ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCE, SCHOOL OF PUBLIC HEALTH

Ethiopia Field Epidemiology Training Program (EFETP)

Compiled Body of Works in Field Epidemiology

By

Tasew Erena Duressa

Submitted to the School of Graduate Studies of Addis Ababa University in Partial Fulfillment for the Degree of Master of Public Health in Field Epidemiology

June 2015

Addis Ababa

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Advisors

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Approval by Examining Board

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ACRONYMS

AACAHB	Addis Ababa City Administration Health Bureau
AAU	Addis Ababa University
AFI	Acute Febrile Illness
AIDS	Acquired Immuno Deficiency Syndrome
ANC	Antenatal Care
ART	Anti Retro Viral Therapy
AWD	Acute Watery Diarrhea
BCG	Bacillus Calmet and Gaurin
BPR	Business Process Reengineering
CDC	Center for Disease Control
CFR	Case Fatality Ratio
CHW	Community Health Worker
DHS	Demographic Health Survey
DPPC	Disaster Prevention and Preparedness Bureau
DRMFSS	Disaster Risk Management Food Security Sector
DPFS	Disaster Prevention and food security
EFETP	Ethiopian Field Epidemiology Training Program
EFY	Ethiopian Fiscal Year
ELISA	Enzyme-Linked Immuno Sorbent Assay
EPHA	Ethiopian Public Health Institute
EPHI	Ethiopian Public Health Institute
EPI	Enhanced Program of Immunization
EVD	Ebola Virus Diseases
FETP	Field Epidemiology Training Program
FMOH	Federal Ministry of Health
FP	Family Planning
GIS	Geographical Information System
HDA	Health Development Army
HC	Health Center
HEWs	Health Extension Workers

HF	Health Facility
HH	House Hold
HIV	Human Immune Virus
HP	Health Post
HSDP IV	Health Sector Development Program Four
IDSR	Integrated Disease Surveillance and Response
IgM	Immune Globulin M
IHC	Integrated Health Centre
IMR	Infant Mortality Rate
IRS	Indoor Residual Spray
ITN	Insecticide Treated Net
LLITN	Long Lasting Insecticide Treated Net
MAM	Mild Acute Malnutrition
MCH	Maternal and Child Health
MDG	Millennium Development Goal
MMR	Morbidity and Mortality Ratio
MMR	Measles, Mumps and Rubella
MOH	Ministry Of Health
MPCP	Malaria Prevention and Control Program
NGO	Non-Governmental Organization
NICD	National Institute for Communicable Diseases
NVS	National Vaccine Store
OPD	Out Patient Department
OPV	Oral Polio Vaccine
OTP	Outpatients Therapeutic Program
PHC	Primary Health Care
PHEM	Public Health Emergency Management
PITC	Provider Initiative Test and Counseling
PLWHA	People Living with HIV/AIDs
PMTCT	Prevention Mother to Child Transmission
PTB	Pulmonary Tuberculosis
RDT	Rapid Diagnostic Test
RHB	Regional Health Bureau

RI	Routine Immunization
RNA	Ribose Nucleic Acid
RRT	Rapid Response Team
SAM	Sever Acute Malnutrition
SC	Stabilizing Center
SOPs	Standard Operating Procedures
SOS	Secretary of State
STI	Sexually Transmitted Infections
TB	Tuberculosis
TBA	Traditional Birth Attendant
TT	Tetanus Toxoid
TVET	Technical and Vocational Education Training
TWG	Technical Working Group
UNICEF	United Nation Children's Fund
US	United States
USA	United States of America
VCT	Voluntary counseling and Testing
VVMs	Vaccine Vial Monitors
WaSH	Water Sanitation and Hygiene
WHO	World Health Organization

EXECUTIVE SUMMARY

This document contains a two years Field Epidemiology Training Program outputs which is equivalent with thesis to be submitted to graduate school of public health for fulfillment of masters degree in Field Epidemiology. It includes reports of diseases outbreak investigations, public health surveillance data analysis, surveillance system evaluation, narrative summary of disaster situation report, manuscripts, abstracts, and training reports. Accordingly, the document is organized to eleven chapters.

Chapter One: contains disease outbreak investigations. I have conducted two outbreak investigations as first Author and one as a collaborator with other field epidemiology residents. Two of the investigations were conducted using case control study design. All investigation report contains abstract, introduction, methods, discussions, conclusion, recommendations, acknowledgement and references separately.

Chapter Two: contains report of surveillance data analysis which was conducted on Analysis of Measles Surveillance Data in Ethiopia, January to December 2013: One year data was used in the analysis. The objective of this study was to describe measles distribution by person, place, and time and recommend possible solutions.

Chapter Three: addresses surveillance system evaluation entitled "To assess key attributes of malaria surveillance system and Performance of the system in line with set objectives and operations of the system to generate evidence based information for the better improvement of the surveillance system. " This chapter clearly presents the purpose and objectives of the malaria surveillance and its progress towards its objectives. The surveillance attributes: simplicity, flexibility, stability, acceptability, representativeness, timeliness, data quality, sensitivity and predictive positive value were also assessed in the chapter.

Chapter Four: contains assessment of Health Profile Data Description of Surround Finfine Special Zone, Dukem Administrative Town, and Oromia Regional State. In the chapter health and health related data of Administrative Town populations were evidently presented which is very imperative for prioritizing high-flying problems. It is basic for planning and undertaking

appropriate public health interventions; and is doorway point for operational public health researches. Stake holders of health and health related issues will access evidence based information from this chapter.

Chapter Five: contains Scientific Manuscripts for Peer reviewed Journals. In chapter two manuscripts were presented. The manuscripts were prepared according to Ethiopian journal of health development author's guideline. The first manuscript was Outbreak of Measles in Jimma Town, Oromia Region, Ethiopia, October 2014 and the second was Traveler Risk Assessment and Risk Management of Ebola in Ethiopia 2014.

Chapter Six: Abstracts on Epidemiology of Measles in Ethiopia, January to December 2013, Outbreak of measles in Jimma Town Oromia Region, Ethiopia 2014 and Traveler Risk assessment and Risk Management of Ebola in Ethiopia Jan,2014 and sent to international conference.

Chapter Seven: includes the narrative disaster situation report. As part of early warning and vulnerability assessment the government of Ethiopia has been conducting nationwide human health and nutrition emergency need assessment twice a year in collaboration with different government sectors and partners. The assessment was conducted to identify potential problems which need humanitarian assistance. Based on the report from the assessment humanitarian requirement document was developed and shared with potential partners for response. This chapter clearly presents pre harvest human health and nutrition need assessment conducted in West Arsi and Bale zones of Oromia region.

Chapter Eight: Two protocols or proposals for epidemiological projects were damped in the proposal entitled "Assessment of factors associated with full immunization in informal and formal settlements among children 12-23 months in Addis Ababa, Ethiopia 2014" was sent to African Field Epidemiology Network (AFENT) for mini grant. It was accepted and funded to be conducted. The second proposal, Traveler Risk Assessment and Risk Management of Ebola Viral Disease in Ethiopia 2014, was developed for epidemiological project to be submitted to Addis Ababa University School of Public Health.

Chapter Nine: describes training conducted on outbreak investigation and response. The training addressed overview of purpose of outbreak investigation, steps out break investigation and understands the use of epidemiologic study designs in outbreak investigation.

Chapter Ten: Ebola virus disease (EVD) prevention and control activity was conducted in Gog woreda of Gambella region for one month in major port of entry.

Chapter Eleven: Finally, Public Health Emergency weekly bulletins were indicated in weekly bulletins. It was prepared during the two years field base attachment, I was includes only two of them in this document. The weekly bulletins were communicated to different stakeholders including ministry of health through Deputy Director General of Ethiopian Public Health Institute on weekly bases.

CHAPTER I– OUTBREAK INVESTIGATION

1.1. Outbreak Investigation of Measles in Jimma Town, Oromia Region, Ethiopia 2014

Abstract

Background: Measles is a highly contagious viral disease caused by Paramyxovirus, of the genus ***Morbillivirus.*** A measles outbreak was detected in Jimma Town, Oromia Region on the 16th of August 2014. An outbreak investigation was carried out.

Objective: To assess the occurrence of the outbreak and identify factors associated with contracting measles in Jimma Town, Oromia Region, Ethiopia 2014.

Methods: We conducted unmatched case control study. We recruited a total of 34 cases and 102 controls. Data was collected from 14-29 October 2014, using structured questionnaire to solicit information from cases and controls. Verbal consent from all participants and confidentiality were in place. Permission to carry out the study was obtained from Ethiopian Public Health Institute and Oromia Regional Health Bureau. Epi Info was used to calculate frequencies, odds ratios and 95% confidence interval finally SPSS software used to perform logistic regression to identify risk factors for measles.

Result: We recruited a total of 34 cases and 102 controls. The mean age for cases was 12.8±14.6 SD and for controls 8.4±9.1 SD. Cases whose mothers educated to the level of primary were 3.4 times more likely to develop measles compared to their counter parts (AOR=3.4; 95%CI: 1.03-15.94) and Children's who had contact with measles cases were 3.2 times at risk of contracting measles compared to who had no contact (AOR=3.2; 95%CI: 1.14-8.93). Also cases that had travel history to outbreak site were 6.3 times more likely to develop measles compared to that had no travel history (AOR= 6.3; 95%CI: 2.52-15.94).

Conclusion: Factors independently associated with the occurrence of measles outbreak were mother's education to the level of primary, travel history and contact with cases and, we recommend routine vaccination for all children before enrolling into schools and strengthening supplemental measles vaccination and Public advocacy on immunization campaigns

Keywords: Measles; Outbreak; Risk factors; Ethiopia

Introduction

Measles is a very infectious viral disease that affects children below the age of 15 years. The signs and symptoms of measles include fever, lack of appetite, cough, coryza, red eyes, and maculopapular rash, with complications such as pneumonia, blindness, brain damage, diarrhea and croup. The incubation period of the disease ranges from 10 days to a month (1). Measles is spread through contact with nose and throat secretions of infected people and through airborne droplets released when an infected person sneezes or coughs. A person can infect others for several days before and after he or she develops symptoms. The disease spreads easily in areas where infants and children come into contact such as in health centers and schools (2). Measles remains the leading cause of childhood morbidity and mortality in the world. Worldwide, there are estimated to be 20 million cases and 164,000 deaths each year were recorded in 2013(8) (3).

The number of measles deaths globally decreased by 71% between 2000 and 2011, from 542,000 to 158, 000. Over the same period, new cases dropped 58% from 853,500 in 2000 to 355,000 in 2011. Estimated global coverage with a first dose of vaccine increased from 72% in 2000 to 84% in 2011. Despite this global progress, some populations remain unprotected. An estimated 20 million children worldwide did not receive the first dose of vaccine in 2011of these 1 million children were from Ethiopia (4).

Measles outbreak investigation conducted in Zimbabwe in 2010 found; contact with a measles case, being unvaccinated against measles and not receiving additional doses of measles vaccine were independent risk factor for contracting measles. Measles is one of the vaccines preventable diseases that are targeted for elimination and with half of the world close to eliminating measles, many countries in sub Saharan Africa are still struggling to control the disease (5). In Africa 450,000 cases were reported and in Sub Saharan Africa 250,000 deaths were reported in 2009 (6).

Measles outbreak investigation conducted using case–control study in Dare Salaam, Tanzania found risk factors included being unvaccinated having received one dose of vaccine compared to two, being younger, and having a less-educated caretaker (7).

In 2011 Ethiopia reported a total of 3255 measles outbreak cases (3). Between August and October 2014, Oromia Region reported 34 cases from Jimma District. Due to an increase in vaccination coverage in developing countries, there has been a significant change in the epidemiology of measles such as higher incidence in older children and young adults (8). Under-nourished people are more susceptible to measles complications, slow recovery, and higher fatalities. Being vaccinated against measles gives protection against measles up to 99% and the World Health Organization recommends that all children who receive the first dose of vaccine should also have a second opportunity for vaccination (8). Jimma Town experienced a measles outbreak with a total of 34 cases from 8 August 2014 to -24 October 2014. 3 cases were measles IgM positive. The index case was a one year old female with signs and symptoms of measles from Jimma Town who reported at Jimma Hospital on the 14 August 2014. Further presentation of patients with similar symptoms and reports from villagers led to the declaration of a measles outbreak.

An investigation of the outbreak was conducted to determine factors associated with contracting measles in Jimma Town. The null hypothesis for the study was; there is no association between demographic, socio-economic and socio-cultural factors and contracting measles in Jimma Town. The alternative hypothesis was: there is an association between demographic, socio economic and socio cultural factors and contracting measles in Jimma Town. Therefore, this outbreak investigation was undertaken to identify factors associated with measles in Jimma Town.

2. Objective

2.1 General Objective:

- To assess the occurrence of the outbreak and identify factors associated with contracting measles in Jimma Town, Oromia Region, Ethiopia 2014.

2.2 Specific Objectives:

- To describe the magnitude of the outbreak
- To identify possible risk factors for measles infection

- To undertake prevention and control measures and recommend corrective actions for preventing further epidemics in the area

3. Methods and Materials

3.1 Study area and Period

Jimma Town is 335 km away from Addis Ababa found in Southwest of Ethiopia and it is one of the town administration found in Oromia Region. The land area is 4,623 hectare. Mostly humid temperature with latitude of 7.67 degree and longitude of 36.83 degree with an elevation of 1725 meter above sea level. It has a total population of 184,925 of which 88,164 are male (47.7%) and 96,761 are female (52.3%). The under one and under five population were 5,955 and 30,383 respectively. The town has 17 Kebeles (13 urban & 4 rural kebeles). A total of 38 health facilities were found in Jimma Town (2 Hospitals, 4 health centers, 26 private clinics, and 4 NGOs clinics). Of the 38 health facilities 34 health facilities were providing routine immunization. The primary health coverage in 2013 is 89 % (14). The village where outbreak occurred is 360 Km far from Addis Ababa (Map 1). The study was conducted from 14-29 October 2014.

Map 1: Map of Measles Affected Woreda, Jimma Zone- Oromia, Ethiopia 2014

3.2 Study design

We conducted community based unmatched case-control study to investigate the outbreak

3.3 Study population

- **Cases:** Anyone with generalized, maculopapular rash lasting ≥3 days; and temperature ≥101°F or 38.3°C; and cough, coryza, or conjunctivitis (34 cases) during the study period (10)
- **Controls:** were all people without measles symptoms (102 controls) During the study period

3.4 Operational definition

- **Suspected measles outbreak:** is defined as occurrence of five or more reported suspected cases in one month in a defined geographic area, like, kebele, woreda or health facility catchment area.
- **Confirmed measles outbreak:** is defined as occurrence of three or more laboratory confirmed cases in one month in a defined geographic area, like, kebele, woreda or health facility catchment area
- **Index case:** The case that is first reported to public health authorities (13).

3.5 Inclusion and Exclusion criteria

Inclusion Criteria

- **Cases:** Anyone with generalized, maculopapular rash lasting ≥3 days; and temperature ≥101°F or 38.3°C; and cough, coryza, or conjunctivitis (34 cases) during the study period
- **Controls:** Any resident of Jimma Town during the study period who was a neighbor to a case and who did not develop signs and symptoms of measles and agreed to participate were included.

Exclusion criteria

- **Controls:** Those who refused to participate were excluded

3.5 Sampling

The sample size was calculated using Stat calc function of Epi-info version 7. Using the confidence level of 95%, power of 80%, and assuming a 36.7% prevalence of a previous contact with someone with measles (8) and an OR 3.64, with 1:3 cases to controls a total of 34 cases and 102 controls.

All 34 cases sent through line list were included in the study. The samping was conducted without replacement and if more than one eligible in the family member the youngest child was taken as control with nearest house hold to the case was given priority until the sample size was reached. Controls were neighbors of cases who did not suffer from measles during the period of the study. Only three controls for one case per household were selected from the neighbors of cases.

3.6 Data collection

A structured questionnaire was used to collect data on factors associated with contracting measles, community knowledge and practices on measles for both cases and controls. Data was collected by two BSC Nurses, who were trained for half days on data collection tool. Data collectors speak Afan Oromo and they were translating English in to Afan Oromo for study participant. Interviews were administered for 4 key informants (HCs medical directors, Health officers, Nurses, and Jimma Town PHEM head). Data was checked by principal investigator for completeness and consistency.

3.7 Data analysis and clearance

The data was collected, entered and edited using Epi-Info version7 software and checked for completeness and consistency. Descriptive statistics were used to determine the frequency of different variables. Bivariate and multivariate logistic regression analysis was applied. Results were displayed using tables and graphs and it was interpreted using Odd ratio, P value <0.05 and 95% confidence interval to see the significance of the study.

3.8 Ethical issues

Ethical clearance was obtained from Ethiopian Public Health Institute (EPHI). A letter was written from Jimma Town health office and health center in order to obtain approval on data collection. An informed oral consent was obtained from all study participants. Confidentiality was assured throughout by not writing participant's names. Participants were treated with respect and willingly participated in the study with no payment or cohesion. Verbal consent to take photographs was obtained from parents or guardians for minors below 18 years while participants above 18 years were asked for their own consent.

4. **Results**

We recruited a total of 34 cases and 102 controls. Three of the five specimens that were collected from the 34 cases reported on the line list, were measles IgM positive. The mean age for cases was 12.8±14.6 SD and for controls 8.4±9.1 SD. Most of the cases and controls 25(73.5%) and 80(78.4%) were from the Muslim religion respectively. More than half 19(55.9%) of cases family and majority 89(87.3%) of controls family were married. Twenty two (64.7%) of cases and 89(87.3%) of controls father's were farmer by occupation. With regards to education 22(64.7%) and 39(38.2%) of cases and controls father's learn to the level of primary and 25(73.5%) and 48(47.1%) of cases and controls mother's learn to the level of primary. Cases were managed by Vit A, Tetracycline eye ointment, Amoxicillin for secondary infection and vaccination campaign was conducted for those not immunized. Review of cases notes was done to assess case management (treatment given to patients) and road to health cards checked to verify immunization date, batch numbers and vitamin A supplementation (Table 1).

Table 1: Demographic Characteristics of Measles Cases and Controls, Jimma, Oromia, Ethiopia 2014

Variable	Cases, n= 34 (25%)	Controls, n= 102 (75%)	P value
Religion			
Orthodox	5(14.7%)	16(15.7%)	0.52
Protestant	4(11.8%)	6(5.9%)	
Muslim	25(73.5%)	80(78.4%)	
Marital Status			
Single	15(44.1%)	13(12.7%)	0.000*
Married	19(55.9%)	89(87.3%)	
Fathers Occupation			
Farmer	22(64.7%)	89(87.3%)	0.01*
Merchant	5(14.7%)	7(6.9%)	
Government	7(20.6%)	6(5.9%)	
Fathers Education			
Primary	22(64.7%)	39(38.2%)	0.01*
Secondary	8(23.5%)	31(30.4%)	
Tertiary	4(11.8%)	32(31.4%)	
Mothers Education			
Primary	25(73.5%)	48(47.1%)	0.02*
Secondary	5(14.5%)	29(28.4%)	
Tertiary	4(11.8%)	25(24.5%)	

Majority, 27(79.4%) of the cases and 53(52.0%) of the controls had contact with measles cases and it was significantly associated with measles outbreak and it was significantly associated with p-value <0.05. Vaccination status was also assessed and found most 25(73.5%) of cases were not vaccinated while 55(53.9%) of controls were not vaccinated and it was significantly associated with p-value <0.05. More than half 22(64.7%) of cases and small proportion 23(22.5%) of the controls had travel history and it was significantly associated with p-value <0.05). Majority 27(79.4%) of the cases reported the presence of other cases in their village while small proportion 6(8.9.4%) of controls reported presence of other cases and it was significantly associated with p-value <0.05. In both 23(67.6%) of cases and 65(63.7%) of controls there were more than 5 peoples in the house (Table 2).

Table 2: Risk Factors for Contracting Measles Cases and Controls, Jimma,Ethioipa 2014

Variable	Cases	Controls	P Value
Contact with measles case			
Yes	27(79.4%)	53(52.0%)	
No	7(20.6%)	49(48.0%)	0.01*
Vaccination status			
Yes	9(26.5%)	47(46.1%)	
No	25(73.5%)	55(53.9%)	0.04*
Travel History			
Yes	22(64.7%)	23(22.5%)	
No	12(35.3%)	79(77.5%)	<0.01*
Other cases with measles			
Yes	27(79.4%)	9(8.9%)	
No	7(20.6%)	92(91.1%)	< 0.01*
Number of peoples			
<= 5 peoples	11(32.4%)	37(36.3%)	
>5 Peoples	23(67.6%)	65(63.7%)	0.67

Majority 24(70.6%) of cases and 49(48.0%) of controls were not vaccinated while 6(17.6%) and 4(11.8%) of cases and 38(37.3%) and 15(14.7%) of controls were vaccinated with one dose and two doses respectively (Fig.1).

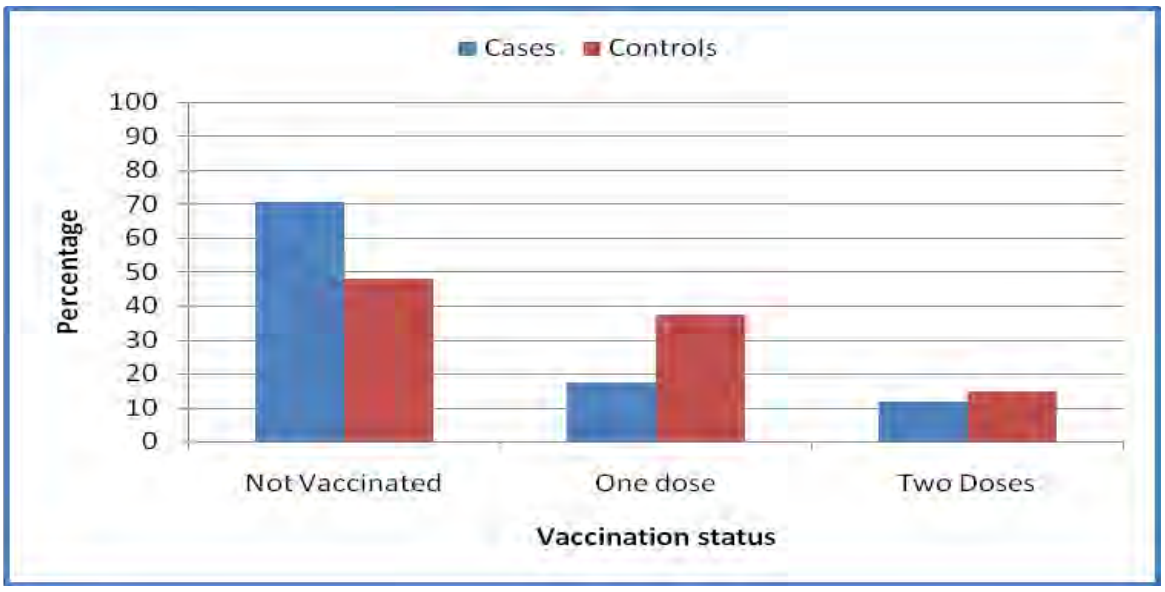

Figure 1: Measles Vaccination Status of Cases and Controls, Jimma Town, Ethiopia 2014

There were multiple peaks on the Epi curve as shown in Figure 2 which showed propagated type of epidemic with person to person transmission. The index case had an onset of symptoms on the 14th of August 2014. The case was a one year old female and interventions (treatment of cases, mass vaccinations, health education, advocacy and contact tracing by environmental heath technicians) however outbreak was started on the 30th of July 2014 almost after one month and two weeks outbreak investigation was conducted because of delay in reporting. The outbreak lasted for two months (July to October 2014).

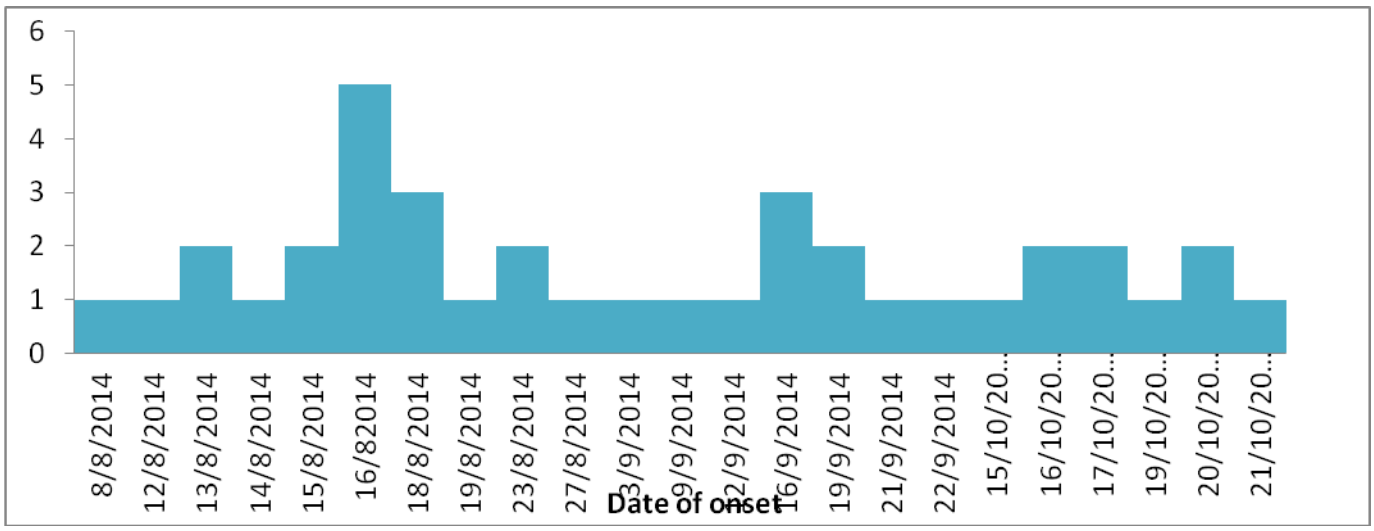

Figure 2: Measles Outbreak by date of Onset In Jimma Town, Oromia Region 2014

Knowledge on measles

Knowledge on measles cases and controls was assessed and it was found that majority 22(64.7%) of the cases replied measles transmitted by contact with measles cases while 43(42.2%) of controls replied measles can be transmitted through air. Concerning methods of measles prevention 15(44.1%) and 66(64.7%) of cases and controls didn't know prevention methods for measles respectively. Also if vaccine can prevent measles was also assessed and 16(47.1%) of cases and 55(55.0%) of controls replied they didn't know. Majority 24(70.6%) of cases and 91(89.2%) of controls replied age at vaccination was less than or equal to 6 months (Table 3).

Table 3: Knowledge on Measles Cases and Controls, Jimma District, Oromia,Ethioipa 2014

Variable	Cases	Controls	P Value
Measles Transmission			
Through air	9(26.5%)	43(42.2%)	0.01*
Oral/Fecal	3(8.8%)	25(24.5%)	
Contact with case	22(64.7%)	34(33.3%)	
Prevention methods			
Vaccination	10(29.4%)	21(20.6%)	0.01*
No Prevention	15(44.1%)	66(64.7%)	
I don't know	9(26.5%)	15(14.7%)	
Can Vaccine prevent			
Yes	11(32.4%)	35(35.0%)	
No	7(20.6%)	10(10.0%)	0.27
I don't know	16(47.1%)	55(55.0%)	
Age at vaccination			
<=6 Months	24(70.6%)	91(89.2%)	0.01*
9 Months	10((29.4%)	11(10.8%)	

During Bivariate analysis eleven independent variables were associated with the occurrence of measles outbreak while during multivariate analysis, factors that remained independently associated with contracting measles outbreak in Jimma District were, Mothers education, contact with measles cases and travel history. Cases whose mothers educated to the level of primary were 3.4 times more likely to develop measles compared to their counter parts (AOR=3.4; 95%CI: 1.03-15.94) and Children's who had contact with measles cases were 3.2 times at risk of contracting measles compared to controls (AOR=3.2; 95%CI:1.14-8.93). Also cases who had travel history to outbreak site were 6.3 times more likely to develop measles compared to controls (AOR= 6.3; 95%CI: 2.52-15.94) (Table4).

Table 4: Independent Predictors of Measles in Jimma District, Oromia Ethiopia, 2014

Variable	Case	Control	COR	AOR
Mothers Education				
Primary	25(73.5%)	46(45.1%)	2.9(1.01-8.56)*	3.4(1.03-15.94)*
Secondary	4(11.8%)	29(28.4%)	0.7(0.18-3.06)	0.6(0.13-2.97)
Tertiary	5(14.7%)	27(26.5%)	1:00	1:00
Contact with measles case				
Yes	27(79.4%)	53(52.0%)	3.5(1.42-8.92)*	3.2(1.14-8.93)*
No	7(20.6%)	49(48.0%)	1:00	1:00
Travel History				
Yes	22(64.7%)	23(22.5%)	6.2(2.71-14.62)	6.3(2.52-15.94)*
No	12(35.3%)	79(77.5%)	1.00	1.00

5. Discussion

Measles spread through contact with nose and throat secretions of infected people and through airborne droplets released when an infected person sneezes or coughs. A person can infect others for several days before and after he or she develops symptoms. The disease spreads easily in areas where infants and children come into contact such as in health centers and schools (2). The mean age for cases was 12.8±14.6 SD and for controls 8.4±9.1 SD. Majority 73.5% of cases were not vaccinated.

This study identified fourteen factors that were associated with contracting measles in Jimma District. It was found that, mothers primary level of education, travel history and contact with a measles case were independent predictors for contracting measles. So measles outbreak investigation in Zaka, Masvingo Province, Zimbabwe, reveals the same finding that cases were high in contact with measles cases (Kufakwanguzvarova W Pomerai,2012) (2).

Cases whose mothers educated to the level of primary were 3.4 times more likely to develop measles compared to their counter parts. These findings were similar with a study done in Burkina Faso and Tanzania. The main reasons for not receiving measles vaccination were lack of knowledge about vaccination campaigns or need for measles vaccination (7, 15).

Majority 79.4% of the cases reported they had contact history with the cases and children's who had contact with measles cases were 3.2 times at risk of contracting measles compared to those who had no contacts and this can facilitate person to person transmission. This is also supported by the ministry of health of Zimbabwe, which states that children who live in crowded places are at high risk of contracting measles in unmatched case control study during from May to August 2010 with (PV <0.05), and that a person with measles can infect others for several days before he/she develops symptoms. Measles spreads easily in places were children gather for example schools (3, 7).

Also cases that had travel history to affected area were 4.7 times more likely to be affected by measles. These can also increase person to person transmission. Cases that had travel history to outbreak site were 6.3 times more likely to develop measles compared to controls and travel history to measles outbreak sites respectively.

Majority 76.5% of the cases were not vaccinated. The low 38.2% of immunization coverage among cases in Jimma Town can be attributed to measles outbreak and this finding in line with the findings of Zaka District, Zimbabwe (3). The median number of siblings was six and this was also reflected in Zeka District that had a median number of siblings of four and the WHO also reports that overcrowding in developing countries is a risk factor for contracting measles (5, 6).

6. Conclusion and Recommendation

Factors independently associated with the occurrence of measles outbreak were, mother's education to the level of primary, travel history and contact with cases. Measles outbreak investigation conducted in Zimbabwe in 2010 found; contact with a measles case, being unvaccinated against measles and not receiving additional doses of measles vaccine were independent risk factor for contracting measles (5).

Measles outbreak in Zaka resulted from the existence of a large number of unvaccinated children among religious objectors in the area and low awareness of the disease. We recommend the promotion of awareness in the community by health education and promotion. District Medical Officer to facilitate formulation of Emergency Preparedness plans (EPR). In the long term we recommend that the Ministry of Health should make it mandatory for all children to be vaccinated before enrolling into primary or boarding schools (7).

Therefore: Awareness rising to vaccinate their children for the community at large. Active case search to minimize transmission.

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1.2 Outbreak Investigation of Measles in Dama Woreda, Guji Zone, Oromia Region, Ethiopia 2015

Abstract

Background: Measles is caused by a ***Paramyxovirus***s, of the genus ***Morbillivirus***. From 2001 to 2011 more than one billion children aged 9 months to 14 years who live in high risk countries were vaccinated against the disease. A measles outbreak was detected in Guji Zone, Dama Woreda, and Oromia Region on the 12th of February 2015. An outbreak investigation was carried out to assess the occurrence of the outbreak and identify factors associated with contracting measles in Dama Woreda.

Methods: We conducted unmatched case control study (50 cases and 100 controls). A case was defined as a person residing in Dama Woreda who developed signs and symptoms of measles from 21 February to 7 March 2015. We used a structured questionnaire to solicit information from cases and controls. Verbal consent from all participants and confidentiality were observed. Permission to carry out the study was obtained from Ethiopian Public Health Institute and Oromia Regional Health Bureau. Epi info was used to calculate frequencies, odds ratios and SPSS to perform logistic regression to identify risk factors for measles.

Result: We recruited a total of 50 cases and 100 controls. Four of five specimens that were collected from the 173 cases reported on the line list were IgM positive. The mean age was 6.5± 5.1 SD for cases and 4.3±2.6 SD for controls. Cases from mothers uneducated were 13.3 times more likely to develop measles compared to their counter parts (AOR=13.3; 95%CI: 2.37-75.38) and Children's who had contact with measles cases were 130.5 times at risk of contracting measles compared to controls (AOR=130.5; 95%CI:12.09-997.47). Also female cases were 4.1 times more likely to develop measles compared to female controls (AOR= 4.1; 95%CI: 1.15-14.35).

Conclusion: Factors independently associated with the occurrence of measles outbreak were uneducated mothers, contact with cases and female sex. We recommend routine vaccination for all children before enrolling into schools

Keywords: Measles; Outbreak; Risk factors; Ethiopia

Introduction

Measles is caused by a ***Paramyxovirus***, of the genus ***Morbillivirus***. The measles virus normally grows in the cells that line the back of the throat and lungs. Measles is a human disease and is not known to occur in animals. Accelerated immunization activities have had a major impact on reducing measles deaths. From 2001 to 2011 more than one billion children aged 9 months to 14 years who live in high risk countries were vaccinated against the disease. Global measles deaths have decreased by 74% from 535 300 in 2000 to 139,300 in 2010 (1).

Measles is one of the leading causes of death among young children even though a safe and cost-effective vaccine is available (1). Measles vaccination resulted in a 74% drop in measles deaths between 2000 and 2010 worldwide. In 2010, about 85% of the world's children received one dose of measles vaccine by their first birthday through routine health services – up from 72% in 2000. Measles is a highly contagious, serious disease caused by a virus. In 1980, before widespread vaccination, measles caused an estimated 2.6 million deaths each year (1).

The first major measles control program in Africa started in 1965. During the 1970s and 1980s, measles vaccination through routine vaccination services was established in all African countries through the World Health Organization (WHO) Expanded Program on Immunization. As of 2009, measles vaccine was widely used throughout Africa, and measles incidence was at an historic low. However, outbreaks continue to occur, and case fatality rates among young children can be as high as 5–10% during outbreaks (2).

Severe measles is more likely among poorly nourished young children, especially those with insufficient vitamin A, or whose immune systems have been weakened by HIV/AIDS or other diseases. Most measles-related deaths are caused by complications associated with the disease. Complications are more common in children under the age of five, or adults over the age of 20. As high as 10% of measles cases result in death among populations with high levels of malnutrition and a lack of adequate health care (3).

Measles epidemiology in Africa since the start of accelerated measles control activities in 2001, we analyzed regional measles case-based surveillance data for 2002–2009. Analysis of the age distribution of confirmed measles cases found that 10% were <9 months, 51% were 9 months–4

years, 18% were 5–9 years, 8% were 10–14 years, and 14% were ≥15 years. Of the confirmed cases, 72,084 (99%) had information on age; the mean age was 79 months. Overall, 30% of cases were missing information for vaccination status, 49% were unvaccinated, 17% received 1 dose, and 4% received ≥2 doses of MCV (4).

Another survey done in Southeast Iran employed multivariate conditional logistic regression analyses, since by multivariate analysis, there was a positive correlation between the numbers of measles vaccines received and age neither of these variables could be employed in the same regression model. Therefore, the values for ``the number of received vaccines'' were used from another model that includes number of vaccines received, contact history, and father's education as predictors (5). A study done in India those reveled children aged 12–59 months who did not receive measles vaccination in infancy were three times more likely to die than those vaccinated against measles (6).

Ethiopia is in the eradication phase of measles control. The NICD is accredited by WHO to perform measles and rubella IgM testing for national case based surveillance to confirm true measles cases and trace the molecular epidemiology of the virus in Ethiopia. Blood specimens from each suspected measles case are sent to the NICD for confirmation. Therefore, this outbreak investigation was undertaken to investigate the extent of the problem, possible factors responsible for its occurrence and to institute preventive and control measures.

2. Objective

2.1 General Objective:

- To investigate and identify risk factors for the occurrence of measles outbreak in Dama Woreda, Guji Zone, Oromia region 2015

2.2 Specific Objectives:

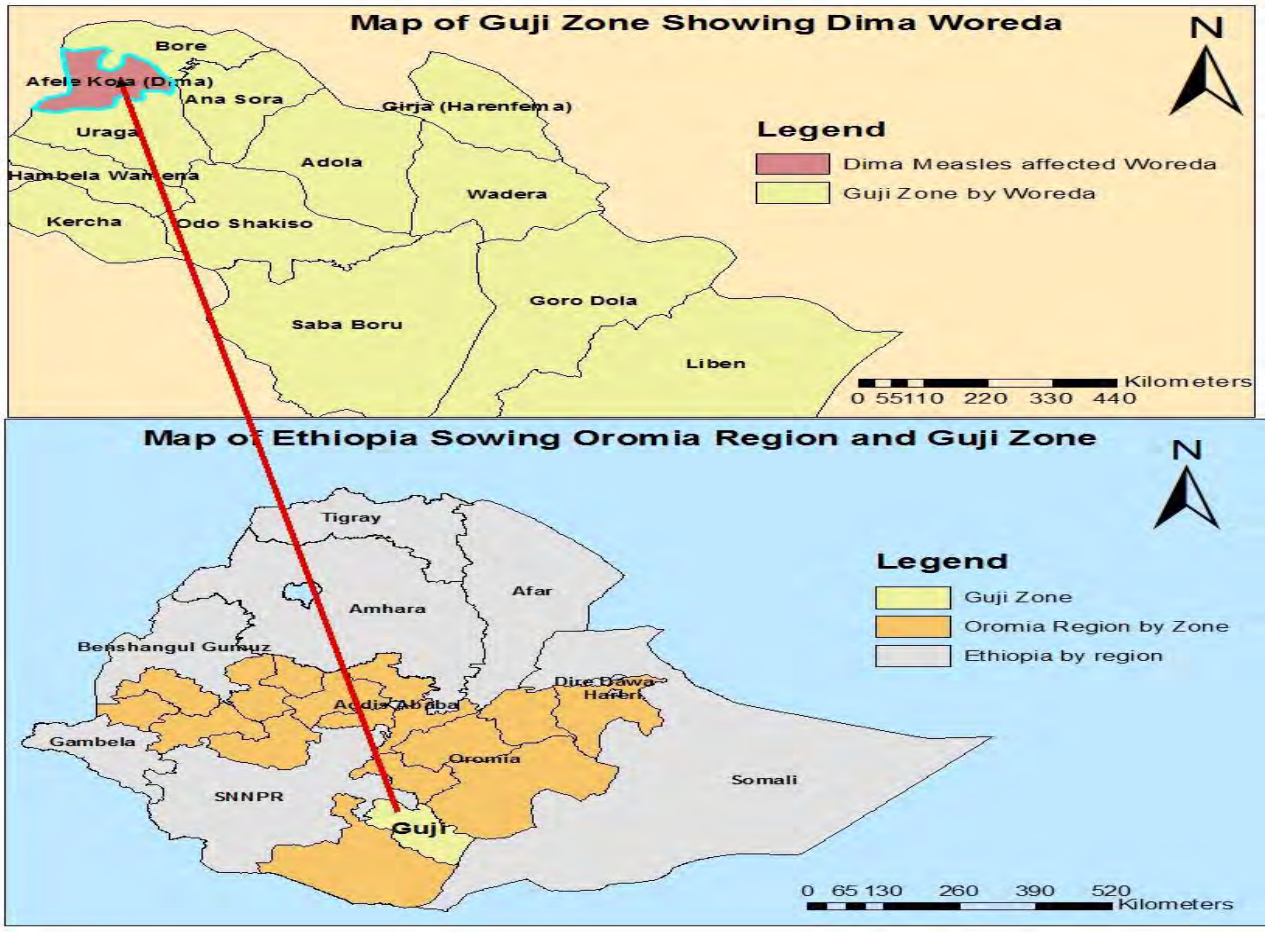
- To describe the magnitude of the outbreak
- To identify possible risk factors for measles infection
- To undertake prevention and control measures and recommend corrective actions for preventing further epidemics in the area

3. Methods and Materials

3.1 Study area and Period

Dama woreda is 401 kilometers Addis Ababa and 236 km from Guji zone bounded by East Sora woreda in the North, Bore woreda in the South, Uraga woreda in the west, Gedeo Zone from SNNPR. Dama woreda is one of the woredas found in Guji Zone, Oromia Regional State and founded in 1998 E.C by the name called Dama. Dama means a place where Aba Gada was gathering together for pray and provide advice for people. The physical area of the woreda is about 53,291 Hectares with an altitude of 2,900. The woreda has a total population of 79,749 of which 40,193 were males, and 39,556 were females among these 77,575 resides in rural and 2,174 resides in urban kebeles, Of the total population 2567 were under one children's, 9916 were 1-4 years old children's, 23666 were 5-14 years old, 33889 were 15-44 years old, and 9711 were above or equal to 44 years. Women's of reproductive age (15-49 females) were 14,854. During the assessment 2767 were pregnant women and 14857 non pregnant. The woreda has 18 rural and 1 urban kebeles, 4 health centers, 18 health posts and 1 private clinic all were giving health services.

Dama woreda health office has a total of 112 Human resources 4 HO, 23 Nurses all types, 6 midwifes, 4 lab technicians, 39 HEWs, 1 Druggist, 1 Environmental health, 1 UHEW, 1 HIT and 30 supportive staffs. The woreda has cold weather (high land) and as a result of such weather condition, Acute Respiratory Infections is the leading cause of morbidity among top ten diseases, followed by pneumonia. The study was conducted from 21 February to 7 March 2015.



Map 2: Dama Woreda, Guji Zone, Oromia Region, Ethiopia 2015

3.2 Study design

We conducted unmatched case-control study to investigate the outbreak and risk factors.

3.3 Study population

- **Cases:** Any person with generalized maculopapular rash lasting ≥3 days; and temperature ≥101°F or 38.3°C; and cough, coryza, or conjunctivitis (50 cases) during the study period
- **Controls:** were all people without measles symptoms (100 controls) during the study period

3.4 Operational Definitions:

Suspected measles outbreak: is defined as occurrence of five or more reported suspected cases in one month in a defined geographic area, like, kebele, woreda or health facility catchment area.

Confirmed measles outbreak: is defined as occurrence of three or more laboratory confirmed cases in one month in a defined geographic area, like, kebele, woreda or health facility catchment area.

Index case: The case that is first reported to public health authorities (8).

3.5 Inclusion and Exclusion criteria

Inclusion Criteria

- **Cases:** Any person with generalized maculopapular rash lasting ≥3 days; and temperature ≥101°F or 38.3°C; and cough, coryza, or conjunctivitis (50 cases) during the study period from 26 February to 7 March 2015 and who agreed to participate in the study were included.
- **Controls:** Any resident of Dama woreda during the study period who was a neighbor to a case and who did not develop signs and symptoms of measles and agreed to participate were included.

Exclusion criteria

- **Cases:** Those who refused to participate were excluded
- **Controls:** When more than one eligible in the family found the elder were excluded and also who were not willing to participate in the study,

3.6 Sampling

The sample size was calculated using Stat calc function of Epi-info version 7. Using the confidence level of 95%, power of 80%, and assuming a , not vaccinated for measles 34%, someone with measles like disease in under ones (8) and an OR 2.85, with 1:2 cases to controls ratio a total of 50 cases and 100 controls were required. Of 173 cases sent through line list 50 cases were included in the study. The sampling was conducted without replacement and if more

than one eligible in the family member the youngest child was taken as control with nearest house hold to the case until the sample size was reached.

3.7 Data collection

A structured interviewer-administered questionnaire was used to collect data on factors associated with contracting measles, community knowledge and practices on measles for both cases and controls.. Data was collected by four BSC Nurses, who were trained for half days on data collection tool. Data collectors speak Afan Oromo and they were translating English in to Afan Oromo for study participant Interviews were administered for 5 key informants (HCs medical directors, one health officer surveillance focal, 2 Nurses working in EPI, and Guji Zone PHEM head). Data was checked by principal investigator for completeness and consistency. Review of cases notes was done to assess case management (treatment given to patients) and road to health cards checked to verify immunization date.

Laboratory investigation: Prior to the investigation period Dama Woreda health center surveillance focal collected five blood serum samples and sent to national measles and polio laboratory EPHI. As part of the investigation the result of laboratory analysis were positive for measles IgM.

3.8 Data analysis and clearance

The data was collected, entered and edited using Epi-Info version7 software and checked for completeness and consistency. Descriptive statistics were used to determine the frequency of different variables. Bivariate and multivariate logistic regression analysis was applied to identify predictors of measles. Results were displayed using tables and graphs and it was interpreted using Odd ratio, P value <0.05 and 95% confidence interval.

3.9 Data Dissemination

The finding of this study will be shared to Addis Ababa University/School of Public Health, Oromia Regional State Health Bureau, Ethiopian Field Epidemiology Training Program Department, Guji Zone Health Department and Dama Woreda Health Office. Also it will be made ready for publication in reputable Journals.

3.10 Ethical issues

Ethical clearance was obtained from Ethiopian Public Health Institute (EPHI). A letter was written for woreda health offices in order to obtain approval on data collection. An informed oral consent was obtained from all study participants. Confidentiality was assured throughout by not writing participant's names. Participants were treated with respect and willingly participated in the study with no payment or cohesion. Verbal consent to take photographs was obtained from parents or guardians for minors below 18 years while participants above 18 years were asked for their own consent.

4. Result

Descriptive Analysis

A total of 173 cases (AR: 21.7/10000 Pop) with 9 deaths (CFR 5.2%) were reported during the investigation. The index case was reported from Dhugo Guticha kebele on 8 February 2014 who had travel history to nearby neighboring Bora woreda, while in incubation period and became symptomatic for measles and meanwhile the index case was died. Then outbreak gradually spread from Dhugo guticha to Hada Guratii kebele .Of the total reported cases 136(78.6%) were from Dhugo Guticha 39(21.4%) were from Hada Guratii kebele. Currently, 2 of 18 (11.1%) kebeles were affected by the outbreak.

Among all identified cases 70(40.5%) were males and 103(59.5%) were females. Children age between 5-14 years were 45(26%) most affected, Children under 5 years were 41(23.7%), 15-30 were 14(8%), and under one years old age groups were less affected compared to 5 -14 years populations. The age specific attack rate was 42.5/1000 and 23.9/1000 population in under five children and 5-14 years old respectively. The attack rate was higher for female as compared to male 2.6/1000 population. Among cases 95.3% were not vaccinated for measles. Seventy five (43.3%) and 80(46.3%) of cases their age group was under five and 5-14 years old respectively. In this outbreak the list affected age group were the over 15 years old 18(10.4%). The attack rate was 23.7/1000 population in Dhugo kebele and 9.1/1000 population in Hada Guratii kebele In 2006 Dama woreda measles vaccination coverage was 82% while most affected catchment of Dhugo Guticha cluster was 68% in the year 2006 and also the report showed in Hada gurati was 74% in 2006 EC (Table 5).

Table 5: Measles Cases Distribution by place and person, Dama Woreda, Oromia, Ethiopia 2015

Characteristics	Population	Frequency	Percentage	Attack Rate /1000 population
Kebele				
Dhugo	5702	135	78.1	23.6
Hada Guratii	4188	38	21.9	9.1
Age Group				
< 5	1764	75	43.3	42.5
5_14	3340	80	46.3	23.9
>=15	4786	18	10.4	3.7
Sex				
Male	40193	70	40.5	1.7
Female	39556	103	59.5	2.6
Vaccinated				
Yes		8	4.7	
No		165	95.3	

There were multiple peaks on the Epi curve as shown in Figure 1 which showed propagated type of epidemic with person to person transmission. The index case had onset of symptoms on 2/8/2015. The case was a two year old male and interventions (treatment of cases, mass vaccinations, health education, advocacy and contact tracing by environmental heath technicians) about the outbreak was provided however investigation was started on the 2/23/2015 almost a two weeks after the outbreak onset. The outbreak lasted for two weeks (Fig. 3).

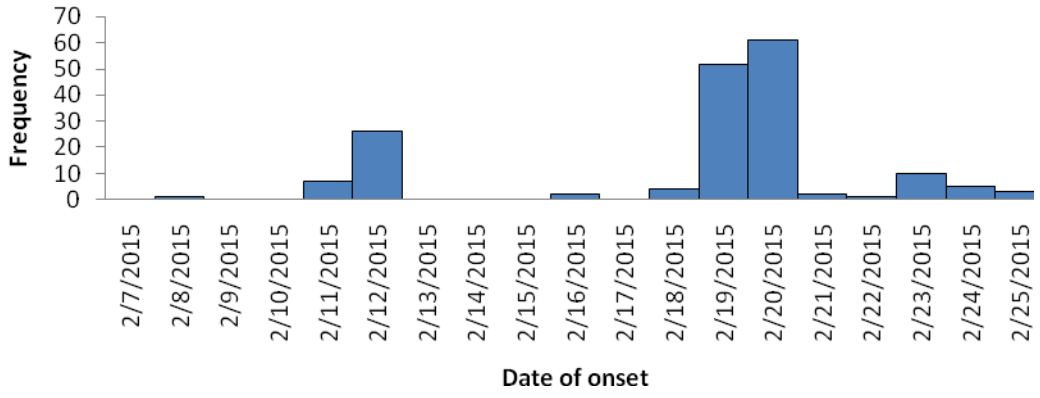


Figure 3: Measles Cases By Date of Onset, Guji Zone, Oromia, Ethiopia 2015

Analytical Analysis

We recruited a total of 50 cases and 100 controls. Four of five specimens that were collected from the 173 cases reported on the line list, were IgM positive. With regards to age distribution 36(72.0%) of the cases and 50(50.0%) of the controls were below five years. The mean age was 6.5± 5.1 SD for cases and 4.3±2.6 SD for controls. Regarding gender, 32(64.0%) of the cases and 37(37.0%) of the controls were female. In 45(90.0%) of cases and 60(60.0%) of controls mothers were illiterate. Also fathers education was found in 31(62.0%) of cases and 48(48.0%) of controls were illiterate (Table 6).

Table 6: Socio Demographic Distribution, Dama Woreda, Guji Zone, Oromia, Ethiopia 2015

Characteristics	Case (50)	Control(100)	P-Value
Age Group			
< 5 Yrs	36(72.0%)	50(50.0%)	>0.05
5-14 Yrs	10(20.0%)	43(43.0%)	
>=15 Yrs	4(8.0%)	7(7.0%)	
Sex			
Male	18(36.0%)	63(63.0%)	0.002*
Female	32(64.0%)	37(37.0%)	
Mothers Education			
Illiterate	45(90.0%)	60(60.0%)	0.001*
Literate	5(10.0%)	40(40.0%)	
Fathers Education			
Illiterate	31(62%)	48(48.0%)	P>0.05
Literate	19(38.0%)	52(52.0%)	

Forty four (88.0%) of the cases and 43(43.0%) of the controls had contact history with measles cases and it was significantly associated with measles outbreak (p-value <0.001). Thirty one (62.0%) of the cases and 37(37.0%) of the controls reported the presence of other cases in their village and it was significantly associated with measles outbreak (p-value <0.01). Forty three (86.0%) of cases and 35(35.0%) of controls had no vaccination card (p-value <0.001) (Table 7).

Table 7: Factors Associated With Measles, Dama Woreda, Guji Zone, Oromia, Ethiopia 2015

Characteristics	Case	Control	P-Value
Contact History			
Yes	44(88.0%)	43(43.0%)	<0.001*
No	6(12.0%)	57(57.0%)	
Other cases with Measles			
Yes	31(62.0%)	37(37.0%)	<0.05*
No	19(38.0%)	63(63.0%)	
Vaccination Card			
Yes	7(14.0%)	63(64.3%)	<0.001*
No	43(86.0%)	35(35.7%)	

Knowledge on measles

Knowledge on measles method of prevention was assessed and it was found that 30(63.0%) of the cases does not know while 20(20.0%) of controls does not know measles method of prevention (P<0.05). On the other hand 40(80.0%) of cases 52(52.0%) of controls did not know age at vaccination for measles (P<0.05). Also if vaccine can prevent measles was assessed and found 27(54.0%) of cases and 40(40.0%) of controls replied they didn't know (P>0.05) (Table 8).

Table 8: Awareness On Measles, Guji Zone, Oromia, Ethiopia 2015

Characteristics	Case	Control	P-Value
Method of Prevention			
Vaccination	14(28.0%)	52(52.0%)	<0.001*
No Prevention	6(12.0%)	28(28.0%)	
I don't know	30(63.0%)	20(20.0%)	
Age at vaccination			<0.05*
9 Months	10(20.0%)	48(48.0%)	
I don't know	40(80.0%)	52(52.0%)	
Vaccine prevent Measles			
Yes	23(46.0%)	60(60.0%)	>0.05
No	27(54.0%)	40(40.0%	

During Bivariate analysis six independent variables were associated with the occurrence of measles outbreak while during multivariate analysis, factors that remained independently associated with contracting measles outbreak in Dama District were, sex, Mothers education and contact with measles cases. Cases from illiterate mothers were 13.3 times more likely to develop

measles compared to their counter parts (AOR=13.3; 95%CI: 2.37-75.38) and Children's who had contact with measles cases were 130.5 times at risk of contracting measles compared to controls (AOR=130.5; 95%CI:12.09-997.47). Also female cases were 3.5 times more likely to develop measles compared to controls (AOR= 4.1; 95%CI: 1.15-14.35) (Table 9).

Table 9: Independent Predictors of Measles Guji Zone, Oromia, Ethiopia 2015

Characteristics	COR	AOR
Sex		
Male	1:00	1:00
Female	3.0(1.49-6.13)*	4.1(1.15-14.35)*
Mothers Education		
Illiterate	5.7(2.10-15.76)*	13.3(2.37-75.38)*
Literate	1:00	1:00
Contact History		
Yes	9.7(3.79-24.89)*	130.5(12.09-997.47)*
No	1:00	1:00
Vaccination Card		
Yes	1:00	1:00
No	4.1((4.49-27.17)*	151.4(19.76-1160.51)
Other Measles cases		
Yes	2.7(1.37-5.59)*	4.2(0.82-21.66)
No	1:00	1:00
Measles transmitted		
Yes	1:00	1:00
No	2.1(1.04-4.52)*	1.1(0.26-5.35)

5. Discussion

Measles spread through contact with nose and throat secretions of infected people and through airborne droplets released when an infected person sneezes or coughs. A person can infect others for several days before and after he or she develops symptoms. The disease spreads easily in areas where infants and children come into contact such as in health centers and schools (2). The index case had date of onset on 2/8/2015. The case was a two year old male and interventions (treatment of cases, mass vaccinations, health education, advocacy and contact tracing by environmental heath technicians) about the outbreak was provided however investigation was started on the 2/23/2015 almost a two weeks after the outbreak onset. The outbreak lasted for two weeks.

The attack rate was 23.7/1000 population in Dhugo kebele and 9.1/1000 population in HadaGuratii kebele. The age specific attack rate was 42.5/1000 and 23.9/1000 population in under five children and 5-14 years old respectively. It was found that the attack rate decreases with increase in age. The attack rate was higher for female as compared to male 2.6/1000 population. Among cases sent by line list 95.3% were not vaccinated for measles.

This study identified several factors that were associated with contracting measles in Dama Woreda. It was found that Cases from illiterate mothers were 13.3 times more likely to develop measles compared to their counter parts. This can be explained by the fact that education creates awareness on the need for immunization. The finding is similar with a study done in Burkina Faso which showed lack of awareness about vaccination campaigns or need for measles vaccination (7). Majority 88.0% of the cases reported they had contact history with the cases and children's who had contact with measles cases were 130.5 times at risk of contracting measles compared to controls. This can facilitate person to person transmission.

This is also supported by the ministry of health of Zimbabwe, which states that children who live in crowded places are at high risk of contracting measles, and that a person with measles can infect others for several days before he/she develops symptoms. Measles spreads easily in places where children gather for example schools. Hence, measles outbreak investigation in Zaka, Masvingo Province, Zimbabwe, reveals the same finding that cases were high in contact with measles cases (3). Female sex was 4.1 times more likely to develop measles compared to male. This can be explained by the fact that in Ethiopia females are responsible to give care for their younger children.

