts of Africa and Asia. According to the World Health Organization (WHO), more than 20 million people are affected by measles each year with more than 95% of measles deaths occur in countries that have low per capita incomes and weak health infrastructures(3).

It usually does not kill children directly; however, as a result of its associated immunosuppression, measles can lead to lethal complications, such as pneumonia, croup, and diarrhea. Measles can also lead to lifelong disabilities, including blindness, brain damage, and deafness (4).

It is a highly contagious and vaccine preventable respiratory paramyxovirus infection. The incubation period is 10– 12 days from exposure to the virus to the onset of fever, and a rash usually appears at around day 14 (range 7–18 days). Patients are contagious from about 4 days before eruption of the rash until 4 days after the eruption (5). Measles occurs naturally only in human being (6). All persons who do not had the disease or who have not been successfully immunized are susceptible (7, 8).

The severity of measles varies widely, depending on a number of host and environmental factors. The risk of developing severe or fatal measles increases for those aged less than 5 years, living in overcrowded conditions, who are malnourished and those with immunological disorders, such as advanced HIV infection (9).

Since the introduction of effective measles vaccines, the epidemiology of measles has changed in both developed and developing countries. As vaccine coverage has increased, there has been a marked reduction in measles incidence, and with

decreased measles virus circulation, the average age at which infection occurs has increased (7).

In 2001, countries in the World Health Organization (WHO) African Region started implementation of the regional measles mortality reduction strategies with a goal to reduce the estimated number of measles deaths in 2005 to half of the estimate for 1999 (10). This goal was achieved, and a new goal was established to reduce measles mortality in 2009 to 90%. The measles mortality reduction strategy adopted by the African Region includes improving routine measles vaccination coverage, providing a second opportunity for measles vaccination through supplementary immunization activities (SIAs), monitoring the impact of vaccination activities through case-based measles surveillance, and improving measles case management (10).

A measles outbreak was defined as the occurrence of five suspected measles cases or the presence of 3 or more laboratory-confirmed measles cases in one month in a defined geographic area such as a kebele, woreda or health facility catchment (8). After an outbreak was confirmed by the laboratory, the collection of blood specimens was interrupted and additional cases that conformed to the case definition were considered to be measles cases confirmed by epidemiologic linkage, as long as these cases occurred in the same woreda and had dates of onset within a month of the laboratory confirmed cases (11).

In developing countries with low vaccination coverage, epidemics often occur every two to three years and usually last between two and three months, although their duration varies according to population size, crowding, and the population's immune status. Outbreaks last longer where family size, and hence the number of household contacts, is large. In the absence of measles vaccination, virtually all children will have been infected with measles by the time they are 10 years old (12).

On 24 august 2013, one case of measles was recorded in unvaccinated child from Ledo kebele of Abaya woreda. Lately on WHO week 36 of 2013 the Abaya woreda health office detected increasing number of cases of suspected measles which later confirmed by lab test for measles IgM. These cases were distributed among twelve kebele's in the Woreda.

1.1.2. Objective

1.1.2.1. General Objective

- To describe measles magnitude and identify risk factors associated with measles outbreak in Abaya district and undertake appropriate public health control measures.

1.1.2.2. Specific Objective

- To verify the existence of measles outbreak in Abaya.
- To describe outbreak in terms of person, place and time in the woreda.
- To identify risk factors associated with measles outbreak.
- To propose appropriate control measures against measles transmission.

1.1.3. Methods and materials

1.1.3.1. Study area

The investigation was conducted in Abaya woreda of Borena zone. It is 370 KM far from Addis Ababa and 200Km from Zone town Yabello. The woreda has 25 rural and 2 urban kebeles. According to the 2007 population census, the projected estimated population of the woreda in 2013 is to be 126,794 which constitute 63,904 and 62,889 males and females respectively (13).

It is bounded by Gedewo Zone of SNNP to the east and Wonago town at South and Gelana Woreda at South West.

The total Surface area of the woreda estimated to be 187,134 KM2. The woreda has an altitude range of 1200m.a.s.l to 2,060 m.a.s.l and endowed by two main agro-ecological zones namely, weynadega and kola.

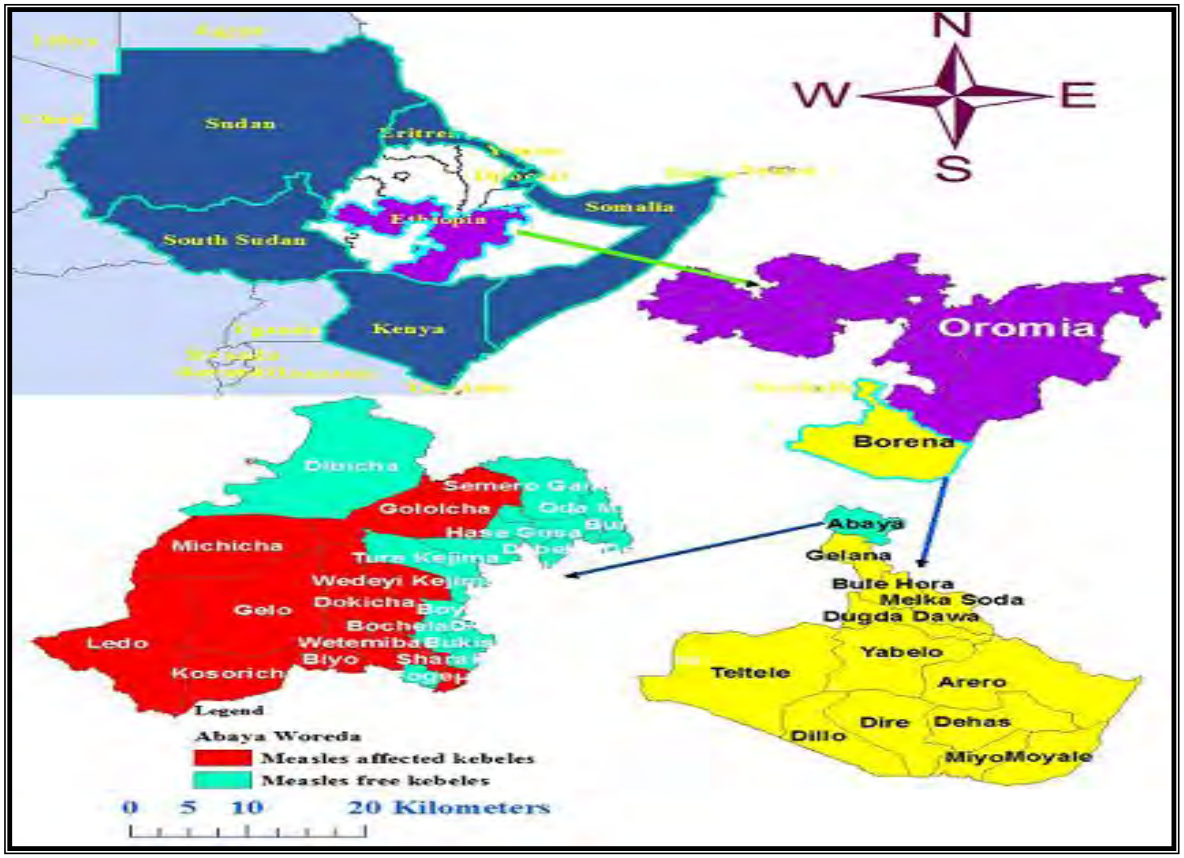

Figure 1.1.I-1: Map of Abaya Woreda, Borena Zone, Oromia Region, Ethiopia, 2013

1.1.3.2. Study period

The study was conducted from end of august to mid of December, 2013.

1.1.3.3. Study design

We used descriptive cross sectional followed by case-control study design to identify risk factors triggered the measles outbreak in the woreda. We used 46 cases with 92 matched community controls selected from the affected kebeles. Matching was conducted based on sex and age.

1.1.3.4. Source and study population

Target population of the investigation was all patients with measles cases /death come to health facilities and fulfills the case definition/confirmed cases of measles in affected kebeles.

1.1.3.5. Data collection

To conduct case control study (interview the participants), structured questioner was prepared and used. We gathered information on patient characteristics (gender, age, and family size), symptoms, treatment (if any), the vaccination status, and the contact history, education status of the patient and family, distance from health center, knowledge and practice of the community. Furthermore, additional data was collected such as line list, observation of cold chain management and case management report. MUAC was used to identify malnourished children during case-control study.

Operational definition

A suspected measles case is defined as: Any person with generalized maculopapular rash and fever plus one of the following: cough or coryza (runny nose) or conjunctivitis (red eyes).

A laboratory confirmed case: - is a suspected case which has laboratory results indicating infection (IGM positive or isolated for a measles virus).

Epidemiologically linked case: - is a suspected case, which has contacts (possibly got the virus) with laboratory confirmed case or another epidemiologically confirmed case.

Measles-related death: - is a death in an individual with confirmed (clinically, laboratory, or epidemiologically) measles in which death occurs within 30 days of rash onset and is not due to other unrelated causes.

Malnourished: children who had MUAC measurement of less than 11 cm as a severe malnutrition and between 11- 12 cm as moderate malnutrition. In addition, who had oedema without MUAC measurement is also taken as malnourished.

1.1.3.6. Data processing and analysis

Data were entered and analyzed by using Epi-Info7 version 7.1.0.6 and Microsoft Excel. Results were presented using graph, table and spot map. Attack rate and case fatality rate were also calculated.

1.1.3.7. Data quality control

We used line listing for describing measles cases interms of time, place and person. However, all data were checked for completeness before the entry and analysis.

1.1.3.8. Ethical consideration

Ethical clearance was obtained as a form of supportive letter from Oromia Regional Health Bureau. Oral informed consent was obtained from participants or from their parents to participate in the study. Confidentiality was assured and no personal details was recorded or produced on this documentation.

1.1.3.9. Dissemination of the result

Written report of the field investigation was submitted to the Oromia Regional Health Bureau, resident advisor, to the EFETP program coordinator of Addis Ababa University, School of Public Health, Borena Zone health department and Abaya woreda health office.

1.1.4. Result

1.1.4.1. Laboratory

Between ends of august 24, 2013 to December 12, 2013 a total of 498 suspected measles cases were reported. Among these suspected cases 5 blood samples were taken to identify the etiologic agent and all samples were positive for measles IgM.

1.1.4.2. Descriptive epidemiology

Person

On 24 august 2013, one case of measles was recorded in unvaccinated child from Ledo kebele of Abaya woreda. From that date until 12 December 2013, considered to be the epidemic period, 498 suspected cases of measles and two deaths were recorded throughout Abaya woreda. The median age of the cases was 5 years with a range of 6 months and 49 years. The case with the earliest date of onset of examination in this outbreak had not travelled abroad (table 1.1.1).

Table 1.1-1: Distribution of measles cases by age group in Abaya woreda of Borena Zone, Oromia Region, Ethiopia, 2013.

S.No.	Kebele	Age Group				Percentage			
		0-4	5-14	15-44	45+	0-4	5-14	15-44	45+
1	Biyo	8	4	1	0	62%	31%	8%	0%
2	Bocesa	0	1	0	0	0%	100%	0%	0%
3	Dhokicha	34	24	2	0	57%	40%	3%	0%
4	Gelo	17	9	5	0	55%	29%	16%	0%
5	Gololcha	11	11	1	0	48%	48%	4%	0%
6	Hafursa Waro	10	17	0	0	37%	63%	0%	0%
7	Kosoricha	60	30	16	1	56%	28%	15%	1%
8	Lado	78	65	42	0	42%	35%	23%	0%
9	Michicha	6	11	5	0	27%	50%	23%	0%
10	Shara	1	1	0	0	50%	50%	0%	0%
11	Waldey Kajima	0	5	0	0	0%	100%	0%	0%
12	Watamba	17	5	0	0	77%	23%	0%	0%
	Grand Total	242	183	72	1	49%	37%	14%	0%

The overall attack rate (AR) of the case was 390 cases per 100,000 populations. The attack rate is high in males (440 cases per 100,000 populations) than females (350 cases per 100,000 populations). Less than five years of age group was more affected than the others (<5 yrs 1160 cases per 100,000 population and >5 yrs 24 cases per 100,000 population). Two deaths were reported with the overall case fatality rate (CFR) of 0.4%. The highest CFR was identified in Hafursa Waro Kebele, which was 7.4% (table 1.1.2).

Table 1.1-2: Measles Attack rate (AR) and case fatality rate (CFR) by kebele in Abaya woreda of Borena zone, Oromia Region, Ethiopia, 2013.

S.No.	Kebele	Total Population	# of cases	# of deaths	Attack rate (per 1000)	CFR
1	Biyo	4,721	13	0	2.8	0%
2	Bocesa	5,656	1	0	0.2	0%
3	Dhokicha	3,959	60	0	15.2	0%
4	Gelo	6,842	31	0	4.5	0%
5	Gololicha	1,818	23	0	12.7	0%
6	Hafursa Waro	7,005	27	2	3.9	7.4%
7	Kosoricha	3,130	107	0	34.2	0%
8	Lado	7,537	185	0	24.5	0%
9	Michicha	3,130	22	0	7.0	0%
10	Shara	5,131	2	0	0.4	0%
11	Waldey Kajima	2,580	5	0	1.9	0%
12	Watamba	6,621	22	0	3.3	0%
13	Abaya woreda	126,794	498	2	3.9	0.4%

Place

The affected kebeles were presented on the spot map, which shows the measles case integration with vaccination coverage for 2013. In Ledo kebele vaccination service is weak and it is hard to reach area (it lays on the boarder of Abaya Lake). Because of that reason the case load is high in this kebele (figure 1.1.2).

The highest attack rate was registered in Kosoricha Kebele, 3420 cases per 100,000 populations and followed by Ledo, Dhokicha and Gololcha Kebeles, 2450, 1520 and 1270 cases per 100,000 populations respectively (table 1.1.2).

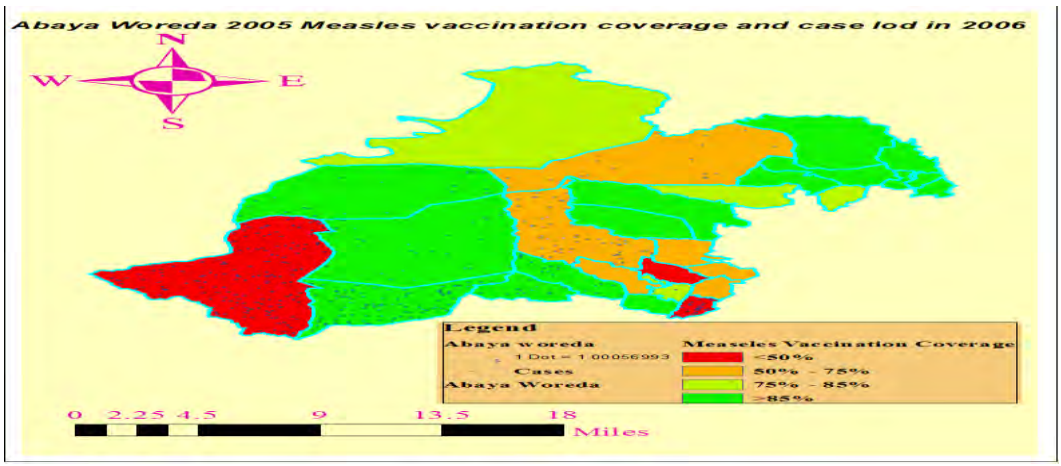

Figure 1.1.I-2: Spot map showing Measles Cases Distributions in line with 2005 measles vaccination coverage of Abaya woreda, Oromia, 2013.

Time

Onset of rash occurred between 24 august 2013 and 12 December 2013 was presented in figure 3. The detection of the outbreak (the cases) was late by 2 weeks. The outbreak stayed for about 17 weeks (four months). This might due to insufficient interventions covering all affected kebeles. Most of the affected kebeles are hard to reach areas. The case builds up gradually to reach its peak on November 09, 2013 and has multiple peaks.

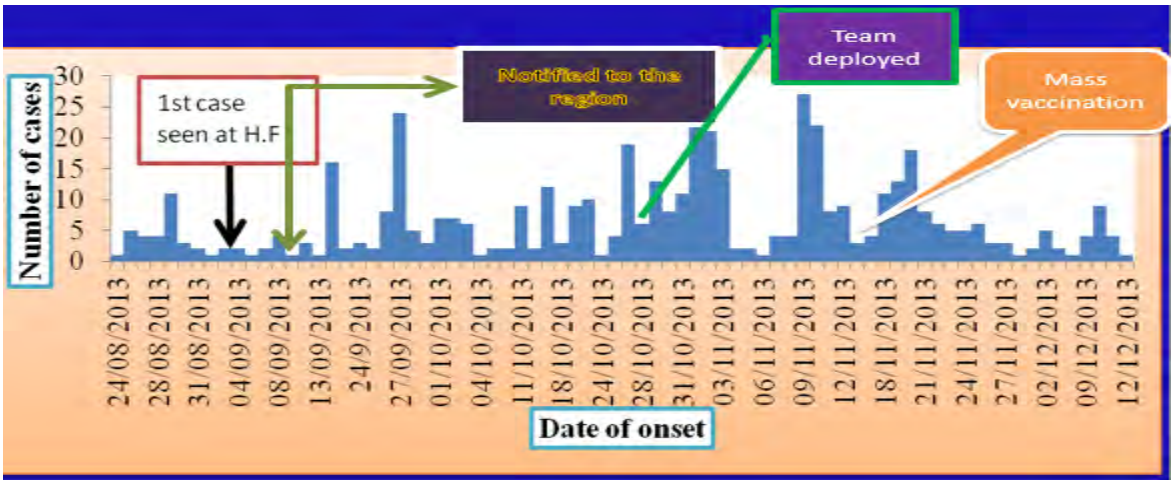

Figure 1.1.I-3: Distribution of Measles cases by Date of Onset-Abaya Districts of Borena Zone, Oromia, Ethiopia, 24/08/2013-12/12/2013.

1.1.4.3. Vaccination coverage

The measles vaccine coverage was 87 %, in 2013. From the affected cases 61% of them had not received any dose of measles vaccine. Moreover, 46% of the cases aged between 1 year and 15 years (the age range in which a high level of vaccination coverage is to be expected) had not received any dose of the vaccine. Among the total cases, 28% of the patients had received one dose of measles vaccine and the rest 7.6% and 2.8% of them were received two and three doses of measles vaccine respectively. The highest unvaccinated cases were reported from Ledo Kebele which was 38% from the total unvaccinated cases and followed by Kosoricha and Dhokicha which was 21% and 11% respectively (table 1.1.3).

Table 1.1-3: Vaccination status of Measles cases in Abaya Woreda of Borena Zone, Oromia Region, Ethiopia, 2013.

S.No.	Kebele	Vaccine dose				% of Unvaccinated cases from kebele total cases	% of Unvaccinated cases by kebele
		0	1	2	3		
1	Biyo	12	1	0	0	92%	4%
2	Bocesa	0	1	0	0	0%	0%
3	Dhokicha	34	8	11	7	57%	11%
4	Gelo	19	12	0	0	61%	6%
5	Gololicha	22	1	0	0	96%	7%
6	Hafursa Waro	14	11	1	1	52%	5%
7	Kosoricha	63	44	0	0	59%	21%
8	Lado	116	43	23	3	63%	38%
9	Michicha	16	6	0	0	73%	5%
10	Shara	0	2	0	0	0%	0%
11	Waldey Kajima	0	0	2	3	0%	0%
12	Watamba	7	14	1	0	32%	2%
13	Grand Total	303	144	40	17	61%	

1.1.4.4. Cold chain management

The woreda has 27 health posts and 5 health centers. These functional health posts have no functional refrigerator due to different reasons like shortage of fuel cost,

shortage of spare part for the fridge and lack of technical skill. There is functional fridge at all health center.

1.1.4.5. Analytical Epidemiology

We compared 46 measles cases with 92 community controls matched by sex and age. Descriptive statics and odds ratios with 95% confidence intervals were calculated to compare risk factors among cases and controls. All measles cases had a history of maculopapular rash and fever, 59% had conjunctivitis, 76% had corayza and 93% had cough.

Table 1.1-4: Socio-demographic information of cases and control- Abaya Woreda, Oromia Region, Ethiopia, 2013.

Descriptive Variables		Case		Control	
		Number	Percent	Number	Percent
Religion	Protestant	40	87%	73	79.4%
	Other	6	12%	19	21%
Ethnic Group	Oromo	45	98%	87	95%
	Other	1	2%	2	2%

Bi-variate analysis was performed to determine the strength of association of potential risk factors for measles cases as compared to controls. The statistically significant variables were found to be associated with measles as listed below: being unvaccinated (OR: 3.1; 95% CI: 1.5-6.5; P: 0.002), being a family member of un educated family (OR: 5; 95% CI: 1.4-17.8; P: 0.002), absence of health facility within 5 km radius (OR: 13; 95% CI: 5.7-31.5; P: <0.05), family size above 4 (OR: 5.7; 95% CI: 1.3-25.8; P: 0.01), living in unventilated house (OR: 0.28; 95% CI: 0.13-0.62; P: 0.00099), being malnourished (OR: 13; 95% CI: 3.5-48; P: 0.0000058), having contact history with measles infected person (OR: 27.9; 95% CI: 9.6-81.3; P: 0.0000), knowing mode of transmission (OR: 0.36; 95% CI: 0.17-0.77; P: 0.0076) (Table 1.1.5).

Table 1.1-5: Bivariate analysis for different exposures-Abaya Woreda, Oromia Region, Ethiopia, 2013.

Exposure		Case (%)	Control (%)	OR (95% CI)	P-value
Age of vaccination at 9 month	Yes	10 (25%)	30 (75%)	1.056 (0.4-2.7)	0.9
	No	12 (24%)	38 (76%)		
Distance of health facility more than 5km from the house	yes	34 (68%)	16 (32%)	13.5 (5.7-31.5)	0.00000
	No	12 (13.6%)	76 (82.4%)		
living in one house with more than four peoples	yes	44 (37.6%)	73 (62.4%)	5.7 (1.3-25.3)	0.0012
	No	2 (9.5%)	19 (90.5%)		
Housing condition	Unventilated	22 (53.7%)	19 (46.3%)	3.5 (1.6-7.6)	0.001
	Ventilated	24 (24.7%)	73 (75.3%)		
Nutritional status of the patient	Malnourished	14 (82.4%)	3 (17.6%)	13 (3.5-48.1)	0.000006
	Normal	32 (26.5%)	89 (73.5%)		
Having travel history to measles affected area prior to 7-18 days to onset rash	Yes	21 (77.8%)	6 (22.2%)	7.7 (2.8-21.4)	0.00003
	No	25 (31.3%)	55 (68.7%)		
Having contact history with measles infected person prior to 7-18 days	Yes	38 (82.6%)	8 (17.4%)	27.9 (9.6-81.3)	0.00000
	No	8 (14.6%)	47 (85.4%)		
Knowing Mode of transmission	Yes	13 (21.3%)	48 (78.7%)	0.36 (0.17-0.77)	0.00789
	No	33 (42.9%)	44 (57.1%)		
Had vaccination history	Yes	22 (24.4%)	68 (75.6%)	0.3 (0.15-0.68)	0.00250
	No	24 (50%)	24 (50%)		
Knowing that measles vaccine is preventable	Yes	18 (32.7%)	37 (67.3%)	0.99 (0.48-2.05)	0.98000
	No	27 (32.9%)	55 (67.1%)		
Educational level of the family	Illiterate	31 (42%)	43 (58%)	2.35 (1.12-4.93)	0.021
	Literate	15 (23.4%)	49 (76.6%)		
Presence of measles infected person in the house	Yes	38 (88.4%)	5 (11.4%)	82.6 (25.4-269.1)	0.000000
	No	8 (8.4%)	87 (91.6%)		

1.1.4.6. Intervention undertaken to contain the outbreak

The investigation team identified and characterized the measles outbreak. 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 measles. Routine surveillance was enhanced and the situation was closely followed at each level on a daily bases. Health education was given for the community members to prevent the transmission of the disease, to motivate health seeking behavior and treatment if there is sign and symptoms of measles. The zone has started closely working with the affected districts and the entire neighboring districts to prevent/control the outbreak from spreading to these areas, and alarming the community, health extension workers and community leaders to strength the local surveillance system.

1.1.5. Discussion

A prolonged measles outbreak was occurred in Abaya Woreda of Borena zone starting from august 24, 2013 to 12 December 2013. The crude attack rate was high compared with the attack rate of measles outbreak recorded nationally, 4.1 per 100,000 population, in 2008 (8). In addition, this finding is higher than others outbreak investigation conducted in other different country (14, 15).

The highest attack rate was observed among children under the age of 15 years (85.3%), which is comparable with the observations made by other outbreak investigation studies (16, 17). The AR of 8-11 month was 255 cases per 100,000 and it was higher than the attack rate reported on other study conducted in Wenzhou city (171/ 100,000) of china (14).

Deaths from measles occur mainly due to complications of measles. Infants and young children, especially those who are malnourished, are at highest risk of dying (18). Unless managed early and aggressively, complications may lead to death within the first month after the onset of rash. The case fatality from measles is estimated to be 3 – 5% in developing countries but may reach more than 10% in outbreaks especially when it is compounded by malnutrition (8, 11).

In this study tow measles deaths were recorded due to complication (pneumonia). so that the measles case fatality rate (CFR) in this study was less than 1%, which means it is less than the expected CFR in Ethiopia and it is similar with Sudan and India findings CFR of 0.9% and 0.45%, respectively (19, 20). In addition, the case fatality rate (CFR) is less than the report of UNICEF (4%) humanitarian action Ethiopia released in 2005 (21). This might show the level of the quality of outbreak response and case management.

In this outbreak, twelve kebeles were affected with measles outbreak. An active case search and contact tracing was conducted. This help to identify the source of infection and determine whether other areas have been exposed or not. The index case was seen in Ledo kebele on August 24, 2013 on 9 years age of unvaccinated female child.

For the laboratory investigation five blood samples were tested in Ethiopia Health and Nutrition Research Institute (EHNRI) laboratory in August, 2013 from Ledo kebele. All of

the samples were confirmed as measles IgM positive and the rest cases were taken as Epidemiological linked.

Several factors contributed to the occurrence of this measles outbreak. The Majority of measles affected children had not received measles vaccination. In other study done in the Netherlands and Minnesota also discovered that 94% and 96% of affected children by measles outbreak were unvaccinated (22, 23). Vaccination is known to be the main protection against Measles. The recent (2013) measles vaccination coverage was less than 90% (national and WHO target) (24). About 52% of the kebeles vaccination coverage was less than the target (especially those measles affected kebeles). From the total measles cases the highest cases were reported from Ledo kebele and the lowest (29%) routine measles vaccination coverage for 2013 was also reported from this kebele. According to this study findings, there is a strong association between vaccination and the chance of acquiring measles virus.

According to WHO health service standard, to increase health seeking behavior of the community health service unit should be available within 5 km radius. If health facilities are available within acceptable range of distance community can utilize the facility and any outbreak can be detected early (25). In this study distance is one risk factor. Most of the affected group was far from health center by 5km and above. According to bivariate analysis result, there is a strong relationship between the distance of health center from the household and the chance of getting measles. In other words, when people are far from health center greater than 5 km, there was 13 fold chance of acquiring measles during an outbreak.

There was a relationship between educational level of the parents and the chances of acquiring measles. This study showed that children from non-educated family were two time at high risk than those educated one for measles infection during an outbreak. Correspondingly the parents' knowledge about measles transmission and prevention was low; only 44% in both groups knew that measles can be transmitted by inhalation and only 40% knew that the disease could be prevented by vaccination. Similar study conducted in Laos showed that 9% and 18% knew that measles can be transmitted by inhalation and the disease can be prevented by vaccination respectively (26).

Furthermore, the most powerful relationship was observed for ``contact history'' which is not surprising given that the virus has a secondary attack rate of more than 90% among susceptible individuals. Due to the high transmission efficiency of measles, outbreaks have been reported in populations where only 3% to 7% of the individuals were susceptible (8, 12, 27).

Measles was more common in households with more than one child. This could reflect an increased risk of exposure to measles, increased severity of measles or both (28). The association between number of family members more than four in the household and measles was stronger for measles cases transmission. Moreover, the transmission of the measles virus is strongly associated with ventilation of the house. This means a person living in unventilated house has a chance of 3.5 fold acquiring measles than living in ventilated house.

Measles infection is more severe among children who are already malnourished. Moreover, measles may exacerbate malnutrition because of decreased food intake due to malaise, increased metabolic requirements in the presence of fever, or the mistaken belief of parents and health practitioners that a child's food should be withheld during an acute illness. Under nutrition may lead to or worsen vitamin A deficiency and keratitis, resulting in a high incidence of childhood blindness following measles outbreaks (12). My result showed that, there is strong association between malnourished children and measles cases.

Immunization may not produce protection if the vaccine has been improperly handled. All health posts had no fridge and they take vaccine from the nearest health center on monthly base. However, most of health posts were found in long distance (almost greater than 10 km from the nearest health center) and the topography is challenging. Long distance coupled with hardship topography need more than a day to take vaccine from health center. Because of this reasons the vaccine potency and the cold chain system be questionable.

This all factors might contribute to measles outbreak.

1.1.6. Limitation of the study

- During the study time of home to home visiting for data collection vaccination card was not available in most of interviewed households. Because of that, vaccination history was taken by simply asking the family. This may introduce bias on the vaccination status.

1.1.7. Conclusion

Less than 15 years of age were primarily affected by the outbreak. The outbreak was confirmed based on laboratory diagnosis. A total of twelve kebeles were affected and resulted in 496 cases and two deaths. The highest attack rate was observed among children under the age of 15 years (85.3%). Unvaccinated children between less than 15 years were the most affected segment of the population. The case fatality was in acceptable range compared to other studies. The highest cases were reported from Ledo kebele.

The woreda routine measles vaccination coverage was less than the expected national target for year 2013. Above 50% of the woreda kebeles, their vaccination coverage was less than 90%. The lowest vaccination report was reported from Ledo kebele in 2013. On the other hand cold chain management was the major problem in the affected area. There was no functional fridge in all health posts except at health center level.

According to this study findings , low vaccination coverage of hard to reach kebeles, poor cold chain management, presence of high family members, low community awareness on measles transmissions and prevention, and presence of health center at a long distance from households (>5KM) were likely contributed for the occurrence of this measles outbreak.

In this outbreak all treated cases, were recovered from their illness. This shows that the case management was relatively good. However, the activities performed on community mobilization and providing the key massages for the community to control and prevent the outbreak was weak.

1.1.8. Recommendation

- Strengthen measles routine vaccination activities with the target of reaching more than 90% of infants of 9 to 11 months of age and the coverage should be monitored accordingly in each level.
- Social mobilization campaigns should be conducted to inform parents and community leaders about the importance of obtaining measles vaccination as soon as possible before one year age.
- Provide supplementary vaccination campaign.
- Attention should be given for cold chain and functional fridge should be established for hard to reach health posts (specially affected kebeles).

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Annex 1.1-1: Questionnaires for Case - control study on Measles outbreak in Abaya Woreda, Borena Zone, Oromia Region,

Case status = Case _____Control_____

Patient Name_____ date of Data collection_____

Region_____ Zone_____ Woreda_____ Kebele _____ Got _____ Phone_____

Location: Longitude:_____ Latitude:_____

I . Socio-demographic Characteristics

S. No	Questions	Alternatives
1.1	Sex	1. Male 2. Female
1.2	Age	years_____ Months_____
1.3	Occupation of the patient	1. Farmer 2. House wife 3. Student 4. Unemployed 5. Daily laborer 6. Merchant 7. Gov't 8. Other (specify)_____
1.4	Family Occupation	1. Farmer 2. House wife 3. Student 4. Unemployed 5. Daily laborer 6. Merchant 7. Gov't 8. Other (specify)_____
1.5	Religion	1. Muslim 2.Orthodox 3. Protestant 4. Catholic 2. Other (specify)_____
1.6	Ethnic group	1. Oromo 2. Tigre 3. Amhara 4. Gurage 5. Other (specify)
1.7	Educational level of the patient	1. Illiterate 2. Read and write 3. Elementary 4. Secondary 5. Above secondary6. Under school age
1.8	Educational level of the family	1. Illiterate 2. Read and write 3. Elementary 4. Secondary 5. Above secondary
1.9	Marital status of the patient	1. Single 2. Married 3. Divorced 4. Widowed 5. Separated
1.10	Family size	_____
1.11	Is there any sick person with rash, fever, running nose In the family?	1. Yes 2. No
1.12	If yes, number of sick person	_____

II. **Clinical History of Diseases:**

2.1	What was the symptom?	1.fever 2.Rash 3.cough, 4.coryza (runny nose), 5. conjunctivitis (red eyes) 6. 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 ☐
2.2	Date of rash on set	___/___/___
2.3	Duration of rash_____	
2.4	Date seen at health facility	___/___/
2.5	Illness duration before visiting the health facility	_____ in days/hours
2.6	Did you (he/she) take treatment?	1.Yes2.No
2.7	If yes, treatment taken	1.ORS 2.Antibiotics 3.Vitamin A 4.Supplementary food 5. TTC ointment 6.Anti pyretics 7.Others given_____
2.8	Did you recovered after the treatment?	1.cure 2. partially 3. deteriorated/disabled 4.death
2.9	Location when rash started?	District_____Kebele_____

III. Risk factor

3.1	Did you ever vaccinated for measles?	1. Yes 2. No 3. Unknown 4. .Not applicable
	Is there vaccination card	Yes No
	If yes last vaccination date	1.patient recall__/___/___ dd/mm/yy 2. vaccination card_/__/____ dd/mm/yy 3. I don't remember
3.2	Number of vaccine doses 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 Religious exemptions
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 before and after rash onset	1.Yes 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 with whom_____

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.Yes2.No 3. If yes specify_____
3.12	Nutritional status of the cases	1. Normal 2. Moderate 3..Severely malnourished
3.14	What is the estimated area of the house?	_____
3.15	House condition?	☐ ventilated ☐ not-ventilated
3.16	Distance from house to HC?	☐ greater than 5 km ☐ equal or less than 5 km
3.17	Where did you go first when you get ill?	1. Health Facility 2. Traditional Healers 3. Holy Water 4. Stayed at home 5. Other :(Specify)_____
3.18	How do you think people get measles?	1. Contact with a virus from ill person 2. From God 3. Bad attitude of other people 4. Other(Specify)
3.19	Do you Know measles is vaccine preventable?	1. Yes 2. No 3. Don't Know
3.20	Who do you think can be affected by measles?	1. Children of aged less than 5 years 2. Children of aged less than 18 years 3. Women of any ages 4. Any age groups of both male and women 5. Other (specify):_____
3.21	How do you think measles can be cured?	1. Using modern medicine 2. Using traditional Medicine 3. Holy water 4. By feeding nutritious foods 5. Keeping the sick person indoor 6. Other(Specify)_____

1.2. Measles outbreak investigation, Gololcha Woreda of Arsi zone, Oromia Region, Ethiopia, 2014.

Abstract

Background: Measles is a highly infectious disease that causes mortality in both developing and industrialized countries. It is estimated that in 2012 about 20 million people contracted measles and122, 000 of them died worldwide.

Methods: Matched case-control study design was used to identify the risk factors of the outbreak. Structured questioner was used during the interview. To identify the cases WHO measles standard case definition was used. Data was analyzed by using epinfo 7 and excel.

Results: A total of 357 measles suspected cases were identified. The outbreak lasted 11 weeks. Among total cases, 185 (52%) were male and 220 (62%) were reported from Komtu Gogeti Kebele. The median age cases were 6 years with rage of 3 month and 30 year. Totally seven kebeles were affected by the outbreak. Under five age group were mostly, 148 (41.5%), affected and above 85% of the cases were less than 15 years. Sixty one percent of the cases were not received any dose of measles vaccine. The rest 27% and 12% were received one and tow or above doses of measles vaccine respectively. The crude attack rate was 0.2% with 2.5% CFR. Among the total cases 3% of them were developed complications like pneumonia, diarrhea and otitis-media. Five blood samples were sent to EHNRI and four of them were measles IgM positive.

For case control study a total of 60 cases and 120 controls were interviewed. The mean age the participants were 7.2 years with age range of 7 months and 38 years. In bivariate analysis, being not vaccinated 1st doses at nine month, having contact history with measles infected person, presence of measles infected person in the house and nutritional status were significantly associated risk factors with the outbreak

Conclusion and recommendation: Several risk factors were contributed in the transmission the outbreak. Fail to vaccinate and being not vaccinated 1st doses at nine month, absence of isolating measles infected cases and presence of sever acute malnutrition were the major risk factors. Strengthening routine vaccination service and conducting mass vaccination, increasing community awareness on isolation infected person and early management of sever acute malnutrition was recommended.

1.2.1. Introduction

Measles is a highly infectious disease that causes mortality in both developing and industrialized countries (1). It is estimated that in 2012 about 20 million people contracted measles and that 122 000 of them died worldwide (2). It is the most frequent cause of vaccine-preventable childhood death globally, with deaths concentrated in developing countries with low vaccine coverage and limited access to basic health care services(3).

According to Ethiopia ministry of health report, in 2012 a total of 11,721 confirmed and epidemiologically linked measles cases and 47 deaths were reported nationally. Out of these cases, 4,359 (37.2%) were reported from Oromia Region (4).

Measles is an infection of the respiratory system caused by a virus, specifically a paramyxovirus of the genus Morbillivirus. Morbilliviruses, like other paramyxovirus, are enveloped, single-stranded, negative-sense RNA viruses(5). It is inactivated rapidly in sunlight, heat or extremes of pH, but remains viable over long periods when stored between –20°C and –70°C(6).

Measles virus transmitted through respiratory droplets but this virus can also infect via the eye and multiply in the conjunctivae. Viremia following primary local multiplication results in widespread distribution to many organs. Hematogenus trans-placental transmission when occur during pregnancy (7, 8).

The average interval from exposure to onset of rash is 14 days (range 7–18 days). Patients are contagious four days before the rash until four days after the onset of the rash. Following inhalation of virus-containing droplets, measles virus infects the nasopharyngeal epithelium and soon extends to cells of the reticuloendothelial tissues. Five to seven days after exposure, the infection is spread through the bloodstream to the skin, conjunctivae and respiratory tract. Viraemia peaks towards the end of the incubation period when patients develop the prodromal symptoms of high fever, cough, coryza and conjunctivitis. The typical maculopapular rash appears three to four days after the prodrome with a high fever peaking at 39°C to 40°C. The rash spreads from the face and neck to the trunk and extremities fading after about three days. The onset of the rash is often accompanied by bluish-white lesions on the oral mucosa called

Koplik's spots, which are pathognomonic for measles. Patients normally improve by the third day of rash and fully recover 7–10 days from the onset of the disease(6, 8, 9).
Measles virus infects multiple organ systems and targets epithelial, reticuloendothelial, and white blood cells, including monocytes, macrophages, and T lymphocytes. Complications from measles include otitis media, pneumonia, diarrhea, blindness and encephalitis. The frequency of complications varies in different parts of the world. In industrialized countries, complications occur in around 10-15% of cases and include diarrhea, otitis media, pneumonia, croup and, typically, encephalitis. The frequency of complications in developing countries is less well known. At least three-quarters of cases in developing countries can be expected to have at least one complication and some have multiple systems involvement (10).

The three major causes contributing to the high case-fatality rate are pneumonia, diarrhea and croup. Measles can also lead to life-long disabilities, including blindness, brain damage and deafness. Low vitamin A status has been associated with a higher rate of complications and a higher death rate, as it has similar pathological effects on epithelia and the immune system. Most measles deaths (98%) occur in developing countries, where vitamin A deficiency is common. The case fatality rates in developing countries are normally estimated to be 3-5%, but may reach 10-30% in some situations. This compares with 0.1% in many industrialized countries (10, 11).
Factors thought to affect CFR include age (12), intensity of exposure to measles virus (for which household crowding may be seen as a surrogate) (13), measles vaccination status(14), nutritional status (15), immunodeficiency (16) and access to appropriate case management (17).

1.2.2. Background

In november, 2013 Gololcha Woreda Health Office informed the Arsi Zone Health Department that 32 suspected measles cases were identified in Komtu Gogeti kebele. Following this, five blood samples were sent to Central laboratory for IgM confirmatory test and confirmed as positive for Measles. This cases were distributed among six kebele's in the Woreda.

Gololcha Woreda is located in Arsi zone of Oromia region and Bounded by West Harerge Zone to the north and east, Amigna to the south, Chole to south west, Guna to west and Aseko to North West. It is 205 KM far from Addis Ababa and 125Km from Zone town Asela. The woreda has 36 kebeles (2 is urban and the remainder is rural).

According to 2007 national census report the projected estimated population of the woreda in 2013 is to be 207,499 which constitutes 104,787 and 102,712 males and females respectively (18).

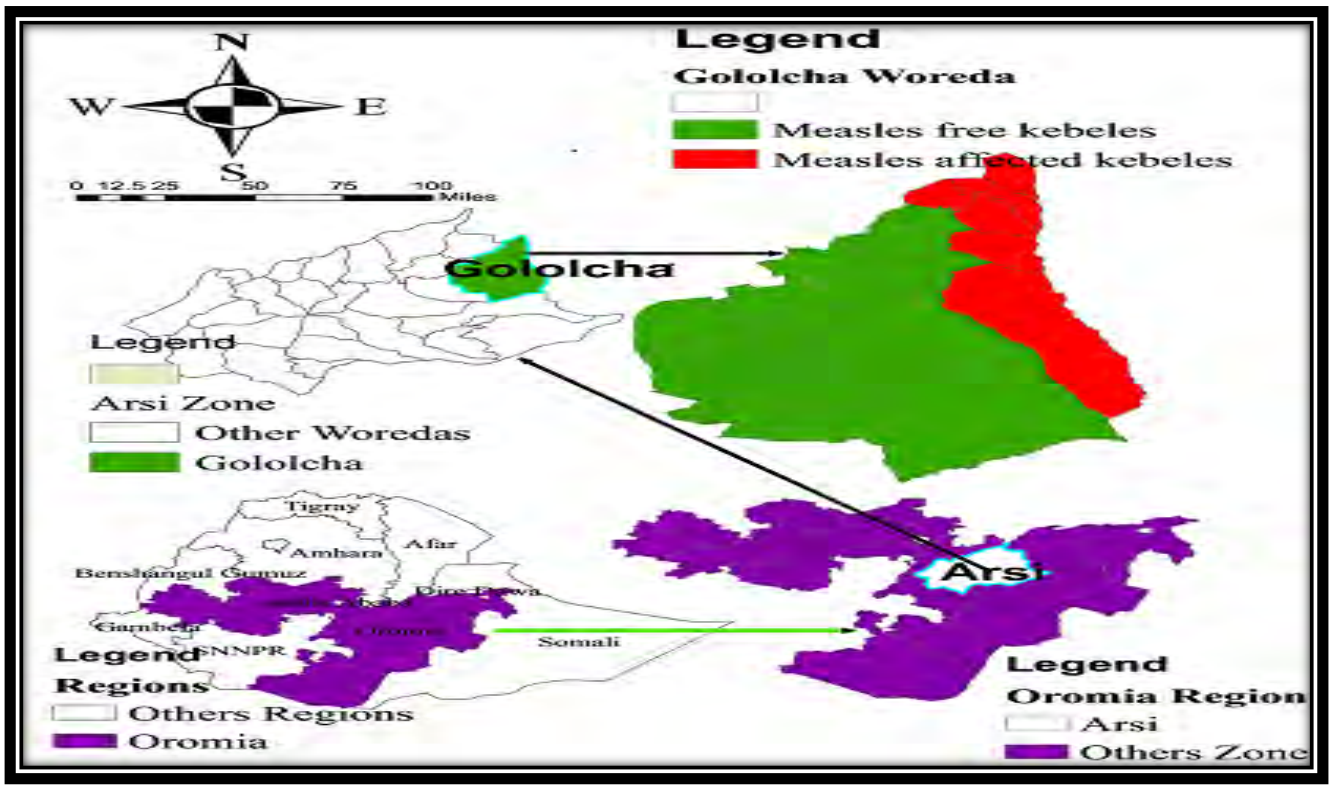

Figure 1.2 -1: Map of measles affected kebeles of Gololcha Woreda, Arsi zone, Oromia, Ethiopia, 2014.

1.2.3. Objective

1.2.3.1. General Objective

To study the epidemiology of measles outbreak in Gololcha Woreda of Arsi Zone, Oromia Region and undertake appropriate public health control measures

1.2.3.2. Specific objective

- To verify the existence of measles outbreak in Gololcha
- To describe outbreak in terms of person, place and time in the woreda.
- To identify factors contributing to the occurrence of an outbreak.
- To propose control measures against measles transmission.

1.2.4. Methods and materials

1.2.4.1. Study area

This outbreak investigation was conducted in Gololcha Woreda of Arsi Zone.

1.2.4.2. Study period

The study was conducted from November 2013 to January 2014.

1.2.4.3. Study design

Descriptive cross sectional followed by matched case-control study design was used and two controls were interviewed for each case. A total of 60 cases and 120 controls were participated in this study.

1.2.4.4. Laboratory investigation

To confirm the existence measles virus five blood specimens were collected and sent to national laboratory as per national guideline.

Case definitions

To identify the cases WHO case definition for measles was used.

> **Suspected measles cases**: Any person with fever and maculopapular (non-vesicular) generalized rash and cough, coryza or conjunctivitis (red eyes).
>
> **Confirmed measles cases:** A suspected case with laboratory confirmation (positive IgM antibody) or epidemiologically linked to confirmed cases in an outbreak.
>
> **Epidemiologically linked**: 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.

1.2.4.5. Data collection tools and procedures

To conduct the interview for the study participants structured questioner were prepared and used. In addition, some important information like vaccination coverage of the

Woreda, cold chain status of health facilities and malnutrition related reports were collected from woreda health office and health center.

1.2.4.6. Data analysis

Data analysis was carried out by using Epinfo 7 for analytic and Microsoft excels for descriptive data analysis.

1.2.4.7. Ethical consideration

Ethical clearance was obtained as a form of supportive letter from Oromia Regional Health Bureau. Oral informed consent was obtained from participants or from their parents to participate in the study. Confidentiality was assured and no personal details was recorded or produced on this documentation.

1.2.4.8. Result dissemination

The results of this study was distributed to AAU/ School of public health department of field epidemiology training program, Ethiopian Public health Association (EPHA), Oromia regional health bureau, Arsi zone health department and Gololcha Woreda health office in hard copy and soft copy.

1.2.5. Result

1.2.5.1. Descriptive epidemiology

A) Outbreak description

A total of 357 measles suspected cases were identified during this outbreak. Among the total measles cases, 185 (52%) cases were male (figure 1.2.2). The median age of the cases was 6 years with range of 3 month to 30 year.

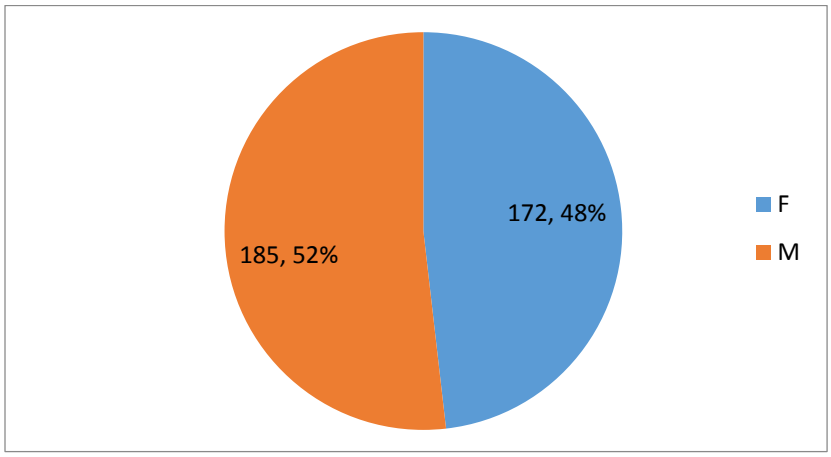

Figure 1.2.1-2: Distribution of measles cases by sex Gololcha District, Arsi zone, Oromia , Ethiopia, 2013.

The highest cases were from Komtu Gogeti kebele 220 (62%), followed by Chebi Kame, 63 (18%). The rest 20% of the cases were reported from Tulu Keraro, Lafto, Badeyi and Furda Bala kebeles. Totally six kebeles were affected out of thirty six (figure 1.2.3).

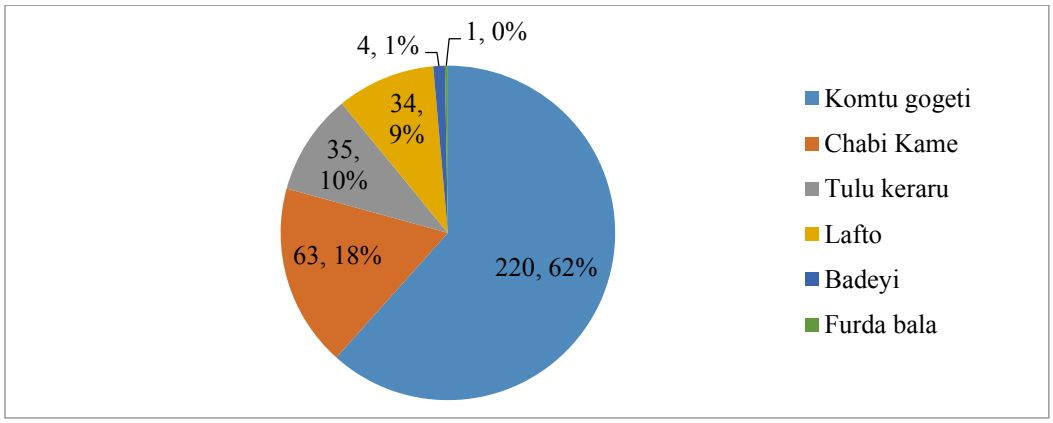

Figure 1.2.1-3: Distribution of measles cases by kebele Gololcha District, Arsi Zone, Oromia, Ethiopia, 2013.

The index case was female. She was 3 years old and visited health facility on November 25, 2014. She was from Komtu Gogeti kebele and not vaccinated for measles vaccine. She had no travel history to measles affected areas. After a day (November 27) 10 cases were reported again. In total, the epidemic lasted 11 weeks. The highest number of cases was reported in December 1, 2013 (figure 1.2.4).

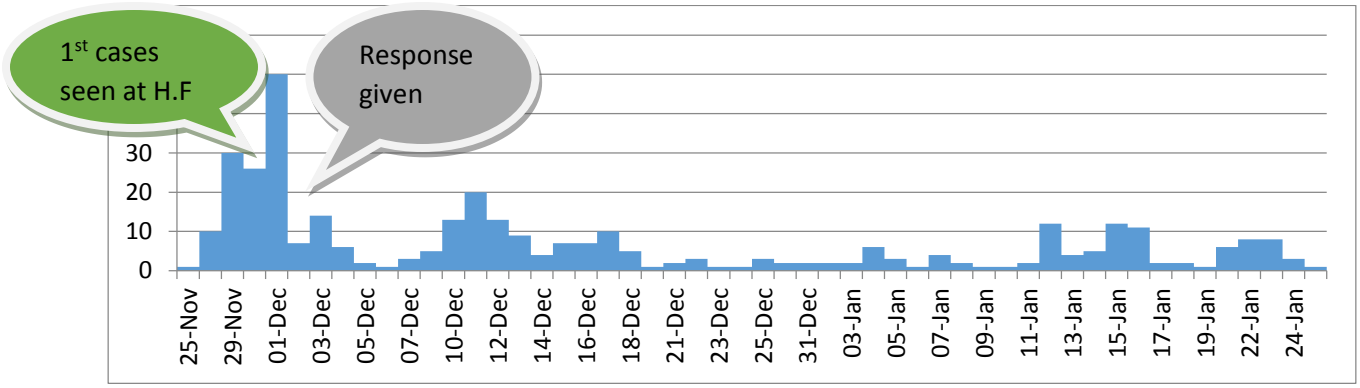

Figure 1.2.-4: Distribution of measles cases by onset of date, Gololcha District, Arsi Zone, Oromia, Ethiopia, 2013.

Generally 85% of the cases were within the age group of less than fifteen years old. Under five were more affected 148(41.5%) followed by the 5-10 year's age group 97 (27.1%) (Table 1.2.1).

Table 1.2-1: Distribution of measles cases by age group Gololcha District, Arsi Zone, Oromia, Ethiopia, 2013.

Age group	Frequency	Percent	Cum. Percent	95% CI Lower	95% CI Upper
0 - <5	148	41.46%	41.46%	36.33%	46.77%
5 - <10	97	27.17%	68.63%	22.69%	32.16%
10 - <15	65	18.21%	86.83%	14.42%	22.69%
15 - <20	22	6.16%	93.00%	3.99%	9.32%
20 - <25	14	3.92%	96.92%	2.24%	6.65%
25 - <30	10	2.80%	99.72%	1.43%	5.26%
30 - <35	1	0.28%	100.00%	0.01%	1.80%
TOTAL	**357**	**100.00%**	**100.00%**		

The crude attack rate of measles infection was 0.2%. In this outbreak the highest (3%) attack rate was registered in Komtu Gogeti kebele. The lowest attack rate was seen in Furda Bala (0.02%) (table1.2.2).

Table 1.2-2: Attack rate and CFR of measles cases by kebele Gololcha District, Arsi Zone, Oromia, Ethiopia, 2013.

S.No.	Kebele	Total Population	# of cases	# of deaths	Attack rate	CFR
1	Komtu Gogeti	7,325	220	6	3.0%	3%
2	Chebi Kame	6,660	63	1	0.9%	2%
3	Tulu Keraru	6,334	35	1	0.6%	3%
4	Lafto	9,609	34	1	0.4%	3%
5	Badeyi	4,698	4	0	0.1%	0%
6	Furda Bala	6,592	1	0	0.02%	0%
7	**Gololcha Woreda**	207,499	357	9	0.2%	3%

Less than 5 years of age was highly affected than the others with the age specific attack rate of 0.43% and age greater than 15 years of age were the less affected group with the age specific attack rate of 0.04% (table 1.2.3).

Table 1.2-3: Age specific attack rate by kebele Gololcha District, Arsi Zone, Oromia region, Ethiopia, 2013.

			<1		<5		<15		>15	
S.No	Kebele	Total Population	# of cases	AR	# of cases	AR	# of cases	AR	# of cases	AR
1	Komtu Gogeti	7,325	13	55	89	7.4%	193	5.6%	27	0.7%
2	Chebi Kame	6,660	4	19	23	2.1%	55	1.8%	8	0.2%
3	Tulu Keraru	6,334	4	20	15	1.4%	30	1.0%	5	0.1%
4	Lafto	9,609	2	7	17	1.1%	27	0.6%	7	0.1%
5	Badeyi	4,698	1	7	3	0.4%	4	0.2%	0	0.0%
6	Furda Bala	6,592	0	0	1	0.1%	1	0.0%	0	0.0%
7	**Gololcha Woreda**	207,499	24	4	148	0.43%	310	0.3%	47	0.04%

The case fatality rate (CFR) was 2.5%. The highest CFR was identified in Komtu Gogeti (2.7%), Tulu Keraru (2.9%), Lafto (2.9%) and Chebi Kame (1.6%). Of the total cases, 13 (3%) faced a complications like Pneumonia, diarrhea and otitis-media.

B) Vaccination coverage

From the reported cases 218 (61%) of them were not vaccinated for measles. The rest 95 (37%) and 44 (12%) were vaccinated 1 dose and 2 or more doses of MCV.

Furthermore in 2013 the administration measles coverage was 100% and in the same year supplementary immunization was carried out with 100% coverage.

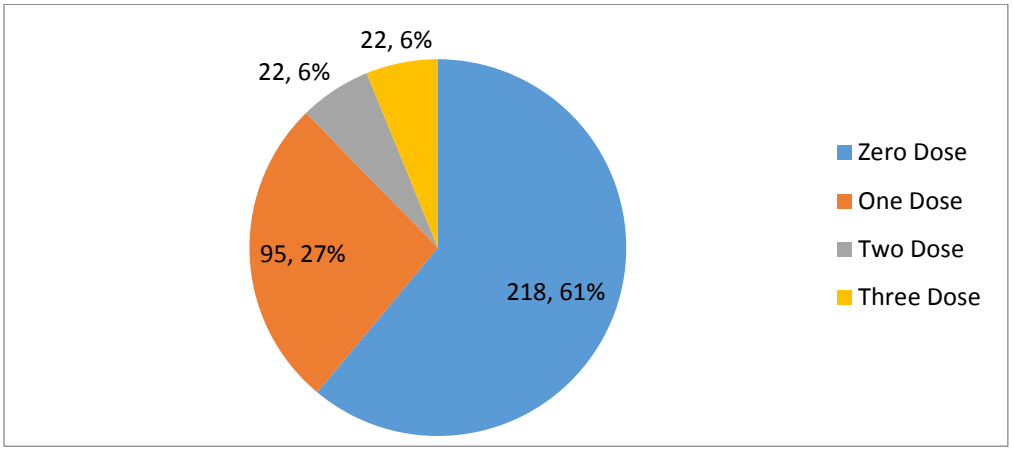

Figure 1.2-5: Distribution of cases by vaccination status Gololcha District, Arsi Zone, Oromia, Ethiopia, 2013.

C) Laboratory investigation

To confirm the existence of the measles outbreak five blood samples were collected and sent to EHNRI and four of them were measles IgM positive.

1.2.5.2. Analytic epidemiology

A total of 60 cases and 120 controls were participated in the case-control study. The mean age of the study participant was 7.2 years with age range of 7 month to 38 years. In bi-variate analysis, receiving 1st dose of MCV at 9 month; OR: 0.0628, 95% CI: 0.0175-0.2253, receiving at least one dose of MCV; OR: 0.168, 95% CI: 0.08-0.35, having contact history with measles infected person; OR: 21.4, 95% CI: 9.6-47.4, knowing MCV can prevent measles infection; OR: 0.298, 95% CI: 0.1008- 0.88, presence of measles infected person in the house; OR: 56, 95% CI: 21.5-145.7, Nutritional status; OR: 4.3, 95% CI: 1.04-17.98, and received number of doses of MCV; OR: 5.8, 95% CI: 1.7-19.6 were significant risk factors for contracting measles (table 1.2.1).

Table 1.2-4: Bivariate analysis variables Gololcha District, Arsi Zone, Oromia, Ethiopia, 2013

Exposure		Case (%)	Control (%)	OR (95% CI)	P-value
Vaccination	yes	16 (16.3%)	82 (83.7%)	0.168 (0.08-0.35)	0.000001
	No	44 (53.7%)	38 (46.3%)		
Having Travel history to measles affected area prior to 7-18 days onset of rash	yes	11 (47.8%)	12 (52.2%)	2.02 (0.8-4.9)	0.114
	No	49 (31.2%)	108 (68.8%)		
Distance of health center	> 5 Km	50 (36.5%)	87 (63.5%)	1.9 (0.86-4.17)	0.108
	< 5 KM	10 (23.3%)	33 (76.7%)		
Do you have contact with measles infected person	yes	46 (74.2%)	16 (25.8%)	21.4 (9.6-47.4)	0.000000
	No	14 (11.9%)	104 (88.1%)		
Do you know modes of transmission for measles	yes	20 (33.3%)	40 (66.7%)	1 (0.52-1.93)	1
	No	40 (33.3%)	80 (66.7%)		
Do you think that measles vaccine can prevent measles	yes	51 (30.9%)	114 (69.1%)	0.298 (0.1008-0.88)	0.022
	No	9 (60%)	6 (40%)		
Educational level of the family	Literate	15 (31.2%)	33 (68.8%)	0.88 (0.43-1.78)	0.72
	Illiterate	45 (34.1%)	87 (65.9%)		
Family size above 4	yes	1 (12.5%)	7 (87.5%)	0.27(0.03-2.3)	0.2
	No	59 (34.3%)	113 (65.7%)		
Housing condition	unventilated	39 (33.9%)	76 (66.1%)	1.1 (0.56-2.05)	0.8
	Ventilated	21 (32.3%)	44 (67.7%)		
Is there any sick person with rash, fever, runniny nose, or conjunctivitis	yes	48 (85.7%)	8 (14.7%)	56 (21.5-145.7)	0.0000000
	No	12 (9.7%)	112 (90.3%)		
Nutritional status	Normal	54 (31.6%)	117 (68.4%)	4.3 (1.04-17.98)	0.02
	Malnourished	6 (66.7%)	3 (33.3%)		

1.2.5.3. Outbreak response

One of the first responses to the outbreak in Gololcha Woreda was a public awareness campaign at the most seriously affected kebeles during week 48. During week 51, an outbreak investigation was conducted at the same kebeles. Woreda health office conducted awareness creation campaign with government structure, recommending the community to consult health professionals for possible treatment. Active case search and case management was carried out in line with active case search and community awareness. Admission areas also prepared at Tumuga health center and severe cases were treated.

1.2.6. Discussion

The purpose of this study was to describe factors associated with a measles outbreak in the Gololcha Woreda. We found that, distance of health center from the house, knowledge on modes of transmission, educational level of the family; family size and overcrowding were not significantly associated risk factor for measles. Most of the cases were under 15 years of age group. In the outbreak, under five year's age group was highly(41%) affected than other groups.

The overall attack rate (0.2%) of this outbreak was lower than the attack rate reported in some other studies in Ethiopia (19-22), Niger (23), Malawi (24), Democratic Republic of Congo(25), Nepal (26)and India(27, 28) . However, it was high compared to the study conducted in Georgia(29) and Italy (30).

The age specific attack rate for under five years was high. This finding is also low compared to others studies conducted in different places, Ethiopia (22), Niger, 3.5% (23) and India (28).

In this outbreak we identified high case fatality rate (CFR) compared to other study findings in DRC, Zimbabwe, Germany, Ethiopia (22, 25, 31, 32). However, when compared to the WHO standards for developing countries, it was within acceptable rage. Measles case fatality ratios (CFR) vary widely by geographic and epidemiologic context and within the same community from year-to-year(6). In addition, it was low compared to findings reported in Ethiopia and Nepal (21, 26).

Measles is sometimes thought as a mild disease. However, we observed a complication rate of 3% for all patients. The most common complication observed in this study was diarrhea (56%) followed by pneumonia and Otitis media. The studies conducted in other area discovered similar range of complication rate (27, 31).

The routine administrative vaccination coverage of measles was 100% for 2013 (33). In addition, in May 2013 mass measles vaccination campaign was conducted. Less than 5 years of age was the target for this vaccination and all of them were received the vaccination. The present study revealed that 61% of measles cases were not received measles vaccine and above 45% of the study participants were not vaccinated. These findings show some discrepancy with administrative reports. This contradiction may be occurred because of data quality and may need further study on this area. The other

study also reported a low vaccination status of measles cases (27, 34, 35). On the statistical analysis vaccination had its own influence in measles transmission and unvaccinated child had 5.9 times higher chance of acquiring measles infection than which vaccinated at least one dose. In addition, being vaccinated 1st dose at the age of nine month has protective effect in this outbreak. The unvaccinated children at nine months of their age have 15 times higher chance of getting measles infection than vaccinated one. Furthermore, vaccinating children more than one measles dose is preventable for measles infection. In this finding we identified that children received less than two doses were susceptible for measles infection than received more than two doses.

History of contact with infected person and presence of infected person in the house are one of the risk factor for this outbreak transmission. Isolation of measles infected persons is the best way of preventing the transmission. However, isolation of cases in this outbreak was very challenging. Because of that it takes three months to control the outbreak.

Malnutrition has been associated with a decrease in immune function. Impairment of immune function may lead to increased susceptibility to infection with viruses. This study prevailed that malnutrition had a significant role in the severity of this outbreak. Based on this finding children that are malnourished had 4 times higher chance of getting measles infection than well-nourished children. Research conducted in USA identified that more than 40% of malnourished children had a chance of getting measles infection (36).

1.2.7. Limitation

Unavailability of vaccination card for cases and controls during the investigation time may introduce bias on the estimation of vaccination coverage of measles cases and during case-control participants. On the other hand, most the family don't know the exact date of onset of rash due to that reason recall bias may have an influence on the epi-curve.

1.2.8. Conclusion

We found that there was real outbreak of measles. In the outbreak we found that the attack rate was low and the CFR was high. Under five years of age group were highly affected than the other group. Both sex were affected by this outbreak. Most of the cases were not vaccinated for measles. Isolation was major problem in this outbreak because of that more than two cases were identified.

Several risk factors were involved in the transmission of the outbreak. Fail to vaccinate, absence of isolation of measles infected persons from non-infected person and presence of sever acute malnutrition were major risk factors for this outbreak transmission.

1.2.9. Recommendation

Woreda Health office

- Should strengthen measles routine vaccination activities with the target of reaching more than 90% of infants of 9 to 11 months of age and the coverage should be monitored accordingly in each level.
- Should conduct continued Social mobilization campaigns by coordinating with other concerned stake holders like Addmin office, Education office, political organizations and other partners, to inform parents and community leaders about the importance of obtaining measles vaccination as soon as possible before one year of age.
- Should provide supplementary vaccination campaign in the area where there is low vaccination coverage and bounded kebeles with affected kebeles.

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Chapter II -Surveillance Data Analysis Report

2. Epidemiology of Typhoid Fever in West Arsi Zone, Oromia-Ethiopia, 2007 - 2012.

Abstract

Background: Typhoid fever is a serious disease and remains an important public health problem in many developing countries including Ethiopia. Therefore, this surveillance data analysis needed to analyze magnitude, trends, and geographical distribution of the disease in West Arsi Zone from 2007 to 2012.

Methods: Descriptive cross sectional study design was used to assess the health status. Six years surveillance data collected from zonal PHEM department and data analysis was carried out by using Microsoft excel.

Results: During 2007 -2012, a total of 34,722 typhoid fever cases were reported with an average of 5,787 cases per year and with 3,117.8 standard deviation. In addition, 309 (52 cases per year) cases admitted in to inpatient services for further medication and 22 were died.

Of the 6 years report, the highest cases were reported in 2012, which was 10,140 (29%) with the incidence rate of 46 cases per 10,000 residents per year and the lowest report was in 2007, which was 2,078 case (6%) with the incidence rate of 11 cases per 10,000 residents per year.

Conclusions: Majority of the cases were treated at outpatients department during past 6 years. On the other hand, few numbers of cases admitted and treated in inpatient department and number of deaths also decreased.

Keywords: Trend, typhoid fever, descriptive study, West Arsi Zone.

Word count: 200

2.1. Introduction

2.1.1. Typhoid Fever

Typhoid fever remains an important public health problem in many developing countries. It is estimated that the worldwide incidence of typhoid fever exceeds 50 million cases per year, with 500,000 deaths occurring annually (1). In Ethiopia in 2012, 24,030,746 patients visited health facilities to get treatment or medication. Of these cases, 665,220 (3%) were typhoid fever patients and it was in the top ten list of morbidity. Among the total deaths of 15,008, 336 (2%) deaths caused by typhoid fever (2).

Typhoid is transmitted by water or food contaminated by Salmonella typhi. As it is water borne or food borne, a small infecting dose can cause the disease in someone who drinks contaminated water or eat contaminated food. As so many water sources are inadequately protected in Ethiopia, the disease is very common, particularly among overcrowded urban migrants who often live in wretched conditions. It can also be described as water borne disease since it results from fecal or urinary contamination of food and drink. Subjects who are particularly susceptible to typhoid infection include those patients with chronic schistosomiasis who may become chronically infected homozygous sickle cell subjects and HIV patients. All are liable to develop chronic invasive salmonella. The mechanism is uncertain but it may be due to reduced complement-mediated opsonizing activity and deficient macrophage function. An infected person passes the bacteria in urine or stool. Ten percent of convalescent patients become chronic carriers as their gall bladder continues to discharge typhoid bacilli for up to 3 months after onset of infection. Patients acutely infected also pass the organism in to their urine before treatment is given. The nature of intestinal pathology dictates that most new infections come either from recent cases or from carriers like food handlers. (3)

The incidence of typhoid rises at the end of the dry season when the rural water supply is lowest and people congregate at the source of water: The infection is more common from October to February when the rain helps spread already contaminated water supplies. Untreated, 10-25% of people with typhoid fever die, but mortality is much less with treatment (1).

To reduce the incidence of typhoid some control and prevention measures should be under taken like- Health education on personal hygiene and environmental sanitation, Community measures on sanitary disposal of human face, Chlorinating or boiling of water, Milk and food hygiene, Fly control, Isolation (enteric precaution), Treatment of patients and Exclude carrier from handling food.

2.1.2. Rationale of the study

Ongoing analysis of surveillance data is important for detecting outbreaks and unexpected increases or decreases in disease occurrence, monitoring disease trends, and evaluating the effectiveness of disease control programs and policies. This information is also needed to determine the most appropriate and efficient allocation of public health resources and personnel (4).

Analyses should be performed at regular intervals to identify changes in disease reporting. These analyses can be performed using standard approaches (e.g., running a standard computer program to generate a summary report). Findings of analyses should be reviewed regularly and provided as feedback to medical providers and others in the community who are asked to report cases. Often additional, special analyses are needed to answer specific questions that arise; these analyses may require additional customized approaches beyond what are routinely performed (4). So in West Arsi, zone health office there is a PHEM and communicable diseases control experts but the trend of doing surveillance data analysis were not performed regularly and they do not use data for decisions making purposes. Therefore, this surveillance data analysis session will help to identify zonal incidence and trends of typhoid fever disease throughout 6 years.

2.2. Objective

2.2.1. General objective

To analyze the data and describe the magnitude of typhoid fever by time and places for the last six years in Oromia Region, West Arsi Zone.

2.2.2. Specific objective

- To analyze and interpret the surveillance data in terms of time and place
- To describe magnitude of typhoid fever in the zone
- To show the disease trend

2.3. Methods

2.3.1. Case definitions

Suspected

Any person with gradual onset of remittent fever (rising in stepladder fashion) in the 1st week, headache, arthralgia, anorexia, constipation and abdominal pain.

Confirmed

A suspected case with Widal test, "O" titer of 1/160 and more, is very suggestive,
A suspected case with positive blood culture at the 1st week or positive stool culture at 3rd, 4th and 5th week illness is very definitive.

2.3.2. Study Area

West Arsi zone is one of newly established zone since May 1998 E.C, in Oromia regional states. Shashemene is the capital town of the zone and located southern parts the region. The capital town placed on the distance of 245 KM from Addis Ababa.

The zone has 12 rural woredas (districts) and 1 administrative town with a total population of 2,239,531. Moreover, divided into three main agro-climatical zones, highland, midland, and lowland, which comprises of 45.5 %, 39.6 % and 14.9% respectively. From the total population 49.5% and 50.5% are male and female respectively.

In the zone there are four hospitals (one NGO and one Governmental functional and two are under construction), 79 health centers (67 functional and 12 are under construction), 311 health posts (283 functional and the rests are under construction) and there are many private health institutions in each woredas with their different types and levels.

2.3.3. Study Period:

Six years typhoid fever surveillance data collected from West Arsi zone health department analyzed and interpreted from 30 January 2013 to 15 February 2013.

2.3.4. Study Design:

Descriptive Cross sectional study design was used to analyze typhoid fever surveillance data in terms of time and place.

2.3.5. Data Analysis Procedures

Data analysis was carried out by using Microsoft office excel 2007.

2.3.6. Dissemination of Results

Report /result of this Typhoid Fever surveillance data analysis was submitted timely to AAU/School of public health/Department of EFETP, EPHA, ORHB and West Arsi zonal Health Department by hard copy and electronic soft copy.

2.4. Result

2.4.1. Report Completeness

In West Arsi zone there was an increment on health service coverage by the mid 2012 (90%) compared to 2007 (11%). Furthermore, there were 96 H.Ps, 8 H.Cs and 2 Hospitals in 2006 when the zone established as new and now at the end of 2012 there were 326 H.Ps, 67 H.Cs and 2 Hospitals.

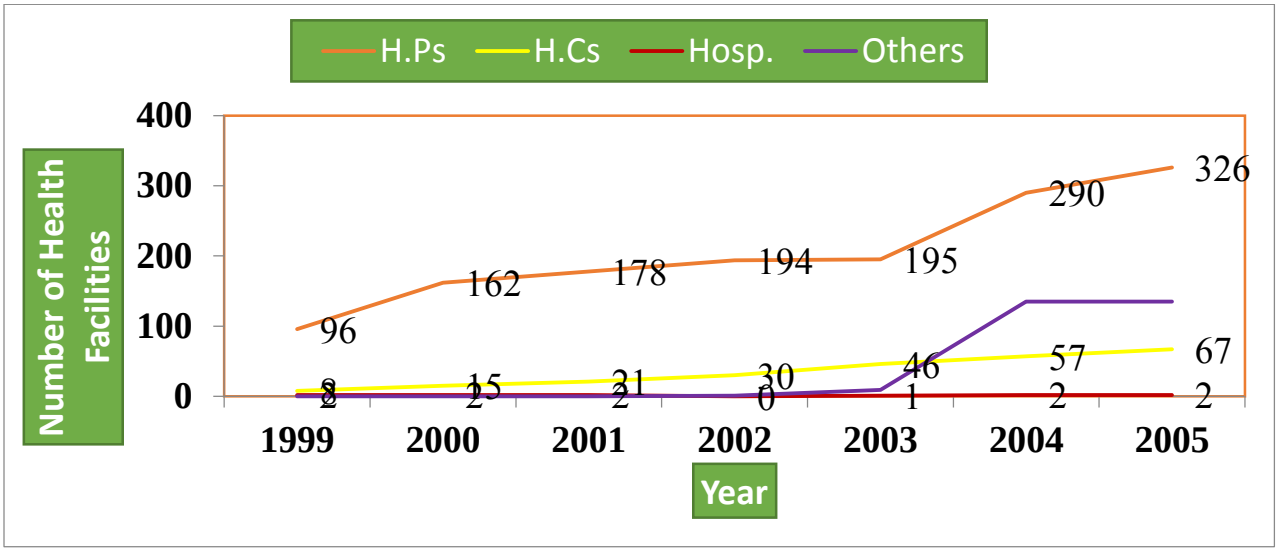

Figure 2 -1: Number of Health Facilities expected to report by year in Oromia Region, West Arsi zone from 2007 to 2012.

As the number of expected facilities to report increased, the completeness of reporting rate of the zone also increased and the zonal completeness rate (from all types of health facilities) in 2012 was 59%, which means it increased by 14% compared to 2007 (in table 1).

Table 2-1: Zonal Surveillance report (from all health facilities) completeness by year in Oromia, West Arsi, from 2007 to 2012

Year	Expected	Reported	Completeness (%)
2007	106	48	45%
2008	179	94	53%
2009	201	132	66%
2010	225	172	76%
2011	251	176	70%
2012	484	286	59%

During the past 6 years, the zonal report completeness rate, which is reported from all types of health facilities like Health Posts, Health Centers, Hospitals and others, was less than 80% in all years. Moreover, it is less than the requirements or the standards of national target. Fig.2.2. shows the trends of zonal report completeness rate by year comparing with the target or the requirement.

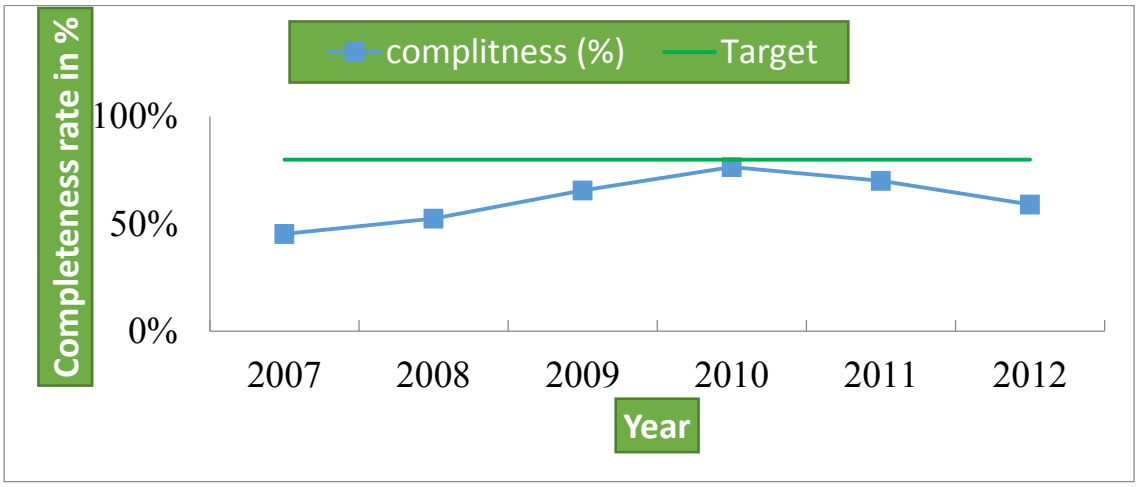

Figure 2 -2: Zonal Surveillance report completeness rate by year West Arsi, from 2007 to 2012

On the other hand, report completeness rate by taking only health centers and hospitals was on average 78%. However, when we see the specific years the 1st two years (2007 & 2008) and 2011 were less than the 80%, and the rest was above 80% (Fig.2.3).

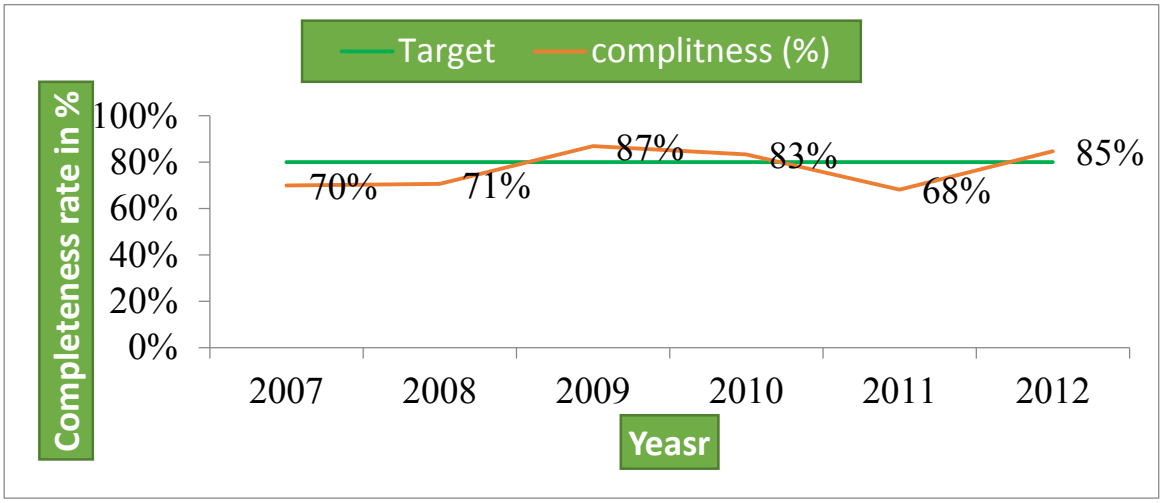

Figure 2 -3: Surveillance Report Completeness by H.Cs and Hosps. In Oromia, West Arsi Zone from 2007 to 2012

2.4.2. Zonal disease trends

In the last 6 years (2007 to 2012), Zonal Public Health Emergency Management unit/ department received 34,722 reports concerning cases of Typhoid Fever among persons in west Arsi zone. The mean was 5,787 cases per year, ranges between 2,078 and 10,140 with a standard deviation of 3,117.8. From the total reported cases 309 (1%) were in patients cases with a mean of 52 cases per year, range between 5 and 99 with standard deviation of 43.09. From admitted cases, 22 patients died with a mean of four deaths per year ranges between zero and nine cases. Table 2.2 below shows the distribution of cases and deaths by year.

Table 2-2: Number of cases and deaths by year in Oromia, West Arsi zone, 2007 to 2012

Year	Population at risk	No. of cases	No. of death	Percent		Prevalence		Case fatality rate
				Cases	Death	Cases/10000	deaths/1000000	
2007	1873233	2078	4	6%	18%	11	0.2	0.2
2008	1927109	3494	7	10%	32%	18	0.4	0.2
2009	1982592	4050	9	12%	41%	20	0.5	0.2
2010	2117574	6508	0	19%	0%	31	0.0	0.0
2011	2178679	8452	2	24%	9%	39	0.1	0.0
2012	2194079	10140	0	29%	0%	46	0.0	0.0
Total	**2045544**	**34722**	**22**			**28**	**0.2**	0.1

During this 6-consquentive years the incidence rate of typhoid fever increased from 11 per 10,000 cases in 2007 to 46 cases per 10,000 in 2012. The incidence rate by 2012 increased 417 percent or 4 folds times than 2007. The highest incidence rate was reported by 2012. Fig. 4 shows the trend of the typhoid fever cases by year as follow.

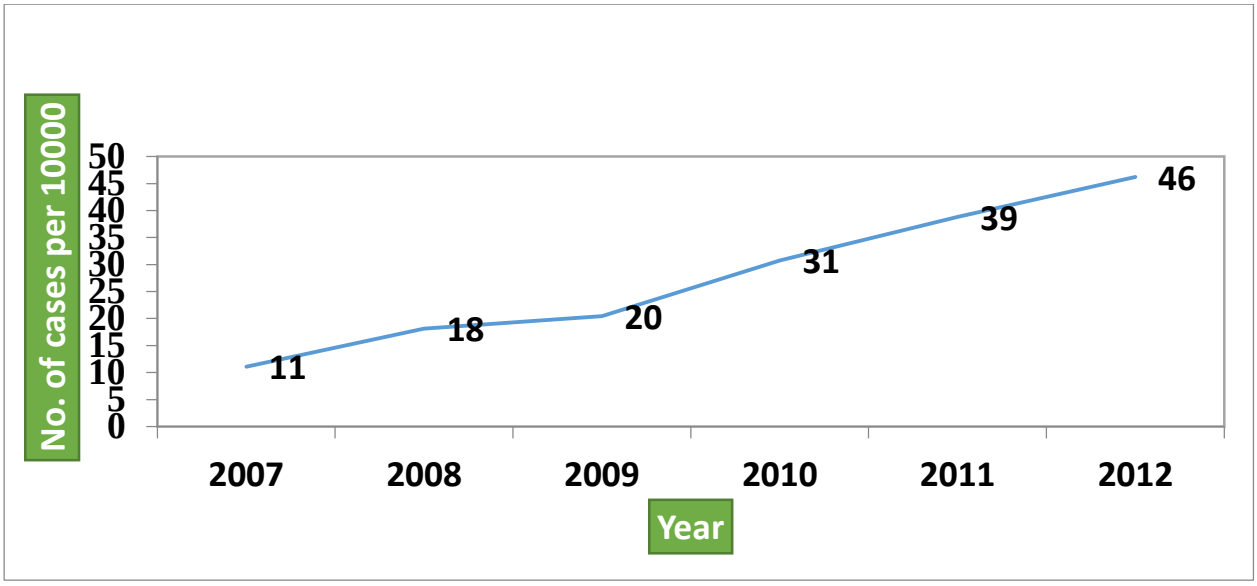

Figure 2 -4: Trends of typhoid fever incidence by year in Oromia, West Arsi zone, 2007-2012

There is no constant peak time throughout the 6 years. However, there was a small peak on March from 2008 to 2012 continually. Furthermore, there was a peak on September and December in 2010 and on January 2012. Overall, the incidence was not uniform, but it was an increasing mode. Further information presented on figure 5 below with the incidence per 10000 in each year and month.

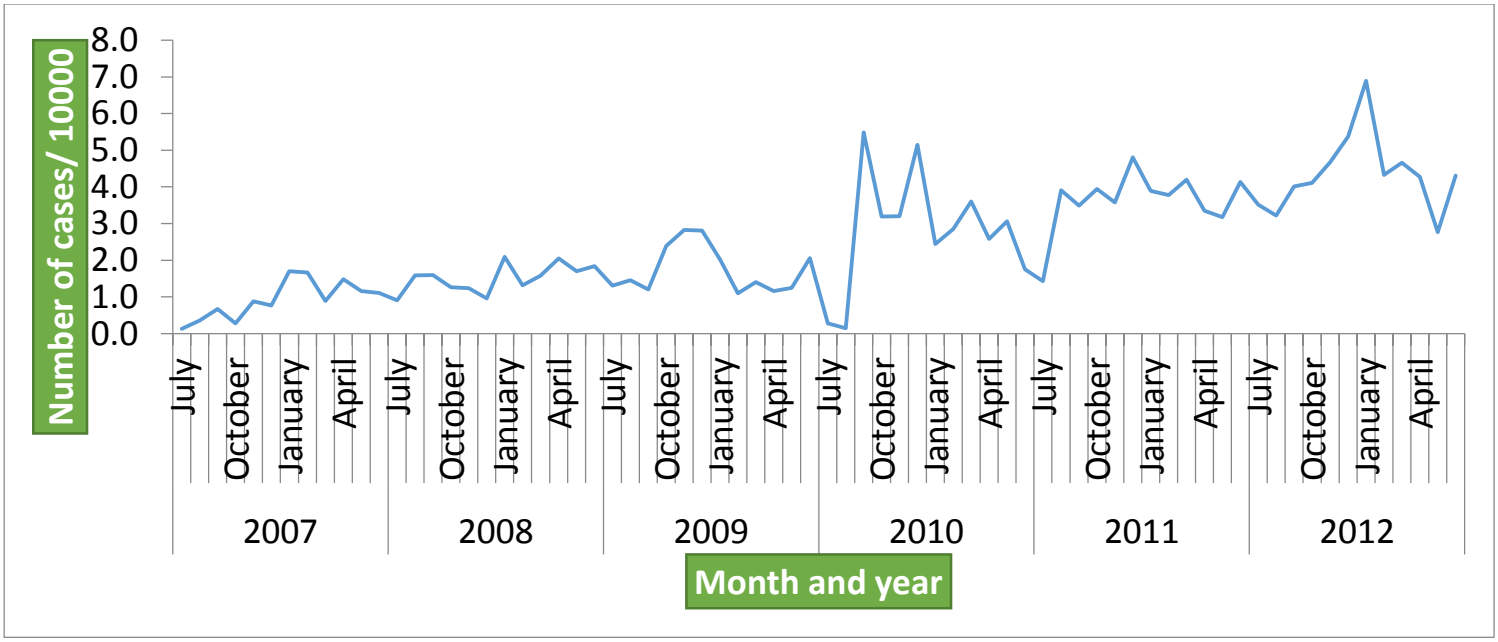

Figure 2 -5: Trends of Typhoid Fever by month in Oromia Region, West Arsi Zone, from 2007 to 2012

When we see the distribution by woreda during the 1st establishment years, which means around 2007 to the of end 2009 zonal PHEM unit received surveillance report from 12 woreda but after the beginning of the year 2010 one new woreda (Wendo) established and increased the woredas to 13. From the total report the majority of the report, 23% of the cases reported from Gedeb Hasasa woreda, Followed by Adaba 19% and Dodola town 13%. Moreover, Nensebo and Shashemene woreda reported the lowest cases, which is 0.3% and 1% within the last 6 years respectively (fig.2.6).

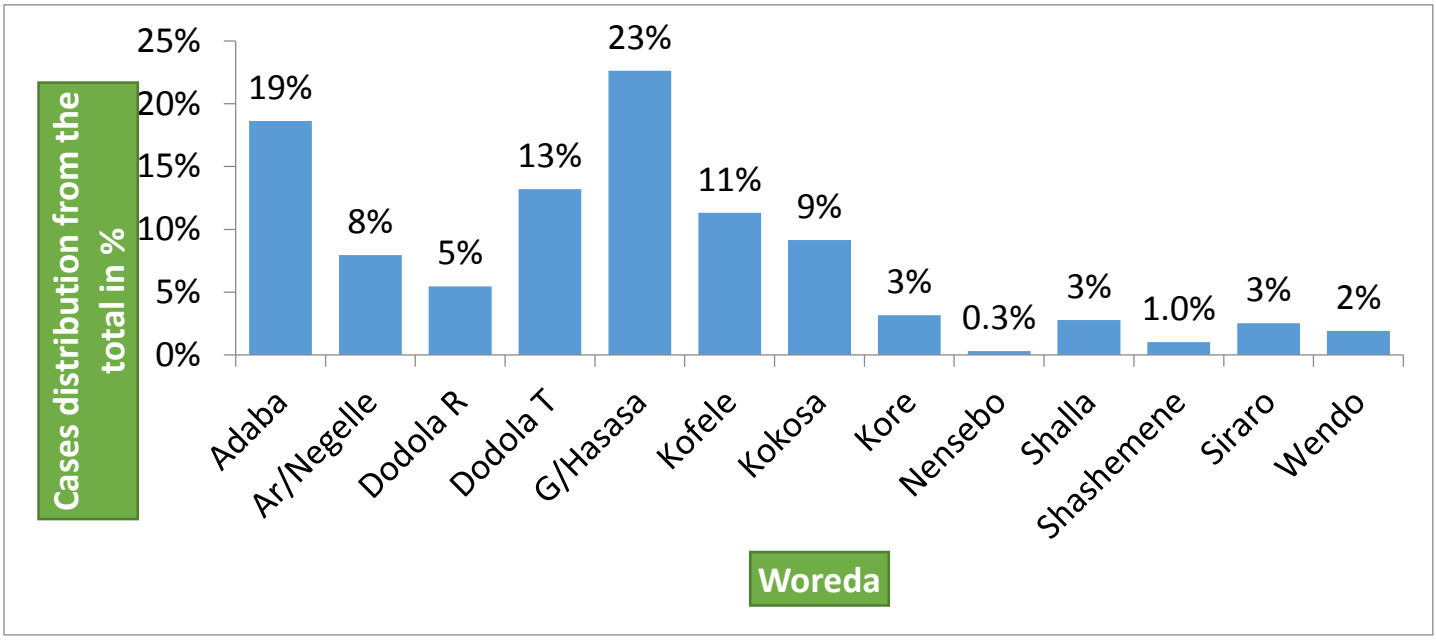

Figure 2.-6: Distribution of cases by woreda in Oromia region, West Arsi Zone, from 2007 to 2012

In 2011 Dodola town had high incidence rate, which was 2,462 case per 10,000. In all years, Dodola town had greater incidence rate than other woredas. In 2012 in Adaba woreda, highest incidence rate registered next to Dodola town, which were 142 cases per 10,000 and Followed by Gedeb Hasasa, 126 cases per 10,000 in the same year. The lowest incidence rate registered in some woredas like Kokosa, Nensebo, and Siraro less than one cases per 10,000 were recorded in 2007; A/Negelle, Kokosa and Siraro in 2008; Shashemene and Siraro in 2009 and Shashemene in 2010 (fig. 2.7).

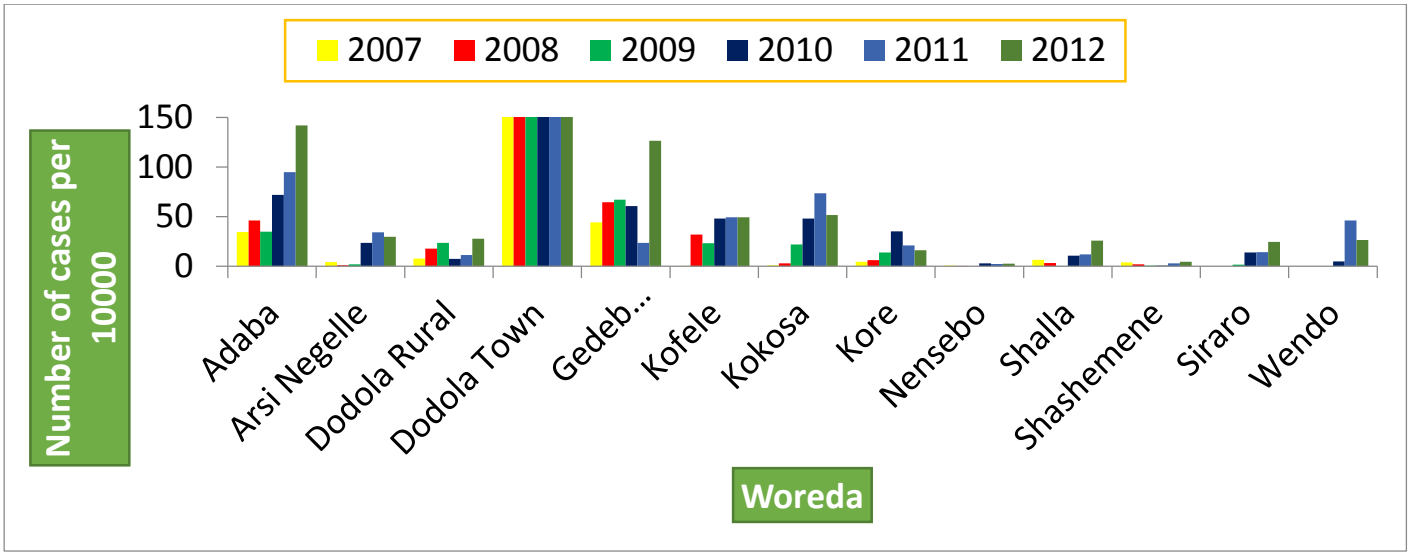

Figure 2 -7: Number of cases per 10000 by woreda in Oromia Region, West Arsi zone, from 2007 to 2012

On average, the incidence of typhoid fever was high in Dodola town, which were 967 cases per 10,000 populations and next to Dodola town Adaba and Gedeb Hasasa accounted 71 and 64 cases per 10,000 populations respectively. The lowest typhoid fever cases occurred in Nensebo and Shashemene with the value of one and two cases per 10000 populations respectively (fig. 2.8).

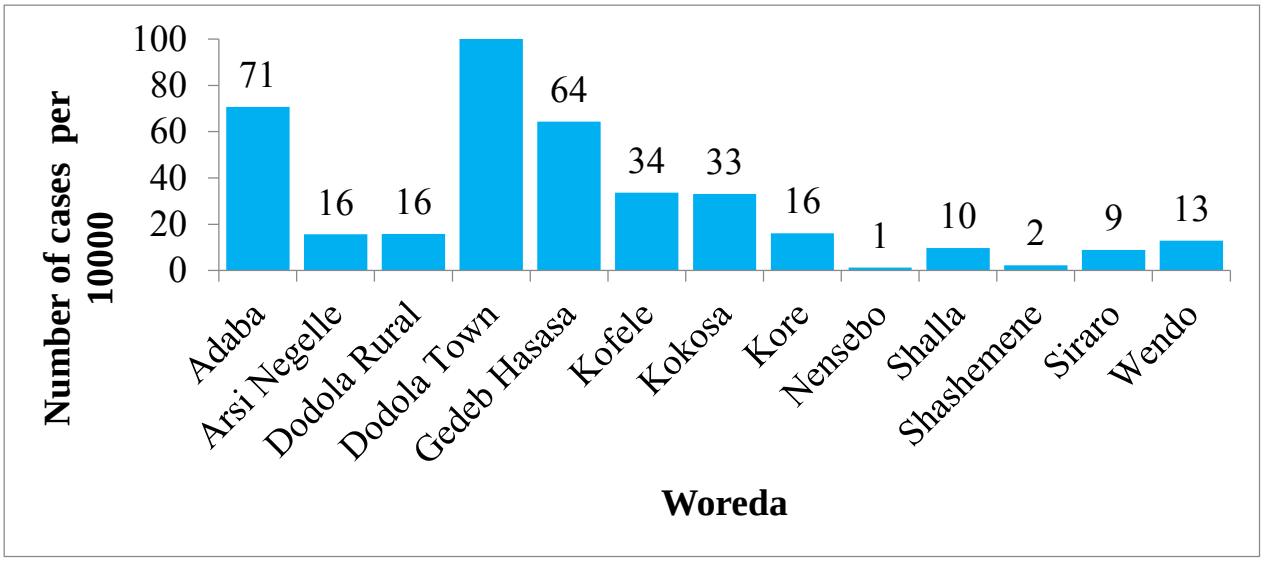

Figure 2 -8: Average Number of cases by woreda Oromia Region, West Arsi Zone, from 2007 to 2012

2.5. Discussion

The incidence rate of typhoid fever cases in outpatient departments increased through a year. The increment was not only in West Arsi but also increased at national as well as at regional level. At national and regional level, the cases increased from 13 and 12 cases per 10000 population in year 2010 to 34 and 39 cases per population respectively in year 2011(2,5). The increment might be occurred because of the increasing of reporting health facilities, which was a total of 10 health facilities (the sum of 2 hospitals and 8 health centers in 2007) increased to 59 health facilities (2 hospitals and 57 health centers in 2012) (6).

In 2007, the report completeness from health center and hospital was 70% and improved to 85% in 2012 (7). The 1st two years zonal report completeness rate was less than national target of 80% (8). However, from 2009 to 2012 completeness rate was improved and it meets the national target of reporting completeness rate 80% (8) except in 2011. On the other side, the average reporting completeness rate was 77%. Therefore, the improvement of reporting completeness rate also might be a reason for the increment of cases.

In Ethiopia, mostly performed diagnosis is Widal test at all health centers and hospitals. The classic Widal test measures antibodies against O and H antigens of S typhi and is more than 100 years old. Although robust and simple to perform, this test lacks sensitivity and specificity, and reliance on it alone in areas where typhoid is endemic may lead to over diagnosis (19). Therefore, due to the lack of specificity and sensitivity, the identification of true cases is very difficult for diagnosis and the Positive cases for Widal test might not be positive for typhoid fever. There for the imperfection of the test makes very difficult for the diagnosis and treatment of typhoid fever early and may affect the incidence rate.

According to national health and health related indicator 2011 report, the incidence rate of typhoid fever was 34 and 39 cases per 10000 inhabitants in Oromia region and at national level respectively and the CFR was 0.1% at national level (2). The zonal incidence rate in 2011, which was 39 cases per 10000 population, is equal with national incidence and greater than from regional incidence. But the zonal CFR was less than

regional as well as national. Based on the bigger rate of incidence comparing with national and regional incidence rate it could be categorized as highly at risk area for typhoid fever.

Seasonality of the occurrence of typhoid fever is not strongly evidenced with studies. However, the incidence of typhoid rises at the end of the dry season when the rural water supply is lowest and people congregate at the source of water: The infection is more common from October to February when the rain helps spread already contaminated water supplies (1). However, in West Arsi zone in March the incidence is greater. This may be rain start in this month and people living in rural area utilize runoff water or pond water for drinking and cooking food. Therefore, the opportunity of contamination of water with pathogenic organisms is high.

However, the admission rate decreased through a year. When we see the admission rate from the total population in each year was 48 cases in 2007, 51 cases in 2008, 41 cases in 2009, 9 cases in 2010, 7 cases in 2011 and 2 cases in 2012 per 1,000,000 residents admitted to inpatient services. This is because health facilities and service expanded throughout the rural community (still the zonal health office is working to address HSDP plan, which is 1 health centre for 25000 people policy (11) and at this time 1 health centre is serving for 32,747 residents). On the other hand, health extension workers are giving health education for the community members on different health and health related topics at health post and during home-to-home visiting. In addition, health centres staffs also are giving health education in health centre as routine activities. For this reason, the awareness of the community is increased and the health seeking behaviour of the community also increased. Therefore, related to increasing of awareness and health seeking behaviour, early detection of cases and appropriate diagnosis and treatment can minimize inpatient cases.

Finally, the case fatality decreased from 0.2% to zero within these 6 years. If the patients treated with prompt antimicrobial therapy, case fatality rate will be less than 1% (12). There for, there is visible improvement in mortality rate.

2.6. Limitation

- Because of Poor documentation of surveillance data and other documents, the report completeness was not 100 percent.
- It was not possible to analyze the data by age and sex because the PHEM reporting format lacks those personal information's.
- Most of private clinics were not included in this surveillance data analysis because they were not in the government reporting system line. Therefore, the number of cases could be greater.

2.7. Conclusion

In general, Majority of Typhoid fever cases were treated at outpatients department and few cases were treated at inpatient department. On the other hand, the highest number of typhoid fever cases was reported from G/Hasasa woreda. In addition, when we see the reported cases by year, the highest number of typhoid fever cases reported in 2012. The surveillance report completeness rate were increased to the expected range and early detection of cases strengthened.

2.8. Recommendation

1. Awareness creation activities on typhoid fever should be strengthened in the zone
2. In line with awareness creation activities, health education on personal hygiene and environmental sanitation activities should be conducted in a strengthen way.
3. Diagnosis of typhoid fever should be strengthened and appropriate measures should be taken.
4. The reporting formats lack some personal information because of that analysis by person and identifying the risk group is very difficult. Therefore, some important information concerning personal identification like age and sex should be included.
5. Continuous surveillance data analysis should be done and the findings should be distributed to the concerned bodies or stakeholders.

Acknowledgment

I would like acknowledge my mentors Mr. Ketema Belda and Dr. Zegeye H/Mariam for their unlimited support. Next to them my acknowledgment goes to Mr. Haji Kedro the PHEM focal person of West Arsi zone. He was helping me by giving all necessary documents with great patience. Finally I would like to thanks ORHB and EFETP for their financial and administrative facilitation role.

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Chapter III - Evaluation of Surveillance System

3. Evaluation of Surveillance System for Malaria, Measles and AFP in Bale Zone of Oromia Region, June 2013.

Executive Summary

Background: Public health Surveillance is recognized as the cornerstone of public health decision-making and practice. The aim of this study was to assess the performance of core functions and attributes of surveillance system in Bale zone of Oromia region.

Methods: A cross-sectional study was conducted from May 28, 2013 to June 16, 2013 in Bale zone, Oromia region. To assess the functionality of the surveillance system in the zone Malaria, Measles and AFP were selected. In the study one zonal PHEM department, eight woreda health offices, ten health centers and eight health post were interviewed during the field visit. Data collection was conducted by using semi-structured questioner by reviewing different documents and observation. The questioner was prepared based on CDC 2001 updated guidelines for evaluating public health surveillance system checklist. During data collection PHEM officers and other concerned experts were interviewed in all visited sites. Data analysis was carried out by using epinfo 7 and Microsoft office.

Result: According the evaluation result, 77% of the visited health institution had case definition for AFP and Measles: however, there was no standard case definition for malaria. Of these interviewed PHEM officers 92% of them understood the case definition accordingly as per the national guideline. Similarly the availability of surveillance formats were assessed and identified that there was shortage of surveillance formats, including weekly reporting formats, in all visited sites. The updated surveillance formats distributed by FMOH were stored in zonal health office store. On the other hand, except health posts, all visited sites have updated public health emergency management guideline and almost all visited sites lack disease specific surveillance manuals.

Completeness of surveillance report were measured and zonally from 26,312 expected report 14,720 (56%) of them were received by zonal health office. From this 80% of

governmental health facilities and 13% of private health facilities sent their weekly surveillance reports for zonal health department. Concerning the report timeliness, 77% Bale zone surveillance report was sent timely to regional health bureau. However, during the assessment time because of incompleteness of reporting date on the reports document, timeliness of the woreda health offices and health facilities were not measured.

In Bale zone, including zonal health department, all visited woreda health offices and health facilities were not conducting surveillance data analysis. Whereas, nine measles outbreaks were reported from June 2012 to July 2013. A total of 516 cases of measles were reported from seven woredas (Gololcha, Ginir, Gasera, M/Wellabu, Berere, H/Buluk and Dawe Serer). Of these cases, 58% of measles cases were reported from Gololcha woreda. However, none of the outbreaks were not reported to regional health bureau.

Regarding preparedness plan, except zonal health department none of the visited woredas were prepared epidemic preparedness plan and 43% of them have drugs and supplies in their stoke for emergency purpose. Similarly all of the visited woredas and zonal health department formally established multi-sectorial task force committee and 88% of them established rapid response team. However, those established committees were not fully functional and lack regularity.

The presence of supportive supervision and feedback in any institution is the confirmation of existence of strong surveillance system. In spite of that, in all visited woredas and zonal health department didn't prepare plan for program specific supportive supervision and feedback. Similarly from June 2012 to July 2013 supportive supervision was not conducted to lower health facilities and the zonal health department also not supervised by regional health bureau. However, integrated supportive supervision was conducted by zonal and woreda health offices.

Ninety percent of the assigned PHEM focal persons in the visited sites were trained on the new approaches of public health emergency management and selected surveillance

priority diseases (such as measles and AFP). Similarly only thirteen percent of (1/8) interviewed health extension workers were trained on community PHEM. Seventy five percent of the woredas and all of the visited health centers were compiled surveillance data manually. However, 61% of the visited sites had computer in their office.

Conclusions and recommendations: The overall functioning of public health surveillance system underway in Bale zone was not satisfactory to achieve its targeted goals of prevention and control of measles, malaria and AFP. Absence of timely analysis and un utilization of data, absence of surveillance specific supervision and feedback from the higher to the lower level, unavailability of budget and logistic for surveillance and delayed results of laboratory made the existing surveillance system weak.

Therefore, it is necessary to strengthen the surveillance system through providing training on the public health emergency management and surveillance systems of malaria, measles, AFP/ polio and others for governmental and non-governmental health care providers, health extension and community health workers. Similarly provision of surveillance manuals for measles, malaria and AFP/ polio, standard and community case definitions, case management protocols, different surveillance formats and regular program specific supportive supervision and feedbacks are the other major activities that should be done to strengthen the surveillance system.

3.1. Introduction

Public Health surveillance is the ongoing systematic collection, analysis and interpretation of health related data essential for the planning, implementation and evaluation of public health interventions [1, 2, 3]. Surveillance needs to be linked to timely dissemination of the data, so that effective action can be taken to prevent disease. Surveillance mechanisms include compulsory notification regarding specific diseases, specific disease registries (population-based or hospital-based), continuous or repeated population surveys [1, 4].