Action Taken:

Community education by investigation team was conducted for a total of 291 (199 females and 92 males). The team educated and discussed on measles vaccination and community attitude

Discussion with kebele leaders

In response to control the spread of the measles outbreak, woreda health officers together with zonal health department have been implementing the three primarily recommended strategies:

- Verify the outbreak and Case management,
- Enhancing routine vaccination and Supplementary immunization

- Strengthening surveillance and active case search in all affected villages.

Team from EPHI, Zonal health office, woreda health offices and health facilities were deployed to the site and discussion with kebele leaders and conducted active case search and case management. Health education was given to public at large for religious leaders, teachers. Health extension workers were not in place with certain problems, instead using health workers from health center were mandatory and orientation was given to go house to house for active cases searching and community awareness creation. Severe and complicated cases were tried to be isolated and treated as per the guideline. Based on the investigation results we convinced the woreda health officers to prepare micro-plan and sent to Zonal health office and ORHB for selective vaccination campaign for children aged nine months to 14 years old, giving emphasis to nine months to five years of age, as they are more affected.

Challenges/Gaps

- Communities were unaware of what measles is?
- HEWs were not in a position to perform their activities, because of opportunity to upgrade their carrier and illness
- Hard to reach area and inaccessible
- Distance from health facilities to the community one of the problem raised by community during case management, active search and community discussion

6. Conclusion and Recommendation

Factors independently associated with the occurrence of measles outbreak were uneducated mothers, contact with cases and sex. Also the immunization coverage was lower than WHO standard 85% at woreda therefore we recommend strengthen routine vaccination for all children before enrolling into schools especially in low immunization coverage like Dama Woreda. Since health Extension workers were not in place and community awareness should be provided, for this reason assign health professionals until trained health extension workers in place. As a result of the study, one day training on outbreak management and surveillance was done with District Rapid Response Team, surveillance focal person and Health Extension Workers.

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CHAPTER II – SURVEILLANCE DATA ANALYSIS REPORT

2.1 Analysis of Measles Surveillance Data in Ethiopia 2013

Abstract

Background: Measles is a viral disease that spreads from person to person. It causes an estimated 2.6 million deaths each year worldwide. The objective of this study was to describe measles distribution by person, place, and time and recommend possible solutions.

Methods: We analyzed measles cases from national measles case-based surveillance system data base reported during January to December 2013. Epi linked, confirmed and suspected cases were included. The proportion of confirmed measles cases was computed. Vaccination status and distribution of cases by age and sex was presented. Moreover, description by place, person, and time was made. Data was entered into a computer, edited, cleaned and analyzed using EPi info 7.1.3

Result: Cumulatively 12,187 measles cases and 20 deaths (CFR: 0.2%) were reported during 2013. Of these, 7862 cases were reported through line list and 4325 through case- based. The mean and median ages were 7.9 and 6.0 years respectively. The age specific attack rate was 69 per 100,000 populations in less than one year. Age group 1-4 year and 5-14 year were the most affected accounting for 28.0% and 46.1%, respectively. Half of the cases, 52.6%, of the cases were reported from South Nations and Nationalities Peoples region followed by Oromia 29.0%. From SNNPR 91.1% reported from 35 woredas of 5 zones. Among investigated cases 1926(44.5%) were confirmed for measles. Overall, 31.2% of cases vaccination status was unknown and 22.9% were not vaccinated. Annualized measles attack rate was 14 cases per 100000 populations. The trend of measles showed case buildup during dry season week 43- 50/ 2013.

Conclusion and Recommendations: Children aged 1-14 years were the most affected. Majority of the cases were not vaccinated or their vaccination status was unknown. Most of the cases were from SNNPR. Therefore, nationally strengthened measles surveillance, routine and Supplementary Immunization Strategy should be designed to address preschool and school age group is highly recommended with especially emphasis to SNNPR.

Keywords: Surveillance, Incidence, Measles, Ethiopia

Introduction

Measles is an acute viral illness caused by a virus in the family paramyxovirus, genus Morbillivirus. Measles is characterized by a prodrome of fever (as high as 105°F) and malaise, cough, coryza, and conjunctivitis, followed by a maculopapular rash. The rash usually appears 14 days after exposure and spreads from head to trunk to lower extremities. Measles is usually a mild or moderately severe illness. However, measles can result in complications such as pneumonia, encephalitis and death. Approximately two to three deaths may occur for every 1,000 reported measles cases. The average incubation period for measles is 14 days, with a range of 7-21 days. Persons with measles are usually considered infectious from 4 days before until 4 days after onset of rash with the rash onset being considered as day zero.

In 1980, before widespread vaccination, measles caused an estimated 2.6 million deaths each year. Despite the availability of a safe and effective vaccine, measles remains one of the leading causes of death among young children globally. More than 95% of measles deaths occur in low-income countries with weak health infrastructures (1).

Increased measles vaccination resulted in a 74% drop in measles deaths between 2000 and 2010 worldwide. In 2010, about 85% of the world's children received one dose of measles vaccine by their first birthday through routine health services up from 72% in 2000 (1).

Member states of the World Health Organization (WHO) African (AFR) and Eastern Mediterranean (EMR) regions have set goals for measles elimination by 2020 and 2015, respectively. The two WHO regions include AFR member states Ethiopia and Kenya, and EMR member state Somalia. All three countries are in the Horn of Africa, where measles remains endemic, with periodic outbreaks despite efforts to achieve elimination goals. This report describes outbreaks that occurred in the Horn of Africa during 2010–2011 (2).

In 2010, the World Health Assembly endorsed targets to be met by 2015 as milestones toward eventual global measles eradication. These included increasing first dose coverage with MCV to ≥90% nationally and ≥80% in every district, reducing to and maintaining an annual measles incidence of <5 cases per million population, and reducing estimated measles mortality by ≥95% in comparison with 2000 estimates. WHO recommends 2 MCV doses for all children and

emphasizes on-time delivery of the first dose at age 9 months in countries with ongoing measles virus transmission (3).

In Ethiopia, Kenya, and Somalia, MCV1 is provided in the routine childhood vaccination schedule at age 9 months, and a second dose of MCV is provided through periodic supplemental immunization activities (SIAs) (4).

Countries report annual measles surveillance data to WHO and UNICEF (5). In Kenya and Ethiopia, measles surveillance is case-based with laboratory confirmation of suspected measles (6). Estimated MCV1 coverage in Ethiopia was 56% in 2010 and 57% in 2011; the percentage of districts reporting ≥80% MCV1 coverage was 45% in 2010 and 43% in 2011. A nationwide measles SIA targeting approximately 9.1 million children aged 9–47 months was conducted in two phases; seven regions were targeted in October 2010 and the four remaining regions in February 2011. Administrative coverage was 106%, and coverage based on a population-based survey was 88.2%; 91% districts reported >95% administrative coverage. During 2010–2011, annual reported measles incidence decreased from 75 to 42 per 1 million population; the percentage of reported cases among children aged <5 years decreased from 45% to 31% (7).

Vaccine preventable diseases together with diarrheal diseases, acute respiratory diseases and malnutrition account for the majority of child deaths in Ethiopia. Ethiopia is also one of the eleven countries worldwide that collectively contributed to over 66% of the estimated measles related deaths that occurred in the year 2000 (8).

The history of immunization services in Ethiopia prior to 1980 has not been documented very well although the smallpox eradication activities have left some legendary memories (9). The Expanded Program on Immunization (EPI) was launched in Ethiopia in 1980 based on the international, as well as national, experiences and resources gained during the smallpox eradication activities in the late 1970s (10).

Measles is probably the commonest of vaccine preventable diseases that occur repeatedly in Ethiopia; mothers recognize it as a self-limited common childhood illness for which no medical care is often sought (11). One dose of measles vaccine at 9 months of age protects 85% of infants

but with the second dose, all children who remained unprotected after the first dose will receive protection (12).

Ethiopia is in the eradication phase of measles control. The NICD is accredited by WHO to perform measles and rubella IgM testing for national case based surveillance to confirm true measles cases and trace the molecular epidemiology of the virus in Ethiopia. Blood specimens from each suspected measles case are sent to the NICD for confirmation. Case investigation forms are completed by facility or district personnel and forwarded to the Ethiopian Public Health Institute National Laboratory. Despite the relatively high reported measles vaccination coverage, increasing number of measles cases were observed, which might raises the question of what are the risk factors for measles behind high vaccination status.

Public health surveillance has been defined as the ongoing, systematic collection, analysis, interpretation and dissemination of data regarding a health related event for use in public health action to reduce mortality and to improve health. Data generated from such public health surveillance systems is used for guiding immediate public health action, program planning and evaluation, monitor trends in the burden of disease and formulating research hypotheses.

Therefore, this analysis was undertaken to describe proportion of confirmed measles cases, vaccination status and determine the extent, distribution, and occurrence of measles in Ethiopia.

2. Objective

2.1 General Objective:

- To Analyze Measles Surveillance Data and describe proportion and its distribution in Ethiopia, January to December 2013

2.2 Specific Objectives:

- To assess the extent of measles in Ethiopia
- To assess the distribution of measles cases by person, place and time
- To describe proportion of confirmed measles cases
- To describe vaccination status of reported measles cases

3. Methods and Materials

3.1 Study area and Period

In Ethiopia, surveillance data for suspected measles cases is routinely collected at all levels of the health delivery system using the measles case based surveillance and line list form and sent to Ethiopian Public Health Institute. Data from the primary facilities is sent through the district, province onto national level where it is entered into the measles case-based surveillance system database, (EPI INFO based), where it is consolidated, cleaned, analyzed and disseminated for action. A copy of this database is also shared with the World Health Organization. Data presented here represent measles patients from whom laboratory results were received during January to December 2013.

Important variables captured by the dataset include; patient's name, age, sex, vaccination status, area of residence (by province, district), date of rash onset, date of first investigation (notification, specimen collection and specimen sending), dates of specimen arrival and dispatch of results from the national virology laboratory, specimen condition on arrival at national virology laboratory, Measles IgM test result, Rubella IgM test and final case classification. Feedback of the final case classification is given to the reporting facility through the same channel used for reporting.

3.2 Study Design

Crossectional retrospective surveillance data analysis was conducted.

3.3 Source of data

Secondary data that was reported in 2013 from all regions through line list and case based format was used from EPHI/PHEM and laboratory data base.

3.4 Study Unit

Secondary measles data base from EPHI sent from Region, Zone and woreda through active case search and routine surveillance

3.5 Sample size and sampling method

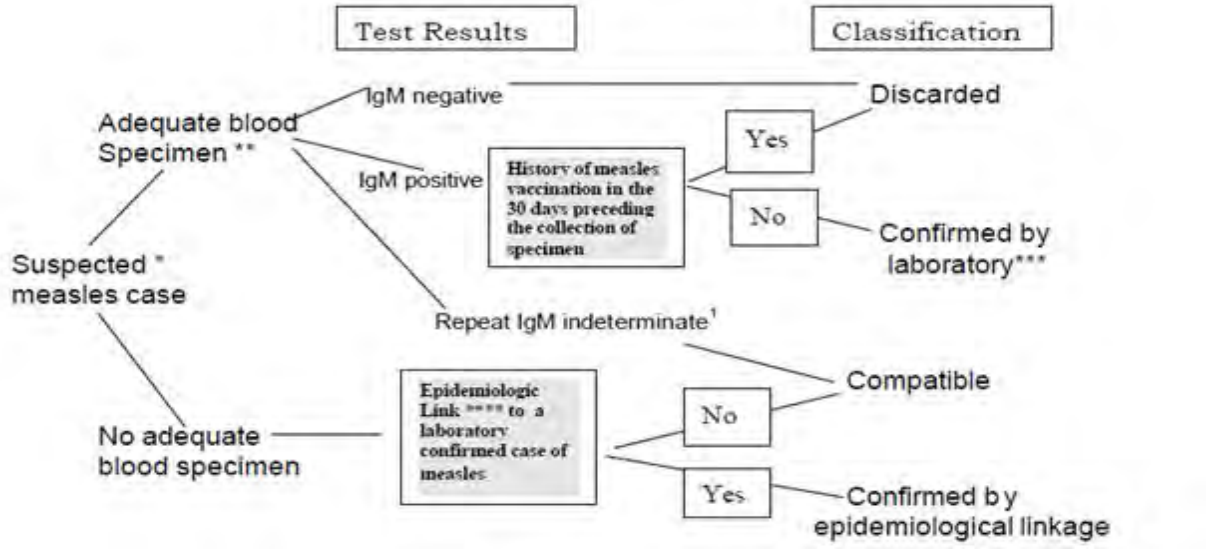
A total of 12187 measles cases reported during 2013 to EPHI/PHEM were included. All data from 30 January 2013 to 30 December 2013 were included.

3.6 Data analysis

Data was cleaned and analyzed using Epi info software version 7.1. Finally the findings will be shared with EHNRI, AAU/SPH, mentors, supervisors, and program coordinators of AAU/SPH/EFETP.

Case Classification Flow Chart for Measles Surveillance

For surveillance purposes, WHO AFRO recommends the following scheme for the classification of measles cases (18).



3.7 Case Definition

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

- **Epidemiologically linked case**: A suspected measles case that has not had a specimen taken for serologic confirmation and is linked (in place, person and time) to a laboratory confirmed case or another epidemiologically-confirmed case.
- **Laboratory-confirmed** case is a suspected case which has laboratory results indicating infection (measles IgM positive or isolation of a measles virus).
- **Compatible case** is a suspected case which has not been adequately investigated.
- **Discarded case** is a suspected case which, upon adequate investigation that includes a blood specimen collected in the appropriate time frame, lacks serologic evidence of a measles virus infection.
- **Suspected measles outbreak**: Occurrence of five or more reported suspected measles cases in one month in a defined geographic area such as a kebele, woreda or health facility catchment area.
- **Confirmed measles outbreak**: Occurrence of three or more laboratory confirmed measles cases in one month in a defined geographic area such as a kebele, woreda or health facility catchment area.

3.8 Ethical Consideration

Permission to proceed with the study was obtained from the Deputy Director General of Public Health Emergency Management, Ethiopian Health and Nutrition Research Institute. Names of patients and addresses were omitted from the analysis. Confidentiality was assured and maintained.

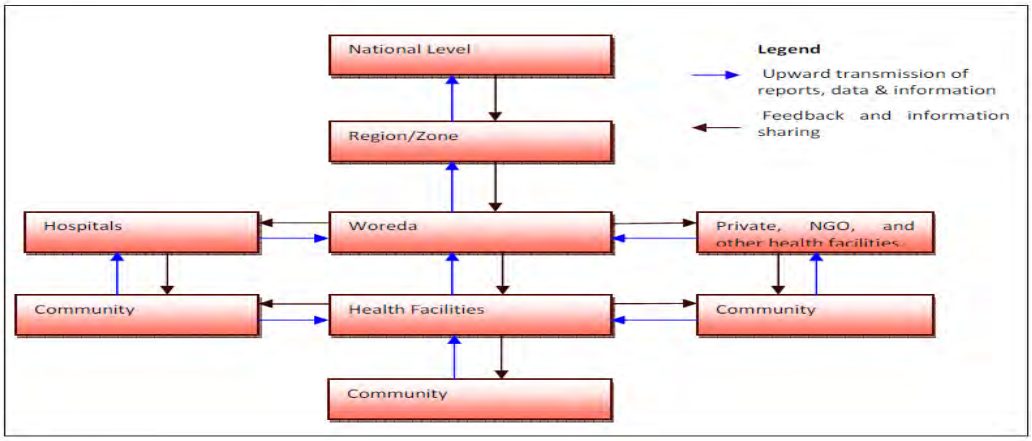


Figure 4: Diagram illustrating surveillance data flow

4. Result

A total of 12187 measles cases and 20 deaths with CFR of 0.2% were reported nationally in 2013. Majority 18 deaths were reported from Oromia and one death each from Amhara and SNNPR. Of these 7862 cases were reported by line list while 4325 were reported by case- based. The mean and median age of measles cases were 7.9 and 6.0 years respectively with ±6.9 SD. Of the total reported measles cases, the 1 - 4 year and 5 - 14 year age groups were the most affected accounting for 3417(28.0%) and 5613(46.1%) respectively. The minority of reported cases came from the under 1 year and above 15 years age groups which accounted for 1388(11.4%) and 1769(14.5%) cases respectively. Concerning sex 6368(52.2%) were male while 5820(47.8%) were female and out of the total reported cases one case had missing value on gender status (Fig. 4)

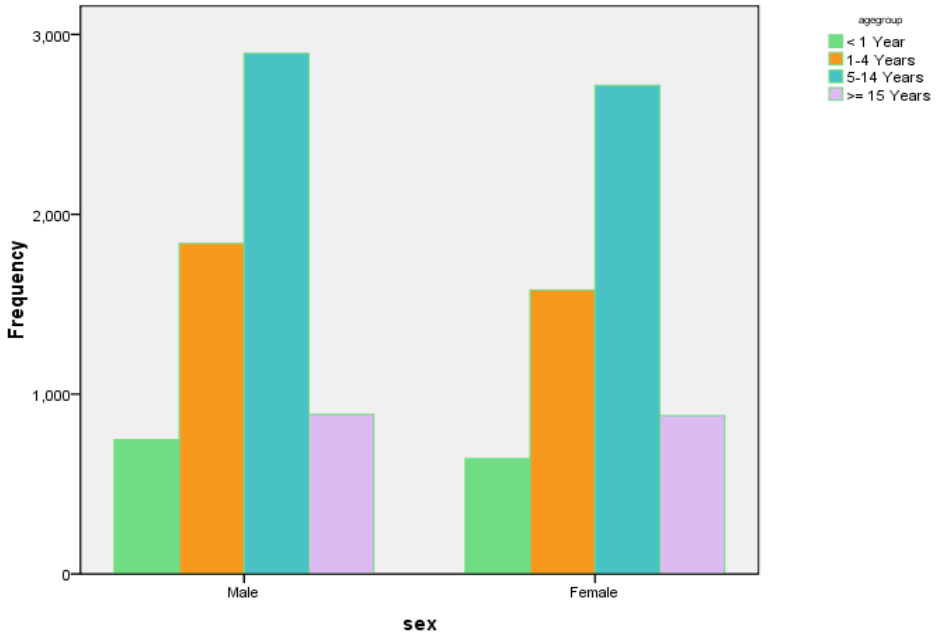


Figure 5:Sex and Age Distribution Of Measles Cases In Ethiopia, 2013

The cumulative age attack rate was 14.2/100,000 populations and the age specific attack rate was highest in under one year children that is 68.5/100,000 populations and it showed the magnitude of measles cases decreasing trend with age increments. Cumulative incidence decreased with increasing age to low levels (0.1/100,000) in person's ≥45 years (Table 10)

Table 10: Distribution of Cases by Age Group, Ethiopia, 2013

Age Group	Population	Cases	AR/100,000 Population
<1	2025781	1388	68.5
1_4	10506593	3417	32.5
5_14	26094805	5613	21.5
15-44	36910416	1759	4.8
>= 45	10300581	10	0.1
Total	**85,838,176**	**12,187**	**14.2**

With regards to geographical distribution, 6412(52.6%) half of the cases were reported from SNNP region followed by Oromia, Amhara and Addis Ababa regions 3540(29.0%), 1223(10.0%) and 610(5.0%) respectively. Low case reporting a region includes Tigray 134 (1.1%), Somali 66 (0.5%), Benishangul Gumuz 49 (0.4%), Afar 43 (0.4%), Harari 28 (0.2%), Dire Dawa 40 (0.3%) and Gambella 42 (0.3%). Also the attack rate was highest in SNNPR 36 cases per 100000 populations followed by Addis Ababa 20 cases per 100000 populations (Table 11)

Table 11: Distribution of Cases and Annual Attack Rate by Region, Ethiopia, 2013

Region	Population	Cases	Percentage	AR/100,000 Population
Addis Ababa	3101896	610	5.0	20
Afar	1607906	43	0.4	3
Amhara	19046226	1223	10.0	6
Benishangul Gumuz	801026	49	0.4	6
Dire Dawa	397574	40	0.3	10
Gambella	390593	42	0.3	11
Hareri	213870	28	0.2	13
Oromia	32240188	3540	29.0	11
SNNP	17857192	6412	52.6	36
Somali	5178258	66	0.5	1
Tigray	5003446	134	1.1	3
Total	**85,838,175**	**12,187**	**100.0**	**14**

Nationally a total of 12 Zones contributed for 8647(71.0%) of measles cases of which from SNNPR, Majority of cases were from Wolaiyta, Gamu Gofa and Sidama zones that is 3039(24.9%), 1267(10.4%) and 648(5.3%) respectively while from Oromia region, Borena zone 638(5.2%), Arsi zone 435(3.6%) and Bale zone 298(2.4%) and from Amhara region, North Shewa zone 511(4.2%) and West Gojam zone 238(2.0%) (Fig 5)

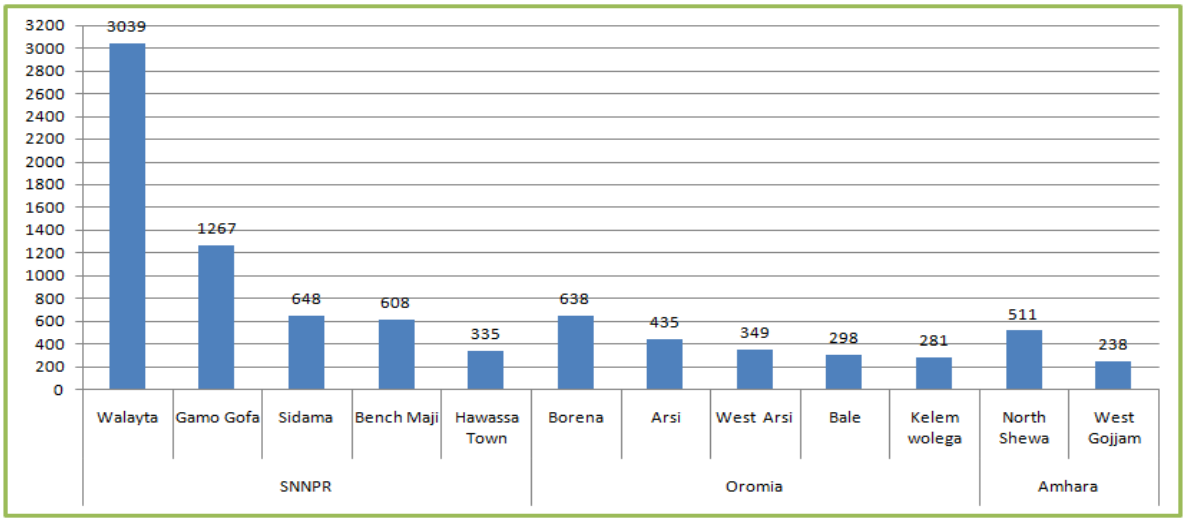


Figure 6: Distribution Of Measles Cases By Zone, Ethiopia, 2013

South Nation and Nationalities Peoples Region (SNNPR) contributed 6412(52.6%) over half of measles cases in 2013. Of these, 5839(91.1%) of measles cases were reported from 35 woredas of 5 zones. Woredas with high case load includes, from Gamu Gofa zone; Kucha woreda 912(14.2%) and Chencha woreda 286(4.5%), from Wolayita zone; Boloso Bombo woreda 653(10.2%) and Kindo Didaye woreda 562(8.8%), from Sidama zone; Aleta Chuko woreda 477(7.4%) and Shebedino woreda 88(1.4%), Bench Maji zone; Shey Bench woreda 444(6.9%) and Semen Bench woreda 82(1.3%). Proportions of districts that have reported at least 1 suspected case of measles with a blood specimen per year were 74.8% (Fig 6).

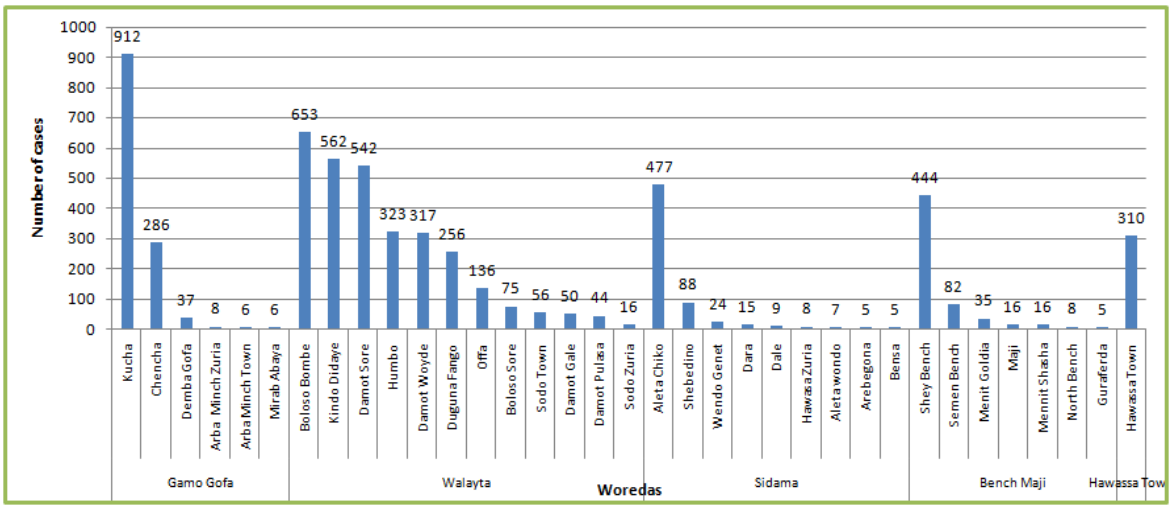


Figure 7:Distribution Of Measles Cases By Woreda, SNNPR, Ethiopia 2013

Laboratory Findings

Out of the 4325 cumulative suspected measles cases reported with samples, 1926(44.5%) of cases were confirmed for measles IgM, and of these, 488(25.3%) had not been vaccinated before and only small proportion 134(7.0%) and 108(5.6%) had at least received a single dose and 2 or more doses of the measles vaccine respectively. The remaining majority 1059(55.0%) and 137(7.1%) had unknown and missing information on vaccination status respectively. Regional slide positivity rate showed higher in Somali, Gambella and Afar, 48(73.8%), 18(60.0%) and 24(55.8%) respectively. In 2013 annualized rate of investigation (with blood specimens) of suspected measles cases was 5 cases per 100,000 populations and it was greater than WHO target of > 1 case investigated with blood specimen /100,000 populations per year) while proportion of lab confirmed measles cases was 44.5% as compared to WHO Target of < 10% of investigated cases confirmed to be measles by serological investigation) (Fig 7)

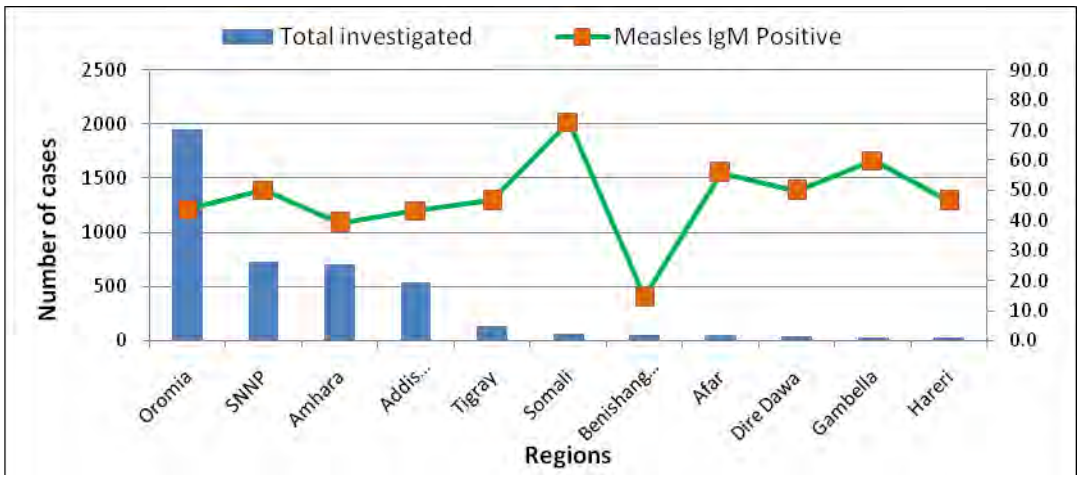


Figure 8: Distribution Of Measles Laboratory Result By Region, Ethiopia, 2013

Overall, 3797(31.2%) of cases their vaccination status unknown, 2795(22.9%) were unvaccinated, 3026(24.8%) received 1 dose, and 1609(13.2%) received ≥2 doses of MCV and 960(7.9%) of cases had missing information on vaccination status (Fig. 8).

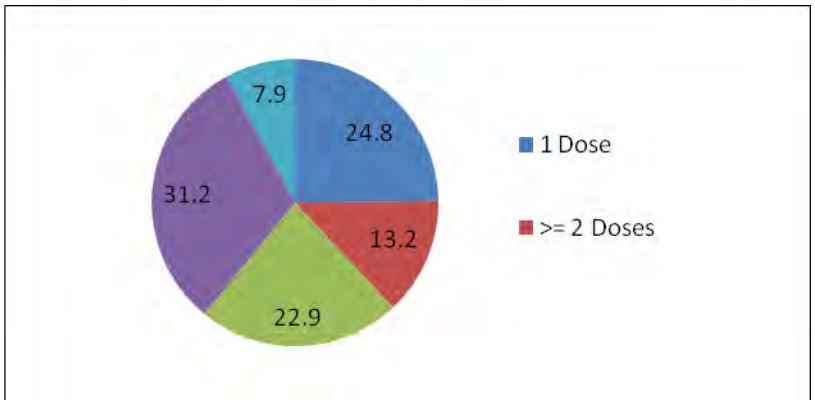


Figure 9: Pie Chart Of Measles Cases By Vaccination Status, Ethiopia, 2013

When we look at vaccination status by region most of unvaccinated or their vaccination status unknown cases were from SNNPR, Oromia and Amhara regions that is 2814(56.1%), 2778(21.5%) and 1075(12.1%) respectively (Fig 9)

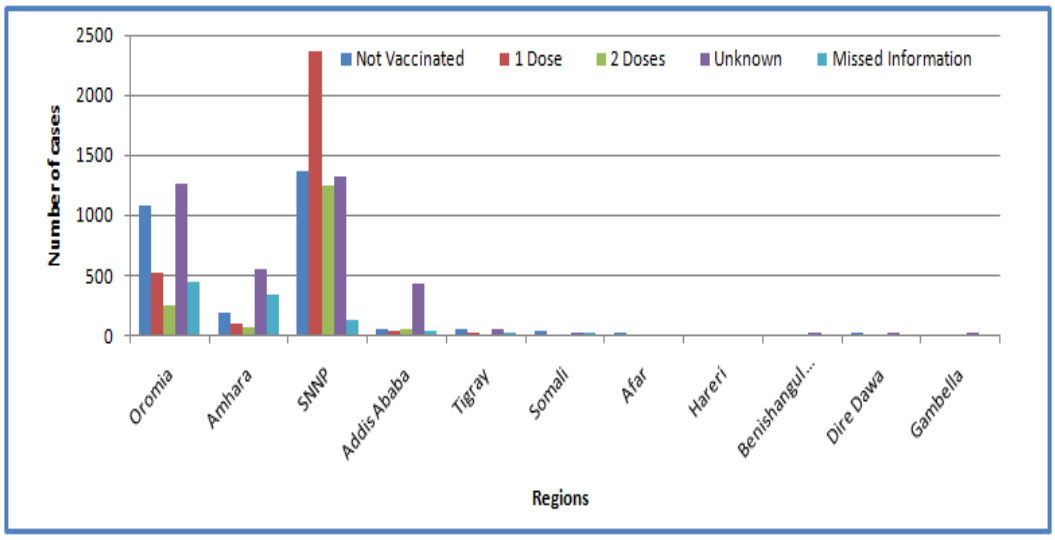


Figure 10: Regional Measles Cases By Vaccination Status, Ethiopia, 2013

Of the total cases over all, 1147(33.6%) and 1531(27.3%) of age group 1-4 years and 5-14 years received one dose of MCV respectively. Age specific vaccination status was analyzed and found majority 510(36.7%) of under one year were not vaccinated and also 297(21.4%) and 323(23.3%) their vaccination status unknown and had missed information on vaccination status (Table 12)

Table 12: Distribution of Measles Cases by Age and Vaccination Status, Ethiopia, 2013

	Not Vaccinated		1 Dose		>=2 Doses		Unknown		Missed	
Age Group	#	%	#	%	#	%	#	%	#	%
<1	510	36.7	175	12.6	83	6.0	297	21.4	323	23.3
1-4	535	15.7	1147	33.6	632	18.5	866	25.3	237	6.9
5-14	1158	20.6	1531	27.3	839	14.9	1774	31.6	311	5.5
>=15	592	33.5	173	9.8	55	3.1	860	48.6	89	5.0
Total	**2795**	**26.6**	**3026**	**20.8**	**1609**	**10.6**	**3797**	**31.7**	**960**	**10.2**

Measles outbreak was started to be reported since week 43-50 of 2013 and the trend of measles started to increase since week 2-17 and slightly decrease between week 18-42 with peak during week 43- 50/ 2013. The trend of measles showed the outbreak occurred during dry season (Fig 10).

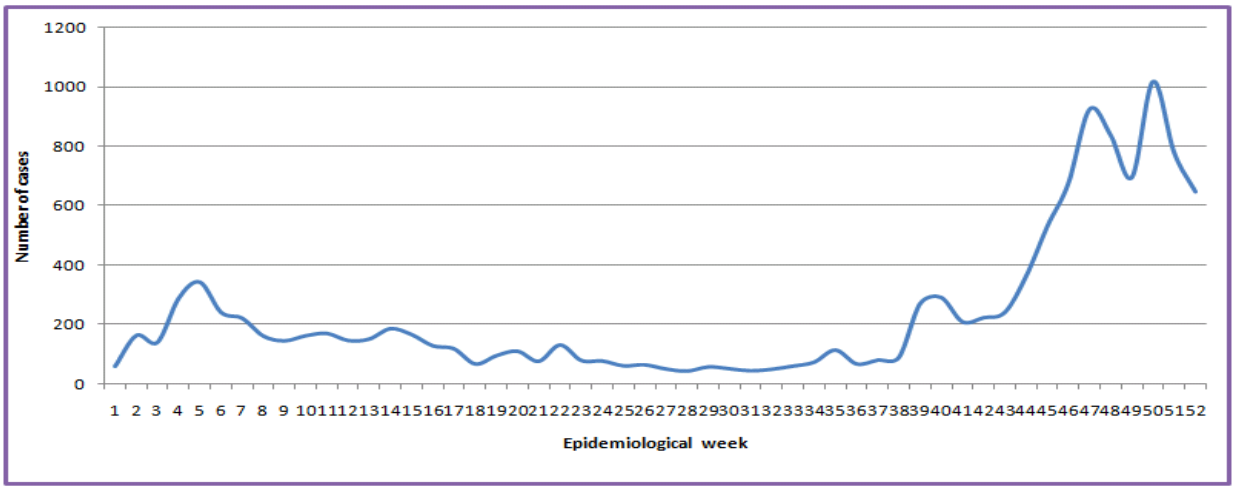
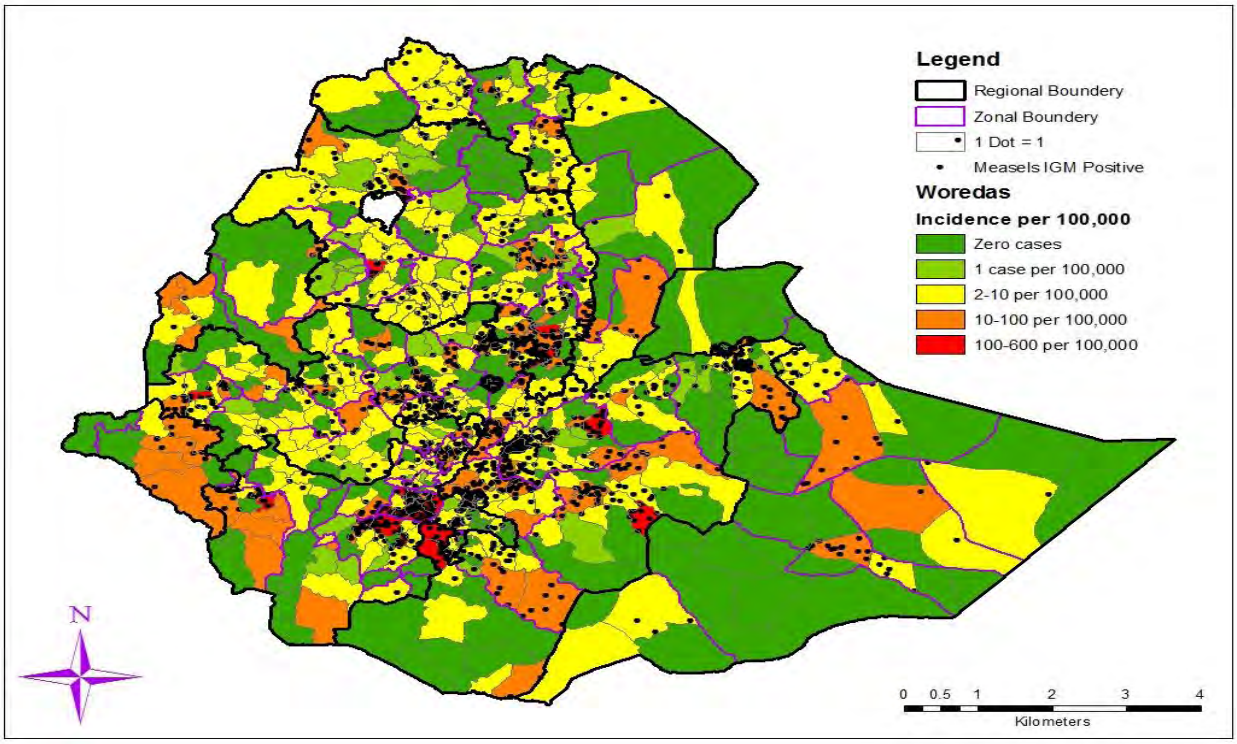


Figure 11: Measles Trend By Epidemiological Week, Ethiopia, 2013



Map 3: Incidence of suspected Measles Cases and Distribution of Igm Positive, 2013

5. Conclusion and Recommendation

In conclusion, despite limitations in the nature of study design in that we were relying on already collected data and could not come up with definitive reasons as to why there were certain trends and anomalies in our findings, our study revealed a number of important findings. These were

relating to quality of data collected by the surveillance system, populations still at risk of contracting measles in Ethiopia and how the national measles case- based surveillance system has been performing in the period under review.

Timely identification, reporting, and investigation of measles cases are important because the spread of the disease can be limited with early case identification and vaccination of susceptible contacts. Tracing vaccination status of school-aged children may reduce the risk of measles transmission on school admission and involvement of stockholders in identifying the risk group. These findings may provide some evidence for estimating disease burden, constructing population susceptibility profiles, and defining target age for vaccination strategies and may guide further efforts toward measles mortality reduction and elimination in the region.

This study demonstrated that most 85.5% of affected age groups were the under 15 years, with 46.1% of them being children between the ages of 5-14 years, while the under 1 year and the above 15 year olds constituted the minority of cases. This finding was slightly lower than other African countries in which 53.4% of cases occur in children aged 5-14 years (14, 15). This highlights the fact that the 1-15 year age group still remains a risky population for contracting measles in Ethiopia and interventions like immunization campaigns need to be targeted at this group if morbidity and mortality due to measles are to be drastically reduced (15).

The cumulative annualized attack rate was 14 cases per 100,000 populations and slightly lower than analysis done in South Africa (18). The age specific attack rate was highest 68.5 cases per 100,000 populations in those aged <1 year. Cumulative incidence decreased with increasing age to low levels (0.1/100,000) in person's ≥45 years. This finding was similar with a survey done in South Africa and France (16, 19). The national surveillance system performed above the recommended WHO target of 2 cases/100,000 populations per year for 2013.

With regards to geographical distribution, most 52.6% of the cases were reported from SNNP region followed by Oromia and Amhara 29.0% and 10.0%. Possible reasons for this include the fact that these regions have a high density population and experiences relatively high rates of immigration from other areas. The numbers of reported case-patients differed between regions. Nationally a total of 12 Zones contributed for 71.0% of measles cases of which 91.1% of measles cases were reported from 35 woredas of 5 zones of SNNPR. Variation in reported case-numbers

by geographic area may be affected by differential access to care between urban and rural areas, as well as differences in laboratory specimen taking practices and underreporting in most of areas. This finding is similar with a study conducted in South Africa from 2009-2011 Gauteng 31% and KwaZulu-Natal 23%. Cumulative incidence differed by province with Mpumalanga and Gauteng provinces being the most affected (16). Proportions of districts that have reported at least 1 suspected case of measles with a blood specimen per year were 74.8% below WHO: target of at least 80%. Incidence varied greatly among geographical regions, and factors such as local epidemiology and accumulation of susceptible groups, but also underreporting, may account for these differences (14).

The laboratory plays a central role in the confirmation of suspected measles cases and outbreaks, and in the identification of circulating strains of measles viruses. Information regarding the circulating strains is useful to track importations of measles virus when a country is in the elimination phase. Detection of measles-specific IgM antibody and measles RNA by real-time RT-PCR are the most common methods for confirmation of measles infection. Serum specimens should be collected during the acute stage of the disease, preferably during the first week after onset of illness, and again during convalescence, ≥ 3 weeks after the acute sample was collected. Measles virus is sensitive to heat and infectivity decreases markedly when samples are not kept cold. It is important to transport samples with cold packs as soon as possible following sample collection. Avoid repeat freeze-thaw cycles or freezing at -20°C (standard freezer temp) because formation of ice crystals decreases infectivity (18).

Out of the 4325 cumulative suspected measles cases reported with samples, 44.5% of cases were confirmed for measles IgM. This finding was slightly lower than Analysis of National Measles Surveillance Data in Italy during 2013(14). Of these, 25.3% had not been vaccinated before which is much higher than a survey done in Zimbabwe (15). Regional slide positivity rate showed higher in Somali, Gambella and Afar. This can be due to the fact that low EPI coverage and cumulative susceptible in these areas. In 2013 annualized rate of investigation (with blood specimens) of suspected measles cases was 5 cases per 100,000 populations and in line with WHO target of > 1 case investigated with blood specimen / 100,000 populations per year while proportion of lab confirmed measles cases was 44.5% much greater than WHO Target of < 10%

of investigated cases confirmed to be measles by serological investigation and this can be due to outbreak and high probable cases were investigated.

Overall, 31.2% of cases their vaccination status unknown and 22.9% were unvaccinated this shows low EPI coverage and this can lead to outbreaks of measles. Measles outbreak was started to be reported since epidemiological week 43-50 of 2013 and this is by the fact that measles outbreak can occur during dry season and school opening time that increase contact with susceptible individuals.

The nature of study design in that we were relying on already collected data and could not come up with definitive reasons as to why there were certain trends and anomalies in our findings because of lack of information on important variables such as residence and contact history. Also recall bias is more common to fill age and vaccination status.

In conclusion, measles affecting a wide age range highlights that Ethiopia remains vulnerable to large measles outbreaks. Efforts to maintain high routine measles vaccination coverage should be emphasized. These can be strengthened by conducting biannual analysis of the potential risk of measles outbreaks with action plans to improve routine vaccination coverage if below 90%. Specific interventions such as immunization awareness days can also be held to reach unvaccinated children and/or those who did not.

Active case search should be conducted for every suspected measles cases to assure timely reporting and contain the outbreak in the population known to be affected as well as other segments of the community that may be at high risk of exposure or in whom vaccination coverage is known to be low. Efforts should be made to obtain specimens for viral detection. Active surveillance should be maintained until at least two incubation periods after the last confirmed case is reported.

Measles surveillance system should be strengthening in the country, especially regions with high measles cases, those faced outbreak in 2013 (SNNP, Oromia, Amhara) even if their populations were relatively higher than other regions. Regions with low coverage measles vaccine should be improved the targeted age group. The level of immunity should increase in children less than five years by giving measles vaccine and providing Vitamin A supplementation. Adequate and quality sample collection labeling and transportation are highly recommended.

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2.2 Travel Risk Assessment and Risk Management of Ebola Viral Disease in Ethiopia 2014

ABSTRACT

Background: World Health Organization and partners have recommended exit screening at airports and land-border crossings in countries affected by Ebola, and it is now an established practice. This research was conducted with the objective of assessing travel risk and risk management of Ebola Viral Disease in Ethiopia 2014.

Methods: A review of the National Ebola Viral Disease Screening data was conducted from September to December 2014 collected by Field Epidemiology residents and Public Health Emergency Management officer. All travelers who had travel history to Ebola Virus Disease affected country filled screening form and their temperature was checked at airport and passenger's residency. In-depth interviews were conducted by the principal investigator using structured questionnaire from 7 key informants and analyzed thematically. A total 527 quantitative data was entered and analyzed using Epi Info 7.1.3.10.

Result: A total of 527 travelers were screened and travel history to an Ebola affected countries was reported by 498/527 (94.5%). Of these 195/498 travelers who had been stayed for more than one day were followed for the development of Ebola Viral Disease sign and symptoms for 21 days. Five of 195 (2.6%) travelers were suspected for Ebola Viral Disease. The average temperatures were 38.5^0c and of these 2 of them were positive for malaria. Fifty five had travel history to Mali, followed by Guinea 12.9%. Seventy eight percent of travelers were using Ethiopian Airlines followed by unspecified carrier, 12.0%. Duration of stay in affected countries was reported as one day in 59.8% and one week in 23%. About 29% of the travelers filled invalid addresses. The qualitative result revealed that not understanding the aim of the screening, language and inadequate screening area were the main barriers of screening.

Conclusion and recommendation: Travel history to an Ebola affected country was reported by 94.5% of the travelers. All fever cases were not tested for malaria which does not full fill standard malaria management protocol. It is very important to create awareness for travelers by posting posters the objective of screening and whom to call when they feel unwell.

Key Words: Travelers, Risk assessment, Risk management, Ebola Viral Disease

Introduction

Ebola is a highly-contagious hemorrhagic virus that breaks down the epithelial cell wall of blood vessels and triggers extensive internal and external bleeding. The Ebola virus causes an acute, serious illness which is often fatal if untreated. The filoviruses, Ebola and Marburg, are among the most virulent pathogens of humans, causing severe hemorrhagic fever (1).

The Ebola fever and other diseases are highly dangerous and transferred by sick people or contaminated objects. In our global world airplanes are one way to export this virus all over the world. Africa for instance has around 60 airports so it's an important international challenge to prevent sick people flying. For this purpose you can use Optris's fever inspection system. (Infrared Temperature Measurement System to prevent sick people flying). Virus epidemics like the Swine influenza in 2009/2010 and the Ebola virus disease in 2014 created a worldwide demand for suitable screening techniques allowing a fast non contact detection of travelers with potential fever (2).

The first outbreak of Ebola virus disease was reported in Democratic Republic of Congo in 1976, in a community near to Ebola River that is the reason of its name. That was a devastating outbreak with 318 cases and 218 deaths for a case fatality ratio of 68.5%, one of the most deadly outbreaks in history. Since 1976, 26 outbreaks of Ebola virus was occurred in ten countries of Africa, including Democratic Republic of Congo, Sudan, Gabon, Cote d'Ivoire, South Africa, Uganda (3).

The current outbreak initiated and reported in Guinea on March 2014, that is also affecting Sierra Leone, Liberia, Nigeria, Senegal, Democratic Republic of Congo (DRC), Mali, United States of America and Spain, is the most severe and deadly outbreak so far taking into account the cumulative number of cases and deaths. As illustrated by a tool to track the Ebola virus disease outbreak in West Africa, as of December 17th, 2014 the World Health Organization (WHO) has reported 18,603 confirmed, probable and suspected cases including 6,915 deaths for a case fatality rate of 37.2%. Senegal and Nigeria have been declared free of EVD transmission (3).

WHO and its partners have recommended exit screening at airports and land-border crossings in countries affected by Ebola, and it is now an established practice. WHO stresses those only 2 categories of people should not travel: those who are infected and those identified as their close contacts as they may be infected with Ebola virus. Since not every traveler from an Ebola-affected country is aware of having been exposed to the disease, completion of a screening questionnaire and testing for the presence of fever represent the best available indicators of risk (4).

The risk of transmission of Ebola virus disease during travel is low. Unlike infections such as influenza or tuberculosis, Ebola is not spread by breathing air (and the airborne particles it contains) from an infected person. Transmission requires direct contact with blood, secretions, organs or other body fluids of infected living or dead persons or animals, all unlikely exposures for the average traveler. People are only infectious after they have started to have symptoms, which include fever, weakness, muscle pain, headache and sore throat. This is followed by vomiting, diarrhea, rash and, in some cases, bleeding. If a person, including a traveler, may have been exposed to the Ebola virus, he/she should seek medical attention at the first sign of illness. Early treatment improves chance of survival (5).

Screening passengers before they get onto an airplane is the best weapon available for limiting the spread of Ebola. Some African countries are already doing this, and the United States can augment that security once international travelers land or switch planes (6).

Certainly, there are challenges to this approach, including determining what level of Ebola exposure requires quarantine. Targeting anyone who has been in a country affected by Ebola would be unnecessarily strict, since Ebola is only transferred by direct contact with an infected person's bodily fluids. Quarantining travelers who have had interactions with people who have or may have the disease will be difficult. It relies on people to be honest about their level of Ebola exposure, and exposed people may be motivated to cover up their travel history to gain access to the American health systems, even if it exposes others to risk. Requiring verifiable documentation would help cut down on this problem.

The challenge of Ebola prevention occurs at the interface of critical issues that include protecting the public, personal privacy, appropriate screening for a threat, and unpredictable human

behavior. The ensuing days and weeks will be ripe for thoughtful and necessary discussion on these aspects of Ebola prevention (3).

A new survey of Fortune 500 companies conducted earlier this week by International SOS found that, in spite of the unprecedented outbreak of Ebola, an overwhelming majority (83%) of organizations expect the flu to impact their business more than the virus in the coming months. Furthermore, less than a third of companies surveyed has had an employee request to change their travel plans or declined to travel due to the global outbreak. Participants were also asked "What is your number one challenge responding to the current Ebola outbreak?" Thirty-five percent said the largest challenge was keeping up to date with the latest information. Additional challenges included managing employee travel plans (19-percent), managing c-suite expectations (16-percent), and communicating effectively with employees in affected areas and providing proactive measures to employees in the affected areas (11-percent each) (3).

The Ethiopian Public Health Institute, leads and coordinates national preparedness activities through a national technical working group (TWG) which meets several times a week to devise plans, monitor progress, develop guidelines and standard operating procedures, oversee logistics and strengthen surveillance at Addis Ababa Airport and other international ports of entry and international borders across the country, identified seven potential land port entries such as Moyale, Metema, Humera, Kumuruk, Togo-Wuchale, Dawale and Gambella. Since August 2014 follow up of all passengers from EVD affected countries screening was on process for travel history within 21 days (1)

2. Objective

The main purpose of this study was to assess traveler risk and risk management in Ethiopia in 2014

3. Methods and material

3.1 Study area and period

Ethiopian Public Health Institute mandated for screening and follow up of passengers traveling from Ebola affected countries with partners. Since August 2014 follow up of all passengers from

EVD affected countries screening was on process for risk identification within 21 days and data base was established for documentation. Hundreds of passengers used Addis Ababa as home land from different countries including those EVD affected countries and the study was conducted on information collected during September 2014 to January 2015. Data was compiled from 20 to 30 December 2014. In-depth interview for 15 key informants 2 Doctors, 5 Supervisors, 5 Nurses, 3 Supportive staff working on screening and isolation sites.

2.2 Study Design

Cross-sectional facility based study was conducted from the National EVD screening data compiled from September 2014 to January 2015. In-depth interview with indivisuals working on the screening was employed to explore the barriers and challenges of screening.

2.3 Study population

All travelers from EVD affected countries and had history of travel to Ebola affected country within the previous 21 days information collected during September 2014 to Jan 2015 within the previous 21 days and in-depth interview for indivisuals working on the screening was included in the study.

Inclusion: All travelers from Ebola affected countries and had history of travel to Ebola affected country within the previous 21 days with or without symptom.

Exclusion: All travelers who were not from Ebola affected country and had no history of travel to EVD affected country within the previous 21 days.

2.4 Sampling and data collection

The sample size was include all passengers 527 information collected with non contact screening procedure was applied. Factors about travelers that should be considered in each risk assessment including date of arrival, duration of stay, transit history, country of residency, history of travel to EVD affected country within the previous 21 days were conducted. Data was collected by Field Epidemiology Residents and Nurses working on the screening at Bole international air port. Also a qualitative in-depth interview was administered using a structured questioner for

those working on the screening; the interview was for 15 health workers 2 Doctors, 5 Supervisors, 5 Nurses, 3 Supportive staff working on screening and isolation sites.

2.5 Data Analysis

Data was entered, edited and cleaned using Microsoft Excel and Epi info software version 7.1. Then data was analyzed and presented using bar and line graphs and tables. Qualitative data was presented thematically after compilation of the findings. Finally the finding will be presented to EPHI and Addis Ababa University and other stakeholders.

2.6 Ethical Issue

This study was approved by the Ethiopia Public Health Institute Institutional Review Board. Information are kept confidential. There was no individual identifier during retrieving the data from the record. Informed consent was obtained for the participants of the qualitative study. Privacy and confidentiality of the information obtained from the interviewee was maintained.

2.7 Dissemination, notification, and report of results

The result of this study will be disseminated to relevant bodies such as EPHI, FMoH, Addis Ababa University, EPHA, Addis Ababa City Administration Health Bureau, and all other concerned bodies through presentation, email and hard copy.

3. Results

Travel Histories to EVD affected countries

A total of 527 passengers were screened and followed from 30 September to 12 December 2014. Majority 498(94.5%) had travel history to Ebola affected countries while 16(3.0%) and 13 (2.5%) their travel history was not filled and had no travel history respectively (Fig.1).

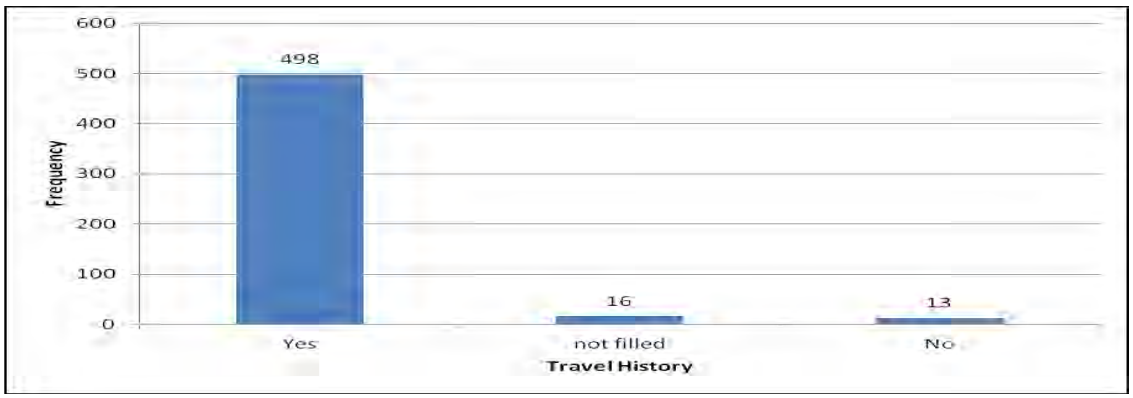

Figure 12: Traveler Histories to Ebola affected Countries, Addis Ababa, Ethiopia 2014

Place of travel to Countries affected with EVD

Majority 265(50.3%) of passengers had travel history to Mali followed by Guinea 66(12.5%), Democratic Republic of Congo (DRC) 54(10.2%), Liberia 46(8.7%), there travel place was not specified 44(8.3%) and Sierra Leone 31(5.9%), while small proportion had travel history to three countries namely Serra Leon, Guinea, Liberia 15(2.8%), and the least three countries Nigeria, Cote Devoir and Senegal 4(0.8%), 1(0.2%) and 1(0.2%) respectively (Fig.2).