Data from a public health surveillance system can be used to guide immediate action for cases of public health importance, measure and monitor the burden and trends of a disease, guide the planning, implementation, and evaluation of programs to prevent and control disease, prioritize the allocation of health resources, and others[5, 6]. In addition, a surveillance system should be simple, flexible, acceptable, situation specific and should be established at the beginning of public health activities set up in response to an emergency [2].

Efforts to establish disease surveillance system was initiated in Ethiopia 1947 when the government issued quarantine rules. Subsequently several legal and administrative measures were taken to strengthen communicable disease surveillance. However, these efforts were not supported with appropriate resources thus; surveillance was limited in scope and usefulness. In the health sector, various institutional arrangements were implemented to strengthen surveillance services. In 1948, an anti-epidemic service was established that later in 1951 identified 35 priority diseases for surveillance; those diseases were classified into first class disease (immediately notifiable) and weekly reportable second-class diseases. These arrangements continued with several minor changes until the 1994 health system reform. The health reform taking into account the resource constraints and the need for strengthening functional surveillance system selected nineteen priority diseases (including those under vertical programs) for surveillance [7].

Lack of functional surveillance system that can guide timely and effective health intervention has been a common problem to the African region. Thus, the African States

through the WHO Africa regional office (WHO/AFRO) made a resolution (resolution AFRO/RC48/R2) in September 1998 to develop an integrated disease surveillance and response (IDSR) initiative as a regional strategy to effectively control priority communicable diseases in the African region. IDSR emphasizes on capacity building at district level, integration and coordination of activities at all levels, timely feedback and use of information for action, improve laboratory capacity in support of surveillance, and community participation[7].

The FMOH adapted a comprehensive strategy recommended by WHO for member state during the 48th assembly in 1998 for improving communicable diseases surveillance and response through Integrated Disease Surveillance and response (IDSR) linking community, health facility, woreda and national levels [8]. Accordingly, as a first step a comprehensive assessment of the existing surveillance, epidemic preparedness and response system of the country was conducted in October 1999. The assessment revealed that most disease prevention programs have vertical surveillance systems, resources are scarce for surveillance at all levels, quality of surveillance is compromised by uncoordinated and multiple use of data collection tools, data are not processed timely and completely to guide health interventions, no data processing and utilization at the district level, there is hardly any feedback at all levels, and epidemic preparedness and management capability are weak [4].

Based on the findings of the assessment the FMOH developed a Five-year strategic plan and plan of action in 2000 for sustainable implementation of IDSR strategy in Ethiopia. Following that the MOH of FDRE has adopted the WHO/AFRO generic technical guidelines and training modules for integrated disease surveillance and response, established a National IDSR Taskforce, officially launched the IDSR strategy, strengthened the IDSR team, conducted a series of training from national to district levels for trainers and focal persons, disseminated the IDSR technical guidelines, developed and distributed new reporting formats, developed and disseminated standard case definitions, distributed laboratory reagents, provided computers, and established feedback system using monthly bulletin and quarterly newsletter [3].

After the implementation of IDSR, The Government of Federal Democratic Republic of Ethiopia has embarked country wide reform initiative aimed at bringing effectiveness and efficiency in execution of various works using the Business Process Reengineering (BPR) as a tool in 2005. In line with this, the Federal Ministry of Health and Agencies under the ministry have identified 7 core processes that need reengineering in order to effectively fulfill sectorial visions and missions. Accordingly, Public Health Emergency Management is one of the core processes identified by the Federal MOH for redesign. Public Health Emergency Management is defined as the process of anticipating, preventing, preparing for, responding to and recovering from the impact of epidemics and health consequences of natural and manmade disasters. The sub processes identified for the process include Preparedness, Early Warning, Response and Recovery. However, as the existing process focuses only on disease surveillance and epidemic response processes, the remaining processes mentioned above couldn't be shown in the As-Is part[9].

In BPR IDSR is included under PHEM core process and before BPR implementation 23 priority diseases included under IDSR by categorizing it three major groups which is Epidemic-Prone Diseases, Diseases Targeted for Eradication and Elimination, and Other Diseases of Public Health Importance[10]. However, after redesigning those priority disease modified in to 20 (13 are immediately reportable whereas 7 are weekly reportable). Those diseases are selected Based on: Diseases which have high epidemic potential, Required internationally under IHR 2005, Diseases targeted for eradication or elimination, Diseases which have a significant public health importance and Diseases that have available effective control and prevention measures for addressing the public health problem they pose [11].

Malaria, measles and AFP are parts of those reportable disease lists mentioned in the guideline which is weekly and immediately basis. And also these selected diseases have a public health importance in Bale zone. As an instance, there was measles epidemic in the zone in the past years including 2012. On the other hand, in the zone there are 73 (37%) malarious kebeles. AFP also a disease which is targeted to eradicate from Ethiopia.

The routine flow of surveillance data is usually from reporting sites to the next level up to the central level as indicated in figure 1. The community and health facilities especially health posts are the main source of information. The information collected from this site is compiled in standard forms, analyzed and then forwarded, to the woreda health office. Woreda level uses standard formats to compile aggregate, and send the data to zone/region, from which the central level receives. Feedback and information sharing will follow the same route.

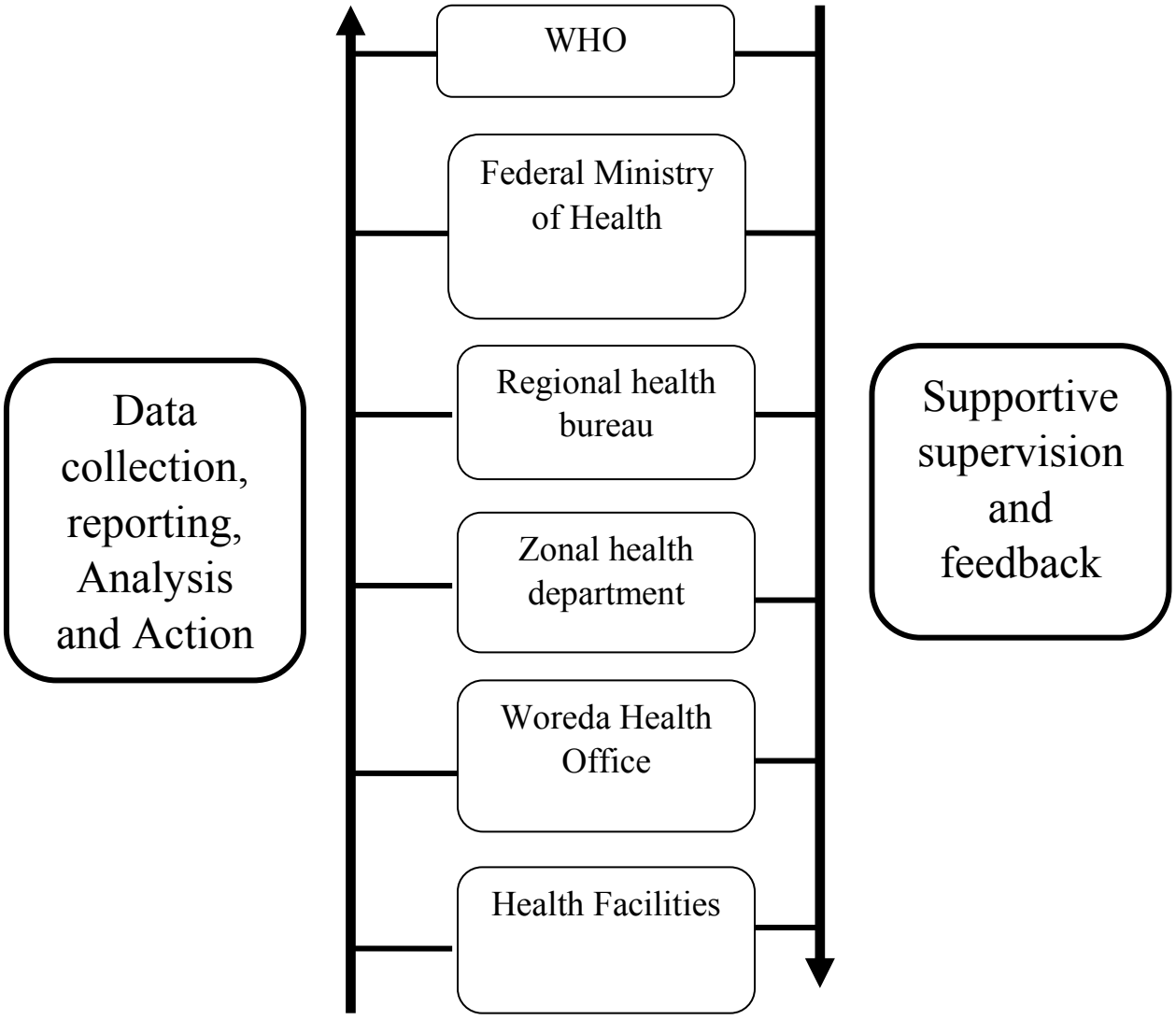

Figure 3 -1: Diagram illustrating the formal flow of surveillance data

On the other hand, evaluation of public health surveillance system is used to ensure that problems of public health importance are being monitored efficiently and effectively.

Thus, Public health surveillance systems should be evaluated periodically, and the evaluation should include recommendations for improving quality, efficiency, and usefulness [5].

While evaluating surveillance system, the evaluation of public health surveillance systems should include an assessment of usefulness of the system, system attributes, including simplicity, flexibility, data quality, acceptability, sensitivity, predictive value positive, representativeness, timeliness, and stability [5].

3.2. Rationale of the study

In Bale zone surveillance system evaluation was not done before and the status of public surveillance system is not well known. Additionally, Outbreaks have occurred frequently and there is relatively delay in detection, reporting and response. Therefore, this study was conducted to determine the status of core activities of the surveillance system, describe the specific attributes of the system and identify areas for improvements.

3.3. Objectives of assessment

3.3.1. General objective

To evaluate the surveillance system of malaria, measles and AFP in Bale zone and to provide recommendation.

3.3.2. Specific objectives

- To assess the core activities of the surveillance system such as case detection, reporting, analysis and response system in Bale zone.
- To evaluate the attributes of surveillance system of measles, malaria and AFP/ polio in Bale zone.
- To identify the strength and weakness of the system and provide necessary recommendations.

3.4. Methods

3.4.1. Study Area

Bale zone is one of 18 zones in the Oromia Regional state. It is located at a distance of 430 KM south east from Addis Ababa. Bale is bordered on the south by the Ganale Dorya River which separates it from Gujii, on the west by the West Arsi Zone, on the north by Arsi, on the northeast by the Shebelle River which separates it from West Harerge and East Harerge, and on the east by the Somali Region. The total population of the zone is 1,661,816 and a surface area of 67,329.59 KM^2 with population density of 25 population per KM^2. The zone has 349 rural kebeles and 23 urban kebeles.

Regarding health facilities distribution within the zone, there are 4 hospitals, 78 functional health centers, 316 functional health posts and with a total of 134 private health facilities including medium clinic, small clinic, drug store and rural drug vender. Zonal health post coverage was 90 and health center coverage was 100%.

3.4.2. Study subject

The study subjects were zonal health office, woreda health offices and health facilities (health centers and health posts) which lays in the zone.

3.4.3. Study design

Cross sectional study design was used to evaluate Bale zone surveillance system. And also the study was conducted by following the recommended outline of 2001 updated CDC guidelines for evaluating surveillance systems.

3.4.4. Sample size and Sampling technique

3.4.4.1. Selection of sites

a. Selection of zone

Oromia Regional State is one of the Regional States in the Federal Democratic Republic of Ethiopia. Administratively, the Region is divided into 18 administrative zones and 12 administrative towns. Bale zone was selected purposively out of eighteen zones by making discussion with regional PHEM core process owner based on: the presence of outbreak, strengthens of surveillance system and the absence of system evaluation before.

b. Selection of districts.

Bale zonal administration is divided in 18 rural woredas and 2 town administration. From these 18 rural woredas, 6 woredas (Goro, Agarfa, Dinsho, Ginir, Gasera and Sinana) were selected by using simple random sampling system and additional 2 (Berbere and Gololcha) woredas were included purposively in the assessment based on: occurrence and currently existence of measles outbreaks.

c. Selection of health facilities

Regarding health facilities there were a total of 351 health posts and 76 functional health centers in the zone. Therefore according to their distribution by woredas, from selected woredas 8 functional health posts and 10 health centers were included in the assessment. Health facilities were selected purposively based on their accessibility.

3.4.5. Data collection tools and procedure

Data collection was conducted by principal investigator. Well-structured questioner was used to interview zonal, woreda and health facilities PHEM focal person and practical observation of documents was also conducted in zonal health office, woreda health office and health facilities (health center and health post).

3.4.6. Standard Cases definition

3.4.6.1. AFP/ polio

Suspected

Any child under 15 years of age with AFP or any person with paralytic illness at any age in whom the clinician suspects poliomyelitis.

Confirmed

A suspected case with wild poliovirus isolation in stool

3.4.6.2. Measles

Suspected

Any person with fever and maculopapular (nonvascular) generalized rash and cough, coryza or conjunctivitis (red eyes) OR any person in whom a clinician suspects measles.

Confirmed

A suspected case with laboratory confirmation (positive IgM antibody) or epidemiological link to confirmed cases in an epidemic.

3.4.6.3. Malaria

Suspected

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

Confirmed

A suspected case confirmed by microscopy or RDT for plasmodium parasites.

3.4.7. Operational case definitions

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

- **Case detection**: is the process of identifying cases and outbreaks.
- **Case registration**: is the process of recording the identified cases
- **Case/outbreak**: Confirmation: refers to the epidemiological and laboratory capacity for confirmation.
- **Reporting**: Refers to the process by which surveillance data moves through the surveillance system from the point of generation.
- **Epidemic preparedness**: Refers to the existing level of preparedness for potential epidemics
- **Stakeholders**: The organizations or individuals that generate or use surveillance data for promotion of health, prevention and control of diseases.
- **Usefulness**: Usefulness of the surveillance system is reflected by documented changes in policies and procedures as a result of information generated by the system.
- **Simplicity**: Simplicity denotes the structure and ease of operation of the surveillance system.
- **Flexibility**: Flexibility of a surveillance system is its capacity to adapt to changing information needs or operating systems within minimal additional time, personnel and funding.

- **Quality**: The quality of data reflects the completeness and validity of the data recorded in the Zonal Health Department.
- **Acceptability**: Acceptability is the willingness of persons, institutions or organizations to participate in the surveillance system.
- **Sensitivity**: Sensitivity refers to the ability of the system to detect cases or outbreaks through trends in the surveillance data.
- **Positive predictive value**: Positive predictive value refers to cases that actually have the health condition in question.
- **Representativeness:** Representativeness refers to the extent to which the surveillance system accurately describes the occurrence of medical condition over time and their distribution in the population by place and person.
- **Stability:** Stability was assessed by questioning the surveillance officers on the consistency of the system.

3.4.8. Data analysis

Data analysis was carried out by using Microsoft office and Epi info 7.

3.4.9. Ethical clearance

This study was conducted to assess the functionality of the surveillance system for measles, malaria and AFP. In addition the study subject was health institutions which were found in the zone. Therefore Ethical clearance was not necessary for this study, because there is no direct contact with patients or community. However, later of consent was written from regional health bureau and zonal health department to visited woredas.

3.4.10. Dissemination of study result

The study result was disseminated to AAU school of public health, department of Ethiopia Field Epidemiology training program (EFETP), EPHA, ORHB, Bale Zonal health department and visited woreda health offices in hard copy and soft copy.

3.5. Result

The surveillance system of Bale zone was assessed. In this assessment a total of 26 sites were participated. The main focuses of the evaluation was the core activities, supportive functions and quality components of the surveillance system.

3.5.1. Description of surveillance system

Importance of the surveillance system

Malaria

Oromia region, from total land mass around the 3/4th is malarious area and about 68% of the region population is at risk of infection. Regionally from July 2012 to June 2013, a total of 717,198 cases and 46 deaths due to malaria were reported. Of these, 417,058 (58%) were confirmed malaria and the rest 300,140 (42%) cases were screened and treated clinically. In addition, from the total malaria 4,126 (1%) cases were treated by admitting to hospitals. In Bale zone, a total of 4,340 case cases were reported. Of these, 4,340 total malaria, 562 (13%) cases were confirmed malaria cases and the other 3,778 (87%) cases were treated clinically for malaria (fig. 2 &3).

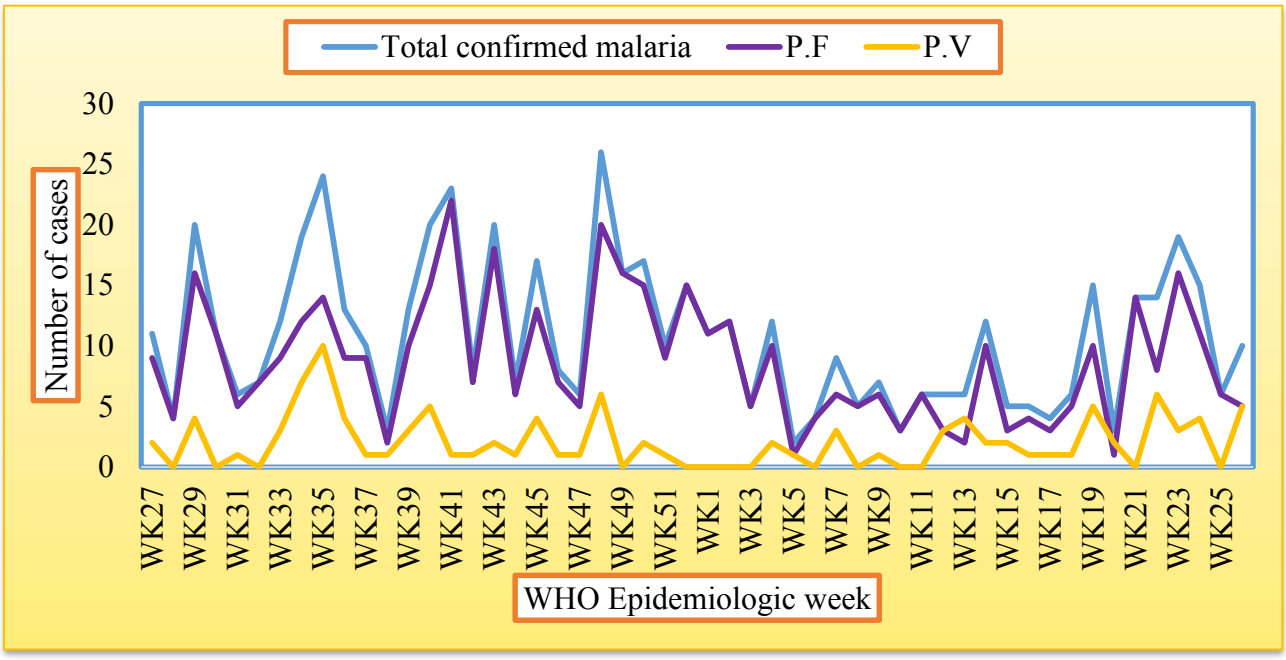

Figure 3 -2: Trend of Confirmed malaria case in Bale Zone, Oromia region, 2012/ 2013

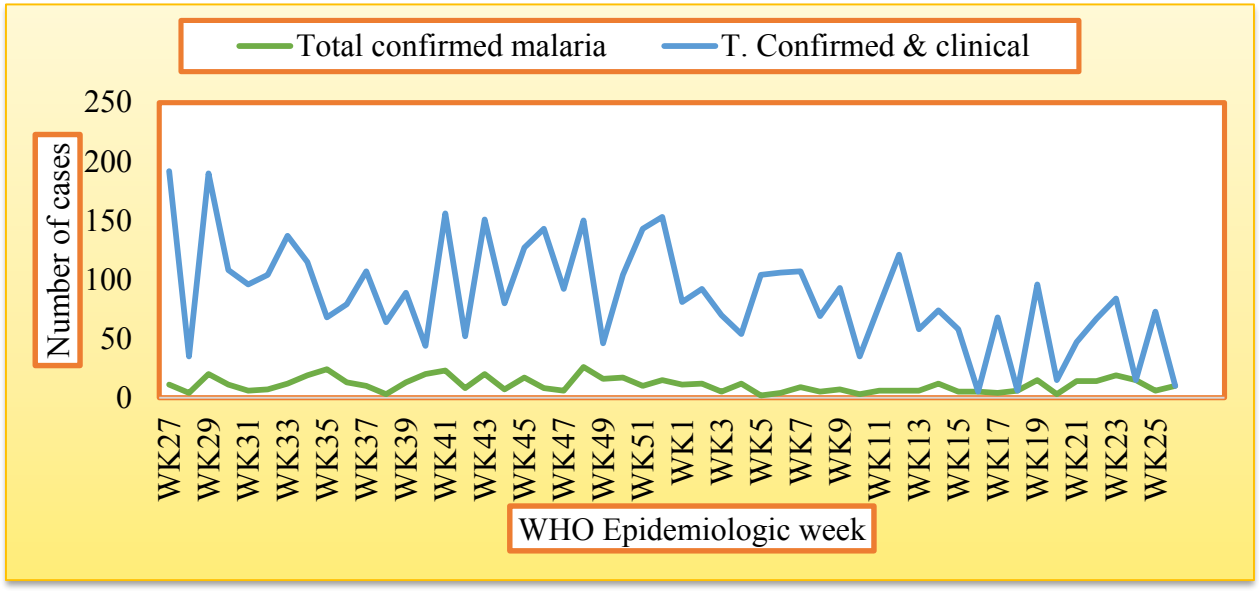

Figure 3-3: Trend of total and confirmed malaria in Bale zone, Oromia region, 2012/ 2013

Measles

Regionally in 2012/2013 a total of 3,978 cases and 8 deaths were reported due to measles. Of these cases, 2,644 (66%) were reported from Arsi, Kellem Wellega and Bale zone. In these three zones measles outbreak was occurred and it took long period of time until the outbreak is controlled. In Bale zone a total of 516 cases were reported in 2012/2013 (fig 4).

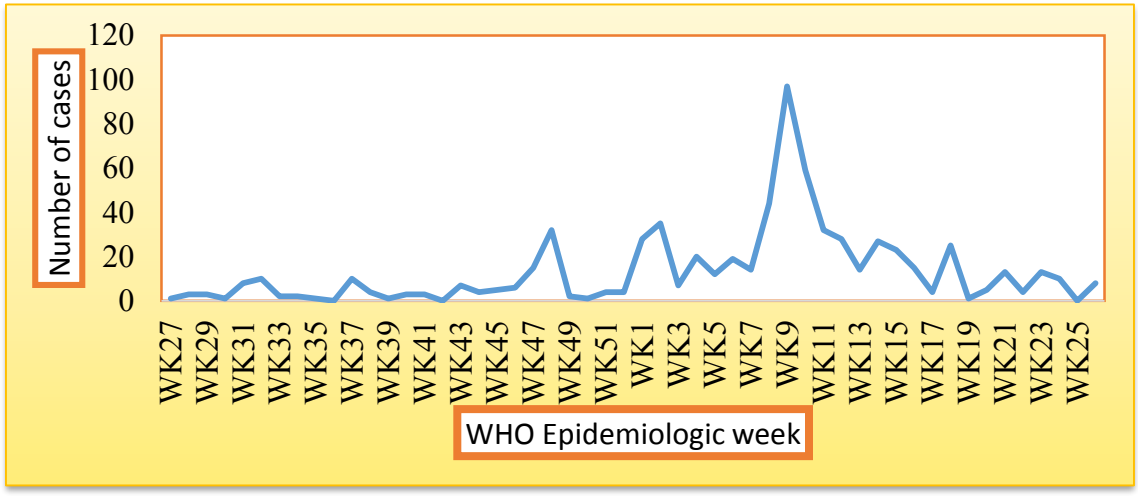

Figure 3 -4: Trend of measles case in Bale zone, Oromia Region, 2012-2013

In addition, seven woredas were affected by measles outbreak in the same year (table 1). Above the cases were reported from Gololcha woreda (table

Table 3-1: Distribution of measles cases by woreda in Bale Zone, 2013

S.No	Woreda	Frequency	Percent
1	Berbere	62	12%
2	Dawe Serer	60	12%
3	Gasera	20	4%
4	Ginir	31	6%
5	Gololcha	297	58%
6	Harena Buluk	24	5%
7	Mede Wellabu	22	4%
TOTAL		**516**	**100%**

Of these 516 measles cases the vaccination status was assessed. Majority of the cases were not received measles vaccine before.

Table 3-2: Vaccination status of measles case in Bale Zone, 2013.

Vaccination status	Frequency	Percent
Unvaccinated	283	54.84%
Vaccinated	191	37.02%
Unknown	42	8.14%
TOTAL	**516**	**100.00%**

AFP/ Polio

Two hundred eighty five AFP suspected cases were reported regionally in 2012/2013. Of these 15 (5.26%) suspected cases were from Bale zone (fig. 5).

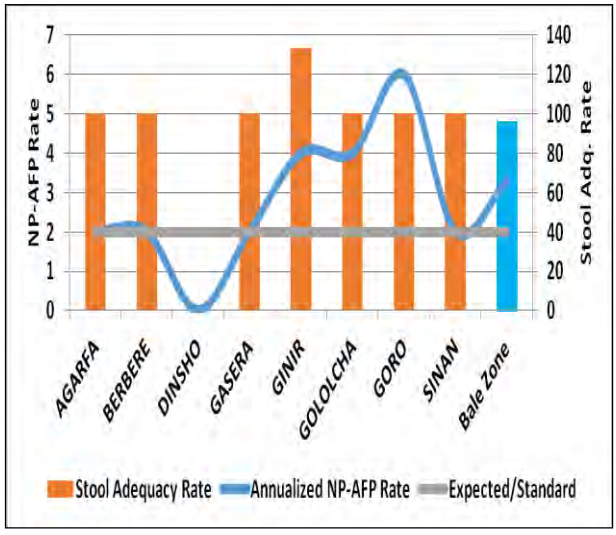

Figure 3 -5: NP-AFP and Stool Adequacy Rate of selected districts and Zonal status 2012

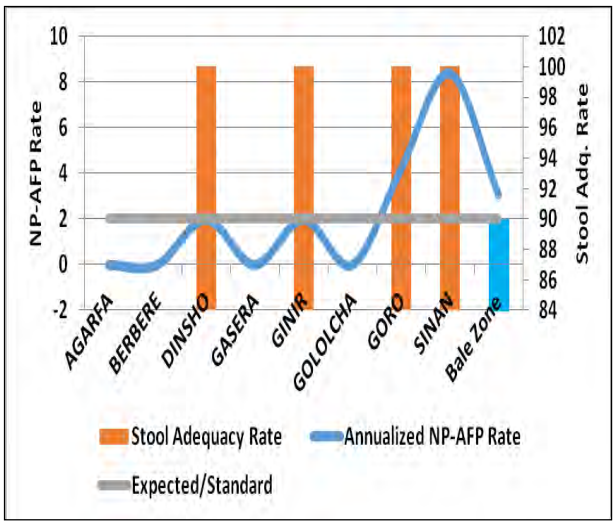

Figure 3 -6: NP-AFP and Stool Adequacy Rate of selected Districts and Zonal status, 2013

The main indicators for AFP/ Polio surveillance is NP-AFP polio rate and stool adiquesy are the major indicators for AFP Surveillance. Zonaly the stool adiquesy rate is 78% in year 2013 and it dereasing compared to the previous year2013 (figure 6 & 7). On the other hand, zonaly NP-AFP polio rate is above the target for 2013, but number of silent woredas are increased in this year and the stool adequescy rate is below the target.

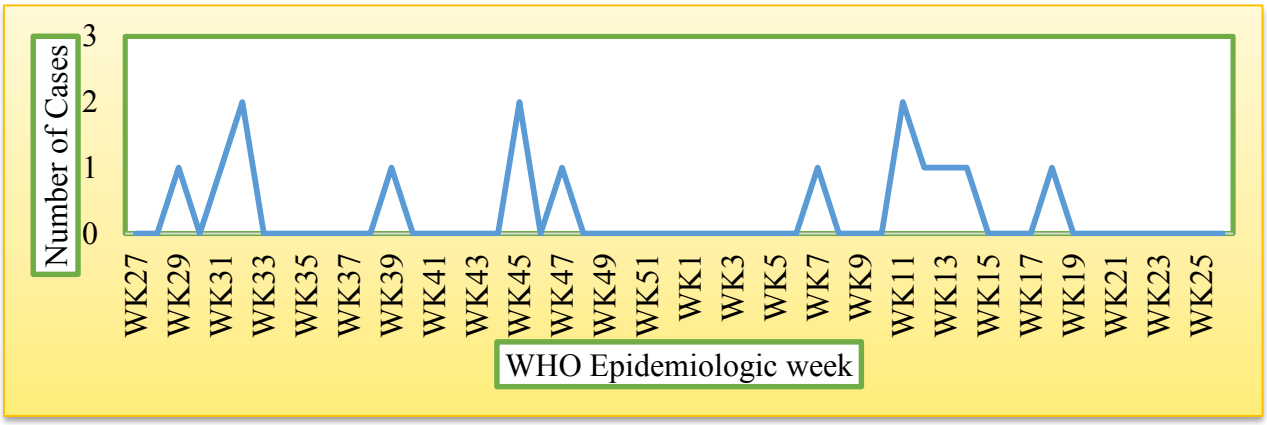

Figure 3-7: Trend of AFP suspect cases in Bale zone, Oromia region, 2012-2013

3.5.2. Targeted diseases under surveillance and included under this study

Resource is very scarce and it needs prioritization. Although because of shortage time and other resources surveillance could not carried out for all diseases and conditions. For the reason of that, Federal ministry of health the public health emergency management core process given prioritization to those diseases that are of interest at

national and international levels. Based on this PHEM core process selected 20 diseases to be included into the routine surveillance system. Of these, 7 diseases (malaria, meningitis, dysentery, typhoid fever, epidemic typhus, relapsing fever and SAM) are reported as weekly base and the rest 13 diseases (yellow fever, rabies, small pox, polio, NNT, measles, guinea warm, viral hemorrhagic fever, cholera, anthrax, avian human influenza, sever acute respiratory syndrome and pandemic influenza) are reported as immediately and weekly base. Of these targeted diseases under surveillance: malaria, measles and AFP were covered in this study (table 3).

Table 3-3: Lists of weekly and immediately reportable diseases/ conditions in Ethiopia

Immediately reportable		Weekly reportable	
1	Measles	1	Malaria
2	Acute Flaccid Paralysis (AFP) /Polio	2	Meningococcal Meningitis
3	Yellow Fever	3	Typhoid fever
4	Anthrax	4	Epidemic typhus
5	Guinea warm/ Dranculculiasis	5	Sever Acute Malnutrition
6	Viral hemorrhagic fever (VHF)	6	Relapsing fever
7	Avian Human influenza	7	Dysentery
8	Rabies		
9	NNT		
10	Pandemic influenza (H1N1)		
11	Cholera		
12	Small pox		
13	Sever acute respiratory syndrome (SARS)		

3.5.3. Availability of case definition, clinical register and surveillance manuals

According to Ethiopia PHEM guideline, there are two types of case definition: standard case and community case definition.

Standard case definition: is a case definition that is agreed upon to be used by every health professional within the country. Standard case definition can be classified as confirmed, probable, and possible or suspected [11].

Community case definition: is a case definition of disease and Conditions adapted to suit to health extension workers (HEWs) and community members. The community case definitions were modified for simplicity and ease understanding by HEWs and the community members list of 14 disease or syndromes and conditions are identified to give simplified case definitions for community levels [11].

According to the assessment, from 26 visited sites 18 (77%) of them had case definition for AFP and Measles. However, none of the visited institutions site had case definition for the rest priority diseases such as Malaria. On the other hand, Health practitioners and health extension workers who were interviewed during the assessment, 24/26 (92%) of them, were understood the case definition clearly and apply the case definition accordingly as per the national guide line. Clinical register was found in all of visited health centers but the handling of registration book was poor and 4/8 (50%) health posts lack clinical registration books (Table 4).

Table 3-4: Availability of guide lines, case definitions and clinical registers in visited health institutions of Bale zone 2013.

S.No	Variable	Health Post	Health Center	Woreda health office	Zonal health department	Total
1.	Availability of case definition (measles & AFP)	62.5%	60%	86%	100%	77%
2.	Availability of clinical register	50%	100%			38%
3.	Availability of guide lines	37.5%				
3.1.	IDSR for measles & AFP (2006)	NA	60%	41.4%	100%	50%
3.2.	PHEM guideline	NA	80%	85.7%	100%	66%
3.3.	Updated Measles (2012)	NA	0%	14.3%	0%	4%
3.4.	Updated AFP/ Polio	NA	0%	0%	0%	0%
3.5.	Malaria (2012) guideline	NA	20%	28.6%	1%	12%

3.5.4. Availability of surveillance formats

Even though reporting format is prepared and distributed from central level to regional and zonal health offices, there was shortage of reporting format in most of visited health facilities in the past 6 months. Due to this reasons all of the visited health facilities were using different types of reporting formats. On the other hand, reporting formats prepared at central level is stored at zonal level instead of distributing to woredas and health facilities. In all visited health facilities and woredas they faced shortage of surveillance formats like weekly reporting formats, case based formats for different diseases, AFP case investigation forms, epidemic reporting format and line listing formats.

3.5.5. Report completeness and timeliness

Bale zonal PHEM department were expected about 26,312 weekly surveillance reports in the past eleven months of 2012/2013 from health posts, health centers, hospitals and other private health facilities. However, 14,720 (56%) report were received from 20 woredas. Because of lack of infrastructure like telephone and internet services, most of the visited woredas were collecting weekly surveillance report from health facilities by reporting format (in hard copy). Whereas zonal PHEM officers collect the weekly surveillance data from all woredas by using telephone. Table 5 shows number of reporting site by government and private institution in visited sites.

Table 3-5: Reporting facilities by visited sites in Bale zone 2013

S.No.	Visited woreda	Government reporting unit	Private reporting unit	Total
1	Bale zone	430	168	598
2	Dinsho	11	7	18
3	Sinana	26	15	41
4	Goro	32	15	47
5	Berbere	21	13	34
6	Ginir	37	15	52
7	Gololcha	29	9	38
8	Gasera	24	12	36
9	Agarfa	26	14	40

According to Bale zonal report (44 weeks summary report), the reporting completeness rate of zonal and all woredas were less than the national target, except Sewena woreda. The detail summary report of reporting completeness by woreda is presented in table 6.

Table 3-6: Reporting completeness weekly surveillance report by woreda, Bale zone, 2013.

S.NO	Woreda	Total expected reporting site	Total expected report	Total report received	Completeness
1	Agarfa	40	1760	1077	61%
2	Berbere	34	1496	561	38%
3	Dello Mena	28	1232	698	57%
4	Dinisho	18	792	461	58%
5	Dawe Kachen	18	792	416	53%
6	Dawe Serer	20	880	477	54%
7	Gasera	36	1584	882	56%
8	Ginir	52	2288	1542	67%
9	Goba	27	1188	910	77%
10	Goba Town	8	352	82	23%
11	Gololcha	38	1672	993	59%
12	Goro	47	2068	1055	51%
13	Gura Damole	21	924	448	48%
14	Harena Buluk	27	1188	528	44%
15	Lege Hida	32	1408	940	67%
16	Mede Wellabu	33	1452	617	42%
17	Robe Town	22	968	72	7%
18	Rayitu	23	1012	778	77%
19	Sewena	33	1452	1265	87%
20	Sinana	41	1804	918	51%
21	**Zonal**	**598**	**26312**	**14720**	**56%**

According to zonal weekly report, the trend of zonal reporting completeness is below national expected target (80%) in the previous 44 continuous weeks. Within this 44 weeks, the maximum reporting rate was 69% and the minimum was 0% with an average of 56% for 11 months as zonal level (figure 6).

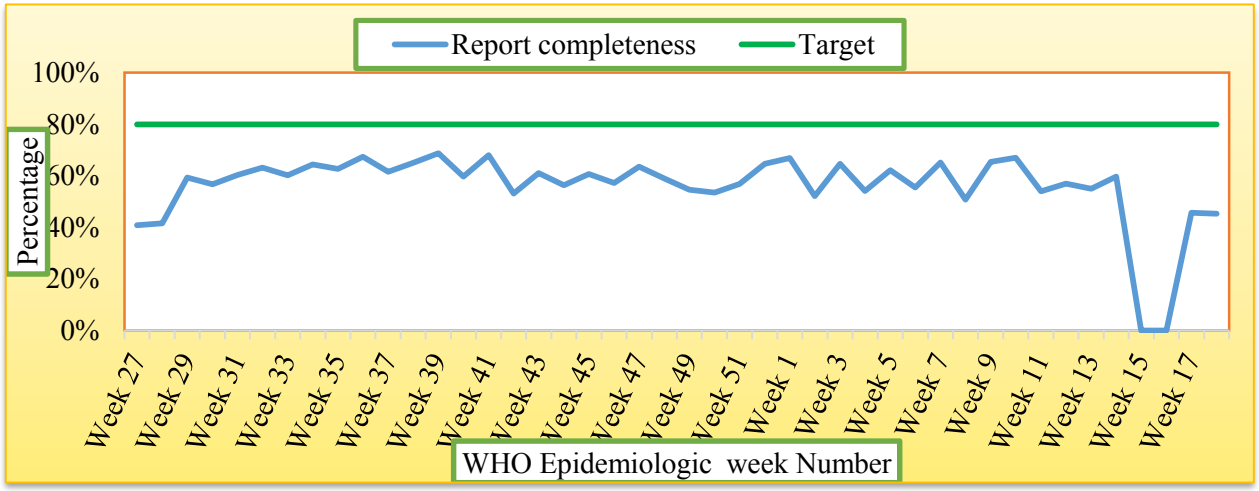

Figure 3-8: Data completeness of reporting health facilities by WHO epi. Week in Bale zone 2012/ 2013

On the other hand, at zonal level there is a big difference between governmental and non-governmental health facilities by weekly report submission. In Bale zone reporting completeness rate of governmental health facility was above the national target. In the last 9 months, on average the zonal governmental health facilities reporting completeness rate was 80% and within this reporting period only two months (July and January) registered less than 80%. In contrary, the reporting completeness rate of private health facilities were less than expected national target. As the same reporting period (9 months) with governmental health facilities, the completeness rate of private health facilities were 13% on average and the maximum was 24% (figure 7).

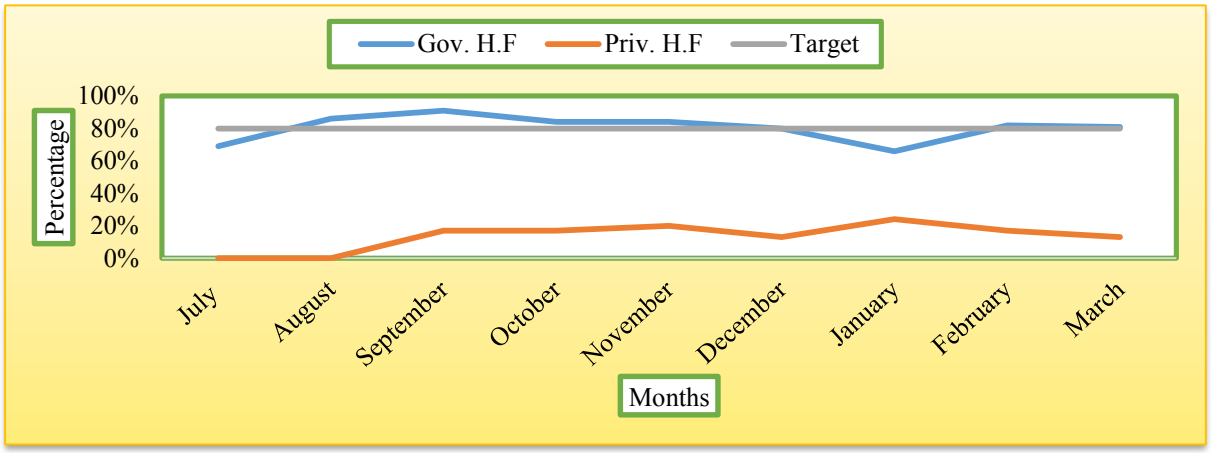

Figure 3-9: Data completeness of reporting facilities by owner ship in Bale zone 2012/2013

When we see the report completeness rate of governmental health facilities by woreda, almost 70% of woredas which found in Bale zone had completeness rate of 80% and above. On the other side, in all woredas private health facilities reporting completeness rate was less than 80% and the maximum was 73% reported by Dinsho Woreda, followed by Raytu 50%, Ginir 45%, Sewena 44% and Goba 44%. Furthermore, about 35% of woredas (M/Wellabu, Gasera, H/Bulk, Siannas, D/ Server, Agarfa and L/ Hide) were not linked private health facilities to surveillance system and they didn't receive weekly report from those private health facilities (figure 8).

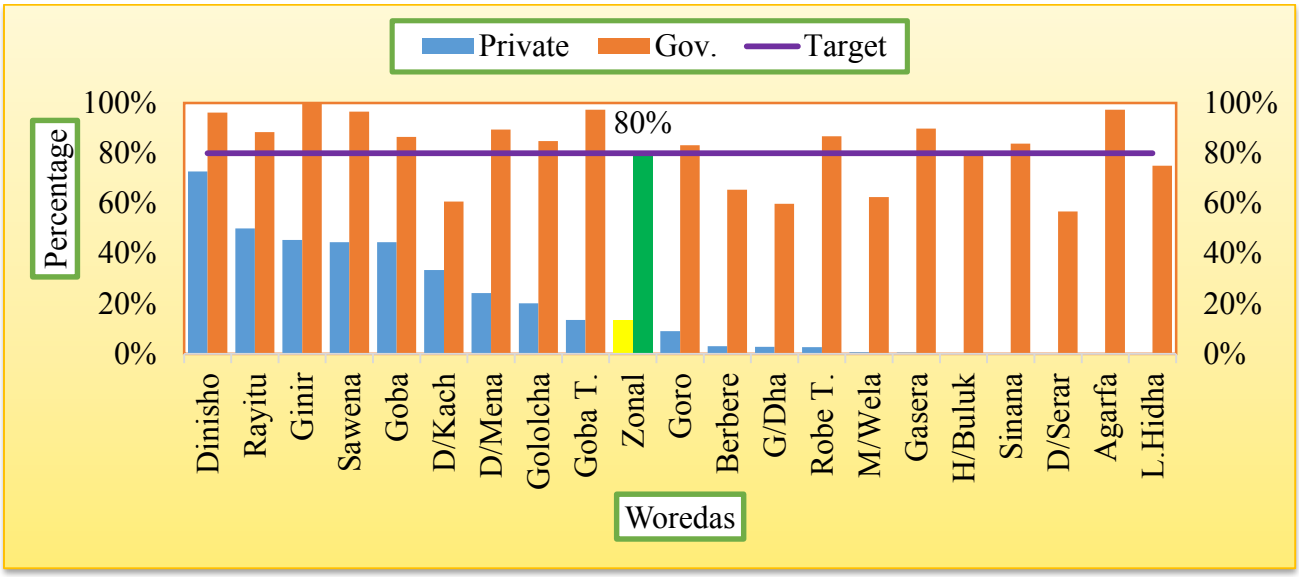

Figure 3-10: Weekly PHEM Report completeness by facility ownership and woreda in Bale of 2012/2013

Concerning timeliness, data were not available in all visited sites; because of that the timeliness of weekly surveillance report of visited sites were not measured except zonal health department. The zonal timeliness rate was measured by month from July 2012 – June 2013 for one fiscal year. In 2012/2013 annual timeliness rate of Bale zone was 77% and it is less than the national target (figure 9).

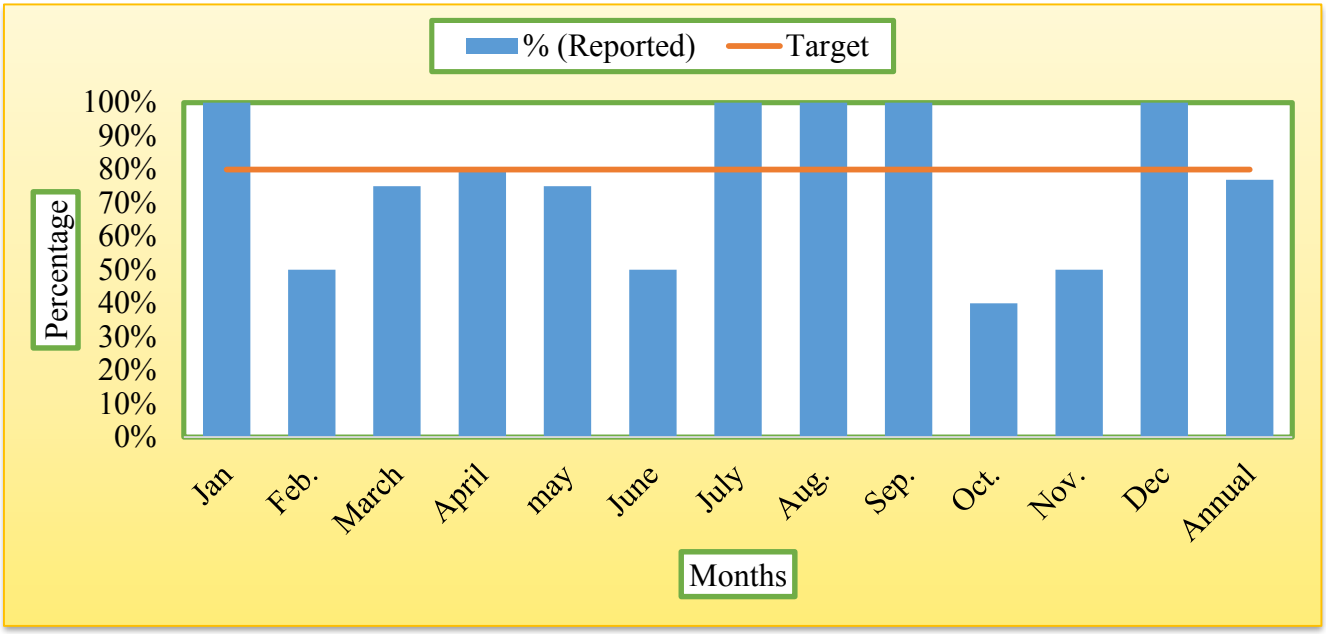

Figure 3-11: Weekly PHEM Report timeliness by month, Bale zone 2012/2013

3.5.6. Data analysis

In all assessed health facilities and health offices, there was assigned responsible person for report compilation and data analysis. In most of visited sites, they had appropriate denominator for data analysis. Including zonal health department data analysis was not taken as usual routine activity. From visited woreda health office only 2 (28.5%) woredas were analyzing the collected surveillance data by time and place irregularly by using simply raw data. However, none of visited health facilities and health offices were analyzing surveillance data by converting raw data in to rate for comparison and analysis purpose. In all visited health facilities and woreda health offices, they prepared action threshold only for malaria.

3.5.7. AFP and Measles Case detection

Case detection of measles and NP-AFP and sample adequacy was assessed by taking data from case based and line listing formats reported to EHNRI. This helps to assess the functionality of the surveillance system of the zone in detecting cases of measles and polio cases.

1. Measles

In the past three years a total of 371 measles suspected cases specimen was taken from all woredas of Bale Zone (table 7).

Table 3-7: Detection of suspected measles cases / year/100,000 pop. by woreda, Bale Zone.

S.No	Woreda	2011	2012	2013 (27 weeks)
1	Agarfa	5.0	1.0	7.7
2	Berbere	0.0	10.0	0.0
3	Dawe Kachen	0.0	0.0	0.0
4	Dawe Serer	2.0	0.0	19.3
5	Dinsho	6.0	14.0	7.7
6	Dello Mena	3.0	18.0	23.1
7	Gasera	2.0	13.0	0.0
8	Ginir	4.0	9.3	9.0
9	Goba	6.0	14.0	23.1
10	Goba (Town)	2.0	6.0	0.0
11	Gololcha	1.0	4.0	131.0
12	Goro	6.0	23.0	11.6
13	Gura Damole	2.0	0.0	0.0
14	Harena Buluk	1.0	11.0	13.5
15	Lege Hida	2.0	10.0	0.0
16	Meda Wellabu	3.0	3.0	11.6
17	Rayitu	2.0	0.0	0.0
18	Robe (Town)	14.0	16.0	34.7
19	Sewena	10.0	5.0	1.9
20	Sinana	14.0	16.0	14.1
21	**Bale**	**4.4**	**9.5**	**16.8**

About 65% of the woredas were reported at least one cases of measles (or >1 reported cases per 100,000 population) with a blood specimen in the previous 6 months of 2013. Proportion of woredas that have reported at least one measles cases for the last three years of bale zone is presented in figure 10 as follow.

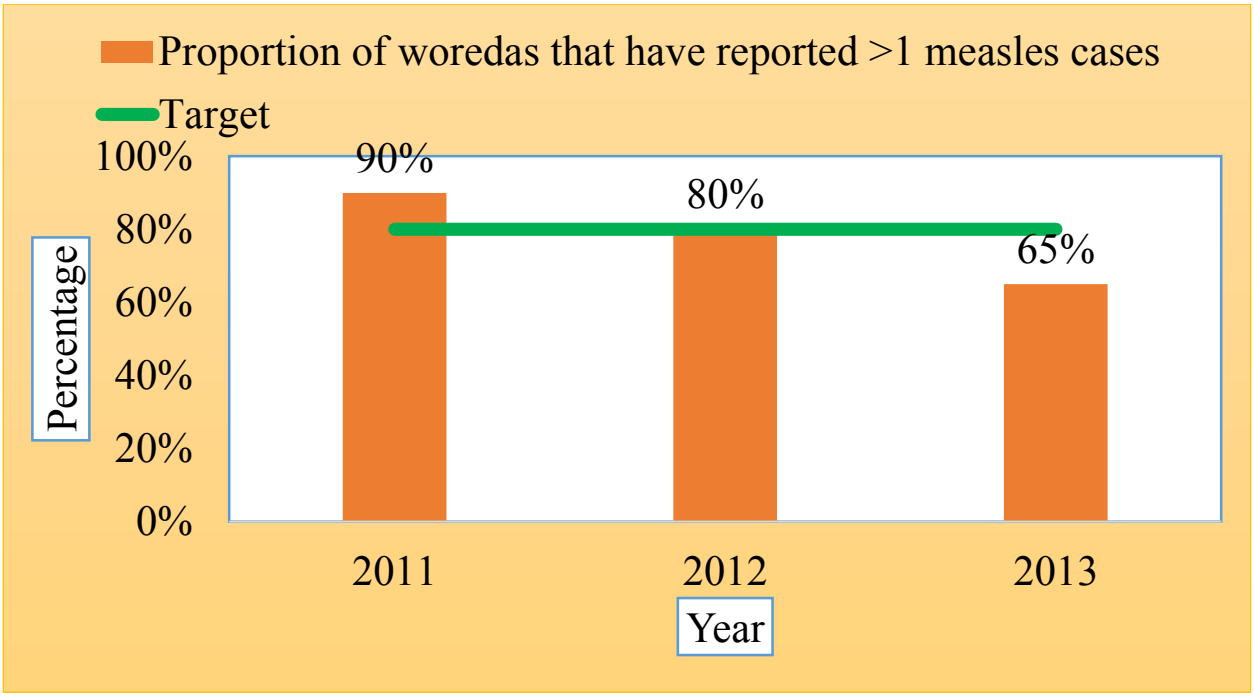

Figure 3-12: proportion of woredas that have reported at least one measles cases with blood specimen by year, Bale Zone.

Non measles febrile rash illness should be reported >2 cases per 100,000 population per year. Annualized detection rate of non-measles febrile rash illness for Bale Zone was 3.5 per 100,000 population in the past six months of 2013. However, number of woredas that have reported 2 and above non measles febrile rash illness was decreased from 85% (2011) to 50% (2013). Details of three years annualized detection of non-measles febrile rash illness is presented by woreda as follow in table 8.

Table 3-8: Number of non-measles febrile rash illness cases per 100,000 population by woreda and year, Bale Zone, 2013.

S.no	Woreda	2011	2012	2013 (27 weeks)
1	Agarfa	3.0	0.0	1.9
2	Berbere	0.0	2.0	0.0
3	Dawe Kachen	0.0	0.0	0.0
4	Dawe serer	2.0	0.0	11.6
5	Dinsho	6.0	12.0	3.9
6	Dello Mena	2.0	15.0	11.6
7	Gasera	2.0	5.0	0.0
8	Ginir	0.7	7.3	2.6
9	Goba	4.0	12.0	0.0
10	Goba (town)	2.0	2.0	0.0
11	Gololcha	1.0	1.0	0.0
12	Goro	2.0	19.0	5.8
13	Gura Damole	2.0	0.0	0.0
14	Harena Buluk	1.0	10.0	9.6
15	Lege Hida	2.0	10.0	0.0
16	Meda Wellabu	3.0	3.0	7.7
17	Rayitu	0.0	0.0	0.0
18	Robe (town)	14.0	14.0	0.0
19	Sewena	6.0	4.0	1.9
20	Sinana	14.0	14.7	5.1
21	**Bale**	3.4	7.1	3.5

Sample adequacy rate was also assessed at zonal and woreda level by using case based and line listing formats. As result zonal sample adequacy rate was 100% till June 2013. In the past six months of 2013, 65% of woredas were send suspected measles cases with blood specimen for laboratory confirmation. Out of these woredas, none of them did not achieve the national target of sample adequacy rate (80%).

Table 3-9: Sample adequacy rate of blood specimen by woreda and year, Bale Zone, 2013.

S.no	Woreda	2011	2012	2013
1	Agarfa	50	50	50
2	Berbere	0	47.4	0
3	Dawe Kachen	0	0	0
4	Dawe serer	50	0	50
5	Dinsho	50	22.2	50
6	Dello Mena	50	45.5	50
7	Gasera	50	43.5	0
8	Ginir	45.5	46.2	50
9	Goba	40	41.7	50
10	Goba (town)	50	50	0
11	Gololcha	50	50	50
12	Goro	40	46.5	50
13	Gura Damole	0	0	0
14	Harena Buluk	50	50	50
15	Lege Hida	50	50	0
16	Meda Wellabu	50	50	50
17	Rayitu	50	0	0
18	Robe (town)	46.2	42.9	50
19	Sewena	50	50	50
20	Sinana	47.4	47.8	52.4
21	**Bale**	**88.2**	**85.3**	**101.2**

2. AFP

Sensitivity of the AFP surveillance system can be monitored and evaluated based on the known incidence of annualized non-polio AFP (2 cases per 100,000 children under 15 years of age) rate. Bale zone non-polio AFP rate was assessed for the past two and half years. As a result, currently in the past six months of 2013 three non-polio AFP cases per 100,000 children under 15 years of age were reported. In addition, the previous years (which means 2011 and 2012) non-polio AFP rate was 2.9 and 1 NP-AFP cases per 100,000 children under 15 years of age in 2011 and 2012 respectively. When we see the NP-AFP performance by woreda, about 35% of the woredas were not eligible for this indicator because their total children under 15 years of age were less than 25000. But this woredas were decreased to 25% in 2012 and 2013. Of these 13 eligible woredas for NP-AFP in 2011, 3 (23%) of them were silent for detection NP-AFP

cases. The ten woredas were reported 2 and above NP-AFP cases per 100,000 children under 15 years of age. In 2012 there were 5 non eligible woredas for NP-AFP cases. Of the rest 15 woredas, 13 (87%) of them were reported 2 and above NP-AFP cases and the rest 2 were silent woredas. However, zonal performance in this year was low. Currently in the past six months of 2013, 15 woredas were eligible for the reporting of NP-AFP cases and of these 8 (53%) of them were reported 2 and above cases of NP-AFP and the rest were silent woredas (table 10).

Table 3-10: annualized NP-AFP rate by woreda and year, Bale Zone.

S.no	Woreda	2011	2012	2013 (27 weeks)
1	Agarfa	3	2	0
2	Berbere	4	2	0
3	Dawe beechen	Low u15 population	Low u15 population	Low u15 population
4	Dawe serer	Low u15 population	Low u15 population	Low u15 population
5	Dinsho	Low u15 population	Low u15 population	2
6	Dello Mena	4	2	7.8
7	Gasera	6	2	0
8	Ginir	2	4	2
9	Goba	2	2	2
10	Goba (town)	Low u15 population	Low u15 population	Low u15 population
11	Gololcha	3	4	0
12	Goro	2	6	3.8
13	Gura Damole	Low u15 population	Low u15 population	Low u15 population
14	Harena Buluk	0	4	0
15	Lege Hida	Low u15 population	0	0
16	Meda Wellabu	0	2	0
17	Rayitu	2	2	Low u15 population
18	Robe (town)	2	0	7.8
19	Sewena	Low u15 population	2	3.8
20	Sinana	0	2	7.8
21	**Bale**	**2.9**	**1**	**3**

On the other hand, stool adequacy of the specimen was assessed and from sent samples 91% of them were adequate zonally. In all woredas that have sent their sample, the sample adequacy rate was 100% in the six months of 2013. In general the stool adequacy rate is increasing time to time in the past three years (from 87% to 91%) table 11.

Table 3-11: Sample adequacy rate by woreda and year, Bale Zone.

S.no	Woreda	2011	2012	2013 (27 weeks)
1	Agarfa	100	100	NA
2	Berbere	100	100	NA
3	Dawe Kachen	Low U15 Population	Low U15 Population	Low U15 Population
4	Dawe serer	Low U15 Population	Low U15 Population	Low U15 Population
5	Dinsho	Low U15 Population	Low U15 Population	100
6	Dello Mena	50	100	100
7	Gasera	100	100	NA
8	Ginir	50	133.3	100
9	Goba	100	100	100
10	Goba (town)	Low U15 Population	Low U15 Population	Low U15 Population
11	Gololcha	100	100	NA
12	Goro	100	100	100
13	Gura Damole	Low U15 Population	Low U15 Population	Low U15 Population
14	Harena Buluk	NA	100	NA
15	Lege Hida	Low U15 Population	NA	NA
16	Meda Wellabu	NA	100	NA
17	Rayitu	100	50	Low U15 Population
18	Robe (town)	100	NA	100
19	Sewena	Low U15 Population	100	100
20	Sinana	NA	100	100
21	**Bale**	**90**	**96**	**91**

Finally the performance of detection of NP-AFP cases and sample adequacy rate was high NP-AFP and high stool adequacy rate zonally for the past six months of 2013.

3.5.8. Outbreak investigation

All the respondents from assessed woreda health offices responded that, they had investigated different outbreaks. As a result they were used the findings for intervention, but there was neither written document nor standard procedures for outbreak investigation was seen during the assessment. Nine outbreak of Measles were reported from seven woredas (Gololcha, Ginir, Gasera, M/Wellabu, Berbere, H/ Buluk and Dawe Serer) of Bale zone in the past 11 months to the zonal health office. A total of 516 cases of suspected measles were reported and; the majority of measles suspect cases were reported from Gololcha (58%) woreda.

In addition, from those nine outbreaks only three out breaks were investigated by zonal and woreda health office experts but during the visit time there was no evidence or document available about the investigation.

Outbreak investigation was not supported by laboratory confirmation. From nine outbreaks, five blood sample was taken for one outbreak of Gololcha woreda, however, the result was not received during the outbreak time for outbreak confirmation. Therefore, none of them were not investigated with specimen.

3.5.9. Epidemic preparedness and response

In all visited health offices they had not experienced any shortage of drugs and supplies during epidemic time. Of visited health offices, 29% of them had prepared written document for epidemic preparedness plan and 43% of them had emergency drugs and supplies in the store. In addition, 88% of them were established Rapid Response Team and task force committee but it lacks continuous functionality in all health offices. All outbreaks occurred in the zone in the previous eleven months were not responded within 72 hours by zonal and woreda health offices and none of visited health offices had outbreak investigation check list. All visited woreda health office and zonal health department encountered shortage of budget and they didn't allocate budget for epidemic preparedness and response activities (table 12).

Table 3-12: Availability of epidemic preparedness and response resource in visited sites of Bale zone, 2013.

S.No.	Variables	Woreda health office(N=7)	Zonal health department (N=1)	Total
1.	Availability of Epidemic response and preparedness plan	2	1	3
2.	Availability of Emergency stock of drugs and supplies	3	1	4
3.	Availability Outbreak investigation check list	1	0	1
4.	Availability of Rapid Response Team (RRT)	6	1	7
5.	Availability of task force committee	7	1	8
6.	# of epidemics responded within 72 hours	0	0	0
7.	Availability of budget for epidemics/ emergency	0	0	0
8.	Experienced shortage of drugs and supplies during epidemics	0	0	0

3.5.10. Supervisions and Feedback

To strengthen surveillance system in each level supportive supervision is the major activities. In all visited health institutions including zonal health office, regular specific supportive supervision was not conducted to lower levels. But in most visited sites integrated supportive supervision was conducted every three month (quarterly) and some surveillance activities were included in the check list. Because of shortage of resources any of visited institutions were not prepared specific supportive supervision plan for their lower level in this year. In 2012/2013 from visited sites 28% (20% WHo, 29% H.C, and 38% H.P) of them were supervised by higher level during integrated supportive supervision and none of them have surveillance supportive supervision checklist (table 13). In addition, during the assessment time all visited sites had not received specific PHEM feedback from higher level.

Table 3-13: Availability of supportive supervision, plan and feedback in visited sites, Bale zone in 2012/2013

S.No.	Variable	Zonal health office (N=1)	Woreda health office (N=7)	Health center (N=10)	Total (N=18)
1.	Specific supportive supervision to lower level	0	0	0	0
2.	Integrated supportive supervision to lower level	1	5	3	9
3.	Availability of supervision plan	0	0	0	0
4.	Availability supportive supervision checklist	0	0	0	0

3.5.11. Training

All zonal technical staffs working in PHEM department were trained short term training on selected priority diseases (such as measles, AFP and malaria) by regional health bureau. From all visited sites, 6 (86%) woredas health offices and 8/10 (80%) health centers were assigned PHEM officer/ focal person. Of those assigned PHEM officers, 13/14 (93%) of them were trained on the new approaches of public health emergency management (PHEM) and selected surveillance priority diseases (such as measles, AFP and malaria). On the other hand, according zonal PHEM department report, all health extension workers which is working in the zone were trained for 2 days on surveillance system and selected priority diseases such as measles and AFP/polio. But during the assessment time from interviewed health extension workers 1 (13%) HEW attended the training.

3.5.12. Resources

From visited Health offices, 6 (75%) of health offices and all of health centers 10/10 (100%) were compile weekly PHEM report manually. According to interviewed staffs response in zonal PHEM department, all zonal PHEM officers can use Microsoft office applications (MS word, MS excel and power point); but they don't have any clue on

epinfo utilization. On the other hand, from woreda health office and health center only 2/7(29%) and 20% of them were have computer skill on Microsoft office application respectively. Regarding availability of computer and printer, zonal PHEM unit have computer, printer and telephone for data management and communication; from visited woredas 86% and 71% of them have computer and printer respectively. Furthermore, 40% and 20% of visited health centers had computer and printer respectively. Availability of resources related to data management and communication in visited sites is presented in detail in table 14.

Table 3-14: Availability of resources for PHEM activates in visited sites of Bale zone, 2013

S.No.	Materials/ Item	Zone (N=1)	Woreda (N=7)	H.Cs (N=10)	Total
1	Electricity	100%	100%	90%	94%
2	Bicycles	0%	0%	0%	0%
3	motor cycle	0%	71%	100%	83%
4	Vehicle	100%	29%	0%	17%
5	Computer	100%	86%	40%	61%
6	Printer	100%	71%	20%	44%
7	Fax	100%	0%	0%	6%
8	Telephone	100%	100%	30%	61%
9	Internet service	0%	0%	0%	0%

3.5.13. Laboratory capacity

At national level, the national health and nutritional research institution have capacity to collect, analyses and send the result to lower level for 7 immediately reportable priority diseases. In addition, sample of SARS, Small box and VHF is referred to international laboratory. Similarly out of 7 weekly reportable diseases the national laboratory have capacity to perform the test for all diseases. However, recently the confirmatory test for relapsing fever and epidemic typhus was discontinued.

On the other hand, in Oromia region there are two regional laboratories. Likewise EHNRI, the regional laboratory have a capacity to perform laboratory tests for all weekly

reportable priority diseases. However, from 13 immediately reportable diseases the laboratory have a capacity to perform confirmatory test for only cholera and, for the other cases they refer the sample to national laboratory.

Regarding the laboratory capacity at woreda level, almost all health centers and health posts have the capacity to check the presence of malaria by using RDT (health post) and microscope (hospital and health center) and for the other cases they send specimen to regional or national laboratory. However, the feedback from national laboratory was let. It take more than three or more months to get the feedback. From the visited health centers, who sent the specimen in year 2013, all were not received laboratory result before three months.

3.5.14. Description of attributes of the surveillance system

Usefulness

Public health surveillance system is useful if it contributes to the prevention and control of adverse health related events, including an improved understanding of the public health implications of such events. A public health surveillance system can also be useful if it helps to determine that an adverse health-related event previously thought to be unimportant is actually important [5].

All visited health institution respondents have common understanding on usefulness of existences of public health surveillance system. Respondents believe that, if there is functional public health surveillance system; the system can detect out breaks of priority diseases early and allows accurate diagnosis, estimate the magnitude of morbidity and mortality related to these diseases including identification of factors associated with these diseases and permit assessment of the effect of prevention and control program.

3.5.15. Simplicity

The simplicity of a public health surveillance system refers to both its structure and ease of operation.

Easiness of case definition

To confirm the existence of suspected cases of selected priority diseases there should be case definition to facilitate easy detection. In addition to that, the case definition should be easy and simply understandable by health care providers and health office

staffs. As the assessment result, all interviewed respondents were replied that the case definition is easily understandable and simple to any health care provider and health office staffs.

To identify exact number of cases or incidence rate in the area each health facilities should be participate in reporting system. According to 2012 annual zonal report, in Bale zone there were on average 334 health posts, 70 health centers, 4 hospitals and 105 all types of private clinics in the year. Of these total health facilities, on average 64% of them sent their reports regularly. Furthermore, out of 408 all types of governmental health facilities 76% of them were participated and out of 104 all types of private clinics about 17% of them sent their report to the nearest health center or woreda health office.

All visited health posts had no fixed line telephone and in 50% of them had access of mobile network because of that telephone was not simple communication method for data collection of surveillance system at health post level. In addition, only 30% of the visited health centers had fixed line telephone service; but all visited health centers had mobile network access. All visited woredas have fixed telephone accesses, except Berbere and 6/8 (75%) woreda health office has telephone service in their office. However, there was budget shortage to pay for telephone service. For that reason using mobile or telephone system was not appropriate and sustainable communication method for weekly surveillance report at health center level.

According to the assessment, the respondent said that they needed only 10 to 15 minutes for collecting weekly data.

Concerning types and contents included in the reporting format, all respondents said that all data elements included in weekly surveillance reporting format is important. But zonal health office, 43% of woreda and 30% of health center respondents were suggested that the reporting format lacks some personal information like sex and age of the cases. So that to get full information for the investigation of the conditions, it is better to include those personal variables in the reporting format.

3.5.16. Acceptability

Acceptability reflects the willingness of persons and organizations to participate in the surveillance system. In this case the participants of the surveillance system are health facilities, health offices, health posts, nongovernmental organizations and private health facilities as Organizations and health workers and the community as individuals. Therefore all the mentioned agents accept and are well engaged to the surveillance activities. But the engagement of private health facilities in the surveillance system is weak as visited in the documents in zonal and woreda health offices. The acceptance of the surveillance system by the above responders was indicated by the use of the standard cases definitions and the recent and standard reporting formats. Almost all visited health facilities and health offices were using surveillance standard case definition and reporting formats.

3.5.17. Flexibility

A flexible public health surveillance system can adapt to changing information needs or operating conditions with little additional time, personnel, or allocated funds. Flexible systems can accommodate, for example, new health-related events, changes in case definitions or technology, and variations in funding or reporting sources. In addition, systems that use standard data formats (e.g., in electronic data interchange) can be easily integrated with other systems and thus might be considered flexible [5].

As nationwide after BPR change the previous reporting system is changed in reporting frequency and reporting format. In the visited woredas and health facilities the respondents are responded that the existing surveillance system is flexible in the structure and reporting format. The reporting format is open for newly emerged and re-emerging diseases and conditions.

3.5.18. Positive predictive value/ cases definition ability

The ability of the case definitions to detect true positive cases were assessed. Because of the incompleteness of surveillance data, only malaria report was seen and attempted to measure the positive predictive value. In Oromia region a total of 1,356,744 cases were identified as suspected malaria by using case definition and sent to laboratory for confirmation. Out of these 417058 of them were positive for malaria and the positive predictive value was **58%**. Similarly 4369 suspected malaria cases were identified by

using case definition and all of them were sent to laboratory for confirmatory test. Of these, 546 of them were positive and the positive predictive value was **13%**.

3.5.19. 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 zonal health service coverage was 90%. The health seeking behavior of the community was dramatically changed due to awareness creation done by community voluntaries in collaboration with HEWs in most of the rural communities of Bale zone as the zonal PHEM focal person response. In addition, the health service converges of visited districts ranging from 84-100%.

3.5.20. Stability

Stability refers to the reliability (i.e., the ability to collect, manage, and provide data properly without failure) and availability (the ability to be operational when it is needed) of the public health surveillance system (1).

Measures of the system's stability can include:

- The number of unscheduled outages and down times for the system's computer;
- The costs involved with any repair of the system's computer, including parts, service, and amount of time required for the repair;
- The percentage of time the system is operating fully;
- The desired and actual amount of time required for the system to collect or receive data;
- The desired and actual amount of time required for the system to manage the data, including transfer, entry, editing, storage, and back-up of data; and
- The desired and actual amount of time required for the system to release data.

Stability of surveillance system as visited in Bale zone health department relating to data collection, data entry, data analysis and transfer is stable. However, because of shortage of budget allocation the effectiveness may be fall under question.

3.5.21. Data quality

Data quality reflects the completeness and validity of the data recorded in the public health surveillance system. Quality of data is influenced by the performance of the screening and diagnostic tests (i.e., the case definition) for the health-related event, the clarity of hardcopy or electronic surveillance forms, the quality of training and supervision of persons who complete these surveillance forms, and the care exercised in data management (1).

Examining the percentage of “unknown” or “blank” responses on surveillance forms is a straightforward and easy measure of data quality. According to the copies of weekly reports of visited sites, at some health facilities and health offices the reporting format lacks reporting date and reporting facilities. At zonal level, three months of weekly reports were assessed and there is no blank/ unknown space. On the other hand, from visited woredas and health facilities 80% of the reporting formats were complete with necessary information including zero report.

3.6. Discussion

We aimed to evaluate the surveillance system of Bale zone by describing the system and measuring the usefulness, simplicity, data quality, acceptability, representativeness, timeliness and stability of the system for the selected diseases of malaria, measles and AFP/ polio.

Appropriate use of data and conclusions that can be drawn from surveillance data will depend on the quality of data collected. The data quality of the surveillance system as a whole depends on the compilation of the quality of all of the source [6].

Quality of data is influenced by the performance of the screening and diagnostic tests (i.e., the case definition) for the health-related event, the clarity of hardcopy or electronic surveillance forms, the quality of training and supervision of persons who complete these surveillance forms, and the care exercised in data management. A review of these facets of a public health surveillance system provides an indirect measure of data quality [5].

Report completeness rate is one of the indicators to determine whether the surveillance system is strong or not. According to the finding, the Bale zone weekly surveillance report completeness is less than the national target, 80% [11]. When we see the reporting facilities by ownership, participation of private health facilities in sending weekly surveillance report is lower (13%) than expected national target as well as regional annual performance. However, the governmental health facilities completeness is closer with regional (68%) performance. Therefore, if reports are late, or are not submitted, the aggregated information for the district (or other administrative area) will not be accurate .Outbreaks can go undetected, and other opportunities to respond to public health problems will be missed.

When reports are sent and received on time, the possibility of detecting a problem and conducting a prompt and effective response is greater. So that, ministry of health prepared an indicator to measure the timeliness of the report and aimed to reach a target of 80% [11]. As indicated in the result, the zonal reporting timeliness was less than the national target. This disparity will hamper the quality of work towards disease surveillance as the reporting weekly itself tells the sensitivity of surveillance system. This clearly illustrates that timely reports will give timely information which helps to

predict future outbreaks, trends of diseases occurrence, cases for further studies, future impact of diseases surveillance and action for problems identified on time.

Surveillance is information for action. Analyzing and interpreting public health surveillance data are the links between the design and operation of a surveillance system and the use of data from the system to implement public health action and disease control program. Surveillance data are used to detect epidemics, suggest hypothesis, characterize trends in disease or injury, evaluate prevention program, and project future public health needs. In general, analyzing and interpreting surveillance data should be of primary importance, resisting the urge to allow the time consuming problems of collecting, managing and storing surveillance data to supersede the analysis itself. Thus, analysis should be implemented as part of a routine surveillance program so results can be monitored over time [6].

According to this, the practice of data analysis and trend of Bale zone for priority diseases of malaria, measles and AFP/ polio was seen. Accordingly, the practice of making data analysis and trend for malaria measles and AFP/ polio in the visited places was poor, particularly at zonal health department, woreda health office and health facilities. However, any data collected from the surveillance system (epidemic report and routine weekly surveillance report) should be analyzed by time, place and person regularly. In addition to that, trends of malaria, measles and AFP should be followed regularly at each level to detect any unusual rising number of cases of health events or conditions at local, zonal or higher level which indicate the occurrence of outbreak situations that require immediate investigation and intervention. Therefore, the absence of performing data analysis regularly may hinder early detection of health events and taking appropriate controlling and preventive actions before the events are causing more illness and disability in the community.

Correspondingly, epidemic preparedness is essential and the basic action prior to the occurrence of any health related events. A public health emergency such as an acute outbreak or public health event calls for an immediate response. Being prepared to detect and respond to such an event is an essential role of the district. Examples of advanced preparations include: identifying key members of an event management

team, mapping available resources, and estimating required supplies and procuring them. If these steps are carried out in advance of an event, the health system will be able to function promptly, effectively, and efficiently to prevent unnecessary deaths or disabilities due to the emergency [4]. Preparedness activities and tasks includes development of plans, procedures, protocols, and systems; establishment of mutual aid agreements and provision of training for health workers and concerned stake holders. 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 [11].

Establishing multi-sectorial PHEM committee and rapid response team is the primary steps of preparedness at each level[11]. In addition, this established committee should be oriented or trained on epidemic preparedness and response (especially for RRT). The committee should have a regular meeting as monthly basis for multi-sectorial committee and RRT will meet regularly when there is an outbreak. In the visited sites even though there is established multi-sectorial task force committee in all woredas and zone, it lacks functionality or regular monthly meeting in all levels. On the other hand, rapid response team/ technical committee were established and had meeting when there was an outbreak and most of team members were trained on epidemic preparedness and response.

Similarly, in most of the visited health institutions lacks epidemic preparedness plan including drugs, supplies and financial resource for epidemic response of malaria, measles AFP/ polio and others. Higher level officials should give special emphasis to strengthen lower level (health office and health facilities) capacities in developing emergency preparedness plan. This can be improved not only by giving on job training and continuous follow up for PHEM officers, but also needs administrative support for managers to allocate enough and necessary resources for emergency.

On the other hand, any outbreak should be detected, investigated and responded within the expected standard time frame (in 72 hrs) [4, 11, 12]. The benefits of a rapid and

effective response are numerous. Rapid response limits the number of cases and geographical spread, shortens the duration of the outbreak and reduces fatalities. These benefits not only help save resources that would be necessary to tackle public health emergencies, but also reduce the associated morbidity and mortality. It is therefore important to strengthen epidemic response, particularly at woreda and community levels. However, in Bale zone none of the outbreaks occurred in year 2012/ 2013 were not early detected, investigated and given appropriate intervention to the affected communities based on the standard (within 72 hours). Therefore, Attention needs to be focused on response strategies and continuous monitoring and evaluation of these activities[11, 12].

At least one case of suspected measles cases per 100,000 population is expected from each woreda. According to national target, 80% and above woredas should report at least one case of measles with a blood specimen per year [13]. According to the assessment result, most of the woredas were sending at least one measles suspected cases per 100,000 population in the previous two years. However, the recent performance of the zone (six months) was less than the national target.

Collection of adequate stool specimens is the most important part of AFP case investigation. WHO recommends that two stool samples be collected at least 24 hours apart within 14 days of paralysis onset from 80% or more of AFP cases. According to the result, the stool adequacy rate of Bale Zone was above the target and this should be maintained for the future [14].

Ensuring reliable reporting of surveillance data throughout the country is important so that program managers, surveillance officers and other health care staff can use the information for action. The community and health facilities especially health posts are the main source of information. The information collected from this site is compiled in standard forms, analyzed and then forwarded to the woreda health office. Woreda level uses standard formats to compile aggregate, and send the data to zone/region, from which the central level receives [11]. In addition to routine data transferring tools, there are also standardized surveillance formats like line listing, case based formats, AFP investigation format, rumor log book, epidemic reporting formats for every level of health

institutions which should be available in every health institutions to record information as per standard during existence of outbreak or any health event suspects. However, the availability of surveillance formats is not sufficient and the utilization was also poor. In most of visited area they lack some important surveillance formats like line listing, case based, and weekly reporting formats. The problem was not only lack of surveillance format, but also because of absence of follow up and monitoring by higher level the utilization of format and their documentation system is poor. Therefore, to improve data quality, data analysis experience, report completeness and timeliness the standardized formats should be distributed to all woredas and health facilities and zonal PHEM officers and other concerned stake holder should follow and monitor the utilization.

For the success of surveillance program capacity building plays pivotal role. To increase the quality of early detection of diseases and reporting system formal or on job training for PHEM officers is necessary. Likewise, most of the zonal and lower level PHEM officers were trained on surveillance of selected diseases like malaria, measles and AFP/ polio. However, the practice of investigating an outbreak and conducting data analysis by zonal and lower level PHEM officers was weak. This may affect the efficiency and effectiveness of the surveillance system to detect early and prevent health related harms. Zonal PHEM officers should be well equipped and knowledgeable on public health surveillance system, because they are expected to support technically for their downward structure. Therefore, conducting refreshment training is important to update and upgrade the health workers knowledge. Furthermore, community surveillance is not given emphasis by zonal and woreda health offices. From visited health post most of health extension workers have no information about the surveillance of measles, malaria and AFP/ polio. However, they are the peripheral source of surveillance report. Any events that happened in the kebele were reported to woreda health office or the nearest health center through health extension workers. So that, they should be well familiar with different types of public health related events.

Laboratory-based surveillance is the key part of the overall surveillance system. Laboratory based surveillance helps to detect and control the outbreaks with rapid identification of the pathogens and their source of infection. Starting from the national

level to the health post level, suspected outbreaks should be confirmed by laboratory investigation. The laboratory confirmation for most of diseases under surveillance like measles can be performed at regional levels. However, samples of a few diseases like AFP/ polio should come to the national laboratory to be examined at this level or to be sent to more advanced laboratories abroad [11]. In Bale zone in all malarious woredas the cases were confirmed by laboratory method (RDT and microscopy). In addition, they were sending serum and stool specimen to national laboratory for identification of measles and AFP/ polio. However, the feedback from the national lab was late, because of that it was not appropriate for outbreak confirmation. During interviewing the health staffs, we investigated that some of the interviewed staffs were not understood the time of sample collection, purpose of sample collection and number of sample to be taken to confirm the existence of outbreak for measles, malaria and AFP.

Case definition is used to decide if a person has a particular disease or condition by specifying clinical criteria and limitations on time, place and person. Using standard case definitions ensures that every case is diagnosed in the same way, regardless of where or when it occurred, or who identified it. This allows for comparing the number of cases of the disease or condition that occurred in one time or place with the number occurring in another time or place. Health staff should be aware of case definitions of measles, malaria and AFP/ polio that may afflict not only the local community but also have the potential for spread across geographic boundaries [4]. Measles and AFP standard case definitions were available in most of visited area and most of the interviewed health staff were understood the case definition. However, all most in all visited health posts community case definitions were not available.

On the other hand, the case definition should be simple and have high ability to detect the true positive cases relative to confirmatory test. The positive predictive value of the case definition of Bale zone for malaria is lower than 4.4 times from the region. Shortage of training for physicians, wrong interpretation of the results by physicians, the problem of the case definition by itself or laboratory errors may affect the capacity of the case definition to detect true positive malaria cases.

Public health emergency management guidelines were available in all visited sites. However, laboratory Specimen collection procedure and updated guidelines for measles, malaria and AFP/ polio were not available in all sites including zonal PHEM unit during visiting time. Moreover, in all visited health posts there were no surveillance guidelines. Un availability of updated guidelines may reduce the effectiveness of the surveillance system.

To strengthen and to create a well stabled surveillance system supportive supervision and feed backing system is a must. Supervision and feed baking system should be conducted with a regular time interval. In the studied health institutions none of them were conducted supervision for their lower levels. Similarly, because of resource related problems none of the visited zone, woredas and health centers had plan to conduct supportive supervision.

3.7. Limitation of the study

- Private health facilities were not included in the assessment
- Hospitals were not participated in the assessment

3.8. collusion

The overall functioning of public health surveillance system underway in Bale zone was not satisfactory to achieve its targeted goals of prevention and control of measles, malaria and AFP. Case definition was available for AFP and Measles and none of them had case definition for Malaria. Likewise, there was shortage of surveillance formats and the reporting formats prepared by FMOH was not distributed to health facilities.

The zonal weekly surveillance reporting completeness rate was less than the national target. The participation of private health facilities in surveillance was poor and the reporting completeness rate was also low. On the other hand, in all assessed health offices and health facilities there were assigned responsible PHEM officers for report compilation and data analysis. However, routine surveillance data analysis was not exercised.

In the zone many outbreaks were occurred in 2012/2013. However, the investigation and response was late as well as weak integration of intervention. On the other hand, all visited health offices were not experienced any shortage of drugs and supplies during epidemics time. Most of them had not prepared epidemic preparedness plan including emergency drugs and supplies. Most of the visited health offices formally established rapid response team but lacks functionality. In addition, All outbreaks were not responded within 72 hours by zonal and woreda health offices.

Regarding supportive supervision, in Bale zone program specific supportive supervision was not conducted for lower level health institutions in 2012/2013. Similarly there was no feed backing system in all level.

Specimen is referred to regional or national laboratory for confirmation for those selected priority diseases (like measles and AFP) except malaria. Malaria confirmatory test is conducted at health center and health post level with microscopy and RDT. However, the feedback from national laboratory was late and it takes more than three months for measles and AFP/ polio.

3.9. Recommendations

The zonal health office needs to strengthen the quality, core activities and supportive functions of the surveillance system at all levels of the health system. According to the assessment results this recommendation was given for some identified gaps as follows:

- Data analysis and interpretation should be performed regularly at zonal and woreda level for measles, malaria and AFP/ polio.
- To increase the representativeness of the surveillance system all private health facilities should be included in the system (especially in M/ Wellabu, Gasera, H/ Buluk, Dawe Serer, Agarfa and Lege Hida woredas) and the zonal or woreda health offices should receive their weekly surveillance report regularly and timeliness of surveillance data also should be measured.
- Rapid response team should be established in Agarfa woreda. On the other hand, the established committee (task force and RRT) should be functional as needed.
- EPRP should be prepared and updated every year at all level especially for measles, malaria, AFP/ polio and other health related threats. In addition, Resources that are necessary for epidemic response such as drugs, supplies and other logistics should be available in all woreda health office stores.
- Budget should be allocated for PHEM to strengthen early detection of health events and response system (especially for Gasera, Gololcha, Berbere).
- To strengthen community surveillance, all HEWs and CHWs should be trained on PHEM and some selected priority diseases such as malaria, measles and AFP/ polio, and Community case definition should be distributed for all health posts.
- Updated Surveillance guidelines of malaria, measles and AFP/ polio should be available in all health facilities and health offices.
- Plan for specific ISS for PHEM department should be prepared at zonal and woreda health office level and the supervision should be conducted every quarter based on the schedule. Similarly regular and supportive Feedback should be given to lower level based on the supervision findings.
- Reporting formats should be redistributed to health facilities especially for health centers.

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Annex 3-1: Questioner

ZONAL LEVEL QUESTIONNAIRE

Identifiers:

Region _____ Respondent
Zone _____Date
Tele._____

General

Total pop._____ Male _____ Female_____

Rural pop._____ urban pop._____

Total Kebeles _____ Urban _____ Rural _____

Hosp._____ H.Cs_____ H.Cs_____ All types of private clinics ____

OGA clinics _____ other private health facility _____ NGOs H.F._____

Total # of malarious Woreda ___Total # of malarious kebeles___ Total pop. A risk for malaria _

I. Availability of a National Surveillance Manual

1. Is there a national manual/ guideline for surveillance? Yes / No
2. ***If yes***, describe (last update, diseases included, case definitions, surveillance and control, integrated or different for each disease):
   _____
   _____
   _____
   _____
3. What is the objectives of surveillance? _____
4. What are the strengths of your surveillance system?
   _____
   _____
   _____
5. What are the weakness of your surveillance system?
   _____
   _____
   _____

II. ***Case Detection and Registration***

6. Do you have standard case definitions for the Country's priority diseases like AFP (polio), malaria, and measles?
   Yes / No / Unknown / Not applicable
7. If the answer is yes for Q #3, observe the presence of the standard case definition for each priority disease. Yes No Unknown Not applicable

III. ***Data reporting::***

Presence of recommended reporting forms in the zone at all times over the past 6 months

8. Is the Federal/ Regional health bureau responsible for providing surveillance forms to the health facilities? Yes No Unknown Not applicable
9. ***If yes***, have you lacked appropriate surveillance forms at any time during the last 6 months? Yes No Unknown Not applicable
10. What are the reporting entities for the surveillance system?
    a. Public health facilities
    b. NGO health facilities
    c. Military health facilities
    d. Private health facilities
    e. Others_____
11. Was there any report of the immediately reportable diseases in the past 1 month? Yes/ No
    What was the disease_____
12. If yes, for Q 8, with in what time is the report received after detection of the diseases?
    a. Less than 1 hour
    b. 2-24 hour
    c. 1- 2 days
    d. 3- 7 days
    e. After 1 week
13. Percent of districts that have means for reporting to next level by e-mail, telephone, fax or radio_____
14. How do you report weekly, monthly and other formations to higher level?
    a. Mail
    b. Fax
    c. Telephone
    d. Radio
    e. Electronic
    f. Other
15. Did you have address of regional PHEM officers? Yes /No
16. How frequently are you communicating with the regional PHEM officers on emergencies and other daily activities?

A) Daily B) Weekly C) Every 2 week

D) Monthly F) Every 6 month H) Others_____

E) Quarterly G) Yearly

17. Did you have address of woredas/health facility PHEM officers? Yes/ No (if yes observe the lists and their address of woreda and H.F PHEM officers)
18. How frequently are you communicating with the woredas/health facility PHEM officers on emergencies and other daily activities?
    A) Daily D) Monthly G) Yearly
    B) Weekly E) Quarterly H)
    C) Every 2 week F) Every 6 month Others_____
19. When are you expected to send weekly report to the Regional PHEM unit? Every
    ☐ Monday ☐ Wednesday ☐ Friday ☐ I don't know
    ☐ Tuesday ☐ Thursday ☐ Saturday ☐ Sunday
20. When are you expected to receive weekly report from woredas /health facilities?
    ☐ Monday ☐ Wednesday ☐ Friday ☐ Sunday
    ☐ Tuesday ☐ Thursday ☐ Saturday ☐ I don't know
21. How is the Zone communicating the woredas/health facility PHEM officers in case of immediately reportable diseases?
    ☐By e-mail ☐By fax ☐ Others----------
    ☐ By phone ☐ Regular weekly report
22. Did you send summary or short report to the administrative /program leaders or other responsible organs on planning, prevention and control activities addressing important issues at community level that have arisen through the surveillance system? Yes/No
23. If answer for Q 19 is yes to whom did you send?
    _____
    _____
    _____
24. If you faced any problems on communicating and reporting, list them_____
    _____
    _____
    _____
    _____
25. How do you manage the problem you faced?
    _____
    _____
    _____

IV. Data analysis

1. Have you trained on surveillance system? Yes/ No
2. If answer for Q1 is yes a) when_____ b) Topic_____ c) For how long_____
3. Did you give any onsite training / orientation about surveillance system for the woredas or health facility PHEM focal persons? Yes/No (if yes observe any documents)
4. How many woredas have permanently assigned surveillance officer or focal person? ___
5. How many of them trained on surveillance and epidemic management? _____
6. If Q #4 is no, how surveillance activates were done at woreda level? _____ _____ _____
7. Was data compiled and registered? Yes/ No (if yes observe documents)
8. Did you have computer on your department (PHEM unit)? Yes/ No
9. What is the data entry and compilation instrument?
   A) Manual C) Other_____
   B) Computer __
10. Did you have computer skill on A) Ms word B)Ms excel C)MS power point D) Epi-info
11. Did you analyze data of the surveillance system (cased based, routine, outbreak ….)?Yes/ No
12. If answer for Q 8 is yes, observe whether or not data is analyzed by time, place and person
13. If you analyze surveillance data how frequently? A) weekly B) every two week C) Monthly D)quarterly E) every 6 month F) annually G) No regular time
14. Did you perform trend analysis for priority diseases? Yes/ No
15. If yes for Q #10, observe and list the diseases which has line graph _____ _____
16. Did you have denominators for data analysis? A) T. population B) male C) female D) U5 E) pop. By woreda E) hard to reach area pop.
17. Did you notify the results of your analysis to the higher level PHEM? Yes/ No
18. Did you notify the results of your analysis to the lower level PHEM? Yes/ No
19. If answer for Q #8 is No, what is the reason?
    ☐ Lack of knowledge ☐Less attention to data analysis ☐Analysis is not familiar
    ☐Shortage of time ☐ Shortage of materials ☐ Negligence
    ☐ Other----------

V. Outbreak Investigation

1. How many outbreaks were occurred in 2004 EFY? _____

2. How many of them were investigated _____list the diseases
   _____
3. Did you have outbreak investigation check list? Yes/No
4. If the answer no for Q #2, how did you know possible factors for the outbreak?
   _____
   _____
5. Where was laboratory confirmation of cases done?
   ☐Regional laboratory ☐ Health center
   ☐ Hospital ☐Contracted private laboratory
   ☐EHNRI ☐ Other----------
6. Who was responsible to investigate an outbreak? ☐ rapid response team ☐ HEW ☐ staffs of woredas health office ☐ experts organized randomly ☐ health facility staffs ☐
   other_____
   ____
7. Fill the table below for question #2

S.No	Name of out break	Place(Kebele/woreda	No of cases			No of deaths			Start date of the out break	Investigation date	Remark
			M	F	U5	M	F	U5			
1											
2											
3											
4											

8. Had you faced any challenge in outbreak investigation in 2004/05 EFY? Yes/No
9. If answer for Q 8 is yes, a) list the challenges_____
   _____
   _____
   b) List the alternatives that you take to tackle the challenges._____
   _____
   _____

VI. Epidemic preparedness(relevant for epidemic prone diseases)

1. Did you have plan for epidemic response and preparedness? Yes/No (if yes observe)
2. Was there emergency stocks of drugs and supplies at all times in the past 1 year? Yes/ No (if yes observe any document for evidence)

3. If answer for Q2 is No, how did you control epidemics? ----------
   ----
   -
4. Had you experienced shortage of drugs, vaccines and supplies in 2004 EFY? Yes/No
5. Was an epidemic management committee established at zonal level? Yes/No
6. Did the epidemic management committee have regularly scheduled meeting time? Yes/No(if yes observe minute book)
7. How many woredas are established epidemic management committee and meet regularly? __
8. Was Rapid response team established at zonal level? Yes/No
9. Did the Rapid response team have regularly scheduled meeting time during epidemics? Yes/No (observe minute book or other document)
10. How many woredas have established Rapid Response Team? _____
11. Did you have case management protocol for epidemic prone diseases? Yes/No/Not applicable (check)
12. Do have multi sectorial emergency preparedness and response task force committee? Yes/No/Not applicable
13. In what frequency did the task force meet during outbreaks?
    _____
14. Were partners working together with your office on emergencies? Yes/No
15. If answer for Q 14 is yes, what type of supports did they give to your office?
    _____
    _____
    _____
16. Was there a budget for epidemic response in the last year? Yes/No
17. Had you a car assigned for emergencies (PHEM)?Yes /No/Not functional
18. If answer for Q 17 is NO, how did you address emergencies?
    _____
    _____
    _____
19. Had you faced any Challenges on epidemic response and preparedness in 2004 EFY? Yes/No
20. If answer for Q 19 is yes,
    a) List the challenges
    _____
    _____
    _____
    b) What measures did you take to tackle the challenges?_____
    _____
    _____

VII. <u>Response to epidemics</u>

1) Does the zonal health office responded for epidemics within 72 hours of notification of most recently reported outbreaks? Yes /No (observe any documents)

2) Are epidemic management committee evaluate their epidemic preparedness and response activities during the past year? Yes/No (check written document)

VIII. Supervision and Feedback

1. Did you have supervision plan in 2004 EFY? Yes/No(check documents)
2. If answer for Q1 is No, how did you supervise? _____
   _____
3. If Q #1 is yes, did you supervise the woredas and health facilities? Yes/No
4. If Q #3 is No, what is the reason?
   _____
5. If Q #3 is yes, how many times did you supervise each woredas and health facilities in 2004 EFY? Woreda----------. Health facility----------
6. Had you received supervision from regional PHEM unit of FMOH in the past year or currently? Yes /No
7. If Q #6 is yes, how many times in 2004 EFY? ----------
8. Did you have regular supervision checklist? Yes/No
9. If Q #8 is No, how did you supervise the woredas and health facilities?
   _____
   __
10. Did you send feedback of your supervision findings to the woredas and health facilities which commenting/indicating their strong and weak sides? Yes /No(check)
11. If Q #10 is No, why?
    _____
12. If answer for Q #10 is yes, for how many woredas and health facilities and sessions did you send a feedback in 2004 EFY? Woreda_____ health facilities_____
13. Had you received feedback from higher level supervisors in 2004 EFY? Yes/No
14. If Q #13 is yes, how many feedbacks did you received in 2004 EFY? _____
15. Did you conducted active case search for health facilities in the past 1 year? Yes/No, if yes, how many times and for how many woredas and health facilities? _____ did woreda PHEM officers also conducted? Yes/ No (observe the document)
16. What did you get from active case search _____
17. Had you faced any challenge on supervision and feedback in 2004 EFY? Yes / No
18. If answer for Q #15 is yes, a) list the challenges._____
    _____
    _____
    _____

b) List the measures that you take to tackle the challenges _____
_____
_____
_____

IX. Resources

Percent of sites that have:

26. **Data management**

Computer	Data
Printer	manager
Photocopier	Statistical package

27. **Communications**

Telephone service
Fax
Radio call
Satellite phone
Computers that have modems

28. **Budget line** _____
29. **Logistics** _____

X. Surveillance

30. Do you have a computerized surveillance network at this level? Yes/No/Not applicable

Budget for surveillance

31. Is there a budget line for surveillance in the zonal Health office budget? Yes/No Not applicable
32. ***If yes***, what is the proportion: %
33. How could surveillance be improved?

_____
_____
_____

Questionnaire for Attributes and level of Usefulness:

1. Total population under surveillance_____ 2012
2. What is the incidence / Prevalence of 2012 -in your area/region
   - Malaria _____cases _____Deaths _____
   - AFP(polio) _____cases _____Deaths _____
   - Measles _____cases _____Deaths _____

I. Level of Usefulness of the Surveillance System for these selected priority diseases

Does the surveillance system help?

1. To detect outbreaks of priority diseases early on time to permit accurate diagnosis? Yes/ No
2. To estimate the magnitude of morbidity and mortality related to these diseases, including identification of factors associated with these diseases? Yes/ No
3. Permit assessment of the effect of prevention and control programs? Yes/ No

Observe (confirmation):

1. interventions and diseases trends analyzed ---Available //Not available

II. Describe Each System Attributes:

1. **Simplicity:**
2. Is the case definition of the priority diseases (malaria, measles, AFP….) easy for case detection by all level health professionals? Yes/ No
3. The surveillance system allow all levels of professionals to fill data? Yes/No
4. Does the surveillance system help to record and report data on time?
5. Does the surveillance system (Reporting format) have necessary information for investigation? Yes/No

6. How long it takes to fill the format? a, <5 minute b-10-15 minutes c- >15 minutes
7. How long does it take to have laboratory confirmation of
    A. Measles
    B. AFP (Polio)
    C. Malaria
    D. Others _____

Flexibility:

2. Can the current reporting formats be used for other newly occurring health event (disease) without much difficulty? Yes/ No
3. Do you think that any change in the existing procedure of case detection and reporting formats will be difficult to implement? Yes /No
   Comment:_____
   _____
   _____
   _____
4. Is the system easy to add new variables? Yes /No
5. Is the surveillance system easy to integrate with other systems? Yes /No
6. Is the surveillance system easy to add new disease on report? Yes /No
7. Is the system easy to add new information technology? Yes /No

Acceptability:

1) Do you think all the reporting agents accept and well engaged to the surveillance activities? Yes/No

2) If yes, how many are active participants (of the expected including all private clinics)? __/__

3) If No for Q #1, what is the reason for their poor participation in the surveillance activity?
    A. Lack of understanding of the relevance of the data to be collected
    B. No feedback / or recognition given by the higher bodies for their contribution;
        i.e. no dissemination of the analysis data back to reporting facilities
    C. Reporting formats are difficult to understand
    D. Report formats are time consuming
    E. Other:_____
    _____
    _____
    F. Were all participants using the standard case definition to identify cases? Yes/ No
    G. If yes, What is your evidence _____

H. Were all the reporting agents send their report using the current and appropriate surveillance reporting format? Yes/ No (if yes observe the documents)
I. Were all the health professionals aware about the surveillance system? Yes/No (if yes how they awared)

Data Quality: (Completeness of the reporting forms/and validity of the recorded data)

1. Are the reporting site / data collectors trained/ supervised regularly? Yes/No
2. **Observe:** Review the last months report of these diseases
   a) Average number of ***unknown or blank responses*** to variables in each of the reported forms
   _____
   b) Percent of reports which are complete(that is with no blank or unknown responses) from the total reports
   _____
3. Are all woredas reporting (including late report)? ☐ Yes ☐ No
4. Percent of woredas that send report of each week in 2004 EFY. ----------
5. Are all hospitals reporting? ☐ Yes ☐ No
6. Percent of hospitals that send report of each week in 2004 EFY. ----------

Total weekly reports received from woredas/Hospitals (including late reports, from July 2012-may, 2013)

WHO epid. Wk	Nº of woredas expected to report	Nº of woredas that report (including late report)	Nº of Hospitals expected to report	Nº of hospitals that report (including late reports)	WHO epid. wk	Nº of woredas expected to report	Nº of woredas that report (including late report)	Nº of Hospitals expected to report	Nº of hospitals that report (including late reports
27/2012 **(Jun 25-Aug. 01/04)**					1/2013 **(Dec. 22-28/05)**				
28/2012 **(Aug. 2-8/04)**					2/2013 (Dec. 29- Jan. 5				
29/2012 **(9-15/11/04)**					3/2013 (Jan. 6-12/05)				
30/2012 **(16-22/04)**					4/2013 (Jan. 13-19/05)				
31/2012 **(2329/11/04)**					5/2013 (Jan. 20-26/05)				

32/2012 **(30/11-6/12/04)**					6/2013 (Jan. 27-Feb. 3)				
33/2012 (7-13/12/04)					7/2013 (Feb. 4-10/05)				
34/2012 (Aug. 14-20/04)					8/2013 (Feb. 11-17/05)				
35/2012 (Aug. 21-27/04)					9/2013 (Feb. 18-24/05)				
36/2012 (Aug. 28-G. 4/04)					10/2013 (Feb. 25-Mar.1)				
37/2012 (Guw. 5- Sep. 6/05					11/2013 (Mar. 2-8/05)				
38/2012 (Sep. 7-13/05					12/2013 (Mar. 9-15/05)				
39/2012 (Sep. 14-20/05)					13/2013 (Mar. 16-22/05)				
40/2012 (Sep. 21-27/05)					14/2013 (Mar. 23-29/05)				
41/2012 (Sep. 28- Oct. 4/05)					15/2013 (Mar. 30-Apr.6				
42/2012 (Oct. 5-11/05)					16/2013 (Apr. 7-13/05)				
43/2012 (12-18/05)					17/2013 (Apr. 14-20/05)				
44/2012 (Oct. 19-25/05)					18/2013 (Apr. 21-27/05)				
45/2012 (Oct. 26- Nov. 2/05)					19/2013 (Apr. 28- May 4				
46/2012 (Nov.3-9/05)					20/2013 (May 5-11/05)				
47/2012 (Nov. 10-16/05)									
48/2012 (Nov. 17-23/05)									
49/2012 (Nov. 24-30/05)									
50/2012 (Dec.1 7/05)									
51/2012 (Dec. 8-14/05)									
52/2012 (Dec. 15-21/05									

Acceptability:

4) Do you think all the reporting agents accept and well engaged to the surveillance activities? Yes/No

5) If yes, how many are active participants (of the expected including all private clinics)? __/__

6) If No for Q #1, what is the reason for their poor participation in the surveillance activity?

A. Lack of understanding of the relevance of the data to be collected

B. No feedback / or recognition given by the higher bodies for their contribution;
i.e. no dissemination of the analysis data back to reporting facilities
C. Reporting formats are difficult to understand
D. Report formats are time consuming
E. Other:_____
_____
_____

7. Were all participants using the standard case definition to identify cases? Yes/ No
If yes, what is your evidence _____
8. Were all the reporting agents send their report using the current and appropriate surveillance reporting format? Yes/ No (if yes observe the documents)
9. Were all the health professionals aware about the surveillance system? Yes/No (if yes how they awared)

Representativeness:

10. What is the health service coverage of the district/ zone/ region? _____%
11. Do you think, the populations under surveillance have good health seeking behavior for these diseases? Yes / No
12. Was the surveillance system enabled to follow the health and health related events in the whole community? Yes /No
13. If answer for Q 4 is no, who do you think is well benefited by the surveillance system? ☐ The urban ☐the rural ☐both
14. If yes for Q 4, do you think that rural and urban communities are equally benefited in surveillance system? Yes/ No , if no why
_____
15. Are all the Socio demographic variables included in the surveillance reporting format? Yes /No
16. If the answer for Q 7 is No, which a) Sex---------- b) age group---------- C) ethnic group----- d) religion---------- is less represented?