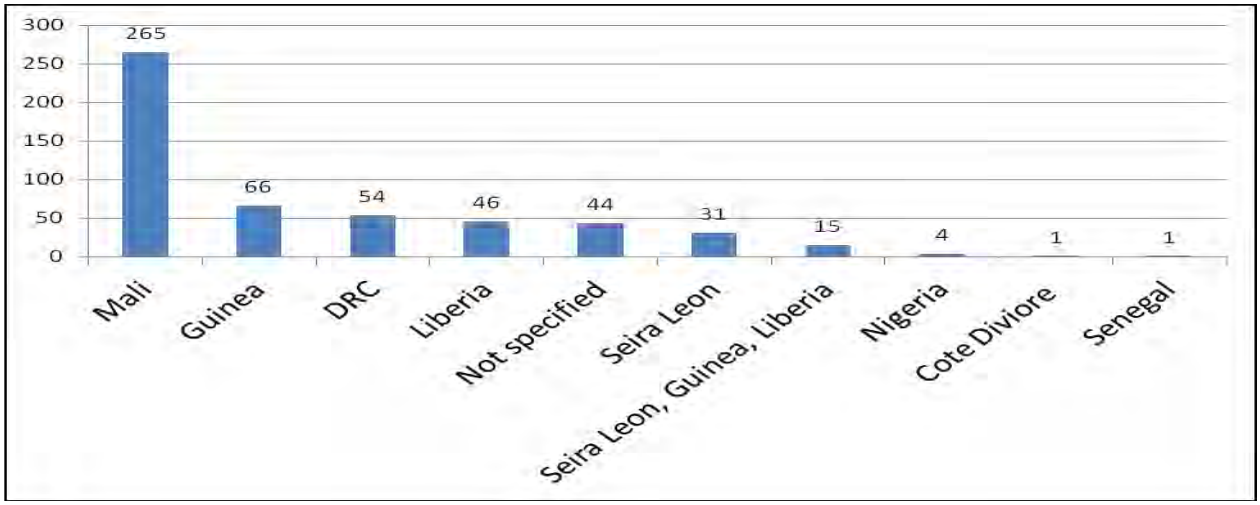

Figure 13: Travel History to which EVD Affected Countries, Addis Ababa, Ethiopia 2014

Mode of Travel

Most 413(78.4%) of the travelers were using Ethiopian Airlines while 83(15.7%) their mode of travel was not specified. Small proportion 12(2.3%), 11(2.1%) were used Egyptian airline and Emirates respectively.

Table 13: Airline Used By Travelers, Addis Ababa, Ethiopia 2014

Airline	Frequency	Percentage
Ethiopian	413	78.4
Not Specified	83	15.7
Egyptian air	12	2.3
Emirates	11	2.1
Air France	5	0.9
Qatar	1	0.2
Turkish	1	0.2
Copenhagen	1	0.2
Grand Total	527	100.0

Duration of stay

More than half 314(59.6%) of travelers were transit and stay for one day only and 121(23.0%) stay for one week. Small proportion 18(3.4%) and 43(8.2%) of travelers were stayed for 2 weeks and three weeks and above respectively while 31(5.9%) of travelers their duration of stay was not specified (Table 14).

Table 14: Duration of Travelers Stay, Addis Ababa, Ethiopia 2014

Duration of stay	Frequency	Percentage
1 day	314	59.6
1 Week	121	23.0
2 Weeks	18	3.4
3 Weeks and above	43	8.2
Not Specified	31	5.9
Grand Total	**527**	**100.0**

Follow up Methods

From a total of 527 screened passengers 314 were transit and 195 were followed and found that 75(38.5%), 57(29.2%), 23(11.8%), and 22(11.3%), physically contacted, invalid address contacted by phone and physically and only contacted by phone respectively. Small proportion 10(5.1%) and 8(4.1%) passengers were on and off responding and not responding at all.

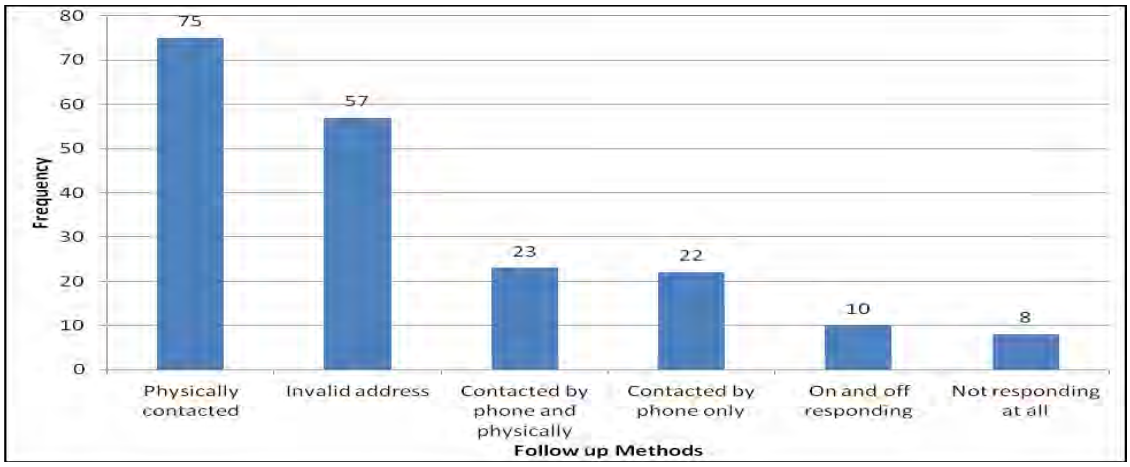

Figure 14: Follow up Methods for Travelers, Addis Ababa, Ethiopia 2014

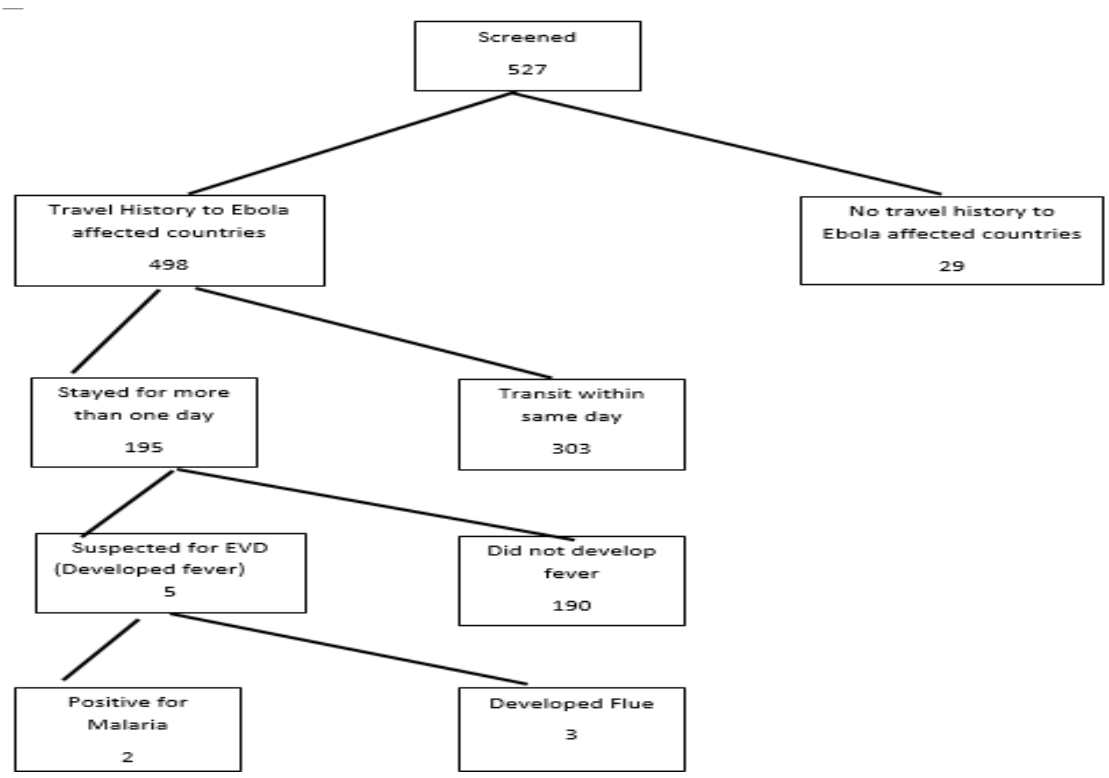

Figure 15 Flow Chart of the Travelers Screening Results, Addis Ababa, Ethiopia 2014

Qualitative data

Majority of the in-depth interviewed reported that they perceive working as a screener is a very interesting job to prevent our country from Ebola Virus disease and it is a national mission, interesting responsibility and we like it. One respondent said, ''He perceived working as screener is a risky activity as he has direct contact with the passengers coming from Ebola affected countries.''

The traveler's react during screening and follow up procedures in different ways; some passengers feel aggressive, most were not happy, feel nervous as if they are affected by disease, some travelers not confidential. A 36 years male said, ''Most of travelers were not giving good response and they are aggressive.''

The importance of screening and follow up of passengers coming from Ebola affected countries were, five of the respondents replied to prevent our country from Ebola Virus Disease while two of them said, '' To detect, protect others, track and follow passengers until the incubation period completed. ''

The strength and weakness of screening includes filling of information for all passengers was stated as strength by one person while the weakness were; language barrier, passengers not fill the form properly, no internet access for reporting, place for screening is small and overcrowded. One respondent said, '' Negligence of professional to fill the form.''

The challenges faced during screening and follow up were; some passengers do not understand the aim of screening, language barrier and screening area not suitable leading to overcrowding, less number of health workers, Two respondents said, ''When a photo thermometer stack and the passengers told to stay for some time they are disappointed.'' One respondent said, ''Passengers complain of using glove to check their pass port.''

4. Discussion

Following a step-wise approach, information can be collected about travelers and their journeys and likely travel-related hazards can be identified (risk assessment). With this information, health professionals can advise (risk management) using real-time and evidence-based resources. Risk assessment helps to identify special risk travelers (such as those with medical conditions,

children, pregnant women or older people) (8). Screening passengers before they get onto an airplane is the best weapon available for limiting the spread of Ebola. Some African countries are already doing this, and the United States can augment that security once international travelers land or switch planes (6).

Majority 94.5% had travel history to Ebola affected countries. This can increase the risk of Ebola transmission to non affected countries. More than half of the passengers had travel history to Mali which is less affected and contained the outbreak immediately and this might lower the risk of Ebola transmission to non affected countries. Small proportions of travelers do not specify their travel history to Ebola affected countries and this can hamper the screening and follow up procedures and unknown travel history may also transmit the virus without the knowledge others. The quantitative and qualitative study revealed similar results on filling travel history to Ebola affected countries.

Most 78.4% of travelers were using Ethiopian Airline which needs special precaution, repeated orientation and continuous follow up on crew members. On the other hand 15.7% of passengers didn't specify their mode of travel this might be due to further interview and delay from their travel as this may increase the risk of Ebola transmission. Small proportion 2.3% and 2.1% were used Egyptian and Emirate Air lines respectively. Majority of 59.8% of travelers were transit and stay only for one day and this can also lower the risk of EVD transmission to non affected countries. During (screening) two reasons for invalid address were: not filling formats by passengers and overcrowd of screening area. Second is changing hotel address once the passengers filled the format has a great contribution for invalid address. Invalid address should be corrected immediately without time taking by discussing with air lines officials follow up travelers fill invalid address, responded on and off and not responded at all, this makes more complex the follow up process. A total of 5 passengers were suspected and screened for EVD but it was found that all were other medical condition like malaria and flue like illness. In general, Ethiopia didn't encounter any conformed Ebola cases during screening and follow up procedures.

The challenge of Ebola prevention occurs at the interface of critical issues that include protecting the public, personal privacy, appropriate screening for a threat, and unpredictable human

behavior. The ensuing days and weeks will be ripe for thoughtful and necessary discussion on these aspects of Ebola prevention (3).

The challenges faced during screening and follow up were; some passengers not understand the aim of screening, language barrier and screening area not suitable, leading to overcrowding, less number of health workers to overcome the problem encountered and incomplete data. This can be improved through awareness creation, include some French speakers in screening procedures, redesign screening area, assign adequate health professionals and strict follow up for completeness of data. Passengers Follow up was focused only on the primary passengers but not addressing the family members and friends. Increasing awareness on the objective of follow up and early symptoms Ebola, among passengers and family members is crucial in the prevention and control of EVD at the same time it is the chance to decrease panic if Ebola case will happen. As a result of this to improve the screening and follow up procedures FMoH, EPHI, WHO, UNICEF and other partners should participate to scale up and sustain the program.

5. Conclusion and Recommendations

Both the quantitative and qualitative study revealed that the screening and follow up procedures depend on traveler's good will and screener's initiative and strong commitment. Travel history to an Ebola affected country was reported by 94.5% of travelers. This can increase the risk of disease transmission to non affected country like Ethiopia. The Interim guide line orders malaria test for fever cases any time for those from EVD affected countries All fever cases were not tested for malaria which does not full fill standard malaria management protocol. Identifying all travelers with their travel history can minimize the risk of EVD transmission. Most of the travelers were unaware of the importance of screening EVD at air port. It is very important to create awareness for travelers by posting posters the objective of screening and whom to call when they feel unwell.

Also it is very important to conduct regular follow up by assigning professionals for fixing photo thermometer when it stacks was underlined. Filling questionnaire by passengers might play a great role for invalid address and hide their travel history as this may easily facilitate viral transmission to non affected country. As 29.2% of traveler were filled invalid address the

screener should check for completeness of passenger profile continuously to improve the quality of data and prevent lost follow up.

Therefore, availing adequate resources/protective materials, adhering to standard precautions were highly recommended. Also assigning adequate health professionals and conducting regular supportive supervision and feedback is also advisable to screeners and follow up health professionals working in the areas.

It is better to inform that Travelers will also be given advice to whom to call and what to do if they become unwell at any time. Using telephone contact only may not assured that everybody is in a good condition as the knowledge of EVD is not fully introduced in the community and not equally understand severity of the problem. So it is better to physically address those people under follow up as much as possible.

Follow up will involve taking temperatures of people's under follow up to check whether they have a fever. Even though; this is one of the main symptoms of Ebola, it is also a symptom of many other infections.

Acknowledgments

The authors would like to appreciate Dr Daddi Jima for his unreserved support in idea generation. Last but not least my gratitude also goes to all PHEM staffs, fifth cohort FETP Residents and to all those working in screening sites AAU at large.

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In-depth-interview Questionnaire on Traveler Risk Assessment and Risk Management of Ebola Viral Disease in Ethiopia 2014

Age_____ Sex_____

1. How do you perceive working as a EVD screener?_____
2. How the travelers react during EVD screening and follow up?_____
3. What are the importance of screening and follow up of people coming from EVD affected countries?_____
4. What were the strength and weakness of screening and follow up from your experience?

   _____
5. What were the challenges you face during screening and follow up?

Thank you for your cooperation!!

CHAPTER III– EVALUATION OF SURVEILLANCE SYSTEM

3.1 Malaria Surveillance System Evaluation, Gidda Ayyana and Kiramu Woreda, East Wollega Zone, Oromia Region, Ethiopia 2014

Abstract

Background: In Ethiopia, malaria is one of the leading causes of morbidity and mortality and it is endemic in most part of the country with an altitude 2000 meter below sea level. About 75% of the land mass is potentially malarious and about 40 million people are at risk of infection. Malaria surveillance system has been useful in providing information of malaria trends and also it provides magnitude of morbidity and mortality due to malaria in the woreda.

Objective: To assess key attributes of malaria surveillance system and Performance of the system in line with set objectives and operations of the system to generate evidence based information for the better improvement of the surveillance system.

Methods: A cross-sectional malaria surveillance system evaluation from 03-18 June 2014 in Gidda Ayyana and Kiramu Woreda East Wollega zone. Data was collected, entered in to a computer, edited and analyzed using Excel software. Descriptive analyses were conducted and presented using tables and graphs.

Result: It was found that the distribution of both male and female sex were 50% each. Majority 42.9% of the age distribution was found between 15-44 years. Majority 89% of the populations reside in rural area. Most 75% of the populations are at risk of malaria and it was found to be the major disease burden in the zone. Of the total reported malaria cases Plasmodium Falciparium accounted for 70%. The Zonal weekly average completeness report was found to be 71.2%. The epidemic preparedness of the zone and woreda did only planning with no financial and /or logistics support, beside, the epidemic committees did not review their plan actions and learned experiences.

Conclusion and Recommendations: The system is useful, simple, acceptable, flexible, and representative but incomplete and not timely, overall qualities of data were good. Provide frequent supportive supervision and increase sensitization to improve data quality. Data

timeliness and completeness of reporting is crucial so it is good to improve data utilization for decision making.

Key words: Surveillance, Evaluation, malaria

Introduction

Disease surveillance has been recognized as an effective strategy in the control and prevention of most especially communicable diseases. An effective surveillance system allows early intervention for the prevention and reduction of the morbidity and mortality that may result from epidemics of communicable diseases. Effective surveillance is the key to control disease in the community. It is weak with duplication of data collection and multiple reporting channels. There is also lack of clarity with regards to data submission responsibilities. However, the knowledge of reporting requirements and responsibilities among health personnel has not been examined adequately as a cause of under reporting (1).

Malaria is caused by intra erythrocytes protozoa of the genus Plasmodium and is vector-borne disease caused by a parasite. These parasites are transmitted by the bite of an infective female Anopheles mosquito. People with malaria often experience fever, chills, and flu-like illness. Left untreated, they may develop severe complications and die. In 2010 an estimated 219 million cases of malaria occurred worldwide and 660,000 people died, most (91%) in the African Region. Malaria is the leading cause of death and disease in many developing countries worldwide. Three point three billion People live in areas at risk of malaria transmission in 106 countries and territories. More than 207 million developed symptomatic malaria (2).

Malaria remains one of the most important causes of human morbidity and mortality with enormous medical, economic and emotional impact in the world. More than half of the world's population is at risk of acquiring malaria, and the proportion increases each year because of deteriorating health systems, growing drug and insecticide resistance, climate change and natural disasters. Combating malaria is one of the millennium development goals; which is planned to halt the incidence of malaria by halve in 2015 (3).

Malaria is the leading communicable disease in Ethiopia with over 5 million clinical cases of malaria reported annually. The Ethiopian Malaria Prevention and Control Program (MPCP) have

set the goal of reducing the burden of malaria by 50% and eventually halting transmission of parasite infections by 2015 (4).

In Ethiopia, malaria is one of the leading causes of morbidity and mortality and it is endemic in most part of the country with an altitude below 2,000 meter. About 75% of the land mass is potentially malarious and about 40 million people are at risk of infection. On average, 60-70% of malaria cases have been due to P. falciparum, with the rest caused by P. vivax. The risk of disease in Ethiopia is also highly variable by location that is affected by rainfall, altitude, and seasonal factors; malaria is classified as unstable, and host immunity to malaria is thought to be low in most parts of Ethiopia (5).

To reduce the overall burden of morbidity and mortality due to malaria in Ethiopia comprehensive approach to vector control, early diagnosis and prompt treatment and surveillance, prevention and rapid management of malaria epidemics when and where it occurs are being implemented by incorporating in the country health sector development program since 1999 (6). Oromia region has many malaria hot spot areas which are affected repeatedly by malaria episode. Hence, this evaluation is conducted to evaluate the gap and the attributes and purposes of the surveillance system.

The evaluation should assess how well the public health surveillance system is integrated with other surveillance and health information system e.g., data exchange and sharing in multiple formats, and transformation of data. The purpose of the system indicates why the system exists, where as its objectives relate to how the data are used for public health action. The objective of public health surveillance system is, addressing immediate public health action, program planning and evaluation, and formation of research hypotheses including the planned uses of its data; establish a frame of reference for evaluating specific components.

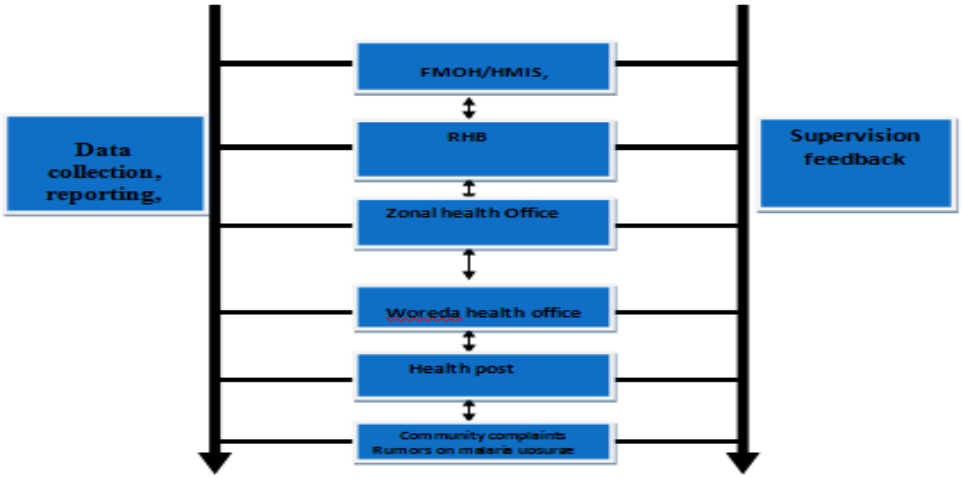


Figure 16: Surveillance Data And Information Flow Chart

Rationale for Evaluation

Malaria is one of the leading causes of morbidity and mortality in Ethiopia. Therefore, this study was conducted to evaluate whether the system is in a way of performing to the set objective and to identify the gap for improving the surveillance system. Malaria surveillance system has been useful in providing information of malaria trends and also it provides magnitude of morbidity and mortality due to malaria in the woreda. The finding of this evaluation will be utilized for planning, effective health interventions and procure of equipment that helps for diagnosis, treatment and prevention of malaria cases.

Objective

General Objective

- To assess malaria surveillance system and Performance to generate evidence based information for the better improvement of the surveillance system and to provide recommendation based on the findings in East Wellega zone, Oromia region in 2013.

Specific Objectives

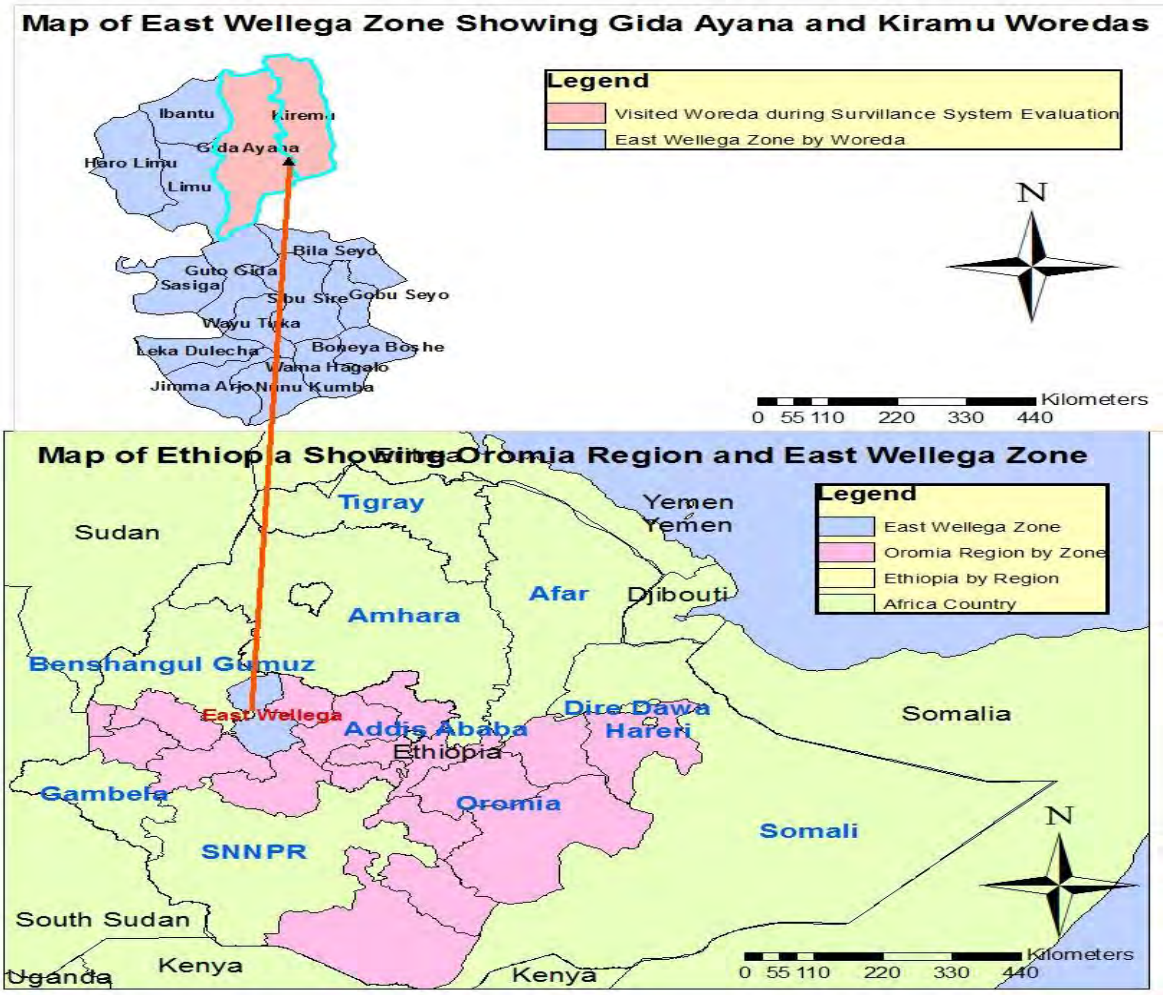
- To assess the Performance of the surveillance system, in early detection of outbreaks and morbidity and mortality.

- To evaluate the attributes of malaria surveillance system in the zone and selected woredas
- To generate evidence based information for the better improvement of the surveillance system.
- To provide recommendation based on findings

Methods and Materials

Study Area and Period

The study was carried out in East wollega zone, Oromia Regional State. The zone is located in Western part of Oromia regional state. According to 2013 projected population, the zone has a total of 1460628 populations of which Male accounted 729791 and Female accounted 730836. East wollega zone has 17 woredas, 367 kebeles, and 26 urban and 287 rural kebeles. Out of these 160669 (11%) of population live in urban and 1299958(89%) of population live in rural. In East wollega zone 1 district Hospital governed by zone, 56 Health Centers, 313 Health posts, 141 private clinics and 6 NGO clinics were found. In East wollega zone all woredas are geographically malarious of this 1095470 (75%) were population at risk of malaria and of which 66,858 populations reside in kiremu woreda and 128106 populations reside in Gidda Ayayna woreda. The woreda was selected using lottery method based on their performance (one from high and one from low performance). The study was conducted from 03-18 June 2014.



Map 4: Map of Gida Ayana And Kiramu Woreda, East Wellega Zone, Oromia, Ethiopia 2014

Study Design

A cross-sectional descriptive study was conducted.

Sample Size and Sampling Technique

First, one zone was selected using lottery method based on their performance on the basis for its burden of malaria cases compared with other zones of the region, then two woredas health office, two health centers from each woreda and two health posts from each health centers and one hospital with a total of 16 health facilities were included in this system evaluation and presented with good and poor surveillance practice as judged by the zonal and woreda health offices. All surveillance focal persons in the selected health office and facilities were interviewed.

Study Settings

The study subjects were zonal health office, woreda health offices, health centers and health posts. A total of 16 study settings were included in the study.

Data Collection Method

Primary data was collected using structured questionnaire by zonal PHEM officer. Data was collected from surveillance focal person (officers) in the selected health offices and health facilities from study unit. Secondary data source such as surveillance report completeness and timeliness as well as malaria surveillance data, supervision report, written feedbacks, preparedness plans were also reviewed.

Data analysis

Data was entered and analyzed using Microsoft office excel-2007. Date was entered, edited and graphs and table was employed.

Dissemination:

The findings, Conclusions and recommendations will be forwarded to all concerned bodies like PHEM, Region, Zone, woredas, mentors, supervisors and coordinators.

Case definition

According to National PHEM guideline the case definition categorized in to two, Clinical and community case definition.

- **Clinical case definition:** Any person with fever, headache, back pain, chills, sweats, myalgia, nausea and vomiting diagnosed as malaria clinically.
- **Community case definition:** Any person with fever OR fever with headache, back pain, chills, sweating, muscle pain, nausea and vomiting OR suspected case confirmed by RDT.

Operational definition

- **Flexibility:** is the ability of the system to adapt to changing needs with little additional time, persons or allocated funds. 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 be easily integrated with other systems.
- **Data Quality**: Data quality reflects the completeness and validity of the data recorded in the public health surveillance system.
- **Timeliness**: is the ability of the system to trigger appropriate action in time. The surveillance system must provide information in time to control communicable diseases.
- **Representativeness**: is the ability of the system to describe health events accurately in terms of time, place and person. A public health surveillance system that is representative accurately describes the occurrence of a health-related event over time and its distribution in the population by place and person.
- **Simplicity**: The simplicity of a public health surveillance system refers to both its structure and ease of operation. Surveillance systems should be as simple as possible while still meeting their objectives.
- **Acceptability**: reflects the willingness of persons and organizations to participate in the surveillance system.
- **Sensitivity**: is of a surveillance system can be considered on two levels. First, at the level of case reporting, sensitivity refers to the proportion of cases of a disease (or other health-related event) detected by the surveillance system. Second, sensitivity can refer to the ability to detect outbreaks, including the ability to monitor changes in the number of cases over time.
- **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.

Results

Performance of existing surveillance and response system

Populations under surveillance

East wollega zone has a population of 1, 460,628 of the total, male accounted 729791(50%) and Female accounted 730836(50%). Majority 628070(42.9%) of the age distribution was found between 15-44 years followed by 5-14 years that is 444031(30.4%). The National PHEM targets all population in the country to be under surveillance for all twenty reportable priority diseases. East wollega zone follows the same procedure of twenty priority disease under surveillance.

In East wollega zone due to climatic change over time 17 woredas, 367 kebeles which means 100% of the zone has malaria, of these 1095470 (75%) of the population are at risk of malaria(8). Malaria remains the major burden of all 20 priority reportable disease in the country (Table 15).

Table 15: Population under Surveillance by Age in the Area of Assessment

S.No	Areas of assessment	Total population	Age Group				
			< 1	1-4	5-14	15-44	>44
1	East wollega zone	1,460,628	34471	178781	444031	628070	175275
2	Gidda Ayana woreda	128106	3029	15685	38949	55078	15365
3	Kiremu woreda	66858	1579	8184	20325	28748	8022

Distribution of Health facilities in East Wollega zone, Oromia, Ethiopia 2014

Regarding health care service; East wollega zone has 1 district hospital, 56 H/C, 313 health posts, 517 all types of private clinics and 6 NGO clinics. The health service coverage of the zone was 93% in 2013 (8). In all assessed health facility the respondents agree that the population under surveillance have inadequate health seeking behavior but there is relatively progress were observed from time to time through the continuous efforts of Health Extension workers (Table 16 & 17)).

Table 16: Reporting Health Facilities (Jan-Mar 2014)

No	Woreda	H/Post	H/Center	Private	NGO	Hosp	Average	Rank
1	G/Ayana	74.5	95.8	37	4.2	100	62.3	15
2	Kiremu	59.8	91.7	36	-	-	62.5	14
	Average	67.15	93.75	36.5	4.2	100	60.32	

Table 17: Health Facilities Potentials Incorporated in Assessment 2014

S.No	Assessment unit	Number of health facility expected to report						Health coverage
		Hosp.	H/C	H.Post	NGO	Private	Total	
1	East wollega zone	1	56	313	6	517	893	93%
2	Gidda Ayana woreda	1	4	22	2	26	55	80%
3	Kiremu woreda	-	4	17	-	10	31	95.5

Malaria case definition

The case definition of malaria was available in all visited health facility and posted on the wall. The understanding of the available case definition by health care providers was satisfactory, as confirmed by some of healthcare providers could define the cases at the time of health facility were visited.

Reporting formats and registration book

The clinical registration was found together with OPD registration at OPD and laboratory level, has no separate clinical registration book. All visited health posts has no clinical registration book but used plane paper for clinical registration.

There was no shortage of epidemic reporting format in the last six months at all level of health facility and health office, but there was a shortage of weekly reporting format at health post level and one health center (Kiramu health center)was observed when used modified paper for weekly report instead of usual format(9). The reporting rates of observed health facilities over the last three months (12weeks) compared to the expected number of reports (completeness) from Gidda Ayyana woreda Health centers, health posts, Hospital and private health facilities were 91.7%, 74.5%, 100% and 37% respectively. While reports from Kiremu woreda Health centers, health

posts, and private health facilities were 95.8%, 59.8% and 36% respectively. Over all visited woreda and health facility report completeness was 60.32%. While the zonal PHEM reported to the regional health Bureau in 12 weeks of reporting period was 71.6%, between 10-22 WHO weeks prior to visit.

All reports were sent to the next level through e-mail, telephone, and manually written (hard copy) particularly from health post to health Center. Reporting through telephone is requests personal expense of some health workers especially HEWs at the health post level, for the reason that there is no government telephone service used for this purpose this might contribute to late report.

Data Analysis

In all visited health offices and health facilities, there was a responsible person for surveillance data analysis, however observed data analysis at woreda and zonal health office was a variable for the disease malaria, AWD, and measles. The data was analyzed at regular bases in woreda and zonal health office, 100% of visited woreda health office, zonal health office and health centers analyzed the data collected for surveillance malaria at their capacity but at health post level data collected for surveillance were not regularly analyzed. The thresh hold for action was set for malaria at zonal health office, woreda health office and health centers level. Even though all visited health office and health facility has denominators for surveillance data analysis but they didn't use to compare the incidence with the previous experience at the woreda and health facility, except at zonal level they used the incidence in comparing with the past experience for surveillance data analysis. There is surveillance data base and they use XLs software and PHEM focal assigned at all visited sites.

In East wollega zone a total of 66,750 clinically suspected malaria cases and 48,738 confirmed malaria cases with 45 malaria deaths were reported in 2005 EFY. Of the total confirmed cases P.F accounted for 70% whereas P.V accounted for 30%. P.F was potentially predominant parasite in the zone (Fig. 12).

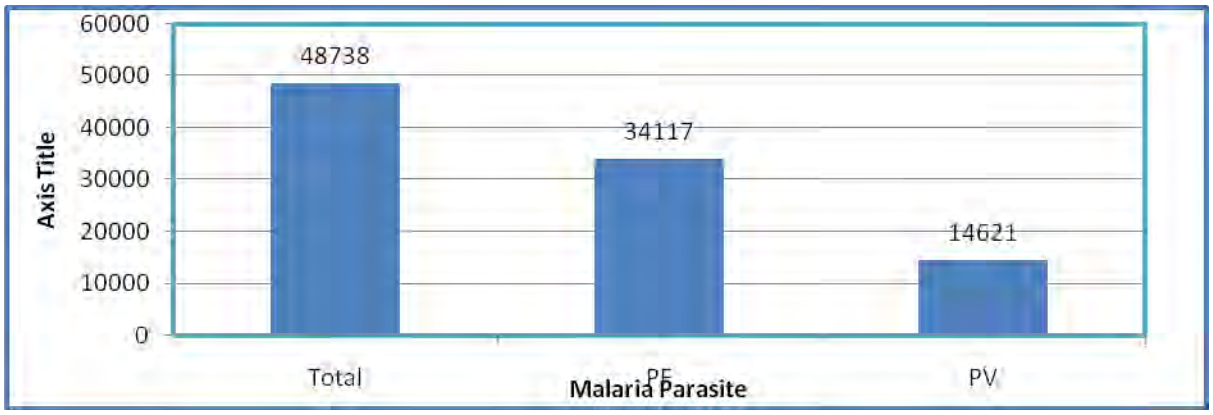


Figure 17: Total Malaria Cases by Parasite, East Wollega Zone, 2013

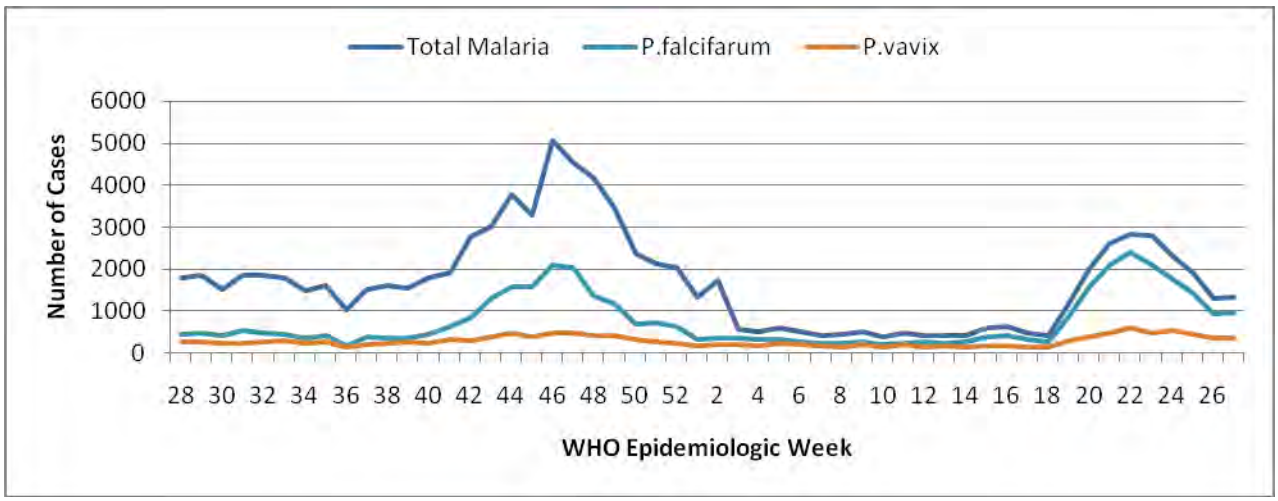


Figure 18: Weekly Trends of Malaria East Wollega Zone 2013

Epidemic preparedness and response

Out of all visited health office and health facilities the zone, one woreda and one health centers experience malaria and measles outbreak in the previous year (10). All were reported the number of increased cases within 48 hrs for measles and for malaria within a weekly bases of report to next higher level for action. All were responded; they set for epidemic preparedness and response plan for the priority disease and have epidemic management committee like RRT and task force at their locality that was confirmed from minute during visiting. All the woreda health office, and health facility has no budget line for outbreak management, except zonal health department that has budget line for epidemic management and all health facility had adequate drug stock like vaccine, and anti malaria drug at hand for six months but health posts had no enough amounts of drugs that may help for the coming 6 months stock at hands.

Epidemic RRT and management committee were actively engaged only if there is an outbreak and in addition they didn't monitor their activities and preparedness at all level. At all level PHEM program was an agenda to detect and notify 20 priority diseases in prevention and control measures have been improved since PHEM was established in 2009. All interviewed surveillance focal person responded that they had investigated outbreak for intervention in their catchment area but they do not have standard procedure for outbreak management. Adequate

Feedback

Feedback is an important function of all surveillance systems and the way of encouraging, an individual or staffs working in the surveillance system. Appropriate feedback can be maintained through supervisory visits. Discussion with the zone experts revealed that both verbal and written feedback was practiced, incorporated with routine integrated supportive supervision together with other departments, a practice of giving feed back in all direction shows the strength and weakness of health facility and woredas health PHEM office surveillance systems. The average feedback given through the ladder was 4 in a year 2005 EFY and 2 in the year 2006 within 9 months of period. All had regular supportive supervision from the respected ladder of health office and health facility.

Supervision

All the visited woreda health office, health centers and health posts had regular integrated supportive supervision from their respective zonal health offices every three months (quarterly). However, to evaluate the system during the supervisory visits checklist was used by expertise but was not applicable during health centers supervise health posts, for the reason that there is one permanently assigned health personnel for health post from health center to provide technical support for health post staffs.

Communication facilities

Resources for data management, communication, and logistics were all available at the zonal level. However, they all became very scarce down in the ladder. There is Computers at woreda health office and health center level but not given particularly for PHEM department. In one of the woreda health office and in one of visited health facilities computer were not functional.

Communication of clinicians and focal person during immediately reportable disease were found to be using fixed telephone were almost nil but using mobile was practical at all level.

The logistic and budget constraints were complained by all visited woreda health office, health centers and health post assessed except the zonal level. These were mentioned frequently as the reasons for poor reporting, monitoring and evaluation of the health office and health facility. Weekly report, monthly and other reports were sent from health facilities to zonal and woreda health office by using hard copy and telephone.

Training

In all visited health office and health facility who is working in surveillance unit got surveillance short term training from 4-5 days prepared by regional health bureau. In health facility health care providers, clinicians and HEW, they were only given surveillance orientation.

Material and resources available for surveillance

Resources for data management, communication, and logistics were all available at the zonal level, but these resources, at the lower level were limited. At zonal level computer and lap top were used for surveillance purpose, fixed telephone and internet access also used for surveillance communication. Challenges raised during assessment were inadequate and lack of resources, logistics, and communication at all level is the main complaints of surveillance focal person at woreda level as these the reason for poor supervision, reporting and monitoring of health facility. In addition to the above mentioned challenges late reporting (timeliness) the prime challenges that affects the surveillance system because of lack of communication at the health post level.

Laboratory

All assessed health facility has functional microscope different types of reagents like oil immersion and gemisa solution that support the identification of malaria parasite during laboratory examination, except Gida Ayana health center that lacks functional microscope and reagents because of budget constraints to maintain and purchase reagents. RDT for malaria parasite test is available at all level of health facility. At health center level laboratories has the capacity to carry out both microscopic blood film for malaria and RDT. RDT used at health post level by health extension workers (HEW) and Challenges on laboratory at health center and health post level were frequent lack of RDT and reagents.

4. Attributes of surveillance system

4.1. Usefulness

The surveillance system is useful to detect outbreaks of selected priority disease and useful to assess the magnitude of morbidity and mortality related to priority disease. All the interviewed respondents agreed that early detection of disease under surveillance is useful. The data collected through surveillance system were useful for health policy decision making. The reported data expected to be employed by higher officials for decision making like the zonal administration, and health department to formulate prevention and control program. But from the interviewed focal person in the visited sites, responded that utilization of the surveillance system by administration and higher officials were not experienced or very limited.

Case detection

From the assessment we found that all the health facilities (100%) have national PHEM surveillance guidelines and case definitions of malaria. The health professionals working in all health facility detect any suspected cases of malaria using both clinical (standard) and community case definitions.

Rapid Response

A strong surveillance and response system is critical for effective priority disease surveillance and response is often inadequate because of certain limited resources, so that efficient use of these resources must be made. Better coordination and integration of surveillance functions will contribute to the effectiveness and efficiency of surveillance systems

4.2. Simplicity

Case definition understood at local level, Simplicity of the surveillance system is undertaken to observe how much the standard case definition for malaria is simple, easy, and understandable and help full for data organizing, entry and data analysis. All respondents agreed that the case definition for malaria is easy to understand and applied by all health professionals. Communication channels established, with the generation of a notification report by a health worker when a case is diagnosed at health facilities. Data generated is passed through defined reporting routes using the standard reporting formats Standardized tools were in place. Line

listings are submitted more frequently in the event of disease outbreak or epidemic. But, to confirm the malaria cases it needs laboratory microscopic identification and RDT at all level.

In flux of data

Since it was set in the surveillance guideline and the route of data flow is simple and clear the reporting entities do not complain any problem in this regard. There was no shortage of reporting format except weekly report format shortage at health post level. Data collection and filling was not time taking which took 10 minutes on average. The main problem here is shortage of weekly reporting format, lack of transport, internet, and telephone which delayed report or affects timeliness of report.

Data management

Data were collected, compiled and sent from the lower level health post to health center, health center to woreda health office, from woreda health office to zonal health office according to higher arch.

4.3 Flexibility

System is flexible as it can accommodate new variables and information, can be operated with other system. Daily case register for malaria management modified to captured RDT positive cases & dose-regimen of treatment administered but not clinical cases of malaria, date of onset of fever and other symptoms. All respondents agreed with a flexible public health surveillance system can be and easily adjusted to use, change can be implemented with little information but without additional time, personnel, or allocated funds. Now it is modified and easy to integrate with other system.

The previous IDSR system has been changed with the implementation of the current PHEM since 2009. This change has made the reporting format more flexible to report other newly occurring health event without much difficulty, and the formats are assumed to be easy and comprehensive as it has a place for new variable. In the mean time change from one system arrangement to another newly system needs positive attitude and transformation of staffs working in the system.

4.4 Acceptability

Willingness to continue the acceptability of the surveillance system assessed based on the engagement of the reporting agents and active participation in the case detection and reporting. Reporting format was easy to understand and all health professionals know about what surveillance system mean is and data flow were clearly defined by all Stakeholders. But because of inadequate resources poor data utilization at lower facility level (health post) were observed.

4.5 Sensitivity

Sensitivity of surveillance system refers to the ability of the system that can detect actual cases in a population and notify through the system. During the evaluation, sensitivity was described at all level by surveillance focal person able to detect the case and notify the outbreak together with health professionals working in the clinical units, this refers to the ability of the system to identify clinical and community based case definition of malaria. The community based case definition helps particularly the health extension workers (HEWs), and health development army (HAD) to identify and notify early all suspected malaria cases and notify able priority diseases at the community level.

PVP

The positive predictive value (PPV) or the proportion of cases reported by the system that actually have malaria was 48738. The capacity of the diagnostic test was ensured microscopic and RDT.

4.6 Representativeness

Representativeness shows how far the routine surveillance report is covered by the health service delivery system and how many facilities are reporting to the offices. The routine surveillance covers all governmental health facilities zonal, woredas health office, health center and health posts private health facility, and all population under surveillance in the catchment area. Representativeness was high for the reason that large febrile patient was diagnosed by HEW using RDT at community level and microscopic examination of blood film at health center and hospital level.

4.7 Timeliness and Completeness

The most important measure of timeliness and completeness are whether data are submitted in timely and completely to begin investigations and implement control measures. Thus, timeliness of reporting was measured according to the National PHEM. It was found that zonal health office was reported to RHB timeliness was 96.9% and completeness was 71.2% which showed the zone completeness does not maintain 80% minimum requirement expected by WHO. The number of facility reported on time or late was not kept recorded and difficult to identify for the reason that date of reported were not recorded (Fig. 14).

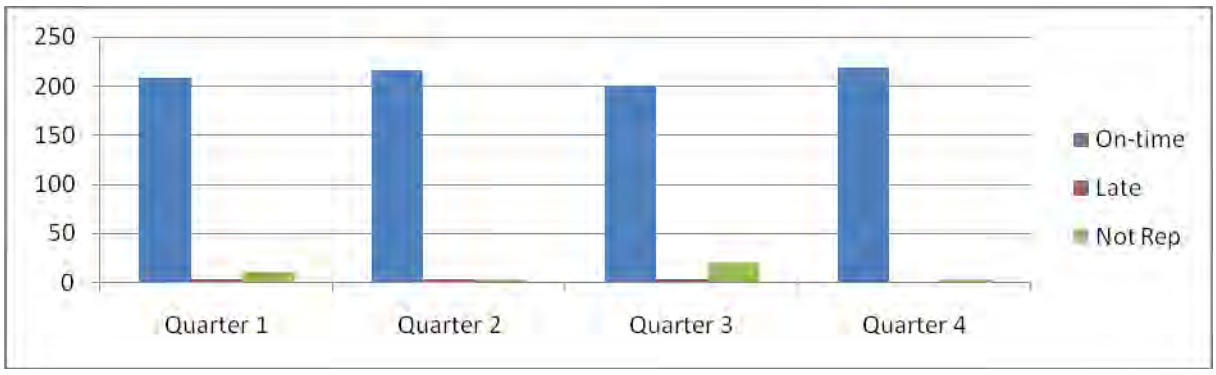


Figure 19: Timelines Of Health Facility East Wollega Zone 2013

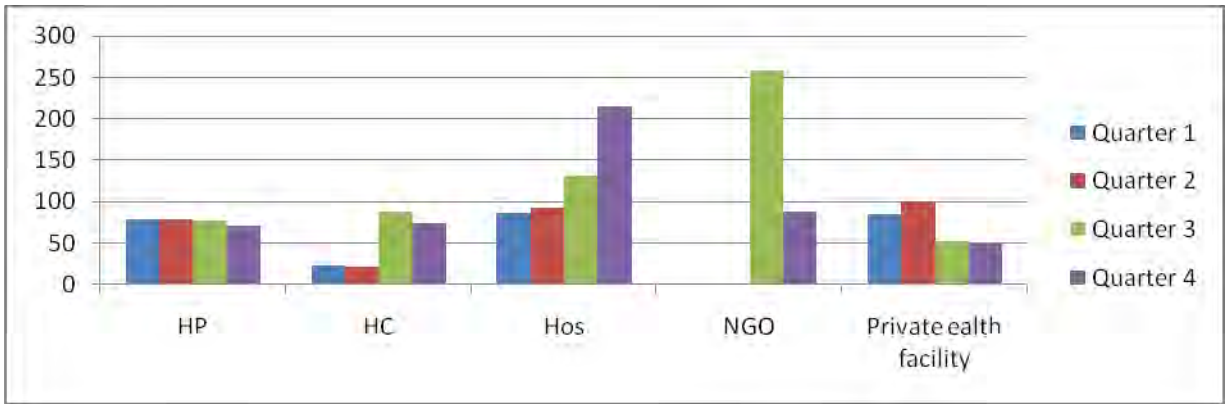


Figure 20: Completeness of Health Facility East Wollega Zone 2013

4.8 Stability

In the era of BPR implementation the procedure and activities of the surveillance of these diseases were affected demanding to have different capacity building. Further change in this system and the work force will make the system more unstable resource intensive. The change of IDSR to PHEM made the reporting system more stable.

5. Discussions

It was found that in East Wollega zone the distribution of both male and female sex were 50% each. Majority 42.9% of the age distribution was found between 15-44 years followed by 5-14 years that is 30.4%. Majority 89% of the peoples reside in rural area while small proportion 11% were resides in urban.

It was found that 75% of the populations are at risk of malaria and Malaria was found to be the major disease burden in East wollega zone this can be due to high population mobility in the area from high Landers and presence of irrigation which is conducive breeding site for malaria as it was identified by this study. Of the total reported malaria cases P.F accounted for 70% whereas P.V accounted for 30%. The predominance of PF can lead to potential malaria outbreak. The Zonal weekly average completeness report was found to be 71.2% which is below 80% WHO requirement. This was due to majority of health facilities were found to be in hard to reach area and lack of communication. Low completeness of reporting can lead to late detection of outbreak which can hamper in the implementation of timely response which reduce the expansion and impact of the outbreak.

The understanding malaria case definition by health care providers including, health extension worker (HEW) was found to be good but collection and registration of data was incomplete and clinical registers and reporting formats were not uniform. Using tally sheet was good but was not used as clinical registration. Tally sheet might easily lose after certain period of time and compilation of report is difficult.

The structure of data reporting flow from the lower to the upper level was well organized with unidirectional fluctuation of data, in simple and defined role and responsibility of each reporting entities. But flow has so many obstacles with reporting means and infrastructure like transport, telephone, radio, fax and computers for data management and analysis. These impacts the overall generation of report by the expected health facilities can make the surveillance system to relay on very limited data. This low reporting rate coupled with delayed (or no analysis) of the collected data will make the surveillance system less useful to meet its objective.

This could be due to poor orientation of all parties, inadequate supportive supervision and feedback system, low or no legal enforcement to the surveillance activities, lack of incentives,

appropriate training, sense of ownership and logistics. The epidemic preparedness of the zone and woreda did only planning with no financial and /or logistics support, beside, the epidemic committees did not review their plan actions and learned experiences. This will make the zone and woredas to wait and see the support of the Regional Health Bureaus in case of epidemic. This will make responses to be late and give epidemic to take the chance to progress.

Furthermore, the woreda health offices were allowed for emergency budget from the woreda administration office only after an event has occurred; this impedes timely investigation, and mitigation of expected events in the woreda by the woreda health office. In cases of epidemics rapid response usually focuses on case management with no any protocol for investigation of risk factors and targeting response based on investigation. The woreda biannual review of the health sector activities did not have detailed revision of all activities related to surveillance, plans and epidemic preparedness and response. This indicates low attention given to surveillance and response of epidemic prone disease like malaria.

Limitation of the study

- Inadequate weekly report particularly at health post level.
- Hard to reach area and in access of network
- No computer in all health facility and woreda health office PHEM unit
- No Telephone when down to woreda and health facility
- Transport problem especially at health post level to transport reports.

6. Conclusion and Recommendation

The system is useful, simple, acceptable, flexible, and representative but incomplete and not timely, overall qualities of data were good. Provide frequent supportive supervision and increase sensitization to improve data quality. Data timeliness and completeness of reporting is crucial so it is good to improve data utilization for decision making.

Increase government commitment for sustainability and stability by providing adequate resources and provide training for health professional on 20 priority disease in order to improve the system to detect, report and contain timely. Overall improve the quality of data needs structural set up of the surveillance system. Also assign good and responsible person in the unit/

focal person at each woreda and health facility level and involvement of the community in the structure is admirable. But active involvement of all parties is not satisfactory, so need active involvements of all parties to sustain the program and scale up the system at all level.

The following recommendations for immediate and long term implementation

- Community sensitization and participation in notification of diseases, increase community awareness and building positive attitude of the community, conducting regular meeting to develop sense of ownership and work with community is very mandatory.
- Improve the capacity and building positive attitude of health care providers in the disease detection, reporting and proper use of data.
- Increasing competence of the reporting unit timely and quality data report, by regular supportive supervision.
- Duties and Responsibilities (everyday jobs) of all focal people in the system should be given in written forms; so, that system hand over to the new staff will be easy whenever there is staff turnover.
- Weekly, monthly, and quarterly time frame for data analysis should be set at all level, so that timely detection of any unusual variation and investigation will be possible
- Regular revision of epidemic preparedness plan and local capacity and resource mapping should be done by woreda and zonal health offices follow and give feedback on regular bases quarterly.

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CHAPTER IV – HEALTH PROFILE DISCRIPTION REPORT

4.1 Assessment of Health Profile Description of Dukem Town, Ethiopia 2014

Executive Summary

Background: Health profile is a holistic approach of gathering information of health and health related events in the community using epidemiological statistics tools. In Ethiopia, particularly at the district level there is no organized health and health related indicator. The aim of this study was to assess health and health related information in Dukem Town during April 2014

Methods: Descriptive cross-sectional study design was conducted from 29 April to 26 May 2014. Both Filling semi-structured questionnaire, which specifically developed for collecting the district health profiles and making interview with responsible district personnel was used as a tool to collect the required data. Data was collected, compiled and analyzed using Microsoft Excel and GIS. Frequency distribution, table and figure were employed. Official letter was obtained from Oromia Regional Health Bureau to the study town health office and other relevant offices to accept the legality of this study.

Result: 51.8% of the populations were males. The town has 4 kebeles, all were urban. Age distribution was found 25.6% were below age of 15 years, 58% were between15-64 years and 16.4% were above the age of 65 years and 22.1% were female between the ages of 15-49 years. From the total population 41.9% were dependent. Majority 68.5% of the populations are Oromo by ethnicity followed by Amahara 26.5%. In terms of Religion most 84.8% of the populations were Orthodox religion followed by 12.8% protestant. Concerning employment status majority 29.3% were student followed by private employment 25.5%. In the town there are 19 health institutions among those 5(26.3%) were owned by government and the other 14(73.7%) are Private health facilities. The health service coverage of the town was 100% in 2013(10). Twenty three percent of the populations are at risk of malaria (10).

Keywords: Ethiopia, Dukem, Health profile

1. Introduction

Health profile is a holistic approach of gathering information of health and health related events in the community using epidemiological statistics tools. The health profile is a comprehensive compilation of information about a community. The data in the profile is a mirror of health and well being of a particular community from much different perspective. In this case, community includes an entire county, made up of urban, rural, and villages or clusters. Information presented includes data collected and published, as well as information collected by the organizations involved in creating the profile. The profile has a wide distribution, used by medical and social service providers, legislators, businesses, non-profits, schools, grant writers, and policy makers. Health profile has an indispensable role in generating evidence-based information for planning, implementation and evaluation of health program in the district. Stake holders of the community will access evidence based information from well compiled health profile and it can also be a basis for the further conducting health research for the benefits of community.

Each and every health institution found at different level has trained professionals who need to have the knowledge and skill to develop a health profile, which will enable to identify important health-related factors in the community, and also expected to update and develop further the woreda-level health profile at regular intervals. This is what the following study session will guide to do, besides helping to understand the basic terminologies related to different data collection tool which will make use of developing health profile data types used in developing community profile.

In Ethiopia communicable disease and nutrition deficiency is the main health problem of the country. Shortage and high turnover of human resource and inadequacy of essential drugs and supplies morbidity and mortality and the health status remains poor have also contributed to the burden (1). Despite major efforts to improve the health of the population in the last one and half decades, Ethiopia's population still faces a high rate of morbidity and mortality and the health status remain poor. The planning and management of health services in developing countries often proceed within an environment of inadequate information about the health status of the population served and the occurrence of important determination of health. This is particularly the case at the district level where health service have traditionally underdeveloped and information system lacking (2). In Ethiopia, particularly at the district level an organized health

and health related indicator which determine the health status of the community is insufficient and these contribute a gap in planning and taking evidence based information for action.