Stability:

1. Was any new restructuring affected the procedures and activities of the surveillance of these diseases? Yes/ No
2. Was there lack of resources that interrupt the surveillance system? Yes / No if yes what was it and how do you solve it_____
3. Was there any time /condition in which the surveillance is not fully operating? Yes/ No
4. If the answer yes for Q #3 When/what is the condition that talks the system not to function properly?----------
5. Is there a surveillance officer or focal person (PHEM unit)? Yes/No Number _____

Timeliness:

1. Are all woredas /health facilities reporting on time? ☐ Yes ☐ No
2. Percent of woredas that report on time. ----------
3. Are all Hospitals reporting on time? ☐ Yes ☐ No
4. Percent of hospitals that report on time. ----------

Weekly Zonal reports received on time for 2005 EFY report (July 201- May, 2013)

WHO epid wk	Nº of woredas expected to report	Nº of woredas that report on time	Nº of Hospitals expected to report	Nº of Hospitals that report on time	WHO epid wk	Nº of woredas expected to report	Nº of woredas that report on time	Nº of Hospitals expected to report	Nº of Hospitals that report on time
27/2012 **(Jun 25-Aug. 01/04)**					1/2013 **(Dec. 22-28/05)**				
28/2012 **(Aug. 2-8/04)**					2/2013 (Dec. 29- Jan. 5				
29/2012 **(9-15/11/04**)					3/2013 (Jan. 6-12/05)				
30/2012 **(16-22/04)**					4/2013 (Jan. 13-19/05)				
31/2012 **(2329/11/04)**					5/2013 (Jan. 20-26/05)				
32/2012 **(30/11-6/12/04)**					6/2013 (Jan. 27-Feb. 3)				
33/2012 (7-13/12/04)					7/2013 (Feb. 4-10/05)				
34/2012 (Aug. 14-20/04)					8/2013 (Feb. 11-17/05)				
35/2012 (Aug. 21-27/04)					9/2013 (Feb. 18-24/05)				
36/2012 (Aug. 28-G. 4/04)					10/2013 (Feb. 25-Mar.1)				
37/2012 (Guw. 5- Sep. 6/05					11/2013 (Mar. 2-8/05)				
38/2012 (Sep. 7-13/05					12/2013 (Mar. 9-15/05)				
39/2012 (Sep. 14-20/05)					13/2013 (Mar. 16-				

					22/05)				
40/2012 (Sep. 21-27/05)					14/2013 (Mar. 23-29/05)				
41/2012 (Sep. 28- Oct. 4/05)					15/2013 (Mar. 30-Apr.6				
42/2012 (Oct. 5-11/05)					16/2013 (Apr. 7-13/05)				
43/2012 (12-18/05)					17/2013 (Apr. 14-20/05)				
44/2012 (Oct. 19-25/05)					18/2013 (Apr. 21-27/05)				
45/2012 (Oct. 26- Nov. 2/05)					19/2013 (Apr. 28- May 4				
46/2012 (Nov.3-9/05)					20/2013 (May 5-11/05)				
47/2012 (Nov. 10-16/05)									
48/2012 (Nov. 17-23/05)									
49/2012 (Nov. 24-30/05)									
50/2012 (Dec.1 7/05)									
51/2012 (Dec. 8-14/05)									
52/2012 (Dec. 15-21/05									

1. How do you work with other departments and other sectors? _____

DISTRICT (INTERMEDIATE LEVEL) QUESTIONNAIRE

Region_____ **Tele**_____
Zone _____ __
Woreda _____ **Date**_____
Name of respondent_____ ____

General

XI. Availability of a National Surveillance Manual

1. Is there a national manual/ guideline for surveillance system?
   Yes /No/ Not applicable / Unknown
2. ***If yes***, describe (last update, diseases included, case definitions, surveillance and control, integrated or different for each disease):
   _____
   _____
   _____
   _____
3. What is the objectives of surveillance? _____
4. What are the strengths of your surveillance system?
   _____
   _____
   _____
5. What are the weakness of your surveillance system?
   _____
   _____
   _____

XII. Case Detection and Registration

1. Do you have standard case definitions for the Country's priority diseases like AFP (polio), malaria, and measles?
   Yes / No / Unknown / Not applicable
2. If the answer is yes for Q #3, observe the presence of the standard case definition for each priority disease. Yes No
3. If answer for Q 4 is No, for which disease(s) did you lack the case definition?
   _____
   _____
   _____

XIII. *Data reporting::*

4. Is the Federal/ Regional health bureau responsible for providing surveillance forms to the health facilities? Yes No Unknown Not applicable

5. ***If yes***, have you lacked appropriate surveillance forms at any time during the last 6 months? Yes No Unknown Not applicable
6. What are the reporting entities for the surveillance system?
   a. Public health facilities b. NGO health facilities c. Military health facilities d. Private health facilities e. Others_____
7. Was there any report of the immediately reportable diseases in the past 1 month? Yes/ No
8. If yes, for Q 8, with in what time is the report received after detection of the diseases?
   a. Less than 1 hour b. 2-24 hour c. 1- 2 days d. 3- 7 days e. After 1 week
9. Percent of health facilities that have means for reporting to next level by e-mail, telephone, fax or radio_____
10. How do you report weekly, monthly and other formations to higher level?
    a. Mail b. Fax c. Telephone d. Radio e. Electronic f. Other

11. Did you have address of Zonal PHEM officers? Yes /No
12. How frequently are you communicating with the Zonal PHEM officers on emergencies and other daily activities?
    ☐ Daily ☐ Monthly ☐ Yearly
    ☐ Weekly ☐ Quarterly ☐ Others----------
    ☐ Every 2 week ☐ Every 6 month -
13. Did you have address of HC/HP PHEM focal persons? Yes /No
14. How frequently are you communicating with the HC/HP PHEM focal persons on emergencies and other daily activities?
    ☐ Daily ☐ Monthly ☐ Yearly
    ☐ Weekly ☐ Quarterly ☐ Others----------
    ☐ Every 2 week ☐ Every 6 month
15. Did you have case based reporting formats for out breaks? Yes /No ☐ Not Applicable
16. Was there guide line for specimen collection, handling and transportation to the next level? Yes/No ☐ Not Applicable
17. Did you have line list for reporting outbreaks? Yes/No ☐ Not Applicable
18. Did you face shortage of surveillance reporting and recording formats? Yes/ No
    If yes, which form

    _____

19. When are you expected to send weekly report to the Zonal PHEM unit?

☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday☐ I don't know

20. When are you expected to receive weekly report from HCs/HPs?

☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday

☐I don't know

21. How is the woreda communicating the HCs/HPs PHEM officers in case of immediately reportable diseases? ☐ by e-mail ☐ by phone ☐ by fax ☐ regular weekly report ☐ others
22. Did you send summary or short report to the administrative /program leaders or other responsible organs on planning, prevention and control activities addressing Important issues at community level that have arisen through the surveillance system? Yes /No
23. If answer for Q9 is yes to whom did you send? _____ _____ _____
24. If you faced any problems on communicating and reporting, list them_____ _____ _____
25. Mention the alternative solutions that you take to tackle the problems you listed on the above?

_____

26. Do you have assigned surveillance officer for PHEM activities and working on? Yes /No

If no, who is responsible for PHEM activities?

_____

27. If yes for Q 28, did he trained on surveillance system?☐ Yes ☐ No
28. If answer for Q 29 is yes a) when---------- b) Topic----------c) For how long? ----------
29. Did you conducted any onsite training / orientation about surveillance system for the HC and HP PHEM focal persons? yes/No
30. Was data compiled? Yes /No
31. Did you have computer on your office? Yes/No
32. Did you have computer on your department (PHEM unit)? Yes /No
33. What is the data entry and compilation instrument? ☐ Manual ☐ Computer ☐ other----------
34. Did you have computer skill on ☐ MS word ☐MS excel ☐MS power point ☐ Epi-info
35. Did you analyze the data collected from surveillance system? Yes /No

36. If answer for Q 37 is yes, did you described data by, ☐ time ☐ place ☐ person
37. If yes for Q 38, for which disease

_____

38. Did you have denominators for data analysis? ☐ total population ☐ male ☐ female ☐ under five
39. Please indicate the frequency of your data analysis.

☐ Weekly	☐ Monthly	☐ Annually
☐ Every two week	☐ Quarterly	☐ No regular time
	☐Every 6 month	

40. Did you notify the results of your analysis to the higher level PHEM? Yes/No
41. Did you notify the results of your analysis to the lower level PHEM? Yes/No
42. If answer for Q 38 is No, what is the reason?

☐ Lack of knowledge ☐ Shortage of materials ☐ Other----------
☐ Shortage of time ☐ Analysis is not familiar
☐ Less attention ☐ Negligence

43. How can reporting system be improved?

_____
_____
_____

44. Do you have an action threshold for any of the country priority diseases?
Yes No I don't know
45. ***If yes,*** what is it? _____cases _____% increase _____rate (Ask for 2 priority diseases)_

_____
_____
_____

I. ***Epidemic preparedness***

46. Did you have plan for epidemic response and preparedness? Yes/No
47. Did you have emergency stocks of drugs and supplies? Yes/No
48. If answer for Q 49 is No, how did you control epidemics?

_____

49. Had you experienced shortage of drugs, vaccines and supplies in 2004 EFY?

Yes/ No

50. Was woreda epidemic management committee established? Yes /No
51. Did the epidemic management committee have regularly scheduled meeting time? Yes/No
52. Was Woreda Rapid response team established? Yes /No
53. Did the Rapid response team have regularly scheduled meeting time during epidemics? Yes /No
54. Did you have case management protocol for epidemic prone diseases? Yes /No

55. Did your PHEM have multi sectorial emergency preparedness and response task force committee? Yes /No
56. In what frequency did the task force meet during outbreaks?
_____
57. Were partners working together with your office on emergencies? Yes /No
58. If answer for Q 59 is yes, what type of supports did they give to your office?
_____
_____
_____
59. Was there a budget for epidemic response? Yes /No
60. Had you a car assigned for emergencies (PHEM)? Yes /No Not functional
61. If answer for Q 62 is NO, how did you address emergencies?
_____
_____
_____
62. Had you faced any Challenges on epidemic response and preparedness in 2003 EFY? ☐ Yes ☐ No
63. If answer for Q18 is yes, a) list the challenges_____
b) What measures did you take to tackle the challenges?
_____

II. ***Outbreak investigation***

64. Had you investigated any outbreak in 2004 EFY? Yes/No
65. Did you have outbreak investigation check list? Yes / No
66. If answer for Q 2 is No, how did you know possible factors for the outbreak? ----------
67. Where was laboratory confirmation of cases done?
☐Regional laboratory ☐ Health center ☐ Other----------
☐ Hospital ☐Contracted private laboratory
☐ EHNRI
68. Who was responsible to investigate an outbreak?
☐ Rapid response team ☐Staffs of woreda H.O ☐ Health facility staffs
☐ Experts organized ☐Other----------
☐ HEWs randomly
69. If answer for Q 66 is yes how many out breaks did you investigated in 2004 EFY? ____

S.No	Name of out break	Place(Kebele/ woreda	No of cases			No of deaths			Start date of the out break	Investigation date	Remark
			M	F	U5	M	F	U5			
1											
2											
3											

70. Had you faced any challenge in outbreak investigation in 2003 EFY? Yes/ No
71. If answer for Q72 is yes, a) list the challenges_____
_____
_____
_____

b) List the alternatives that you take to tackle the challenges._____
_____
_____

III. Responses_____

72. Has the district implemented prevention and control measures based on local data for at least one reportable disease or syndrome?
    Yes No Unknown Not applicable
73. Does the district responded within 72 hours of notification of most recently reported outbreak (from written reports)
    Yes No unknown Not applicable
74. Does the district achieved an acceptable case fatality rate for most recent outbreak (Observe from outbreak report)
    Yes No Unknown Not applicable
75. Has epidemic management committee evaluated their preparedness and response activities during the past year? (observe written report to confirm)
    Yes No Unknown Not applicable

IV. Supervision and Feedback_____

76. Did you have supervision plan in 2004 or 2005 EFY? Yes/ No
77. If answer for Q 78 is No, how did you supervise?
_____-
_____
_____
78. If answer for Q 78 is yes, did you supervise the health centers (HCS) and health posts (HPs) according to your plan in 2004 or 2005 EFY? Yes/ No
79. If answer for Q 80 is No, what is the reason?
_____-
_____
_____
_____
80. If answer for Q 80 is yes, how many times did you supervise each health center (HC) and health post (HP) in 2004 or 2005 EFY? Health center_____ health post_____
81. Had you reviewed about surveillance practice by higher level supervision? Yes /No
82. Did you have regular supervision checklist? Yes/ No
83. If answer for Q 84 is No, how did you supervise the health centers and health posts?

_____
_____

84. Were you supervised by higher level officers in 2004 or 2005 EFY? Yes/ No
85. If answer for Q 86 is yes how many times in 2004 or 2005 EFY?

_____

86. Did you send feedback of your supervision to the health centers (HCS) and health posts (HPs) commenting/indicating their strong and weak sides? Yes /No (observe)
87. If answer for Q 88 is No, why_____

_____
_____
_____

88. If answer for Q 88 is yes, for how many HCs and HPs did you send a feedback in 2004 or 2005 EFY? HC---------- and health post----------
89. Had you received feedback from higher level supervisors in 2004/ 2005 EFY? Yes/ No
90. If answer for Q 91 is yes how many feedbacks did you received in 2004 or 2005 EFY? _
91. Did you conducted active case search for health facilities? Yes/No if yes, how many times and for how many health facilities?

_____

92. Had you faced any challenge on supervision and feedback in 2004/05 EFY? Yes/No
93. If answer for Q 93 is yes a) list the challenges_____

_____
_____
_____

b) List the measures that you take to tackle the challenges_____

_____
_____
_____

V. ***Training***

_____

94. Have you been trained in disease surveillance?
    Yes No Unknown Not applicable
95. ***If yes,*** specify when, where, how long, by whom?

_____
_____

96. What percent of your personnel in the district have been trained in surveillance and epidemic management? _____

VI. ***Resources***_____

97. **I. Percent of sites that have:**

Logistics

a. Electricity 2. Motor cycles a. Vehicles
b. Bicycles

98. **Data management**

a. Stationery b. Calculator c. Computer e. Statistical package
d. Printer

99. **Communication**

a. Telephone service d. Computers that have modems
b. Fax
c. B radio

100. **Information education and communication materials**

a. Posters c. Flipcharts or Image box e. Generator g. Projector
b. Megaphone d. VCR and TV set f. Screen (Movie)
h. Other:

VII. Satisfaction with surveillance system

101. Are you satisfied with the surveillance system?
Yes No Unknown Not applicable

102. ***If no***, how can the surveillance system be improved?_____

_____

103. **Opportunities for integration**

What opportunities are there for integration of surveillance activities and functions (core activities, training, supervision, guidelines, resources etc.)

_____

_____

_____Questionnaire for Attributes and level of Usefulness:

1. Total population under surveillance_____ 2005
2. What is the incidence / Prevalence of 2004 -in your area/region
   - Malaria _____cases _____Deaths _____
   - AFP(polio) _____cases _____Deaths _____
   - Measles _____cases _____Deaths _____

III. Level of Usefulness of the Surveillance System for these selected priority diseases

Does the surveillance system help?

4. To detect outbreaks of priority diseases early on time to permit accurate diagnosis? Yes/ No

5. To estimate the magnitude of morbidity and mortality related to these diseases, including identification of factors associated with these diseases? Yes/ No
6. Permit assessment of the effect of prevention and control programs? Yes/ No

Observe (confirmation):

1. interventions and diseases trends analyzed ---Available //Not available

IV. Describe Each System Attributes:

Simplicity:

A. Is the case definition of the priority diseases (malaria, measles, AFP….) easy for case detection by all level health professionals? Yes/ No
B. The surveillance system allow all levels of professionals to fill data? Yes/No
C. Does the surveillance system help to record and report data on time?
D. Does the surveillance system (Reporting format) have necessary information for investigation? Yes/No
E. How long it takes to fill the format? a, <5 minute b-10-15 minutes c- >15 minutes
F. How long does it take to have laboratory confirmation of

A. Measles
B. AFP (Polio)
C. Malaria
D. Others

_____

Flexibility:

A. Can the current reporting formats be used for other newly occurring health event (disease) without much difficulty? Yes/ No
B. Do you think that any change in the existing procedure of case detection and reporting formats will be difficult to implement? Yes /No
Comment:_____
_____
_____
C. Is the system easy to add new variables? Yes /No
D. Is the surveillance system easy to integrate with other systems? Yes /No
E. Is the surveillance system easy to add new disease on report? Yes /No
F. Is the system easy to add new information technology? Yes /No

Data Quality: (Completeness of the reporting forms/and validity of the recorded data)

1) Are the reporting site / data collectors trained/ supervised regularly? Yes/No
2) **Observe:** Review the last months report of these diseases
3) Average number of ***unknown or blank responses*** to variables in each of the reported forms
_____
4) Percent of reports which are complete(that is with no blank or unknown responses) from the total reports
_____
5) Are all health facilities reporting (including late report)?☐ Yes ☐ No
6) Percent of health facilities that send report of each week in 2004 EFY. --------

Total weekly reports received from H.C/health posts (including late reports. from Jul 2012—may, 2013)

WHO epid. Wk	Nº of HPs that repor t	Nº of HPs that do not report	Nº of HCs that report	Nº of HCs that do not report	WHO epid. wk	Nº of HPs that report	Nº of HPs that do not report	Nº of HCs that report	Nº of HCs that do not report
27/2012 **(Jun 25-Aug. 01/04)**					1/2013 **(Dec. 22-28/05)**				
28/2012 **(Aug. 2-8/04)**					2/2013 (Dec. 29- Jan. 5				
29/2012 **(9-15/11/04**)					3/2013 (Jan. 6-12/05)				
30/2012 **(16-22/04)**					4/2013 (Jan. 13-19/05)				
31/2012 **(2329/11/04)**					5/2013 (Jan. 20-26/05)				
32/2012 **(30/11-6/12/04)**					6/2013 (Jan. 27-Feb. 3)				

33/2012 (7-13/12/04)					7/2013 (Feb. 4-10/05)				
34/2012 (Aug. 14-20/04)					8/2013 (Feb. 11-17/05)				
35/2012 (Aug. 21-27/04)					9/2013 (Feb. 18-24/05)				
36/2012 (Aug. 28-G. 4/04)					10/2013 (Feb. 25-Mar.1)				
37/2012 (Guw. 5- Sep. 6/05					11/2013 (Mar. 2-8/05)				
38/2012 (Sep. 7-13/05					12/2013 (Mar. 9-15/05)				
39/2012 (Sep. 14-20/05)					13/2013 (Mar. 16-22/05)				
40/2012 (Sep. 21-27/05)					14/2013 (Mar. 23-29/05)				
41/2012 (Sep. 28- Oct. 4/05)					15/2013 (Mar. 30-Apr.6				
42/2012 (Oct. 5-11/05)					16/2013 (Apr. 7-13/05)				
43/2012 (12-18/05)					17/2013 (Apr. 14-20/05)				
44/2012 (Oct. 19-25/05)					18/2013 (Apr. 21-27/05)				
45/2012 (Oct. 26- Nov. 2/05)					19/2013 (Apr. 28- May 4				
46/2012 (Nov.3-9/05)					20/2013 (May 5-11/05)				
47/2012 (Nov. 10-16/05)									
48/2012 (Nov. 17-23/05)									
49/2012 (Nov. 24-30/05)									
50/2012 (Dec.1 7/05)									
51/2012 (Dec. 8-14/05)									
52/2012 (Dec. 15-21/05									

Acceptability:

7) Do you think all the reporting agents accept and well engaged to the surveillance activities? Yes/No
8) If yes, how many are active participants (of the expected including all private clinics)? _____/_____
9) If No for Q #1, what is the reason for their poor participation in the surveillance activity?
   A. Lack of understanding of the relevance of the data to be collected

B. No feedback / or recognition given by the higher bodies for their contribution;
C. i.e. no dissemination of the analysis data back to reporting facilities
D. Reporting formats are difficult to understand
E. Report formats are time consuming
F. Other:

_____
_____

G. Were all participants using the standard case definition to identify cases? Yes/ No
H. If yes, what is your evidence? _____
I. Were all the reporting agents send their report using the current and appropriate surveillance reporting format? Yes/ No (if yes observe the documents)
J. Were all the health professionals aware about the surveillance system? Yes/No (if yes how they awared)

Representativeness:

10) What is the health service coverage of the district? _____%
11) Do you think, the populations under surveillance have good health seeking behavior for these diseases? Yes / No
12) Was the surveillance system enabled to follow the health and health related events in the whole community? Yes /No
13) If answer for Q 3 is no, who do you think is well benefited by the surveillance system? ☐ The urban ☐the rural ☐both
14) If yes for Q 4, do you think that rural and urban communities are equally benefited in surveillance system? Yes/ No , if no why

_____

15) Are all the Socio demographic variables included in the surveillance reporting format? Yes /No
16) If the answer for Q 6 is No, which a) Sex---------- b) age group---------- C) ethnic group----- d) religion---------- is less represented?

Timeliness:

1. Are all health facilities reporting on time? ☐ Yes ☐ No
2. Percent of health facilities that report on time. ----------

Weekly health facilities reports received on time for 2005 EFY

WHO epid wk	Nº of HCS expected to report	Nº of HCs that report on time	Nº of HPs expected to report	Nº of HPs that report on time	WHO epid wk	Nº of HCS expected to report	Nº of HCs that report on time	Nº of HPs expected to report	Nº of HPs that report on time
27/2012 **(Jun 25-Aug. 01/04)**					1/2013 **(Dec. 22-28/05)**				
28/2012 **(Aug. 2-8/04)**					2/2013 (Dec. 29- Jan. 5				
29/2012 **(9-15/11/04**)					3/2013 (Jan. 6-12/05)				
30/2012 **(16-22/04)**					4/2013 (Jan. 13-19/05)				
31/2012 **(2329/11/04)**					5/2013 (Jan. 20-26/05)				
32/2012 **(30/11-6/12/04)**					6/2013 (Jan. 27-Feb. 3)				
33/2012 (7-13/12/04)					7/2013 (Feb. 4-10/05)				
34/2012 (Aug. 14-20/04)					8/2013 (Feb. 11-17/05)				
35/2012 (Aug. 21-27/04)					9/2013 (Feb. 18-24/05)				
36/2012 (Aug. 28-G. 4/04)					10/2013 (Feb. 25-Mar.1)				
37/2012 (Guw. 5- Sep. 6/05					11/2013 (Mar. 2-8/05)				
38/2012 (Sep. 7-13/05					12/2013 (Mar. 9-15/05)				
39/2012 (Sep. 14-20/05)					13/2013 (Mar. 16-22/05)				
40/2012 (Sep. 21-27/05)					14/2013 (Mar. 23-29/05)				
41/2012 (Sep. 28- Oct. 4/05)					15/2013 (Mar. 30-Apr.6				
42/2012 (Oct. 5-11/05)					16/2013 (Apr. 7-13/05)				
43/2012 (12-18/05)					17/2013 (Apr. 14-20/05)				

44/2012 (Oct. 19-25/05)					18/2013 (Apr. 21-27/05)				
45/2012 (Oct. 26- Nov. 2/05)					19/2013 (Apr. 28- May 4				
46/2012 (Nov.3-9/05)					20/2013 (May 5-11/05)				
47/2012 (Nov. 10-16/05)									
48/2012 (Nov. 17-23/05)									
49/2012 (Nov. 24-30/05)									
50/2012 (Dec.1 7/05)									
51/2012 (Dec. 8-14/05)									
52/2012 (Dec. 15-21/05									

Stability:

6. Was any new restructuring affected the procedures and activities of the surveillance of these diseases? Yes/ No
7. Was there lack of resources that interrupt the surveillance system? Yes / No if yes what was it and how do you solve it
   _____
   _____
8. Was there any time /condition in which the surveillance is not fully operating? Yes/ No
9. If the answer yes for Q #3 When/what is the condition that talks the system not to function properly?----------
   ----
   ----
10. How did you work with other departments and other sectors?_____

HEALTH CENTER QUESTIONER

Region_____ **Tele**_____
Zone _____ __
Woreda _____ **Date**_____
Name of H.C_____ ____
Name of respondent_____

General

Catchment population_____ # of Kebeles/H.Ps____/____

1. Is there a national manual for surveillance at this site?

Observe national surveillance manual:

Yes No Unknown Not applicable

2. What is the objectives of surveillance? _____
3. What are the strengths of your surveillance system? _____

_____
_____

4. What are the weakness of your surveillance system? _____

_____
_____

I. Case detection and registration

5. Observe the existence of a clinical register

Yes No Unknown Not applicable

6. Observe the correct filling of the clinical register during the previous 30 days

Yes No Unknown Not applicable

7. Do you have a standard case definition for: (each priority disease) like AFP (polio), measles, malaria?

Yes No Unknown Not applicable

8. Observe the standard case definition for:(each priority disease)

Yes No Unknown Not applicable

9. Observe the respondent correctly diagnosing one of the country's priority diseases using a standard case definition

Yes No Unknown Not applicable

(Select one of the priority diseases in the facility's clinical register and ask how they diagnosed it — interviewer should have the standard case definition from MOH)

II. Case confirmation

10. Are you able to collect sputum Y N U N/A
Stool Y N U N/A
Blood Y N U N/A
CSF at this facility? Y N U N/A

11. Observe the presence of materials required to collect
Stool Y N U N/A
Blood/serum Y N U N/A
CSF Y N U N/A

12. Do you have the capacity to handle sputum, stool, blood/serum and CSF until shipment at this facility?
Yes No Unknown Not applicable

13. Observe presence of functional cold chain at health facility
Yes No Unknown Not applicable

14. Observe presence of transport media for stool at health facility
Yes No Unknown Not applicable

15. Observe presence of packing materials for shipment of specimens at health facility
Yes No Unknown Not applicable

III. Data reporting

16. Which communication material did you have?
☐ E-mail
☐ Wired phone
☐ Mobile
☐ Radio
☐ Fax
☐ Other----------

17. Did you have address of Zonal/woreda PHEM officers? ☐Yes ☐ No
18. How frequently are you communicating with the Zonal/woreda PHEM officers on emergencies and other daily activities?
☐ Daily
☐ Weekly
☐ Every 2 week
☐ Monthly
☐ Quarterly
☐ Every 6 month
☐ Yearly
☐ Others----------
19. When are you expected to send weekly report to the Zonal/woreda PHEM unit?
☐ Monday
☐ Tuesday
☐ Wednesday
☐ Thursday

☐ Friday
☐ Saturday
☐ Sunday
☐ I don't know exactly

20. How is your facility communicating the Zonal/woreda PHEM officers in case of immediately reportable diseases?
☐ By e-mail
☐ By phone
☐ By fax
☐ Regular weekly report
☐Others----------
21. Did you send summary or short report to the administrative /program leaders or other responsible organs on planning, prevention and control activities addressing Important issues at community level that have arisen through the surveillance system? ☐ Yes ☐No
22. If answer for Q 18 is yes, to whom did you send? ----------
23. If you faced any problems on communicating and reporting, list them----------
24. Mention the alternative solutions that you take to tackle the problems you above? ----------
25. Have you lacked appropriate surveillance forms and records at any time during the last 6 months (rumor log book, epidemic reporting, weekly, case based, investigation…
Yes No Unknown Not applicable

26. Observe that the last monthly report agreed with the register for 4 diseases (1 for each targeted group [eradication; elimination; epidemic prone; major public health importance])
    a. **Obs** Measles Y N U N/A
    b. **Obs** Malaria Y N U N/A
    c. **Obs** AFP (polio) Y N U N/A

27. **Percent of sites that reported each reporting period to the next higher level during the past 3 months**
Number of reports in the last 3 months compared to expected number
Obs Weekly: /12 times the number of sites
Obs immediately: /-- times the number of sites

28. **On time (use national deadlines)**
Obs Number of weekly reports submitted on time:-_____ /12 times the number of sites

Obs Number of immediately reports submitted on time: ___/-- times the number of sites

29. How do you report to higher level?
    a. Mail
    b. Fax
    c. Telephone
    d. Radio
    e. Electronic
    f. Other
30. **Strengthening reporting**
    How can reporting be improved?
    _____
    _____
    _____
    _____

IV. Data analysis

31. Is there assigned focal person for surveillance activities? Yes/ No
32. If no for Q 28 how do you do surveillance activities?
    _____
    _____
    _____
33. If yes for Q 28, did he trained on surveillance system? Yes/ No
34. If answer for Q30 is yes a) when----------? b) Topic----------? c) For how long? ----------
35. Was data compiled? Yes /No
36. Did you have computer on your office? Yes / No
37. Did you have computer on your department (PHEM unit)? Yes /No
38. What is the data entry and compilation instrument? ☐ Manual ☐ Computer ☐ other_____
39. Did you have computer skill on ☐ Ms word ☐Ms excel ☐MS power point ☐ Epi-info
40. Did you analyze data of the surveillance system? Yes /No
41. If answer for Q 37 is yes, did you describe data by ☐ time ☐ place ☐ person
42. Did you have denominators for data analysis? ☐ total population ☐ male ☐ female ☐ U5
43. Please indicate the frequency of your data analysis.
    ☐ Weekly
    ☐ Every two week
    ☐ Monthly
    ☐ Quarterly
    ☐Every 6 month
    ☐ Annually

☐ No regular time

44. Did you notify the results of your analysis to the higher level PHEM? Yes /No
45. If answer for Q 41 is No, what is the reason?
    - ☐ Lack of knowledge
    - ☐ Shortage of time
    - ☐ Less attention given
    - ☐ Shortage of materials
    - ☐ Analysis is not familiar
    - ☐ Negligence
    - ☐ Other----------

46. Did you perform trend analysis **(**Observe the presence of line graph of cases by time)

Yes No Unknown Not applicable

47. Do you have an action threshold for any of the Country priority diseases?

Yes No Unknown Not applicable

48. ***If yes for Q 44,*** what is it(Ask for at least 2 priority diseases)? _____cases ____ % increase _____rate

V. Epidemic preparedness

49. Did you have plan for epidemic response and preparedness? Yes/ No
50. Did you have emergency stocks of drugs and supplies? Yes/ No
51. If answer for Q 47 is No, how did you control epidemics?

    _____

    _____

    _____

52. Had you experienced shortage of drugs, vaccines and supplies in 2004 or 2005 EFY? Yes No I don't know
53. Did you established epidemic management committee? ☐ Yes ☐ No ☐ Not Applicable
54. Did the epidemic management committee have regularly scheduled meeting time? Yes/ No
55. Did you established Rapid response team? ☐ Yes ☐ No ☐ Not Applicable
56. Did the Rapid response team have regularly scheduled meeting time during epidemics? Yes/No
57. Did you have case management protocol for epidemic prone diseases? ☐ Yes ☐ No ☐
58. Was there a budget for epidemic response? ☐ Yes ☐ No
59. Any Challenges on epidemic response and preparedness in 2004/05 EFY? Yes / No

60. If answer for Q 56 is yes, a) list the challenges_____
_____
_____
_____
b) what measures did you take to tackle the challenges?_____
_____
_____
_____

*VI. Epidemic response*_____

61. Is there any outbreak occurred in your area in 2004/05 EFY? Yes/ No how money _____
62. If yes for Q 58, how many of them were investigated in 2004/05 EFY? _____
63. Did you have outbreak investigation check list? Yes/ No
64. If answer for Q 59 is No, how did you know possible factors for the outbreak? ----------

65. Where was laboratory confirmation of cases done?

☐ Regional laboratory
☐ Hospital
☐ EHNRI
☐ Health center
☐Contracted private laboratory
☐ Other----------

66. Has the health facility implemented prevention and control measures based on local data for at least one epidemic prone disease?

Yes No Unknown Not applicable

67. Did they achieved acceptable case fatality rates (e.g. 10% for Meningococcal CSM 1% for Cholera) during the most recent outbreak
Observe that the health facility achieved an acceptable case fatality rate for most recent outbreak

Yes No Unknown Not applicable

*VII. Supervision and Feedback*_____

68. Were you supervised by higher level (regional, zonal or woreda) officers in 2003 EFY? Yes /No(observe at least one feedback report)
69. If answer for Q 64 is yes, how many times in 2004/05 EFY? ----------
70. Had you received feedback from higher level supervisors in 2004/05 EFY? Yes /No

71. If answer for Q 66 is yes, how many feedbacks did you received in 2004/05 EFY? ---------
72. Had you faced any challenge on supervision and feedback in 2004/05 EFY? Yes /No
73. If answer for Q 68 is yes a) list the challenges.----------
---

---
b) list the measures that you take to tackle the challenges.----------
---

---
74. How many meetings has this health facility conducted with the community members in the past six months? _____
Observe the minutes or report of at least 1 meeting between the health facility team and the community members within the six months
Yes No Unknown Not applicable

VIII. Resources

75. Logistics

a) Electricity
a) Bicycles
b) Motor cycles
c) Vehicles

76. Data management

a) Stationery
b) Calculator
c) Computer
d) Software
e) Printer

77. Communication

A. Tel. service
B. Fax
C. Radio call
D. Computer with modem

78. Information education and communication materials

A. Posters
B. Megaphone
C. Flipcharts or Image box
D. VCR and TV set
E. Generator
F. Screen
G. Projector (Movie)

79. Other:

Protection materials (list) _____ _____ _____

_____

_____

_____

Questionnaire for Attributes and level of Usefulness:

80. Total population under surveillance_____ 2005
81. What is the incidence / Prevalence of 2004 -in your area/region
    - Malaria _____cases _____Deaths _____
    - AFP(polio) _____cases _____Deaths _____
    - Measles _____cases _____Deaths _____

Level of Usefulness of the Surveillance System for these selected priority diseases

Does the surveillance system help?

82. To detect outbreaks of priority diseases early on time to permit accurate diagnosis? Yes/ No
83. To estimate the magnitude of morbidity and mortality related to these diseases, including identification of factors associated with these diseases? Yes/ No
84. Permit assessment of the effect of prevention and control programs? Yes/ No

Describe Each System Attributes:

Simplicity:

1) Is the case definition of the priority diseases (malaria, measles, AFP….) easy for case detection by all level health professionals? Yes/ No
2) The surveillance system allow all levels of professionals to fill data? Yes/No
3) Does the surveillance system help to record and report data on time?
4) Does the surveillance system (Reporting format) have necessary information for investigation? Yes/No

5) How long it takes to fill the format? a, <5 minute b-10-15 minutes c- >15 minutes
6) How long does it take to have laboratory confirmation of
    i. Measles
    ii. AFP (Polio)
    iii. Malaria
    iv. Others _____

Flexibility:

1. Can the current reporting formats be used for other newly occurring health event (disease) without much difficulty? Yes/ No
2. Do you think that any change in the existing procedure of case detection and reporting formats will be difficult to implement? Yes /No
   Comment:_____
   _____
   _____
3. Is the system easy to add new variables? Yes /No
4. Is the surveillance system easy to integrate with other systems? Yes /No
5. Is the surveillance system easy to add new disease on report? Yes /No
6. Is the system easy to add new information technology? Yes /No

Data Quality: (Completeness of the reporting forms/and validity of the recorded data)

1) Are the reporting site / data collectors trained/ supervised regularly? Yes/No
2) **Observe:** Review the last months report of these diseases
3) Average number of ***unknown or blank responses*** to variables in each of the reported forms
   _____
4) Percent of reports which are complete(that is with no blank or unknown responses) from the total reports
   _____

Acceptability:

1. Were all health workers using the standard case definition to identify cases? Yes/ No
2. If yes, What is your evidence _____
3. Were your health facility send your report using the current and appropriate surveillance reporting format? Yes/ No (if yes observe the documents)
4. Were all the health professionals aware about the surveillance system? Yes/No (if yes how they awared)

Representativeness:

1) What is the health service coverage of the district? _____%

2) Do you think, the populations under surveillance have good health seeking behavior for these diseases? Yes / No
3) Was the surveillance system enabled to follow the health and health related events in the whole community? Yes /No
4) If answer for Q 3 is no, who do you think is well benefited by the surveillance system? ☐ The urban ☐the rural ☐both
5) If yes for Q 3, do you think that rural and urban communities are equally benefited in surveillance system? Yes/ No , if no why

_____

6) Are all the Socio demographic variables included in the surveillance reporting format? Yes /No
7) If the answer for Q 6 is No, which a) Sex---------- b) age group---------- C) ethnic group----- d) religion---------- is less represented?

Timeliness:

1. Are you sending report timely? ☐ Yes ☐ No (observe copy of reports)

Stability:

1. Was any new restructuring affected the procedures and activities of the surveillance of these diseases? Yes/ No
2. Was there lack of resources that interrupt the surveillance system? Yes / No if yes what was it and how do you solve it

_____

_____

3. Was there any time /condition in which the surveillance is not fully operating? Yes/ No
4. If the answer yes for Q #3 When/what is the condition that talks the system not to function properly?----------

---

5. Opportunities for integration

What opportunities are there for integration of surveillance activities and functions (core activities, training, supervision, guidelines, resources etc.)

_____

_____

_____

____

Health Post Level Questionnaire

Region _____ Respondent _____
Zone_____ Tele._____
Woreda_____ Date_____
Health C._____
Name of health Post_____

A. General overview

1. What is the objectives of surveillance? _____
2. What are the strengths of your surveillance system? _____
3. _____
4. What are the weakness of your surveillance system? _____
5. _____

B. Communication and reporting assessment

1. Which communication material did you have?
☐ E-mail ☐ Radio ☐ Other----------
☐ Wired phone ☐ Fax -
☐ Mobile
2. Did you have address of woreda or H.C PHEM officers? Yes /No
3. How frequently are you communicating with the woreda or H.C PHEM officers on emergencies and other daily activities?
   ☐ Daily ☐ Quarterly ☐ Yearly
   ☐ Weekly ☐ Every 6 month ☐ Others----------
   ☐ Every 2 week -
4. When are you expected to send weekly report to the woreda or H.C PHEM unit?
   ☐ Monday ☐ Wednesday ☐ Friday ☐ Sunday
   ☐ Tuesday ☐ Thursday ☐ Saturday ☐ I don't know
5. How are you communicating the woreda or H.C PHEM officers in case of immediately reportable diseases?
☐ By e-mail ☐ By phone ☐ Regular weekly ☐ Others----------
☐ By fax -
6. If you faced any problems on communicating and reporting, list them----------
7. Mention the alternative solutions that you take to tackle the problems you above? -

C. Assessment of availability of Surveillance Documentation, Registers, and Forms

1. Was there national manual for surveillance?☐Yes ☐ No ☐ Not Applicable
2. Did you have standard case definition for all country priority diseases? Yes/ No
3. Was the case definition posted? ☐Yes ☐ No
4. If answer for Q2 is No, for which disease(s) did you lack the case definition?----------
   ---

   --
5. Did you have case reporting formats for out breaks?☐Yes ☐ No ☐ Not Applicable
6. Was there guide line for specimen collection, handling and transportation to the next level? ☐Yes ☐ No ☐ Not Applicable
7. Had you line list format for reporting outbreaks? ☐Yes ☐ No ☐ Not Applicable
8. Was there a clinical register/logbook in your health post? ☐Yes ☐ No ☐ Not Applicable
9. Did you face shortage of surveillance reporting and recording formats? Yes/ No
10. If answer foe Q9 is yes, which form? ----------

D. Data analysis and training assessment

1. Had you trained on surveillance system? Yes/ No
2. If answer for Q1 is yes a) when----------? b) Topic----------?
   c) For how long? ----------
3. Did you analyze data?☐ Yes ☐ No

E. Outbreak investigation and case confirmation assessment

1. Was there any outbreak in your Kebele in 2004/05 EFY? Yes/ No

2. If your answer for Q1 is yes, what did you do?
   ☐ Reported to the woreda PHEM
   ☐ Reported to administrative leaders
   ☐ We investigated
   ☐ Cases referred to health center/hospital
   ☐ Other----------

3. Where was laboratory confirmation of cases done?

   _____

4. Who was responsible to investigate an outbreak?

   _____

5. If answer for Q1 is yes how many out breaks were occurred in your Kebele in 2003 EFY? Fill the table below
6. Had you faced any challenge in outbreak investigation in 2004/05 EFY? Yes/ No
7. If answer for Q 6 is yes, a) list the challenges----------
   ---

   ---

   b) list the alternatives that you take to tackle the challenges.----------
   ---

--------**F. Supervision and feedback**

1. Were you supervised by higher level (regional) officers in 2003 EFY? ☐ Yes ☐ No
2. If answer for Q1 is yes how many times in 2003 EFY? ----------
3. Had you received feedback from higher level supervisors in 2003 EFY? ☐ Yes ☐ No

If answer for Q 3 is yes how many feedbacks did you received in 2003 EFY? ---------
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Chapter IV -Health Profile Description Report

4. **Hetosa District Health Profile description, Arsi- Oromia region, Ethiopia March, 2013.**

Abstract

Background: Health profile description is key for identifying and prioritizing health problem, for planning, implementation and evaluation of intervention activities.

Methods: Cross sectional descriptive study design was used and data necessary for health profile description was collected from woreda health office, woreda administration office, agriculture office, education office, finance and economic development office, water resource office, and others from February 25/2013 to March 15/2013.After data collection and compilation, the data was processed by using Microsoft excel.

Results: In 2005 there were total of 54 schools in the woreda with 97% enrolment rate (47% female). Of these the overall drop out was 3.4%. Female student dropout was 47% and 70% of the dropout was from primary school.

In the woreda there were 23 health post, 4 health center and 20 private health institutions which were delivering health care services. Furthermore, one health center and health post were serving for 37,056 and 5,440 populations respectively. In the district one health center provide service to 37056 people and one health post serves for 5440 people. Potential health service coverage was 77.6% with total health workforce density of 2.2 per 10,000 populations.

Regarding family health service coverage, 89% pregnant mothers were received at least 1st ANC services. Similarly 25.7% of pregnant mothers delivered in health institutions and 37% were received PNC services. At the same time, Penta 3 and measles was 79% and 73% respectively.
From ten top diseases seen in 2004, upper respiratory tract infection was the leading cause of morbidity accounting for 19% followed by acute febrile illness 15%, diarrhea 10% and pneumonia 8%. From July to January 2005 a total of 69 malaria cases were diagnosed and treated, and the incidence was decreased by 40% from previous year. As part of prevention, IRS was conducted and the coverage was 72%. On average two ITNs were also provided for every household and the coverage was 100%.
According to 7 month reports, 6965 clients were screened for HIV and of these 9 were positive. On the other hand, 44 smear positive TB cases were detected with detection rate of 55% in past 2 quarter of 2005.

Discussion: According to HSDP plan the goal of potential health service coverage is 100%, but the actual coverage of Hetosa woreda was 77.6%. In addition, health

work force, 2.2 per 10000 population, was less than WHO standard of 23 per 10000 population. On the other hand 1st ANC coverage and contraceptive acceptance rate was good compared to national 2003 performance report. In contrast, delivery service was less than the national 2003 annual performance as well as, HSDP target. Immunization coverage was less than expected target of 85% and the dropout rate of Penta 1 to Penta 3 and Penta 1 to measles were within expected range (10%), but Penta 1 to PVC-1 and Penta 1 to PCV-3 were very high (greater than 10%).

Conclusion and recommendation: Upper respiratory tract infection was the major health problem. Health service coverage and health work force density was very low. In maternal and child health services the accessibility was good, but the utilization is poor. Regarding communicable disease control and prevention all services were available except for PMTCT and ART services in the woreda. Finally TB detection rate was good compared to national performance but still needed improvement according to WHO guideline.

4.1. Introduction

Health profile description is important to identify and prioritize major problems at any level of health system to make decision for action and to prepare plan. Health profile description include scanning of health system, problem identification, prioritization of identified problems by using prioritization criteria; public health importance, magnitude of the problem, severity or seriousness of the problem, community and political concern and feasibility of the interventions.

In the previous time in Hetosa woreda health office health profile description was not prepared and the health status of the woreda was not documented and known in compiled and organized way. In other word the planning and intervention program was not based on priority problem of the community. Therefore, this study was conducted to prepare health profile of Hetosa woreda and to identify the major problems of the woreda on health system.

4.2. Objective

4.2.1. General Objective:

To assess and describe health related issues about health status, health indicators and to identify problems for priority setting of Hetosa district, Arsi Zone.

4.2.2. Specific objective:

- To identify the health service status of Hetosa District.
- To indicate the major problem related to communicable diseases of the woreda
- To identify observable health problem in the woreda

4.3. Method

4.3.1. Area of study

This study was conducted in Hetosa woreda, Arsi zone of Oromia region. Hetosa is one of the oldest Woreda in Arsi zone, established in 1958 E.C. During 1958 there was no kebele instead divided by landlords and after the introduction of formal government in the district there was 68 kebeles. During derg regime in 1978 for easy management three districts (Hetosa, Dodota and Sire) merged to one and called Keleta Awraja. During the beginning FDRE regime the previous Hetosa district reestablished again in 1984. Then for the sake of easy administration Hetosa woreda were reestablished with 23 rural and 2 urban kebeles in 1986 E.C.

In the district there are a lot of areas to be visited by visitors. Such as natural hot water, Ngoro forest, half of mount Cilalo and Harme Mura and Harke Mura monument.

4.3.2. Study design

Descriptive cross sectional study was conducted to identify and indicate the woreda health service status as well as to identify the major health problem of the area and to set recommendations for the identified major problems.

4.3.3. Sample size and sampling technique.

For health profile description there is no need of sample size determination as well as sampling technique. Because the study was conducted to document and show the woreda's image for planning by gathering information (performance) from different concerned offices and by using 2005 seven month and 2004 annual report of different sectors at woreda office level.

4.3.4. Data collection

Data was collected from Arsi zone, Hetosa district health office and other respective sectors like administration, water sector, agriculture office, education office, animal health office and others by reviewing available data from those mentioned sectors by using structured questioner and interviewing different concerned individuals from 25/02/2013 to 15/03/2013.

4.3.5. Data analysis

Data analysis was conducted by using Microsoft office excels.

4.4. Result

4.4.1. Geography & climate:

Hetosa district is one of the twenty five districts of Oromia region, Arsi zone and located 150 KM from Addis Ababa on the direction of South east and 25 KM from Asela, the capital town of the zone in the direction of West. Hetosa is bordered on the south by Digeluna Tijo, on the south west by Tiyo, on the west by Ziway Dugda, on the North West by East Shewa Zone, on the north east by Dodotana Sire and on the east by Tena with a total area of 714 Km^2 which accounts for 3.39% of the total area Arsi Zone.

The altitude of this woreda ranges from 1500 to 4170 meters above sea level; mount Chilalo is the highest point. It has three Climatic zones, which is 32% Kola, 20% Dega and the rest 48% is Weyina dega. It has on average 21 ^oC annual temperature, maximum of 27 ^oC and minimum 14 ^oC. in addition it has annual rain fall on average 800 mm and ranges from maximum of 1200 mm and minimum of 400 mm and the district rainy season start from June and extend to October.

A survey of the land in this woreda shows that 52.8% is arable or cultivable (46.5% was planted in cereals), 16.3% pasture, 28.1% forest, and the remaining 2.8% is considered swampy, mountainous or otherwise unusable.

4.4.2. Administrative &political structure:

Hetosa woreda has twenty three rural and two urban kebeles. The administrative center of the district is Iteya town. It (Iteya) has a latitude of 8.2 N and longitude of 39.14 E with an elevation of 2215 meters above sea level. All sectors of the district are found in the town (Iteya).

In Hetosa woreda around 60 small scale industries, including 47 grain mills and 1465 registered business center. Of these, 27.7% of them were wholesalers, 39.4% and 32.9% of them were retailer and service provider respectively. There were 37 Farmer Associations with a member of 29,093 and 11 Farmers Service Cooperatives with 18,182 members. Development of road network system is a vital to any countries socio-economic progress. Hetosa woreda has 68 kilometers of dry-weather and 161 all-weather road which connect localities. About 55.3% of the total population has access to drinking water.

Figure 4-1: map of Hetosa Woreda, Arsi zone Oromia region, Ethiopia

4.4.3. Demographic information

According to 2007 census result report, Hetosa woreda had a total population of 124,179. In addition, in 2013 the total population projected in to 148,225 with growth rate of 2.9%. Male to female ratio is about 1:1 which is similar with regional and national ratio. Of those total population, 124509 (84%) were living in 23 rural kebeles and the rest 23716 (16%) were living in 2 urban kebeles of the woreda. Of these total population, women of reproductive age group (women 15-49 years of age) constitute 22.1% and 47.6% of the population were under 15 years of age.

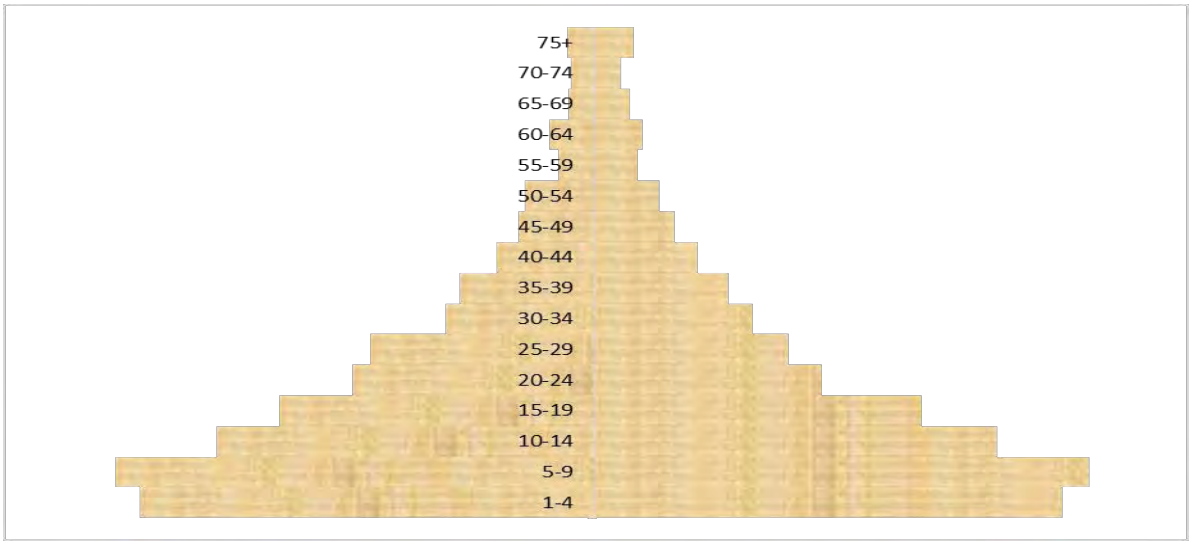

Figure 4-2: Population pyramid of Hetosa woreda, Arsi Zone 2005

From population living in Hetosa woreda about 53.8% of the population were Muslim, 44.7% were Orthodox and the rest 1.5% were Protestant and other religion followers.

There are more than 5 different ethnic group's composition in Hetosa woreda. From the total population Oromo accounts 80.7% of the population, Amhara 17.8% and the rest 1.5% were Silte, Gurage and other ethnic groups. Afaan Oromoo language is the official language in the woreda. However, from the total population Afaan Oromoo was spoken as a 1st language by 76.4%, Amharic by 10.24% and the remaining were other language speakers. The population density was 208 person per 1 Km^2 in 2004. In 2004 in Hetosa woreda there were 4743 surviving infants, 20752 under three and 30880 households. List of kebeles and other detail information is presented in table 1.

Table 4-1: Estimated population distribution profile by kebele of Hetosa Woreda in 2013.

S.No.	Name of kebeles	Total Population	< 1 year	< 3 years	< 5 years	Pregnant	Non Pregnant	# of H.Hs
1	Shaki Sherara	6914	221	968	1134	256	1265	1440
2	Sero Hankato	6879	220	963	1128	255	1259	1433
3	Habe Guchi	6464	207	905	1060	239	1183	1347
4	Hate Handode	6104	195	855	1001	226	1117	1272
5	Boru Lencha	5960	191	834	977	221	1091	1242
6	Jango kilisa	4462	143	625	732	165	817	930
7	Tado Leman	5003	160	700	820	185	916	1042
8	Guri Dabula	4056	130	568	665	150	742	845
9	Dawe Guticha	5152	165	721	845	191	943	1073
10	Daya'a Dabaso	5944	190	832	975	220	1088	1238
11	Itaya 01 &02	17604	563	2465	2887	651	3222	3668
12	Harbe Ademogne	5031	161	704	825	186	921	1048
13	Jawi Chilalo	9122	292	1277	1496	338	1669	1900
14	Sibu Abadir	13650	437	1911	2239	505	2498	2844
15	Anole	2659	85	372	436	98	487	554
16	Hurtuba	1379	44	193	226	51	252	287
17	Tero Moye	2033	65	285	333	75	372	424
18	Welargi	1578	50	221	259	58	289	329
19	Danisa	1852	59	259	304	69	339	386
20	Boru Chilalo	5350	171	749	877	198	979	1115
21	Oda Jila	3744	120	524	614	139	685	780
22	Gonde Finchema	6275	201	879	1029	232	1148	1307
23	Boneya Edo	9132	292	1278	1498	338	1671	1903
24	Debaya Adare	6374	204	892	1045	236	1166	1328
25	Boru Jawi 01	5504	176	771	903	204	1007	1147
G.Total/Woreda		148225	4743	20752	24309	5484	27125	30880

4.4.4. Production

Bimodal pattern of the rain rainfall gives a wide opportunity for the district to produce different types of crops and use the same land twice a year. That is for Meher and Belg. However, Meher is the largest season in terms of both cultivated land area and crop production.

The major annual crops grown in the district are cereals, pluses, Oil seeds and maize. From cereal crops Barley, Teff, wheat and Maize are the most widely grown ones. In addition, it is known in producing some cash crops like tomato, onion, carrot, sugar cane, etc.

In the Meher and Belg season of 2004, about 27415 hectares of land were cultivated from which 924382.625 quintals of production was obtained. These give an average productivity of 33.7 quintals per hectares. By crop type in 2004 wheat with production of 636390(69%), barley with production of 138572 (15%), beans with production of 74399 (8%), maize with production of 20189.125 (2.18%) and the others Teff, sorghum, pea and others with production of 54832.5 (5.93%) quintals.

Fertilizers, improved seeds, herbicides and insecticides are very essentials agricultural inputs to improve crop production and productivity, to meet rapid increase of demand for food and industrial raw material. In Hetosa woreda farmers were using DAP 0.75 quintal per hectare and 0.5 quintal of uria per hectare.

Most inhabitants are farmers (dependents on seasonal agriculture and animal production) 90%, Government and private sector employee 10% and the rest 1% have their own business.

4.4.5. Education

Hetosa woreda had 44 primary school, 2 high school, 1 preparatory and 1 TVET school. In 2005 a total of 33952 students were planned to be enrolled and 32929 (97%) were registered and started class. Of these 47% were females and there was a difference from grade to grade.

Table 4-2: student's enrolment by sex and grade in Hetosa woreda, 2005 E.C

S.No.	Grade	Plan		Achievement		Percentage		
		Total	Female	Total	Female	Total	From Female	Female From total
1	1-8	30076	14647	29401	14064	98%	96%	48%
2	9-10	3412	1475	3126	1146	92%	78%	37%
3	11-12	464	126	402	115	87%	91%	29%
	Total	33952	16248	32929	15325	97%	94%	47%

There were 6 kindergarten schools with 17 sections and the numbers of teachers were 23 with a student's of 990. There were 6 kindergarten schools with student population of 990 and 23 teachers in the woreda.

The district provides primary education by 347 male and 215 female teachers and there were a total of 455 sections. The teacher to student's ratio was 1:50 while class room to student's ratio was 1:61.9.

In secondary school there were 112 teachers with 51 rooms. A teacher to student ratio was 1:27.5 and class room to student's ratio was 1:60. In preparatory school there were 17 teachers.

In the woreda most of the time dropout rate is high in elementary school than others in both sex. On the other hand, female students drop their class than male students in elementary and in preparatory school. Detail information on dropout rate is presented as follow in table 3.

Table 4-3: school dropout by sex and grade Hetosa woreda 2005 E.C.

S.No	Grade	Total # of Students						
		Male		Female			Total	
		No.	% from total male	No.	% from total female	% from total student	No.	%
1	1 to 8	390	65%	399	76%	51%	789	70%
2	9 to 10	202	34%	117	22%	37%	319	28%
3	11 to 12	7	1%	12	2%	63%	19	2%
Total		599	100%	528	100%	47%	1127	100%

Students drop their class for different reasons like migration to abroad, illness, lack of support, they don't have interest to learn, marriage, changing living places, death and discipline. Because of lack of data we couldn't figure out the number of students with their reasons who discontinued discontinue their class.

4.4.6. Facilities and infrastructure

Road is the major one in day to day activities. In Hetosa woreda except Sibu Abadir all kebele have road access with 43.5 Km length of gravel all weather road type and 24 Km of asphalt road. Regarding communication, all urban and rural kebeles have supplied with mobile telephone services. On the other hand, one urban kebele has supplied with digital type of telecommunication. Moreover, 23 rural kebeles supplied with wireless type of telephone. In addition, the district has one agent type of postal services in Eteya town. Among the total health posts and health centers all health facilities have road access except one health post.

In the district both kinds of Energy sources were used. Modern like electricity, biogas, fossil fuel and solar energy and traditional source of energy like Charcoal, animal dug, farm residue and fire wood. All towns of the district had supplied with electric power. On the other hand, some parts of rural areas (Boru Lenca, Hate, OdaJila, Shaki, and Daya Dabbaso) had electric service. In rural and urban areas the dominant source of energy for cooking and other purposes are still the traditional one. In urban area, charcoal is most important energy source followed by fire wood, electricity, crop residues and animal dung were used most frequently. On the other hand, fire wood is the major energy source in rural area followed by crop residue, animal dung and kerosene. However, even if there was electric access in the kebeles none of health centers and health posts had electric power.

When we see the water supply, spring and ground water were the main source of water supply for the district. According to data obtained from water resource office, the woreda drinking water service coverage was reached 72%. Moreover, according to survey result conducted in 2003 most of the populations are getting water within 1.5 K.ms distance and greater than 20 L per person per day. When we see the water supply service in health institutions, all health centers had water supply and from 23 health posts none of them had water supply.

4.4.7. Health system

4.4.7.1. Health indicators

Immunization coverage

At woreda level the dropout rate from Penta one to Penta three was -3.9% and from Penta one to Measles was 4%. Furthermore when we see the dropout of Penta one to

PCV-one was 39% and Penta one to PCV-three was also 35%. The others vaccination coverage presented as follow by type of antigen in table 4.4.

Table 4-4: Seven month Immunization coverage by type of antigen in Hetosa woreda, 2005 E.C

S.No.	Type of antigens	Coverage
1	BCG	69%
2	Penta 1	76%
3	Penta 3	79%
4	OPV0	0%
5	OPV1	76%
6	OPV3	79%
7	Measles	73%
8	PCV-1	46%
9	PCV-3	49%
10	Fully immunization	48%

Maternal health services

To prevent unwanted pregnancy woreda health office is working on family planning services through health extension workers at each kebele level and also in all health centers. To estimate the prevalence of the contraceptive data were not available but we can use contraceptive acceptance rate instead of contraceptive prevalence rate. During the past seven months of 2005 the contraceptive acceptance rate was 59%.

Basedon the Hetosa woreda health office seven month report, 1st visit antenatal care (ANC) coverage was 89%. On the other hand vaccination coverage of TT for pregnant and non-pregnant women was 63% and 47% respectively.

4.4.7.2. Health services

The district had one type A and three type B a total of four government health centers and 23 health posts, one in each 23 kebeles. All health centers and health posts were functional and there were more than 20 private (clinics, diagnostic laboratory and drug stores) health facilities in the woreda. Furthermore, at the end of 2012 the primary health service coverage was 77.6%. Table 5 below shows detail information about health facilities.

Table 4-5: Health Facilities by type in Hetosa Woreda, 2013

Type of Health facilities		Number	Remark
Hospital		0	
Government Health centers	Type A	1	
	Type B	3	
Government Health Posts		23	
Private Health facilities	Clinic	13	
	Diag. Lab.	0	
	Drug. Store	7	

On the other hand, at the end of 2004 one health center was served for 37056 residents and one health post served for 5440 residents.

In the beginning of 2013 a total of 134 health professional and supportive staff were employed and working at different level of health system. In all health centers there were 3 health officers, 32 nurses, 7 mid wife nurses and other paramedics and supportive staffs. In 23 health posts there are 45 health extension workers, which mean 2 health extension workers for each kebeles except Deya Debeso health post. In woreda health office a total of 12 health professionals were working at different department. Additional information regarding number of health professionals and other administrative staffs presented in table 6 as follow.

Table 4-6: Number of health professionals and other administrative staff employed in Hetosa woreda in 2005.

S.No.	Type of Profession	No. of Professionals	Remark
1	Health officer	4	one woreda health office staff
2	Nurses (Deg. And Dip.)	32	9 woreda health office staff
3	Mid wifery nurse (Deg and Dep)	7	
4	Lab. (Deg and Dip)	6	
5	Pharmacy (Dep. And Deg.)	7	one woreda health office staff
6	Environmental health	2	one woreda health office staff
7	Health Information Technologist (HIT)	0	
8	Health education	0	
9	Health Extension Worker	45	
10	others	31	
Total		134	

Considering the health professionals to population ratio, all professionals were included who are working in health facility only. In Hetosa woreda 1 health officer served for 49,408 population, one nurse served for 6445 population, one mid wave served for 21175 and one health extension worker served for 3294 population.

In 2012 ten top causes of morbidity in outpatient department the most frequently occurred disease was upper respiratory infection and accounts about 19% of total cases. List of ten top diseases presented as follow in table 7.

Table 4-7: list of Top Ten Leading causes of OPD in 2012 in Hetosa woreda

S.No	Disease	# of cases	% from total cases	Remark
1	Upper respiratory Infection	1783	19	
2	Acute febrile illness	1010	15	
3	Diarrhea	871	10	
4	Pneumonia	795	8	
5	Intestinal Parasite	731	7.5	
6	Gastritis	650	6	
7	Skin Infection	439	4	
8	Tonsillitis	398	2.9	
9	Eye Infection	209	1.8	
10	Wound/ Injury	189	1.5	
	Others	2314	24.65	
Total		9389	100	

On the other hand, there is no data to show the top ten causes of admission and death in the woreda. Because of lack of monthly morbidity and mortality report it is difficult to show top five causes of morbidity and mortality in under five. However, the outpatient attendance per capita in 2004 was 0.06 per person per year.

Regarding financing all health centers were started health care financing and they started utilizing their money. On the other hand, woreda administration allocated 3,018,093 birr (8%) of the woreda budget (32479649 birr) for health office including running cost, salary, and for drug in 2005 budget year. This budget allocation rate was almost constant for the last 3 years. In 2003 budget year a total of 26,624,914 birr were allocated for the woreda and of these the woreda administration 1,795,281 (7%) birr allocated for health sector. In addition, in 2004 budget year a total of 32,479,649 birr was allocated to the woreda. Of these 2,388,622 (7%) birr were allocated for health sector.

4.4.7.3. Community health service

At this time federal ministry of health implemented developmental army in each kebele starting from 2010. Therefore, all Community health workers are replaced by those developmental armies all over the country.

MCH/RH

One component of the millennium development goal is reducing maternal and child death. To accomplish this goal in Hetosa woreda health office many activities were implemented which was included in the growth and transformation strategic plan. Family planning is one of activities done under reproductive health/ MCH services. In family planning service there are choice of methods like permanent family planning, long acting family planning and short term family planning methods. In Hetosa woreda injectable and pills were mostly preferred methods and now a day the need of permanent and long acting family planning is increasing. The woreda health office also working to satisfy the community needs by train 42 health extension workers out 45 on long acting family planning insertion and by supplying logistics at health post level. Based on this until January 2005 there were 5650 (21%) users of long acting family planning methods.

The other service was post natal care (PNC) service which was given in all health centers and health posts. In 2004 a total of 1871 (39%) mothers were received post natal care services. In contrast, in the past seven months of 2005 a total of 1297 (27%)

deliveries attended in health facilities. Of these 1155 were attended by health professionals in health centers and the rest 142 were attended by health extension workers in health post.

Environmental health/ Water supply & sanitations

Hetosa woreda had a total of 30883 households in 2005. Of these 26093 (86%) had have latrine (latrine coverage) and 18610 (60%) of households were using it (latrine utilization). In the woreda there were a total of 6 communal latrines in Iteya town. Of the total households until January 2005 there were 4171 households, which use solid waste disposal pit. In addition, until January 2005 there was no open defecation free (ODF) kebeles but planned for 5 kebeles for this year. On the other hand, in all kebeles there were safe drinking water supply and as woreda the safe drinking water supply coverage was 72%.

On the contrary, inspection of food and drinking establishments, inspection of government and private health facilities were performed in the previous two quarter according to the schedule. In addition health education was given to the community on different topics such as ANC, PNC, post abortion care, EPI, F/P, STD, HIV/AIDS and others health problems for a total of 143695 within the last seven months of 2005 at different places like at health facilities, schools, religious areas, during associations and others meeting and so on.

4.4.7.4. Endemic diseases

4.4.7.4.1. Malaria

Hetosa woreda has 7 malarious kebeles with at risk population of 21,447. The district health office performed different activities to prevent and control malaria transmission. From the performed activities in the last seven months were case management, indoor residual spray, health education on ITNs utilization and environmental management on mosquito breeding sites. In 2004 ITNs were distributed to all households (100%). Furthermore, IRS was performed once per year and the last year coverage was 78% and 5 kebeles were covered.

In addition to prevention measures, curative service also given for those who diseased with malaria. To diagnose malaria RDT and microscope were using in health posts and health centers. Within the last seven months, a total of 69 cases were diagnosed and treated with anti-malarial drugs. Until now malaria epidemic was not occurred in the woreda.

4.4.7.4.2. TB & Leprosy

In the past 6 months of year 2005 a total of 44 smear positive patients were identified and started anti-TB drug. On other hand all TB patients were screened for HIV and 9 patients were positive for HIV. There was no registered leprosy patients in the last seven months.

4.4.7.4.3. HIV/AIDS

In prevention and control measure of HIV/AIDS program, counselling and testing services, health education, condom distribution and others services were given to the community. In 2004 a total of 14743 tests were performed in VCT room, OPD and other service units. In 2005 within 7 months a total of 6965 tests were performed in different service units (Fig. 1).

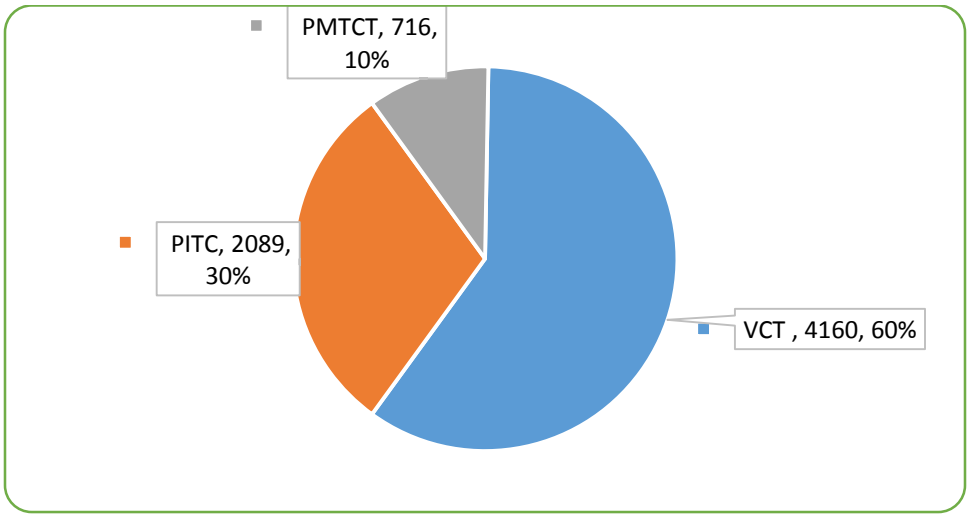

Figure 4-3: Number of HIV counseling and testing in seven months of 2005 in Hetosa woreda

ART service was not available in the woreda instead of that they refer and linked HIV positive cases with other ART sites. Moreover until January 2005 number of peoples living with HIV/AIDS was more than 120 patients.

In all health centers VCT and PITC services were given to the community. But there were no trained health professionals on VCT. In addition, in all health centers health education was given on HIV/AIDS for the costumers. On the other hand in all health posts, health education was given to the community by health extension workers and at the same time they facilitate schedule for VCT service in the health post.

Main streaming was implemented in almost in all different sectors. About 27 sectors were started putting 2% from their budget to perform HIV related activities in the sector. About 20 PLWHA were received financial support from this budget. And also, from 2001 to 2004 CC was conducted in all sectors by using this 2% budget.

In addition, Community conversation (CC) was conducted in all kebeles. From all kebeles (25 kebeles) a total of 88 groups conducted CC and 5280 participants were participated. Furthermore, CC conducted in 32 schools continuously with 270 groups and 13997 participants were participated. On the other hand, in all schools anti-AIDS club was established and there is no NGOs working on HIV/AIDS prevention and control program.

4.4.7.5. Nutritional status and disasters

Even if the area is very fertile malnutrition problem is usual in this woreda. Until January 2005 there were 27 OPT sites, which gives therapeutic feeding service weekly. In OTP there were 195 new admission cases. And there was no establishment center for severe cases.

In the last five years there were no disaster occurred, but in March 2001 acute watery diarrhea epidemic was occurred and more than seven kebeles were affected by the epidemic. By the time epidemic investigation was conducted. The source of epidemic was identified by the investigators and the source was contaminated water. The index cases were infected at Muslim religious festivity in Shekena Husen of bale zone. During the epidemic time a total of 450 cases were admitted and treated at Case treatment center (CTC) and the epidemic was continued for 2 months with zero case fatality rate.

4.5. Discussion

In Hetosa woreda upper respiratory tract infection was most frequently occurred disease in 2004 and similarly it was 1st place in ten top diseases of lists of 2003 at national level. Following to ARTI, acute febrile illness and diarrhea were most frequently occurred diseases in the woreda. In addition, the ten top diseases were not only the major problems but also Malaria, TB/Leprosy and HIV/AIDS had their impact on the community health. However, those diseases have their prevention and control department in woreda health office. So far from July to January 2005, Malaria cases were decreased by 40% compared to last year same reporting period of 2004. TB smear positive case detection rate in the last 2 quarter of 2005 were 55% and the detection rate is better compared to regional and national performance of 2003, which was 33.4% and 32.7% respectively. But when compared to WHO case detection rate standard or target, it was less than 70%. On the other hand HIV counseling and testing was conducted in all health centers. But there was no trained health personnel on VCT in any of health centers. According to the guideline the counselor should take the training before counseling.

Expanded immunization program is one of preventions and control measures program performed under child health department. WHO set EPI coverage target for the control of vaccine preventable diseases. Hetosa woreda in the last seven months, the overall EPI performance was less than the target. Penta 3 coverage was less than regional and national performance of 2003, which was 86.9% and 84.7% respectively. In addition, measles and fully immunization coverage was also less than regional and national coverage like that of Penta 3, which was 83.4% and 81.5% measles and 79.6% and 74.5% fully immunization coverage at regional and national level respectively. On the other hand, the dropout rate of Penta 1 to Penta 3 and Penta 1 to measles was less than 10% and it is in the acceptable range. But the newly introduced vaccine (PCV-3) coverage was less than national target, 85% and dropout rate of Penta 1 to PCV-3 was greater than the target, 35%.

To reduce maternal mortality and to achieve millennium development goal, different activities are delivered at health post and health center level in the woreda. ANC service

is one of the activities done in all health facilities and 89% of the pregnant women in the woreda were taken 1st visit ANC services within seven months of 2005 and the accessibility of the service is better than regional and national performance, 79% and 82% respectively compared to 2003 national report. On the other hand, PNC coverage was 37% and it was less than regional, 41.6% and national, 42.1% performance of 2003.

All over the country including Hetosa woreda, coverage of delivery services attended in health facility was very low. Delivery attended in seven months of 2005 at health facilities in Hetosa woreda was nearly the same, 25.7% (2.8% by HEW and 22.9% by skilled professional) with national, 31.3% (16.6% by HEW and 14.7%) performance of 2003. In addition to that, to increase utilization of delivery service federal ministry of health designed new approach. At this time the main emphasis of the government is the training of health extension workers on clean and save delivery, and simultaneously distribution of delivery kits to health facilities.

To give quality health service to the community and to get acceptance from the community infrastructure is the major and the key component. As HSDP plan, health post was constructed in each kebele. In Hetosa woreda one health post serve for 5440 population and it meet the HSDP target (1:3000-5000 population). On the other hand, to give delivery and other services water supply and electric power is important. But none of health posts had water and electric power supply, but water supply is available in all kebeles and only 5 kebeles had electric power supply. The other HSDP plan related to health facility was constructing one health center to serve 5 kebeles or 25000 population. In Hetosa woreda one health center was served for 37056 population and greater compared to national performance, 1:30794 population and is good compared to regional performance, which was 1:57872 in 2003. So according to government policy there is 2 health center gap to reach one health center for 25000 population target. Furthermore, to give good services water and electric supply is must in each health center. But in Hetosa woreda all health centers have water supply, but none of health center had electric power in the health center. In addition, In the woreda primary hospital were not constructed yet.

According to the assessment of the woreda at the beginning of 2005 there were health workforce densities of about0.02 per 1000 population for HO, 0.16 per 1000 population for nurse, 0.05 per 1000 population for mid wife and 0.3 per 1000 population for health extension worker (H.O 1:49408, Nurse 1:6445, M. Wife 1:21175, and HEW 1:3294). Compared to 2003 regional and national report relatively it is low, which was HO 1:24,146 at regional and 1:22,387 at national level, Nurse 1: 2958 and 1:2772, M. Wife 1:35906 and 1:33903 and HEW 1:2277 and 1:2647 at regional and national level respectively. Furthermore, based on BPR human resource structure at health center level 2 health officer, 8 nurse (BSc and Diploma), 2 mid wife, 2 pharmacy, 2 laboratory and 1 health information technician (HIT) with a total of 17 health professionals are needed in one health center. Based on this BPR structure in Hetosa woreda in all health centers 8 HO, 32 nurses (BSc and Diploma), 8 mid wife, 8 pharmacy, 8 laboratory and 8 HIT with a total of 68 health professionals are needed to give complete health services to the community. On the other hand the available health workers are 3 HO, 23 nurse (BSc and Diploma), 7 mid wife, 7 pharmacy, 6 laboratory and 0 HIT with a total of 45 health workers are working in health centers.

Health service utilization, 0.06/ person/year, was low compared to 2003 regional and national performance and HSDP IV strategic plan, which was 0.3 and 0.7/ person/year respectively.

Health budget allocation in Hetosa woreda was less than the regional and national report of 2003 and ministry of health annual target, 13%, 10% and 15% respectively.

4.6. Conclusion and Recommendation

4.6.1. Conclusion

In Hetosa woreda health service utilization like ANC, Vaccination, contraceptive acceptance rate is fairly good On the other hand, some health indicators are below the target or the standard and it needs improvement. Those gaps which needs improvements such as high dropout rate of Penta to PCV, low PNC and delivery service utilization, low outpatient per capita, high health workers to population ratio, high health center to population ratio, health centers and health posts were without water and electric supply, low budget allocation to health sector, PMTCT and ART services not available, low latrine utilization, low smear positive TB case detection rate were some of the major problems.

Summary of assessment findings:

1. **Weak management system and HMIS**
   - Poor monitoring & evaluation (Incomplete, inaccurate and untimely reporting system)
   - Lack of analysis and utilizations of reports on sites.
   - No feedback to concerned body on regular basis at all levels.
2. **Resource shortage**
   I. Transportation & Other Materials
      - There was no vehicle for health office and had shortage of motor cycle.

   II. Man power shortage
      - There was shortage of clinical health workers (H.O, nurses and mid-wiferies).
      - There was a gap on training for technical staffs (inadequate refreshment training)

   III. Inadequate budget allocation for Health service from woreda council
3. **Low quality of Health services**
      - Underutilization of Health service (low OPD per capita)
      - Lack of experience sharing
4. **Low Family Health service coverage**

- Low access and utilization for vaccination services (penta1 76% and penta3 79%)
- Low vaccination coverage of TT for pregnant and non-pregnant women
- Low Measles coverage compared to the target.....……..73%
- Low utilization of ANC ……..…….. ….....89%
- Low utilization of PNC services ……..39%
- Low performance of Skilled Delivery service ……...…24%
- Low F/P (CAR) service utilization...…… 59%

5. **Prevention and control of communicable Disease (**HIV/AIDS control)
      - ART and PMTCT service is not available in the woreda
6. **Low sanitation coverage**

- Low Latrine coverage and utilization (86% and 60%).
- Low solid waste disposal pit

7. Infrastructure

- Low health service coverage (72%)
- Low water supply access for health posts
- Most health facilities had no electric supply

Table 4-8: Problem Identification and Priority Setting:

S. No	Problems	Magnitude	Sensitivity	Feasibility	Community Concern	Gov't Concern	Total	Rank
1	Weak Management system (Planning , implementation, M&E) and HMIS	5	3	4	3	4	19	2
2	Resource shortage (Human, transportation and Budget	4	3	2	4	4	17	4
3	Low quality of H. Service	4	2	3	4	4	17	4
4	Low Family health service coverage	3	5	4	4	5	21	1
5	Prevention and control of communicable Disease (HIV/AIDS)	2	2	3	2	3	12	7
6	Low sanitation coverage	4	4	3	3	4	18	3
7	Low infrastructure coverage	3	3	3	4	3	16	6

4.6.2. Recommendations

- should be improved
- Family health Services and other activities which were performed less than the target or expected during the study period should be improved within short period of time for the better health of the community as well to achieve national and global targets.
- Additional health professionals should be employed for health centers as per the standard of BPR or WHO guide line.
- On VCT sites health professionals should train on counseling and testing technique to provide quality VCT services to the customers.
- To minimize defaulter rate on ART users in other area due to different reasons and to minimize HIV positive deliveries ART and PMTCT services should be established in the woreda by communicating with concerned bodies.

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Chapter V - Scientific Manuscripts for Peer reviewed Journals

5. **Investigation of Measles outbreak -Abaya, Borena zone, South Eastern Oromia, Ethiopia 2013.**

BACKGROUND: Measles is a highly contagious vaccine-preventable disease that resulted in an estimated 140,000 deaths worldwide in 2010.Measles out-breaks was occurred in Abaya District. This investigation was conducted to identify risk factors contributing to the outbreak.

METHODS: Case-control study was conducted on august to November, 2013 in Abaya District. Cases were identified by using WHO standard case definition. The outbreak was confirmed by laboratory. Data collection instrument was prepared. Bivariate analysis was conducted by using Epinfo 7and odd ratio with 95% confidence interval (C.I.) and P-value < 0.05.

RESULTS: A total of 498 cases (AR 390/100,000) and two deaths (CFR 0.4%) were identified. Of the cases, 424 (84%) were less than 15 years of age. Vaccination coverage for 2013 was 87%. For case-control study 138 data were collected. The statistically significant variables are: health facility distance more than 5km: OR 13 (5.7-31.5); malnutrition: OR 13 (3.5-48); family size above 4: OR 5.7 (1.3-25.8); educational status of the family: OR 5 (1.4-17.8); ventilation of the house: OR 3.5 (1.6-7.6); and vaccination status: OR 3.1 (1.5-6.5).

CONCLUSION AND RECOMMENDATION: Less than 15 years of age were primarily affected by the outbreak. Malnutrition, low community awareness and low vaccination coverage of hard to reach kebeles were likely contributed to the outbreak. Undertaking supplementary immunization, maintaining routine vaccination coverage in hard to reach kebeles, increasing community awareness and managing malnourished cases can reduce measles outbreak.

Keywords: measles outbreak, Abaya, Ethiopia, 2013

5.1. BACKGROUND

Measles has been, and remains, a major killer disease of children around the world. Despite the introduction of the measles vaccine in 1963, measles caused an estimated 2·6 million deaths in a single year as recently as 1980(1). According to the Assessment result of the 2010 global measles mortality reduction goal: results from a model of surveillance data, estimate that, after more than 45 years of measles vaccine availability, the disease caused nearly 140 000 deaths in 2010(2).

Measles is still a public health problem in many developing countries, particularly in parts of Africa and Asia. According to the World Health Organization (WHO), more than 20 million people are affected by measles each year with more than 95% of measles deaths occur in countries that have low per capita incomes and weak health infrastructures(3).

It usually does not kill children directly; however, as a result of its associated immunosuppression, measles can lead to lethal complications, such as pneumonia, croup, and diarrhea. Measles can also lead to lifelong disabilities, including blindness, brain damage, and deafness (4).

It is a highly contagious and vaccine preventable respiratory paramyxovirus infection. The incubation period is 10– 12 days from exposure to the virus to the onset of fever, and a rash usually appears at around day 14 (range 7–18 days). Patients are contagious from about 4 days before eruption of the rash until 4 days after the eruption(5). Measles occurs naturally only in human being(6). All persons who do not had the disease or who have not been successfully immunized are susceptible(7, 8).

Since the introduction of effective measles vaccines, the epidemiology of measles has changed in both developed and developing countries. As vaccine coverage has increased, there has been a marked reduction in measles incidence, and with decreased measles virus circulation, the average age at which infection occurs has increased(7).

In 2001, countries in the World Health Organization (WHO) African Region started implementation of the regional measles mortality reduction strategies with a goal to reduce the estimated number of measles deaths in 2005 to half of the estimate for 1999(9). This goal was achieved, and a new goal was established to reduce measles mortality in 2009 to 90%. The measles mortality reduction strategy adopted by the African Region includes improving routine measles vaccination coverage, providing a second opportunity for measles vaccination through supplementary immunization activities (SIAs), monitoring the impact of vaccination activities through case-based measles surveillance, and improving measles case management(9).

In developing countries with low vaccination coverage, epidemics often occur every two to three years and usually last between two and three months, although their duration varies according to population size, crowding, and the population's immune status. Outbreaks last longer where family size, and hence the number of household contacts, is large. In the absence of measles vaccination, virtually all children will have been infected with measles by the time they are 10 years old(10).

On 24 august 2013, one case of measles was recorded in unvaccinated child from Ledo kebele of Abaya woreda. Lately on WHO week 36 of 2013 the Abaya woreda health office detected increasing number of cases of suspected measles which later confirmed by lab test for measles IgM. These cases were distributed among twelve kebele's in the Woreda. This outbreak was carried out to describe measles magnitude and identify risk factors associated with measles outbreak in Abaya district and undertake appropriate public health control measures.

5.2. METHODS

5.2.1. STUDY AREA

The investigation was conducted in Abaya woreda of Borena zone. It is 370 KM far from Addis Ababa and 200Km from Zone town Yabello. The district has an estimated projected population of 126,794 which

constitute 63,904 and 62,889 males and females respectively in 2013(11).

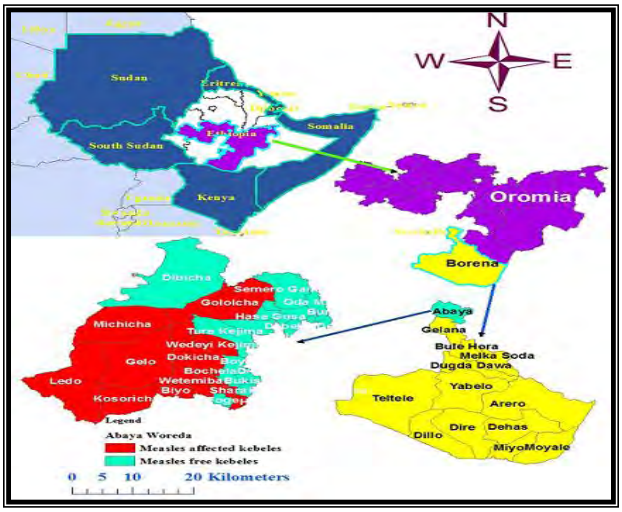

Figure 5 -1: Map of Abaya Woreda, Borena Zone, Oromia Region, Ethiopia, 2013

5.2.2. STUDY PERIOD

The study was conducted from august to December, 2013.

5.2.3. STUDY DESIGN

Case control study design was used to identify risk factors for the occurrences of the outbreak.

5.2.4. DATA COLLECTION

Structured questioner was prepared and used for data collection. Additional data was collected such as line list, observation of cold chain management and case management reports. MUAC was used to identify malnourished children during cases control study. Cases were identified by using WHO case definition.

5.2.5. DATA PROCESSING AND ANALYSIS

Data was entered and analyzed by using Epi-Info7 version 7.1.0.6. Results were presented using graph, table and spot map. Attack rate and case fatality rate were also calculated.

5.2.6. DATA QUALITY CONTROL

We used line listing for describing measles cases interms of time,place and person . in addition, all data were checked for compeletnes before data entery and analysis.

5.2.7. ETHICAL CONSIDERATION

Ethical clearance was obtained as a form of supportive letter from Oromia Regional Health Bureau.

5.3. RESULT

5.3.1. LABORATORY

Among the suspected cases 5 blood samples were taken to identify the etiologic agent and all samples were positive for measles IgM.

5.3.2. DESCRIPTIVE EPIDEMIOLOGY

On 24 august 2013, one case of measles was recorded in unvaccinated child from Ledo kebele of Abaya woreda and had not travelled abroad. A total of 498 suspected cases of measles (incidence of 390 cases per 100,000) were identified and two were died (0.4% CFR). The median age of the cases was 5 years with a range of 6 months and 49 years.

The overall attack rate (AR) of the case was 390/100,000 populations. The attack rate is high in males (440 cases per 100,000 populations) than females (350 cases per 100,000 populations). Less than five years were more affected than the others (<5 yrs 1160/100,000 population and >5 yrs 24/100,000 population).

The affected kebeles were presented on the spot map, which shows the measles case integration with vaccination coverage for 2013. In Ledo kebele vaccination service is weak and it is hard to reach area (it lays on the boarder of Lake Abaya). Because of that reason the case load is high in this kebele (figure 5.2).

The highest attack rate was registered in Kosoricha Kebele, 3,420 cases per 100,000 populations and followed by Ledo, Dhokicha and Gololcha Kebeles, 2,450, 1,520 and 1,270 cases per 100,000 populations respectively.

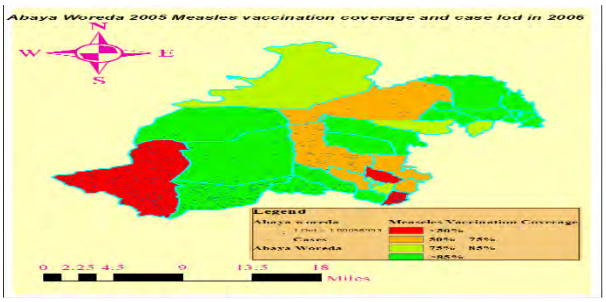

Figure 5 -2: Measles Cases Distributions and 2005 MCV coverage of Abaya woreda, 2013.

Onset of rash occurred between 24 august 2013 and 12December 2013 was presented in figure 5.3. The detection of the outbreak (the cases) was late by 2 weeks. The outbreak stayed for 17 weeks (four months). This might due to insufficient interventions covering all affected kebeles. Most of the affected kebeles are hard to reach areas. The

cases build up gradually to reach its peak on November 09, 2013 and have multiple peaks.

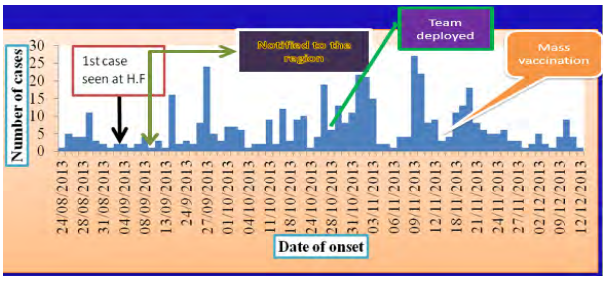

Figure 5 -3: Distribution of Measles cases by Date of Onset of rash-Abaya, Oromia, Ethiopia, 2013.

5.3.3. VACCINATION COVERAGE

The measles vaccine coverage was 87 % in 2013. From the affected cases 61% of them had not received any dose of measles vaccine. Moreover, 46% of the patients aged between 1 year and 15 years (the age range in which a high level of vaccination coverage is to be expected) had not vaccinated. The rest 28%, 7.6% and 2.8% of the patients had received one, two and three dose of measles vaccine respectively. The highest unvaccinated cases were reported from Ledo Kebele which was 38%from the total unvaccinated cases and followed by Kosoricha and Dhokicha which was 21% and 11% respectively.

5.3.4. ANALYTICAL EPIDEMIOLOGY

We compared 46 measles cases with 92 community controls matched by sex and age. All interviewed measles cases had a history of maculopapular rash and fever, 59% had conjunctivitis, 76% had coryza and 93% had cough.

On bivariate analysis The statistically significant variables were: absence of vaccination (OR: 3.1; 95% CI: 1.5-6.5; P: 0.002), educational status of the family (OR: 5; 95% CI: 1.4-17.8; P: 0.002), absence of health facility within 5km radius (OR: 13; 95% CI: 5.7-31.5; P: <0.05), family size above 4 (OR: 5.7; 95% CI: 1.3-25.8; P: 0.01), ventilation of the house (OR: 0.28; 95% CI: 0.13-0.62; P: 0.00099), nutritional status of children (OR: 13; 95% CI: 3.5-48; P: 0.0000058) and contact history with measles infected person (OR: 27.9; 95% CI: 9.6-81.3; P: 0.0000).

5.3.5. INTERVENTION UNDERTAKEN

The investigation team identified and characterized the measles outbreak. 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 measles. Routine surveillance was enhanced and the situation was closely followed at each level on a daily bases.

5.4. DISCUSSION

A prolonged measles outbreak was occurred in Abaya Woreda of Borena zone starting from august 24, 2013 to 12 December 2013. Through the outbreak time a total of 498 cases were identified with highest attack rate compared with the attack rate of measles outbreak recorded nationally, 4.1 per 100,000 population, in 2008(8). In Wenzhou city of china and Granada of Spain the study revealed that lowest measles incidence rate, 3.3 and 33.6 per 100,000 populations respectively, compared to this study(12,13).

The highest attack rate was observed among children under the age of 15 years (85.3%), which is comparable with the observations made by other outbreak investigation studies(14,15). The AR identified on 8-11 month was higher than the attack rate reported on other study conducted in Wenzhou city (171/ 100,000) of china(13).

In developing countries, the expected case-fatality rate is between 3% and 6%. In certain high-risk populations, case-fatality rates as high as 30% have been reported in infants aged less than 1 year of age(8).

In this study tow measles deaths recorded and the CFR was less than 1%. it is less than the expected CFR in developing countries and it is similar with Sudan and India findings; CFR of 0.9% and 0.45%, respectively (16,17). This might show the level of the quality of case management.

In the laboratory investigation five blood samples were tested in Ethiopia Health and Nutrition Research Institute (EHNRI) laboratory in August, 2013 from Ledo kebele.

All of the samples were confirmed as measles IgM positive. The rest cases were categorized as Epidemiological linked cases.

Several factors contributed to the occurrence of this measles outbreak.

The Majority of measles affected children had not received measles vaccination. The study done in the Netherlands and Minnesota revealed that 94% and 96% of affected children by measles outbreak were unvaccinated (18,19).Vaccination is known to be the main protection against Measles. The recent (2013) measles vaccination coverage was less than 90% (national and WHO target)(20).Among the total kebeles half of them were reported low vaccination coverage in 2013 compared to the target (especially those measles affected kebeles).From the total measles cases the highest cases were reported from Ledo kebele and the lowest (29%) measles vaccination coverage for 2013 was also reported from this kebele. According to this study finding, there is a strong association between vaccination and the chance of acquiring measles virus. Vaccination has protective effect during this outbreak time.

In this study distance is one risk factor. Most of the affected area was found above 5km distance from health center. According to bivariate analysis result, there is a strong relationship between the distance of health facility from the household and the chance of getting measles. In other words, when people are far from health center greater than 5 km, there was 13 fold chance of acquiring measles during an outbreak.

This finding revealed that educational level of the parents had association with the chances of acquiring measles. Children from non-educated family were two times at higher risk than those educated one for measles infection during an outbreak. Correspondingly the parents' knowledge about measles transmissions was low. Similar study conducted in Laos showed that 9% and 18% knew that measles can be transmitted by inhalation and the disease can be prevented by vaccination respectively(21).

Furthermore, the most powerful relationship was observed for ``contact history'' which is not surprising given that the virus has a secondary attack rate of more than 90% among susceptible individuals. Due to the high transmission efficiency of measles, outbreaks have been reported in populations where only 3% to 7% of the individuals were susceptible (8, 10, 21).

Measles was more common in households with more than one child. This could reflect an increased risk of exposure to measles, increased severity of measles or both(22). The association between number of family members more than four in the household and measles was stronger for measles transmission. Moreover, the transmission of the measles virus is strongly associated with ventilation of the house. This means a person living in unventilated house has a chance of 3.5 fold acquiring measles than living in ventilated house.

Measles infection is more severe among children who are already malnourished. Moreover, measles may exacerbate malnutrition because of decreased food intake due to malaise, increased metabolic requirements in the presence of fever, or the mistaken belief of parents and health practitioners that a child's food should be withheld during an acute illness. Under nutrition may lead to or worsen vitamin A deficiency and keratitis, resulting in a high incidence of childhood blindness following measles outbreaks(11). My result showed that, there is strong association between malnourished children and measles infection.

This all factors might contribute to measles outbreak.

5.5. CONCLUSION

Unvaccinated children less than 15 years of age were primarily affected by the outbreak. The case fatality was less than 1%. The woreda routine measles vaccination coverage was less than the expected national target for year 2013. Low vaccination coverage, presence of high family members, low community awareness and presence of health center at a long distance from households

(>5KM) were likely contributed for the occurrence of this measles outbreak.

5.6. RECOMMENDATION

- Strengthen measles routine vaccination activities and the coverage should be monitored accordingly in each level.
- Woreda health office should give emphasis for hard to reach kebeles to strengthen routine vaccination.
- Social mobilization activities should be strengthened to increase the awareness of the community on the importance of obtaining measles vaccination as soon as possible before one year age.
- Provide supplementary vaccination campaign.

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Chapter VI - Abstracts for Scientific Presentation

6.1. Investigation of Measles outbreak -Abaya, Borena zone, South Eastern Oromia, Ethiopia 2013.

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Abstract

Measles is a highly contagious vaccine-preventable disease that resulted in an estimated 140,000 deaths worldwide in 2010.Measles out-break occurred in hard to reach kebeles of Abaya District, Borena Zone, Oromia region. I conducted investigation to identify risk factors contributing to the outbreak and to provide evidence based recommendations. Matched community case-control study was conducted from august to November, 2013 in Abaya District. Cases were identified by using WHO standard case definition. The outbreak was confirmed by using serological laboratory test. Pre-designed data collection instrument was used. Bivariate analysis was conducted using odd ratio (OR) with 95% confidence interval (C.I.) and P-value < 0.05 by using Epinfo 7. A total of 498 cases (AR 390/100,000) and two deaths (CFR 0.4%) were identified. Of the cases, 424 (84%) were less than 15 years of age. Vaccination coverage of the District in 2013 was 87%. On case-control study a total of 138 data were collected. The statistically significant variables are health facility distance more than 5km: OR 13 (5.7-31.5); malnutrition: OR 13 (3.5-48); family size above 4: OR 5.7 (1.3-25.8); educational status of the family: OR 5 (1.4-17.8); ventilation of the house: OR 3.5 (1.6-7.6); and vaccination status: OR 3.1 (1.5-6.5). All health posts had no functional refrigerator. Less than 15 years of age were primarily affected by the outbreak. Malnutrition, low community awareness, inadequate and poor cold chain management and low vaccination coverage of hard to reach kebeles were likely contributed to the outbreak. Undertaking supplementary immunization, maintaining routine vaccination coverage in hard to reach kebeles, increasing community awareness, expanding and improving cold chain management and managing malnourished cases can reduce measles outbreak.

Keywords: measles outbreak, Abaya, Ethiopia

6.2. Measles outbreak investigation, Gololcha, Arsi zone of Oromia Region, Ethiopia, 2014.

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Abstract

Background: Measles is a highly infectious disease that causes mortality in both developing and industrialized countries. It is estimated that in 2012 about 20 million people contracted measles and122, 000 of them died worldwide.

Methods: Matched community case-control study design was used to identify the risk factors of the outbreak. Structured questioner was used during the interview. To identify the cases WHO measles standard case definition was used. Data was analyzed by using epinfo 7 and excel.

Results: A total of 357 measles suspected cases were identified. The outbreak lasted 11 weeks. Of the total suspected cases 185 (52%) were male and 220 (62%) were reported from Komtu Gogeti Kebele. The median age of the cases was 6 years with rage of 3 month and 30 year. Totally seven kebeles were affected by the outbreak. Under five age group were mostly, 148 (41.5%), affected and above 85% of the cases were less than 15 years. Sixty one percent of the cases were not received any dose of measles vaccine. The rest 27% and 12% were received one and tow or above doses of measles vaccine respectively. The crude attack rate was 0.2% with 2.5% CFR. Among the total cases 3% of them were developed complications like pneumonia, diarrhea and otitis-media. Five blood samples were sent to EHNRI and four of them were measles IgM positive.

For case control study a total of 60 cases and 120 controls were interviewed. The mean age the participants were 7.2 years with age range of 7 months and 38 years. In bivariate analysis, being not vaccinated 1st doses at nine month, having contact history with measles infected person, presence of measles infected person in the house and nutritional status were significantly associated risk factors with the outbreak

Conclusion and recommendation: Several risk factors were contributed in the transmission the outbreak. Fail to vaccinate and being not vaccinated 1st doses at nine month, absence of isolating measles infected cases and presence of sever acute malnutrition were the major risk factors. Strengthening routine vaccination service and conducting mass vaccination, increasing community awareness on isolation infected person and early management of sever acute malnutrition was recommended.

Keyword: Gololcha, measles outbreak, Ethiopia 2013.

Chapter VII - Narrative Summary of Disaster Situation

7. Report on Belg Emergency Needs Assessment in Oromia Region, South Eastern Ethiopia, June 2013.

Abstract

Health and nutrition component of Belg 2013 needs assessment was conducted in June 2013 in East Shewa, Bale and Arsi zone. Regional health bureau and WHO representatives conducted the assessment in the three zones and sampled Woredas from each zones. Health and Nutrition related data that are necessary to anticipate and respond to emergency situation was collected and analyzed in this report.

Multi-agency Belg 2013 needs assessment was conducted in Oromia region of south eastern Ethiopia from 17 June 23013 to 26 June 2013. A team comprising of experts from RHB, WFP, WHO, UNOCHA, Regional Water Office, National Metrology Agency, Zonal Dan Church Aid, and Save the Children have participated in the assessment of cross-sectional survey type with objective of identifying humanitarian need for the second 6 months of 2013. The assessment was conducted in the following sampled Woredas: Dawe-Kachen, Gasera, Harena Buluk, Meda Wellabu, Seru, Tena, Ziway Dugda, Liben, Adami Tulu and Fentale. The Method utilized for this assessment include group discussion, direct face to face semi-structured interview, document review, observations, briefing and debriefing to collect data from respective zonal and woredas health offices.

Multi-Sectorial taskforce is established at all visited zonal and Woreda level. However, problem exists with respect to coordinated planning, implementing and evaluation of emergency preparedness and response activities. On the other hand, Epidemic of Measles has been reported from Berbere, Gololcha and Gasera of Bale zone, Lemu Bilbilo, Onkolo Wabe, Shirka and Bele Gasgar Woredas of Arsi zone and Adami Tulu and Adea of East Shewa zone. On the other hand meningitis cases has been reported from Adami Tulu and Batu woredas. In addition, Drugs and supplies for preparedness and response were found inadequate at all zonal and Woreda level. Water related diseases such as diarrhea/AWD and malaria are also found to be the feared epidemic in the zone.

Zonal data shows the malnutrition trend was slightly increasing in Arsi zone and decreasing in Bale and East Shewa zone. More specifically, in food insecure Woredas like Ziway Dugda, it is expected to rise in the coming summer season. Consecutive screenings done in last six month also show incremental in all three visited zones. Major problem observed in the assessment is lack of linking screening

and TFP with supplementary feeding program. Lack of proper distribution of TFP supplies has also been observed.

Public health emergency preparedness and response program is not well coordinated and functioning at all level. EPRP and multti- sectorial coordination forum was not developed and performing in most visited zones and woredas. Thus, strengthening PHEM coordination and multi-sectorial approach to preparedness is recommended. This includes capacity building in training, data/report quality improvement, capacity building and budget allocation. In addition, Diarrheal diseases (including AWD/cholera), malaria, measles, malnutrition, meningitis and rabies are the most feared epidemic prone diseases in all zones. Preparedness and response activities should be given emphasis among these priority diseases by preparing drugs, supplies and other important resources to manage anticipated epidemics.

Finally the risk of Beseka Lake in Fentale Woreda requires integrated response and multi-sectorial approach in risk reduction, preparedness and response to the problem.

7.1. Introduction

Experience has shown that coordinating Humanitarian need and community risk assessments is an important element in saving lives and restoring people's livelihood. Along with emergency preparedness, the timeliness and quality of assessments help determine an effective humanitarian response. A coordinated assessment is an assessment planned and carried out in partnership by humanitarian actors, in order to document the impact of a particular crisis and to identify the needs of affected population. Credible and accurate assessment results from the basis for needs-based strategic planning and system-wide monitoring(1).

Humanitarian need assessment/community risk assessment is a process of assessing hazards, vulnerabilities, risks, ability to cope, preparing coping strategies and finally preparing a risk reduction options implementation plan by the local community. In Ethiopia this humanitarian need assessment is conducted twice a year, during Belg (around June,) and Meher (around November).

The major public health risks identified in the Ethiopian health system from high priority to low priority are Epidemics of communicable disease, Drought conditions with malnutrition, Food contamination, Flood, Pandemic Influenza, Diseases that affect people during conflicts and in displaced populations, Accidents including chemical spills, Earthquake, volcanic eruptions and Bioterrorism(2)

DRMFSS and EHNRI organized the seasonal multi-agency needs assessment for post-harvest (Belg) in collaboration with WFP and UNOCHA.The multi-agency team deployed for the assessment of Belg composed of experts from RHB, WFP, WHO, UNOCHA, Regional Water Office, Regional DPPC, National Metrology Agency, Zonal Dan Church Aid, and Save the Children were deployed to three Zones of Oromia region. The assessment was conducted from 17/6/2013- 26/6/2013 in the selected woredas and zones focusing on emergency and emergency prone diseases, contingency planning, availability of drugs and medical supplies to respond to outbreaks, emergency health and nutrition conditions. Zonal and Woreda Health Officials were contacted during the assessments. Description from individuals, field observations and analysis of secondary information obtained from various government offices were used to collect basic information during the assessment.

7.2. Objectives

7.2.1. General Objective

To assess emergency requirements and to contribute in ensuring appropriate and effective humanitarian planning and responses that leads to reducing morbidity and mortality in the most vulnerable areas of the assessed zones.

7.2.2. Specific Objectives

- To assess the extent, types, magnitude, severity and likely of the different hazards (drought, human epidemics, sever and acute malnutrition, etc.) and risks to the populations in the most vulnerable Woredas (including to identify the most vulnerable populations) for epidemic prone problems considering health and nutrition emergencies.
- To assess the existing capacity of the health services to address health and nutrition emergencies likely to occur during the second six months of 2013;
- To determine the shortcomings (gaps) in the capacity of the existing health services to address health and nutrition emergencies likely to occur between July and December 2013;
- To identify areas where health and nutrition emergency assistance might be needed during the coming six months due to acute problems and come up with reasonable estimates of the size of the population needing emergency assistance.

7.3. Methodology

By the time of the assessment three (Bale, Arsi and East Shewa) zones were covered and selected woredas from each zone were included. Cross sectional descriptive study was conducted. Selection of woredas was made based on the discussion with zonal multi sectorial task force committee during the briefing time. As the discussion, a total of twelve (Fentale, Adami Tulu, Liben, Ziway Dugda, Tena, Seru, Mede Wellabu, Dawe Kachen, Gasera and Harena Buluk) were selected for field visit. Time constraint was the major problem during the assessment. Because of that the team was forced to subdivide itself in to two groups at the beginning to achieve its objectives.

Before the assessment briefing was conducted for all zonal multi-sectorial task force committee at zonal level. Then Woredas were selected for the field visit based on potential risks. By using semi-structured questioners interview method was conducted to collect data from zonal and woredas health offices using zonal and woreda level questionnaire. In addition to that, a review of documents and reports obtained from woreda and zonal health offices, discussion with woreda and zonal preparedness and response task force officials and program managers, and field visit in selected woredas and kebeles were conducted. Finally, Discussions were also conducted at both zonal and woreda administration offices.

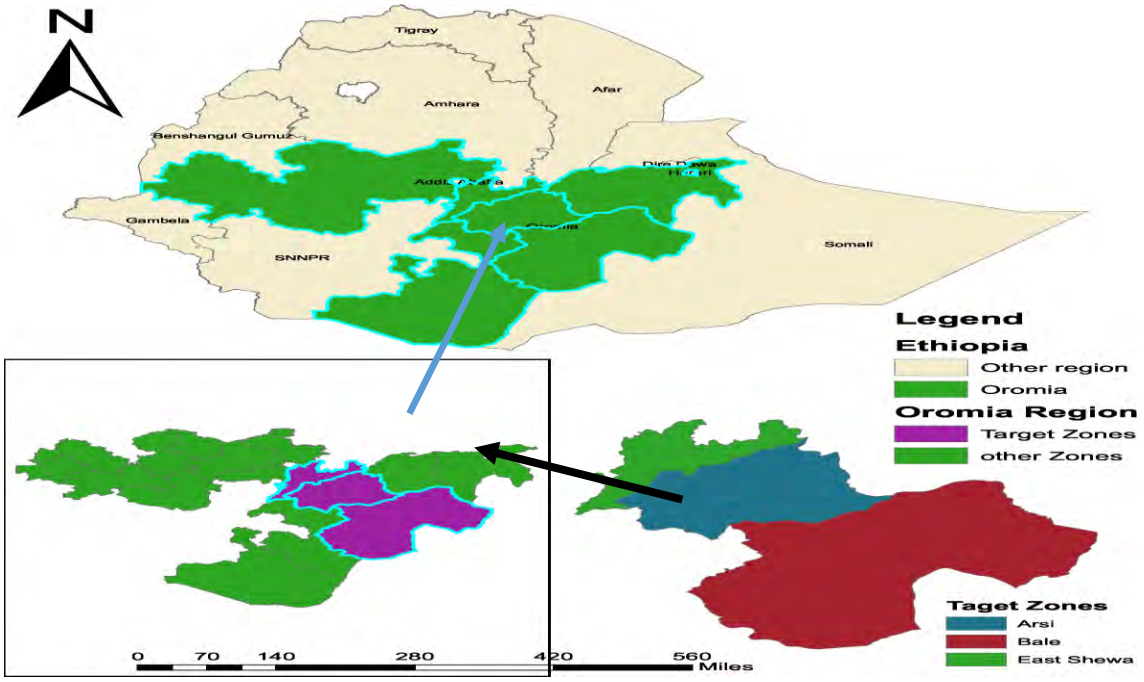

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Figure 7-1: Map of target zones for Belg assessment in Oromia region 2013.

7.4. Findings

7.4.1. Coordination of EPRP

Zonal multi-sectorial taskforce is existent in all visited zones. Similar report was also found at Woredas level. However, coordination of the committee in preparedness and response was found very weak. The activities of the taskforce were not found to be functioning coordinated planning, implementing and evaluation of emergency preparedness and response activities. There is no regular meeting at all levels. All concerned government, NGOs and donors are also not represented where it exists.