Dukem Town is 37 Kilometers South East of Addis Ababa. Based on figures from the Central Statistical Agency in 2005, Dukem has an estimated total population of 34,777 populations of this. 17,998 (51.8%) were males and 16,779(48.2%) were females. This town has a latitude and longitude of 08°48′N 38°54′E and an elevation of 1950 meters above sea level. It is the former administrative center of Akakai woreda. It is named after the Dukem River Located in the Oromia Special Zone surrounding Finine. It Dukem is situated along the Addis Ababa – Diredawa highway and is a station on the Ethio-Djibouti Railway, and heavy truck. It is also the location of an industrial park covering 40 hectares owned and developed by East African Group (Ethiopia), Ltd.

In Dkuem town health profile was not done before and the town is a high corridor area for which heavy truck drivers were stayed overnight that might be exposed the community for HIV. This health profile was collected, compiled, interpreted and disseminated that help for woreda planning, prioritizing health and health related problems.

Therefore, to continuously monitor and evaluate the health plan according to their situation all levels have to describe, summarize and analyze the health profiles. The purpose of this health profile description was based on the data available at the end of 2013; describing the health profile to identify gap/problems, to clearly present a community's health needs and issues so that they can be prioritized for action; to form the base line for the community health improvement plan and other community planning documents; to identify health indicators and sources of data that can be used to monitor change and progress in addressing priority health issues, and provides the recommendation for the town, zone and regional health staff and managers.

1.1 Rationale

The purpose of collecting health profile data is to identify strategies that improve the access of every member of the community to effective health care and health promotion. Dukem Town health profile was not done before and also there is no organized health and health related information. No organized health and health related indicator which determine the health status

of the community and these contribute a gap in planning and taking evidence based information for action.

2. Objective

2.1 General Objective

- To assess health and health related information in Dukem Town during April 2014

2.2 Specific Objectives

- To gather community health and health related information and make ready for use at each level
- To identify the availability of major health infra structures and problems in the town
- To lay the basis for the Community Health development Plan
- To make straightforward health information and communicate the local burden of disease and other health related information in a practical, accessible format
- To set recommendations based on the identified findings

3. Methods and Materials

3.1 Study area and period

Dukem town is found in Oromia regional state. It was founded in the Regime of former Ethiopian emperor Minilik II in 1907. Of the total kebeles 3 were 19445 (52.6%) population were rural kebele enrolled to the town before 3 years during the town was selected for special zone and new reform formulated to the industrial zone. In terms of population density the town is not densely populated 0.97 people per Kilometer square (0.97 P/Km^2). Compared with the national population density figure 79 p/ Km^2, it is much lesser than the national.

The town; Dukem is found on highway 37 kilo meters far from the regional States of Oromia and the capital city of Ethiopia, Addis Ababa. It has boundary with Bishoftu town in the East, Dibandiba kebele from Ada'a woreda in the South, Yerere Mountain in the North and Gelan town in the west. It has a total area of 35,860 square kilometers, of this 9060 square kilometers utilized for cultivation,1600 square kilometers utilized for forest 25200 square kilometers utilized for grazing and for industry Zone in general. Climatic zone of the town is 100% Woyina Dega, has different type of soil: Black 97% and loom sandy soil is 3%.

The higher Annual rain fall for the town is 142mm, the mean annual rainfall 95mm, and the lower annual rainfall is 48 mm. The highest temperature recorded so far was 29.3 ^{o}c. The median and the lower temperatures were also 25.5 ^{o}c and 7.1^{o}c respectively. This town has latitude and longitude of this town has a latitude and longitude of 08°48′N 38°54′E and an elevation of 1950 meters above sea level. The land surface is 97% flat and 3% is round. The total budget allocated from government was 16,838,367.09 for recurrent and salary in 2013, there was also capital and NGOs budget allocated which was 1,300,053.87 and 626,565.00 respectively. When we see the climatic zone classification: Dukem Administrative town is 100% Weyina-dega (Middle land).The annual average rainfall in MM. is 95 and the cropping season of the town is one time in a year.

3.2 Study Design

Descriptive cross-sectional study design was conducted from April 29 to May 26/2014.

3.3 Data Collection Tools and Procedures

Both Filling semi-structured questionnaire, which specifically developed for collecting the district health profiles and making interview with responsible district personnel was used as a tool to collect the required data. Before starting filling the questionnaire on the purpose and benefit of this work data collectors were made brief discussion with town Health office. Health and health related data was collected using check list to collect the primary and secondary district health profile data. The data source was town health office, education sector, agriculture and rural development, district finance, water office and other sectors. Data was collected from registers book, reports from national census 2007 and 2013 health indicators and research articles. Interview was performed with right officers from the above particular offices based on required data. The study was conducted from April 29- May 26/2014.

3.4 Data Analysis Procedure

Data was collected, compiled and analyzed using Microsoft Excel and GIS. Frequency distribution, table and figure were employed.

3.5 Ethical Clearance/Ethical Consideration

Official letter was obtained from Oromia Regional Health Bureau to the study town health office and other relevant offices to accept the legality of this study. The purpose and objective of the

study for which the data required was briefly explained to the respected Officials based on their level of responsibility and they were asked for oral consent to conduct the study.

3.6 Data Dissemination

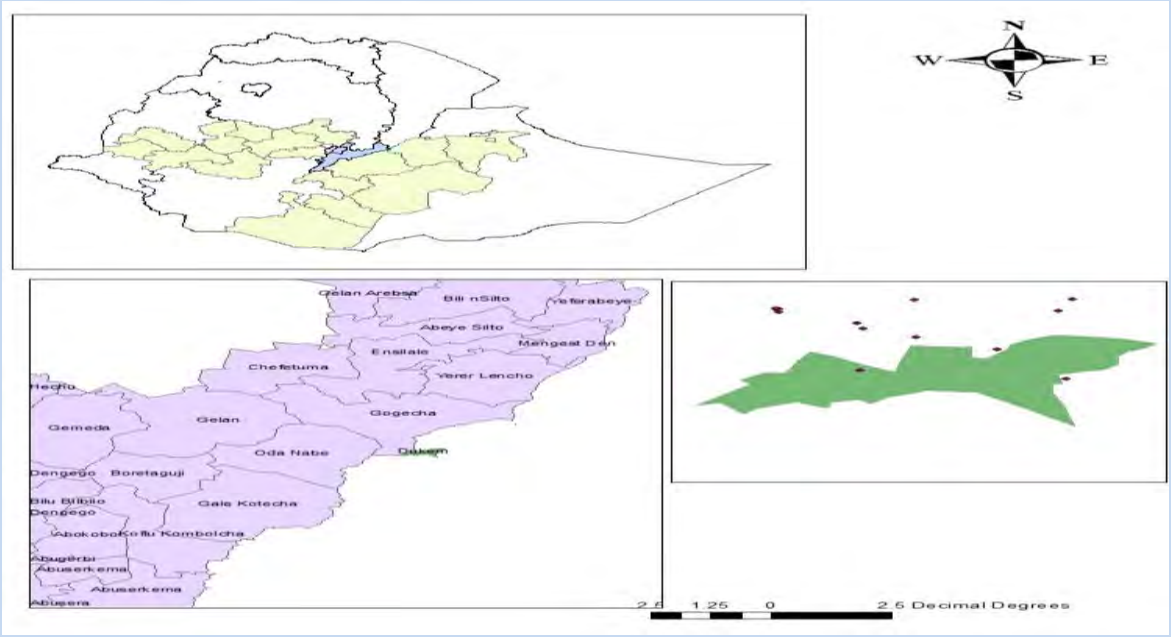
After the Health profile data description finalized, the report will be prepared and shared to Addis Ababa University/School of Public Health, Oromia Regional State Health Bureau, Ethiopian Field Epidemiology Training Program Department, round Finfine special Zone Dukem Administrative town Health Office and other relevant offices

3.7 Data Quality Assurance

First, the immediate field supervisor and mentors were commented the prepared data collection check list was pretested by using the available data at regional level prior to conduct the study. The data was compared and cross checked with the data collected from the town Health Office with the data available at town data base to assure the reliability and validity of the data. After the completion of data, the researcher was given presented the strength and weakness on data quality for the respective offices and discussed on the gaps identified.

1.8 Operational Definition

Dependant age group: Age group < 15 years and > 64 years



Map 5: Dukem Administrative Town Oromia, Ethiopia 2014

The town has a total of four kebeles namely Dukem 01 kebele, Gogecha kebele, Koticha kebele,and Tadecha kebele.

4. Results

A total of 34,777 populations were residing in the town of which, 17,998(51.8%) were males and 16,779(48.2%) were females. The town has 4 kebeles, all were urban. Majority 16510(47.4%) of population were from kebele 01 followed by Koticha 6979(20.0%). Small proportion 5145(15.0%) of population were from Tadecha kebele (Table 18).

Table 18: Distribution of Population by Kebele and Sex, Dukem, Ethiopoia 2013

No.	Kebele	Male	percent	Female	percent	Both sexes	percent
1	Dukem 01	8552	51.8	7958	48.2	16510	47.4
2	Gogecha	3182	51.8	2961	48.2	6143	17.6
3	Koticha	3612	51.75	3367	48.25	6979	20.0
4	Tadecha	2660	51.7	2485	48.3	5145	15.0
	Total	**17,998**	**51.8**	**16,779**	**48.2**	**34777**	**100**

The sex ratio (Male: female) was 1:1. Of the total population 11315(32.5%) were below age of 15 years, 22815 (65.6%) were between15-64 years and 647(1.9%) were above the age of 65 years and 7680(22.1%) were female between the ages of 15-49 years. From the total population 14,606(41.9%) population are dependent (Table 19). Majority 68.5% of the populations are Oromo by ethnicity, 26.5% are Amahara, 2.4% are Gurage 1.9%Tigire and others are 0.7%. In terms of Religion most 84.8% of the populations are Orthodox religion follower followed by 12.8% protestant, 1.7% Muslim and Catholic 0.7%. Concerning employment status majority 29.3% were student followed by private employment 25.5% and small proportion 2.1% were Government employees (Table 20).

Table 19: Socio Demographic Distribution of Population, Dukem, 2013

Characteristics (Ethnic)	Frequency	Percentage
Sex		
Male	2954	51.8
Female	2749	48.2
Age Group		
<1	1247	3.6
1-4	4492	12.9
5-14	5576	16.0
15-64	22815	65.6
<= 65	647	1.9
Ethnic		
Oromo	23822	68.5
Amhara	9216	26.5
Tigre	661	1.9
Gurage	835	2.4
Others	243	0.7
Religion		
Orthodox	29491	84.8
Protestant	4452	12.8
Muslim	591	1.7
Catholic	243	0 .7
Occupation		
Unemployed	4500	13.0
Student	10203	29.3
Government Employees permanent	728	2.1
Private Employees temporary and permanent	8868	25.5
Merchant	2406	6.9
Farmers	503	1.4
Others	7569	21.8

5. Infrastructure of Dukem Administrative town

In the town there are 19 health institutions among those 5(26.3%) are owned by government and the other 14(73.7%) are Private health facilities. The health service coverage of the town was 100% in 2013(10). Health facility to population ratio of the town is below the standard of the ministry of health (1:5000, 1:25000 and 1:100,000 for HP, H.C and hospital respectively). But in Dukem Administrative town health facility to population ration H.C 1:34777, H.P 1:8694 there is one private hospital for 1:34777 population and 7 private clinics for 1:5796 provide the services (10). (Table 21).

Table 20: Type and Number of Health Institution to Population Ratio 2013

Type of health facility		Number	Total no. of beds	Health facility to population ratio
Private hospital		1	10	1:34,777
Government Health center	Type A	1	5	1:34,777
	Type B	0	0	0
Private health facilities (clinics/disg.lab/drug)	Clinic (all type)	6	0	1:5796
	Diagnosis. Lab.	0	0	0
	Drug store	7	0	1:4968
Government health posts		4	0	1:8694
Total		19	15	1:1830

6. Health

6.1. Vital statistics and health indicator

Vital statistics and health indicators are playing a main role in estimating population size and in guiding countries policy making and program development. It's the majority influential tool for monitoring and communicating critical information about population health. In Dukem town the crude birth rate is 11.7 per 1000 population this is lower when compared with the national crude birth rate (34.5/1000 population). The total fertility rate is one of the most useful indicator of fertility, it measured the average number of children that a women would be born throughout her child bearing age (15-49), the town total fertility rate (4.6 per 1000 women of reproductive age) is almost near with the national TFR (4.8 per1000 women of reproductive age). Data on other measures of fertility like crude death rate, child and infant mortality rate are not available in the town.

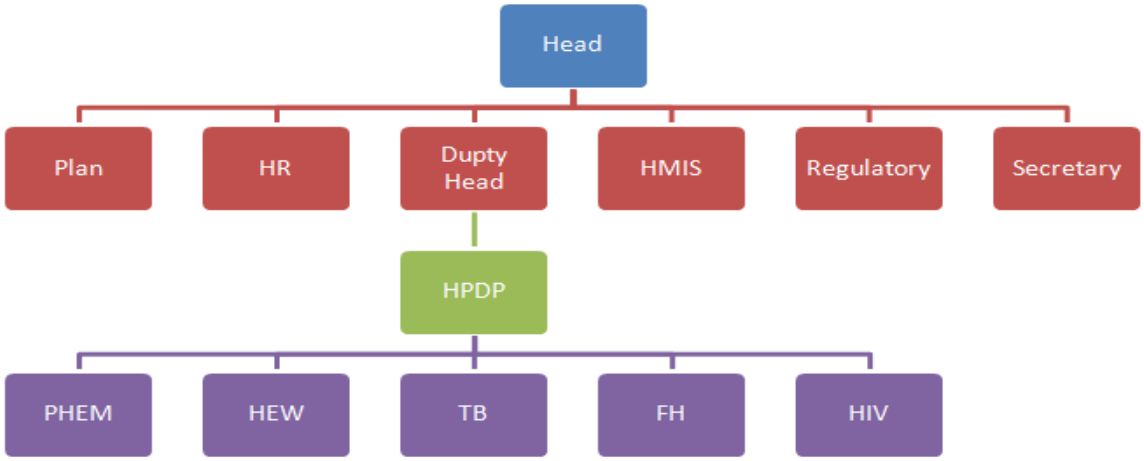


Figure 21: Organo Graph of Dukem Administrative Town Health Office

A total of 51 health workers found in the town, among those majority 25(61%) are Health extension workers and nurses. In the town there is one private hospital but there is one General practitioner and specialist. The health professional to Population ratio for physician 1:17,389, for HO, nurses and Midwife of the town is indicated below (1:11592, 1:2675, 1:17,389 for HO, nurses and midwife respectively). In addition, there is 3,254 Health Development Army (HDA) in the town which is appointed from the community to work with the health extension workers to accelerate community health service program. Community health service program was supported and monitored by Dukem Administrative town. There were Women's, Child and Youths affairs office (Table 22).

Table 21: Health Professionals to Population Ratio, Dukem Town 2013

Type	**No.**	**Professional to popn. Ratio**
Physician	2	1:17,389
HO	3	1:11592
Nurses (Deg. and Dip.)	13	1:2675
Mid wife (Deg. and Dip.)	2	1:17,389
Lab. (Deg. and Dip.)	2	1:17,389
Pharmacy (Deg. and Dip.)	2	1:17,389
Env. Health (Deg. and Dip.)	1	-
HIT	1	-
Health education	0	-
HEWs	12	1:2829
Supportive staffs	15	-
Total health workers	51	

Immunization is one of the preventive and control of vaccine preventable disease strategies used to protect the life of surviving children's against disease. In Dukem Administrative town the average immunization coverage has been increasing constantly from year to year starting from full immunization coverage is increased from 599(52.2%) in the year 2012 to 677(61%) in 2013. DPT3/Pentavalent coverage increased from 68.7% in 2012 to 78.7% in 2013 with an increase of 10% from 2012-2013. Measles immunization coverage increased from 52.4% in 2012 to 61.4% in 2013with an increase of 9% from 2012-2013. However, OPV 0 was not administered for infants at birth. In Dukem Administrative town 625(57%) children's were given Neonatal tetanus vaccine at birth (Table 23).

Table 22: Immunization Coverage of Dukem Town, Oromia, Ethiopia 2014

Year	Target Pop <1	Vaccination coverage (%)										
		BCG	OPV (%)			Penta(%)			Measles (%)	PCV (%)		Full immunization
			0	1	3	1	2	3		1	2	
2012	1067			733		802	-	733	599	840	784	599
2013	1102	791(72)	-	830	770	830	-	868(61)	677(61)	784	760(71)	677(61)

7. Immunization Coverage

Surviving infant who were fully vaccinated. The Infant Antigens are: BCG, Pentavalent (DPT-HepB, Hib), doses 1 -3; OPV, doses 1—3; Measles PCV dose 1-3. Rota vaccine dose 1-2 and fully vaccinated.

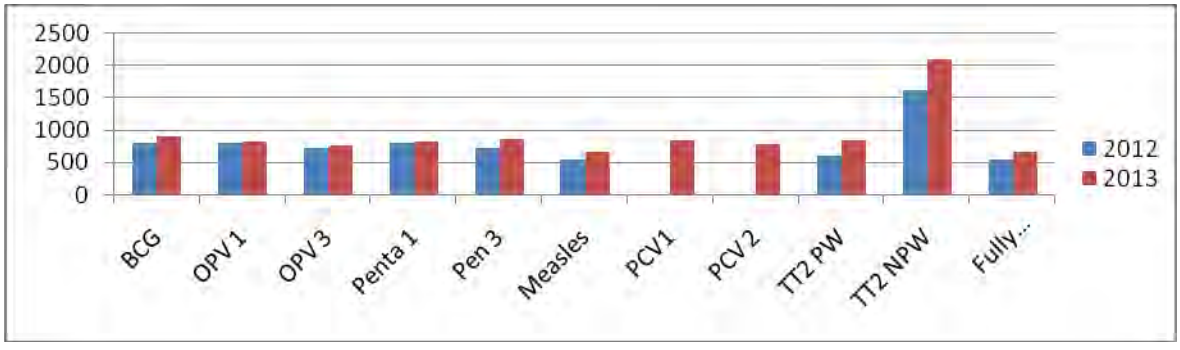


Figure 22: Trend in Immunization Coverage by Year 2012-2013

Dropout rate for penta = penta1-penat3/penta1= 830-777/830= 6.4%

Dropout rate for measles = penta1-measels/penta1= 830-677/830=18.4%

Maternal Health service

8. PMTCT

Concerning PMTCT a total of 986 pregnant women were attend Dukem health center of which 932 women were tested for HIV that follow PMTCT service during ANC visit. Among women who attained ANC clinic counseled and tested for HIV , 13 women's were +ve for HIV virus, 3 of them were linked and put on ART in the same health facility and among 13 positive cases 10 were took full course of prophylaxis's for prevention of mother to Child transmission during labor and registered on chronic care in 2013.

The proportion of pregnant women in Dukem town had at least one ANC visit increased from 931(81%) in 2004 to 986(87.4 %) in 2005 however only 11% of pregnant women attended 4th ANC visit. In 2005, 406(36%) of births were attended by skilled health personnel. A total of women who attained for PNC were 349 (85.9%) and safe abortion was 286(28.9%) (Fig. 17).

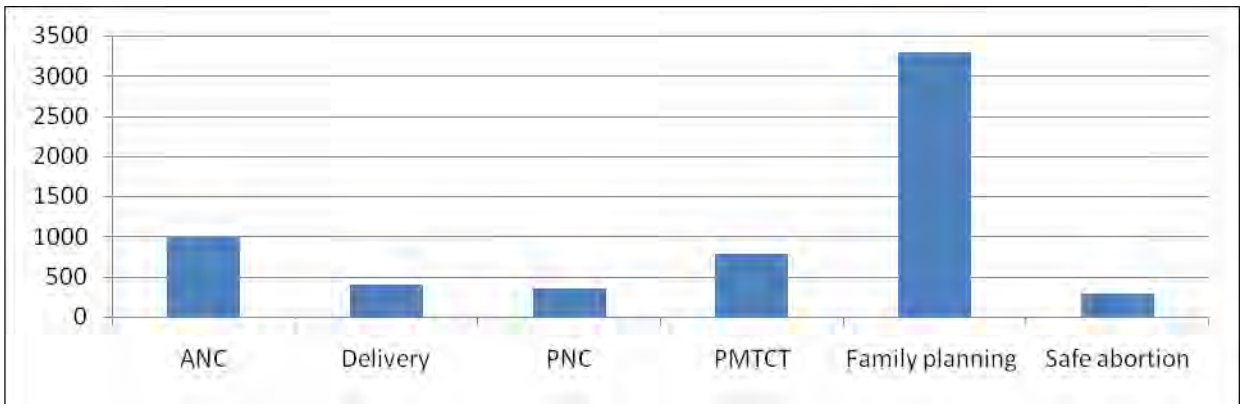


Figure 23: ANC, Delivery, PNC, PMCT, F/P and Safe Abortion Coverage, 2013

9: Contraceptive prevalence rate

In the town proportion of women of reproductive age (15-49 years) who are not pregnant who are accepting a modern contraceptive method (contraceptive acceptance rate) was 25%, this is very low compared with the national 62% and Oromia regional state health bureau 62% respectively.

The proportion of women who were using contraceptive method (the contraceptive prevalence rate) of the Dukem Administrative town is 51.5%. Family planning coverage of the town is 100% (10) and the most commonly used family planning methods was Pill, Depo-Provera, and Implanol.

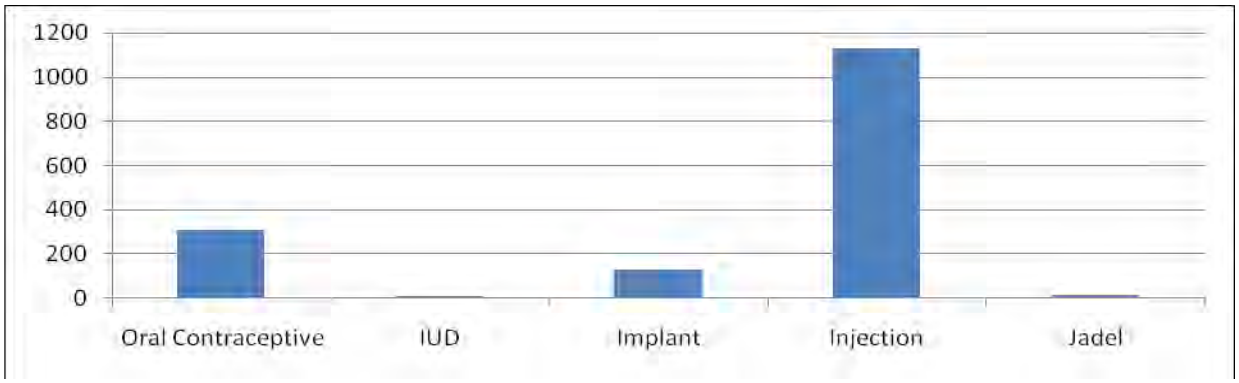


Figure 24: Proportion of Women of Reproductive Age (15-49 Years), 2013

Table 23: Sex and Age distribution in Out Patients Department attendants Dukem 2013

S.No	OPD attendants with age	Male	%	Female	%	total	Laboratory M	f
1	OPD visits < 5: new	1700	18.3	1289	19.5	2983	4937	3132
2	OPD visits < 5: repeat	14	0.2	7	0.1	21		
3	OPD visits 5-14: new	761	8.2	809	12.3	1570		
4	OPD visits 5-14: repeat	41	0.5	17	0.3	58		
5	OPD visits > 15: new	6681	72.0	4418	67.0	11093		
6	OPD visits >15 repeat	81	0.8	52	0.8	133		
7	Total	9278	100	6592	100	15870	4937	3132

Table 24: Out Patient Department and Admission by Health Facility, Dukem 2013

S.No		OPD		Admission		Laboratory	
	Gender	M	F	M	F	M	F
1	OPD first visit	19112	1054	102	65	514	246
2	OPD second visit	612	248	-	-	-	-
Total		19724	1302	102	65	514	248

10: Endemic diseases

10:1. Malaria by parasite

Dukem Administrative town composed of 4 (four) kebeles all are malarious area and out of 34,777 populations 8000(23%) are population at risk of malaria. In 2013 Indoor Residual Spray (IRS) was not conducted and the ITN coverage was 97% but replacement was not given in the year 2013. A total of 755 malaria cases reported out of this 144(19.1%) cases were confirmed for plasmodium Falciparum and 72(9.5%) cases were plasmodium vivax the rest were 539(71. 4%) were clinically diagnosed with peak from September to December 2013 (Fig.19).

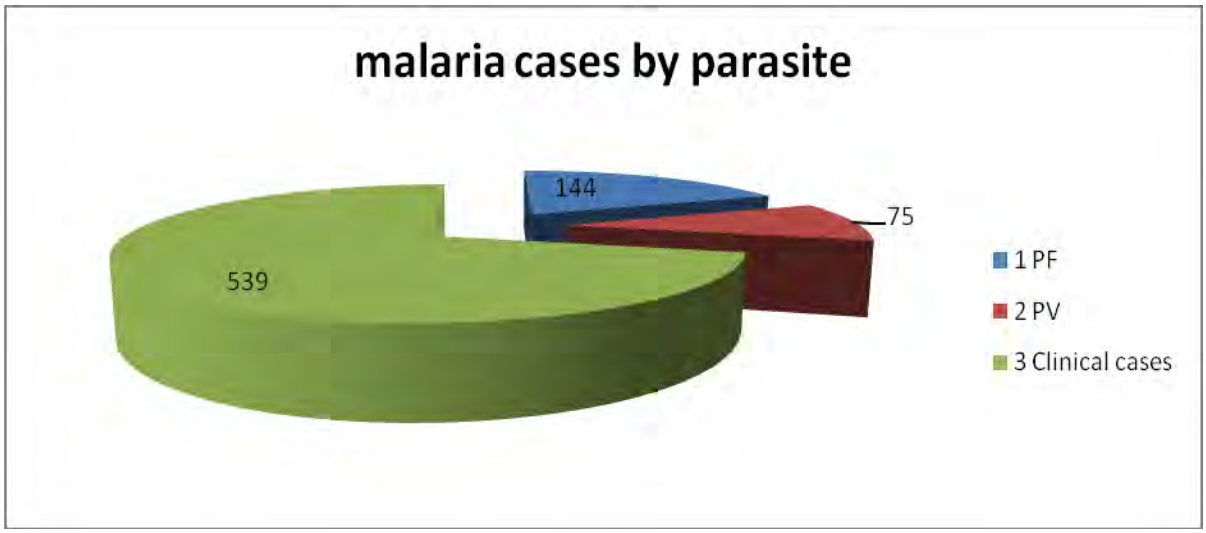


Figure 25: Malaria Cases by Parasite, in Dukem Town 2013

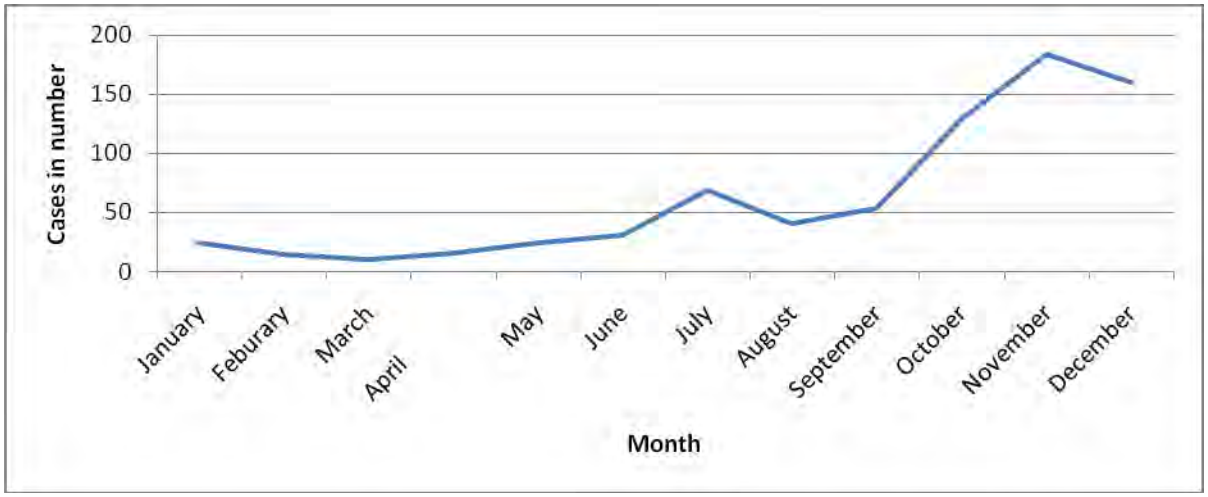


Figure 26: Malaria Distribution by Month in Dukem Town 2013

Table 25: The Top Leading Diseases in Dukem Town, Oromia, Ethiopia 2013

S.No	Types of disease	Frequency	Percent
1	Malaria	755	64.2
2	Typhoid fever	234	19.9
3	Relapsing fever	27	2.3
4	Epidemic Typhus	14	1.2
5	Acute malnutrition	134	11.4
6	Dysentery	9	0.8
7	Measles	2	0.2
Total		1175	100

11: Environmental Health and sanitation

Dukem Administrative town is one of the largest industrial zones among special zones. The town has about 7245 household among those 7100 (98%) of the households had an access to latrine utilization which was above the national 74% of latrine utilization. The town has no organized and solid waste management system, (has no Proper and safe excreta disposal system), has no solid waste disposal site, and has no solid waste collection container and vehicle for solid waste collection. But there are people who organized in small scale micro enterprise who collect solid waste from house to house but disposed anywhere not segregated and which can re-contaminate the community because of inappropriate solid waste disposal. In addition to this the town has no Proper and safe liquid waste management system (sewerage system). Meanwhile the town is under construction many industries have been under construction beside this the town is vulnerable to environmental pollution of chemicals. Newly built factories and hotels release liquid waste to open filled without precaution.

12. TB/Leprosy

A total of 170 new TB cases were reported in the town of these 57(33.5%) were Pulmonary TB positive, 38(22.4%) were pulmonary TB negative 75(44%) were extra pulmonary TB cases. Among the new smear–positive TB cases estimated in the town (TB detection rate) was 85% and higher than the national TB detection rate which is 36% so, it is an area which shows improvement. TB treatment completeness and TB cure rate were 88% and 80% respectively. It was much better than the national base line of 67% and TB treatment success rate 88% also better than the national base line standard 84% 2013.

From the total number of 170 TB patients enrolled in TB treatment screened and tested for HIV in 2013 was 101(60.8%) of these was above national TB/HIV screening strategy 15% is encouraging Scale-up collaborative TB/HIV activities. Of these TB patients enrolled in TB treatment screened and tested for HIV who were HIV +ve were five (5). In Dukem town a total of 1 leprosy case was reported who was currently on treatment.

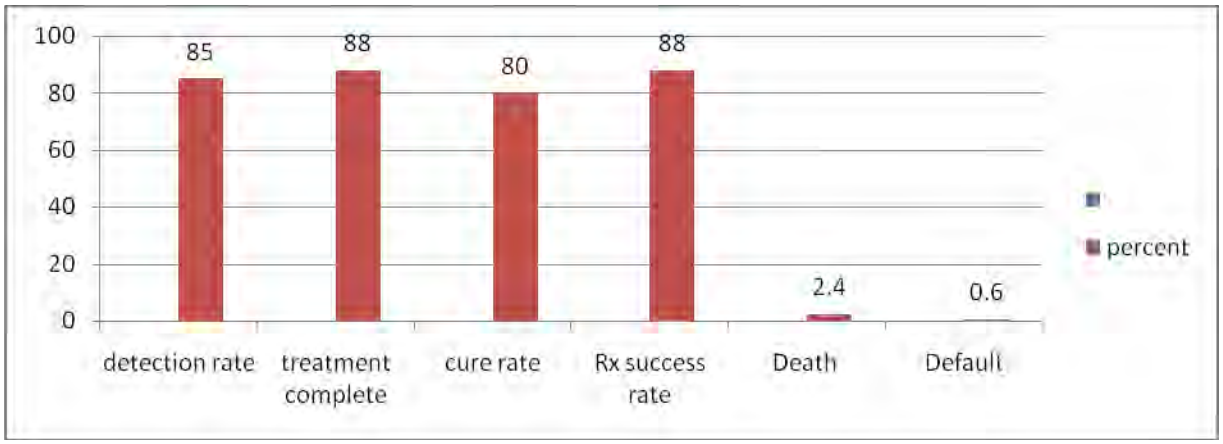


Figure 27: Tuberculosis Result of Treatment, Dukem Town, Oromia, Ethiopia2013

12. HIV/AIDS

A total of 10,324 people screened for HIV/AIDS among those 95(0.92%) were positive of which 42(44.2%) were male and 53(55.8%) were female. There were 1222 people lived with HIV/AIDS with the prevalence of 3.5%. From the total 1222 positive cases 455(37.2%) were initiated and put on anti retroviral therapy (ART) and 767 were enrolled for pre ART chronic care in 2013. Patients enrolled on ART in 2013 were 143.

Concerning PMTCT a total of 986 pregnant women were attended Dukem health center , from 986 pregnant women counseled for HIV 932 women were tested for HIV that provide PMTCT service during ANC visit. Out of tested women 13(1.3%) were positive for HIV virus, 13 of them were received full course of ARV prophylaxis's and 1 was referred to other health facility. During the year 21 HIV positive women delivered in facility and all 21 neonates were received full course of HIV prophylaxis.

A total of 134 STI (Gonorrhea, Syphilis and Chanchroid…) cases were seen at OPD level in Dukem health center. This shows that there was unprotected sex practice in the town in era of HIV/AIDS 2013.

13. Causes of Morbidity and Mortality

In Dukem Administrative town acute febrile illness, URTI, and diarrhea (with no blood) are the top leading cause of adult morbidity and similarly acute respiratory tract infection, diarrhea (with no blood) and malnutrition were top leading causes of morbidity in under five children's.

Table 26: Top 10 Causes of Morbidity among Adults, in Dukem Town health Facility 2013.

S.No	**Adult**	**Frequency**	Percent
1	AFI (Unspecified fever)	2684	21%
2	Other unspecified infectious and parasitic disease	2569	20 %
3	URTI (Acute upper respiratory tract infection)	2018	16 %
4	Diarrhea(non bloody)	2009	15.8%
5	Trauma /injury, fracture	691	5.4%
6	Infection of the skin and subcutaneous tissue	658	5%
7	UTI (urinary tract infection)	623	4.8%
8	Dyspepsia	521	4%
9	Other Helminthiasis	519	4%
10	Glaucoma	493	39%
11	Total	**12,785**	**100%**

Table 27: Top Five Causes of Morbidity in Under five children, Dukem Ethiopia 2013

No	Adult	Frequency	Percent
1	Acute respiratory infection (ARI)	1367	53.63
2	Diarrhea (non bloody)	970	38.1
3	Malnutrition	168	6.6
4	Conjunctivitis	24	0.94
5	Malaria	20	0.78
6	Total	2549	100

13. Nutrition

In Dukem Administrative town there are 4 sites used for outpatient therapeutic program (OTP) but three of the sit were not functional. In Dukem health center a total of 168 malnourished children was admitted for OTP. Out of the total 134(80%) were moderately malnourished Children and 34(20%) were severely malnourished children received service during 2013.

14. Essential drugs

Most frequently used and available essential drugs in the health facility of Dukem town to treat disease occurring and for prevetion is Amoxicillin, Oral Rehydration Salt (ORS), Arthemisin / Lumphantrine (Coartam), Mebendazole Tablets ,Tetracycline Eye Ointment. Medroxyprogesterone (Depo-Provera) Injection, and Ferrous Salt plus Folic Acid. In general no shortage of essential drug was encountered during the year in 2005 (10).

15. **Education**

There are a total of 15 schools (6 kindergartens, 6 primary, 1 secondary, 1 preparatory and 1 technical and vocational school) are available In the Dukem Administrative Town a total of 10203 students are learning in the schools among those 5015(49.2%) were males and 5188(50.8%) were females.

From the total 10203 enrolled student 131(1.3%) is dropped out due to several reasons out of this 64(48.8%) were male and 67(51.2%) were female. Among 15 schools 2(13.3%) have no enough water supply for drinking, hand washing, students and teachers used while staying in school. no adequate water supply and 3(20%) of the school has no water supply, 10(66.7%) have water supply and toilet facility. however all water supply and latrine for the school was below the standard no continuous water supply and no separate latrine for the students and teachers.

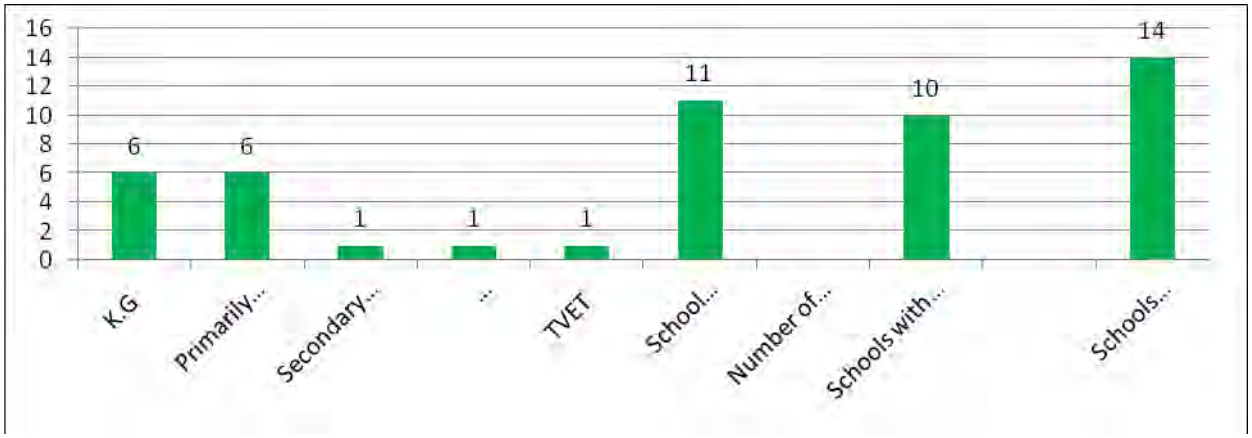


Figure 28: Institution of Education, Dukem Town, Oromia, Ethiopia 2013

Table 28: Educational Status by Age and Sex, Dukem Town, Oromia, Ethiopia 2013

School Enrolment Illiterate	Sex				Total
	Male		Female		
	Frequency	%	Frequency	%	Frequency
KG	744	52.8	664	47.2	1408
4-Jan	1776	47.8	1940	52.2	3716
5_8	1246	46	1463	54	2709
9_10	882	52.4	800	47.6	1682
12-Nov	217	57	164	43	381
TVT	86	48.9	90	51.1	176
School dropout in 6 months or year 2005	64	48.9	67	51.1	131
School Age Children (target)	7	-	7	-	7
Total	5015	100	5188	100	10203

There are a total of 15 schools, of this 8 schools were owned by government and 7 schools were private facilities. Schools with the category of first cycle 1-4 are 6, primary and secondary school is 6, high school is 1, and preparatory 1 and TEVT is 1. Within this school a total of 10,203 students were learning. The sex compositions of the student were 5015 male and 5188 female. Out of this there were 131 students dropped out from the school during 2013. Out of the total student who drops out during 2013, 64 were male while 67 were female from different schools. in Dukem Administrative town .11 schools have a line for the water supply and latrine, out of all 15 schools 20% of the schools do not have adequate water supply and 13.3% of the school due to lack of maintenance on the water line have no water supply and all school have latrine but all are below the standard (has no separate latrine for male and one for female) and not fully functioned, they do not have separate toilet for teachers, girls and boys. Due to lack of adequate water supply for the school the student carried water from their home for their daily consumption or they did not take. As the result of inadequate toilet, the students are optionally used open space to urinate and/or defecate round the school or wait until they back to home.

Table 29: Name of Schools and Number of Students in Dukem Town, Oromia, Ethiopia 2014

S.No	Name of schools	Male	Female	Total
1	D ukem No.1	1451	1658	3109
2	Dukem No.2	1103	1227	2330
3	Gogecha	57	50	107
4	Koticha	84	48	132
5	Tadecha	16	17	33
6	Oda Nabe High school	840	809	1649
7	Oda Nabe preparatory	218	162	380
8	TVT	86	90	176
	Total	**3855**	**4061**	**7916**
Private school with sex distribution				
1	Danfer	165	201	366
2	Brehane Hiwot	119	132	251
3	Bright youth	29	29	58
4	Faaya	93	95	188
5	Holy land	32	29	61
6	Nigat	115	129	244
7	Amanuel	24	21	45
8	KG	663	491	1154
	Total	**1240**	**1127**	**2367**

16. Water

In Dukem Administrative town from 34,777 of total population 26,187(75.3%) of the resident from all kebele have supplied safe and adequate water. The main source of water for the town is Bore Hole water, the daily water consumption per day per person is 55L. Because of the town is reached in industry and the town is under construction the consumption of water is greater than needed so the Dukem Administrative town water and irrigation office designed strategy line and system network to improve adequate and safe water supply for the town accordingly(11).

Table 30: Water Coverage, in Dukem Town, Oromia, Ethiopia 2014(11)

Characteristics	Frequency	Percentage
Total safe water coverage	4	75.3
Safe water supply coverage by kebeles	4	75.3
Main source of water supply	7 Bore Hole	77.8
Population getting safe water	26187.1	75.3
Daily water consumption per day per person	55 Litter	67

17. Transportation

In Dukem Administrative Town there is one main road called Addis Ababa-Djibouti highway, the road is 10m width and all 4 Kebeles have an access to the main road transportation, a total of 30,000 heavy trucks, medium vehicles and automobiles' have cross the main road to either side daily within 24 hours. In Dukem Administrative tow a total of 38 traffic accidents were happened, of the total 18 death was recorded followed by 2 major injuries, 7 simple injuries and the rest accidents were an accident happened on the resources 2013. Different committee members were organized from different offices to investigate the cause for the accidents and it was found less road in relation to population need) and Low awareness to the rule of traffic (14).

The road is used as the main sources of inlet to the capital city of Ethiopia Addis Ababa and outlet to differ regions, so different heavy trucks, small and medium vehicles were stopped on both side during day and night that might contributed for the accidents. The strategy was designed by transport and road office to minimize traffic accidents in the Dukem Administrative town. The strategy are:

- Involving stakeholders increase awareness to traffic rule and uses, introduced to the different institution through small group discussion in the office and Religious institution on the day of Holy day and in any occasion.
- Increasing school traffic students, where too many students and residents cross the zebra road
- Drivers who repeated attempt an accident should be dismissed their license.

17: Electric power supply and telephone communication

A total of 7409 (98%) household have an access to electric power supply, while public large and medium scale manufacturing industry have supplied 100% and 5443 (72%) house hold have access to fixed telephone communication. Mobile telephone data particularly for Dukem Administrative town were not exactly known.

Table 31: Telecommunication, Road Authority and Bank Dukem, Oromia, Ethiopia 2014 (12).

Characteristics	Frequency	Percentage
Transport		
Accessibility (main roads)	4	100
Type of road	1 Asphalt	
How many kebeles have access to transportation	4	100
Flow of transportation per day	30,000	
Telecommunication		
How many house hold get power supply	7409	98
How many people have access to fixed telephone	25039	72
How many people have access to mobile phone (coverage)	=	=
Post Office	1	100
Bank	5	
Power supply		

18: INDUSTRY

Dukem Administrative tow is the large industry zone among town selected for special zones from Oromia. That is why below are the industry established for different purposes.

Table 32:.Number of Public Large and Medium Scale Manufacturing Industry, 2014 (13)

S	Town	Types of Industry	Number of establishment	Percent
1	Dukem	Agro Industry Processing	33	35.1
2	Dukem	Textile and Garment	11	11.7
3	Dukem	Leather and Leather product	2	2.2
4	Dukem	Chemical Industry	18	19.1
5	Dukem	Metals and Engineering	24	25.5
6	Dukem	Construction	6	6.4
	Total		**94**	**100**

5. Discussion

The average immunization coverage has been increasing constantly from year to year. Full immunization coverage is increased from 52.2% in the year 2012 to 61% in 2013. DPT3/Pentavalent coverage increased from 68.7% in 2012 to 78.7% in 2013 and Measles immunization coverage increased from 52.4% in 2012 to 61.4% in 2013. However, OPV 0 was not administered for infants at birth. Children's protected from Neonatal tetanus at birth were 57%.

Men involvement in reproductive health interventions can improve positive health outcomes of the family. A woman seeking antenatal services during Antenatal care with partner is more benefited in preventing complication related pregnancy, getting HIV free child, if attended in early pregnancy and continued through delivery and PNC. In Dukem Administrative tow health center a total of 120 partners came together with their spouse for HIV counseling and testing in support to their wife and know their status. Early detection of pregnancy related problems in the early pregnancy can determine women who needs referrals for women's in high-risk, and women's with complications;

The proportion of pregnant women who had at least one ANC visit increased from 81% in (2012) to 87.4% in (2013). It was encouraging and the facility should work for more success in achieving MDG 5 in 2015. However, the percentage of deliveries assisted by skilled health personnel was 36% which was greater than national and Oromia region figure 17% and 19% respectively DHS report in 2011(4). Out of delivery attended at health facility 64% were not known, where they gave birth by health facility even though the health extension workers working in the community and with community. Improving transport, education and birth in a health facility can reduce 75% of maternal deaths (4). A study conducted in Ethiopia showed that majority of delivery (78%) attended at home assisted by traditional birth attendants. The study revealed that the reasons for not preferring health institution delivery were traditional birth attendants are seen as culturally acceptable and competent health worker (5).

There were 1222 people lived with HIV/AIDS in the town with the prevalence of 3.5%. of this positive cases 455(37.2%) were initiated and put on anti retroviral therapy (ART) and 767(62.8)

were enrolled for pre ART chronic care.HIV prevalence rate of the town was 3.5% together with STI the HIV prevalence rate was slightly high, so it needs the involvement administrative town together with stakeholders to tackle the problem.

A total of 131 students dropped out from the school during 2013. Out of the total student who drops out during 2013, 64 were male while 67 were female from different schools. 20% of the schools do not have adequate water supply and 13.3% of the school due to lack of maintenance on the water line have no water supply and all school have latrine but all are below the standard and not fully functioned, they do not have separate toilet for teachers, girls and boys. Due to lack of adequate water supply for the school the student carried water from their home for their daily consumption or they did not take. As the result of inadequate toilet, the students are optionally used open space to urinate and/or defecate round the school or wait until they back to home.

Poor hygiene, insufficient and unsafe drinking water accounted for 7% of the total disease burden and 19% of child mortality worldwide. In Ethiopia about 75% of causes of OPD visits are largely due to the lack of basic sanitation provisions (8). Likewise in Dukem Administrative town from top 10 causes of morbidity both in Adults and children, majority of the disease were communicable diseases which can be prevented through improving hygiene and sanitation.

Family planning saves lives of thousands of women and children's, as well as improves the quality life of the family in general. It is one of the best measures that can be made to ensure the health and well-being of women, children, family and communities. Family planning has a great role in significant reduction of maternal mortality by reducing exposure to unintended pregnancy and exposure to unsafe abortion in developing countries where the majority of maternal deaths occur. The use of modern family planning methods has potential to reduce about 25%-40% of all maternal deaths in developing countries (5).

Contraceptive Acceptance Rate (CAR) is the proportion of women of reproductive age (15-49 years) who were not pregnant and were accepting a modern contraceptive method (new and repeat acceptors). In the town proportion of women of reproductive age (15-49 years) who were not pregnant accepting a modern contraceptive method (contraceptive acceptance rate) was 25%, this was very low compared with the national 61.7% and Oromia Regional State Health Bureau 62% (4).

Family planning coverage of the town is 100% and the most commonly used family planning methods in Dukem Administrative town is Pill, Depo-Provera, and Implant (10).

Moreover, the study conducted in Ethiopia showed that inclusion of husband in family planning program will increase the use of modern contraceptive methods. Therefore, advocacy work has to be done for the community to improve the community acceptance of modern contraceptive method (6). This situation demands a concerted effort to scale up community based advocacy and Information, Education, Communication and Behavior Change Communication (IEC/BCC) activities in these areas. Whereas, the contraceptive prevalence rate of the Dukem Administrative town is 51.5 % this is higher than CAR 25% (contraceptive acceptance rate). As the contraceptive prevalence rate reaches a high level the number of new acceptors is likely to decrease because of the fact that most of the eligible persons have been already enrolled as users. Dukem Administrative town is one of the largest industrial zone among special zones surrounding FinFine and the town has about 7245 household among those 98% of the households have an access to latrine utilization which was above the national 74% of latrine utilization. The town has no organized and scientific solid waste management system, (has no Proper and safe excreta disposal system), has no solid waste disposal site, and has no solid waste collection container and vehicle for solid waste collection. But there are people who organized in small scale micro enterprise to collect solid waste from house to house, but they disposed anywhere not segregated and which can re-contaminate the community because of the fact that inappropriate solid waste disposal is one of the source for communicable disease .

A study conducted in Eastern Ethiopia revealed that improper waste management may have health and environmental hazards. Improper waste management and many communicable diseases have close relationship. Health office and local authorities' offices together must pay special emphasis to improve waste collection, handling, and disposing in Dukem Administrative town. And finally a committee will be formed to monitor and evaluate for waste management interventions and improvement (7). Dukem Administrative town is now a days a town under construction, many industries have been on building, beside this the environmental protection, solid and liquid waste management is poor which need multi-sect oral effort to overcome the environmental pollution, carbon monoxide, and the release of liquid waste to open field.

Due to no vital event registration in the town data on 10 top cause of mortality in adult and pediatric population in the health office and at the health facility is difficult to determine the main causes of mortality. The town health office should also be supported by the higher level government entities and stakeholders to have less than one year, less than five year death and other death records for better planning and success.

LIMITATIONS:-

- All the Administrative town office data could not be found from the main data base (source).
- Some of the experts from different offices in town have less knowledge of their office information.
- Getting appropriate person on time on their seat was very difficult.

6. Conclusion and recommendation

Communicable disease like, Acute febrile illness (unspecified), other unspecified and parasitic disease, acute upper respiratory infection and Diarrhea without blood are the most commonly occurring disease in all age group both in Adult and pediatric attending outpatient department. These diseases can be easily prevented by promoting hygiene and sanitation therefore the town have to promote hygiene and sanitation for the community in addition the town have to work with stakeholder who is directly or indirectly benefited from or affected with hygiene and sanitation**.**

There was better health improvement in ANC follow up as well as in immunization coverage in comparing 2012 to 2013. But institutional delivery is less while health extension workers are in the community and working with the community. Even though it is not an easy task, area needs great attention. The health office must take initiative to promote institutional delivery through health education, advocacy and social mobilization. Meanwhile there was low contraceptive acceptance rate which is 25%, comparing to the national figure 61.7% and Oromia 62% this should be the area needing improvement by giving health education for the community and conducting social mobilization through urban health extension workers. This situation demands an intensive effort to scale up community based advocacy and Information, Education, Communication and Behavior Change Communication (IEC/BCC) activities in these areas

Moreover there was good achievement in all aspects that Dukem Administrative town should continue on this progress.

The presence of road and electric power as well as availability and utilization of latrine, adequate and safe water supply in the community is mainly a good opportunity for health service and for health promotion and disease prevention. Therefore prevention and control measures should be strengthened to reduce the morbidity of acute febrile illness, upper respiratory infection, malaria, diarrhea, and other priority diseases and improve mother's health.

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CHAPTER V – SCIENTIFIC MANUSCRIPTS

5.1 Outbreak investigation of Measles in Jimma Town, Oromia Region, Ethiopia, 2014

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ABSTRACT

Background: Measles is a highly contagious viral disease caused by Paramyxovirus, of the genus ***Morbillivirus.*** A measles outbreak was detected in Jimma Town, Oromia Region on the 16th of August 2014. An outbreak investigation was carried out.

Objective: To assess the occurrence of the outbreak and identify factors associated with contracting measles in Jimma Town, Oromia Region, Ethiopia 2014.

Methods: We conducted unmatched case control study. We recruited a total of 34 cases and 102 controls. Data was collected from 14-29 October 2014, using structured questionnaire to solicit information from cases and controls. Verbal consent from all participants and confidentiality were in place. Permission to carry out the study was obtained from Ethiopian Public Health Institute and Oromia Regional Health Bureau. Epi Info was used to calculate frequencies, odds ratios and 95% confidence interval finally SPSS software used to perform logistic regression to identify risk factors for measles.

Result: We recruited a total of 34 cases and 102 controls. The mean age for cases was 12.8±14.6 SD and for controls 8.4±9.1 SD. Cases whose mothers educated to the level of primary were 3.4 times more likely to develop measles compared to their counter parts (AOR=3.4; 95%CI: 1.03-15.94) and Children's who had contact with measles cases were 3.2 times at risk of contracting measles compared to who had no contact (AOR=3.2; 95%CI: 1.14-8.93). Also cases that had

travel history to outbreak site were 6.3 times more likely to develop measles compared to that had no travel history (AOR= 6.3; 95%CI: 2.52-15.94).

Conclusion: Factors independently associated with the occurrence of measles outbreak were mother's education to the level of primary, travel history and contact with cases and, we recommend routine vaccination for all children before enrolling into schools and strengthening supplemental measles vaccination and Public advocacy on immunization campaigns
Keywords: Measles; Outbreak; Risk factors; Ethiopia

1. Introduction

Measles is a very infectious viral disease that affects children below the age of 15 years. The signs and symptoms of measles include fever, lack of appetite, cough, coryza, red eyes, and maculopapular rash, with complications such as pneumonia, blindness, brain damage, diarrhea and croup. The incubation period of the disease ranges from 10 days to a month (1). Measles is spread through contact with nose and throat secretions of infected people and through airborne droplets released when an infected person sneezes or coughs. A person can infect others for several days before and after he or she develops symptoms. The disease spreads easily in areas where infants and children come into contact such as in health centers and schools (2).

Measles remains the leading cause of childhood morbidity and mortality in the world. Worldwide, there are estimated to be 20 million cases and 164,000 deaths each year were recorded in 2013(8) (3).

The number of measles deaths globally decreased by 71% between 2000 and 2011, from 542,000 to 158, 000. Over the same period, new cases dropped 58% from 853,500 in 2000 to 355,000 in 2011. Estimated global coverage with a first dose of vaccine increased from 72% in 2000 to 84% in 2011. Despite this global progress, some populations remain unprotected. An estimated 20 million children worldwide did not receive the first dose of vaccine in 2011of these 1 million children were from Ethiopia (4).

Measles outbreak investigation conducted in Zimbabwe in 2010 found; contact with a measles case, being unvaccinated against measles and not receiving additional doses of measles vaccine were independent risk factor for contracting measles (5). In Africa 450,000 cases were reported and in Sub Saharan Africa 250,000 deaths were reported in 2009 (6). Measles is one of the vaccines preventable diseases that are targeted for elimination and with half of the world close to eliminating measles, many countries in sub Saharan Africa are still struggling to control the disease (5).

In 2011 Ethiopia reported a total of 3255 measles outbreak cases (3). Between August and October 2014, Oromia Region reported 34 cases from Jimma District. Due to an increase in vaccination coverage in developing countries, there has been a significant change in the epidemiology of measles such as higher incidence in older children and young adults (7). Under-nourished people are more susceptible to measles complications, slow recovery, and higher fatalities. Being vaccinated against measles gives protection against measles up to 99% and the

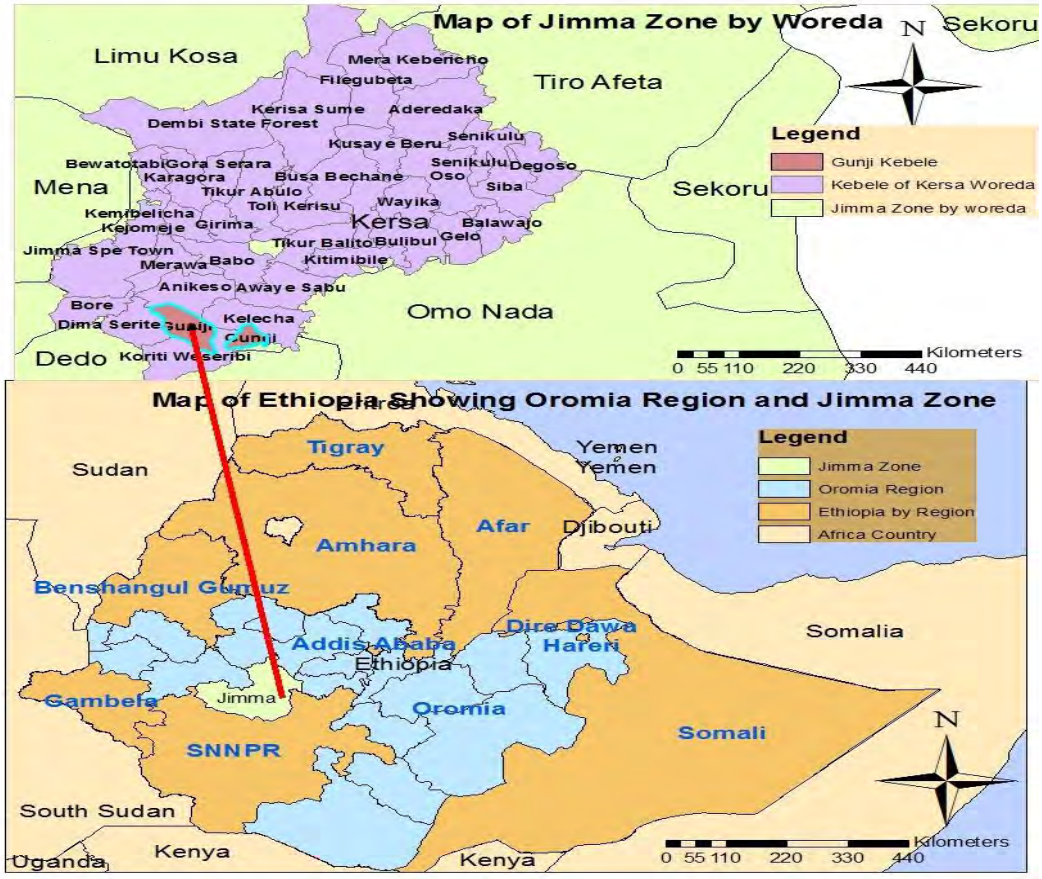
World Health Organization recommends that all children who receive the first dose of vaccine should also have a second opportunity for vaccination (7). Jimma Town experienced a measles outbreak with a total of 34 cases from 8 August 2014 to -24 October 2014. 3 cases were measles IgM positive. The index case was a one year old female with signs and symptoms of measles from Jimma Town who reported at Jimma Hospital on the 14 August 2014. Further presentation of patients with similar symptoms and reports from villagers led to the declaration of a measles outbreak.