Zonal and Woreda health offices claim the availability of emergency preparedness and response plan, and most of them were not prepared the EPRP. However, most of them had assigned budget for preparedness. All visited zones has been conducted training on PHEM at zonal level, except East Shewa zone this year, and as a result there are untrained PHEM focal persons who replaced turnover positions in East Shewa zone. Seven zonal and 112 Woreda level professionals have been trained on PHEM from Bale and Arsi zones. Except two woredas of Bale Zone, Rapid response team at Woreda health office is available in the visited Woredas.

Regional health bureau in collaboration with WHO has given training on risk reduction and emergency preparedness and response for flood affected areas in the East Shewa zone. Two persons from flood affected Woredas (Adama Town, Adama, Beset, Fentale, and Bora) and one PHEM focal person from zones have taken the training. Training was not given for the RRT in all visited Woredas.

7.4.2. Epidemic Situation

7.4.2.1. East Shewa Zone

Epidemic of measles and meningitis has been reported from the zone in the last three months. However, it was contained and there was no ongoing outbreak at the time of the Belg Assessment 2013.

Measles outbreak has been reported from Adami Tulu and Adea Woreda with zonal total of 96 suspected cases and no death from January 06, 2005 to June 1, 2005 EC (fig. 1). Of the total cases 52 (54%) of them were reported from Adami Tulu and the rest 44 (46%) were from Adea Woreda. As a result of the national measles SIA campaign, risk of measles epidemic is expected to be minimized.

Meningitis outbreak occurred in Adami Tulu, Batu Town, Bora, Metehara Town, Boset, and Dugda Woredas with total of 13 suspected cases and 1 death. Vaccination has been given for population in 185,145 populations in Adami Tulu Woreda and Batu Town.

Figure 7-2: Measles Trend in East Shewa Zone, 2013

Zonal data of malaria shows an alarming increase in last week of June 2005 EC (first week of July 2013) with sign of outbreak in some Kebeles of Woredas like Liben. IRS is done once a year due to lack of budget in most Woredas. For instance in Liben Woreda, due to lack of budget, only 3 of 11 malaria most risk Kebeles has been sprayed in Belg 2013. There was no ITN distribution this year. In addition, due to climatic and geographic condition of the zone, most population in the zone are at highest risk of malaria outbreak (fig. 7.3).

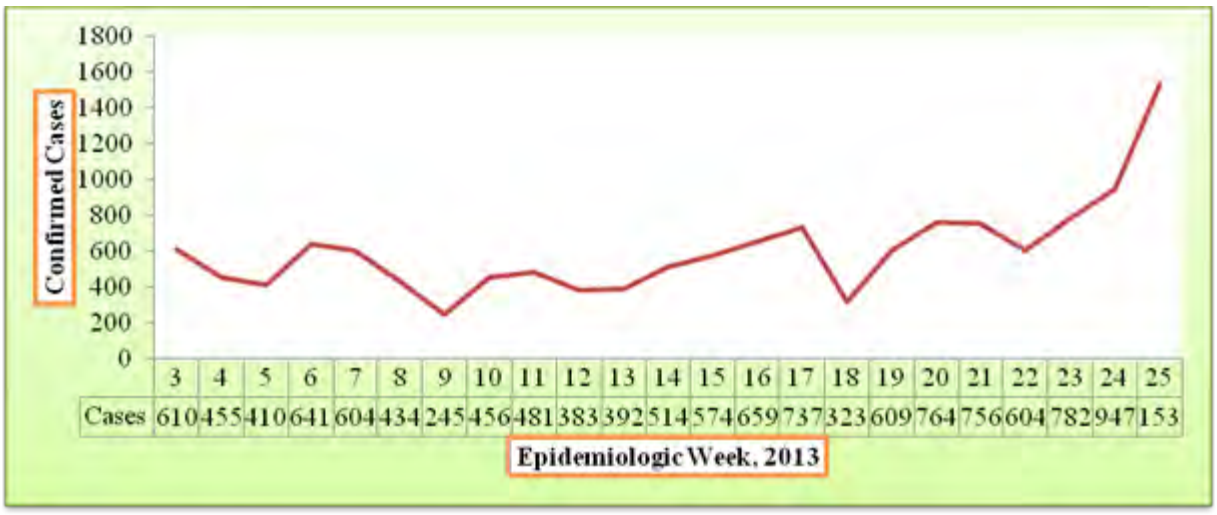

Figure 7-3: Trends of Malaria cases, East Shewa Zone, 2013

Overflow of Beseka Lake in Fentale Woreda

Gradual overflow of Beseka Lake in Fentale Woreda is becoming a concern for the Metehara Town and surrounding Kebeles in Fentale Woreda. In 2003 EC, drainage system was made by regional water office to decrease the risk of flooding and blockage of the main road. However, the drainage has affected surrounding villages by over flooding and drying plants in the right and left side farmlands. As Atom Muktar Fentale (community leader) and villagers said, more than 190 households have lost their productive land due to the drainage system. Increased disease of human and animals has also been observed since the drainage is made, according to these villagers. Therefore, food insecurity and health problem related to the impact of the Lake Beseka and Drainage system is increasing and needs due attention.

7.4.2.2. Arsi Zone

Measles epidemic has been reported from Lemu Bilbilo, Onkolo Wabe, Shirka and Bele Gasgar Woredas. The epidemic was controlled in May 2013. More than 1000 cases and 2 deaths were reported since then. Water related diseases such as diarrhea and amoeba/giardia has also been reported in last five months.

In some low land areas such as Ziway Dugda, malaria epidemic is anticipated due to low performance of malaria prevention. Preparedness for malaria such as spray and ITN distribution was not conducted in last 6 months. Last IRS was made in August 2012 and re-spray couldn't be done because of shortage of budget.

Water related diseases such as diarrhea/AWD, malaria and measles was the anticipated epidemics in the zone.

Slight increment in malaria cases has been observed from March-May 2013. However, number of measles cases decreased in the same period (fig. 7.4). Poor data quality as well as low completeness can be observed from the zonal data shown on graph below. As shown on the graph, week 43 is missed and report was not reported to the next level due to the presence of campaign in the zone.

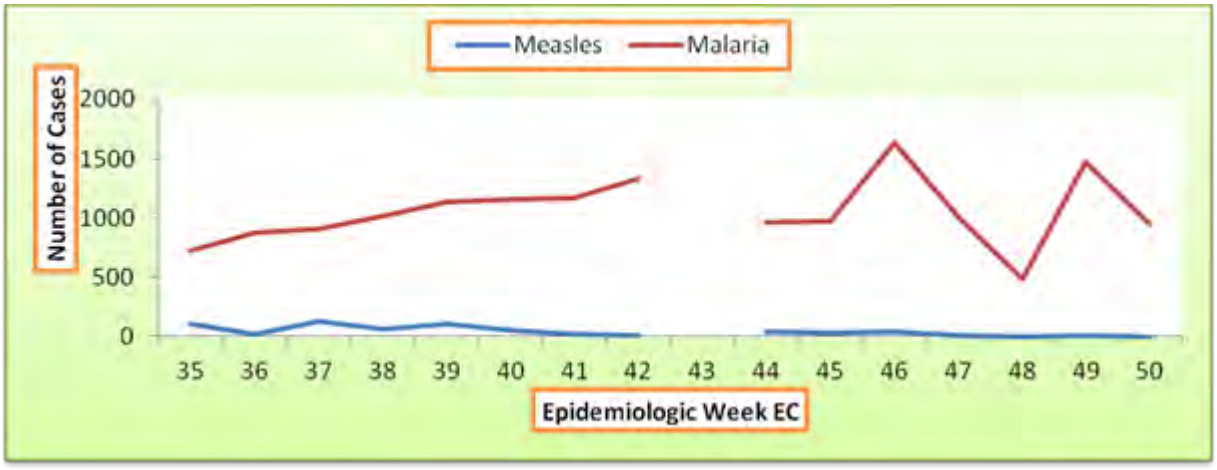

Figure 7-4: Trends of Malaria and Measles cases, Arsi zone, 2013

7.4.2.3. Bale Zone

Epidemic of Measles has been reported from nine Woredas according to the zonal report in the last nine months. A total of 509 cases and 2 deaths were reported in the last nine months (table 7.1). Epidemic of suspected Typhoid fever cases was reported from Gasera Woreda in Megabit 2005 with total of 21 cases and 2 deaths. In other visited Woredas there was no epidemic. Water related diseases such as diarrhea and typhoid fever has also been reported in last five months.

Table 7-1: Number of measles cases by woreda in Bale Zone 2013.

S.No	Woreda	# of cases	# of death	2005 EFY Measles vaccination coverage (%)
1.	Gasera	20	0	86
2.	Berbere	62	0	116
3.	Dawe Serer	66	0	104.8
4.	Ginir	31	0	88.4
5.	Gololcha	291	2	83.1
6.	Goro	5	0	93.9
7.	H/Buluk	12	0	71.4
8.	M/Wellabu	17	0	95.1
9.	Sinana	5	0	95.9
	Zonal	509	2	92.7

Decreasing trend of malaria cases has been observed from January 2013. However, number of measles cases raised in the same period (fig. 7.5)

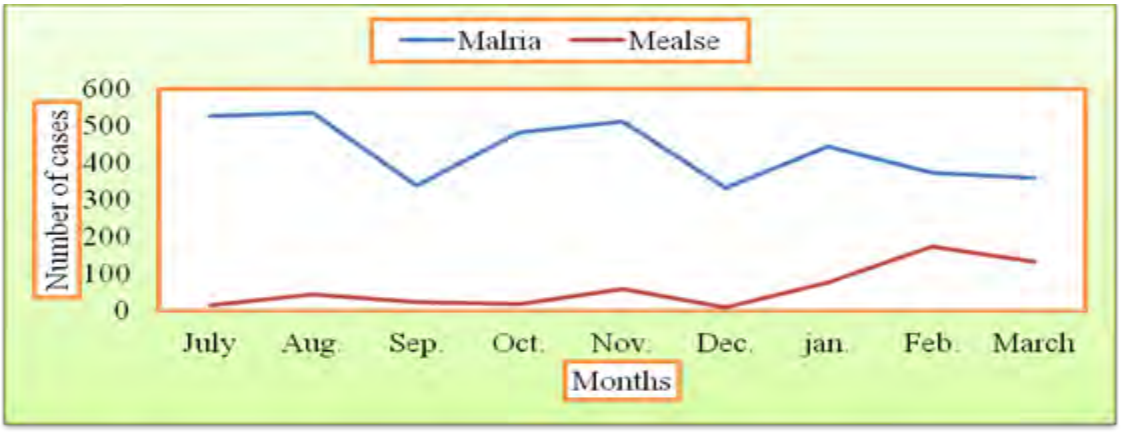

Figure 7-5: Trends of Malaria and Measles cases, Bale zone, 2013

Epidemic Preparedness and Response Drugs and Supplies

Most of drugs and supplies for preparedness and response of malaria and measles was reported to be adequate at Woreda level in East Shewa and Arsi zone, but there is shortage at zonal and woreda level of Bale zone. However, zonal health office reported their inadequacy. Anti-malaria drugs including the new anti-malaria drugs was found inadequate and there was adequate RDT kit in the visited woredas. ORS, IV fluids and other drugs for diarrheal diseases are also adequately available at Woredas visited but not reported from zones. Other drugs for diarrheal diseases such as cholera and typhoid fever such as doxycycline, CTC and PPE are also not found during the assessment. On the other hand. Supplies for emergency reproductive health such as delivery kit and MVA are available at all Woredas visited. Minimum initial service package for RH training was also not given in the zone.

7.4.3. Nutrition

7.4.3.1. East Shewa

In East Shewa zone malnutrition problem is common like other zones of Oromia region. Because of that routine outpatient therapeutic feeding program (OTP) is established and conducting treatment and follow up every two weeks in all kebeles. In addition, establishing center is prepared to admit severe malnutrition and in all woredas community health day screening program carried out every three moth.

According to zonal routine malnutrition monthly report, starting from July 2012 to April 2013 a total of 4528 new SAM cases were admitted to the OTP program in all woredas. Of these SAM cases, the highest cases (23%) were reported from Adami Tulu woreda followed by Boset (15%) and Dugda (13%) (Figure 7.6). Furthermore, in

some woredas like Adami Tulu, Dugda and Adama the reported new SAM cases was high in July to October 2012 compared to other months. This indicates needs some intervention for the next 6 months.

Figure 7-6: Number of SAM cases admitted to OTP and SC program by Woreda in East Shewa Zone, 2012/2013.

On the other hand, the zonal malnutrition trend was decreased in March and April 2013, but the highest number of cases (46%) were still reported in July to November 2012 (especially number of SAM cases reported in October is two times higher than other months) (figure 7.7) at zonal level.

Figure 7-7: Trends of SAM cases of East Shewa Zone by month, 2012/2013.

Prior to this assessment community health day (CHD) malnutrition screening was carried out three times from June 2012 to April 2013. As a result, a total of 509,272 (81.9%) under five children and 96,031 (62%) pregnant and lactating women were screened for malnutrition status. Of these screened under five children, 1,943 (0.4%) and 10,591 (2%) of them were identified as sever acute malnutrition (SAM)[1] and

[1] SAM case include edema and MUAC <11 cm

moderate acute malnutrition (MAM)[2] cases respectively. Similarly from screened PLW[3], 3,312 (3%) of them were identified as MAM cases. According to CHD screening result the trend of SAM cases was decreased. However, MAM cases of under-five children and PLW was increased (Figure 7.8).

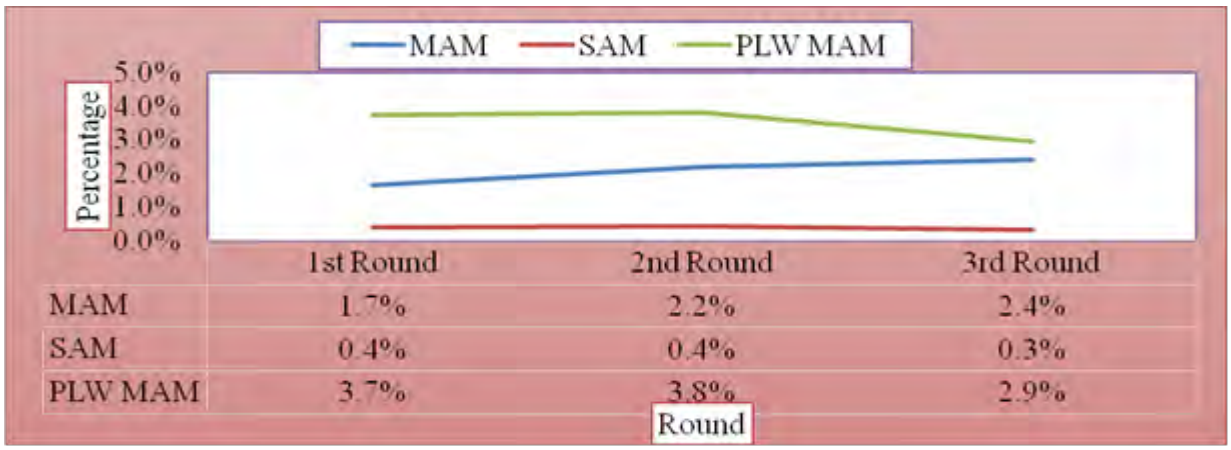

Figure 7-8: Trends of SAM, MAM and PLW MAM by round in East Shewa zone, 2012/2013.

7.4.3.2. Arsi Zone

Similar with East Shewa zone, CHD was conducted In Arsi zone for three rounds. A total of 1,197,252 under five children were screened on the previous 3 rounds. Of these, 7,717 (1%) and 29,074 (2%) of them were identified as SAM and MAM cases respectively. Furthermore, 170,539 pregnant and lactating women were screened in all rounds. Of these, 16,623 (10%) of them were identified as MAM cases. Figure 7.9 shows the detail screening results of each round for under five children and pregnant and lactating women.

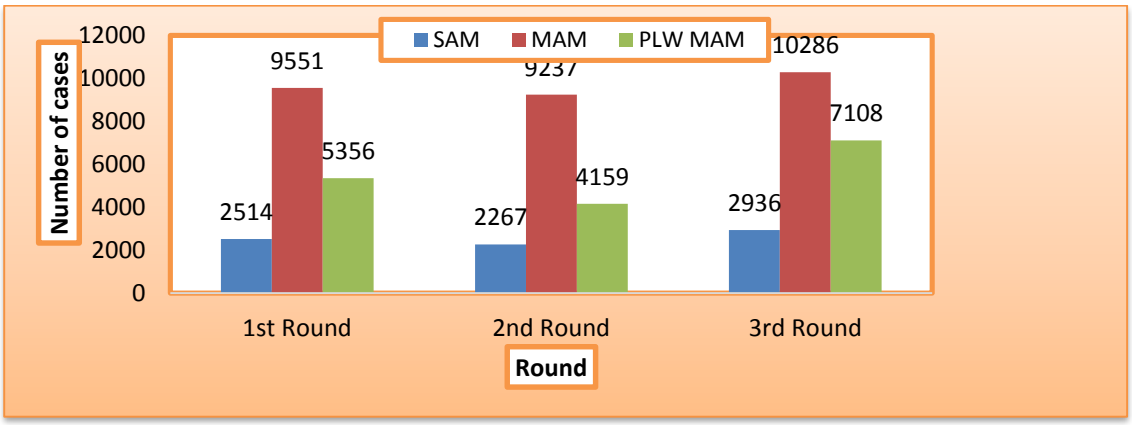

Figure 7-9: Trends of malnutrition, Bale Zone 2013

[2] MAM- their MUAC measurement is 11-12 cm
[3] PLW means MUAC <23 cm

The trend of malnutrition is increasing at zonal level. Figure 7.10 shows the trends of SAM cases in Arsi zone from June 2012 to April 2013.

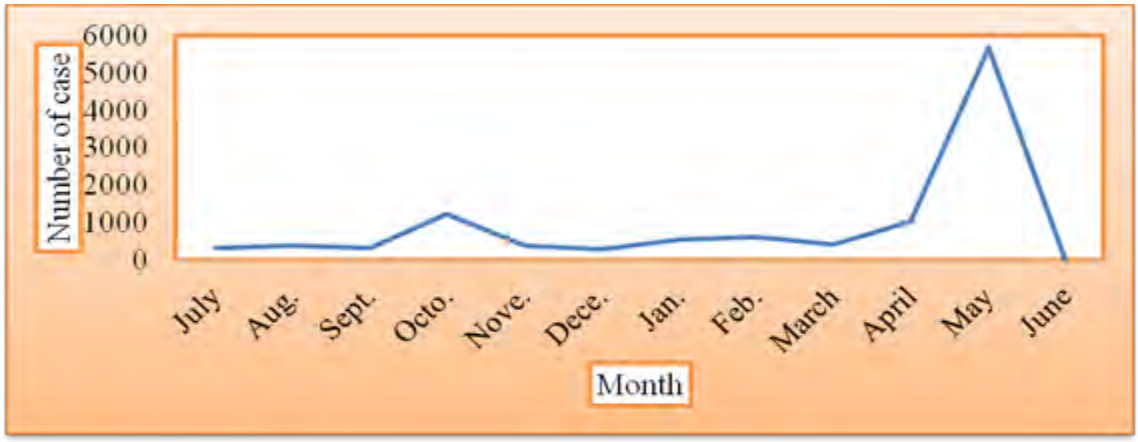

Figure 7-10: Trends of SAM cases in Arsi zone in 2012/2013

7.4.3.3. Bale zone

Child feeding habit and main foods types differ from high land to low land (pastoralist) areas of Bale zone. In pastoralist areas, culturally the family gives the priority for feeding child than adult. Milk, Wheat, Barely, Teff, Sorghum and Maize are main source of food.

According to CHD screening carried out during may, 2013 in all woredas of the zone; 227,977 under five children and 63,149 pregnant and lactating women (PLW) were assessed for malnutrition problem. As a result, 1,089 (0.5%) SAM cases and 8,620 (3.8%) MAM cases of under five children were identified. Of these, Dawe Kachen (20.2%) and Harena Buluk (12%) woredas were reported higher number of cases compared to others. On the other hand, from the screened Pregnant and lactating women 19% of them were MAM cases (<23 MUAC). From 20 woredas, 8 (35%) woredas were reported greater than 20% of PLW MAM cases from screened (Harena Buluk 47%, Dawe Kachen 46%, Mede Wellabu 33%, Lege Hida 32%, Berbere 28%, Rayitu 26% and Gura Damole 23%).

The total number of new SAM cases reported from January to May 2013 among visited woredas was highest in Harena Buluk and Mede Wellabu with 161 and 119 cases respectively. The trends of SAM cases deceased in most of visited woredas except Mede Wellabu (figure 7.11).

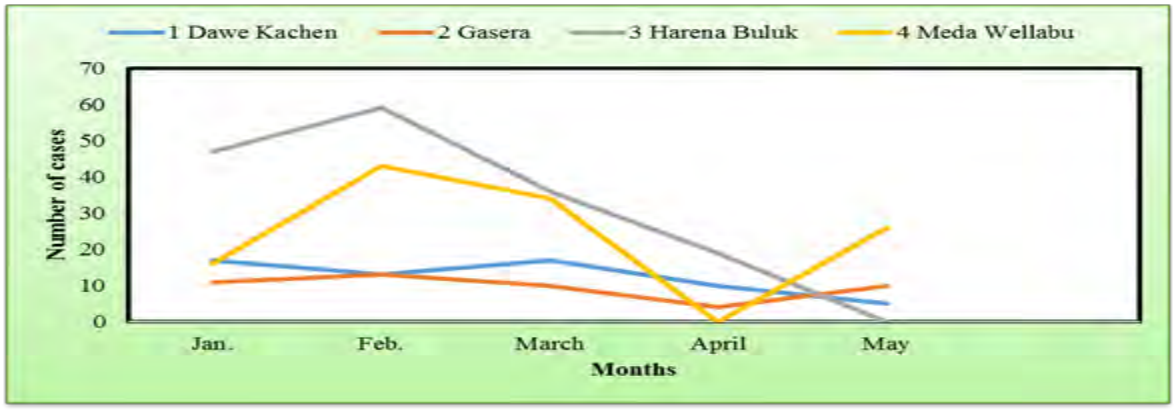

Figure 7-11: Trends of SAM cases in Visited woredas of Bale Zone 2013

7.4.4. Vulnerability Mapping of Epidemic Prone Diseases

7.4.4.1. East Shewa

Due to many factors, malaria was found most feared epidemic prone disease in the zone. Among these the major factors are presence of large numbers of surface water including Rift Valley lakes, availability of interrupting rivers and flooding.

Meningitis is also found to be epidemic risk disease as the areas is favorable for the disease in extended dry windy seasons and as the zone is in meningitis belt. History of epidemic in last month and lack of vaccination in most Woredas due to vaccine shortage was also raised as contributing factors.

Before two years cholera outbreak was occurred and other epidemic prone diseases were reported including diarrheal diseases and measles. Similar conditions are also reported from the Woreda health office public health emergency management unit.

Poor safe water supply coverage, poor personal hygiene, lack of water treatment chemicals and their utilization, low latrine utilization coverage are reported to be factors that contributes to the occurrence of diarrheal diseases including AWD/Cholera. Occurrence of flooding is also aggravating factor for transmission of water borne diseases.

The following table describes type of epidemic prone diseases in the zone, Woredas at risk with respective population.

Table 7-2: Vulnerability Mapping, East Shewa Zone, Belg 2013

S. No	Woreda	Total Popn.	Diarrhea/AWD		Malaria		Measles		Meningitis		Malnutrition	
			At Risk Pop.	Expected Cases	At Risk Pop.	Expected Cases	At Risk Pop.	Expected Cases	At Risk Pop.	Expected Cases	Expected MAM	Expected SAM
1	Adama	168412	30314	1516	30314	1516	0	0	0	0	33682	3368
2	Adami Tulu	186202	33516	1676	33516	1676	7448	15	32585	33	37240	3724
3	Adea	152681	27483	1374	27483	1374	24429	49	26719	27	30536	3054
4	Batu Town	56044	10088	504	10088	504	0	0	0	0	11209	1121
5	Bora	70106	12619	631	12619	631	11217	22	12269	12	14021	1402
6	Boset	169467	30144	1507	30144	1507	26795	54	29307	29	33893	3389
7	Dugda	173836	31290	1565	31290	1565	27814	56	30421	30	34767	3477
8	Fentale	71722	12910	645	12910	645	11476	23	12551	13	14344	1434
9	Gimbichu	102522	0	0	0	0	0	0	0	0	20504	2050
10	Liben	89779	16160	808	16160	808	14365	29	0	0	17956	1796
11	Lume	103585	18645	932	18645	932	0	0	18127	18	20717	2072
12	Metehara	26343	4551	228	4551	228	0	0	0	0	5269	527
13	Mojo	37928	6827	341	6827	341	0	0	6637	7	7586	759
Total		1408627	234547	11727	234547	11727	123544	248	168616	169	281725	28173

7.4.4.2. Arsi Zone

Epidemic prone diseases reported from visited Woredas include diarrheal diseases (including AWD/Cholera), measles and malaria. Similar conditions are also reported from the zonal health department public health emergency management unit.

Poor safe water supply coverage, poor personal hygiene, lack of water treatment chemicals and their utilization, low latrine utilization coverage are reported to be factors that contributes to occurrence of diarrheal diseases including AWD/Cholera. Mass gathering at Muda Ceremony in Seru Woreda is also aggravating factor for transmission of water borne diseases.

Low vaccination measles coverage that usually results from remoteness of some pocket areas, lack of refrigerator, and transportation as well as occurrence of drought and malnutrition are risk factors for the existence of measles epidemic risk. The 2013 national vaccination campaign is expected to reduce the risk to some level.

Risk factors for malaria as mentioned by visited Woredas and zonal expert are low IRS, low ITN coverage (as there was no distribution for last three years), availability of malaria breading sites especially in low land Woredas and Kebeles. Low environmental action and depleted prevention activities also exists.

The following table 7.3 describes type of epidemic prone diseases in the zone, Woredas at risk with respective population.

Table 7VII-3: Vulnerability Mapping, Arsi Zone, Belg 2013

Type of Risk	Woreda	Population	At Risk Population	Expected Cases
Diarrhea/AWD	Seru	56,657	11,331	23
	Munesa	197,327	39,465	79
	Total	**253,984**	**50,797**	**102**
Malaria	Lemu Bilbilo	193,526	19,353	387
	Gololcha	203,463	20,346	407
	Merti	108,047	10,805	216
	Dodota	76,880	7,688	154
	Ziway Dugda	142,598	14,260	285
	Seru	56,657	5,666	113
	Jeju	147,457	14,746	295
	Sire	87,915	8,792	176
	Total	**1,016,543**	**101,654**	**2033**
Measles	Hankolo Wabe	70,437	11,270	23
	Munesa	197,327	31,572	63
	Ziway Dugda	142,598	22,816	46
	Gololcha	203,463	32,554	65
	Lemu Bilbilo	193,526	30,964	62
	Seru	56,657	9,065	18
	Total	**864,008**	**138,241**	**276**

Due to drought and food insecurity that results from multiple factors, almost all Woredas in the zone are affected with malnutrition with varying degrees. At this time routine therapeutic feeding program is established in all woredas of Arsi zone. The following table describes population at risk and estimated SAM cases that require intervention in the next year.

Table 7-4: Malnutrition Vulnerability Mapping, Arsi zone, 2013

S.No	Woreda at risk	Total Pop.	Target Pop. (MAM)	Excepted SAM
1	Amigna	86792	17358	1736
2	Aseko	98607	19721	1972
3	B/Gasgar	88589	17718	1772
4	Bekoji T	22956	4591	459
5	Cole	104397	20879	2088
6	Digeluna Tijo	166670	33334	3333
7	Dodota	76880	15376	1538
8	Diksis	85408	17082	1708
9	Gololcha	203463	40693	4069
10	Guna	90347	18069	1807
11	Hetosa	148225	29645	2965
12	Honkolo Wabe	70437	14087	1409
13	Jeju	146459	29292	2929
14	LemuBilbilo	193526	38705	3871
15	Lode Hetosa	128441	25688	2569
16	Merti	108047	21609	2161
17	Munesa	197327	39465	3947
18	Robe	195527	39105	3911
19	Seru	56657	11331	1133
20	Shirka	193095	38619	3862
21	Sire	87915	17583	1758
22	Sude	171310	34262	3426
23	Tena	79737	15947	1595
24	Xiyo	102650	20530	2053
25	Ziway Dugda	142598	28520	2852
	Total	3046060	609212	60921

7.4.4.3. Bale Zone

Epidemic prone diseases reported from visited Woredas include diarrheal diseases (including AWD/Cholera), measles, malaria, meningitis and rabies. Similar conditions are also reported from the zonal health department public health emergency management unit.

Poor safe water supply coverage, poor personal hygiene, lack of water treatment chemicals and their utilization, low latrine utilization coverage are reported to be factors that contributes to occurrence of diarrheal diseases including AWD/Cholera. Mass gathering at Dire Shaken Husen and Sophoumer cave is also aggravating factor for transmission of water borne diseases.

Low vaccination measles coverage that usually results from remoteness of some pocket areas, lack of refrigerator, and transportation as well as occurrence of drought and malnutrition are risk factors for the existence of measles epidemic risk. The 2013 national vaccination campaign is expected to reduce the risk to some level. Especially Bale zone of some woredas are bordered by Somalia Region. Due to that reason insecurity problem is major contributing factor.

Risk factors for malaria as mentioned by visited Woredas and zonal expert are low IRS, low ITN coverage (as there was no distribution for last three years), availability of malaria breading sites especially in low land Woredas and Kebeles. Low environmental action and depleted prevention activities also exists.

Segment of the zone that boarder with West Arsi zone, Guji zone and SNNPR where reports of epidemic meningitis occurred last four months are identified as meningitis high risk areas/Woredas. Meningitis vaccination was not conducted in this segment of the zone even though it is adjacent to meningitis epidemic areas.

Due to drought and food insecurity that results from multiple factors, almost all Woredas in the zone are affected with malnutrition with varying degrees. The following table describes population at risk and estimated SAM cases that require intervention.

The following table describes type of epidemic prone diseases in the zone, Woredas at risk with respective population.

Table 7-5: Vulnerability Mapping, Bale Zone, Belg 2013

S.No	Woreda	Total Popn.	Diarrhea/AWD		Malaria		Measles		Meningitis		Malnutrition	
			At Risk Pop.	Expected Cases	At Risk Pop.	Expected Cases	At Risk Pop.	Expected Cases	At Risk Pop.	Expected Cases	Expected MAM	Expected SAM
1	Agarfa	121076									24215	2422
2	Berbere	106827			10683	214	17092	34			21365	2137
3	Dawe Kachen	36220			3622	72					7244	724
4	Dawe Serer	50592					8095	16			10118	1012
5	Dello Mena	106250			10625	213			74375	74	21250	2125
6	Dinsho	46169	9234	18							9234	923
7	Gasera	92178	18436	37							18436	1844
8	Ginir	165693									33139	3314
9	Goba	47750									9550	955
10	Goba Hospital	41109									8222	822
11	Gololicha	118756	23751	48			19001	38			23751	2375
12	Goro	98321									19664	1966
13	Gura Damole	34072									6814	681
14	Harena Buluk	96028			9603	192			67220	67	19206	1921
15	Lege Hida	73474									14695	1469
16	Meda Wellabu	114601			11460	229			80221	80	22920	2292
17	Rayitu	39219			3922	78			27453	27	7844	784
18	Robe City	56971									11394	1139
19	Sewena	77567			7757	155					15513	1551
20	Sinana	138942	27788	56					97259	97	27788	2779
Total		1661815	79209	159	57672	1153	44188	88	346528	345	332362	33235

7.4.5. EPRP Requirements

7.4.5.1. East Shewa

7.4.5.1.1. EPR Planning Workshop and PHEM Training

Capacity building of the focal persons of PHEM at zonal and Woreda level should be made for the emergency affected districts. This may include PHEM training for focal persons at Woreda and Health Facility level. In addition, Preparedness and Response Plan developing workshop can be conducted simultaneously. Strengthening multi-sectorial task force at zonal and Woreda level is also recommended action.

7.4.5.1.2. Supportive Supervision

Supporting health facilities with respect to PHEM activities should be conducted by zone and Woreda focal persons. These include strengthening RRT and multi-sectorial taskforce at Woreda level, and other capacity building issues.

7.4.5.1.3. Preparedness Drugs and Supplies

Table 7-6: Drugs and supplies for EPR, East Shewa zone, 2013

Type of Risk	Drugs/Supplies	Unit	Target Population	Required	Available	Gap
Meningitis	Meningitis vaccine	Amp	168617	168,617	0	168,617
	Ceftriaxone	Amp	169	413	0	413
	Pastorex for Meningitis	Pcs	169	7	0	7
	LP set (for Hospitals)	Pcs	4	4	0	4
	TI bottle	bottle	169	7	0	7
Malaria	Coartum of 30 tab	strip	11727	6,978	415	6,563
	Cloroquine	Tin	11727	4	0	4
	Artesunate (rectal)	Supp	11727	246	80	166
	Artesunate (inj)	amp	11727	985	120	865
	Quinine (PO) tin of 200	Tin	11727	21	0	21
	Quinine (IV)	amp	11727	1,689	0	1,689
	RDT for Malaria 25 str	Box	11727	469	120	349
	Chloroquine Suspension	Bottle	11727	704	0	704
Diarrhea/AWD	Doxycycline	strip	526	105	0	105
	Cotrimoxazole suspension	bottle	526	21	0	21
	Ringer Lactate	Bag	526	631	0	631
	ORS	sacket	526	3,419	0	3,419
	CTC kit (AWD)	Pcs	5	4	0	4
	Gloves 100	box	526	26	0	26
	Syringes 50	box	526	26	0	26
	PPE	Pcs	5	4	0	4
Measles	Amoxicillin suspension 250	bottle	247	124	0	124
	Tetracycline ointment	tube	247	247	0	247
	Vitamin A	Tin	247	247	0	247

7.4.5.1.4. Nutrition

Treatment of severe acute malnutrition cases is covered by routine nutrition program. In the next 6 months of 2013 an estimated case of 28173 will be affected. In this period some essential drugs and supplies should be available for the treatment of those affected children. Lists of drugs and supplies that are necessary for the treatment of those malnourished children listed in table 7.7.

Table 7-7: vulnerability mapping for malnutrition of East Shewa zone, 2013

Description of Items	Unit	Target Pop.	Quantity
Vit A of 100,000 IU of 1000	Tin	5635	6
Vit A of 200,000 IU of 1000	tin	45076	45
Folic acid of 1000 tabs	Tin	112690	113
Amoxicillin syrup 125 mg/5 ml	Bott	11269	5635
Amoxacillin syrup 250 mg/5 ml	Bott	4508	2254
Gentamicin injection 80 mg of 100	Box	5635	1127
Chloramphenicol injection 250 mg of 100	Box	5635	1878
Iron of 1000 tabs	Tin	11269	11269
Mebendazole 100 mg of 240 tabs	Box	70431	293
Albendazole 400 mg tab	Box	70431	35216
F100	Box	28173	5635
F75	Tin	28173	5635
PlumpyNut	Tin	281725	7888311
Paediatric NGT	Each	1127	282
ReSoMall	Box	28173	140863
ORS	Sachet	5635	28173
Ringer's Lactate of 1000 ml	Bag	5635	5635

7.4.5.2. Arsi zone

Capacity building of the focal persons of PHEM at zonal and Woreda level should be made for the emergency affected districts. This may include PHEM training for focal persons at Woreda and Health Facility level. In addition, Preparedness and Response Plan developing workshop can be conducted simultaneously. Strengthening multi-sectorial task force at zonal and Woreda level is also recommended action.

7.4.5.2.1. Supportive Supervision

Supporting health facilities with respect to PHEM activities should be conducted by zone and Woreda focal persons. These include strengthening RRT and multi-sectorial taskforce at Woreda level, and other capacity building issues.

7.4.5.2.2. Preparedness Drugs and Supplies

Table 7-8: Drugs and supplies for EPR, Arsi zone, 2013

Type of Risk	Drugs/Supplies	Unit	Target Population	Required	Available	Gap
Malaria	Coartum of 30 tab	strip	2033	1,210	21630	0
	Cloroquine	Tin	2033	6	150	0
	Artesunate (rectal)	Supp	2033	43	0	43
	Artesunate (inj)	amp	2033	171	0	171
	Quinine (PO) tin of 200	Tin	2033	4	0	4
	Quinine (IV)	amp	2033	293	0	293
	RDT for Malaria 25 str	box	2033	81	200	0
	Chloroquine Suspension	Bottle	2033	122	0	122
Diarrhea/AWD	Doxycycline	strip	102	20	0	20
	Cotrimoxazole suspension	bottle	102	4	0	4
	Ringer Lactate	Bag	102	122	0	122
	ORS	sacket	102	660	0	660
	CTC kit (AWD)	pcs	102	2	0	2
	Gloves 100	box	102	5	0	5
	Syringes 50	box	102	5	0	5
	PPE	pcs	102	2	0	2
Measles	Amoxicillin suspension 250	bottle	276	138	0	138
	Tetracycline ointment	tube	276	276	0	276
	Vitamin A	tin	276	1	3	0

7.4.5.2.3. Nutrition

Treatment of severe acute malnutrition cases is covered by routine nutrition program. In the next 6 months of 2013 an estimated case of 16618 will be affected. Treatment of severe acute malnutrition cases is covered by routine nutrition program. In the next 6 months of 2013 an estimated case of 60921 will be affected.

Table 7-9: Malnutrition Drugs and Supplies Requirement, Arsi Zone, 2013

Descriptions of Items	Unit	Target Pop.	Quantity
Vit A of 100,000 IU of 1000	Tin	12184	12
Vit A of 200,000 IU of 1000	tin	97474	97
Folic acid of 1000 tabs	Tin	243685	244
Amoxicillin syrup 125 mg/5 ml	Bott	24368	0
Amoxicillin syrup 250 mg/5 ml	Bott	9747	0
Gentamicin injection 80 mg of 100	Box	12184	0
Chloramphenicol injection 250 mg of 100	Box	12184	0
Iron of 1000 tabs	Tin	24368	24368
Mebendazole 100 mg of 240 tabs	Box	152303	635
Albendazole 400 mg tab	Box	152303	76152
F 100	Sachet	60921	0
F 75	Sachet	60921	0
Plumpy Nut	Sachet	609212	17057936
Pediatric NGT	Each	2437	0
ReSoMall	Box	60921	304606
ORS	Sachet	12184	60921
Ringer's Lactate of 1000 ml	Bag	12184	12184

7.4.5.3. Bale zone

Capacity building of the focal persons of PHEM at zonal and Woreda level should be made for the emergency affected districts. This may include PHEM training for focal persons at Woreda and Health Facility level. In addition, Preparedness and Response Plan developing workshop can be conducted simultaneously.

7.4.5.3.1. Supportive Supervision

Supporting health facilities with respect to PHEM activities should be conducted by zone and Woreda focal persons. These include strengthening RRT and multi-sectorial taskforce at Woreda level, and other capacity building issues.

7.4.5.3.2. Preparedness Drugs and Supplies

Table 7-10: Drugs and supplies for EPR, Bale zone, 2013

Type of Risk	Drugs/Supplies	Unit	Target	Required	Available	Gap
Meningitis	Meningitis vaccine	Amp	346528	346,528	0	346,528
	Ceftriaxone	Amp	347	849	0	849
	Pastorex for Meningitis	Pcs	347	14	0	14
	LP set (for Hospitals)	Pcs	4	4	0	4
	TI bottle	bottle	347	14	0	14
Malaria	Coartum of 30 tab	strip	1153	686	450	236
	Cloroquine	Tin	1153	4	0	4
	Artesunate (rectal)	Supp	1153	24	126	0
	Artesunate (inj)	amp	1153	97	36	61
	Quinine (PO) tin of 200	Tin	1153	2	0	2
	Quinine (IV)	amp	1153	166	0	166
	RDT for Malaria 25 str	Box	1153	46	192	0
	Chloroquine Suspension	Bottle	1153	69	25	44
Diarrhea/AWD	Doxycycline	strip	158	32	0	32
	Cotrimoxazole suspension	bottle	158	6	0	6
	Ringer Lactate	Bag	158	190	0	190
	ORS	sacket	158	1,030	0	1,030
	CTC kit (AWD)	Pcs	4	4	0	4
	Gloves 100	box	158	8	10	0
	Syringes 50	box	158	8	0	8
	PPE	pcs	4	4	0	4
Measles	Amoxycillin suspension 250	bottle	88	44	0	44
	Tetracycline ointment	tube	88	88	0	88
	Vitamin A	Tin	88	88	0	88
Rabies	Rabies vaccine	bottle	333	333	0	333

7.4.5.3.3. Nutrition

Treatment of severe acute malnutrition cases is covered by routine nutrition program. In the next 6 months of 2013 an estimated case of 16618 will be affected.

Discription of Items	Unit	Target Pop.	Quantity
Vit A of 100,000 IU of 1000	Tin	3324	3
Vit A of 200,000 IU of 1000	Tin	26589	27
Folic acid of 1000 tabs	Tin	66473	66
Amoxacillin syrup 125 mg/5ml	Bott	6647	1662
Amoxacillin syrup 250mg/5ml	Bott	2659	665
Gentamicin injection 80 mg of 100	Box	3324	665
Chloramphenicol injection 250mg of 100	Box	3324	997
Iron of 1000 tabs	Tin	6647	6647
Mebendazole 100mg of 240 tabs	Box	41545	1039
Albendazole 400mg tab	Box	41545	20773
F100	Box	16618	3739
F75 of 100 sac	Tin	16618	7478
PlumpyNut	Tin	166182	4653082
Paediatric NGT	Each	665	166
ReSoMall of 100 sac	Box	16618	831
ORS	Sachet	3324	16618
Ringer's Lactate of 1000ml	Bag	3324	3324

7.4.6. Recommendations

Public health emergency preparedness and response program is not well coordinated and functioning at zonal and Woreda level. EPRP, though claimed to be prepared, was not budgeted in most Woredas visited. Multi-sectoral coordination forum is not performing emergency preparedness activities in coordinated manner. Thus, strengthening PHEM coordination and multi-sectorial approach to preparedness is recommended. This includes training, data/report quality improvement, capacity building and budget allocation.

Diarrheal diseases (including AWD/ cholera), malaria, measles, malnutrition, meningitis and rabies are the most feared epidemic prone diseases in the visited zones. Preparedness and response activities should be given emphasis among these priority diseases.

The risk of Beseka Lake in Fentale Woreda requires integrated response and multi-sectoral approach in risk reduction, preparedness and response to the condition.

Humanitarian assistance to the flood affected population in Boset and Adama Woredas of East Shewa zone is highly recommended, with emphasis to shelter, food and water aid and prevention of communicable diseases.

Drugs and supplies for preparedness of the identified epidemic prone diseases should be prepared to manage the anticipated epidemic.

Children with Moderate Acute Malnutrition screened during Community Health Day should be linked to Supplementary Feeding Program (SFP). Distribution of Plumpy-Nut, F75 and F100, as well as, routine drugs and medications should be strengthened.

Management of SAM cases is supposed to be addressed in routine nutrition program. However, ensuring availability of SAM management drugs and supplies (Mainly Plumpy-Nut, F75, F100 and associated routine drugs) for SAM cases in the coming 6 months is recommended.

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Chapter VIII - Protocol/Proposal for Epidemiologic Research Project

8. Assessment of latrine utilization and factors associated with latrine utilization in Shashemene Rural, West Arsi, Oromia, Ethiopia 2014.

Abstract

Background: Worldwide lack of sanitation is a serious health risk, affecting billions of people around the world, particularly the poor and disadvantaged of people around the world. Lack of sanitation facilities compels people to practice open defecation and this increases the risk of transmission of communicable diseases.

Over 50 different infections are potentially transmitted from an infected person to a healthy one by various routes involving excreta. The use of sanitation facilities is known to interrupt the transmission of faeco-oral related disease. The construction of traditional pit latrine is relatively a simple technology that is available to control the spread of diarrhea that is prevalent in developing nations. Sanitation facilities are being constructed in Ethiopia so as to meet the millennium development goal and due emphasis is given by Ethiopian ministry of health. However the coverage of latrine utilization and influencing factors on the utilization of latrine in the community is not widely assessed. Therefore, as there is wide spread and recurring epidemic of acute watery diarrhea in Shashemene woreda of West Arsi zone, assessing the proper utilization of latrine and other factors will enable us discuss the correlation between them.

Methods: Cross sectional study design will be used in Shashemene woreda from September to October 2014. A total of 1725 sample households with latrine will be included in the study. The sample size is determined by using single population proportion formula with estimated latrine utilization 50%, z/2= 1.96, precision of 0.035 and design effect 2. Data collection instrument will be prepared and before data collection the questioner will be translated in to Oromifa and then again changed back to English. Data will be entered and analyzed by using Epinfo 7 and SPSS version 20. Ethical clearance will be approved by Addis Ababa university of IRB committee.

Work plan: Data collection will be started on august 1, 2014 and ends on august 30, 2014. The study will be completed in October 2014.

Budget: The required cost for the study is estimated **51,864.8**ETH Birr.

8.1. Introduction

8.1.1. Background

Worldwide lack of sanitation is a serious health risk, affecting billions of people around the world, particularly the poor and disadvantaged people around the world. Lack of sanitation facilities compels people to practice open defecation and this increases the risk of transmission of diseases. [1]

Sanitation generally refers to the provision of facilities and services for the safe disposal of human urine and faeces. Inadequate sanitation is a major cause of disease world-wide and improving sanitation is known to have a significant beneficial impact on health both in households and across communities. The word 'sanitation' also refers to the maintenance of hygienic conditions, through services such as garbage collection and wastewater disposal [2].

Over 50 different infections are potentially transmitted from an infected person to a healthy one by various routes involving excreta. The use of sanitation facilities is known to interrupt the transmission of faeco-oral related disease. The construction of traditional pit latrine is relatively a simple technology that is available to control the spread of diarrhea that is prevalent in developing nations [3].

The treatment and disposal of human waste is becoming increasing important as the world population increases. Each year two million children die from diarrheal diseases, making it the second most serious killer of children under the age of five. The main source of diarrheal infection is human excreta. It seems clear therefore, that human excreta should be managed as a potentially dangerous material. The construction of latrines is a relatively simple technology that may be used to control the spread of infectious diseases. Studies have shown that latrine coverage has to reach 90% of a population to have an impact on community health. However, 2.3 billion people, 40% of the world total population, lack improved sanitation and 80% of these people live in rural areas (WHO, 2000). Improvements in sanitation coverage are one of the key elements to ameliorate health around the world. [4]

Despite the enormous potential benefits of improved sanitation, large-scale latrine promotion around the world has been very disappointing. The percent coverage of sanitation has increased by 5% during twenty years of sanitation promotion, however the number of people lacking sanitation services remains practically the same (WHO, 2000). Current sanitation promotion tactics needs to be reevaluated in order to develop new techniques that meet with wider public appeal. Considering the reasons behind the non-adoption and the results of case studies can provide the necessary information to create a successful sanitation program. [4]

Lack of sanitation facilities forces people to defecate in the open, in rivers or near areas where children play or food is prepared. This increases the risk of transmitting disease. The Ganges River in India has 1.1 million liters of raw sewage dumped into it every minute, a startling figure considering that one gram of faeces may contain 10 million viruses, one million bacteria, 1000 parasite cysts and 100 worm eggs. Examples of diseases transmitted through water contaminated by human waste include diarrhea, cholera, dysentery, typhoid, and hepatitis A. In Africa, 115 people die every hour from diseases linked to poor sanitation, poor hygiene and contaminated water. [5]

Health care facilities need proper sanitation and must practice good hygiene to control infection. Worldwide, between 5% and 30% of patients develop one or more avoidable infections during stays in health-care facilities. Each year more than 200 million people are affected by droughts, floods, tropical storms earthquakes, forest fires, and other hazards. Sanitation is an essential component in emergency response and rehabilitation efforts to stem the spread of diseases rebuild basic services in communities and help people return to normal daily activities.[5]

8.1.2. Statement of the problem

Two point four billion People, 40% of the total world population, lack improved sanitation and 80% of these people live in rural areas of the developing world. In the WHO African Region, a total of 631 million people, (40%), had no access to any kind of improved sanitation facilities in 2000. This figure is about the same (36%) in 2002 for Sub-Saharan African nations. A very recent publication of WHO/UNICEF indicated Africa is lagging much behind to attain MDG goals in sanitation that aims to achieve improving coverage of 38% (in 2006) to a level of 66% in 2015. [3].

WHO estimates that diarrheal diseases are the third leading cause of infectious disease-related mortality, claiming approximately 2.2 million lives annually. Children under 5 years account for an estimated 2 million deaths and 1.5 billion bouts of diarrhea annually. [6]
The disease burden associated with poor water, sanitation, and hygiene is estimated to account for 4.0% of all deaths and 5.7% of the total disease burden in disability-adjusted life year (DALYs) in worldwide, principally through diarrheal diseases. About 1.8 million people die every year due to diarrheal diseases, and children under the age of 5 years account for 90% of diarrheal deaths. Moreover, 88% of diarrheal diseases are attributed to unsafe water supply, inadequate sanitation, and poor hygiene. [1]

In most developing countries, especially in Sub- Saharan Africa (SSA), the basic causes of more than 80% of the diseases are inadequate and unsafe water supply, and improper disposal of waste. Ethiopia is among the poorest countries in the world, ranking 170 out of 177 in the UN human development index and is the second most populous country in Africa (population estimated above 80 million). Yet, Ethiopia's rural populations are among the least served with rural water supply and sanitation access at only 24% and 8% respectively. [7]

Sanitation is one of the most basic services in human life. However, the provision of this service is very poor in developing countries, like Ethiopia. Only 54% of the households use pit latrines in Ethiopia, the rest being too poor to build their own toilets they use open fields. But the coverage in urban areas is expected to be < 54%. Rapid urbanization is occurring throughout the country, creating a demand for housing, infrastructure, sanitation and other socioeconomic services. [8]

8.1.3. Literature review

Human excreta (Faeces) are the source of many infectious disease agents. Diseases for which human excreta are the source are known as excreta borne diseases or faecal Oral Route Infections [9].

The excreta can affect human health through drinking water, improper sewerage system, indirect contact and food from various pathways. Thames river water contaminated with faecal matter killed more than 10,000 Londoners during the outbreak of cholera epidemic in 1831–1832, 1848–1849 and 1853–1854 [10, 11].

The burial of excreta is an almost 100% safe practice of excreta disposal. This, in turn means the efficient use of latrines [12]. Achieving both coverage and use, however, are essential in order to realize the health benefits associated with improved sanitation. Even a comparatively small number of non-users can contaminate the environment with faecal pathogens, causing direct exposure to faecal pathogens through contact and indirect exposure via mechanical vectors (flies) and contaminated drinking water. Microbiological evidence and modeling based on quantitative microbial risk assessment suggests that high levels of coverage and use are necessary to minimize exposure and prevent disease [13].

Nearly half of the world's population lacks basic sanitation, i.e. half of the world is not protected against the contamination by human faeces [14].

A large fraction of the world's illness and death is attributable to communicable diseases. Sixty-two percent and 31% of all deaths in Africa and Southeast Asia, respectively, are caused by infectious disease [15]. This trend is especially notable in developing countries where acute respiratory and intestinal infections are the primary causes of morbidity and mortality among young children [16]. Inadequate sanitary conditions and poor hygiene practices play major roles in the increased burden of communicable disease within these developing countries.

According to a study conducted by Meddings D.R. et al. in Kabul Afghanistan, 1238 cases and 625 controls were used. Logistic regression modeling was performed both for children <5 years and <11 years, and the parameter estimates were later used with results from a stratified cluster sample survey. Conditional logistic regression showed that

patients were less likely than controls to live in households with revised latrines (odds ratio (OR) 0.57, 95% confidence interval (CI) = 0.42 – 0.77 for children <5 years, and OR 0.53, 95% = CI 0.41 – 0.67for children <11 years). The results from the survey of cause-specific mortality by verbal autopsy enabled estimation of the number of deaths averted over a 1-year period due to the intervention; these estimations were 235 (95% CI = 109 – 360) for children <5 years and 285 (95% CI = 180 – 397) for children <11 years. Estimates of cost effectiveness ranged from approximately US$ 1800 to US$ 4100 per death averted depending on age and payer perspective. They concluded that estimates are conservative because only 1 year of effectiveness is considered, yet they compare favorably with a review of other pediatric interventions. These results are important because funding for sanitation interventions is often limited by the belief that the interventions are not cost-effective. [6]

In Tanzania, Kemal K. et al. conducted a cross- sectional study among 375 randomly selected households using a pre-tested questionnaire to determine whether the households owned improved ventilated latrines and how they utilized them. they found that About half (50.5%) of the households had an improved ventilated latrine and households with earnings of more than 50,000 Tanzanian Shillings were two times more likely to own an improved latrine than those that earned less (AOR 2.1, 95% CI=1.1-4.0, p= 0.034). The likelihood of owning an improved latrine was reduced by more than 60 percent for female-headed households (AOR=0.38; 95% CI=0.20-0.71; p=0.002). Furthermore, it was established that all members of a household were more likely to use a latrine if it was an improved ventilated latrine (AOR=2.4; 95% CI=1.1-5.1; p= 0.024). The authors concluded that Findings suggest adoption of strategies to improve the wellbeing of households and deploying those who had acquired improved ventilated latrines as resource persons to help train others. Furthermore, efforts are needed to increase access to soft loans for disadvantaged members and increasing community participation. [17]

A community-based cross-sectional study conducted on 608 households in district of Bahir Dar Zuria revealed that of the 608 households, 355 (58.4%) had pit latrines and

only 220 (62.0%) were functional (providing services during data collection). One hundred eighty seven (52.7%) had been constructed two or more years prior to the time of the study and 202 (56.9%) latrines required maintenance. The availability of latrines was twice higher in households with an income of 5000 or more Ethiopian Birr (1USD = 17.5 Ethiopian Birr) per year than those who hand an income less than 5000 Birr per year; the availability of latrines was twofold higher in households visited by health professional at least three times a month than those that received no visits. The latrine coverage was about two times higher in households that were less than 30 minutes walk from a health institution than households that were over 30 minutes' walk. The latrine coverage was lower in households located in distant areas than in households closer to the city. The author suggested that Latrine coverage in District of Bahir Dar Zuria was far from the national target of 100%. The availability of latrines was affected by income level, frequency of visits by health workers, walking time from local health institutions, and distance from Bahir Dar. Therefore, it is recommended that the frequency of supportive visits be increased and that special attention be given to households in inaccessible areas. [1]

Anteneh A. and kumie A. assessed the impact of latrine utilization on diarrheal diseases in the rural community in the district of Hulet Ejju Enessie Woreda, East Gojam, Ethiopia. They randomly selected 824 households that had 90% latrine coverage at the time data collection in 2006. Most (61%) households with traditional pit latrines had latrine utilization. In a bivaraite analysis, the extent of latrine utilization was significantly associated with presence of primary or secondary school children in the house, perceived reasons for latrine construction and learning from neighborhoods ecology of 'Kolla' and 'Woyna-Dega' [AOR: 0.55, 95% CI: (0.38-0.81), and owning latrines for >2 years. The occurrence of childhood diarrhea was not statistically associated with the extent of latrine utilization [AOR: 0.63, 95% CI: (0.22-1.81)]; however, only owning latrines for >2 years remained significant in a multivariate analysis. The study also showed that Utilization of latrine facilities was common among the majority of households. The duration of having latrines had impacted the occurrence of childhood diarrhea.[3]

Regassa N. et al conducted a study to assess the level of sanitation and hygiene information and identifying factors that determine its access and utilization by rural households in Alaba District, Southern Ethiopia. The study generated the required data from 162 respondents selected from four rural 'kebeles'/villages using multistage sampling technique The analysis revealed that rural households in the study area have limited access to sanitation and hygiene information. Taking selected indicators of sanitation and hygiene: once in a week basis, 3.1% of the respondents accessed the messages on hand washing which is followed by safe excreta disposal (1.9%), safe water collection and storage (1.2%), food hygiene (0.6%), household waste disposal (0.6%) and disease causing vectors (0%). With regard to utilization of the accessed information, safe excreta disposal accounts for (57.4%), hand washing (26.5%), safe water collection and storage (16%), disease causing vectors (9.3%), food hygiene (4.3%), and household waste disposal (3.1%). The result of the study indicated that educational status of the respondent, health extension worker contact, information seeking behavior and perception of the respondent were found to be significant determinants of access to sanitation and hygiene information among rural households in the study area. Regarding sanitation and hygiene information utilization, the overall findings of the study underlined the importance of communication and behavioral factors in the areas of sanitation and hygiene information access. and level of utilization. Therefore, policy and health interventions should give emphasis to improvement of information sources, which can address the rural households and more focuses should be given to adult education and behavioral change communication approaches. [7]

8.1.4. Rationale

Sanitation facilities are being constructed in Ethiopia so as to meet the millennium development goal and due emphasis is given by Ethiopian ministry of health. However the impact of latrine utilization and other related factors on the health of the community are not widely assessed in a way to evaluate the trend of latrine usage. Especially Shashemene woreda faced cholera outbreak frequently starting from year 2006. For instance in 2009 there was an outbreak of cholera occurred in West Arsi zone. In this outbreak a total of 373 cholera cases and 14 cholera deaths were reported. Of these reported cholera cases and deaths, 294 (79%) of cases and 11 (79%) of deaths were reported from Shashemene woreda. The index case was also reported from this woreda.

Therefore, as there is wide spread and recurring epidemic of cholera in Shashemene Woreda of West Arsi zone, assessing the proper utilization of latrine and other factors will enable us discuss the correlation between them.

8.1.5. Conceptual frame work of latrine utilization

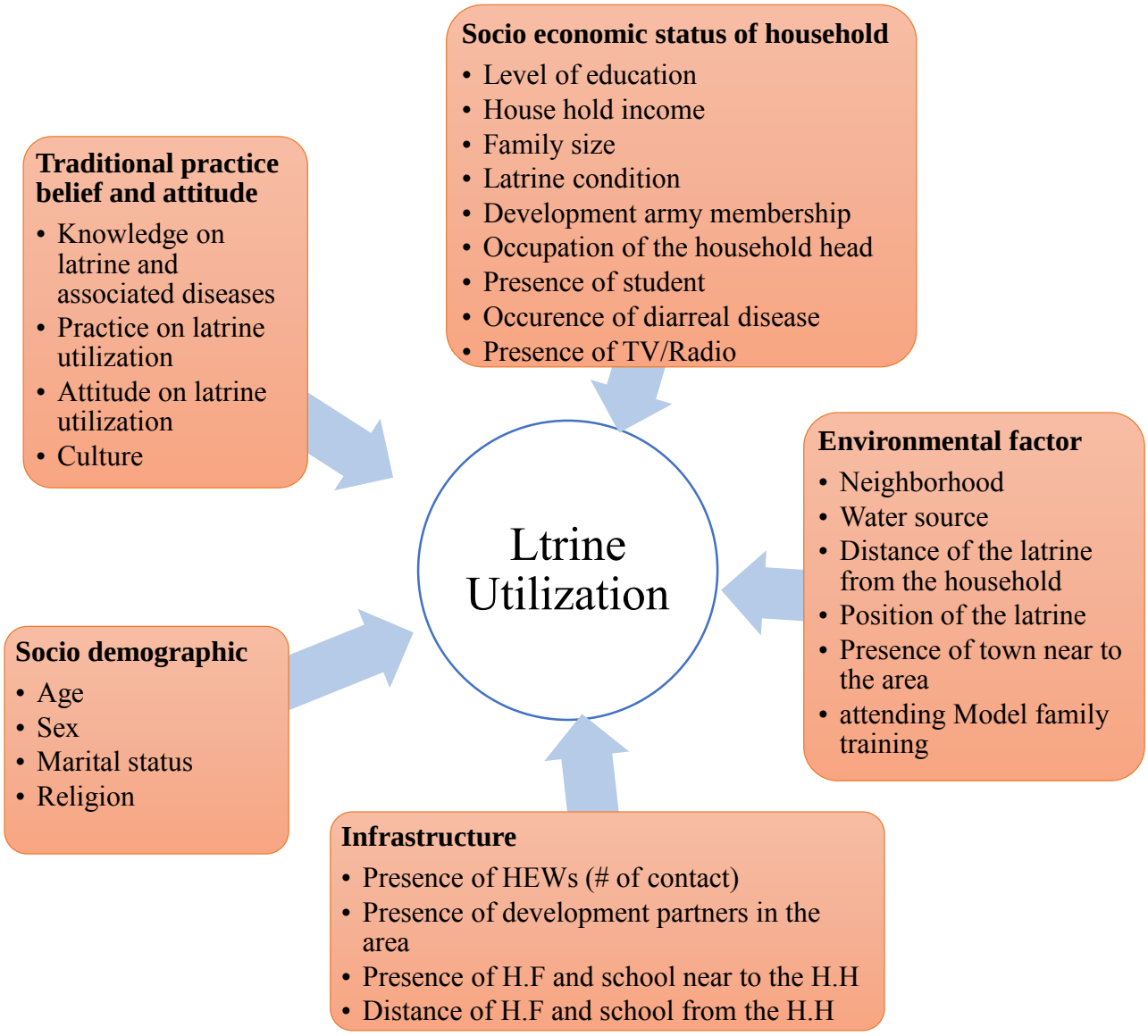

Figure 8-1: Study frame work for assessment of latrine utilization and influencing factor for latrine utilization Shashemene woreda of Oromia Region, Ethiopia, 2014.

Research questions

Is there a gap on latrine utilization? (What is the latrine utilization coverage in the woreda?)

What are major influencing factor for latrine utilization?

8.2. Objectives

8.2.1. General Objective:

To assess latrine utilization and influencing factors for latrine utilization in Shashemene Woreda, West Arsi, Oromia Ethiopia.

8.2.2. Specific objective:

- Describe the current latrine utilization coverage of the woreda.
- Find out factors associated with latrine utilization in the woreda
- Describe the knowledge on latrine utilization in the woreda
- Describe the attitude on latrine utilization in the woreda
- Describe the practice of latrine utilization in the woreda

8.3. Methods

8.3.1. Study area

The study will be carried out in Shashemene Zuria woreda, Oromia Region, which located about 245 km away to South of Addis Ababa, capital city of Ethiopia. According to the 2007 central statistics agency population census projection the total population of the district is 251,290 [18]. The woreda has a total of 38 kebeles of which 34 are rural kebeles. The total number of households is estimated to be 52,352 with an average household size of 4.7 and of these households about 80% of them have latrine facility [19]. Six health centers and 37 health posts cover the health care needs of the population.

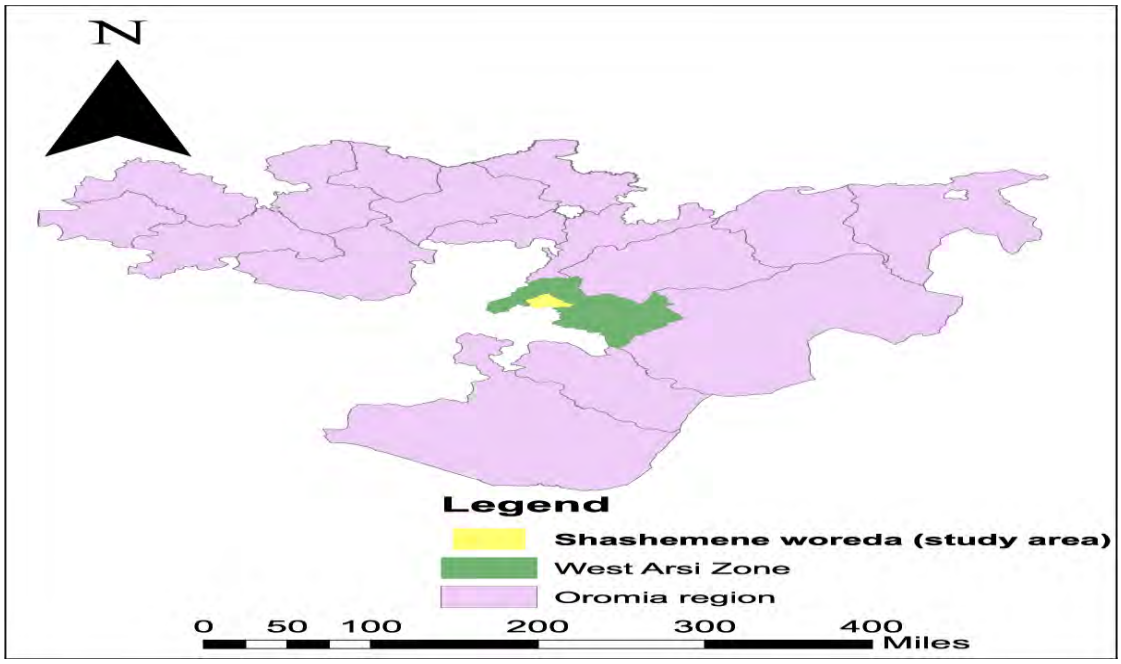

Figure 8-2: Map study area Shashemene, 2014

8.3.2. Study design and study period

A descriptive community based cross-sectional study will be conducted from 1 October to 30 December 2014 in the rural community of Shashemene woreda, West Arsi Zone.

8.3.3. Source population

All households with latrine in the district will be the source population for this study.

8.3.4. Study population

Selected households with latrine facilities among 17 rural and two urban kebeles of Shashemene woreda will be included in the study.

8.3.5. Sample size

The sample size (n) will be calculated using the following single population proportion formula based on the assumption of 50% proportion (p) that all latrine owners are utilizing latrines, 0.035 marginal error (d) to maximize the size of the sample, a standard Z score of 1.96 corresponding to 95% confidence interval ($Z_{\alpha/2}$), design effect of 2 to provide correction for the loss of sampling efficiency resulting from the use of stratified sampling and 10% non-response rate: $n = \frac{(Z_{\alpha/2})^2 P(1-P)}{d2} = \frac{(1.96)^2 0.5(0.5)}{(0.035)^2} = 784$

Accordingly the required sample size = 784 x 2 + 10% (784x2) = 1725H.Hs with latrines.

8.3.6. Sampling procedures

The sampling will be carried out in two stages. Primarily, the kebeles will be stratified as rural and suburban kebeles. Then 19 kebeles will be selected randomly by using lottery method (17 from rural and 2 from urban kebeles). Secondly, the registered latrine owner households will be identified using registration list available at Woreda health office (health post). Based on larine owners' household registration lists sampling frame will be prepared. Then, by using Systematic Sampling every sample at K^{th} -term will be incorporated in the sample. The numbers of households which included in the study from each kebele will be determined proportionally based on latrine coverage of each kebeles. A representative sample of 1725 households will be selected.

8.3.7. Data collection procedures (Instrument, personnel, data quality control)

Data will be collected quantitatively using pre-tested and standardized questionnaires. The questionnaires will be prepared in English and translated to local language"AfaanOromo'' and later translated back to English to ensure reliable information. Trained data collectors, health workers will collect the data. Principal investigator will act as supervisor and follow up the data collection process. Based on sampling procedure in the households either the head of the house or mother or any person age of greater or equal to 18 years living in the selected houses will be interviewed. Prior to the interview verbal consent will be obtained from the study subject. Health workers that have diploma or above will be selected from woreda health office and health center, for data collection.

8.3.8. Study variables

8.3.8.1. Dependent variables

Latrine utilization

8.3.8.2. Independent variables

Age
Area of the latrine (width* length* height)
Attitude about latrine utilization
Cleanliness of the compound (human excreta)
Cultural perception of the family
Distance of the H.F or school from the house
Distance of the latrine from the living house
Distance of town from the area
Educational status of the family
Ethnicity
Family size
Hand washing facilities
Hand washing practice
Knowledge about latrine utilization and associated diseases
Marital status
Membership/participation in HDA
Monthly income
Occupational status
Occurrences of diarrheal diseases in the previous time
Position of the latrine
Presences of development partners like UNICEF, World vision, WASH…
Presence of electronic communication media
Presence of elementary or secondary school students
Presence of health extension workers in the area (frequently contact)
Presence of H.F or school in the kebele
Presence of town near the area
Presence of TV/radio
Religion
Sex
Source of information
Source of water
Status of CLTS in the kebele
Structure of the latrine
Water consumption per day

8.3.9. Inclusion and exclusion criteria

- In one compound if there is more than one households with latrine only one house will be selected/included in the study
- Households in the area where there is a communal latrine will be excluded
- Households who have latrine that is on construction will excluded

8.3.10. Data Analysis procedures

Data will be entered in to EPI info. Data clearance and analysis will be conducted. Bivariate analysis of associations between risk factors and outcome variables will be conducted using chi square tests. Logistic regression then performed to examine the strength of association between covariates with a p value <0.05. To investigate the association between the covariates and latrine use, multivariable models will be built using a hierarchical conceptual framework. To avoid an excess number of variables and unstable estimates in the subsequent model, only variables with a p-value of <0.025 were kept in the subsequent model analysis.

8.3.11. Data quality management

Pre-testing will be conducted in kebeles of similar settings but which are not part of the study. Then needed adjustments will be made after the pre-test. Training will be conducted for the data collectors. During the training they will practice on how to complete the format/questionnaires. Close supervision will be carried out by the principal investigators during the data collection. Some of the collected data will be assessed daily for the completeness that will help for correction in the next days.

8.3.12. Ethical consideration

Ethical clearance will be obtained from the respective school of public health, Addis Ababa University and Oromia Regional Health Bureau ethical committees. A formal letter will also be submitted to all the concerned bodies to obtain their co-operation. All the participants will be asked their consent. Confidentiality will be assured and no personal details will be recorded or produced on any documentation related to the study.

8.3.13. Dissemination of findings

The findings of this study will be disseminated to Ministry of Health, Oromia Regional Health Bureau, West Arsi Zonal Health Department and Shashemene zuria District Health Office. The findings will also be disseminated to different organizations that will have contributions to improve the health condition of the community. In addition, effort will be exerted to publish the paper and critiques that will be written based on the practical exposure.

8.4. Work plan

Table 8-1: Research project implementation Work Plan Shashemene, Oromia, Ethiopia, April 2014

S. No	Planned Activities	April 2014	May 2014	June 2014	July 2014	August 2014	September 2014	October 2014
1.	Prepare proposal and submit to donors							
2.	Review of Proposals and Approval of Projects							
3.	Select data collectors and research assistants							
4.	Conducting training for data collectors and supervisors							
5.	Pre-testing of the survey instrument							
6.	Prepare for field Work							
7.	Data collocation							
8.	Data entry and cleaning							
9.	Data analysis and interpretation							
10.	Report writing and submission							

8.5. Budget

Table 8-2: Budget breakdown of latrine utilization and influencing factor assessment in Shashemene woreda, Oromia, Ethiopia, 2014

	Budget Category	Unit Cost	Total Quantity	Total days	Total Cost in Birr
1	**Training**				
	Principal investigator	200	1	3	3*1*200=600
	Field Supervisors	180	2	3	2*3*180=1080
	Data collectors	150	8	3	8*3*150=3600
	Data entry clerk	150	1	1	1*1*150=150
	Sub total			**Personnel TOTAL**	**5430**
2	**Supplies**	Cost per Item		Number	
	Flip chart paper	2		75	150
	1 pack Pen	190		1	190
	Pencil	1		17	17
	Eraser	2		17	34
	Sharper	2		17	34
	Marker	95		4	380
	Printing paper (pack)	110		20	110*20=2200
	Printer ink	1000		4	4000
				Supplies TOTAL	**7005**
3	**Field Work**				
	Project coordinator	Person x days		1*21*200	4200
	Field supervisor	Person x days		2*21*180	7560
	Data collectors	Person x days		8*21*150	25200
				Sub Total	**36960**
				Total	**49,395**
				Contingency 5%	2,469.8
				Grand Total	**51,864.8**

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Annex 8.1: Dummy Table

Table 8-1: Scio demographic characteristics of the study area

Variables		Number	Percent
Sex	Male		
	Female		
Age of the responder	18-25 years		
	26-45 years		
	>46 years		
Head of the house	Male		
	Female		
Responsibility of the responder in the house	Head		
	Wife		
	Son/ Daughter		
	Relative		
	Other		
Religion	Orthodox		
	Muslim		
	Protestant		
	Others		
Marital status	Single		
	Married		
	Divorced		
	Widowed		
	Separated		
	Other		
Ethnicity	Oromo		
	Amhara		
	Tigre		
	Other		
monthly income	< 500 birr		
	> 500 birr		
educational level of the H.H head	Illiterate		
	Able read and write		
	Primary		
	secondary and above		
Family size	<4		
	>4		
presence of students in the house	Yes		
	No		

Table 8-2: Characteristics of the house hold latrine

Variables		Number	Percent
Type of latrine	Pit latrine		
	VIP latrine		
	Other		
reason for latrine construction	Advice from health workers		
	Self-initiation		
	Seeing others		
	Imposition from others		
	Others		
Latrine distance from the house	> 15 M		
	<15 M		
Condition of latrine superstructure	No superstructure (open air pits)		
	only with Wood		
	wood plastered with mud		
Presence of squat hole cover	Yes		
	No		
Presence of flies in the latrine	Yes		
	No		
Presence of faecal matter on floor or wall of the latrine	Yes		
	No		
Latrine with hand washing	Yes		
	No		

Table 8-3: latrine utilization

Variables		Number	Percent
All family members use latrine	Yes		
	No		
Does the latrine has track	Yes		
	No		
Which group use latrine frequently	Yes		
	No		
Are < 5 years children use latrine	Yes		
	No		

Table 8-4: Knowledge, attitude and practices of the study area

Variables		Number	Percent
knowing excreta create health problem	Yes		
	No		
knowing latrine utilization can reduce disease	Yes		
	No		
presence of health facility	Yes		
	No		
Did the house Visited by H.E.Ws	Yes		
	No		
Presence of school	Yes		
	No		

Annex 8.2: Questionnaire for the assessment of latrine coverage, utilization and factors associated with latrine utilization in Shashemene woreda, West Arsi, Oromia, Ethiopia

English questionnaire

Household Identification Code _____

Name of Kebele _____

Zone_____

Gare_____

Annex A: Verbal Consent Letter

Dear interviewee, I extend my greeting to you. I / we are here to collect health related data for the purpose of research from Addis Ababa University of Medical Faculty. The aim of this study is to assess latrine utilization and factors associated with latrine utilization in the rural community of Shashemene Woreda, West Arsi Zone. We are requesting your permission to participate in an interview on issues related to latrine utilization and the associated factors for low utilization.

This information will help the policy makers and other responsible bodies as background to improve the health status of the rural community related with proper utilization of latrines. We assure you that whatever information you provide will only be used for the purpose of this research and will not be made available to anyone outside of the research team.

Your willingness and support to respond the interview is very much appreciated. We also assure that the interview process will not bring any harm to you and your family. It is also your right to withdraw any time from the process when your feeling is uncomfortable with it.

Please make (X) mark to indicate the respondents' decision regarding participation in the study. The purpose of the study and confidentiality procedures has been explained to me and I on my own consent:

a) Agree b) Disagree

Interviewer name_____ Signature _____

Date of interview _____ Time started_____ Time completed _____

Result of interview: 1. Completed 2. Respondent not available 3. Refused4. Incomplete

Checked by supervisor: Name_____Signature____ Date _____

Additional instructions to the Interviewers:

1. The interview will continue only after the respondent will agree on the consent
2. fill the questionnaire only with pen
3. Circle the answer from the options of possible responses

QUESTINNAIRE FOR THE ASSESSMENT OF LATRINE COVERAGE, UTILIZATION AND FACTORS ASSOCIATED WITH LATRINE UTILIZATION IN SHASHEMENE WOREDA, WEST ARSI, OROMIA, ETHIOPIA.

No	Questions	Possible responses
Socio Demographic Factors		
001	Sex the responder?	1. Male 2. Female
002	Age of the responder?	_____
003	Responsibility of the responder in house?	1. House hold head 2. House wife 3. Son/ daughter 4. Relative 99. other specify
004	Marital status of the responder?	1. Single 4. Widowed
		2. Married 5. Separated
		3. Divorced 99. Others
005	How many family members do you have?	_____
006	What is your religion?	1. Orthodox 2. Muslim 3. Protestant 99. Others/specify__
007	What is your ethnicity	1. Oromo 2. Amhara 3. Tigris 99. Others/specify__
008	What is your educational level (interviewee)? If the interviewee is mother or father skip Q005 of Q006	1. Illiterate
		2. Able read and write
		3. Primary
		4. secondary and above
009	What is the educational level of the household head (father)?	1. Illiterate
		2. Able read and write
		3. Primary
		4. secondary and above
010	What is the educational level of the household head (mother)?	1. Illiterate
		2. Able read and write
		3. Primary
		4. secondary and above
011	What is your children level of education? (write the numbers of children in the space provided)	1. Illiterate ___
		2. Able read and write___
		3. primary(grade1-8)____
		4.Secondary & above___
012	Who is the head of the family?	1. Husband 2. Wife 99.Other/specify__
013	What is the occupation of the father?	1. Farmer 2. Daily laborer 3. Merchant 99.Other/specify _____

014	What is the occupation of the mother?	1. Housewife 2. Farmer 3. Merchant 4. Daily laborer 99.Other/specify _____
015	Marital status of the house owner?	1. Married 4. Widowed
		2. Unmarried 5. Separated
		3. Divorced
016	Did any of the household member graduated or participated on Model Family training?	1. Yes 2. No
017	If yes for Q16 who?	1. Husband 2. Housewife 3. other specify
018	If yes for Q16 when?	specify the time (month & year)_____
019	If yes for Q16 did take the refreshment training?	1. Yes 2. No
020	If yes for Q19 When was that?	specify the time (month & year)_____
021	Is there CC session in this area?	1. Yes 2. No 3. I don't know
022	If yes for Q#021 did your family member participate?	1. Yes 2. No 3. I don't know
Economic Indicator		
101	Do you have domestic animals?	1. Yes 2. No
102	Which one of the following do you have? And how much?	1. Cattle___ 4. Donkey___
		2. Goat ___ 5. Hen ___
		3. Sheep___ 99. Other /specify__
103	Monthly income/ yearly (in cash)	_____
104	Do you have other source of income?	Specify in birr
Excreta disposal system		
201	What type of latrine do you have?	1. Pit latrine 2. VIP latrine 99. others/specify
202	How many years since latrine is constructed	Specify in month/ year____/____
203	What are your reasons to construct latrines?	1. Advice from health workers
		2. Self-initiation
		3. Seeing others
		4. Imposition from others
		99.Others/specify___
204	Is the latrine functional?	1. Yes 2. No
	What is the status of supper structure?	1. Good 2. Fair 3. Bad
205	Generally What is the status of latrine?	1. Maintained 2.Need Maintenance
206	If the answer for Q#205 is #2 then Which parts of the latrine need maintenance?	1. Superstructure 2. Slab 3. Roof 4. pit
		99. others/specify
207	Do you have water well in the compound?	1. Yes 2. No
208	Where is the location of latrine from well (if only well is available)? (observation)	1. Downward
		2. on the same level
		3. Uphill
209	How far is the distance between latrine and well?(in meters) (observation)	1. <15 2. 15-30
		3. >30
210	What is the condition of latrine superstructure	1.No superstructure

	(observation)?	2. Only with wood
		3. Wood plastered with mud
		99. Others/ specify
211	Is the slab sealed with mud or cemented (observation)?	1. yes 2.No
212	Is the latrine drop-hole covered (observation)?	1. yes 2.No
213	Are there any excreta smears or urine in the pan, on the floor or in the surroundings?	1. yes 2.No
214	Are there visible signs of flies in or around the latrine?	1. yes 2.No
215	Does the latrine have hand washing facilities?	1. yes 2.No
216	If yes for Q214 is there water in the hand washing facility? (observation)	1. yes 2.No
217	If yes for Q215 is there soap or ash for hand washing? (observation)	1. yes 2.No
218	How close are hand-washing facilities to the latrine (Observation)?	1. next to the latrine 3. inside the house
		2. Within walking distance 4.No facilities
219	How far is the distance between the latrine and the house?	Specify in meters
220	In which direction is constructed the latrine from the house? (observe)	1. At the back of the house 2. In front of the house 3. Next to the house 99. Other specify
	How often is the latrine cleaned?	1. Once a day 2. Once a week 3. Monthly 4. Never 99. Other specify
Utilization of latrines by family members above 5 years old		
	Does everyone in your family use the latrine?	1. Yes 2. No
301	If no for Q#301 then Who use the latrine?	1 .Males only 2.Females only
		3. All family members
302	If users are males or females only, why?	1 .Both sexes do not share
		2.Males can go for open defecation
		3.Males stay out for work
		4. No reason
		99.Others/specify
303	How frequently is the latrine used?	1 .Rarely 2.Mostly 3.Always
304	If latrine is used always, why?	1 .Excreta are dangerous to health
		2.Convenient/privacy
		3.No other place to defecate
		99. Others /specify____
305	If latrine is used rarely, why?	1. No superstructure
		2. Bad smell
		3. Open field is convenient
		4. Stay out for work

		99. Other/specify____
306	Does the track to the latrine indicate its being used or uncovered with grass (observation)?	1. yes 2.No
307	Is there fresh faeces seen through the latrine squat hole (observation)?	1. yes 2.No
308	Are there observable faeces in the compound?	1. yes 2.No
Utilization of latrines by under 5 children		
401	Do you have under 5 children in the house?	1. Yes 2. No
402	If the answer in Q 401 is yes, how many?	Age group M F
		1 .0-5 months __ __
		2. 6-11 months __ __
		3. 12-23 months __ __
		4. 24-35 months __ __
		5..36-47 months __ __
		6. 48-59 months __ __
403	Do <5 children use latrine?	1. Yes 2. No
404	At what age do children start using latrine?	Specify in years_____
405	What are the reasons for not using the latrine by <5 children?	1 .Floor not safe to stand on
		2. Large squat hole
		3. Latrine not clean
		4. Unreasonable bad smell
		99. Others/specify
406	Where do you dispose faeces of children who do not start using latrines?	1. Left in the house
		2. Disposal in the compound
		3. Disposal outside the compound
		4. Pit latrine disposal
		99. Others/specify
Water supply		
701	What is the main source of water for the household?	1. Protected well /spring
		2. Unprotected well/spring
		3. River water
		4. Rain water
		5. Protected and unprotected
702	How much minutes are needed to collect water (to go back and forth)?	1. <15 2. 15-30 3. 30 and more
703	What is the volume of the container used to fetch water?	1. <5 liters 4. 16-20 liters
		2. 5-10 liters 5. >20 liters
		3. 11-15 liters
704	How frequent do you fetch water each day for the family?	1. Once 3. Three times 2. Twice 4. >3 times
705	How much water is consumed per day on	In pots or 20 liters jerrican__

	average for the family?	
Hand washing practices		
901	When do you wash your hand?	1 .After defecation
		2. After cleaning child's bottom
		3.Before handling food
		4.Before feeding children
		(including breast feeding)
		99. other/specify____
902	What do you usually use during hand washing especially after defecation, after cleaning child's bottom, before feeding children and before handling food?	1 .Only water 2.With soap 3. With ash 99. Others/specify____
Community Sanitation		
1001	Are you keeping domestic animals	1. Yes 2. No
	with you in the same house?(observation)	
1002	If the answer of Q1001 is no, how far	1. <10 2. 10 and above
	from the house (in meters)?(observation)	
1004	Where do you dispose house hold/solid wastes?	1. Open field 2. Burning 3. Dumping 4.composting 99. Other /specify__
1005	Are there observable faeces in the neighborhood yard (observation)?	1. Yes 2. No
Knowledge, Attitude and Practice		
2001	Do you know that human excreta can create health problem on human health?	1. Yes 2. No
2002	If yes for Q2001 what kind of diseases?	1. Diarrheal Disease 2. Chronic Diseases 99. other specify
	If yes for Q#2001 where did you get the information?	1. HEWs 2. Students in the house 3. Neighbor 4. Radio/ TV 5. During MF/CC session 99. Other specify ____
2003	Who do you think can use latrine?	1. All the family member 2. Male 3. Female 4. Adult 99. others specify
2004	If not all for Q2003 why?	
2005	Do you think latrine utilization can reduce diarrheal disease?	1. Yes 2. No 3. I don't know
Infrastructure		
3001	Is there health facility in this area?	1. Yes 2. No
3002	If yes, how far from the house?	Specify in KM_____
3003	Is the HEWs visits you?	1. Yes 2. No
3004	If yes, how frequently in the month?	1. Once 2. Twice 3. Three times 4. Four and more 99. Other specify _____
3005	Is there primary/ secondary school in the area?	1. Yes 2. No
3006	If yes, how far from the house?	Specify in KM_____

Chapter IX -Other Additional Output Reports.

9. Zonal and Woreda PHEM Focal Persons Training report

9.1. Introduction

Training and development play an important role in the effectiveness of organizations and to the experiences of people in work. Training has implications for productivity, health and safety at work and personal development. All organizations employing people need to train and develop their staff. Most organizations are cognizant of this requirement and invest effort and other resources in training and development. Such investment can take the form of employing specialist training and development staff and paying salaries to staff undergoing training and development.

The purpose of training and management development programs is to improve employee capabilities and organizational capabilities. When the organization invests in improving the knowledge and skills of its employees, the investment is returned in the form of more productive and effective employees. Training and development programs may be focused on individual performance or team performance. The creation and implementation of training and management

In Ethiopia the main causes of morbidity and mortality in children are communicable diseases and malnutrition. Among the communicable diseases acute respiratory tract infections (ARI), diarrheal diseases and the vaccine preventable diseases together account for about 70 percent of childhood mortality.

Oromia is one of the regional states in the country with a population of nearly 40 million. The region had the history of certain communicable diseases' outbreaks including acute watery diarrhea (AWD), measles and occasionally, malaria epidemics.

The diseases of interest that the public health emergency management core process at Oromia regional health bureau at present has planned to train health professionals on acute watery diarrhea, malaria, measles, meningococcal meningitis, malnutrition, AFP and Neonatal tetanus. The regional health bureau usually used to give trainings on all public health emergencies at all levels.

9.2. Objective

9.2.1. General objective

To strengthen PHEM focal persons on general PHEM activities and outbreak investigation on selected epidemic prone diseases, to improve the recording, reporting and case managing abilities of zonal and woreda focal persons.

9.2.2. Specific objective

- To enable participants to develop the skills necessary to support district and health Facilities on surveillance systems and outbreak investigation.
- To improve the health workers ability on case management of selected epidemic prone Diseases
- To strengthen the recording and reporting capabilities of the health workers.

9.3. Methods and materials

- Prior to the presentations pre-test was administered to Identify the level of their awareness of the participants about public health emergencies prone diseases
- PPT presentation, LCD, flip chart and computer were used to conduct the training.
- Group work
- General discussion
- Evaluating their level of awareness at the end of the training through administration of post-test

9.4. Result

9.4.1. Activities accomplished before the training

Prior to the training gap was identified (need assessment was conducted). Based on the assessment result this training is prepared. A selection criterion was also prepared such as the trainee must be PHEM focal person who is permanently working at woreda health office, hospital or zonal health department. Invitation letter was written to zone health offices to call trainees and other administration issues also managed

A total of 54 different categories of health professionals who have been working as zonal, woreda and hospital PHEM focal person was selected and joined the training. The training was held at Adama and conducted from April 8 to April 12, 2014. The participants were from West Shewa, North Shewa, East Harerge, West Harerge, South West Shewa and Finfine zuria zones. The majority of the participants 45 (83%) were from woreda, 3 from zone and 6 were from hospital. Daily attendance of the trainees, morning recap of daily topic learnt, pre and post training were some of important strategies conducted to insure the quality of the training. All soft copies of power points presented by trainers and other important reference materials were provided for the trainees.

A total of 7 trainers and facilitators, 5 from ORHB (PHEM staff and EFETP resident) and two from WHO have been participated.

9.4.2. Contents of the training

The different topics were presented by different trainers, particularly on epidemic prone disease, malnutrition and PHEM such as AWD, Measles, Meningitis, Malaria, Poliomyelitis, Neonatal Tetanus and components of public health emergency management.

9.4.3. Output of the Training

Pre and post test result

Table 9-1: Pre and posttest mark and percentage of Adama PHEM training for Zone, woreda and Hospital PHEM focal person from April 8-12/2014.

Code of Trainee	Pre		Post		Code of Trainee	Pre		Post	
	Mark (25)	%	Mark (25)	%		Mark (25)	%	Mark (25)	%
A1	22	88	25	100	**A28**	23	92	24	96
A2	16	64	19	76	**A29**	20	80	22	88
A3	16	64	22	88	**A30**	21	84	25	100
A4	23	92	23	92	**A31**	19	76	22	88
A5	16	64	20	80	**A32**	14	56	15	60
A6	19	76	23	92	**A33**	16	64	20	80
A7	17	68	20	80	**A34**	15	60	18	72
A8	21	84	20	80	**A35**	21	84	22	88
A10	21	84	25	100	**A36**	15	60	20	80
A11	22	88	23	92	**A37**	21	84	24	96
A12	24	96	23	92	**A38**	17	68	23	92
A13	16	64	18	72	**A39**	20	80	24	96
A14	22	88	24	96	**A40**	19	76	24	96
A15	15	60	19	76	**A41**	17	68	18	72
A16	14	56	19	76	**A42**	20	80	23	92
A17	20	80	24	96	**A43**	25	100	25	100
A18	20	80	22	88	**A44**	19	76	23	92
A19	19	76	21	84	**A45**	11	44	19	76
A20	20	80	22	88	**A46**	19	76	23	92
A21	10	40	17	68	**A47**	15	60	18	72
A22	14	56	21	84	**A49**	20	80	23	92
A23	23	92	25	100	**A50**	24	96	25	100
A24	21	84	23	92	**A51**	16	64	18	72
A25	18	72	20	80	**A52**	23	92	24	96
A26	22	88	21	84	**A53**	17	68	17	68
A27	16	64	20	80	**A54**	20	80	23	92

The pre-test result showed that the majority of the trainees achieved highest grades. A total of

32(61%) trainees achieved a score of 70-100 points. This shows that most of the trainees had concepts on PHEM and were not far from the program. This could be

because most of them were working in the environments where PHEM related activities were being performed. The result of the posttest following the conclusion of the training showed that the improvement made was significant. A total of 49(95%) of the training participants achieved 70 and above marks as shown in Table 2.

Table 9-2: Pre and post result category of Adama PHEM training for Zone, woreda and Hospital PHEM focal person from April 8-12/2014.

Category	Pretest Frequency	Pretest Percentage	Posttest frequency	Post Percentage
>=85	11	21%	30	58%
70-84.9	21	40%	19	37%
50-69.9	18	35%	3	6%
<49.9	2	4%	0	0%
Total	**52**	**100%**	**52**	**100%**

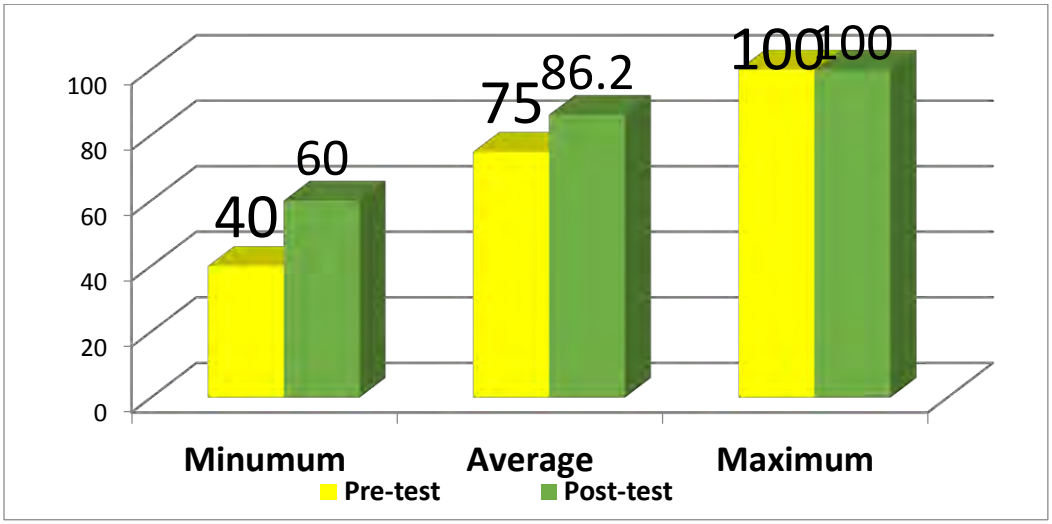

Figure 9-1: Comparison of pretest and posttest result in Adama PHEM training for Zone, woreda and Hospital PHEM focal person from April 8-12/2014.

When comparing pre-test and post-test point scores for the group, the average pre-test percent was **75** and the average post-test percent was **86.2%** , showing a positive percent difference of **11.3%**. While this percent difference was positive, it was also found to be statistically significant. Moreover, the results of a T-test also demonstrated

that for the group the difference between the pre-test average score and the post-test average score was statistically significant (p<0.001).

Table 9-3: Paired sample statistics of pretest and posttest exam Adama PHEM training for Zone, woreda and Hospital PHEM focal person from April 8-12/2014

Test	Mean	N	Std. Deviation	Std. Error Mean
Pretest	74.92	52	13.469	1.868
Posttest	86.23	52	10.157	1.409

Table 9-4: Paired difference of pretest and posttest result of PHEM training

	Paired Differences					T	df	Significance
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Posttest - Pretest	11.308	8.106	1.124	9.051	13.564	10.059	51	.000

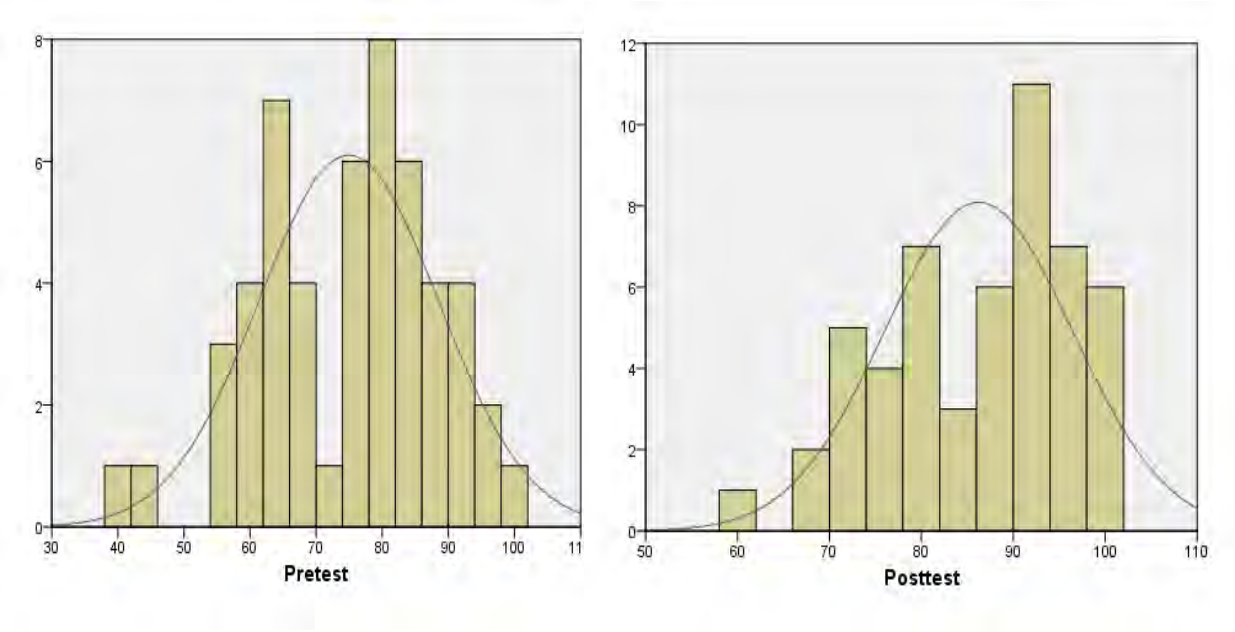

Figure 9-2: normal distribution of pre and post test results of Adama PHEM training for Zone, woreda and Hospital PHEM focal person from April 8-12/2014.

Limitation

- The training hall was not convenient.

9.5. Discussion

For the group the difference between the pre-test average score and the post-test average score was statistically significant. Mean difference of 11.3 at 95%, C.I of (9.05 – 13.5). This showed how trainees had developed skill and acquired new knowledge. Moreover, the majority of the trainees 49(95%) scored, grades of 70 and above in the post test. This is significantly different from the pre-test where 32(61%) achieved grades between 70 and 100. This gave proof that a significant change witnessed that how change or improvement was seen.

9.6. Conclusion and recommendation

The training was effective and had influence on the trainees in increasing knowledge and skill on PHEM activities and core components. After the training the trainees gained and shared good experience from the training. Regional health bureau should maintain and update knowledge and skills of PHEM focal person about PHEM and outbreak investigation at zonal and woreda level.

Acknowledgement

I would like to thank Oromia regional health bureau PHEM core process for facilitating conditions to enable me to participate on the training. I also thank EPHA for facilitating our attendance by providing the required financial support.

Annex 9-1: Pre/ Post Test on Selected Epidemic disease, PHEM, ORHB

Instruction: Choose the best answer from the given options in the space provided.

_____1. Which of the following is true statement regarding standard case definition?

A standard case definition is an agreed upon set of criteria used to label an individual as having a disease of interest or not

A standard case definition does not help to identify cases of interest

A standard case definition facilitates screening of many sick persons in a short period of time

B and C are true E) A and C are true

_____2.Currently how many diseases/conditions are reported under IDSR in Ethiopia?

19 B) 21 C) 22 D) 23

_____3. Which of the following condition is currently added under reportable?

A) Cholera B) Meningitis C) NNT D) Maternal death E) None of the above

_____4.One of the following is an activity in IDSR?

A. Detecting and reporting priority diseases B) Evaluation of disease control program C)Provision of feedback D) A&B E) all

_____5.Cholera is caused by shigella characterized by sudden onset of profuse painful watery diarrhoea or rice-water like diarrhoea, often accompanied by vomiting and may end up in severe dehydration and death. A) True B) False

_____6. Which of the following AWD case management at CTC is appropriate?

A. Patients those who come to CTC with some dehydration needs to have IV fluids.
B. Patients those who come to CTC with severe dehydration needs to have IV fluids.
C. Patients those who come to CTC with No dehydration need to have Rehydration.
D. Patients those who come to CTC with some dehydration needs to have antibiotics.

_____7. 2% chlorine solution is used for:

A. Disinfection of corpses (dead bodies), waste and Excreta
B. Disinfection of floors, objects, beds, footbath and clothes

C. Disinfection of hands and skin D) none of the above

_____8) which of the following are the recommended measles control strategies?

Improved immunization coverage B) measles surveillance

C) Case management including Vit.A supplementation D) Measles SIAs

E) All of the above F) None of the above

_____ 9. What is the temperature range that is ideal for storing measles vaccine in a refrigerator?

0 to 8 degree cet. B) 2 to 8 degree cet.

C) 2 to 10 degree cet. D) It varies from vaccine to vaccine

_____10. What is the efficacy of measles vaccine given at the age of 9 months?

85% B) 90% C) 95% D) 100%

_____ 11. Which of the following are recommended for polio eradication strategies?

Routine immunization B) Polio SIAs C) AFP surveillance

D) Mopping up activities in the areas of low coverage E) All of the above

_____ 12) If you are working in the OPD which one of the following cases will you suspect as a case of AFP?

A) person who has weakness of one leg due to injection to the buttock

B) Person who has fever, weakness of both legs and swelling over the back due to Tuberculosis

C) Person who claims to fall down suddenly while playing and has weakness of one arm

D) All of the above E) none of the above

_____ 13. Which of the following statements are good qualities of AFP surveillance?

A. Non-polio AFP rate of at least 2/100,000 in children under 15 years of age per annum

B. At least 80% of AFP cases have adequate stool specimen

C. Two stool specimens collected within 14 days of paralysis onset, at least 24 hours apart and

received in the lab in good condition

D. Appropriate geographic representation E) All of the above F) None of the above

_____14. Neonatal Tetanus is not an immediately reportable disease in Ethiopia.

A) True B) False

____ 15. What is the dose of Vitamin A for Measles case management to children of 6 to 11 months of age?

A) 50,000 IU B) 100,000 IU C) 200,000 IU D) None

_____ 16. In nutritional screening

Nutrition screening should be done for all children 6-59 months, pregnant women and lactating mothers

Check for bilateral oedema in children 6-59months.

Take the MUAC measurement to children with and without oedema.

A and B are correct E) All are correct

_____17.It is true that Malnutrition is caused only due to food insecurity

A) True B) False

_____18. Anthropometric indices is not necessary to identify SAM; It is possible to identify child with

Malnutrition by looking at the face/body A) True B) False

_____19.The alert threshold level for meningococcal meningitis for a population of 30,000-100,000 per

Week is

5 cases/100,000 population B) 2 cases /100, 000 population

C) 15 cases /100.000 population D) 3 cases /100,000 population E) All can be the answer

_____20. The three pillar strategies for epidemic meningococcal meningitis control

Surveillance B) Early case detection treatment and patient care

C) Vaccination D) All are the answer E) A&B are the answer

_____21. The most common serotypes of meningococcal meningitis in Africa are

Serotype A B) Serotype B C) Serotype C D) Serotype W135 E) A&C are the answer

_____22. People who are at risk for severe malaria include:

Children under the age of five years B) Pregnant women C) People living with HIV

D) All members of the population in areas of unstable malaria transmission E) All

_____23. One is not true about malaria epidemiology in Ethiopia?

Adults are not at risk to develop severe malaria B) Transmission is seasonal and unstable

C) Major epidemics occurred every 5-8 years D) P. vivax & P. falciparum are the two dominant species

E) Transmission coincides with agricultural activity and it affects the economy

_____24. Malaria control prevention and elimination strategy of Ethiopia include:

A) Community empowerment and mobilization

Diagnosis and treatment of malaria within one week of onset of symptoms

Provision of ITN to only children and pregnant women

Indoor residual spraying all over the country E) Less attention to health system strengthening

_____25. The Gold standard test for the diagnosis of malaria is

A) Giemsa stained blood film (examined by light Microscope)

B) Molecular test C) Rapid diagnostic test D) A & B E) None

Good Luck

Training Schedule

Date	Time	Topic	Presenter	Facilitator
Day1	8:30- 9:00	Registration	Organizer	Mr. Ahmed
	9:00- 9:15	Welcoming note	Mr. Tesfaye Deti	
	9:15- 9:25	Objective of the training and Ground rules	Daniel	
	9:25 -10:00	Pre-test	Organizer	
	10:00- 10:20	Tea break	Organizer	
	10:20- 11:20	Over View of PHEM & Public Health Surveillance	Tujuma/Daniel	
	11:20 - 12:30	AFP/Polio Surveillance	WHO	
	12:30- 2:00	Lunch	Individual	
	2:00- 3:30	Measles & NNT Surveillance	WHO	
	3:30 - 3:50	Tea Break	Organizer	
	3:50- 5:30	Epidemiology and risk factors for AWD	Birhanu Areda	
Day 2	8:30- 9:00	Recap of Day 1	Participant	Mr. Daniel
	9:00- 10:00	AWD case management (Rehydration)	Mr. Tujuma	
	10:00- 10:20	Tea break		
	10:20- 11:00	Hygiene in the CTC and Health promotion	Birhanu Areda	
	11:00 - 12:30	House hold water treatment and safe storage with demonstration	Birhanu Kenate	
	12:30 - 2:00	Lunch	Individual	
	2:00 - 3:30	Overview of Acute Malnutrition	Mr. Ahmed	
	3:30 - 3:50	Tea break	Organizer	

	3:50 - 5:30	Meningitis & its case mgt	Tujuma	
Day 3	8:30- 9:00	Recap of day 2	Participants	Mr. Tujuma
	9:00- 10:00	Malaria prevention and its Control based on the new guideline	Birhanu Kenate	
	10:00- 10:20	Tea Break	Organizers	
	10:20- 11:00	Malaria prevention and its Control based on the new guideline Cont…	Birhanu Kenate	
	11:00 - 12:30	Early Warning and Surveillance	Mr. Birhanu Areda	
	12:30 - 2:00	Lunch	Individual	
	2:00 - 3:30	Preparedness	Mr. Gemechu	
	3:30 - 3:50	Tea Break	Organizers	
	3:50 - 5:30	Preparedness cont…	Mr. Gemechu	
Day 4	8:30-9:00	Recap of day 2	Participant	Mr. Yadeta
	9:00-10:00	Response	Mr. Amaneal	
	10:00- 10:20	Tea break	Organizer	
	10:30-12.30	Response	Mr. Amaneal	
	12:30- 2:00	Lunch	Individual	
	2:00- 3:30	Recovery	Mr. Amaneal	
	3:30 - 3:50	Tea Break	Organizer	
	3:50- 5:00	Recovery	Mr. Amaneal	
Day 5	8:30- 9:00	Recape	Participant	Mr. Tujuma
	9:00- 10:00	Post test		
	10:00- 10:20	Tea break		
	11:00 -	General discussion and closing		

Declaration

I, the undersigned, declare that this is my original work and has never been presented by another person in this or any other University and that all the source materials and references used for this thesis have been duly acknowledged.

Name: _____

Signature: _____

Place: _____

Date of Submission: _____

The thesis has been submitted for examination with my approval as a university advisor.

Name of advisor: _____

Signature: _____

Date: _____