An investigation of the outbreak was conducted to determine factors associated with contracting measles in Jimma Town. The null hypothesis for the study was; there is no association between demographic, socio-economic and socio-cultural factors and contracting measles in Jimma Town. The alternative hypothesis was: there is an association between demographic, socio economic and socio cultural factors and contracting measles in Jimma Town. Therefore, this outbreak investigation was undertaken to identify factors associated with measles in Jimma Town.

2 Methods and Materials

2.1 Study area and Period

Jimma Town is 335 km away from Addis Ababa found in Southwest of Ethiopia and it is one of the town administration found in Oromia Region. The land area is 4,623 hectare. Mostly humid temperature with latitude of 7.67 degree and longitude of 36.83 degree with an elevation of 1725 meter above sea level. It has a total population of 184,925 of which 88,164 are male (47.7%) and 96,761 are female (52.3%). The under one and under five population were 5,955 and 30,383 respectively. The town has 17 Kebeles (13 urban & 4 rural kebeles). A total of 38 health facilities were found in Jimma Town (2 Hospitals, 4 health centers, 26 private clinics, and 4 NGOs clinics). The primary health coverage in 2013 is 89%. The village where outbreak was occurred is 360 Km far from Addis Ababa (Map 1). The study was conducted from 14-29 October 2014.



Map 6: Map of Measles Affected Woreda, Jimma Zone- Oromia Region 2014

2.2 Study design

We conducted unmatched case-control study to investigate the outbreak

2.3 Study population

- **Cases:** Anyone with generalized, maculopapular rash lasting ≥3 days; and temperature ≥101°F or 38.3°C; and cough, coryza, or conjunctivitis (34 cases) (10)
- **Controls:** were all people without measles symptoms (102 controls)

2.4 Inclusion and Exclusion criteria

Inclusion Criteria

- **Cases:** All 34 measles cases sent by line list that had symptoms of measles (generalized maculo-papular rash and fever plus one of the following: cough or coryza (runny nose) or conjunctivitis (red eyes) from 8 August to 24 October 2014 and who agreed to participate in the study were included.

- **Controls:** Any resident of Jimma Town during the study period who was a neighbor to a case and who did not develop signs and symptoms of measles and agreed to participate were included.

Exclusion criteria

- **Cases:** No refusal to participate in the study was encountered.
- **Controls:** Those who refused to participate were excluded as well as when more than one eligible in the family the elder were excluded.

2.5 Sampling

The sample size was calculated using Stat calc function of Epi-info version 7. Using the confidence level of 95%, power of 80%, and assuming a 36.7% prevalence of a previous contact with someone with measles like disease in under ones (8) and an OR 3.64, with 1:3 cases to controls a total of 34 cases and 102 controls were required.

All 34 cases sent through line list were included in the study. The samping was conducted without replacement and if more than one eligible in the family member the youngest child was taken as control with nearest house hold to the case was given priority until the sample size was reached. Controls were neighbors of cases who did not suffer from measles during the period of the study. Only three controls for one case per household were selected from the neighbors of cases.

2.6 Data collection method

A structured interviewer-administered questionnaire was used to collect data on factors associated with contracting measles, community knowledge and practices on measles for both cases and controls. Interviews of key informants (HCs medical directors, health care givers and Woreda, Zone and Regional health authorities) were also conducted. Review of cases notes was done to assess case management (treatment given to patients) and road to health cards checked to verify immunization date, batch numbers and vitamin A supplementation.

2.7 Data analysis and clearance

The data was collected, entered and edited using Epi-Info version7 software and checked for completeness and consistency. Descriptive statistics were used to determine the frequency of different variables. Bivariate and multivariate logistic regression analysis was applied. Results

were displayed using tables and graphs and it was interpreted using Odd ratio, P value <0.05 and 95% confidence interval.

2.8 Ethical issues

Ethical clearance was obtained from Ethiopian Public Health Institute (EPHI). A letter was written for woreda health offices in order to obtain approval on data collection. An informed oral consent was obtained from all study participants. Confidentiality was assured throughout by not writing participant's names. Participants were treated with respect and willingly participated in the study with no payment or cohesion. Verbal consent to take photographs was obtained from parents or guardians for minors below 18 years while participants above 18 years were asked for their own consent.

4. **Results**

We recruited a total of 34 cases and 102 controls. Participants were comparable in almost all demographic characteristics. Three of the five specimens that were collected from the 34 cases reported on the line list, were IgM positive. The mean age for cases was 12.8±14.6 SD and for controls 8.4±9.1 SD. Most of the cases and controls 25(73.5%) and 80(78.4%) were from the Muslim religion respectively. More than half 19(55.9%) of cases family and majority 89(87.3%) of controls family were married. Twenty two (64.7%) of cases and 89(87.3%) of controls father's were farmer by occupation. With regards to education 22(64.7%) and 39(38.2%) of cases and controls father's learn to the level of primary and 25(73.5%) and 48(47.1%) of cases and controls mother's learn to the level of primary (Table32).

Table 33: Demographic Characteristics of Measles, Jimma, Oromia, 2014

Variable	Cases n= 34 (25%)	Controls n= 102 (75%)	P value
Religion			
Orthodox	5(14.7%)	16(15.7%)	0.52
Protestant	4(11.8%)	6(5.9%)	
Muslim	25(73.5%)	80(78.4%)	
Marital Status			
Single	15(44.1%)	13(12.7%)	0.000*
Married	19(55.9%)	89(87.3%)	
Fathers Occupation			
Farmer	22(64.7%)	89(87.3%)	0.01*
Merchant	5(14.7%)	7(6.9%)	
Government	7(20.6%)	6(5.9%)	
Fathers Education			
Primary	22(64.7%)	39(38.2%)	0.01*
Secondary	8(23.5%)	31(30.4%)	
Tertiary	4(11.8%)	32(31.4%)	
Mothers Education			
Primary	25(73.5%)	48(47.1%)	0.02*
Secondary	5(14.5%)	29(28.4%)	
Tertiary	4(11.8%)	25(24.5%)	

Majority, 27(79.4%) of the cases and 53(52.0%) of the controls had contact with measles cases and it was significantly associated with measles outbreak (p-value =0.01). Vaccination status was also assessed and found most 25(73.5%) of cases were not vaccinated while 55(53.9%) of controls were not vaccinated (p-value =0.04). More than half 22(64.7%) of cases and small proportion 23(22.5%) of the controls had travel history (p-value <0.01). Majority 27(79.4%) of the cases reported the presence of other cases in their village while small proportion 6(8.9.4%) of controls reported presence of other cases (p-value <0.01). In both 23(67.6%) of cases and 65(63.7%) of controls there were more than 5 peoples in the house (Table 33).

Table 34: Risk Factors For Contracting Measles, Jimma, Oromia 2014

Variable	Cases	Controls	P Value
Contact with measles case			
Yes	27(79.4%)	53(52.0%)	
No	7(20.6%)	49(48.0%)	0.01*
Vaccination status			
Yes	9(26.5%)	47(46.1%)	
No	25(73.5%)	55(53.9%)	0.04*
Travel History			
Yes	22(64.7%)	23(22.5%)	
No	12(35.3%)	79(77.5%)	<0.01*
Other cases with measles			
Yes	27(79.4%)	9(8.9%)	
No	7(20.6%)	92(91.1%)	< 0.01*
Number of peoples			
<= 5 peoples	11(32.4%)	37(36.3%)	
>5 Peoples	23(67.6%)	65(63.7%)	0.67

Majority 24(70.6%) of cases and 49(48.0%) of controls were not vaccinated while 6(17.6%) and 4(11.8%) of cases and 38(37.3%) and 15(14.7%) of controls were vaccinated with one dose and two doses respectively (Fig.23).

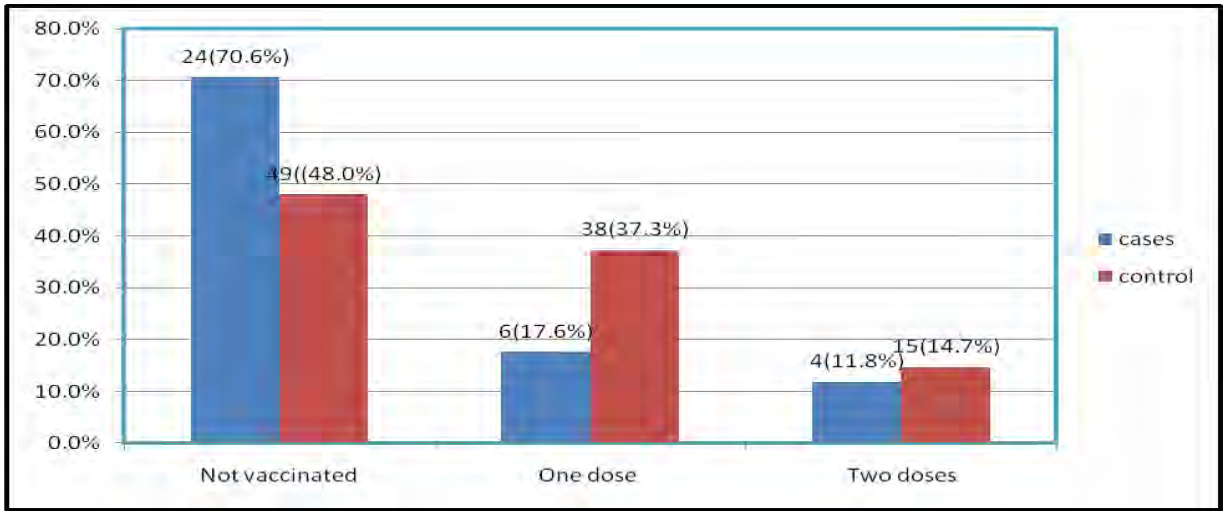


Figure 29:Measles Vaccination Status Of Cases And Controls, Jimma, Oromia, 2014

There were multiple peaks on the Epi curve as shown in Figure 2 which showed propagated type of epidemic with person to person transmission. The index case had onset of symptoms on the 14th of August 2014. The case was a one year old female and interventions (treatment of cases,

mass vaccinations, health education, advocacy and contact tracing by environmental heath technicians) to the outbreak however started on the 30th of July 2014 almost a one week after the outbreak onset. The outbreak lasted for two months (Fig. 24).

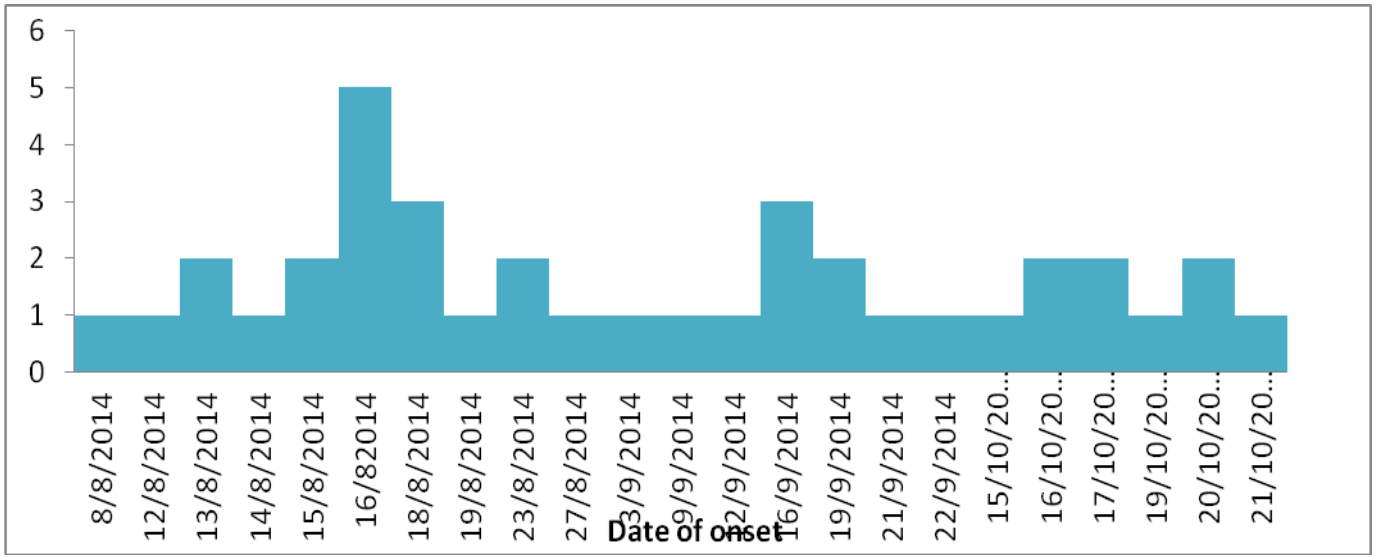


Figure 30: Measles Outbreak By Date Of Onset In Jimma District, Oromia Region 2014

Knowledge on measles

Knowledge on measles cases and controls was assessed and it was found that majority 22(64.7%) of the cases replied measles transmitted by contact with measles cases while 43(42.2%) of controls replied measles can be transmitted through air. Concerning methods of measles prevention majority 15(44.1%) and 66(64.7%) of cases and controls didn't know prevention methods for measles respectively. Also if vaccine can prevent measles was also assessed and 16(47.1%) of cases and 55(55.0%) of controls replied they didn't know. Majority 24(70.6%) of cases and 91(89.2%) of controls replied age at vaccination was less than or equal to 6 months (Table 34).

Table 35: Knowledge on Measles Cases And Controls, Jimma, Oromia Region, 2014

Variable	Cases	Controls	P Value
Measles Transmission			
Through air	9(26.5%)	43(42.2%)	0.01*
Oral/Fecal	3(8.8%)	25(24.5%)	
Contact with case	22(64.7%)	34(33.3%)	
Prevention methods			
Vaccination	10(29.4%)	21(20.6%)	0.01*
No Prevention	15(44.1%)	66(64.7%)	
I don't know	9(26.5%)	15(14.7%)	
Can Vaccine prevent			
Yes	11(32.4%)	35(35.0%)	
No	7(20.6%)	10(10.0%)	0.27
I don't know	16(47.1%)	55(55.0%)	
Age at vaccination			
<=6 Months	24(70.6%)	91(89.2%)	0.01*
9 Months	10((29.4%)	11(10.8%)	

During Bivariate analysis eleven independent variables were associated with the occurrence of measles outbreak while during multivariate analysis, factors that remained independently associated with contracting measles outbreak in Jimma District were, Mothers education, contact with measles cases and travel history. Cases whose mothers educated to the level of primary were 3.4 times more likely to develop measles compared to their counter parts (AOR=3.4; 95%CI: 1.03-15.94) and Children's who had contact with measles cases were 3.2 times at risk of contracting measles compared to controls (AOR=3.2; 95%CI:1.14-8.93). Also cases who had travel history to outbreak site were 6.3 times more likely to develop measles compared to controls (AOR= 6.3; 95%CI: 2.52-15.94) (Table35).

Table 36: Independent Predictors of Measles in Jimma District, Oromia Region, 2014

Variable	Case	Control	COR	AOR
Mothers Education				
Primary	25(73.5%)	46(45.1%)	2.9(1.01-8.56)*	3.4(1.03-15.94)*
Secondary	4(11.8%)	29(28.4%)	0.7(0.18-3.06)	0.6(0.13-2.97)
Tertiary	5(14.7%)	27(26.5%)	1:00	1:00
Contact with measles case				
Yes	27(79.4%)	53(52.0%)	3.5(1.42-8.92)*	3.2(1.14-8.93)*
No	7(20.6%)	49(48.0%)	1:00	1:00
Travel History				
Yes	22(64.7%)	23(22.5%)	6.2(2.71-14.62)	6.3(2.52-15.94)*
No	12(35.3%)	79(77.5%)	1.00	1.00

4. Discussion

Measles spread through contact with nose and throat secretions of infected people and through airborne droplets released when an infected person sneezes or coughs. A person can infect others for several days before and after he or she develops symptoms. The disease spreads easily in areas where infants and children come into contact such as in health centers and schools (2). The mean age for cases was 12.8±14.6 SD and for controls 8.4±9.1 SD. Majority 73.5% of cases were not vaccinated.

This study identified several factors that were associated with contracting measles in Jimma District. It was found that, mothers primary level of education, travel history and contact with a measles case were independent predictors for contracting measles. So measles outbreak investigation in Zaka, Masvingo Province, Zimbabwe, reveals the same finding that cases were high in contact with measles cases (3).

Cases whose mothers educated to the level of primary were 3.4 times more likely to develop measles compared to their counter parts. This can be by the fact that education creates awareness on the need for immunization and this finding are similar with a study done in Burkina Faso (7).

Majority 79.4% of the cases reported they had contact history with the cases and children's who had contact with measles cases were 3.2 times at risk of contracting measles compared to those who had no contacts and this can facilitate person to person transmission. This is also supported by the ministry of health of Zimbabwe, which states that children who live in crowded places are at high risk of contracting measles, and that a person with measles can infect others for several days before he/she develops symptoms. Measles spreads easily in places were children gather for example schools (3, 7).

Also cases that had travel history to affected area were 4.7 times more likely to be affected by measles. These can also increase person to person transmission. Cases that had travel history to outbreak site were 6.3 times more likely to develop measles compared to controls and travel history to measles outbreak sites respectively.

Majority 76.5% of the cases were not vaccinated. The low 38.2% of immunization coverage among cases in Jimma Town can be attributed to measles outbreak and this finding in line with the findings of Zaka District, Zimbabwe (3)

The median number of siblings was six and this was also reflected in Zeka District that had a median number of siblings of four and the WHO also reports that overcrowding in developing countries is a risk factor for contracting measles (5, 6).

5. Conclusion and Recommendation

Factors independently associated with the occurrence of measles outbreak were, mother's education to the level of primary, travel history and contact with cases. Measles outbreak investigation conducted in Zimbabwe in 2010 found; contact with a measles case, being unvaccinated against measles and not receiving additional doses of measles vaccine were independent risk factor for contracting measles (5).

Measles outbreak in Zaka resulted from the existence of a large number of unvaccinated children among religious objectors in the area and low awareness of the disease. We recommend the promotion of awareness in the community by health education and promotion. District Medical Officer to facilitate formulation of Emergency Preparedness plans (EPR). In the long term we recommend that the Ministry of Health should make it mandatory for all children to be vaccinated before enrolling into primary or boarding schools (7).

Therefore; it is highly recommended that strengthening routine vaccination for all children before enrolling into schools. Awareness rising to vaccinate their children for the community at large using local mass media and to revitalize the RRT to take part in the area of coordination and response, Conduct routine outreach program and assign Health Extension Workers were mandatory.

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Competing Interests

Authors have declared that no competing interests exist.

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5.2 Traveler Risk Assessment and Risk Management of Ebola Viral Disease in Ethiopia, 2014

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ABSTRACT

Background: World Health Organization and partners have recommended exit screening at airports and land-border crossings in countries affected by Ebola, and it is now an established practice. This research was conducted with the objective of assessing travel risk and risk management of Ebola Viral Disease in Ethiopia 2014.

Methods: A review of the National Ebola Viral Disease Screening data was conducted from September to December 2014 collected by Field Epidemiology residents and Public Health Emergency Management officer. All travelers who had travel history to Ebola Virus Disease affected country filled screening form and their temperature was checked at airport and passenger's residency. In-depth interviews were conducted by the principal investigator using structured questionnaire from 7 key informants and analyzed thematically. A total 527 quantitative data was entered and analyzed using Epi Info 7.1.3.10.

Result: A total of 527 travelers were screened and travel history to an Ebola affected countries was reported by 498/527 (94.5%). Of these 195/498 travelers who had been stayed for more than one day were followed for the development of Ebola Viral Disease sign and symptoms for 21 days. Five of 195 (2.6%) travelers were suspected for Ebola Viral Disease. The average temperatures were 38.5^0c and of these 2 of them were positive for malaria. Fifty five had travel history to Mali, followed by Guinea 12.9%. Seventy eight percent of travelers were using Ethiopian Airlines followed by unspecified carrier, 12.0%. Duration of stay in affected countries

was reported as one day in 59.8% and one week in 23%. About 29% of the travelers filled invalid addresses. The qualitative result revealed that not understanding the aim of the screening, language and inadequate screening area were the main barriers of screening.

Conclusion and recommendation: Travel history to an Ebola affected country was reported by 94.5% of the travelers. All fever cases were not tested for malaria which does not full fill standard malaria management protocol. It is very important to create awareness for travelers by posting posters the objective of screening and whom to call when they feel unwell.
Key Words: Travelers, Risk assessment, Risk management, Ebola Viral Disease

Introduction

Ebola is a highly-contagious hemorrhagic virus that breaks down the epithelial cell wall of blood vessels and triggers extensive internal and external bleeding. The Ebola virus causes an acute, serious illness which is often fatal if untreated. The filoviruses, Ebola and Marburg, are among the most virulent pathogens of humans, causing severe hemorrhagic fever (1).

The Ebola fever and other diseases are highly dangerous and transferred by sick people or contaminated objects. In our global world airplanes are one way to export this virus all over the world. Africa for instance has around 60 airports so it's an important international challenge to prevent sick people flying. For this purpose you can use Optris's fever inspection system. (Infrared Temperature Measurement System to prevent sick people flying). Virus epidemics like the Swine influenza in 2009/2010 and the Ebola virus disease in 2014 created a worldwide demand for suitable screening techniques allowing a fast non contact detection of travelers with potential fever (2).

The first outbreak of Ebola virus disease was reported in Democratic Republic of Congo in 1976, in a community near to Ebola River that is the reason of its name. That was a devastating outbreak with 318 cases and 218 deaths for a case fatality ratio of 68.5%, one of the most deadly outbreaks in history. Since 1976, 26 outbreaks of Ebola virus was occurred in ten countries of Africa, including Democratic Republic of Congo, Sudan, Gabon, Cote d'Ivoire, South Africa, Uganda (3).

The current outbreak initiated and reported in Guinea on March 2014, that is also affecting Sierra Leone, Liberia, Nigeria, Senegal, Democratic Republic of Congo (DRC), Mali, United States of America and Spain, is the most severe and deadly outbreak so far taking into account the cumulative number of cases and deaths. As illustrated by a tool to track the Ebola virus disease outbreak in West Africa, as of December 17th, 2014 the World Health Organization (WHO) has reported 18,603 confirmed, probable and suspected cases including 6,915 deaths for a case fatality rate of 37.2%. Senegal and Nigeria have been declared free of EVD transmission (3).

WHO and its partners have recommended exit screening at airports and land-border crossings in countries affected by Ebola, and it is now an established practice. WHO stresses those only 2 categories of people should not travel: those who are infected and those identified as their close contacts as they may be infected with Ebola virus. Since not every traveler from an Ebola-affected country is aware of having been exposed to the disease, completion of a screening questionnaire and testing for the presence of fever represent the best available indicators of risk (4).

The risk of transmission of Ebola virus disease during travel is low. Unlike infections such as influenza or tuberculosis, Ebola is not spread by breathing air (and the airborne particles it contains) from an infected person. Transmission requires direct contact with blood, secretions, organs or other body fluids of infected living or dead persons or animals, all unlikely exposures for the average traveler. People are only infectious after they have started to have symptoms, which include fever, weakness, muscle pain, headache and sore throat. This is followed by vomiting, diarrhea, rash and, in some cases, bleeding. If a person, including a traveler, may have been exposed to the Ebola virus, he/she should seek medical attention at the first sign of illness. Early treatment improves chance of survival (5).

Screening passengers before they get onto an airplane is the best weapon available for limiting the spread of Ebola. Some African countries are already doing this, and the United States can augment that security once international travelers land or switch planes (6).

Certainly, there are challenges to this approach, including determining what level of Ebola exposure requires quarantine. Targeting anyone who has been in a country affected by Ebola would be unnecessarily strict, since Ebola is only transferred by direct contact with an infected person's bodily fluids. Quarantining travelers who have had interactions with people who have or may have the disease will be difficult. It relies on people to be honest about their level of Ebola exposure, and exposed people may be motivated to cover up their travel history to gain access to the American health systems, even if it exposes others to risk. Requiring verifiable documentation would help cut down on this problem.

The challenge of Ebola prevention occurs at the interface of critical issues that include protecting the public, personal privacy, appropriate screening for a threat, and unpredictable human

behavior. The ensuing days and weeks will be ripe for thoughtful and necessary discussion on these aspects of Ebola prevention (3).

A new survey of Fortune 500 companies conducted earlier this week by International SOS found that, in spite of the unprecedented outbreak of Ebola, an overwhelming majority (83%) of organizations expect the flu to impact their business more than the virus in the coming months. Furthermore, less than a third of companies surveyed has had an employee request to change their travel plans or declined to travel due to the global outbreak. Participants were also asked "What is your number one challenge responding to the current Ebola outbreak?" Thirty-five percent said the largest challenge was keeping up to date with the latest information. Additional challenges included managing employee travel plans (19-percent), managing c-suite expectations (16-percent), and communicating effectively with employees in affected areas and providing proactive measures to employees in the affected areas (11-percent each) (3).

The Ethiopian Public Health Institute, leads and coordinates national preparedness activities through a national technical working group (TWG) which meets several times a week to devise plans, monitor progress, develop guidelines and standard operating procedures, oversee logistics and strengthen surveillance at Addis Ababa Airport and other international ports of entry and international borders across the country, identified seven potential land port entries such as Moyale, Metema, Humera, Kumuruk, Togo-Wuchale, Dawale and Gambella. Since August 2014 follow up of all passengers from EVD affected countries screening was on process for travel history within 21 days (1)

3. Objective

The main purpose of this study was to assess traveler risk and risk management of Ebola Viral Disease in Ethiopia in 2014

3. Methods and material

3.1 Study area and period

Ethiopian Public Health Institute mandated for screening and follow up of passengers traveling from Ebola affected countries with partners. Since August 2014 follow up of all passengers from EVD affected countries screening was on process for risk identification within 21 days and data base was established for documentation. Hundreds of passengers used Addis Ababa as home land from different countries including those EVD affected countries and the study was conducted on information collected during September 2014 to January 2015. Data was compiled from 20 to 30 December 2014. In-depth interview for 15 key informants 2 Doctors, 5 Supervisors, 5 Nurses, 3 Supportive staff working on screening and isolation sites.

2.2 Study Design

Cross-sectional facility based study was conducted from the National EVD screening data compiled from September 2014 to January 2015. In-depth interview with indivisuals working on the screening was employed to explore the barriers and challenges of screening.

2.3 Study population

All travelers from EVD affected countries and had history of travel to Ebola affected country within the previous 21 days information collected during September 2014 to Jan 2015 within the previous 21 days and in-depth interview for indivisuals working on the screening was included in the study.

Inclusion: All travelers from Ebola affected countries and had history of travel to Ebola affected country within the previous 21 days with or without symptom.

Exclusion: All travelers who were not from Ebola affected country and had no history of travel to EVD affected country within the previous 21 days.

2.4 Sampling and data collection

The sample size was include all passengers 527 information collected with non contact screening procedure was applied. Factors about travelers that should be considered in each risk assessment including date of arrival, duration of stay, transit history, country of residency, history of travel to EVD affected country within the previous 21 days were conducted. Data was collected by Field Epidemiology Residents and Nurses working on the screening at Bole international air port. Also a qualitative in-depth interview was administered using a structured questioner for those working on the screening; the interview was for 15 health workers 2 Doctors, 5 Supervisors, 5 Nurses, 3 Supportive staff working on screening and isolation sites.

2.5 Data Analysis

Data was entered, edited and cleaned using Microsoft Excel and Epi info software version 7.1. Then data was analyzed and presented using bar and line graphs and tables. Qualitative data was presented thematically after compilation of the findings. Finally the finding will be presented to EPHI and Addis Ababa University and other stakeholders.

2.6 Ethical Issue

This study was approved by the Ethiopia Public Health Institute Institutional Review Board. Information are kept confidential. There was no individual identifier during retrieving the data from the record. Informed consent was obtained for the participants of the qualitative study. Privacy and confidentiality of the information obtained from the interviewee was maintained.

2.7 Dissemination, notification, and report of results

The result of this study will be disseminated to relevant bodies such as EPHI, FMoH, Addis Ababa University, EPHA, Addis Ababa City Administration Health Bureau, and all other concerned bodies through presentation, email and hard copy.

3. Results

Travel Histories to EVD affected countries

A total of 527 passengers were screened and followed from 30 September to 12 December 2014. Majority 498(94.5%) had travel history to Ebola affected countries while 16(3.0%) and 13 (2.5%) their travel history was not filled and had no travel history respectively (Fig.1).

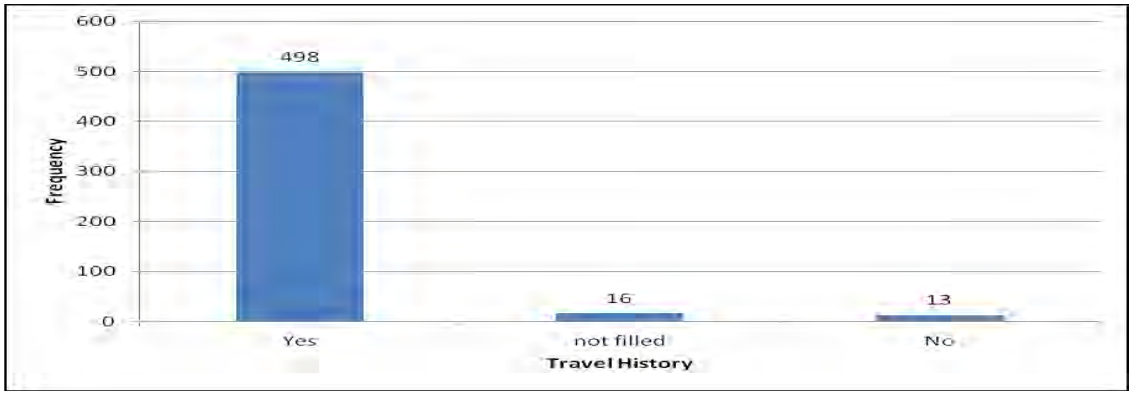

Figure 31: Traveler Histories to Ebola affected Countries, Addis Ababa, Ethiopia 2014

Place of travel to Countries affected with EVD

Majority 265(50.3%) of passengers had travel history to Mali followed by Guinea 66(12.5%), Democratic Republic of Congo (DRC) 54(10.2%), Liberia 46(8.7%), there travel place was not specified 44(8.3%) and Sierra Leone 31(5.9%), while small proportion had travel history to three countries namely Serra Leon, Guinea, Liberia 15(2.8%), and the least three countries Nigeria, Cote Devoir and Senegal 4(0.8%), 1(0.2%) and 1(0.2%) respectively (Fig.2).

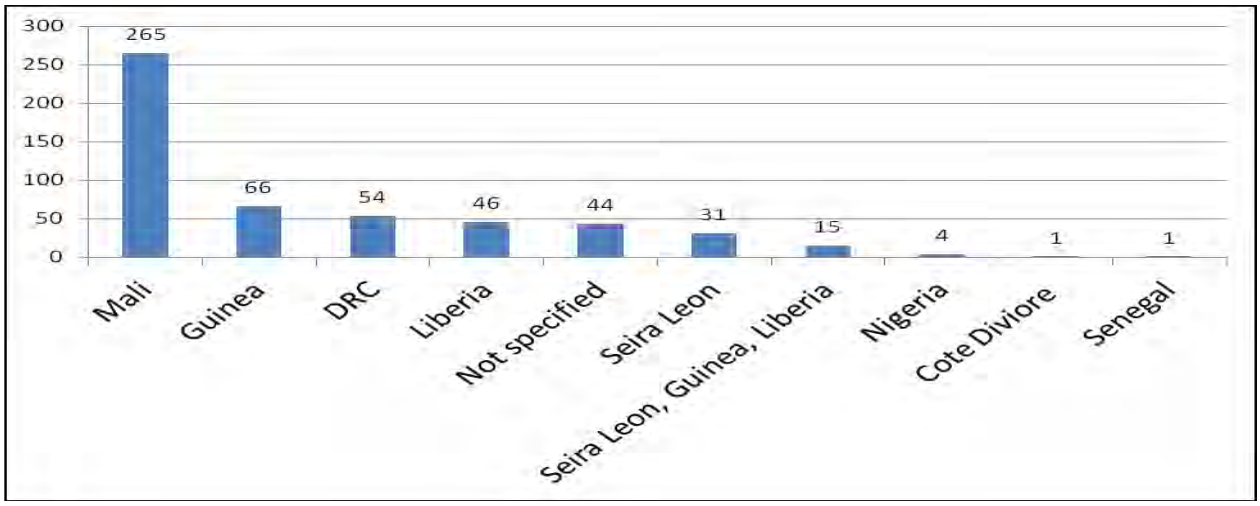

Figure 32: Travel History to which EVD Affected Countries, Addis Ababa, Ethiopia 2014

Mode of Travel

Most 413(78.4%) of the travelers were using Ethiopian Airlines while 83(15.7%) their mode of travel was not specified. Small proportion 12(2.3%), 11(2.1%) were used Egyptian airline and Emirates respectively.

Table 37: Airline Used By Travelers, Addis Ababa, Ethiopia 2014

Airline	Frequency	Percentage
Ethiopian	413	78.4
Not Specified	83	15.7
Egyptian air	12	2.3
Emirates	11	2.1
Air France	5	0.9
Qatar	1	0.2
Turkish	1	0.2
Copenhagen	1	0.2
Grand Total	527	100.0

Duration of stay

More than half 314(59.6%) of travelers were transit and stay for one day only and 121(23.0%) stay for one week. Small proportion 18(3.4%) and 43(8.2%) of travelers were stayed for 2 weeks and three weeks and above respectively while 31(5.9%) of travelers their duration of stay was not specified (Table 14).

Table 38: Duration of Travelers Stay, Addis Ababa, Ethiopia 2014

Duration of stay	Frequency	Percentage
1 day	314	59.6
1 Week	121	23.0
2 Weeks	18	3.4
3 Weeks and above	43	8.2
Not Specified	31	5.9
Grand Total	**527**	**100.0**

Follow up Methods

From a total of 527 screened passengers 314 were transit and 195 were followed and found that 75(38.5%), 57(29.2%), 23(11.8%), and 22(11.3%), physically contacted, invalid address contacted by phone and physically and only contacted by phone respectively. Small proportion 10(5.1%) and 8(4.1%) passengers were on and off responding and not responding at all.

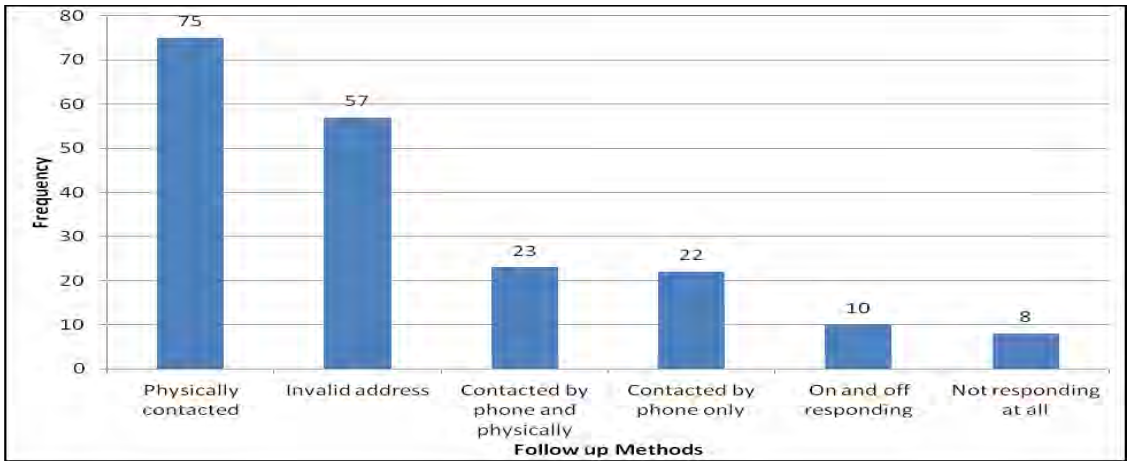

Figure 33: Follow up Methods for Travelers, Addis Ababa, Ethiopia 2014

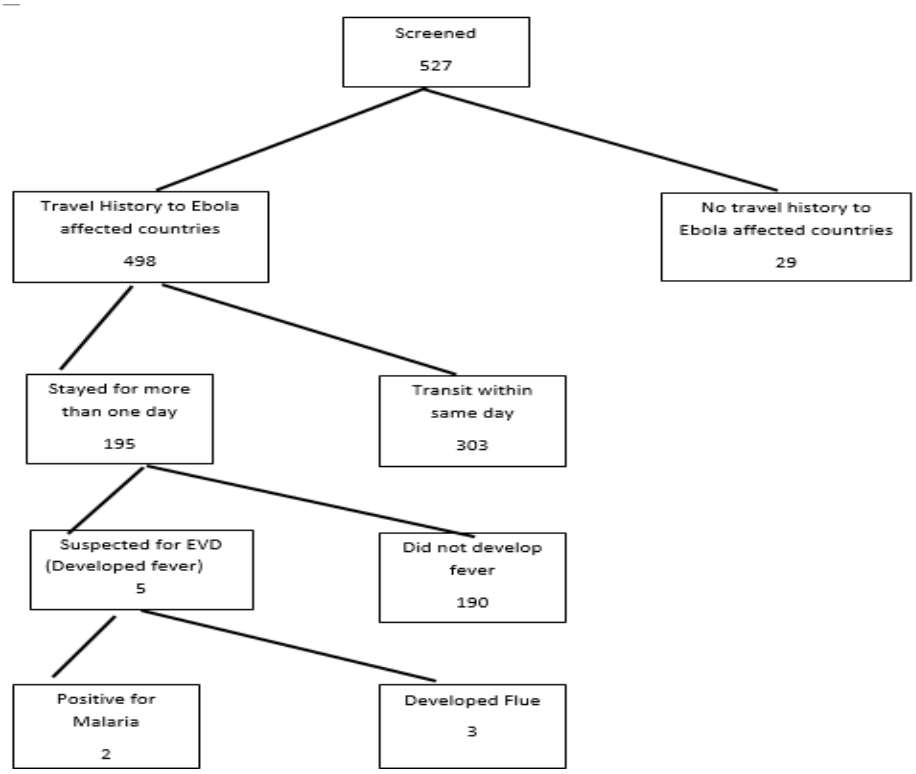

Figure 34 Flow Chart of the Travelers Screening Results, Addis Ababa, Ethiopia 2014

Qualitative Data

Majority of the in-depth interviewed reported that they perceive working as a screener was a very interesting job to prevent our country from Ebola Virus disease and it is a national mission, interesting responsibility and we like it. One respondent said, ''He perceived working as screener was a risky activity as he had direct contact with the passengers coming from Ebola affected countries.''

The traveler's react during screening and follow up procedures in different ways; some passengers feel aggressive, most were not happy, feel nervous as if they were affected by disease, some travelers not confidential. A 36 years old male said, ''Most of travelers were not giving good response and they are aggressive.''

The importance of screening and follow up of passengers coming from Ebola affected countries were, five of fifteen the respondents replied to prevent our country from Ebola Virus Disease while two of them said, '' To detect, protect others, track and follow passengers until the incubation period completed. ''

The strength and weakness of screening includes filling of information for all passengers was stated as strength by one person while the weakness were; language barrier, passengers not fill the form properly, no internet access for reporting, place for screening was small and overcrowded. One respondent said, '' Negligence of professional to fill the form.''

The challenges faced during screening and follow up were; some passengers do not understand the aim of screening, language barrier and screening area not suitable leading to overcrowding, less number of health workers, Two respondents said, ''When a photo thermometer stack and the passengers told to stay for some time theywere disappointed.'' One respondent said, ''Passengers complain of using glove to check their pass port.''

4. Discussion

Following a step-wise approach, information can be collected about travelers and their journeys and likely travel-related hazards can be identified (risk assessment). With this information, health professionals can advise (risk management) using real-time and evidence-based resources. Risk assessment helps to identify special risk travelers (such as those with medical conditions, children, pregnant women or older people) (8). Screening passengers before they get onto an airplane is the best weapon available for limiting the spread of Ebola. Some African countries are already doing this, and the United States can augment that security once international travelers land or switch planes (6).

Majority 94.5% had travel history to Ebola affected countries. This can increase the risk of Ebola transmission to non affected countries. More than half of the passengers had travel history to Mali which is less affected and contained the outbreak immediately and this might lower the risk of Ebola transmission to non affected countries. Small proportions of travelers do not specify their travel history to Ebola affected countries and this can hamper the screening and follow up procedures and unknown travel history may also transmit the virus without the knowledge others. The quantitative and qualitative study revealed similar results on filling travel history to Ebola affected countries.

Most 78.4% of travelers were using Ethiopian Airline which needs special precaution, repeated orientation and continuous follow up on crew members. On the other hand 15.7% of passengers

didn't specify their mode of travel this might be due to further interview and delay from their travel as this may increase the risk of Ebola transmission. Small proportion 2.3% and 2.1% were used Egyptian and Emirate Air lines respectively. Majority of 59.8% of travelers were transit and stay only for one day and this can also lower the risk of EVD transmission to non affected countries. During (screening) two reasons for invalid address were: not filling formats by passengers and overcrowd of screening area. Second is changing hotel address once the passengers filled the format has a great contribution for invalid address. Invalid address should be corrected immediately without time taking by discussing with air lines officials follow up travelers fill invalid address, responded on and off and not responded at all, this makes more complex the follow up process. A total of 5 passengers were suspected and screened for EVD but it was found that all were other medical condition like malaria and flue like illness. In general, Ethiopia didn't encounter any conformed Ebola cases during screening and follow up procedures.

The challenge of Ebola prevention occurs at the interface of critical issues that include protecting the public, personal privacy, appropriate screening for a threat, and unpredictable human behavior. The ensuing days and weeks will be ripe for thoughtful and necessary discussion on these aspects of Ebola prevention (3).

The challenges faced during screening and follow up were; some passengers not understand the aim of screening, language barrier and screening area not suitable, leading to overcrowding, less number of health workers to overcome the problem encountered and incomplete data. This can be improved through awareness creation, include some French speakers in screening procedures, redesign screening area, assign adequate health professionals and strict follow up for completeness of data. Passengers Follow up was focused only on the primary passengers but not addressing the family members and friends. Increasing awareness on the objective of follow up and early symptoms Ebola, among passengers and family members is crucial in the prevention and control of EVD at the same time it is the chance to decrease panic if Ebola case will happen. As a result of this to improve the screening and follow up procedures FMoH, EPHI, WHO, UNICEF and other partners should participate to scale up and sustain the program.

5. Conclusion and Recommendations

Both the quantitative and qualitative study revealed that the screening and follow up procedures depend on traveler's good will and screener's initiative and strong commitment. Travel history to an Ebola affected country was reported by 94.5% of travelers. This can increase the risk of disease transmission to non affected country like Ethiopia. The Interim guide line orders malaria test for fever cases any time for those from EVD affected countries All fever cases were not tested for malaria which does not full fill standard malaria management protocol. Identifying all travelers with their travel history can minimize the risk of EVD transmission. Most of the travelers were unaware of the importance of screening EVD at air port. It is very important to create awareness for travelers by posting posters the objective of screening and whom to call when they feel unwell.

Also it is very important to conduct regular follow up by assigning professionals for fixing photo thermometer when it stacks was underlined. Filling questionnaire by passengers might play a great role for invalid address and hide their travel history as this may easily facilitate viral transmission to non affected country. As 29.2% of traveler were filled invalid address the screener should check for completeness of passenger profile continuously to improve the quality of data and prevent lost follow up.

Therefore, availing adequate resources/protective materials, adhering to standard precautions were highly recommended. Also assigning adequate health professionals and conducting regular supportive supervision and feedback is also advisable to screeners and follow up health professionals working in the areas.

It is better to inform that Travelers will also be given advice to whom to call and what to do if they become unwell at any time. Using telephone contact only may not assured that everybody is in a good condition as the knowledge of EVD is not fully introduced in the community and not equally understand severity of the problem. So it is better to physically address those people under follow up as much as possible.

Follow up will involve taking temperatures of people's under follow up to check whether they have a fever. Even though; this is one of the main symptoms of Ebola, it is also a symptom of many other infections.

Acknowledgments

The authors would like to appreciate Dr Daddi Jima for his unreserved support in idea generation. Last but not least my gratitude also goes to all PHEM staffs, fifth cohort FETP Residents and to all those working in screening sites AAU at large.

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CHAPTER VI– ABSTRACT FOR SCIENTIFIC PRESENTATION

6.1 The Epidemiology of Measles in Ethiopia, 2013: A Retrospective Data Analysis

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ABSTRACT

Background: Measles is a viral disease that spreads from person to person. It causes an estimated 2.6 million deaths each year worldwide. The objective of this study was to describe measles distribution by person, place, and time and recommend possible solutions.

Methods: We analyzed measles cases from national measles case-based surveillance system data base reported during January to December 2013. Epi linked, confirmed and suspected cases were included. The proportion of confirmed measles cases was computed. Vaccination status and distribution of cases by age and sex was presented. Moreover, description by place, person, and time was made. Data was entered into a computer, edited, cleaned and analyzed using EPi info 7.1.3

Result: Cumulatively 12,187 measles cases and 20 deaths (CFR: 0.2%) were reported during 2013. Of these, 7862 cases were reported through line list and 4325 through case- based. The mean and median ages were 7.9 and 6.0 years respectively. The age specific attack rate was 69 per 100,000 populations in less than one year. Age group 1-4 year and 5-14 year were the most affected accounting for 28.0% and 46.1%, respectively. Half of the cases, 52.6%, of the cases were reported from South Nations and Nationalities Peoples region followed by Oromia 29.0%. From SNNPR 91.1% reported from 35 woredas of 5 zones. Among investigated cases 1926(44.5%) were confirmed for measles. Overall, 31.2% of cases vaccination status was unknown and 22.9% were not vaccinated. Annualized measles attack rate was 14 cases per 100000 populations. The trend of measles showed case buildup during dry season week 43- 50/ 2013.

Conclusion and Recommendations: Children aged 1-14 years were the most affected. Majority of the cases were not vaccinated or their vaccination status was unknown. Most of the cases were from SNNPR. Therefore, nationally strengthened measles surveillance, routine and Supplementary Immunization Strategy should be designed to address preschool and school age group is highly recommended with especially emphasis to SNNPR.
Keywords: Surveillance, Incidence, Measles, Ethiopia

6.2 Traveler Risk Assessment and Risk Management of Ebola Viral Disease in Ethiopia 2014

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ABSTRACT

Background: World Health Organization and partners have recommended exit screening at airports and land-border crossings in countries affected by Ebola, and it is now an established practice. This research was conducted with the objective of assessing traveler risk and risk management from affected countries to Ethiopia in 2014.

Methods: A review of the National Ebola Viral Disease Screening data was conducted from September to December 2014 collected by Field Epidemiology residents and Public Health Emergency Management officer. All travelers who had travel history to Ebola Virus Disease affected country were filled screening form and asked for any development of sign and symptoms of EVD and their temperature was checked at airport and passenger's residency. In-depth interviews were conducted by the principal investigator using a semi-stractured questionnaire and analyzed thematically. Quantitative data was entered and analyzed using Epi Info 7.1.3.10.

Result: A total of 527 travelers were screened and travel history to an Ebola affected countries was reported by 498/527 (94.5%). Of these 195/498 travelers who had been stayed for more than one day were followed for the development of EVD sign and symptoms for 21 days. Five of 195 (2.6%) travelers were suspected for EVD as they had history of travel to EVD affected countries and developed fever. The average temperatures were 38.50c and of these three were tested and 2 of them were positive for malaria. Three of them develop Flue and one traveler diarrhea. Fifty five travelers had travel history to Mali, followed by Guinea 12.9% of 498. Travel history was not reported by 8.3% of travelers. Seventy eight percent of travelers were using Ethiopian Airlines followed by unspecified carrier, 12.0%. Two point three percent, 1.3%, 0.8%, 0.6% and

0.4% were using Egyptian, Emirate, Lufthansa and Air France respectively; while 0.2% each was using Qatar, Turkish and China. Duration of stay in affected countries was reported as one day in 59.8%, one week in 23%, and was not reported in 6% of the travelers. About 29% of the travelers filled invalid addresses.. The qualitative result revealed that not understanding the aim of the screening, language and inadequate screening area were the main barriers of screening.

Conclusions: Travel history to an Ebola affected country was reported by 94.5% of the travelers included in the current study. This can increase the risk of disease transmission to non affected countries including Ethiopia. All fever cases were not tested for malaria which does not full fill standard malaria management protocol. Identifying all travelers with their travel history can minimize the risk of EVD transmission. It is very important to create awareness for travelers by posting posters the objective of screening and whom to call when they feel unwell.

Key Words: Travelers, Risk assessment, Risk management, Ebola Viral Disease

CHAPTER VII – NARRATIVE SUMMARY OF DISASTER SITUATION

7.1 Health and Nutrition Emergency Needs Assessment in Bale and Arsi Zones, Ethiopia 2014

Executive summary

The livelihoods of Oromia communities have been affected by recurrent drought, and associated health and nutrition emergencies and have resulted in sufferings humans and lose of many lives of livestock's. Sugum non-food humanitarian need assessment was conducted in Arsi and Bale zones in 8 selected woredas by Oromia regional state government in collaboration with concerned Federal Ministries and partner organizations.

Among the five top causes of morbidity pneumonia, ARI, Diarrheal diseases and SAM were the major diseases in the visited zones. The potential risk factors for the occurrence of public health emergencies include low latrine coverage and utilization, shortage of water, interrupted river, lack of budget capacity for preparedness and response. Also there is high coverage of LLINs, IRS in all visited woredas and SIA was not conducted. Analysis of the occurrence and distribution of epidemic prone diseases and associated potential risk factors in different Woredas during the last three years were found, there is the likelihood of the occurrence of public health and nutrition emergencies such as outbreaks of AWD, Measles, malaria, and SAM in hot spot Woredas.

Concerning preparedness and response capacity of the Zone and Woredas it was found to be limited such as Lack of contingency budget, critical shortage of emergency drugs and medical supplies as well as weak multi sectoral PHEM coordination. Also there was a public health emergency preparedness and response plan, but no accessible emergency response fund; as this is the main identified gaps. The plan encompasses activities such as provision of drugs and medical supplies, items for early detection and reporting, prevention of the spread of the outbreak, nutrition, preparedness and capacity building.

A total of ETB 5,737713.00 (USD 286685.65) is required to respond anticipated emergency problem. For drug and supplies procurement 235000.00 Birr, to strengthen surveillance system 522892.00 Birr nutrition drug and supplies 595009.00 Birr.

Introduction

Drought can be defined as deficiency in precipitation over an extended period, usually a season or more, resulting in a water shortage causing adverse impacts on vegetation, animals, and/or people. It is an ordinary, frequent feature of climate that happen in almost all climate zones, from very wet to very dry. Droughts are one of the most costly weather related events, in terms of economics and loss of millions life. Drought can results in food shortage and hunger by reducing agricultural production. Climate change is believed to be the main root cause of hunger and malnutrition affecting many people as result of lower crop yields and fewer livestock and livestock products. As a result of this the price of crop increases and the price of live stocks can be reduced. The same is true in Arsi zone many livestock's were died and the crop production were reduced.

The livelihoods of the Oromia particularly Arsi and Bale Zone communities have been affected by recurrent drought, and associated health and nutrition emergencies and have resulted in sufferings humans and lose of many lives of livestock's. Pre harvest Belg, non-food humanitarian need assessment is conducted in Arsi and Bale zone in 8 woredas. In Oromia regional state government with different team members of which was organized from National DRMSS, FMoH (EPHI) and Zonal government in collaboration with concerned Federal line ministries and the partner organizations and has identified potential risk for the occurrence of public health emergencies, current preparedness status and response capacity of the zones and woredas. Epidemic prone diseases among others have been commonest causes of morbidity and mortality in the zones. Among communicable diseases which afflict people of the region includes AWD (Acute watery diarrhea), Measles, Meningitis and the like. Unreserved efforts have been made both regionally and zonaly to prevent and control epidemic prone diseases and others so far. The purpose of this assessment was to determine type, magnitude, risk factors, and vulnerable groups and make sound recommendations to prevent further spread and mitigate their adverse effects.

The zone and woreda preparedness and response capacity was identified to be limited. Critical shortage of emergency drugs and medical supplies, lack of contingency budget, weak coordination, shortage of skilled /trained professionals, weak visited surveillance and improper

management of health data, are among the preparedness and response capacity gaps. The plan encompasses activities such as provision of drugs and medical supplies, items for early detection and reporting, prevention of the spread of the outbreak.

Background

Oromia region is one of the 9 regional states of Ethiopia that comprise male 16,608,478 and Female 16,367,798 with a total of 32,976,276 people with mean annual growth rate of 2.9% .

Arsi and Bale Zone is one among 18 rural zone that were found in Oromia regional state according to CSA of Ethiopia 2007 Arsi zone has the population of 3104235, of this male accounted 1,521075and female accounted 1,563160 of the total children below one year accounted 114,857, children's under five accounted 509,095, children's under 15 accounted 1,471407 and Bale has the population of 1708910, of male accounted 837366 , female 871544, children below one year accounted 54172, under 5 children 280261, below 15 children 813612 respectively

Arsi and Bale zone is found in Oromia region that have been affected by ongoing measles, and malaria outbreak. The recent data review indicated that there were a total of 711 suspected measles cases in both zone, and 4 deaths from Dawa kechen woreda. Malaria case buildup in both zones reported a total case of 2980 starting from January to May 2014.

One of the priority areas for health selected by Arsi zone health department to be visited were For Malaria and AWD Merti, Dodota, Zeway Dugda and Jeju woredas, for measles Gololcha, Jeju, Seru, Sude, Lemu bilibilo and Onkolo wabe woredas, for malnutrition Lemu bilbilo and Merti woredas. Merti woreda is a hot spot area for measles, malaria and AWD found in Arsi zone. The recent data review five month report indicated that there were a total of 19 suspected measles cases from different kebeles of Merti woreda, No deaths and confirmed cases were reported. A total of 594 Malaria cases were reported from different kebeles of Merti woreda starting from January to May 2014 and 5 suspected meningitis cases were reported.

In Arsi and Bale zone 8 woredas were the hot spot area selected for pre belg assessment and risk factors for emergency prone diseases such as malaria, measles and Malnutrition that are still persistent, malaria is also the major public health problems of the visited woredas almost greater

than 85% of the woredas of the land and population at risk. Consequently, there has been potential risk reported from the woreda health, shortage of food that causes Sever Acute Malnutrition (SAM) cases and the number of cases in Stabilization Center (SC) increasing in the respective health centers and health posts.

3. Objectives

3.1 General objective:

To contribute ensuring appropriate and effective humanitarian planning and responses to reduce morbidity, mortality and acute malnutrition in the most vulnerable areas of Arsi and Bale visited zone and woredas 2014.

3.2 Specific Objectives:

- To assess the extent, types, magnitude, severity and likely of the different hazards (drought, human epidemics, water supply shortage, and sever and acute malnutrition, etc) and risks to the populations in the most vulnerable areas.
- To assess the existing capacity of the health services to address health and nutrition emergencies, likely to occur during the coming three months;
- To determine the shortcomings (gaps) in the capacity of the existing health services to address health and nutrition emergencies likely to occur between January and May 2014 based on the findings, to develop preparedness plans.

4. Methodology:

The pre harvest Belg Public Health and Nutrition emergency rapid need assessment has been conducted in selected hotspot Arsi and Bale Zones of Oromia region from 23, June 2014 to 5, July 2014. Existing records and reports were reviewed to obtain data on leading causes of morbidities, ongoing epidemics, emergency drugs and medical supplies, PHEM coordination, risk factors for epidemic prone diseases and malnutrition were carried out using data collection checklists.

This health and nutrition emergency rapid needs assessment has been conducted as part of the 2014 pre harvest assessment in selected hotspot woredas of Arsi and Bale zone Oromia region, using the following major data collection methods:

This health and nutrition emergency rapid needs assessment has been conducted as part of the 2012 pre Sugum assessment in selected hotspot woredas using the following major data collection methods:

- The multi agency Rapid Assessment team was briefed by DRMFSS in Addis Ababa;
- Briefing was also done at regional DPFSPCO
- Discussion with woreda level Disaster prevention and food security DPFS Desk, water resource, health, education and Pastoralists;
- Review of secondary data
- Physical observation
- Discussion with community
- The multi agency Rapid Assessment team was briefed by DRMFSS in Addis Ababa;
- Briefed also in done in regional DPPB and selected
- Discussion with zonal level Disaster prevention and preparedness(DPP) committee, water resources, health, education and food security;
- Discussion with zonal and woreda level health officials;
- Review of secondary data against prepared checklist;
- Observation of the medical stores.

Operational Definition

Malaria case load: single determination of malaria parasite density in the blood

5. Findings:

A total of 667,391 population were living in these 12 woredas among these 400,322 were male and 308,217 were female with under five population of 77,275. Majority of the population were from zone 1 and 2 (Table 42).

Table 39: Socio-Demographic Characteristics in the Visited Zones and Woredas, 2014

Zone	**Woreda**	**Population**			**< 5**
		Male	**Female**	**Total**	
Arsi Zone		1521075	1583160	3104235	509095
1	L/Bilbilo	97190	99507	196697	32258
	Diksis	49019	51815	100834	16537
	Merti	55519	55519	111038	18210
	jeju	3802	3539	7341	1175
Bale Zone		837366	871544	1708910	280261
2	Agarfa	61016	63506	124522	20427
	Gasara	46404	48298	94702	15531
	Ginir	72436	75392	147828	24244
	D/kechen	72856	59609	132465	21194

5.1 Top Five Morbidity Causes:

During five months period epidemic related morbidity report were showed based on the types of disease like Malaria cases were 286, measles cases were 269, meningitis cases 20, malnourished patients were 1953, and adult dysentery cases were 1683 and under five dysentery were 10483.

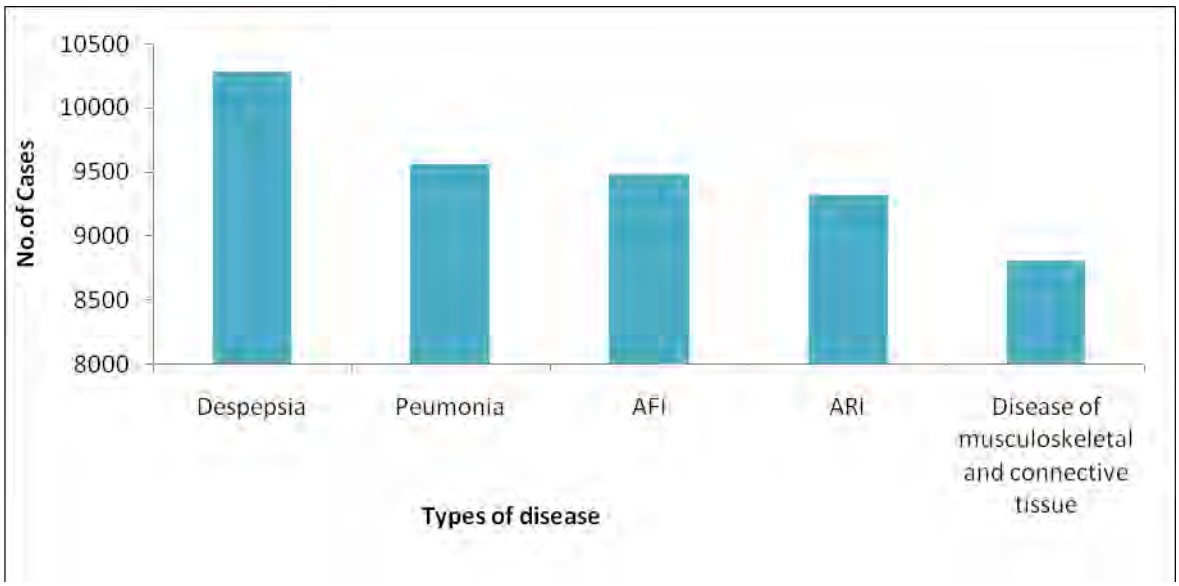

Figure 35: Bale Zone Top Five Morbidity above five years of age at OPD, 2014

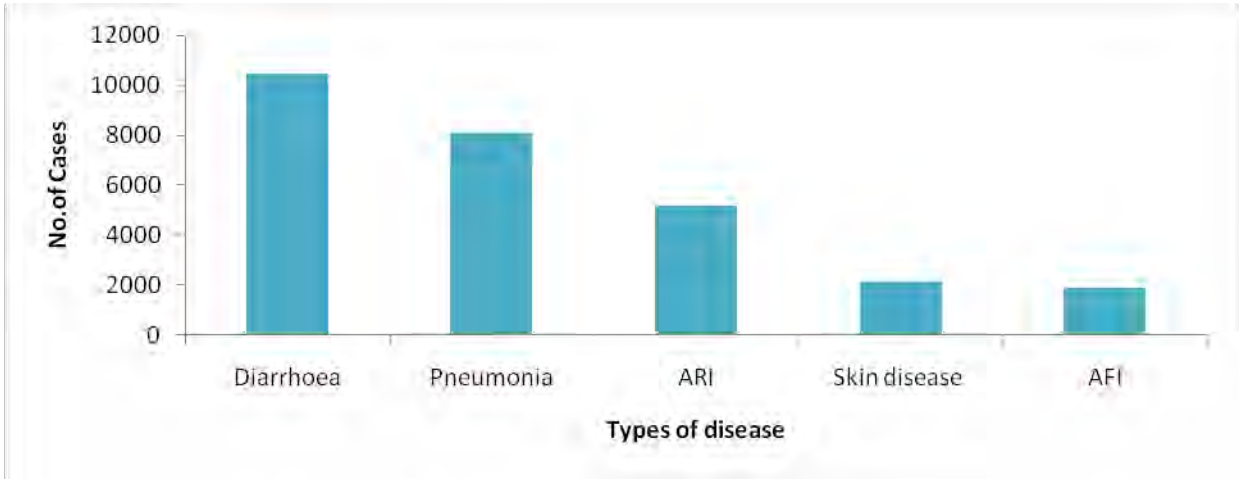

Figure 36: Bale Zone Top Five Morbidity under Five at OPD, 2014

Table 40: Top five Morbidity by age group, Merti Woreda, Arsi Zone, 2014

	Under 5 years of age		Above 5 years of age	
S.No	Types of disease	Number	Types of disease	Number
1	Diarrhea	1055	AFI	2725
2	ARI	858	UTI	2162
3	Pneumonia	724	ARI	1688
4	AFI	368	Dyspepsia	1189
5	Diarrheawith dehydration	123	Typhoid Fever	1017
11	Total	3128	Total	8781

Table 41: Top five Morbidity by Age Group, Lemu Bilbilo Woreda, Arsi, 2014

	Under 5 years of age		Above 5 years of age	
S.No	Types of disease	Number	Types of disease	Number
1	Diarrhea without blood	262	Pneumonia	125
2	ARI	234	AFI	122
3	Pneumonia	184	Trauma injury (fracture)	112
4	Diarrhea with dehydration	53	ARI	110
5	AFI	28	Typhoid Fever	10
11	Total	761		479

5.2. AWD

In cases of Acute Watery Diarrhea (AWD) there was no current ongoing out break at zonal and woreda level both in Arsi and Bale zone. There were no enough amounts of drugs and supplies for epidemic management AWD. No cases of AWD were reported for the last 3 years. Latrine coverage, utilization and safe water coverage were lower in all assessed woredas and where it is very much conducive for disease outbreak (1).

5.3 Meningitis

No meningitis outbreak was reported from Arsi and Bale zone of all visited woredas since January. No epidemic expected within the coming two months due to unfavorable weather condition for the occurrence of meningitis outbreak. It needs close monitoring and strengthening surveillance system is mandatory.

Preparedness

Main shortages of emergency drugs include; Ringer Lactate, Doxycycline, PPE, CTC kit (for AWD) and Tetracycline ointment (for measles) while ORS, Vit A, Amoxicillin suspension were partially available. Concerning supplies Coartem, RDT for Malaria were available: for the coming one month and no budget allocated for emergency Rapid response by the zone and woreda.

Coordination

There is multi sectoral PHEM coordination forum in both zone and all assessed woredas but there is no regular meeting. Also there is public health emergency preparedness and response plan. Whereas no accessible emergency response fund at all level.

5.4 Measles

Measles is the ongoing outbreak and a major cause of morbidity and mortality in Oromia region, even though it is vaccine preventable diseases that have been repeatedly reported in epidemic proportion in the visited Arsi and Bale zone woredas. A total of 1056 suspected measles cases were reported from different Oromiya zones at regional level and within five month period a total of 583 suspected measles cases were reported from Arsi 314 and from Bale Zone 269 since January to May 2014. The measles vaccination coverage was in good progress both in routine and SIA vaccination program in most of the assessed woredas. Routine coverage were > 80% and SIA coverage were >90% (2). Malnutrition and drought can aggravate the situation.

In 2006 Ethiopia budget year (in the 3rd Quarter of 2013 and 1st Quarter of 2014) measles outbreak was reported in Arsi and Bale zone including visited woredas with total cases of 711. The highest cases were reported from Arsi zone 442 and following Bale zone 269. Cases are still reporting from all woredas 2014.

Out of the total 711 measles cases reported from Arsi and Bale zone, 314 cases were reported from Arsi and 269 cases were reported from Bale zone within five months January 104, 43, February 31,58, March 92, 81, April 60, 50, and May 27, 37 respectively.

Figure 37: Arsi and Bale Zone Measles Cases by Months from January to May, 2014

5.5 Malaria:

Regarding malaria in Bale zone and Arsi zone there was no malaria out break during five months period from January to May. In Arsi zone total malaria morbidity of the year 2006 EFY was 207,254 of these children's under five years' accounted 51731 and above five years cases were 150689. In five months period from January to May, total malaria cases were 2694. This means it doesn't show the sign of increasing that may a pinpoint forecast outbreak. The same is true in Bale zone a total of 286 malaria cases were reported out of this 177 cases were reported from one woreda (Dawe Kechen woreda). Malaria case load was high in zone. The case load from the assessed woredas by zone and months is indicated below (Fig. 1).

The drug and supplies for (RDT and Coartem) preparedness and response for malaria was good and adequately available at zonal level in Arsi and Bale zone for six months, but there is no enough amounts of RDT and coartem at woreda level. The highest cases were reported from Bale zone D/kechen woreda followed by Arsi zone Merti woreda. All visited woredas were malaria endemic area with presence of malaria breeding site, Interrupted or potentially interrupting rivers, unprotected ponds, irrigation in the area. The LLINs coverage in most of the woredas was >80%. The IRS coverage was 100% in most of the woredas. A total of 8 woredas populations will be at risk of malaria are 253203 in Bale zone and 407226 in Arsi zone (Fig. 28).

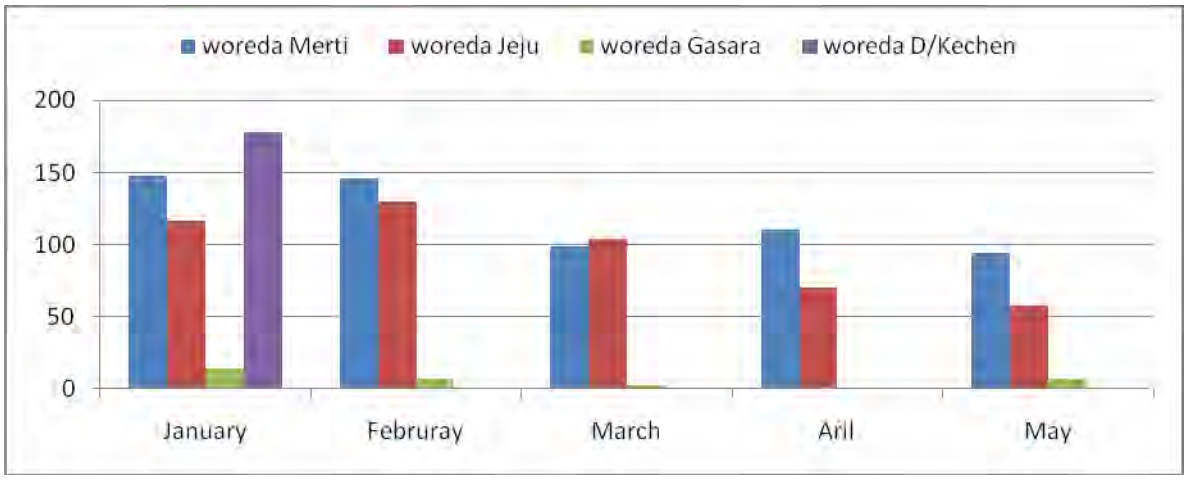

Figure 38: Malaria Cases by Woreda, in Arsi and Bale Zone, 2014

Majority of cases were reported from Dawe kechen woreda followed by Merti, Jeju and Gasara woreda. The trend showed high case load during January and February when the Belg rain

started and due to the absence of rain malaria cases start to decrease as the number of breeding site tend to be low (Table 39).

Table 42: Malaria Morbidity by Species, Arsi Zone, 2014

S.No	Months	Types of Species				Total
		PF	PV	Mixed	Clinical	
1	January	235	310	5	3	553
2	February	174	216	5	0	395
3	March	248	303	10	6	567
4	April	401	255	29	0	685
5	May	283	208	3	0	494
6	Total	1341	1292	52	9	2694

5.7 Nutrition

In 2006 EFY CHD (Community Healthy Day) were carried out in under five children, a target for screening from a total of under five children were 460,668. Of a total 404298 were performed which is about 87.8%. During screening for malnutrition 425,446 children's were supplied with Vit A. Among screened under five children's 1411(0.35%) was SAM and 6009 (1.5%) was MAM cases. Over all SAM and MAM cases were increased. On the other hand screening of pregnant women (PW) and lactating women were identified and carried out at the same time as MUAC < 23 cm and MUAC > 23 cm cases were 3867 and 52041 respectively. At zonal level, a target for screening a total of pregnant women were 104613 and 55916 were performed with the coverage of 54%. According to CHD the number of MAM, in Pregnant women cases were increased by 7% and in Bale Zone CHD (community healthy day) were carried out in 2006 EFY in under five children. A target for screening from a total of under five children were 256337. Of a total 242651 were performed which is about 94.7%. During screening for malnutrition 245203 children's were supplied with Vit A and 163877 children's were dewormed. Among screened under five children's 884(0.36%) was SAM and 7298 (3%) was MAM cases. Over all SAM and MAM cases in under five children were increasing. On the other hand screening of pregnant women (PW) and lactating mother were identified and carried out at the same time as MUAC < 23 cm and MUAC > 23 cm cases were 8873 and 458877 respectively

Since January a total of 4925 cases of SAM were reported from both Arsi 2972 and Bale zone 1953 with high case load in February, April and May. The majority of cases were reported from Arsi and followed by Bale zone. All cases were managed in 189 OTP/TFP sites. More than half of the assessed woredas had adequate RUFT supply for the coming one month. There is no shortage of F75 and F100 in Stabilizing Center(SC) running woredas. Farther more there is referral linkage of children discharged from TFP to SF program in all assessed woredas.

In general the prevalence of malnutrition is getting similar with 2013 the same period report but there was aggravating factors like chronic shortage of water, drought, pasture deterioration and poor live stock products which are the main source of food. This condition reduces immunity and predisposes children and mothers to other diseases like, measles and pneumonia. This data was based on the admission criteria of MUAC < 11cm and/or edema. It was observed that in assessed woredas management of SAM was based on the national protocol. Weather condition

In the past five months from January to May 2014 after the occurrence of weather condition changed Arsi zone report showed that children's admitted for SAM were 2972. Total number of OTP site S/C in the zone was 91.Total OTP 2286 admitted in the health center was 223. In Bale zone children's admitted for SAM were 1953 and total number of children's admitted to S/C was 222. While total number of children's discharged were 193 (Fig. 29).

Figure 39: Arsi and Bale Zone SAM Cases Admitted Monthly, 2014

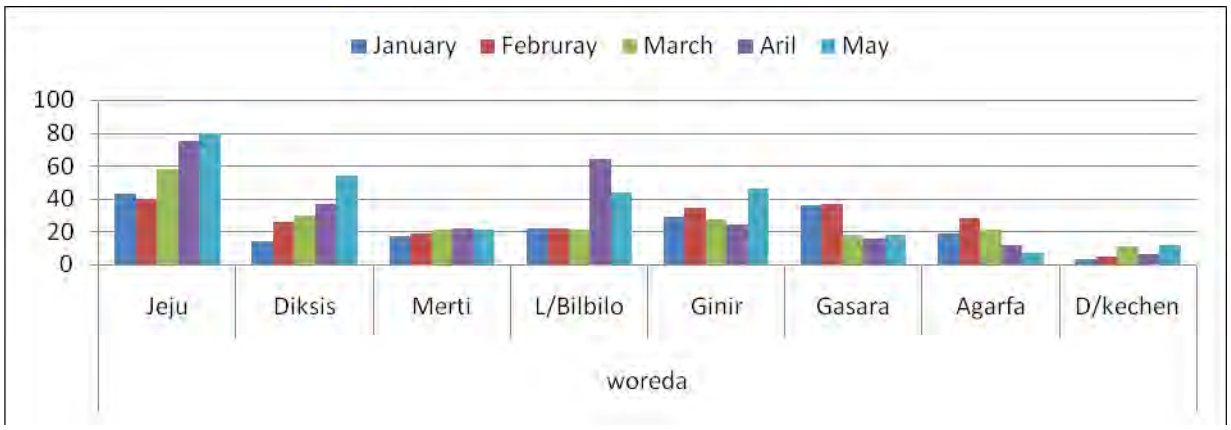

Figure 40: Arsi and Bale Zone, SAM Cases by Woredas, 2014

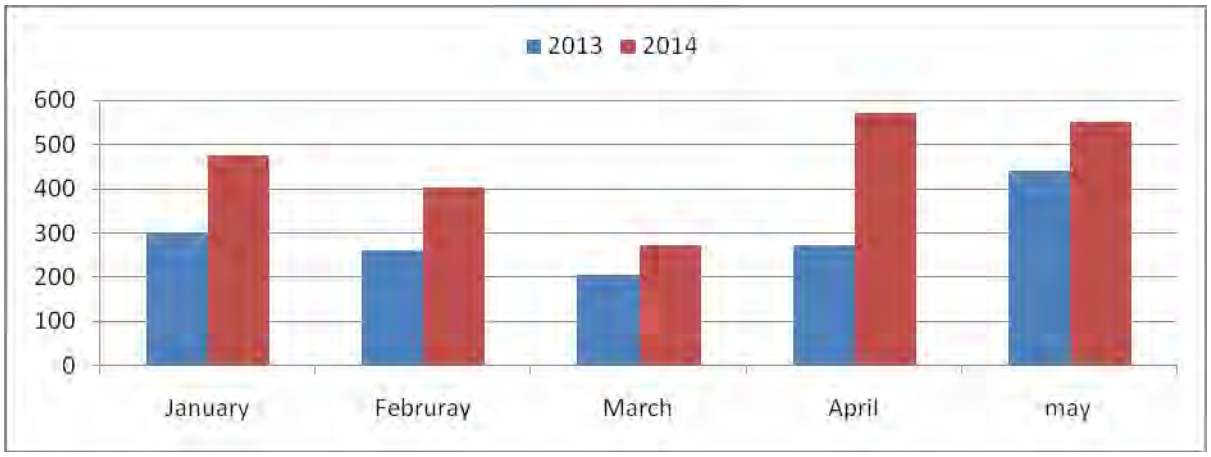

Figure 41: Arsi Zone Malnutrition Cases by Months from January to May 2013 And 2014

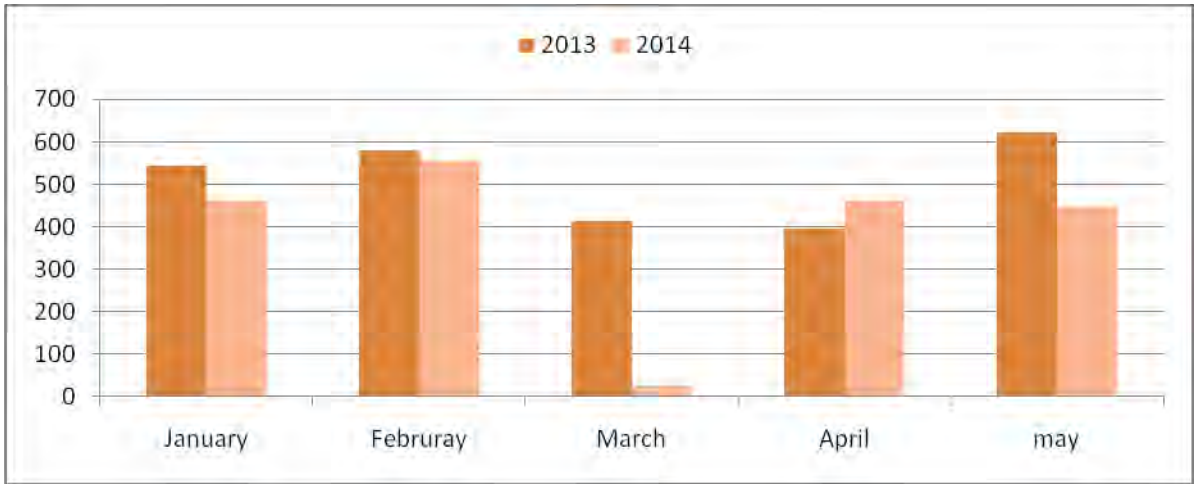

Figure 42: Bale Zone Malnutrition Cases by Months from January to May 2013 And 2014

5.9. Water

Regarding water in Arsi and Bale zone the potable water coverage were 69.25% and 70 % respectively in average and water coverage for affected woredas were Sude, Lemu bilbilo, Diksis, JeJu, Sire and Robe woreda 44.6%, 47.9%,64 %, 58.5%, 63.2% and 59.59% respectively (3). In Bale zone the coverage for visited woreda were Gassara, Ginir, Dawen ketchen and Agarfa woredas is 63%, 78%, 18% and 80% respectively. In all visited woredas there was chronic shortage and supply of water.

The main sources of water for the zone is rivers, springs, Bore hole, ponds, tape water and hand dug wells. There was chronic water shortage in all affected woredas. This is high in low land area that they were travelled 17 to 21 km to found water in Arsi and 3 to 15 km in Bale zone.

The team visited all affected woredas, particularly kebeles with very low water supply during dry season, for the reason that of inadequate amounts of Belg rain fall, its erratic destitution, dried shallow deep in nature, and not substituted by rain fall, and also the team observed that majority of ponds, shallow well, traditional deep well and spring would be dried up and most of peoples migrated intra and inter woreda with livestock to search water. Most of the woredas mainly depend on seasonal water sources such as ponds, as these sources are depleted during dry season the community live in affected woredas has the practice of migration with their herds to nearby woredas and intra woredas to seek water for their live stocks and themselves as well.

The problem in existing water source supply of both Arsi and Bale zone were, shortages of fuel in motorized water supply, maintenance problem in the line to the water source, pump failure in all have chronic water shortages. Wash: - Latrine coverage of the Arsi zone is 64% and latrine utilization 55% and in Bale zone latrine coverage is 61%, and latrine utilization was 61%. On the other hand in Bale zone there is no animal mortality and prevalence of livestock diseases recorded in all agro ecological zone.

In terms of Hygiene all of affected kebele residers develop a practice of poor hygiene both personal and environmental due to chronic shortage of water but latrine coverage and utilization were relatively in good condition despite of poor water available. Because of inadequate and

poor water supply humans and animals uses the same source of water for drinking, cocking, hygiene which was highly contaminated and dangerous for human health.

Figure 43: Human and animal uses the Same Sources for Drinking, June 2014

Figure 44: Human and animal uses the Same Sources for Drinking, June 2014

Figure 45. Discussion with Community Leader on Safe Water Supply June 2014

6. Major challenges

- Shortage of budget, transport as well as distributed supplies were near to expires.
- Overcrowding with poor environmental hygiene and drought.
- Shortage of budget and supplies for emergency response
- Lack of proper documentation and information.
- Average Latrine coverage and utilization.

7. Recommendation

7.1 Water

- Long term solution for areas experience chronic water shortage
- Urgent water supply for all in need (rationing).
- Sources of water used for drinking should be separated from animal use as much as possible

7.2 Health

- Strengthen emergency task force at zonal, woreda and kebel level to exchange information in early warning, early response and pool resources
- Stocks of essential drugs and medical supplies for emergency needs should be secured both at zonal and woreda

- Capacity building for health workers on PHEM, such as preparedness planning, forecasting emergencies, surveillance and reporting.
- All woredas should improve and strengthen recording, reporting and documentation of all activities.
- Allocate budget for emergency preparedness and response at all level
- Timely updating data at all level

7.3 Nutrition

- Strengthen all OTP sites through regular and consistent supportive supervision
- Link moderate cases and SAM discharged cases to SFP
- Strengthen enhanced outreach strategy
- Continue partners to work on nutrition program in the affected and assessed woreda.
- Provide training on SAM management protocol for supervisors (health workers) and HEWs no
- Provide adequate TFP supplies to respective sites.

Table 43: Summary of Budget Requirement

S/N	Item	Arsi	Bale	Total
1	Awd Response	190664	300000	490664
2	Malaria	146413	146413	292826
3	Measles And Nutrition	145009	450000	595009
4	Meningitis	686322	800000	1486322
5	Drug And Supplies	1500000	850000	2350000
6	Capacity Building	322892	200000	522892
	Total	**2991300**	2746413	5737713

Table 44: At High Risk Woredas and Type of Risks in Arsi Zone

S.No	At risk woreda	Types of risk	At risk population
1	Gololch	Measles	98790
2	Jeju	Measles	63067
3	Seru	Measles	27602
4	Sude	Measles	84774
5	Lemu bilbilooreda	Measles	93647
6	Onkolo wabe	Measles	33962
7	Merti	Malaria	110687
8	Dodota	Malaria	59933(75% of residers)
9	Zuway dugda	Malaria	127268
10	Jeju	Malaria	109338 (75% of residers)
11	Merti	AWD	110687

Table 45 : High Risk Woredas and Type of Risks in Bale Zone

S.No	At risk woreda	Types of risk	At risk population
1	Dawe serare	AWD, malnutrition	51925
2	Dawe kechen	AWD, malaria	34188
3	Barbere	AWD, Malaria	109754
4	Hora Buluk	AWD, malnutrition	98658
5	Laga hidha	AWD, measles	75450
6	Golocha	AWD, measles	122000
7	Raytu	AWD, malnutrition	40316
8	Sawona	AWD, malnutrition	79685
9	Dawe mana	Malaria	109261
10	Mada walabu	Malaria, meningitis	117679

Table 46: Human Resources

Arsi zone Human resources				
S.No	Types of health facility	Number	Types of Profession	Number
1	Hospital	2	Doctors	12
2	Health Center	95	Health Officers	124
3	Health Post	499	Nurses	948
		-	Pharmacy	112
		-	Lab	104
		-	Sanitarian	54
	Total	596		1354
Bale zone Human resources				
S.No	Types of health facility	Number	Types of Profession	Number
1	Hospital	4	Doctors	29
2	Health Center	80	HO	102
3	Health Post	371	Nurse	1003
			Lab	131
			Pharmacy	95
	Total	455		1360

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CHAPTER VIII –EPIDEMIOLOGIC RESEARCH PROJECT PROPOSALS

8.1 Effectiveness of Cold Chain Management for Vaccines and factors contributing for poor cold chain management in Addis Ababa, 2015

Executive Summary

Background: Good cold chain management and reduction in vaccine wastage is an important quality and financial aspect in maintaining an effective national immunization program. Vaccine wastage and its cost is a common problem for all immunization programs. Assessing the frequency and causes of vaccine wastage can help to target efforts to reduce vaccine potency failures and minimize unnecessary extra service delivery costs.

Objective: To assess the Effectiveness of Cold Chain Management for Vaccines and factors contributing for poor cold chain management in Addis Ababa, 2015

Methods: We will conduct a cross sectional study of cold chain management from October to November 2015. Data collection methods will include questionnaires, observations and document desk review. Of all 157 health facilities, 63 health facilities will be included in the study 36 government and 27 private health facilities providing immunization activity will be included in the study using lottery method. Data collectors will be 8 diploma nurses and 2 BSC nurse supervisors. Data collectors will be trained for one day over all on the data collection instruments. Data will be entered, edited and cleaned using Microsoft Excel and Epi info software version 7.1. Then data will be analyzed and presented using bar and line graphs and tables. This research will be approved by the Ethiopia public health institute. Interviews will be performed after explaining the objective of the study to nurses, health officers and pharmacist and will be obtained the consent of the respondents for in-depth interview.

Study Period and Budget: The study will be conducted from 1st October –30, November 2015. To conduct this study a total of 80,740 **Birr** is required.

Key Words: Vaccine, Cold Chain, Ethiopia, Effectiveness

1. Introduction

The term ‘cold chain’ is defined as the maintenance of vaccines at stable temperatures throughout the process of transportation and storage from site of manufacture through to vaccine administration. Maintaining the vaccine cold chain is an essential part of a successful immunization programme, because immunological potency of vaccines can be compromised on exposure to extreme temperatures. Retaining stability of vaccine potency from manufacturer through to delivery requires maintenance at every step of a cold chain infrastructure (1).

The World Health Organization guidelines and manufacturers’ guidelines all recommend national schedule vaccines be kept at +2 to +8°C (except oral polio) (2). Potency cannot be guaranteed when vaccines fall outside the manufacturer’s recommended range (1). Environmental damage by freezing is generally the most significant threat to vaccine integrity, with the most freeze-sensitive vaccine being hepatitis B vaccine (3). Exposure to freeze damage is a significant problem internationally, with reports of as much as 75–100% of freeze-sensitive vaccine being damaged (4).

Good cold chain management and reduction in vaccine wastage is an important quality and financial aspect in maintaining an effective national immunization programme (5). Vaccine wastage and its associated costs is a common problem for all immunization programmes (6). For example, a US study conducted in 1998/1999 estimated a national wastage of approximately US$6–31 million worth of vaccine compromised by cold chain failure or lapses in expiration in the public sector (7).

When the delivery of vaccines occurs in primary care, breaks in the cold chain are common, particularly with exposure to unacceptably cold temperatures. As many as one quarter of all primary care refrigerators may be freezing vaccines (8).

Assessing the frequency and causes of vaccine wastage can help to target efforts to reduce vaccine potency failures and minimize unnecessary extra service delivery costs (7). New Zealand (NZ) purchases scheduled vaccines nationally, distributes them to regional stores, and from there on to the primary care practices which are the main site of vaccination delivery. Historical cold chain surveys in NZ have shown that around one-fifth of freeze-sensitive vaccines had been cold

exposed at some stage along the distribution chain and nearly 8% of heat-sensitive vaccines had been heat exposed (9).

In December 2002, routine ongoing monitoring of the NZ cold chain between the National Vaccine Store (NVS) and the point of delivery was introduced. Vaccine vial monitors (VVMs) have been used to monitor and measure the adequacy of the cold chain since that time (10). Five percent of scheduled childhood immunization vaccine packs have a heat-sensitive monitor (WarmMark®) or a cold-sensitive monitor (ColdMark®) attached at the NVS, along with a record card.

Given its composition, to preserve its potency and safety, each vaccine should be strictly kept within a specific range of temperature from manufacturer to the recipient. The maximum vaccine potency is preserved by, among other things, maintaining its functional cold chain system at all levels. It implies for those involved, mastering vaccines sensitivity to temperature and being adequately skilled and equipped regarding conditions of storage and transportation for each vaccine as well as cold chain and power supply monitoring (4-11). The Cameroon National Standard Operating Procedures (SOPs) for EPI activities is a dynamic document that recommends storing vaccines at different levels (12).

The monitoring of cold chain at each level is to be insured by trained personnel. Each health facility in charge of storing vaccines or organizing vaccination sessions should have adequate functional cold chain equipment. To monitor the temperature in the freezer or refrigerator used to store vaccines, temperature should be read twice daily and recorded on the temperature sheet pasted on it. Temperatures out of recommended range are recorded in red. A plan of contingency to maintain vaccines in recommended range of temperature when the cold chain equipment is broken or when power supply is interrupted should be pasted on cold chain equipment and implemented as indicated. To follow up and monitor EPI activities, all IHC and DHS personnel have to be periodically trained, supervised and evaluated (13).

Health care delivery in Ethiopia has as objective to make Primary Health Care (PHC) accessible to the entire population through the decentralization of the health management process to the health district level (13). Thus the health system is organized in three levels including the central, the regional and the Health District. The health policy and strategies are elaborated from central

level and implemented at the district level by the DHS. Resources are mainly allocated by the state budget, local communities, international and national organizations.

Power supply in the Ethiopia varies from one locality to another. Hydroelectricity is the cheapest and main power source in urban and semi urban areas, but it is still not available in many rural localities where kerosene, solar, natural gas and in some occasion generators are the main sources for cold chain.

Considering the unequal distribution of power supply, lack of information on availability of cold chain equipment, shortage of trained and motivated health personnel, this study was designed to attempt to answer to the question whether in targeted health districts, cold chain status at health district level complies with the national SOP.

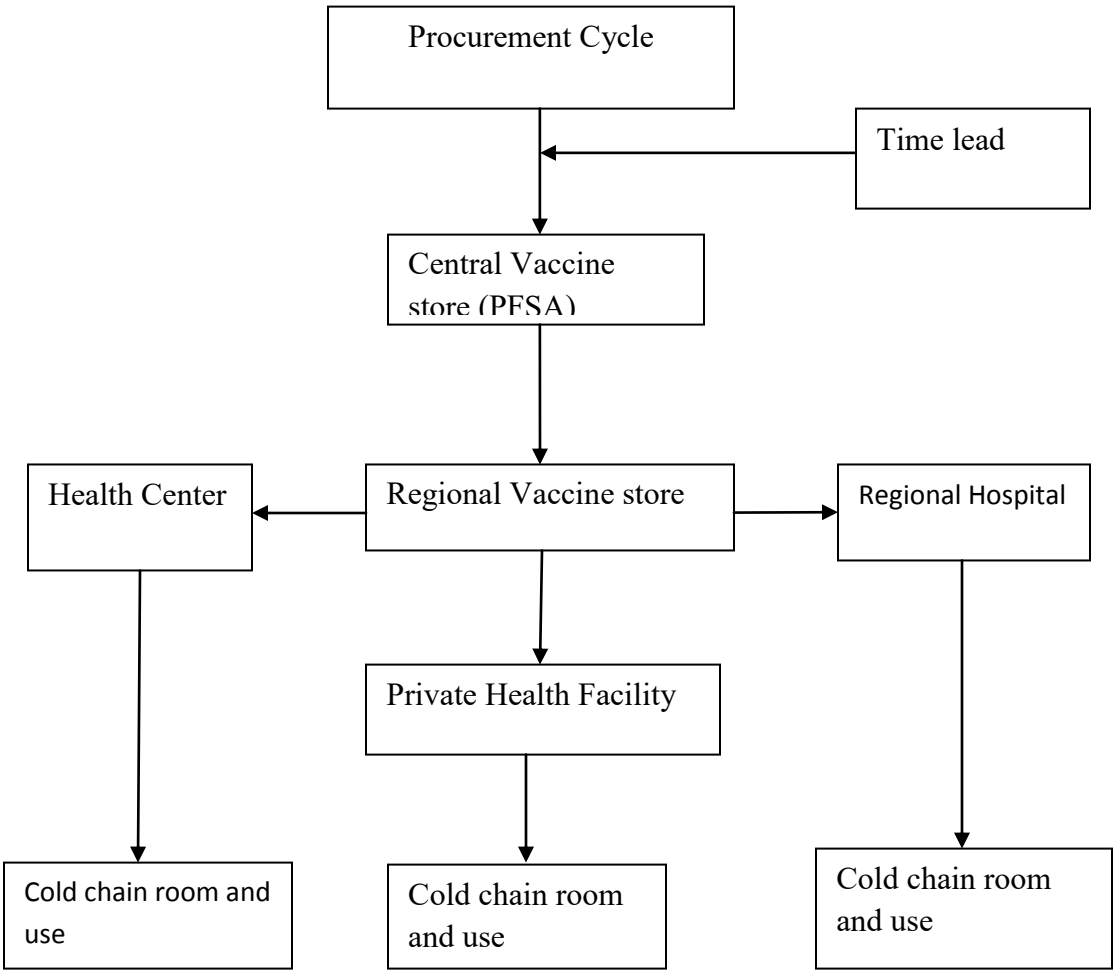
1.1 Statement of the Problem

The task is to specify a logistics and stock management information system to optimize the cold chain management in Ethiopia. As for all national vaccine supply chains, the vaccine's Sensitivity to heat poses a risk of waste, especially for the health facilities. The current system is paper based and includes the use of stock cards which is predominant in most health centers, about 80% practice. This system is very inefficient and prone to errors (including transcription errors), is not granular enough to be useful, and cannot forecast demand of inventory and makes it tedious to extract useful information for decision making at any level of the supply chain. Ethiopia has switched to a number of vaccines like the single dose pentavalent vaccine (a few years ago), the pneumococcal and plans to introduce the Rota vaccine. These vaccines are bulky and more expensive both to purchase and store. Thus, it is essential that an improved and efficient logistics system is put in place to reduce waste, stock outs, overstocking, and expired stock, and to improve on decision and information flow between the national cold storage, the regional health facilities, and every level of the vaccine supply chain.

1.3 Conceptual Framework

Conceptual Model for vaccines and cold chain distribution in Addis Ababa

This model tries to explain some major causes that may lead to problems in distribution system and poor vaccines storage practices at the healthcare facilities.



2. Objective

2.1 General Objective:

- To assess the vaccines cold chain distribution system in public healthcare facilities in the Addis Ababa region, Ethiopia 2015

2.2 Specific Objectives:-

- To determine the availability of vaccines at the healthcare facilities.
- To determine the average stock out duration at the healthcare facilities.
- To assess the storage conditions of vaccines at the healthcare facilities
- To determine the level of knowledge of the healthcare workers on storage and handling of vaccines.
- To identify profession of personnel involved in handling and dispensing vaccines at healthcare facilities.

Literature Review

This chapter reviews various research studies and literatures on effects and consequences brought about by improper vaccine distribution system and poor vaccine storage and handling to the community. The chapter examines various research studies and reports done locally (Ethiopia), regionally (Africa) and globally. The chapter also reviews some common types of vaccines currently available in routine immunization at healthcare facility for human being.

1.2.1 Global perspective on vaccine distribution and management

A study conducted in Bali province Indonesia regarding improving the human health cold chain and vaccine management indicated that there were urgent needs for improvements in management of vaccine. Approximately half of the refrigerators were unsuitable for vaccine storage generally in poor condition, temperature was not monitored. As a result healthcare workers did not know if the temperature of refrigerator was within the recommended range at 2-8 0C. In additional vaccines were arranged inappropriately in the refrigerators, and were mixed with other items including expired and partially used vaccine vials. (Vogel, et al, 2011) In a cross sectional study that was conducted in Toronto Canada, staff responsible for vaccine storage were interviewed about their knowledge and practices of vaccine handling and storage. Refrigerators

were inspected, fewer than 7(6%) practices staff answered all questions related to vaccines storage and handling correctly, and only 11(10%) refrigerator had thermometer.

One –third of refrigerators had temperatures outside the recommended range of 2 to 8 degrees centigrade. Older refrigerators were more likely to had inappropriate temperature than newer ones. Knowledge and practice of vaccine storage and handling were often inadequate in primary care physician's offices (Yuan, et al, 1995). The study conducted in Secunderabad India concerning vaccine distribution found that the implementation of an Immunization program in the rural areas was affected by gap in the distribution system. The study also identified other problem areas such as a faulty cold chain and need for an improved monitoring and control system and for better supervision (Subramanyam, K. 1989)

1.2.2 African perspective on vaccine distribution and storage management.

The cold chain in the last mile is particularly labor intensive during immunization campaigns, such as those conducted across sub-saharan Africa against Meningitis A. Given the size of the target populations the logistical challenges in maintaining the cold chain, from faltering electricity, poorly functioning or absent equipment, to ice pack production capacity, were significant.

1.2.3 Ethiopia perspectives on vaccine distribution and storage management

The vaccine management assessment conducted in December 2009 assessed 2 Central Vaccine Stores (CVS), 13 Regional Vaccine Stores (RVS), 14 District Vaccine Stores (DVS), and 28 Health facilities based on 11 standard criteria (MOHSW, 2010). The overall average score on vaccine management performance was 79% for all levels. The National level was 89%, Sub-national level was 74% (RVS/DVS) and for Service level was 75%.The assessment established that the vaccine arrival procedure is good, the health workers have high knowledge on the use of Vaccine Vial Monitors (VVMs) and the Multi Dose Vial Policy (MDVP). However, vaccine storage temperatures, vaccine stock management, effective vaccines delivery and correct diluents use for freeze dried vaccines need to be improved. In view of the above studies conducted in Ethiopia, it is observed that previous assessment studies focused on vaccine management in totality and there is no specific study that has been done with a special attention to Effectiveness

of Cold Chain Management for Vaccines and factors contributing for poor cold chain management in Addis Ababa, 2015

Given this existing gap, this study will assess Effectiveness of Cold Chain Management for Vaccines and factors contributing for poor cold chain management in Addis Ababa and healthcare personnel's knowledge on storage and proper handling of vaccines at health care facilities. The potency of vaccines, and test kits depends on maintaining of cold chain. Vaccines must be kept at precisely controlled temperatures range from the point of manufacture to the point of administration. Cold chain defects are a frequent cause of problems in immunization programs (MSH Managing Drug Supply, 1997). National, Regional, District and healthcare vaccine stores should be equipped with standby generators to ensures that vaccines and other products are protected in the event of a power failure.

Freezing is as damaging as high temperature for some items, including injectables such as adrenaline and ergometrine, contraceptives, insulin and vaccines such as the Diphtheria, Pertussis Tetanus, Toxoid Tetanus and hepatitis B vaccines. Toxoids which frozen can be detected by the ―shake test‖ method (MSH, Managing Drug Supply, 1997). As a result loss of potency occurs and medicines need to be discarded. Vaccines, blood products and some other medicines lose potency if kept, even briefly, at temperatures outside the recommended range. For these products, the cold chain must be maintained at every stage (MSH, Managing Drug Supply, 1997). Any electrical power black-outs must also be recorded including the period during which the vaccines were exposed to uncontrolled temperatures. Vaccines are then discarded or kept depending on the manufacture advice (MSH, Managing Drug Supply, 1997).

Considering the unequal distribution of power supply, lack of information on availability of cold chain equipment, shortage of trained and motivated health personnel, this study was designed to attempt to answer to the question whether in targeted health facilities, cold chain status at health facility level complies with the national SOP.

3. Methods and Material

3.1 Study area and period

The study will be conducted from 1st October –30, November 2015 in Addis Ababa a capital city of Ethiopia, which was established in November, 1887 by Emperor Minilik II and Empress Taitu , currently serve as the Federal Capital of Ethiopia and a Chartered City; having three layers of Administration: City Government at the top, 10 Sub City Administrations in the Middle, and 116 Woreda Administrations at the bottom, covers an area of 540 square kilometers with a total Population of 3,167,036, with 59,209 children aged 12-23 months with the annual growth rate of 2.1%. A total of 157 health facilities, of which 4 hospitals, 86 health centers and 67 private health facilities providing EPI health services in Addis Ababa.

3.2 Study Design

A retrospective facility based cross sectional study will be employed

3.3 Study population

All 157 health facilities, 90 government and 67 private health facilities providing immunization and managing cold chain activity will be included in the study.

Inclusion criteria

Pharmacist in-charges of the healthcare facility vaccines store or any other health personnel employed as in-charges of the vaccines and cold chain store in respective healthcare facilities for a period of not less than 6 months, immunization focal person,

Exclusion criteria

Those healthcare personnel who were unwilling to participate and those who were on leave during the study

3.4 Sampling procedures and Sample Size determination

Sample size will be determined based on 80% power, 95% CI and Vaccine storage in the refrigerator was not proper in 73.4% HF (14). A total of 63 health facilities of which 36 government and 27 private health facilities will be included in the study. The study will include regional levels vaccine stores and employs a multi- stage sampling technique in selecting sub

cities and health facilities. A multi-stage sampling will be done for the sub cities to ensure representation from the different levels of EPI service delivery. Multi-stage randomly sampling of 4 sub cities came up with 63 health facilities. At each sub cities, one regional hospital will be selected plus 10 healthcare facilities that will be randomly selected within each sub cities in which 2 will be healthcare centers and 7 will be vaccine dispensaries and added up to made a large representative sample of the facilities surveyed during the study period which was 10 facilities per sub cities.

Total for region: 36 public healthcare facilities and 27 private health facilities will be included in the study to make a total of 63 public healthcare facilities.

. -At Regional level – 1 Regional Vaccine Store were assessed

-At sub city level – 4 sub city Vaccine Stores will be assessed

Random selecting public healthcare facilities from sub cities

Step 1: The sub city public hospitals will be selected from a list of all public health care facilities in the sub city.

Step 2: The selection of second facility will be involved identified all primary health facilities in the sub city and randomly selected one.

Step 3: Number they remained primary health facilities that will be health centers and dispensaries.

Step 4: Calculate the sampling interval. For example if there were 20 public health facilities in the sub city and 10 were to be chosen. The sampling interval will be calculated by dividing the total number of facilities by the number selected, 20/10=2

Step 5: Identify the third, fourth, fifth up to tenth facilities

-chosen random whole number between 1 and 4, for instance 3.

- The third facility will be the one numbered 3

-Added the sampling interval to the randomly chosen number 4 + 3 = 7

-The fourth facility will be number 7

-The fifth facility 4 + 7 = 11 continues until all 10 facilities are chosen.

The same process illustrated above was used to select public healthcare facilities in each of the 4 geographic sub cities included in the survey. Selected sub city in the regional and their healthcare facilities will be included in study.

Sample size calculations:

Population size, n In each of the selected levels information will be collected from the following:-

-At Regional level will be =2 people

-At HF level = 2 people * 4 sub city =8people

- At healthcare facility level personnel in charge of vaccine storage and immunization focal person = 2 people

Healthcare facilities that will be selected in region= 63

People that will be interviewed at public healthcare facilities= 63* 2 =126

People that will be interviewed at Regional and sub city level administrative level =10

Total numbers of people who will be interviewed are 136 and assessment will be on 63 Public Health care facilities.

II. Qualitative part:

Ten Key informants (Nurses and Pharmacist) will be selected based on their exposure to immunization or cold chain management from the Study area and these will be communicated and brought others until saturation reached. Data consisted of empirical observation of practices such as, the opening and closing the fridge, the presence of temperature charts, the reading of thermometers and the presence of other products than vaccines in the fridge. As the logbook constitutes a valuable source of information, it was carefully and empirically studied to identify issues related to information on cold chain management. To assess vaccine distribution from the district to the health facility, the vaccine distribution and routine reports at the district level were reviewed by comparing the activities performed and the amount of vaccines physically received by the health facility. Depots located in the main health facility, were also observed to try and understand could chain practices at this level

3.5 Data collection

The data collection tool will be developed from the cold chain supervision grid in the SOPs on EPI in Ethiopia. It will be pre-tested in health facilities providing immunization (where such facilities will be excluded from the main study), reviewed and the last version will be adopted by authors. Also cold chain management guideline and observation check list will be employed. Data collectors will be 8 diploma nurses and 2 BSC nurse supervisors. All data collectors and

supervisors will be diploma and BSC nurses who had been previously involved in EPI activities at different level and will be trained for one day and evaluated before their involvement in the data collection process. Data will be collected by Interview, observation of the cold chain and by reviewing related documents. This will be done on the availability of cold chain equipment, power supply, ice packs, temperature record sheets and thermometer. Information on vaccines and diluents storage conditions, temperature recording and its variations out of recommended ranges in two previous months and at the moment of evaluation will also collected. In addition, it will be verified and recorded if ice packs will adequately dispose and if food or other non recommended products will be found in the refrigerator.

3.6 Data Analysis

Data will be entered, edited and cleaned using Microsoft Excel and Epi info software version 7.1. Then data will be analyzed and presented using bar and line graphs, and tables. Bivarate and multivariate logistic regression analysis will be conducted to explore factors associated with poor cold chain management.

3.7 Pre-Testing of Tools

The data collection tools (interview and facility indicator forms) will be tested at 4 different facilities in order to validate them prior to roll out to a larger scale. Data collecting tools will be modified accordingly upon completing the pilot study.

3.8 Ethical Issue

All study participants will be sought informed consent about the purposes of the study and they sign a written consent prior to enrolment. The name of the study participants will not be mentioned and any information received will be used only for the study purpose to keep the confidentiality. The study will be receiving ethical approval from the Ethiopian Public Health Institute Ethical Committee. Also ethical approval from Addis Ababa regional health bureau ethical committee will be received. The finding of this study will benefit both the study participants and the community at large.

3.8 Dissemination, notification, and report of results

The result of this study will be disseminated to relevant bodies such as EPHI, FMoH, Addis Ababa University, EPHA, Addis Ababa City Administration Health Bureau, and all other concerned parties through email and hard copy. Also the findings of this study will be made ready for possible publication in a reputable journal.

Operational definition

Cold Chain: a network of refrigerators, cold stores, freezers and cold boxes organized and maintained so that vaccines are kept at the right temperature to remain potent during vaccine transportation, storage and distribution from factory to the point of use.

Active Cold Chain (Materials for producing cold): These include active thermal systems that do not use any phase change materials (PCM) such as water/ice or dry ice. These systems use mechanical or electric systems powered by an energy source, combined by thermostatic control to maintain proper product temperatures.

Passive Cold Chain (Shipping/storage materials): These include passive thermal systems that commonly use phase change materials (PCM) such as water/ice or dry ice. These shipping systems are the most basic and cost effective.

Evaluation of Existing Means: The system for guaranteeing vaccines quality is generally referred to as “cold chain”. Cold chain management has two categories: managing equipment and managing people.

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8.2 Post Outbreak Risk Assessment of Dengue Fever, and Opportunities for Integrated Control and Elimination in Dire Dawa Town, Ethiopia 2015.

Executive Summary

Background: Dengue fever is the fastest emerging arboviral infection spread by Aedes mosquitoes with major public health consequences in over 100 tropical and sub-tropical countries in South-East Asia, the Western Pacific and South and Central America. In Ethiopia Dengue Fever have been emerging in Dire Dawa in 2013, Somali and Afar region in 2014. The purpose of this study is to conduct Post Outbreak Risk Assessment of Dengue Fever in Dire Dawa, Ethiopia, and Opportunities for Integrated Control and Elimination

Methods: A community-based cross sectional study will be conducted in Dire Dawa City Administration during the period June through December 2015. A total of 438 households will be included in the study. Simple random sampling technique will be used to select the households. List of households will be received from regional Central Statistics Agency (CSA) and then simple random sampling table will be used to identify the households. Data collection methods will include structured questionnaires, observations of breeding sites for insects and document review. In addition, qualitative data will be collected by principal investigator using open-ended questionnaire from 10 key informants. Data collectors will be 8 diploma nurses and 2 BSC nurses supervisor and one day training will be provided over all on data collection instruments. Data will be entered into computer using Epi.Info version 7.1.3.10 and SPSS version 16.0. Univariate and multivariate logistic regressions will be used where presence of previous case in the house hold were dependent variables and demographic variables age and gender, clinical variables, source of water, waste disposal will be the independent variables. The results will be expressed as odds ratios (ORs) and 95% confidence intervals (95% CIs) with p-value < 0.05 will be considered significant. Qualitative data will be thematicaly analysezed by principal investigator and presented.

Study Period and Budget: The study will be conducted from April through August 2015. To conduct this study a total of 100,164 Birr (about USD 5,000) is required.

Key words: Aedes mosquitoes - Dengue Fever /Dengue Hemorrhagic Fever, Dire Dawa, Ethiopia

1. Introduction

1.1 Background

"Dengue" is an African word meaning "bone breaking" because it causes severe joint and muscle pain that feels like bones are breaking. It is an infectious disease mainly transmitted by female mosquito, Aedes aegypti, and causes four serotypes of dengue viruses [1]. The first epidemic of dengue was recorded in 1635 and World Health Organization (WHO) estimated that about 50-100 million cases of dengue are recorded from all over the world annually, and two fifth of the world population is at risk and more than one hundred countries have been affected by dengue or DHF/DSS epidemics [1].

Today about 2.5 billion people, or 40% of the world's population, live in areas where there is a risk of dengue transmission. Up to 50 million infections occur annually with 500,000 cases of dengue hemorrhagic fever and 22,000 deaths mainly among children. Prior to 1970, only 9 countries had experienced cases of dengue hemorrhagic fever (DHF) [2]. Several factors have combined to produce epidemiological conditions in developing countries such as rapid population growth, rural-urban migration, inadequate basic urban infrastructure (eg. unreliable water supply leading householders to store water in containers close to homes) and increase in volume of solid waste, such as discarded plastic containers and other abandoned items which provide larval habitats in urban areas. Increased air travel and breakdown of vector control measures have also contributed greatly to the global burden of dengue and DHF [2].

Dengue is characterized by high fever, headache, and pain in various parts of the body, prostration, rash lymphodenopathy, and leucopenia. DHF is a severe febrile disease characterized by abnormalities of homeostasis and increased vascular permeability which may result into DSS [3]. Dengue viruses, the causative agent of dengue fever and dengue hemorrhagic fever, are comprised of four distinct serotypes (DEN-1, DEN-2, DEN-3, and DEN-4) and are members of the family Flaviviridae, genus *Flavivirus* [4].

A survey conducted in India showed Dengue cases were more during September to November only, which is similar to most of the previous outbreaks in India. It may be because this season is very favorable for high breeding of the vector, i.e., *Aedes aegypti*. This seasonal outbreak of disease transmission is very important at local level for effective control measures. The study

draws attention toward the male, young adult age group. Dengue infection is no more an urban area infection but it has penetrated in rural areas also [5].

Also a study done in Zambia reveled that Aedes aegypti commonly bites during the day and therefore the use of ITNs would not be expected to provide a barrier between the humans and this Dengue fever transmitting vector. Considering the outdoor activities participated in during the day including farming, fishing, and socializing, the population may be at risk of being bitten by the vector [6].

Vector control is known to be a good method for prevention of vector borne diseases. There are several reports from India which have demonstrated resistance of mosquito vector with anti larval substances like DDT and dieldrin but susceptibility to malathione is reported. Temephos is relatively more effective in controlling Aed. Aegypti, followed by fenthion, malathion and DDT. Peridomestic thermal fogging reduced the resting and biting for the 3 days after treatment, whereas indoor fogging suppressed adult populations for 5 days [7].

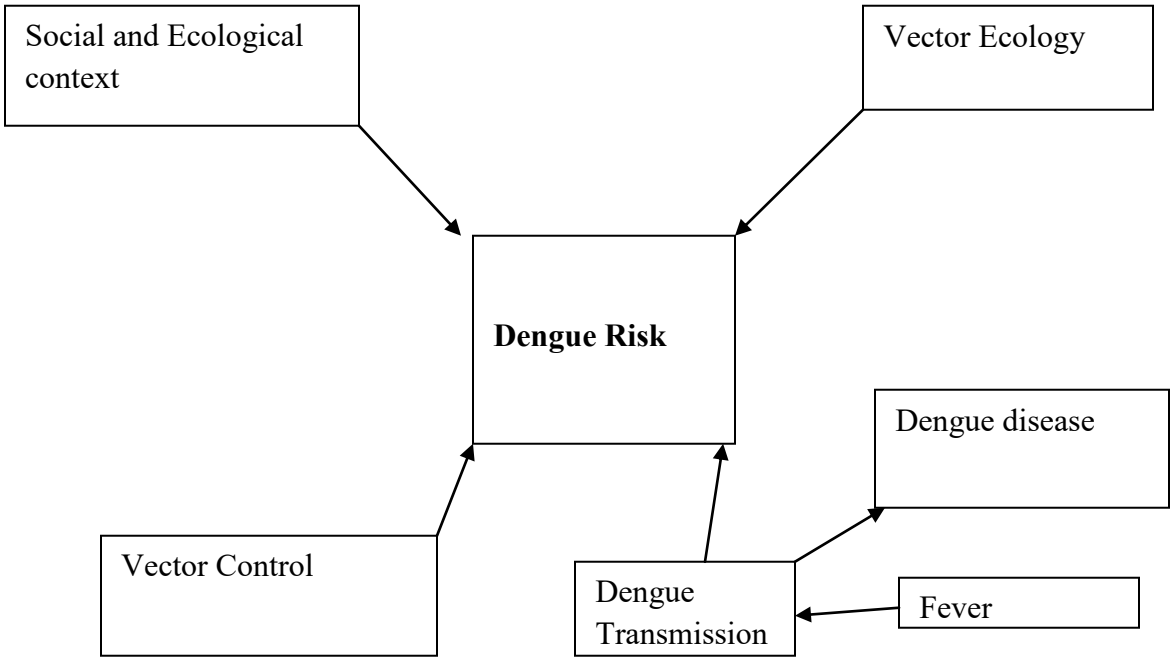
Ethiopia reported Dengue outbreak for the first time in 2013. During an international consultative workshop in 2014 key recommendations were forwarded for strengthening dengue prevention and control in Ethiopia: expand the scope of the existing Malaria Control Program to include Dengue Fever and other Vector-Borne Diseases; initiate dengue surveillance by establishing sentinel sites at health centers and hospitals in the most affected areas of Dire Dawa, Afar and Somali Regions; strengthen capacity for laboratory diagnosis and case management; develop an integrated vector management strategy and plan of action; establish a coordination mechanism with relevant sectors, including establishment of a multi-sectoral task force; work with partners such as WHO, CDC and AFENET for capacity building in case management, integrated vector management and surveillance; actively engage in Advocacy, communication and social mobilization [8].

This study will be conducted with the aim of Post Outbreak Risk Assessment of Dengue Fever in Dire Dawa, Ethiopia, and Opportunities for Integrated Control and Elimination.

8.2 Statement of the problem

Dengue fever, which was caused by Dengue virus infection, had become a major public health problem in the tropic and subtropical countries including Ethiopia. Dengue virus had four serotypes (DENV-1, DENV-2, DENV-3 and DENV-4), based on their immunogenic in the human body. Preventive measure will be necessary to decrease the prevalence of dengue fever, by strengthening prevention and control methods.

8.3 Dengue Fever Conceptual Frame Work



2. Objective

2.1 General Objective

- To conduct Post Outbreak Risk Assessment of Dengue Fever and Opportunities for Integrated Control and Elimination in Dire Dawa, Ethiopia,2015.

2.2 Specific Objectives

- To investigate lesson learned and challenges in prevention activities
- To describe factors associated with the occurrence of Dengue Fever
- To assess level of current preparedness and interventions activity

Literature Review

There was a serious outbreak in Rio de Janeiro in February 2002 affecting around one million people and killing sixteen. In Singapore, there are 4,000–5,000 reported cases of dengue fever or dengue haemorrhagic fever every year. In the year 2004, there were seven deaths from dengue shock syndrome. here is an ongoing 2010 outbreak occurring in Puerto Rico with 5382 confirmed infections and 20 deaths [9].

American visitors to and visitors from dengue-endemic regions will continue to present a potential pathway for the dengue virus to enter the United States and infect populations that have not been exposed to the virus for several decades. An epidemic broke out in Bolivia in early 2009, in which 18 people have died and 31,000 infected [9].

For 2011 until April 16, Brazil has recorded some 56,882 cases with 39 deaths, Paraguay with 27,000 cases and 31 deaths. Dengue deaths have tripled in Malaysia until Feb 2014 over 2013, after tripling 2013 over 2012. A study claims India has 6 million unreported dengue cases annually,[84] while in Guangdong, China, a 15-fold increase over last year and 5-fold increase of mosquitos has left the normally lightly hit region stunned [9].

Viral etiologies of fever, including dengue, Chikungunya, influenza, Rota and adeno viruses, and cause major disease burden in tropical and subtropical countries [10]. According to the World Health Organization (WHO) September 2013 statistics, the incidence of dengue has grown dramatic world's population – are now at risk from dengue [11].

Ethiopia reported Dengue outbreak for the first time in 2013. Then in 2014 Dengue Fever cases were reported from Somali and Afar region which affects more than 10,000 people even though no post outbreak assessment was conducted to identify risk of disease re-emergency and level of preparedness. To our knowledge no post outbreak assessment conducted during literature review. This study will come up with challenges and level of preparedness after outbreak contained.

3. Methods and Material

3.1 Study area and Period

The study will be conducted from April to August 2015 in Dire Dawa town, Ethiopia. Dire Dawa is located in the eastern part of the country enclosed by the State of Somalia and the State of Oromia. It is found at a distance of 515 Kilometres from Addis Ababa. It is Ethiopia's second

largest city. Based on 2002 (EFY) figures from the Central Statistical Agency (CSA) of Ethiopia, the Dire Dawa Region has an estimated total population of 369,641 consisting of 185,377 male and 184,264 female. 32.2% of the population is estimated to be rural inhabitants, while 67.5% are urban dwellers (CSA 2007).The city of Dire Dawa was founded in 1902 as "…. a relatively lowland link (1200 m).The council has no administrative zones but one woreda - Gurgura woreda. There are 4 Higher (Keftegnas), 24 urban kebeles and 28 rural peasants associations. The administration has an estimated area of 128,802 hectares. The region is selected purposively based on their Dengue Fever outbreak in 2013. According to the 2002 (EFY) Health and Health Related Indicators published by FMoH, Dire Dawa has one hospital, 15 health centers and 34 health posts. An estimated area of 1,558.61 square kilometers, this region has an estimated density of 237.2 people per square kilometer.

3.2 Study Design

A community-based cross sectional study will be conducted in Dire Dawa City Administration during the period April through August 2015.

3.3 Source Population

All residents of Dire Dawa City Administration

3**.4 Study Population**

A total of 438 households will be included in the study.

3.5 Inclusion and Exclusion criteria

Inclusion Criteria

- All households who give verbal or written consent to participate in the study will be included.

Exclusion criteria

- Those households who refused to participate and absent during the study period will be excluded.

*3***.6 Sampling and data collection**

The sample size will be calculated based on population proportion formula

$$N = \frac{(Za)^2[p*q]}{d2}$$

P: The prevalence of the condition/ health state. The prevalence of Dengue Fever is unknown so we used 50% (prevalence in Ethiopia is unknown).

q:. When p is in percentage terms: (100-p)

d: The precision of the estimate. This could be either the relative precision, or the absolute precision 95%.

Zα [Z alpha]: The value of z from the probability tables. If the values are normally distributed, then 95% of the values will fall within 2 standard errors of the mean. The value of z corresponding to this is 1.96 (from the standard normal variate tables).

The formula for estimating sample size is given as: that is, "Z-alpha squared into pq; upon d-square" substituting the values of Za, we get:

$$N = \frac{(1.96)2[p*q]}{0.05^2}$$

$$N = \frac{(1.96)2(0.50*0.50)}{0.05^2}$$

N= 398

Adding the non response rate of 10% = 40 households

The final sample size will be 438

Simple random sampling technique will be used to select the households. List of households will be received from regional CSA and then simple random sampling table will used to identify the households. If any house hold refused new household will be selected. For one household with previous history of Dengue Fever; two households with no previous history of Dengue Fever will be selected from nearest household to the case reported. Data will be collected using a structured questionnaire, information on age, gender, level of education, water source, waste disposal and ITNs and IRS activities. Data collection methods will include questionnaires, observations of breeding sites for insects and document review. In addition, qualitative data will be collected by principal investigator using open-ended questionnaire from 10 key informants until saturation obtained. Data collectors will be 8 diploma nurses and 2 BSC nurse supervisors. Data collectors will be provided training for one day over all on the data collection instruments. The health workers will be blinded for the study to minimize bias. The interviewers will be carefully

supervised daily and data checked for completeness and any ambiguity will be addressed before next day duty.

3.7 Data Analysis

Data will be entered into computer using Epi.Info version 7.1.3.10 and SPSS for Window, version 16.0. The mean and standard deviation will be calculated for numerical data and frequency distribution will be calculated for nominal or ordinal variables. Bivariate and multivariate logistic regressions will be used where presence of previous case in the house hold were dependent variables and demographic variables age and gender, clinical variables, source of water, waste disposal will be the independent variables to identify association. The results will be expressed as odds ratios (ORs) and 95% confidence intervals (95% CIs) with p value < 0.05 will be considered significant. Qualitative data will be thematicaly analysezed by principal investigator and presented.

3.8 Ethics

All study participants will be sought informed consent about the purposes of the study and they sign a written consent prior to enrolment. The name of the study participants will not be mentioned and any information received will be used only for the study purpose to keep the confidentiality. The study will be receiving ethical approval from the Ethiopian Public Health Institute Ethical Committee. Also ethical approval from Dire Dawa town health bureau ethical committee will be received. The finding of this study will be distributed for stake holders as this benefit both the study participants and the community at large.

3.10 Dissemination, notification and report of results

The result of this study will be disseminated to relevant bodies such as FMoH, EPHI, Addis Ababa University, EPHA, Dire Dawa Health Bureau and all other concerned partners through email and hard copy and also the findings of this study will be made ready for possible publication in a peer-reviewed and reputable journal and presentations at scientific conference.

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8.3 Level of Adherence to the Malaria Management Protocol among Health Workers Attending Under-Five Years Old Febrile Children at Weliso St. Lucas Catholic Hospital, South West Shewa, Oromia, Ethiopia 2015

Executive Summary

Background: In spite of the World Health Organization recommendations for the treatment of malaria, febrile patients are still infrequently tested and erroneously treated for malaria. This study aimed to investigate the adherence to malaria national protocol for the management of malaria among under five year's old febrile children.

Methods: A cross sectional hospital-based study will be conducted during the period from 15 April through 10 May 2015 among health workers in St. Lucas Catholic hospital, South West Shewa, Oromia. A total of 413 under five children with fever will be included in the study. Demographic, clinical and laboratory data [blood film, rapid diagnostic test (RDTs), hemoglobin, WBCs and chest x-ray] and anti-malarial and/or antibiotics prescription will be reviewed. Data collection methods will includes questionnaires, observations and document review. In addition, qualitative data will be collected from health workers using open-ended questionnaire on factors hindering adherence to laboratory diagnosis. Data collectors will be 4 diploma nurses and 2 BSC nurses supervisor. Data collectors will be trained for one day over all on the data collection instruments. Data will be entered, edited and cleaned using Epi info software version 7.1.3.10. Data will be analyzed using SPSS version 16.0 statistical software. Bivariate and multivariate analysis will be employed to assess factors associated with adherence to national protocol for the management of malaria. This research protocol will be approved by the Ethiopia public health institute Ethical Committee.

Study Period and Budget: The study will be conducted from 15 April to 10 May 2015. To conduct this study a total of **98,164 Birr (about USD 4,908)** is required.

Keywords: Malaria; Treatment; Diagnosis; Children; Ethiopia

Introduction

1.1 Background

In spite of many measurements, malaria remains a big public health problem where it is estimated that about a million deaths and over 400 million malaria cases occur worldwide each year, with more than 90% of the worldwide deaths from malaria occur in sub-Saharan Africa and most of these deaths are in children. The highest incidence of malaria is around the equator and in the tropics [1]. Malaria is an important cause of death and illness in children and adults, especially in tropical countries. Malaria control requires an integrated approach, including prevention (primarily vector control) and prompt treatment with effective anti malarias [2].

About 75% of the landmass of Ethiopia is malarious, 68% of the Ethiopian populations, estimated at about 54 million in 2010, live in malaria risk areas, and immunity against malaria is the ability to fight the infection, which is developed by people with repeated episodes of malaria. Under endemic conditions, children under the age of five years, and pregnant mothers, are most likely to be infected as they have weaker immunity [3].

Owing to the spread of **Plasmodium falciparum** resistant strains in the majority of malaria endemic countries, the World Health Organization (WHO) recommended Artemisini-based Combination Therapy (ACT) for the treatment of uncomplicated **P. falciparum** malaria, which is adopted in most of the African countries including Ethiopia [4].

The first edition of the Guidelines for the treatment of malaria was published in 2006. The second edition introduces a new fifth ACT to the four already recommended for the treatment of uncomplicated malaria. Furthermore, the Guidelines recommend a parasitological confirmation of diagnosis in all patients suspected of having malaria before treatment [5].

Despite a decade adoption of “test and treat” policy for malaria in this country, there is still poor adherence to malaria management protocol in Sudan among physicians treating children below five years of age. The poor adherence materializes in low testing rate, faulty prescription of anti-malarial to test-negative children and ominously about three quarters of children with malaria were treated with non-recommended anti-malarials. There is a high rate of antibiotic prescription, which needs further studies to clarify the drive behind such clinical behavior [6].

A considerable number of patients are treated for malaria despite negative test results and high frequency antibiotic prescription for those patients was reported as well [7]. In this context, it is vital to investigate the prescription practices of health care providers in Ethiopia for reasonably accurate information about the causes of childhood death is part of the Target of Millennium Development Goal 4 [8].

1.2 Statement of the problem

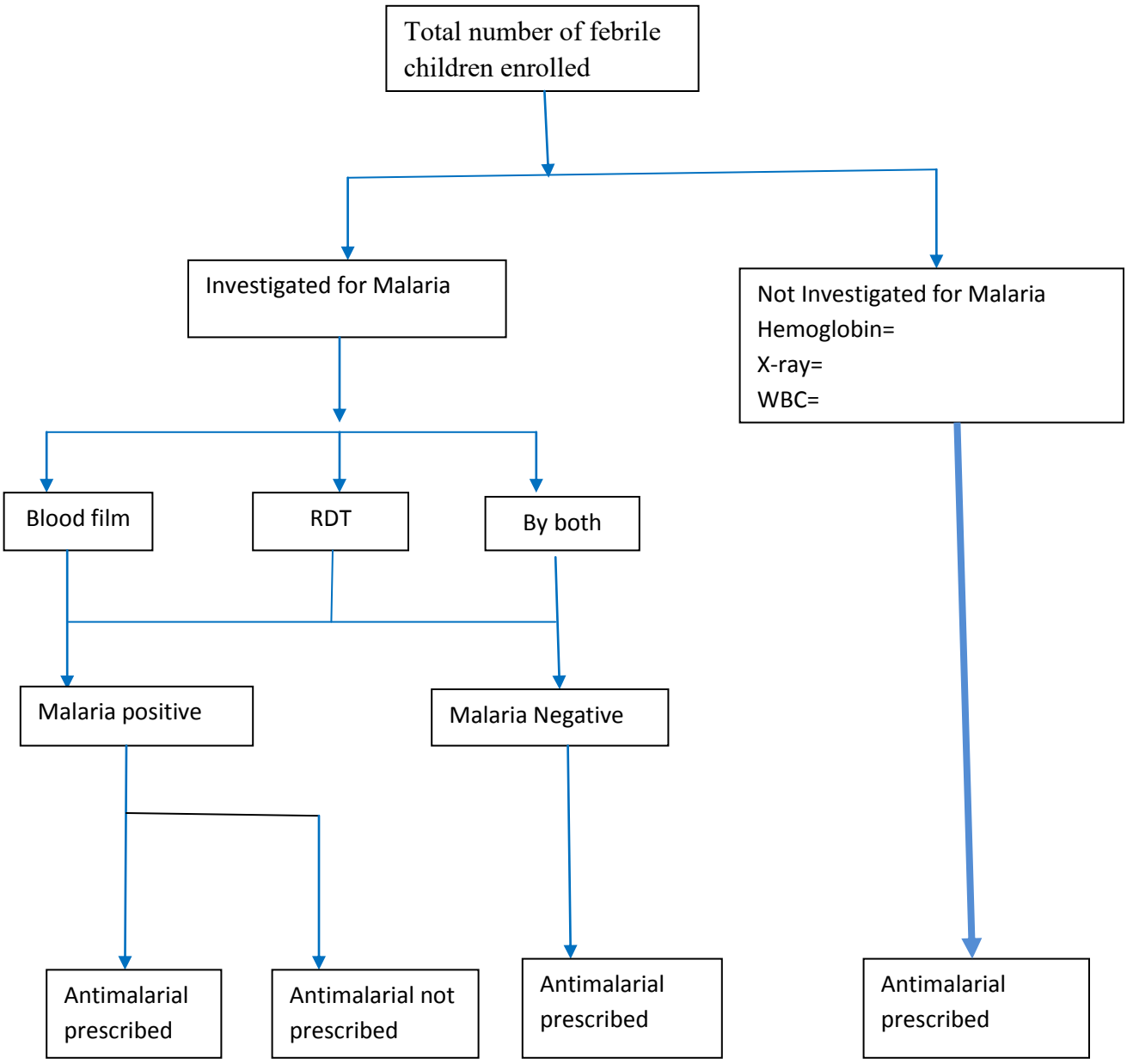
Information on success/failure of the national malaria programmes in endemic countries will help augment the new plan of the WHO towards malaria elimination since one of operational requirements for elimination is "all malaria cases are microscopically confirmed and treated according to national policy" [8].

The problem of malaria is very severe in Ethiopia where it has been the major cause of illness and death for many years. Early diagnosis and prompt treatment is one of the key strategies in controlling malaria. For areas where laboratory facilities are not available, clinical diagnosis is widely used [9]. To diagnose malaria, microscopy remains the standard method, but it is not accessible or affordable in most peripheral health facilities. The recent introduction of rapid diagnostic tests (RDT) for malaria is a significant step forward in case detection, management and reduction of unnecessary treatment [10].

Malaria is a major public health problem in Ethiopia; it contributes up to 20% of under-five deaths. The Ethiopian malaria control and prevention strategy gives due emphasis for early treatment [10].

When replacing failing drugs for malaria with more effective drugs, an important step towards reducing the malaria burden is that health workers (HW) prescribe drugs according to evidence-based guidelines. Past studies have shown that health workers commonly do not follow guidelines, yet few studies have explored with appropriate methods why such practices occur [11]. The aim of this study will be to investigate the adherence to malaria national protocol for the management of malaria among under five year's old children. The woreda is malarious with multiple breading sites due to river over flow after rainy season, it is malaria hotspot woreda, and no previous study conducted to identify the gaps.

1.3 Malaria conceptual framework



2. Objective

1.1 General Objective

- To assess Level of Adherence to the Malaria Management Protocol among Health Workers Attending Under-Five Years Old Febrile Children at Weliso St. Lucas Catholic Hospital, South West Shewa, Oromia, Ethiopia 2015

2.2 Specific Objectives

- To assess status of laboratory confirmation with microscopy or a rapid diagnostic test (RDT) before initiating anti-malarial therapy
- To describe the treatment given to patients that test positive and those that test negative;
- To assess factors that affect adherence by health workers to laboratory results in the management of malaria

Literature Review

More than half the world's people are at risk of malaria infection, and while there have been significant reductions in the numbers falling ill and dying from the mosquito-borne disease, it still kills more than 600,000 people each year. Most malaria victims are children under five living in the poorest parts of sub-Saharan Africa [13].

A considerable number of patients are treated for malaria despite negative test results and high a frequency antibiotic prescription for those patients was reported as well [5] In this context, it is vital to investigate the prescription practices of health care providers in Sudan for reasonably accurate information about the causes of childhood death is part of the Target of Millennium Development Goal 4 [5]. WHO towards malaria elimination since one of operational requirements for elimination is “all malaria cases are microscopically confirmed and treated according to national policy” [14].

In 2008, just 22% of suspected malaria cases were tested in 18 of 35 African countries reporting. Until now, most clinics had to rely on microscopy, but the recent development of quality-assured Rapid Diagnostic Tests (RDTs) using a dip stick and a drop of blood means a policy change is possible [15]. Half of the world's population is at risk from malaria. Each year almost 250 million cases occur, causing 860 000 deaths. Approximately 85% of these deaths are among children, and most occur in Africa [15].

Current malaria control interventions in Ethiopia include early diagnosis and prompt treatment with effective antimalarial drugs, preventive measures such as the use of insecticide-treated nets (ITNs) and indoor residual spraying (IRS), and malaria epidemic prevention and control [16].

To our knowledge; in Ethiopia, no studies have been carried out to assess level of Adherence to the malaria management protocol among health workers attending under-five year old febrile children and therefore, the present investigation becomes more significant and pertinent. Indeed, studying Adherence to the malaria management protocol is considered to be one of the most important aspects of employing effective control strategies in malaria-prone settings. In Ethiopia, hospitals are the basic elements of the healthcare system which play a vital role in minimizing the malaria burden among the rural poor residing in remote areas of the country. In this context, the present retrospective study has greater relevance and significance.

3. Methods and Materials

3.1 Study area and Period

The study will be conducted from 15 April to 10 May 2015 in Weliso St. Lucas Catholic Hospital, South West Shewa, and Oromia regional state. It is 100km away from Addis Ababa with total populations of 1,110,112 according to CSA population census 2007. There are 14 woredas and 2-town administration. The health facilities include 62 governmental and 8 nongovernmental of which 1 hospital, 62 health center and 414 health posts. There are 14 woredas of which 11 woredas are malarious among these 7 woredas are malaria hotspot. St. Lucas Catholic Hospital is one of the private owned Hospitals (17). Medical doctors (graduate of medical colleges) are managing children at St. Lukas Catholic Hospital. The hospital is equipped with a well-prepared laboratory with malaria diagnosis facilities; thin and thick blood films and RDT performed by well-trained technicians. The hospital was selected purposively based on their malaria endemicity in the woreda.

3.2 Study Design

A hospital-based cross sectional study will be conducted in St. Lucas Catholic hospital, South West Shewa, Oromia regional state during the period from 15 April through 10 May 2015.

3.3 Study Population

A total of 413 under five children presented with fever to the outpatient/emergency clinics at St. Lukas Catholic Hospital will be included in the study.

3.4 Inclusion and Exclusion criteria

Inclusion Criteria

All under five children with fever (Axillary temperature>= 38.50c) treated in the hospital during 15 April to 10 May 2015 will be included in the study.

Exclusion criteria

- Children in coma will be excluded

3.5 Sampling and data collection

The sample size will be calculated based on population proportion formula

$$N = \frac{(Za)^2[p*q]}{d2}$$

p: The prevalence of the condition/ health state. The prevalence of plasmodium falciparum malaria in Oromia Region in 2001 is 52% (12).

q: When p is in percentage terms: (100-p)

d: The precision of the estimate. This could be either the relative precision, or the absolute precision 95%.

Za [Z alpha]: The value of z from the probability tables. If the values are normally distributed, then 95% of the values will fall within 2 standard errors of the mean. The value of z corresponding to this is 1.96 (from the standard normal variate tables).

The formula for estimating sample size is given as: that is, "Z-alpha squared into pq; upon d-square" substituting the values of Za, we get:

$$N = \frac{(1.96)2[p*q]}{0.052}$$

$$N = \frac{(1.96)2(0.52*0.48)}{0.052}$$

N= 376

Adding the non response rate of 10% = 37 children

The final sample size will be 413

Data will be collected using a structured questionnaire, information on age, gender, whether the child complained of fever, cough, runny nose, and difficulty of breathing, vomiting, diarrhea, convulsion and inactivity will be prospectively recorded at recruitment. Demographic, clinical and laboratory data [blood film, rapid diagnostic test (RDTs), hemoglobin, WBCs and chest x-ray] and anti-malarial and/or antibiotics prescription will be reviewed. Data collection methods will includes questionnaires, observations and document review. In addition, qualitative data will be collected from health workers by principal investigator using open-ended questionnaire on factors hindering adherence to laboratory diagnosis. Data collectors will be 4 diploma nurses and 2 BSC nurses supervisor. Data collectors will be provided training for one day over all on the data collection instruments. Also qualitative data will be collected from health workers interview on factors hindering adherence to laboratory diagnosis in the management of malaria, availability of laboratory staff, health workers training on adherence to malaria treatment protocol; availability of Guidelines for the treatment of malaria; reasons for starting treatment before laboratory confirmation and perceptions of health workers on routine use of laboratory tests for malaria. The health workers will be blinded for the study to minimize bias. The interviewers will be carefully supervised daily and data checked for completeness and any ambiguity.

3.6 Data Analysis

Data will be entered into computer using Epi.Info version 7.1.3.10 and SPSS for Window, version 16.0. The mean and standard deviation will be calculated for numerical data and frequency distribution will be calculated for nominal or ordinal variables. Bivariate and multivariate logistic regressions will be used where level of Adherence to malaria treatment protocol will be dependent variable and demographic variables age and gender, clinical variables and laboratory values will be the independent variables to identify risk factors. The results will be expressed as odds ratios (ORs) and 95% confidence intervals (95% CIs) with p value < 0.05 will be considered significant. Qualitative data will be thematicaly analysezed by principal investigator and presented.

3.7 Ethics

Children's caretakers will be informed about the purposes of the study and they signed a written consent prior to enrolment. The name of the study participants will not be mentioned and any information received will be used only for the study purpose to keep the confidentiality. The study will be receiving ethical approval from the Ethiopian Public Health Institute, Oromia regional health bureau and ethical committee of the hospital. The finding of this study will benefit both the study participants and the community at large.

3.8 Project outcomes

The finding of this study will help in police redesign and change strategy in adherence to malaria national protocol for the management of malaria among under five year's old children at health facility level.

3.9 Dissemination, notification and report of results

The result of this study will be disseminated to relevant bodies such as FMoH, EPHI, Addis Ababa University, EPHA, Oromia Health Bureau, and St. Lukas Catholic Hospital and all other concerned partners through email and hard copy and also the findings of this study will be made ready for possible publication in a peer-reviewed and reputable journal and presentations at scientific conference.

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8.4 Assessment of Factors Associated with Full Immunization in Informal and Formal Settlements among Children 12-23 Months: Addis Ababa, Ethiopia 2014

Executive summary

Background: The concentrated global effort to use immunization as a public health intervention began when World Health Organization launched the Expanded Program on Immunization in 1974. More than 111 million infants received vaccines in 2013 to protect them from deadly diseases. These infants accounted for about 84% of the world's children, but an estimated 21.8 million infants remained unvaccinated, according to new estimates from WHO and UNICEF.

Objective: To assess factors associated with full immunization in Informal and Formal Settlements among children aged 12-23 months: Addis Ababa, Ethiopia 2014

Methods and Materials: A cross-sectional study will be conducted on immunization coverage in 15 informal and 15 formal settlement areas. Primary data will be collected from care givers reside in Addis Ababa city Administration using both card and history. Data will be collected using structured questionnaire adopted from WHO mannual and data will be collected by 8 Urban Health Extension Workers and 2 BSC nurse supervisors trained on data collection instrument for one day. This research is a cross-sectional study planned as a pre-intervention assessment. A sample of 1185 children aged 12 to 23 months The total Woreda in the sub city will initially stratified into formal and informal areas. Then 23 woredas will be selected by lottery methods from the total woredas in the selected sub city.. Data entry will be performed using Epi-Info and SPSS. Relative frequencies and other descriptive statistics will be performed to present the distribution of the independent variables and vaccine uptake.

Study Period and Budget

The study will be conducted from September to October 2014. The total required budget to conduct the study is 129,105 Birr (USD 6,455)

Key words: Vaccine, Full immunization, Ethiopia

1. Introduction

The concentrated global effort to use immunization as a public health intervention began when WHO launched the Expanded Program on Immunization (EPI) in 1974. The percentage of children who receive a full course of 3 doses of the diphtheria/tetanus/pertussis vaccine (DPT3) by 12 months of age is traditionally used as a standard measure of an immunization program's ability to access the target population and reflects the overall performance of EPI. Immunization has been one of the most significant, cost-effective and stimulatory public health interventions (1).

More than 111 million infants received vaccines in 2013 to protect them from deadly diseases. These infants accounted for about 84% of the world's children, but an estimated 21.8 million infants remained unvaccinated, according to new estimates from WHO and UNICEF. The estimates tell a success story for the Expanded Program on Immunization, namely that global coverage with vaccines, measured by the proportion of kids who received 3 doses of vaccines containing diphtheria tetanus-pertussis (DTP3), rose from 73% in 2000 to 84% in 2013, a substantial increase. (2).

Increased immunization rates over the past twenty years have played a key role in the reduction of under-five mortality rates in Africa. However, low uptake of vaccines persists; only 71% of African infants receive all three doses of the diphtheria-tetanus-pertussis vaccine (DPT) (Wiysonge) (3).

One of the priorities in Health Sector Development Program, IV (HSDP IV) is improving child health, with a target for the reduction of under five mortality rates from 101 to 68 per 1,000 live births and reduction in the infant mortality rate from 77 to 31 per 1000 live births by 2015. Neonatal mortality per 1,000 live births was 37, infant mortality per 1,000 live births 59, under five Mortality per 1000 live births 88. While Addis Ababa neonatal mortality per 1000 live births was 21, infant mortality per 1000 live births 40 and under five mortality per 1000 live births 53 (DHS 2011).

A survey conducted in Bangladesh showed delayed or non-immunization was associated with low socio-economic status, maternal illiteracy, and lack of mothers' knowledge on vaccine preventable diseases as recommended by the Expanded Program on Immunization (EPI) (4).

It was also found that the main reasons for low vaccination rates in urban Dili included caregivers' knowledge, attitudes, and perceptions as well as barriers at immunization service sites. Other important factors were access to services and information, particularly in the city periphery, health workers' attitudes and practices, caregivers' fears of side effects, conflicting priorities, large family size, and lack of support from husbands and paternal grandmothers, and seasonal migration (5).

Factors which have a significant association with childhood immunization are: maternal education (especially at post-secondary level), exposure to media, maternal healthcare utilization, maternal age, occupation type, immunization plan, and regional and local peculiarities (6).

Studies in India, Niger, Bangladesh and Kenya have shown that immunization rates for the urban poor are significantly lower than coverage in higher income urban areas. In Nairobi, the full vaccination rate for children in informal settlements was 44 percent, which was significantly lower than the rate of 73% for children within the entire Mutua city (5). Results were similar in Niger, where the immunization coverage rate in informal settlements was 35%, as compared to 86% coverage in higher income areas (Unger).

The 2011 Ethiopia DHS did not include informal settlements as enumeration areas in Addis Ababa when conducting the study. (Verify with DHS lead at EPHA) Consequently, the vaccination rates reported for Addis Ababa was 78.7%. In EFY 2003, the target was to reach 90% immunization coverage for Pentavalent 3 vaccine, 86% for measles vaccine, and 80% for full immunization. A slight decrease was observed for Pentavalent 3 vaccine coverage (from 86.0% in EFY 2002 to 84.7% in EFY 2003) and measles vaccine coverage (from 82.4% to 81.5%), while full immunization coverage increased from 72.3% to 74.5% in the same period: however, the performance was below the target set for the year (7).

The objective of this study is to assess factors associated with full immunization in Informal and Formal Settlements among children aged 12-23 months and propose solution to improve routine EPI performance and take the findings and solutions given as best practice.

2. Objective

2.1 General Objective

- To assess factors associated with full immunization in Informal and Formal Settlements among children aged 12-23 months: Addis Ababa, Ethiopia 2014

2.2 Specific Objectives

- To assess socio demographic status and vaccination coverage in informal and formal settlements.
- To assess Geographic factors, locality, birthplace, distance of vaccination site and immunization
- To determine Economic factors and immunization uptake
- To provide appropriate recommendations to City Government of Addis Ababa Health Bureau.

3. Methods and Material

3.1 Study area and Period

Addis Ababa as a capital city of Ethiopia was established in November, 1887 by Emperor Minilik II and Empress Taitu , currently serve as the Federal Capital of Ethiopia and a Chartered City; having three layers of Administration: City Government at the top, 10 Sub City Administrations in the Middle, and 116 Woreda Administrations at the bottom, covers an area of 540 square kilometers with a total Population of 3,167,036, with 59,209 children aged 12-23 months with the annual growth rate of 2.1%. A total of 4 sub cities were randomly selected with a total populations of 1,352,650 based on 2007 census survey. Eligible age group of Bole (6527), Kolfe Keranyo (9063), Addis Ketema (5394) and Lideta sub city (4262). The total children aged 12-23 months in the selected sub cities were 25,246. The study will be conducted from September to October 2014

3.1 Study Design

A cross-sectional study will be conducted on immunization coverage in 4 randomly selected sub cities which are 15 informal and 15 formal settlement areas. Primary data will be collected from care givers reside in Addis Ababa city Administration. The total Woreda in the sub city will initially stratified into formal and informal areas. Then, 23 woredas will be selected by lottery

methods from the total woredas in the selected sub city. The modified 2005 WHO EPI cluster sampling method will be employed to select study households. Each woreda will be considered as one cluster. In each woreda the first household will be selected by randomly chosen from the central location of woreda, then counting the households along the directional line to the edge of woreda area and selecting randomly one. The subsequent households will be selected, according to the inclusion criteria, based on the principle of the next nearest household. Households in the woreda will be visited until the allocated sample size for the woreda will be fulfilled. For a coverage of 94.1% assuming a 10% non-response rate and 2% margin of error and plan for a sample of 1185.

3.4 Study Unit

3.4.1 Inclusion criteria

Households with all children aged 12-23 months will be included in the study in selected sub cities and woreda

3.4.2 Exclusion criteria

Households with more than one eligible child the elder will be excluded from the study and if the care givers are not mental able to provide information

3.5 Operational definitions

Primary data will be collected from 15 formal and 15 informal settlements in slum area of Addis Ababa city Administration residents in selected sub cities and woreda

- **Slum area:** is a heavily populated urban informal settlement characterized by substandard housing and squalor
- **Formal settlements:** A formal settlement is a legally binding written contract that incorporates the terms and conditions of the parties' agreement
- **Informal settlements:** An ‘Informal Settlement’ exists where housing has been created in an urban or peri-urban location without official approval or Slum area

3.6 Sample and procedure

Data will be collected using structured questionnaire adopted from WHO mannual data will be collected by 8 Urban Health Extension Workers and 2 BSC nurse supervisors trained on data

collection instrument for one day. This research is a cross-sectional study planned as a pre-intervention assessment. A sample of 1185 children aged 12 to 23 months will be calculated using the Epi-Info Statcalc with a 95% confidence level, a power of 80%, and 94.1% as the estimated immunization coverage rate in the research area in 2012 EPI coverage survey and assuming a 10% non-response rate and 2% margin of error will be considered.

. The sampling will be carried out using the database of the DHS of Ethiopia, which contained 59209 households with children in the targeted age group. Of which1185 households with eligible children will be included in the study. The number of households to visit in each village determined according to the proportion of 12 to 23 month-old children in the woreda from the database that is Kolfe Keranyo (425), Lideta (200), Addis ketema (253) and Bole (306) children's. The codes of all the households of a village will be written on pieces of paper and then the households will be drawn (without replacement) until the required number for the village will be obtained. The household will be identified using this code and the name of the head of the household. Children will be identified using their name and the name of the parents. An appointment will be set with the parents; only one child will be selected per household. Data collectors will be trained for one day on data collection instrument and interview question procedures.

3.7 Data Analysis

All collected data will be reviewed daily by supervisor and principal investigator for completeness, accuracy, and clarity carefully. Any error, ambiguity or incompleteness encountered will be addressed on the following day before starting next day activities. The questionnaire will be pre-tested to ensure consistency of the questionnaire.

Data will be entered into a computer, edited, cleaned and analysis will be done using SPSS version 16.0 packages. Univariate analysis will be conducted to check for outliers, consistencies and to identify missed values. Chi-square analysis will be used to assess the association between independent and dependant variables under study and relative frequencies and other descriptive statistics will be performed to present the distribution of the independent variables and vaccine uptake as measured by OR and 95% CI and p-values less than 0.05 will be considered as significant. To identify independent predictors of full vaccine uptake multivariate backward

binary logistic regression analysis will be used. Finally, interpretation of our findings takes into account the literature, context and purpose of the study.

3.8 Ethical issues

This research will be approved by the local ethical committee and woreda leaders. Interviews will be performed after explaining the objective of the study by data collectors and obtaining the consent of the respondents. Security and confidentiality of the data will be preserved. The informants are rendered anonymous by using an alphanumerical coding system to identify the compound, the household and the members.

3.9 Dissemination, notification, and report of results

The result of this study will be disseminated to relevant bodies such as EPHI, Addis Ababa University, Addis Ababa City Administration Health Bureau, subcity health office and woreda health office through email and hard copy and all other concerned parties. Also the findings of this study will be made ready for possible publication in a reputable journal. Also based on the findings recommendation will be made. The findings of this study also notified to study Participants through workshop and using health extension workers. The public will be communicated through radio, television and news paper

Map 7: High-Resolution Image From Google Earth, Awarae, Addis Ababa.

The area on the right shows characteristics of an informal settlement with small densely grouped dwellings in irregular patterns located along a stream. This area was confirmed on visual field surveys to meet the criteria for an informal settlement, whereas the area on the left of the image was confirmed to be a formal settlement.

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CHAPTER IX – TRAINING

9.1 Outbreak Investigation and Response Training for Woreda, Zonal and Regional PHEM Officers, Adama, 2014

Executive Summary

The training was given for 65 (5 Females and 60 Males) trainees from four regional state zonal and woreda health office PHEM focal person for two days (Dec 20-21-2014).
At the end of training, participants were llists the operational steps of an outbreak investigation given a cluster of cases of illness in a community.

The purposes of an outbreak investigation are to stop the outbreak, prevent further spread, and improve surveillance to detect future events. Once an outbreak is confirmed, investigation and control should follow a set of steps which have been developed and refined over long experience, good descriptive epidemiology (time, place, person) can provide key information on cause, source, transmission, risks, and exposures. This can be further explored or defined by developing and testing hypotheses. The most important reasons for investigation are to control and prevent current and future outbreaks.

Determine whether an epidemic exists, Verify the diagnosis Count cases and determine attack rate Develop biologically plausible hypotheses describe the use of and present data in a line listing Construct and interpret an epidemic curve.

The way forward was directed by Early Warning and Response team leader emphasizing on transaction of samples, feedback, finance and utilization of data at all levels. A total of 94,100.00 birr was used to conduct the training.

Introduction

The term outbreak and Epidemic have become part of the world's general vocabulary used broadly and frequently to describe health, financial, and social maladies. The word outbreak gets our attention and indicates that something's awry. An outbreak or an epidemic exists when there are more cases of a particular disease than expected in a given area, or among a specific group of people, over a particular period of time. An aggregation of cases in a given area over a particular

period, regardless of whether the number of cases is more than expected, is a cluster. In an outbreak or epidemic, we usually presume that the cases are related to one another or that they have a common cause.

Many epidemiologists use the terms "outbreak" and "epidemic" interchangeably; however, some restrict the use of "epidemic" to situations involving large numbers of people over a wide geographic area. The public is more likely to think that "epidemic" implies a crisis situation.

Health departments investigate suspected outbreaks for a variety of reasons. These include the need to institute control and prevention measures, the severity of the problem and its risk to others, the opportunity for research and training, program considerations, and public relations, political concerns, and legal obligations.

Control and Prevention. A primary reason for a public health investigation is to control the outbreak at hand and prevent future outbreaks. In any investigation, you have to strike a balance between these two goals, depending on where the outbreak is in its natural course: Are cases occurring in increasing numbers or is the outbreak just about over?

If cases are continuing to occur, your first priority will more than likely be controlling the outbreak, so you want will to assess its extent and the characteristics of the population at risk so you can design measures to prevent additional cases. On the other hand, if an outbreak appears almost over, you may want to focus on investigating further to identify its source and using that information to develop measures that will prevent future outbreaks.

The balance between instituting control measures and conducting further investigation depends on how much you know about the agent causing the illness, the source of the agent, and its mode of transmission, since you cannot design control measures without this information.

Severity and risk to others. Decisions regarding whether and how extensively to investigate an outbreak are also influenced by the severity of the problem and its risk to others. It is particularly urgent to investigate an outbreak when the disease is severe and could affect more people unless prompt control measures are taken. For example, in the United States, every case of plague and botulism is investigated immediately to identify and eradicate the source. Cases of syphilis,

tuberculosis, and measles are investigated promptly to identify contacts and interrupt transmission.

In investigating an outbreak, speed is essential, but getting the right answer is essential, too. To satisfy both requirements, epidemiologists approach investigations systematically, using the following 10 steps:

- Prepare for field work
- Establish the existence of an outbreak
- Verify the diagnosis
- Define and identify cases
- Describe and orient the data in terms of time, place, and person
- Develop hypotheses
- Evaluate hypotheses
- Refine hypotheses and carry out additional studies
- Implement control and prevention measures
- Communicate findings

The steps are presented here in conceptual order. In practice, however, several may be done at the same time, or they may be done in a different order. For example, control measures should be implemented as soon as the source and mode of transmission are known, which may be early or late in any particular outbreak investigation.

Objective

General objective

To provide awareness on outbreak investigation and response for the participants

Specific objectives

- List the reasons that health agencies investigate reported outbreaks
- Define the terms "cluster," "outbreak," and "epidemic"
- Define a "line listing" and describe what it is used for
- Understand the steps of outbreak investigation and management
- Understand the use of epidemiologic study designs in outbreak investigation

- To share experiences and their practices in outbreak investigation
- Recommend strategies for control and prevention in response to an outbreak

Methods and Materials

Date of the training, number of trainees and duration of training were decided by Ethiopian Public Health institute (EPHI). Invitation letters were developed and sent to regional health bureaus one week ago before the date of training. Training schedule was drafted by PHEM team members. Training topics were identified and trainers were assigned based on their interest and areas of expertise. For each training sections moderators were also assigned. The trainees were selected by respective regions. Training venue was suggested by PHEM team members and selection of hotel was conducted through the Public Relations Office of EPHI. Accommodation was not facilitated but allowance and transport cost was covered by EPHI. Stationery materials such as note books and pens were distributed to all trainees. All trainees' addresses were registered and documented upon their arrival. All power point presentations were received from all trainers and placed in one folder before training was officially opened. LCD and flip charts were used for presentation. After each presentation the floor was opened for questions and discussions. A number of questions were raised by trainees and answers were given by trainers.

Achievement

The training was successfully conducted according to the schedule. All expected trainees from respected regions were participated. Totally 65(5 Female and 60 Male) trainees and 11 trainers attended the training. Of the Trainees 33(50.7%) were from Afar and 11(17%) were from Somalia regions. 11(20%) were Dire-Dawa, 8(12.3 %) were from Hareri and 2(3%) officers were from national PHEM EPHI. Following each presentation heated discussions were held. The importance of the availability of continuous feedbacks at each level was raised by participants and got acceptance. The issue of timely notification and reporting outbreak investigation and response at all level were also got emphasis during the training. The responsibility of each level was also clearly presented in the training to strengthen outbreak investigation and response. The objective of the outbreak investigation and response was also clearly presented.

Expectation from the Training:

The training will enable all trainees to implement outbreak investigation and Response according to the guideline. Having attended the training, all trainees were familiarized with the objectives of outbreak investigation and Response. Training was used as motivation and information sharing mechanism, hence trainees clearly understood the gaps, problems with outbreak investigation and Response surveillance data and how to improve and utilize surveillance data at all levels. All clinicians from health centers and hospitals will be expected to identify all cases and report to the national level. We expect the data quality will be significantly improved and all variables on reporting formats will be completed. Weekly summary report will be disaggregated by age and reported as per the guidelin

Training Highlights

During the two day training, over 7 topics were addressed by different trainers from EPHI, FMoH. Among them, overview of public health emergency early warning system, weekly report format(for health extension workers and health workers), Outbreak investigation and response, Ebola Epidemiology surveillance and outbreak investigation, Introduction to maternal death surveillance and response, MDSR data flow within the IDSR system and maternal death review at facility level and practical exercise and demonstratid were presented.

Way forward

Sensitization workshops and quarterly review meeting will be periodically organized to inspire and enlighten all individuals and stakeholders working in outbreak investigation disease surveillance. Continuous supportive supervisions will need to be carried out at all levels to closely identify potential problems and give solution at the grass root levels. Data will be analyzed and utilized at all levels. Feedback should be given frequently for both health officials at all levels and health providers at the ground level.

Training Cost:

To facilitate the training all training costs were covered by EPHI. All trainees came to the training site by public transport. The transport expenses were reimbursed for all trainees' based on their distance travelled and receipt. Daily perdiam were also covered by EPHI. Finally a total of 94,100.00 birr was used to conduct the training.

Acknowledgement

My sincere thanks go to Ethiopia public health institute for nominate and sending me the appropriate trainee and for arranging transport vehicles and financing training costs.. I also express my gratitude to all trainees for their active participation and for constructive comments and suggestions they raised throughout the training. . Last but not the least I acknowledge the Ethiopia Public Health Association for financial support.

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CHAPTER X: EBOLA VIRUS DISEASE (EVD) PREVENTION AND CONTROL ACTIVITY

10.2 Establishing EVD Screening Sites at Land crossing ports in Gambella, 2014

Introduction

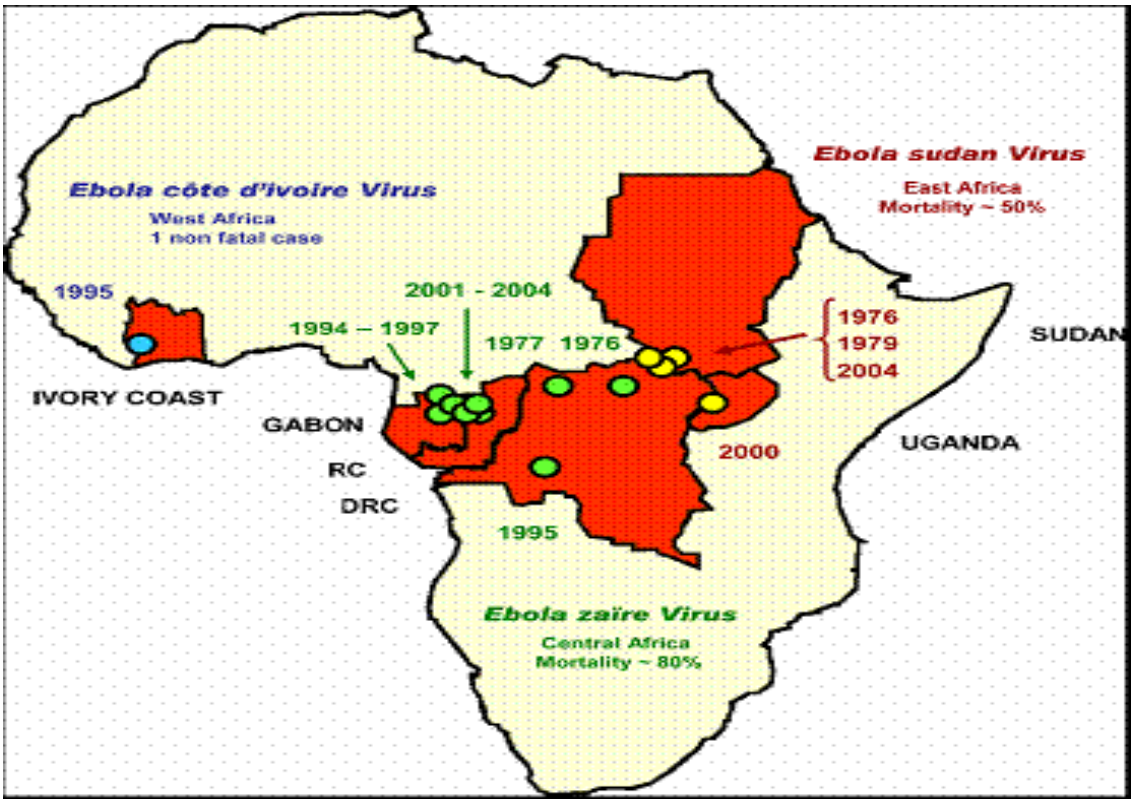
Ebola is a highly-contagious hemorrhagic virus that breaks down the epithelial cell wall of blood vessels and triggers extensive internal and external bleeding (1).

Contacts of an EVD case have different levels of exposure risk, as follows: The filoviruses, Ebola and Marburg, are among the most virulent pathogens of humans, causing severe hemorrhagic fever. Like all filoviruses, ebolavirions are filamentous particles that may appear in the shape of a shepherd's crook or in the shape of a "U" or a "6", and they may be coiled, toroid, or branched. Ebola and Marburg viruses are non-segmented, negative-sense, single-stranded RNA viruses that resemble rhabdoviruses and paramyxoviruses in their genome organization and replication mechanisms (2).

Following the infection of EVD coagulation defect a capillary leak syndrome and shock occur. Other types of viral hemorrhagic fever include Rift Valley fever, Crimean-Congo hemorrhagic fever, Lassa fever, yellow fever, and dengue hemorrhagic fever. EVD is caused by four of five viruses classified in the genus Ebolavirus, family Filoviridae, and order Mononegavirales (2, 3).

The genus Ebola virus is divided into five different species: E. Zaire, Sudan, E. Ivory Coast, E. Bundibugyo, and E. Reston (Only reported in animals like pigs and other primates). The filoviruses were first recognized in 1967, when the inadvertent importation of infected monkeys from Uganda into Germany and Yugoslavia resulted in explosive outbreaks of severe illness among vaccine plant workers who came into direct contact with the animals by killing them, removing their kidneys, or preparing primary cell cultures for polio vaccine production 1976, Ebola first appeared in 2 simultaneous outbreaks in Sudan and in Democratic Republic of Congo. Since Ebola discovery in 1976 until December 2013: 23 outbreaks, 2388 human cases including 1590 deaths ,Since 1976, the Zaire species has caused multiple large outbreaks with mortality rates of 55-88 % (4).

The Sudan virus has been associated with about 50 % case-fatality rate in four known epidemics: two in Sudan in the 1970s, one in Uganda in 2000, and another in Sudan in 2004. The Ivory Coast virus has only been identified as the causative agent in one person, who survived .The Bundibugyo virus emerged in Uganda in 2007, with a lower case-fatality rate of about 30% and is less fatal than E. Zaire and E. Sudan viruses. Sequencing has shown that the agent is most closely related to the E. Ivory Coast agent (5).



Map 8: Map showing current Ebola affected Countries, October 2014

The 2014 current Ebola outbreak began in Guinea in December 2013 and now involves transmission in Guinea, Liberia, Nigeria, and Sierra Leone, Since August 11, 2014 the epidemic has also been reported in DRC, Most severe outbreak of Ebola in terms of the number of cases and fatalities since the discovery of the virus in 1976 (40%) of cases occurred in the last three weeks. As of 19 April 2015 there have been a total of 26,044 reported confirmed, probable, and suspected cases of EVD in Guinea, Liberia and Sierra Leone, with 10,808 reported deaths (6).

First human cases start with infection by an animal Chimpanzes, gorillas, monkeys, forest antelopes, fruit bats, porcupine... How 2014 outbreak in West Africa started is unknown Infection from person-to-person creates an outbreak direct or indirect physical contact with body fluids of infected person (blood, saliva, vomitus, urine, stool, semen) Well known locations where transmission occurs Hospital: health care workers, other patients, unsafe injections Communities: Family, friends, contacts caring for ill, through funeral practices (6).

Unaffected Nations with land borders adjoining States with Ebola transmission should urgently establish surveillance for clusters of unexplained fever or deaths due to febrile illness, establish access to a qualified diagnostic laboratory for EVD, ensure that health workers are aware of and trained in appropriate IPC procedures, and establish rapid response teams with the capacity to investigate and manage EVD cases and their contacts deaths due to febrile illness, should treat this as a health emergency, take immediate steps in the first 24 hours to investigate and stop a potential Ebola outbreak by instituting case management, establishing a definitive diagnosis, and undertaking contact tracing and monitoring (7).

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Ethiopia has seven major land ports of entry at which persons entering into Ethiopia can be screened for risk of Ebola virus disease (EVD) importation and where appropriate public health action can be implemented to prevent the spread EVD. Major Land Ports: Moyale , Togo-wachale, Dawale, Humera, Metema, Kumruk and Gambella. Of this, Gambella is one of the potential areas identified for EVD screening particularly at five land port entry site Metahar (Burbiye), Pagag(Laree), Dima, Akobo and Gog woreda (pugnido).

Screening of all persons entering Ethiopia at the land ports of entry to be initiated in August 2014, in all ports in collaboration with RHBs, and health control authorities and other stakeholders.

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Screening of all persons entering to Ethiopia at the land ports of entry was initiated in August 2014, in all ports in collaboration with RHBs, health control authorities and other stakeholders. EVD screening protocol based on WHO and CDC's interim guidance intended to provide public health authorities and other partners a framework for evaluating risk of exposure of persons to Ebola Virus Disease (EVD) and initiating appropriate public health actions based on exposure risk and clinical assessment to prevent the spread of Ebola virus disease (EVD) in Ethiopia by early detection and quarantine of persons entering Ethiopia who are at risk of having EVD at major land ports of entry.

Objective

2.1 General Objective

To Assess Risk of EVD through Contact Tracing, Early detection and isolation of persons entering Ethiopia who are at risk of having EVD at Gog Woreda, Gambella region, September 2014

2.2 Specific objectives

- To present the progress of the EVD response,
- To report detail activities of advocacy and social mobilization
- To report training activities
- To report screened in-migrants' update

- To equip the task force and technical working group on effective handling of the mission taking the experience of the last four weeks activities.

3. METHODES

Study area and Period

Gambella is found at south west of the country and has the population of 401,920, three zones and one special zone and 13 woredas. Gog woreda (Pugnido) is one of the woreda in Agnuwa Zone and found at south west of Gambella city and has the population of 23,201 and 16 kebeles of this 13 were rural and 4 were urban Keble's. There are three health centers in the woreda. Gog woreda (Pugnido) bordering with South Sudan puchala District. The woreda has three land port entries namely Johor, Gog and Puchala. Puchala is the land port entry which is active during rainy seasons while the rest two were used during dry season. The entry land port is through river by using boats and land to land on foot. The average number of daily imported refugees to the country is 123.

Health profile of the woreda

The region has a total population of 401,920; three zones, 13 woredas and one special woreda, there are five potential land port entries in the region, Gog, Pagag, Dima, Akobo and Methar. Gog Woreda is one of the five land port entries, Tasew Erena and Dereje Mamo deployed to Gog Woreda land port entry (Since Sept 4, 2014), Gog Woreda has three identified land port entries Johor, Puchala and Gog , has the total population of 23,201 (51.9% are male while 48.1% are female)and 13 Kebeles, 4 health centers (1NGO), 12 HPs , The three leading causes of morbidity in the woreda were malaria, ARTI and diarrhea (non-bloody), the woreda has 4 Health Officers Four midwifes (One BSc), 30 clinical Nurses, 12 Lab technicians, two environmental health , One pharmacy technician, 38 HEWs and 54 supportive staffs.

Study Design

- Non contact screening procedure was applied with observation if any person looks sick,
- Ask if any person has fever,

- Ask if any person has travel history to affected countries OR has contact with a person from the affected countries within the previous 21 days (currently Guinea, Liberia, Sierra Leone, Nigeria and DR Congo)

Case Definition for Ebola Virus Disease (EVD)

A person who has both consistent symptoms and risk factors as follows:

1) Clinical criteria, which includes fever of greater than 38.6^0C or 101.5^0F, and additional symptoms such as severe headache, muscle pain, vomiting, diarrhea, abdominal pain, or unexplained hemorrhage; and

2) Epidemiologic risk factors within the past 21 days before the onset of symptoms, such as contact with blood or other body fluids or human remains of a patient known to have or suspected to have EVD; residence in—or travel to—an area where EVD transmission is active*; or direct handling of bats, rodents, or primates from disease-endemic areas.

Case Definition for Ebola Virus Disease (EVD)

Probable Case

A Person who is a contact of an EVD case with either a high or low risk exposure (see below).

Confirmed Case

A case with laboratory confirmed diagnostic evidence of Ebola virus infection.

Data Collection Methods

Action plan was developed on Sep 5, 2014 on the same day Sept 5, 2014 Task force and TWG established, task force and TWG was shared their duty and responsibility, Specific land port entries was identified in the presence of RHB PHEM head, partners and task force members (Puchala, Johor and Gog) because of rainy season the woreda TWG decided to start screening in the gate of Gog, Register and tally (list) all who has fever, contact history with known or suspected Ebola case , and travel history to affected country.

Activities being implemented

Advocacy and social mobilization

Targets for advocacy and social mobilization were government sectors**,** religious institutions, schools, refugees, federal police and defense force

Capacity Building

Orientation was given for the total of 4,885 peoples resides in Gog woreda (male 2,747 while 2,138 were female). Government sector = 416, Federal police = 36, Defense force = 126, WCY affairs = 33, Refugees = 1328, Religious institutions = 2,946

Take handover procedures

1. Action plan was developed and given to head of woreda administration and head of woreda health office for contentious monitoring and evaluation.
2. ARRA and IRC are partners working at the woreda level and we are communicated with them and discussed to carry out this mission successfully.
3. Woreda task force and technical working group (TWG) was established and actively engaged in a daily planned activities of EVD screening and advocacy.
4. As viral hemorrhagic fever (VHF) is one of the diseases under surveillance in our country, the TWGs are oriented to give due attention on following daily as well as weekly PHEM reports of all health facilities in the woreda.
5. Rapid response team (RRT) of Pugnido health center is revitalized and equipped with up-to-date information of EVD and its response.
6. Beside of EVD screening procedure the TWG was introduced VHF (viral hemorrhagic fever) is one of the identified immediately reportable disease in the country.
7. Potential land port entries are identified and screening site was selected. Shelter for screening is not yet implemented
8. Opening and closing time for screening was decided, as the in-migrants arrives only day time (source: Woreda Officials) the schedule was settled from 6:00 am to 7:00 pm and this is already applied.

9. Orientation was given to 25 health workers and 16 administration staffs of the woreda health sector.
10. Awareness creation about EVD was given to 1,670 (Female 968 and Male 702) attendants who gathered from different sectors and religious institutions, boat drivers, hotel owners and waiters.
11. From September 5 – 15, 2014 a total of 1,230 in-migrants were screened for EVD. Of these females were 922 while 308 were males. No EVD suspected case or high risk individuals were found. Among all screened in-migrants only 27 individuals were screened and examined for AFI and ARI.

1 Summary of screened in-migrants in Gog woreda, Agnuwa zone, Gambella.

S.NO	Date (dd/mm/yy)	Number of screened in-migrants			Level of Risk		
		M	F	Total	High	low	No risk but fever + cough
1	6/9/2014	28	98	126	0		2
2	7/9/2014	33	90	123	0		1
3	8/9/2014	24	96	120	0		4
4	9/9/2014	42	76	118	0		2
5	10/9/2014	20	103	123	0		3
6	11/9/2014	34	86	120	0		2
7	12/9/2014	31	94	125	0		5
8	13/9/2014	41	86	127	0		1
9	14/9/2014	23	101	124	0		3
10	15/9/2014	32	92	124	0		4
	Total	**308**	**922**	**1230**	**0**		**27**

SWOT analysis

STRENGTH	WEAKNESS	OPPORTUNITY	THREAT
Availability of trained health worker on EVD Availability of standard guide line for EVD Ability to Plan for EVD program Commitment of the task force and TWG	Inadequate coordination for partners Inadequate capacity of the woreda Weak to follow up EVD program Shortage of man power Inadequate effort for resource mobilization	Availability of partners	Uncontrolled mobility refugees Instability of adjoining country

Challenges

1. Tent placement for isolation and screening is yet implemented. The problem is communicated to RHB PHEM.
2. Materials for infection prevention and control are not fully supplied.
3. Security forces who have been working with us interrupted their presence on the site of screening due to claiming for per diem.
4. Refugees from south Sudan is very aggressive on arrival because of long distance walk they are very tired and they are not patiently responding to our question.

Possible solution for challenges

1. Tent placement for isolation will be in place with in the coming two days.
2. Partners and RHB (PHEM) will equip the needed PPE very urgently.
3. Negotiating with security force and assign police regularly in place where the screening activity will be carried out.
4. To calm the refugees try to provide Biscuit and water on arrival.
5. Work done in the woreda was identified pre hand then both task force and TWG together received all performed and ongoing activities.

After four consecutive week's activity of EVD response, all the performed activities and those on progress as well as the way foreword were presented on the meeting held at woreda administration office. Woreda task-force and technical working group members were found in the meeting.

Starting from the very beginning of our mission up to the day we gathered for final meeting, we found that the woreda administration officials are highly committed, cooperative and motivated to work with us and showed their contribution to take part in the area of EVD prevention and they showed us their willingness to keep sustain the program. And thus, because of their support, we are succeeded the mission and officially gave them the responsibility to take handover the EVD response mission.

Gambela, Gog Woreda land port entries EVD screening activities supported by picture

This is the get of Gog Woreda administration office. Gog Woreda is found in Agnuwa Zone of Gambela regional state and has three land port entries. Among these entries only Pugnido-puchala entry site is active during rainy seasons while the rest to be in the summer. Currently we are working on Pugnido-Puchala-Ethiopia land port entry.

Regarding the preparation of shelter for screening, it is not accomplished as expected. During our meeting at the Woreda administration office, the responsibility to establish the shelter was given to the Woreda office. But it was our interestto start the screening with locally available furniture rather than waiting the tent and other equipment from the Woreda, as it may delay our job. This is Mr. Ujulu Gizaw, head of office of justice who helped by collecting locally available materials from nearbyhouse holds.

This is where we started screening. (A picture taken one day after screening began)The only protective material we have during the start and so far is glove, mask and eye google. There is

also one contact thermometer obtained from EPHI, and when recording the in-migrants information and taking body temperature from fore head of the in-migrant (Tasew Erena)

This is Pugnido-puchala land port entry where in-migrants and those who travel from Ethiopia to South Sudan for trading are used. The travelers use traditional Boats as means of transportation on the river infront of the screening site. The shelter for screening and isolation will be palced in this area and Boat drivers were also our targets for awareness creation, as they are always giving service for travelers and are might be the first to contact in-migrants.

Awareness creation to people living near the land port was done while they gathered in Church

This is picture shows when Orientation given for different sectors October 2014

Picture during take hand over procedure at Gog Woreda Administration office and at screening site, October 2014

The way forwards (Recommendation)

1. Avail PPE as SOP, Develop SOP for high and low risk screening procedure, Ensure full engagement of partners, the high mobility of refugees need attention, Prepare basic set pack needed for field trip
2. Gog woreda (Pugnido) Health office and woreda administrative leaders together with FETP Residents should assume a prominent leadership role in coordinating and implementing emergency Ebola response measures at their local site.
3. The woreda should activate their local role in emergency management mechanisms and establish an emergency operation centre, under the authority of the Head of woreda administration, to coordinate support across all partners, security forces and other relevant sectors, to ensure efficient and effective implementation and monitoring of comprehensive Ebola control measures. These measures must include infection prevention and control, community awareness, surveillance, timely and accurate information among neighboring woredas Puchala Ethiopia and Puchala Sudan. The woreda should ensure that to fully engage the community – through religious leaders and traditional leaders and healer's. So the communities plays a central role in case identification, contact tracing and risk education; the population should be made fully aware of the benefits of timely reporting.
4. The capacity to manage travelers originating from known Ebola-infected countries who arrive at major land crossing points with unexplained febrile illness should strictly screened and monitored for EVD, AFI and ARI. The general public should be provided with accurate and relevant information on the Ebola viral disease and measures to reduce the risk of exposure.
5. The established committee of Gog Woreda emphasized the importance of continued support by regional, national and international partners towards the effective implementation and monitoring of EVD screening. Health workers should provide health education on EVD for travelers to Puchala-Sudan or to any at-risk areas with relevant

information on risk measures to minimize those risks, and advice for managing a potential exposure.

6. Early recognition is critical for infection control. Healthcare providers should be alert for and evaluate any patients suspected of having EVD.

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4. Center for Disease control and prevention www.cdc.gov/vhf/virus-families/index.html
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6. Ebola site: www.cdc.gov/ebola
7. National and regional rapid response teams could be strengthened by addition of a laboratory technician, a psychosocial expert, a clinician and a logistician.
8. Interim Guideline Infection Prevention, Control and Case Management of Ebola Viruses Ethiopian Public Health Institute(EPHI)

11.1 Public Health Emergency Management Weekly Bulletin, Week 50, 2014

Highlights of the Week:

Weekly malaria trend has been decreasing

National Completeness was increased

Completeness

During week 50completeness of reporting was 91.7% at national level and it is >=80% completeness as compared to WHO standard.

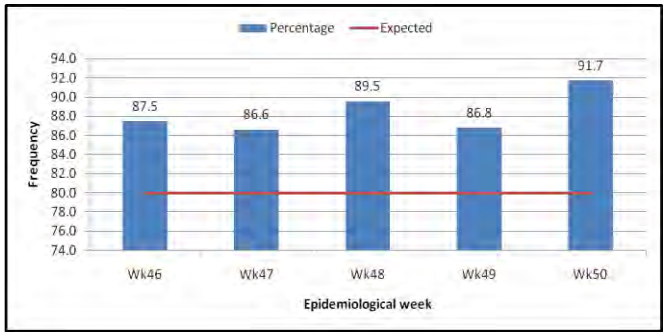

Fig 1: National Completeness of reporting

Diseases

Malaria

A total of 47,067, malaria cases (confirmed + clinical) with one death were reported. Of the total cases, the highest 15011(31.9%), 7688(16.3%), 7335(15.6%) and 6879(14.6%) of cases were reported from Amhara, Oromia, SNNPR and Tigray respectively. Weekly malaria trend has been decreasing (Fig. 3).

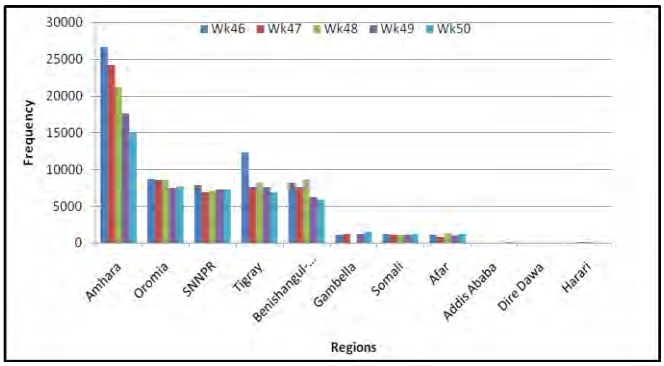

Fig. 3: **National malaria trend-week 50/2014**

Amhara

A total of 15,011(31.9%) of malaria cases were reported. Of these, 5346(35.6%), 2069(13.8%), 1796(12.0%), 1737(11.6%) and 1652(11.0%) of cases were reported from North Gondar, North Gojam, South Gondar, Awi and East Gojam zones respectively. Malaria trend was decreased in all zones (Fig. 4)

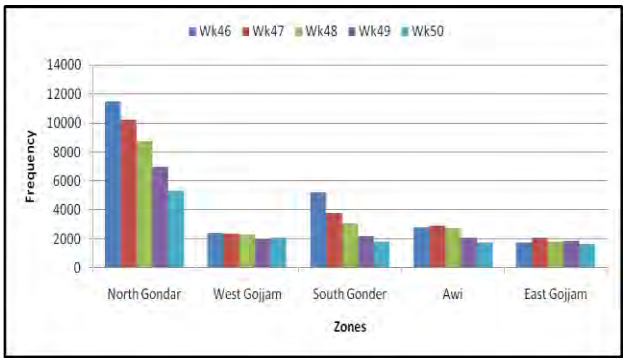

Fig. 4: Malaria trend by zone- Amhara region,week 50/2014

Oromia Region

A total of 7688(16.3%) of malaria cases were reported with no death during week 50. Majority 1045(13.6%), 936(12.2%), 889(11.6%), 693(9.0%) and 526(6.8%) of cases were reported from Ilu Aba Bora, East Shewa, West Hararge, West Wellega and East Welega zones respectively. Malaria trend was decreased in most of the zones with slight increase in Ilu Aba Bora and West Hararge (Fig. 5)

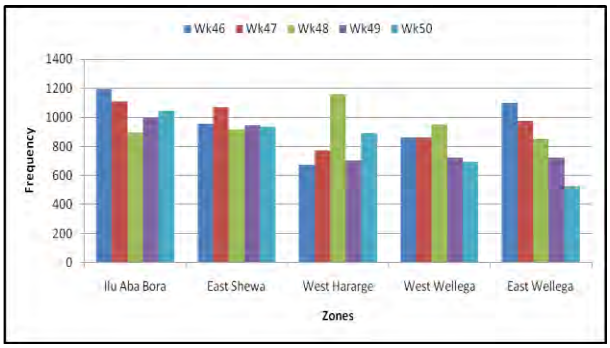

Fig. 5: Malaria trend by zone-Oromia region, week 50/2014

SNNPR

A total of 7335(15.6%) of malaria cases were reported with no death during week 50. Majority 1427(19.4%), 1171(15.9%), 808(11.0%), 658(8.9%) and 527(7.2%) of cases were reported from Gamo Gofa, Wolayita, Hadiya, Gurage, and South Omo respectively. Slight increase in case load in Gurage zone (Fig. 6).

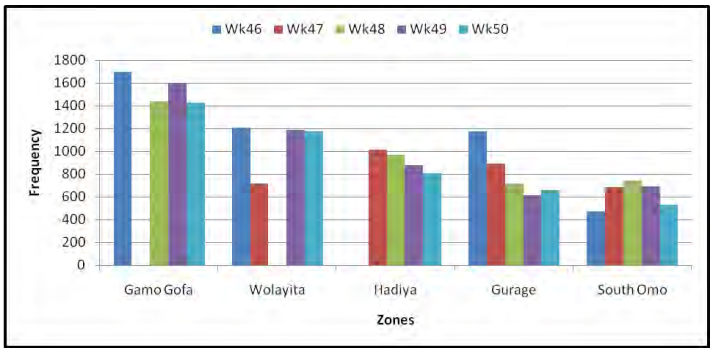

Fig. 6: Malaria trend by zone –SNNPR, week 50/2014

Tigray

A total of 6879(14.6%) of malaria cases were reported with no death during week 50. Majority 2782(40.4%), 1753(25.5%) and 1654(24.0%) of cases were reported from Wetern Tigray, Central Tigray and North Western Tigray zones respectively. Malaria trend decreased in all zones. (Fig. 7)

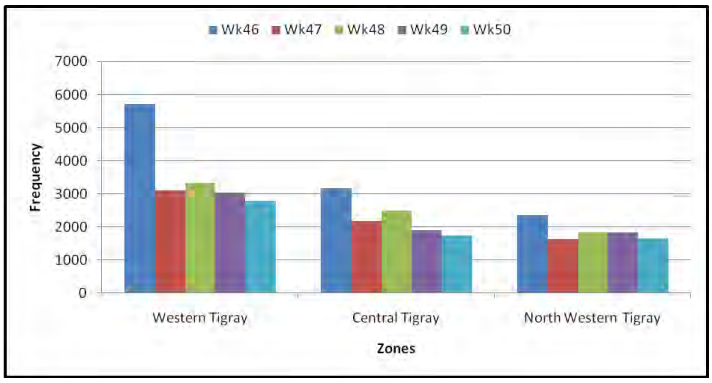

Fig. 7: Malaria cases by date of report- by zone, Tigray, region, week 50/2014

Meningitis

A total of 27 suspected meningitis cases with no death were reported during week 50. Majority of cases were reported from Oromia (15 cases), SNNPR (10 cases) and Amhara (2cases).

Measles

A total of 412 suspected measles cases with 3 deaths one each from Afar, Oromia and SNNPR. Among these 212(51.5%) of cases were from Oromia followed by 115(27.9%) and 40(9.7%) of cases from Amhara and SNNPR respectively (Table 1)).

Table 1: Measles cases by region, week 50/2014

Region	Wk50	
	Number	%
Oromia	212	51.5
Amhara	115	27.9
SNNPR	40	9.7
B-Gumuz	19	4.6
Afar	16	3.9
Harari	7	1.7
Addis Ababa	2	0.5
Tigray	1	0.2
Somali	0	0.0
Dire Dawa	0	0.0
Gambella	0	0.0
Total	**412**	**100**

Compared to week 49 measles cases were increased by 32%. The measles trend was highest during week 48 (Table 1).

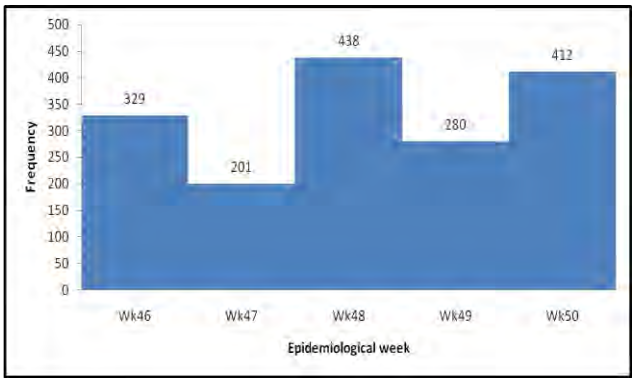

Fig.8: Suspected measles cases by WHO epidemiological week 50/2014

Polio

During week 50, 14 AFP/Polio cases were reported. Among these Oromia (3), Amhara (6), B/Gumuz (1), Somali (3) and Tigray (1).

Response Activities

One team deployed to different regions to give technical support to control measles outbreak.

Active case search is in place

11.2 Public Health Emergency Management Weekly Bulletin, Week 10, 2015

- Weekly malaria trend has been decreasing but no report from 5 regions
- National Completeness was below minimum requirement 80%.

Completeness

During week 10 completeness of reporting was 68.5% at national level and it is <80% completeness as compared to WHO standard (**Error! Reference ource not found.**).

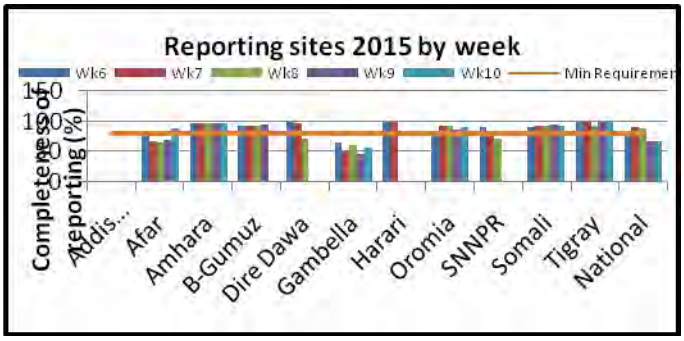

Fig 1: National Completeness of reporting

Diseases

Malaria

A total of 16,026, malaria cases (confirmed + clinical) with no death were reported. No report from Dire Dawa, Addis Ababa, Harari, SNNPR and B/Gumuz. Of the total cases, the highest 6293(39.3%), 3680(23.0%), 3110(19.4%) and 1168(7.3%) of cases were reported from Amhara, Oromia, Tigray and Afar respectively. Weekly malaria trend has been decreasing except Oromia region for week 10/2015 (Fig. 3).

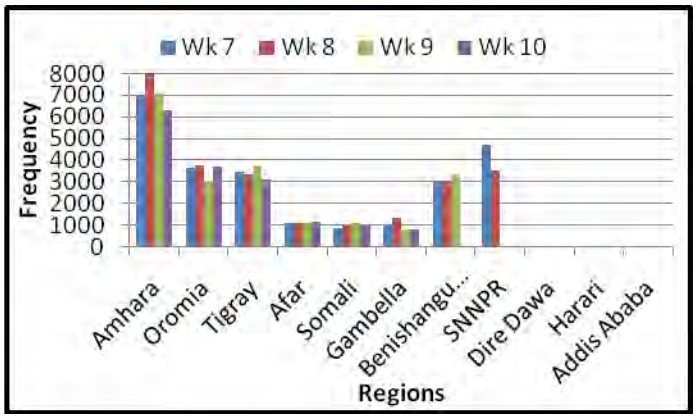

Fig. 3: **National malaria trend-week 10/2015**

Amhara

A total of 6293(39.3%) of malaria cases were reported. Of these, 2298(36.5%), 1048(16.7%), 850(13.5%) and 816(13.0%) of cases were reported from North Gondar, West Gojam, South Gondar and Awi +zones respectively. Malaria trend was decreased in all zones (Fig. 4)

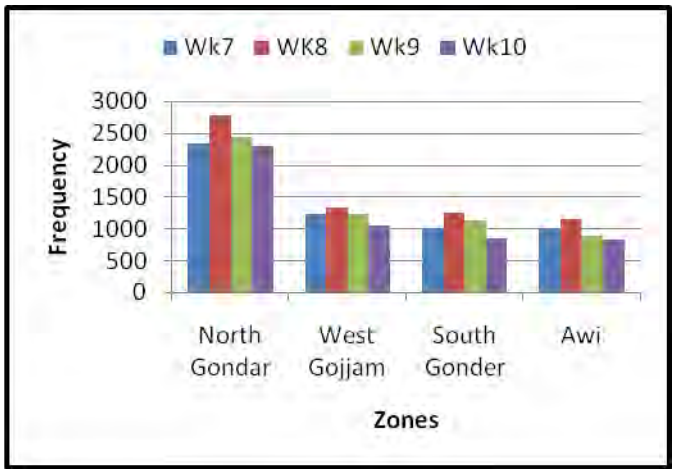

Fig. 4: Malaria trend by zone- Amhara region, week 10/2015

Oromia Region

A total of 3680(23.0%), of malaria cases were reported with no death during week 10. Majority 559(15.2%), 499(13.6%), 492(13.4%) and 306(8.3%) of cases were reported from Ilu Aba Bora, West Wellega, West Hararge and East Shewa zones respectively. Malaria trend was decreased in most of the zones with slight increase in Ilu Aba Bora and West Hararge (Fig. 5)

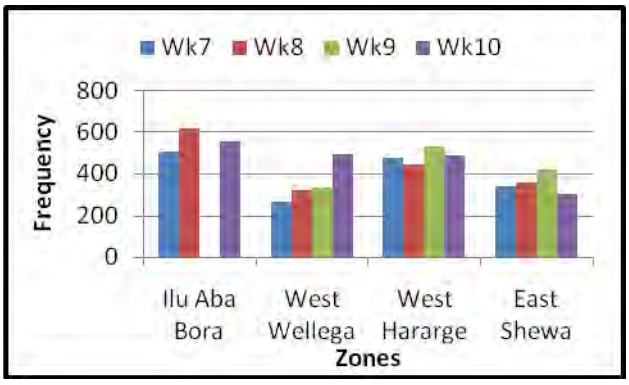

Fig. 5: Malaria trend by zone-Oromia region, week 10/2015

Tigray

A total of 3110(19.4%) of malaria cases were reported with no death during week 10. Majority 1168(37.6%), 956(30.7%) and 703(22.6%) of cases were reported from North Western Tigray, Western Tigray and Central Tigray zones respectively. Malaria trend decreased in all zones. (Fig. 6)

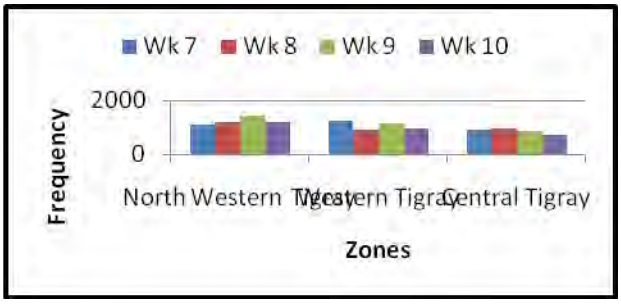

Fig. 6: Malaria cases by date of report- by zone, Tigray, region, week 10/2015

Meningitis

A total of 12suspected meningitis cases with no death were reported during week 10. Majority of cases were reported from Oromia (5 cases), Gambella (3 cases) and Amhara (4 cases).

Measles

A total of 1651 suspected measles cases with 9 deaths of which seven from Oromia and 2 from Amhara. Among these 212(51.5%) of cases were from Oromia followed by 115(27.9%) and 40(9.7%) of cases from Amhara and SNNPR respectively (Table 1)

Table 1: Measles cases by region, week 10/2015

Region	Wk 10/2015	
	Number	%
Oromia	1360	82.4
Amhara	254	15.4
SNNPR	-	-
B-Gumuz	-	-
Afar	16	1.0
Harari	-	-
Addis Ababa	-	-
Tigray	21	1.3
Somali	-	-
Dire Dawa	-	-
Gambella	-	-
Total	**1651**	**100**

Compared to week 9 measles cases were decreased by 20.1% (Table 1).

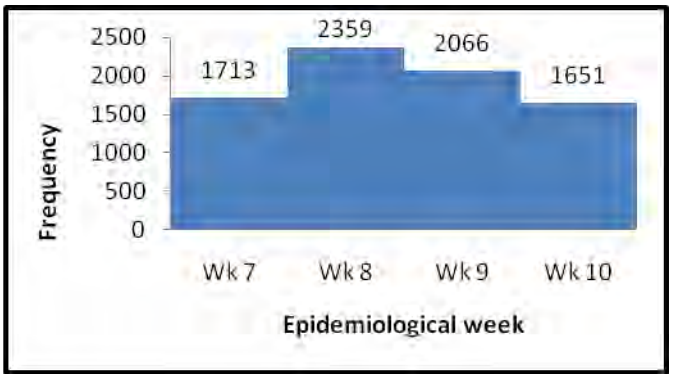

Fig.8: Suspected measles cases by epidemiological week 10/2015

Polio

During week 10, 11 AFP/Polio cases were reported. Among these Oromia (3), Amhara (6), Somali (1) and Tigray (1).

Response Activities

Three team deployed to different regions to give technical support to control measles outbreak returned

Active case search is in place

Annex 1:Measles Outbreak Investigation Questioner Used In Jimma

	Respondent category:	**case Active case control**
1	Data collector name	
2	Date of data collection	
3	Kebele	
4	Got	
5	Latitude	
6	Longitude	
7	What is your relation to the person we are asking questions about?	Mother Father Grandparent The case or control Other (please specify) _____
SOCIO-DEMOGRAPHIC		
1	What is the respondent's name?	
2	How old is the respondent?	_____months ____ years
3	What sex is the respondent?	1. Male 2. Female
4	Has the respondent ever attended school?	1. yes (go to question 15) 2, No (go to question 16) 3. Not Applicable (mark N/A on Q.15, Q.16, then go to question 17)
5	What is the highest level of education the respondent has completed? (read answers):	1. KG 2. Primary 3. Secondary 4.Tertiary 5.Not applicable
6	What is the respondent's occupation?	1. Farmer 2. Merchant 3. Housewife 4. Unemployed 5. Government 6. Pastoralist 7. Student 8. Not applicable Other _____
7	What is the respondent's ethnicity?	1. Oromo 2. Tigre 3. Amhara 4. Gurage 5. Other (specify) _____
8	What is the respondent's religion?	1. Orthodox 2. Protestant 3. Muslim 4.Catholic 5.Other_____
9	What is the respondent's marital status?	1. Single 2. Married 3. Widowed 4. Divorced 5. Not applicable
10	What is the respondent's father's occupation?	1. Farmer 2. Merchant 3. Unemployed 4. Government 5. Student 6. Pastoralist 7. Other _____
11	What is the education level of the FATHER of the respondent?	1. Illiterate 2.Primary 3. Secondary 4.Tertiary 5.I Don't know
12	What is the education level of the MOTHER of the respondent?	1. Illiterate 2. Primary 3. Secondary 4. Tertiary 5.Don't know
13	*What is the main material of the roof? RECORD OBSERVATION*	1. No roof thatch/leaf/mud 2. Rustic mat/plastic sheets 3.reed/bamboo 4. Wood planks 5. Cardboard corrugated iron /metal 6. Wood 7. Asbestos/cement fiber 8. Cement/concrete roofing shingles 9. other (specify) _____

	Does your household have…	Electricity? 1. Yes 2. No A watch/clock? 1. Yes 2. No A radio? 1. Yes 3. No A television? 1. Yes 2. No A mobile telephone? 1.Yes 2.No A non-mobile telephone? 1. Yes 2. No A refrigerator? 1. Yes 2. No A table? 1. Yes 2. No A chair? 1.Yes 2.No

KNOWLEDGE

13	How do you think measles is transmitted, or do you not know? You can pick more than one response. Do you think measles is transmitted…. (READ ANSWERS)	Through the air/coughing Fecal/oral routes Food Close contact with an ill person Another way _____ Or, do you not know?
14	How do you think measles can be prevented? Do you think..(READ ANSWERS)	1. Vaccination can prevent measles 2.There is no prevention 3. Local healing can prevent measles 4. Another way _____ Or, do you not know?
15	Who do you think can be affected by measles, or are you not sure?	1. Children less than 5 years old 2. Children between 5-18 years 3. People over 18 years old 4. Any age group 5. I Don't know 6. Other (specify):_____
16	Do you think vaccination can prevent measles?	1. Yes 2. No 3. Don't know
17	What is the routine age for a child to be vaccinated with measles vaccine, or do you not know?	1. 3 months 2. 6 months 3. 9 months 4. Other _____ 5. I Don't know
18	There is a vaccine that can prevent measles. Did you know that this vaccine exists?	1. Yes 2. No 3. I Don't know

RISK FACTORS

19	Can I see your immunization card?	1. Yes (go to question 33) 2. No (go to question 32)
20	Why do you not have an immunization card?	1. Never went to get vaccinated 2. Got vaccinated but was never given the card 3. Lost the card 4. Other _____
21	Was the respondent vaccinated again measles, or do you not know? (if have an immunization card, refer to the card to find out if vaccinated)	1.Yes (go to question 34) 2. No (go to question 37) Don't know (go to question 38)
22	What is the number of measles vaccine doses received? (refer to card if possible)	One Age of first dose _____ Card validated Two Age of second dose _____ Card validated

		More than two Age of third dose _____ Card validated
23	Where did the respondent get these vaccines? Was it… (READ ANSWERS)	1. Routine in the health center 2. A visit by HEW during routine program 3. A door-to-doorcampaign 4. Did you forget or you don't know 5. Or in another way? _____ **If no GO TO QUESTION 35**
24	The recommended age for vaccination is 9 months. What is the main reason the respondent not vaccinated against measles?	1. Clinic was too far 2. You were absent during vaccination campaign 3. You didn't know it was time for vaccination 4. You think the vaccine will hurt the child 5. The child is not yet 9 month old 6.Other, (specify)_____

E25XPOSURE

25	To your knowledge, did you have contact with a person with measles/(CASES: 2-3 weeks before onset of illness?) (CONTROLS: In the last 2-3 weeks?)	1. Yes 2. No ---------- skip to Q38 3. Don't know ---------- skip to Q38
26	If yes, who did you have contact with?	Name: _____
27	Where did you have contact with this person?	_____
28	Have you travelled outside of your village (CASES: 2-3 weeks before onset of illness?) (CONTROLS: In the last 2-3 weeks?)	1.Yes, (If yes), District _____ Kebele_____ 2. No 3. I Don't know
29	Is there anyone else with measles symptoms in your household?	1. Yes: Total number of measles cases in the house _____ 2. No
30	How long does it take you to walk to the health center from your house?	1. Less than 10 minutes 2. 10-30 minutes 3. 31 minutes – 1 hour 4. More than 1 hour 5. More than 2 hours 6. I Don't know
31	*How many windows and doors does the house have?*	1. two or more windows or doors 2. less than two windows or doors
32	How many sleeping rooms are there in your house?	
33	How many people slept in your house last night?	

CLINICAL PRESENTATION*(for case ONLY)*

1	Did the case have any of the following symptoms?	Rash: 1.Yes 2. No Fever: 1. yes 2. No Runny nose: 1. yes 2. No Red eyes: 1. yes 2. No Cough : 1. yes 2. No Tiny white spots or sores inside the mouth 1. Yes 2. No

2	What is the date the case first saw a rash on their body?	____/_____/_____
3	Was the case in your home village when you first noticed you were ill?	yes (skip to question 50) No (go to next question)
4	Where were you when the illness started?	District:_____Kebele; _____ Purpose of trip:_____
5	How long have you had a rash?	_____days
6	Do you still have the rash?	1. Yes 2. No
7	Did you visit a health facility for this illness?	1.Yes (date went to facility____/____/____) 2. No (go to Q.55)
8	How long were you sick before visiting the health facility?	_____ in days/hours
9	Were you admitted?	1. Yes --- date admitted:___/___ /_____ 2. No
10	Treatment given?	1. Yes (go to question 56) 2. No (go to question 57)
11	Was the respondent given…	1. ORS 2. Antibiotics 3.Vitamin A 3.Supplementary food 4. TTC ointment 5. Anti-pyretic 6. Others ____
12	*Outcome*	1. Alive 2. dead
13	Did you have any of the following complications when you were sick with measles?	Diarrhea: 1. yes 2. No Blindness: 1. yes 2. No Ear infection: 1. yes 2. No Convulsions 1. Yes 2. No Change in vision: 1. yes 2.No OTHER _____
14	Did you travel four days prior to or four days after rash onset?	9. Yes (go to question #60) 2. No (FINISHED)
15	Where did you travel to?	

Annex 2: Measles Outbreak Investigation Questionnaire Used In Guji Zone, 2015

	Respondent category:	**Case Active case control**
	Data collector name Date of data collection Kebele Latitude Longitude What is your relation to the person we are asking questions about?	 Mother Father Grandparent The case or control Other (please specify) _____
SOCIO-DEMOGRAPHIC		
	What is the respondent's name?	
	How old is the respondent?	_____months ____ years
	What sex is the respondent? Has the respondent ever attended school? What is the highest level of education the respondent has completed? (read answers): What is the respondent's occupation? What is the respondent's ethnicity? What is the respondent's religion? What is the respondent's marital status?	Male Female Yes (go to question 15) No (go to question 16) Not Applicable (mark N/A on Q.15, Q.16, then go to question 17) KG Primary Secondary Tertiary Not applicable Farmer Merchant Housewife Unemployed Government Pastoralist Student Not applicable Other _____ Oromo Tigre Amhara Gurage Other (specify) _____ Orthodox Protestant Muslim Catholic Other_____ Single Married Widowed Divorced Not applicable
	What is the respondent's father's occupation?	Farmer Merchant Unemployed Government Student Pastoralist Other _____
	What is the education level of the FATHER of the respondent?	Illiterate Primary Secondary Tertiary Don't know
	What is the education level of the MOTHER of the respondent?	Illiterate Primary Secondary Tertiary Don't know
	What is the main material of the roof? RECORD OBSERVATION	No roof thatch/leaf/mud rustic mat/plastic sheets reed/bamboo wood planks cardboard corrugated iron /metal wood asbestos/cement fiber cement/concrete roofing shingles other (specify) _____
	Does your household have…	Electricity? Yes No A watch/clock? Yes No A radio? Yes No A television? Yes No A mobile telephone? Yes No

		A non-mobile telephone? Yes No A refrigerator? Yes No A table? Yes No A chair? Yes No
KNOWLEDGE		
	How do you think measles is transmitted, or do you not know? You can pick more than one response. Do you think measles is transmitted…. (READ ANSWERS)	Through the air/coughing Fecal/oral routes Food Close contact with an ill person Another way _____ Or, do you not know?
	How Do You Think Measles Can Be Prevented? Do You Think..(READ ANSWERS) Who do you think can be affected by measles, or are you not sure? Do you think vaccination can prevent measles? What is the routine age for a child to be vaccinated with measles vaccine, or do you not know? There is a vaccine that can prevent measles. Did you know that this vaccine exists?	Vaccination can prevent measles There is no prevention Local healing can prevent measles Another way _____ Or, do you not know? Children less than 5 years old Children between 5-18 years People over 18 years old Any age group Don't know__ Other (specify):_____ Yes No Don't know 3 months 6 months 9 months Other _____ Don't know Yes No Don't know
RISK FACTORS		
	Can I see your immunization card?	Yes (go to question 33) No (go to question 32)
	Why do you not have an immunization card?	Never went to get vaccinated Got vaccinated but was never given the card Lost the card Other _____
	Was the respondent vaccinated again measles, or do you not know? (if have an immunization card, refer to the card to find out if vaccinated)	Yes (go to question 34) No (go to question 37) Don't know (go to question 38)
	What is the number of measles vaccine doses received? (refer to card if possible) Where did the respondent get these vaccines? Was it… (READ ANSWERS) The recommended age for vaccination is 9 months. What is the main reason the respondent not vaccinated against measles?	One Age of first dose _____ Card validated Two Age of second dose _____ Card validated More than two Age of third dose _____ Card validated Routine in the health center A visit by HEW during routine program A door-to-doorcampaign Did you forget or don't know Or in a other way? __GO TO QUESTION 35 Clinic was too far You were absent during vaccination campaign You didn't know it was time for vaccination You think the vaccine will hurt the child The child is not yet 9 months old Other, (specify) _____
EXPOSURE		
	To your knowledge, did you have contact with a person with measles/(CASES: 2-3	Yes No ---------- skip to Q38

	weeks before onset of illness?) (CONTROLS: In the last 2-3 weeks?)	Don't know ---------- skip to Q38
	If yes, who did you have contact with?	Name: _____
	Where did you have contact with this person?	_____
	Have you travelled outside of your village (CASES: 2-3 weeks before onset of illness?) (CONTROLS: In the last 2-3 weeks?)	Yes, (If yes), District _____ Kebele_____ No___ Don't know
	Is there anyone else with measles symptoms in your household?	Yes: Total number of measles cases in the house _____ No
	How long does it take you to walk to the health center from your house?	Less than 10 minutes 10-30 minutes 31 minutes – 1 hour More than 1 hour More than 2 hours Don't know
	How many windows and doors does the house have? How many sleeping rooms are there in your house? How many people slept in your house last night?	Two or more windows or doors less than two windows or doors

CLINICAL PRESENTATION*(for case ONLY)*

	Did the case have any of the following symptoms?	Rash: Yes No Fever: yes No Runny nose: yes No Red eyes: yes No Cough : yes No Tiny white spots or sores inside the mouth yes No
	What is the date the case first saw a rash on their body?	____/_____/_____
	Was the case in your home village when you first noticed you were ill?	Yes (skip to question 50) No (go to next question)
	Where were you when the illness started?	District:_____Kebele; _____ Purpose of trip:_____
	How long have you had a rash?	_____days
	Do you still have the rash?	Yes No
	Did you visit a health facility for this illness?	Yes (date went to facility____/____/____) No (go to Q.55)
	How long were you sick before visiting the health facility?	_____ in days/hours
	Were you admitted?	Yes --- date admitted:___/___/_____ No
	Treatment given? Was the respondent given…	Yes (go to question 56) No (go to question 57) ORS Antibiotics Vitamin A Supplementary food TTC ointment Anti-pyretic Other ____
	Outcome	Alive death

	Did you have any of the following complications when you were sick with measles?	Diarrhea: yes No Blindness : yes No Ear infection: yes No Convulsions yes No Change in vision: yes___ No _-OTHER _____
	Did you travel four days prior to or four days after rash onset?	Yes (go to question #60) No (FINISHED)
	Where did you travel to?	

Annex 3: Measles Annual Attack Rate Per 100000 Population, Ethiopia 2013

Region	Zone	Wodera	Case	Percentage	Population	AR/100000 Populations
Oromia	Borena	Abaya	501	14.2	123904	404
		Gelana	116	3.3	83443	139
	Guji	Liben	68	1.9	163461	42
	Arsi	Gololcha	277	7.8	205373	135
	Kelem wolega	Yamalogi Walwal	231	6.5	60996	379
	Bale	Dawe Kachen	116	3.3	36630	317
		Golocha	71	2	120163	59
	Jimma	Limu Seka	96	2.7	222254	43
		Goro Dola	53	1.5	136882	39
	West Arsi	Kore	84	2.4	123487	68
		Shashemene	82	2.3	294430	28
		Seraro	55	1.6	172611	32
	West Hararge	Tulo	47	1.3	173888	27
	West Shewa	Meta Robi	85	2.4	166890	51
	Bishoftu Town	Bishoftu Town	60	1.7	118847	50
	Assela Town	Assela Town	57	1.6	79833	71
	Total		**1999**	**56.5**	**2283094**	**88**
SNNPR	Bench Maji	Shey Bench	444	6.9	138515	321
		Semen Bench	82	1.3	127274	64
	Gamo Gofa	Kucha	912	14.2	177871	513
		Chencha	286	4.5	132577	216
	Hawassa Town	Hawassa Town	310	4.8	308416	101
	Sidama	Aleta Chiko	477	7.4	203788	234
		Shebedino	88	1.4	225356	39
	Walayta	Boloso Bombe	653	10.2	108252	603
		Kindo Didaye	562	8.8	117737	477
		Damot Sore	542	8.5	126048	430
	SNNPR Total		**4356**	**67.9**	1665832	**261**
Amhara	North Shewa	Angolelana Tera	106	8.7	89782	118
		Moretena Jiru	88	7.2	102788	86
		MojanaWedera	83	6.8	77734	107
		Debre Brehan	28	2.3	72155	39

		Basona Werana	18	1.5	133745	13
		Mida Weremo Wajetu	18	1.5	102954	17
	West Gojjam	Sekela	181	14.8	153409	118
		Bahirdar Zuria	13	1.1	202119	6
	South Wello	Tenta	78	6.4	183898	42
		Dessie Town	33	2.7	167176	20
		Tehuledere	14	1.1	130400	11
	Amhara Total		**660**	**54.0**	**1416159**	**47**

Annex 4: Budget, Schedule For Surveillance Evaluation

Activities	**Schedule**			
	May 26-30/2013	**June2-9/2014**	**June 10-16/2013**	**June 17-21/2014**
Proposal submission	**X**			
Organizing Admin issue	**X**			
Field trip and Data collection		X		
Data entry			X	
Data analysis and interpretation			X	
Writing progress report				X
Submitting Final report				X

Annex 5. Budget Proposal For Malaria Surveillance System Evaluation

Item/Description	Number	No of days	Allowance per day	Total cost in Birr	Remark
Evaluator	1	15	400	6000	
Vehicle	1	15	2300	34,500	
Grand TOTAL				40,500	

Annex 6: Questionnaire for malaria Surveillance Evaluation

1. **Identifiers:**

1. Region _____ Zone _____ Woreda _____
2. Health facility:_____ Date:_____ Interviewer:_____
3. Respondent:_____

2. **General**

Total pop._____ Male _____ Female_____

b. Rural pop._____ Urban pop._____

c. Total Kebeles _____ Urban _____ Rural _____

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

e. GOV clinics _____ other private health facility _____ NGOs H.F._____

f. Total pop. At risk for Malaria_____

3. Availability of a national surveillance manual

a. Is there national manual for surveillance at this site? 1. Yes 2.No 3.Unknown

4. Case detection and registration

1. Percent of health facilities that have a clinical register 1. Yes 2.No 3.Unknown
2. Percent of health facilities that correctly register cases filling of the clinical register during the previous 30 days 1. Yes 2.No 3.Unknown
3. Do you have a standard case definition for: malaria? 1. Yes 2.No 3.Unknown

5. Case confirmation

1. Do you have RDT to test Malaria at this facility? 1. Yes 2.No 3.Unknown
2. Do you have functional microscope to test for Malaria at this facility 1. Yes 2.No 3.Unknown
3. Do you have Gemisa reagent to stain plasmodium species? 1. Yes 2.No 3.Unknown
4. Do you have oil immersion at this facility? 1. Yes 2.No 3.Unknown
5. Which communication material did you have?
6. ☐ E-mail ☐ Wired phone ☐ Mobile ☐ Radio ☐ Fax ☐ Other----------
7. Did you have address of Zonal/Woreda PHEM officers? ☐Yes ☐ No
8. 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----------
9. 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
10. 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
11. ☐Others----------

12. 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
13. If answer for Q 14 is yes, to whom did you send? ----------
14. If you faced any problems on communication and reporting, list them----------
15. 15Mention the alternative solutions that you take to tackle the problems you mentioned above? -
16. 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
17. Observe that the last monthly report agreed with the register for 3 diseases (1 for each targeted group [eradication; elimination; epidemic prone; major public health importance])
18. Obs Measles Y/ N /U/ Obs Malaria Y/ N/ U/ Obs Rabies Y/ N /U/
19. Percent of sites that reported each reporting period to the next higher level during the past 3 months
20. Number of reports in the last 3 months compared to expected number
21. Obs Weekly: /12 times the number of sites Obs immediately: /-- times the number of sites
22. On time (use national deadlines)
23. Obs Number of weekly reports submitted on time:-_____ /12 times the number of sites
24. Obs Number of immediately reports submitted on time: ___/-- times the number of sites
25. How do you report to higher level?
26. Mail___ Fax __Telephone ___ Radio ___ Electronic___ Other __
27. Strengthening reporting How can reporting be improved? _____

6. <u>Data analysis</u>

1. Is there assigned focal person for surveillance activities? Yes/ No
2. If No for Q 24 how do you do surveillance activities? _____
3. If answer for Q24 is yes did he train on surveillance system? a) when----------? b) Topic---------- ----------? c) For how long? ----------
4. Did you have computer on your office? Yes / No
5. Did you have computer on your department (PHEM unit)? Yes /No
6. What is the data entry and compilation instrument? ☐ Manual ☐ Computer ☐ other_____
7. Did you have computer skill on ☐ Ms word ☐Ms excel ☐MS power point ☐ Epi-info
8. Did you analyze data of the surveillance system? Yes /No
9. If answer for Q 31 is yes, did you describe data by ☐ time ☐ place ☐ person

10. Did you have denominators for data analysis? ☐ total population ☐ male ☐ female ☐ U5

11. Please indicate the frequency of your data analysis.

12. ☐ Weekly ☐ Every two week ☐ Monthly ☐ Quarterly ☐Every 6 month ☐ Annually

    a. No regular time

13. Did you notify the results of your analysis to the higher level PHEM? Yes /No

14. If answer for Q 35 is No, what is the reason?

    a. Lack of knowledge ☐ Shortage of time ☐ Less attention given ☐ Shortage of materials

15. ☐ Analysis is not familiar ☐ Negligence ☐ Other----------

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

17. Yes 2. No 3. Unknown 4. Not applicable

18. Do you have an action threshold for any of the Country priority diseases? 1. Yes 2. No 3.Unknown /Not applicable

19. If yes for Q 38**,** what is it (Ask for at least 2 priority diseases)? ____cases __ % increase __rate

7. <u>Epidemic preparedness</u>

1. Did you have plan for epidemic response and preparedness? 1. Yes 2. No
2. Did you have emergency stocks of drugs and supplies? 1. Yes 2. No
3. If answer for Q 41 is No, how did you control epidemics? _____
4. Had you experienced shortage of drugs, vaccines and supplies in 2005 or 2006 EFY? 1. Yes 2. No 3. I don't know
5. Did you establish epidemic management committee? 1. Yes 2. No 3. Not Applicable
6. Did the epidemic management committee have regularly scheduled meeting time? 1. Yes 2. No
7. Did you establish Rapid response team? 1. Yes 2. No 3. Not Applicable
8. Did the Rapid response team have regularly scheduled meeting time during epidemics? 1. Yes. 2. No
9. Did you have case management protocol for epidemic prone diseases? 1. Yes 2. No
10. Was there a budget for epidemic response? 1. Yes 2. No
11. Any Challenges on epidemic response and preparedness in 2005/06 EFY? 1.Yes 2. No

If answer for Q 50 is yes, a) list the challenges_____

b) What measures did you take to tackle the challenges? _____

<u>8. Epidemic response</u>

a. Is there any outbreak occurred in your area in 2005/06 EFY? Yes/ No how money
b. If yes for Q 52, how many of them were investigated in 2005/06 EFY? _____

c. Did you have outbreak investigation check list? 1. Yes 2. No

2. If answer for Q 54 is No, how did you know possible factors for the outbreak? ----------
    a. Has the health facility implemented prevention and control measures based on local data for at least one epidemic prone disease? 1. Yes 2. No 3. Unknown
    b. Did they achieved acceptable case fatality rates (e.g. 10% for Meningococcal CSM 1% for Cholera) during the most recent outbreak
    c. Observe that the health facility achieved an acceptable case fatality rate for most recent outbreak 1. Yes 2. No 3. Unknown

9. Supervision and Feedback

1. Were you supervised by higher level (regional, zonal or Woreda) officers in 2005 EFY? 1. Yes 2. No (observe at least one feedback report)
2. If answer for Q 58 is yes, how many times in 2005/06 EFY? ----------
3. Had you received feedback from higher level supervisors in 2005/06 EFY? 1. Yes 2. No
4. If answer for Q 60 is yes, how many feedbacks did you received in 2005/06 EFY? --------
5. Had you faced any challenge on supervision and feedback in 2005/06 EFY? 1. Yes 2. No
6. If answer for Q62 is yes a) list the challenges.--- b) list the measures that you take to tackle the challenges.------
7. How many meetings has this health facility conducted with the community members in the past six months? _____
8. Observe the minutes or report of at least 1 meeting between the health facility team and the community members within the six months 1. Yes 2. No 3. Unknown
9. Resources

Logistics Electricity_._____Bicycles_____Motor cycles_____Vehicles

1. **Data management**

Stationery__Calculator__Computer__Software___Printer

2. **Communication**

Tel. service __Fax ___Radio call ___ Computer with modem

3. **Information education and communication materials**

Posters___Megaphone___Flipcharts or Image box___TV set___Generator__Screen

Projector (Movie)___Other:

12. Questionnaire for Attributes and level of Usefulness:

1. Total population under surveillance_____

2. What is the incidence / Prevalence of Malaria in your area/region

Malaria: cases _____Deaths _____

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

1. Does the surveillance system help?
2. To detect outbreaks of these selected priority diseases early? 1. Yes___ 2.No____
3. To estimate the magnitude of morbidity and mortality related to these diseases, including identification of factors associated with these diseases? 1. Yes_____ 2.No_____
4. To permit assessment of the effect of prevention and control programs? 1. Yes____ 2.No_____
5. To observe (confirm): interventions and diseases trends analyzed 1. Available__ 2.Not available__

16. Describe Each System Attributes:

A. Simplicity:

Is the case definition of the priority diseases (malaria) easy for case detection by all level health professionals?

1. Yes_____ 2. No_____

2. Does the surveillance system help to record and report data on time?

3. Do you feel that additional data collected on ~~a~~ case are time consuming? 1. Yes_ 2. No_

4. How long it takes to fill the format? 1. Less than five minute 2.10-15minuts 3.Greater than15 minutes

5. How long does it take to have laboratory confirmation of Malaria? 1. Less than five minute 2.10-5minuts 3. Greater than15 minutes

B. Flexibility:

1. Can the current reporting formats be used for other newly occurring health event (disease) without much difficulty? 1. Yes__ 2.No___

2. Do you think that any change in the existing procedure of case detection, reporting, and formats will be difficult to implement? 1. Yes___ 2.No ___

3. Is the system easy to add new variables? 1. Yes 2. No

5. Is the surveillance system easy to integrate with other systems? 1. Yes 2. No

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

1. Are the data collection formats for these priority diseases clear and easy to fill for all the data collectors/ reporting sites? 1. Yes 2.No
2. Are the reporting site / data collectors trained/ supervised regularly? 1. Yes 2. No

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. Percent of woredas that send report of each week in 2005 EFY. ----------

6. Total weekly reports received from woredas/Hospitals (including late reports, from July 2012 May 2013)

D. Acceptability:

a. Do you think all the reporting agents accept and well engaged to the surveillance activities? 1. Yes 2. No

b. If yes, how many are active participants (of the expected total)? _____

c. If No, what is the reason for their poor participation in the surveillance activity?

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

e. No feedback or recognition given by the higher bodies for their contribution; i.e. no dissemination of the analyzed data back to reporting facilities

f. Reporting formats are difficult to understand

g. Report formats are time consuming

h. Were all the health professionals aware about the surveillance system? Yes/No (if yes how they aware) _____

E. Representativeness:

1. 1.What is the health service coverage of the district/ zone/ region? _____(#) _____%
2. 2.Do you think, the populations under surveillance have good health seeking behavior for these diseases? 1. Yes 2. No
3. 3.Who do you think is well represented by the surveillance data? The urban/ the rural and what is the reason?
4. 4.Was the surveillance system enabled to follow the health and health related events in the whole community? 1. Yes 2. No
5. 5.If answer for Q 12 is no, who do you think is well benefited by the surveillance system? 1. Urban 2. Rural 3. Both
6. 6.If yes for Q 12, do you think that rural and urban communities are equally benefited in surveillance system? 1. Yes 2. No, if no why _____

F. Timeliness:

a. Timeliness of reporting in the past one year (by Zone and Woreda)

1. on time---------- 2. Late_____

b. Percent of woredas that report on time. ----------

c. Percent of HF that report on time. ----------

G. Stability:

a. Was the new BPR restructuring affected the procedures and activities of the surveillance of these diseases?

1. Yes 2. No

b. Was there lack of resources that interrupt the surveillance system? 1. Yes 2. No

c. Was there any time /condition in which the surveillance is not fully operating? 1. Yes 2. No

d.Is there a surveillance officer or focal person (PHEM unit)? Yes/No Number _____

H. Strength and Weakness

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

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

3. What are the weaknesses of your surveillance system? _____

I. Health Post Level Questionnaire

Identifiers:

Assessment team: Type of health facility:

Date : District:

Interviewer : Region/province:

Respondent : Country:

Name of health facility: Surveillance system:

General

Total pop._____ Male _____ Female_____

Rural pop._____ Urban pop._____

Total Kebeles _____ Urban _____ Rural _____

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

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

1. Total pop. At risk for Malaria_____
2. of National surveillance Manual

Is there national manual for malaria surveillance at this site? 1. Yes 2.No 3.Unknown

3. Case detection and registration

Is there a clinical register book health facility? 1. Yes 2.No 3.Unknown

Do you have standard case definition for malaria? 1. Yes 2.No 3.Unknown

4. Data reporting

1. Have you faced lack of appropriate surveillance forms at any time during the last 6 months?

2. 1. Yes 2.No 3.Unknown
3. Percent of sites that is accurately reported cases from the registry into the summary report to go to higher level? _____
4. Percent of sites that reported each reporting period to the next higher level during the past 3 months
5. Number of reports in the last 3 months compared to expected number
6. Observe Weekly: Observe Immediately:
7. Percent of HF that have means for reporting to next level by e-mail, telephone, fax or radio?_____
8. How do you report?
9. 1.Mail 2.Fax 3. Telephone 4. Radio 5. Electronic 6.Others(specify):_____

5. Data analysis

1. Performing trend analysis observed line graph of cases by time 1. Yes 2.No 3.Unknown

5. Epidemic response

1. Has the health facility implemented prevention and control measures based on local data for at least one epidemic prone disease? 1. Yes 2.No 3.Unknown

6. Feedback and supervision

1. How many feedback bulletins or reports has the health facility received in the last year?
2. How many meetings has this health facility conducted with the community members in the past six months? _____
3. How many times have you been supervised in the last 6 months? _____

7. Training

Have you been trained in disease surveillance and epidemic management?

1. Yes 2.No 3.Unknown

If yes, specify when, where, how long, by whom?_____

10. Resources

Percent of sites that have: Logistics

1. Electricity___ 2. Bicycles 3. Motor cycles4.Vehicles

11. Data management

1. Stationery 3.Computer
2. Calculator 4. Printer

Communications

Telephone service 2.Radio call 3. Fax 4. Computers with modems

12. Information education and communication materials

2. Posters 4.Screen
3. Megaphone 5.Projector (Movie)
4. Flipcharts or Image box 6.Other(specify):_____

13. Hygiene and sanitation materials

1. Spray pump

2. Disinfectant

List protection materials _____

12. Describe Each System Attributes:

Simplicity:

Is the case definition of the priority diseases (malaria) easy for case detection by all level health professionals?

1. Yes 2. No

2. Does the surveillance system help to record and report data on time?

3. Do you feel that additional data collected on ~~a~~ case are time consuming? 1. Yes 2. No

4. How long it takes to fill the format? Less than five minute 2. 10-15minuts 3.Greater than15 minutes

5. How long does it take to have laboratory confirmation of Malaria?

1. Less than five minute 2.-10-15minuts 3.Greater than15 minutes

14. Flexibility:

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

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

1. Are the data collection formats for these priority diseases clear and easy to fill for all the data collectors/ reporting sites? 1. Yes 2. No
2. Are the reporting site / data collectors trained/ supervised regularly? 1. Yes 2. No
3. 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 _____

c. Percent of woredas that send report of each week in 2005 EFY. ----------

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

WHO epid. wk	N^{O} of woredas expected to report	N^{O} of woredas that report (including late report)	N^{O} of Hospitals expected to report	N^{O} of hospitals that report (including late reports)	WHO epid. wk

16. Acceptability:

a. Do you think all the reporting agents accept and well engaged to the surveillance activities? 1. Yes 2.No

b. If yes, how many are active participants (of the expected total)? _____

c. If No, what is the reason for their poor participation in the surveillance activity?

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

2. No feedback or recognition given by the higher bodies for their contribution; i.e. no dissemination of the analyzed data back to reporting facilities

3. Reporting formats are difficult to understand

4. Report formats are time consuming

5. Were all the health professionals aware about the surveillance system? Yes/No (if yes how they aware) _____

17. Representativeness:

1. What is the health service coverage of the district/ zone/ region?_____(#) _____%
2. Do you think, the populations under surveillance have good health seeking behavior for these diseases? 1. Yes 2. No
3. Who do you think is well represented by the surveillance data? The urban/ the rural and what is the reason?
4. Was the surveillance system enabled to follow the health and health related events in the whole community? 1. Yes 2. No
5. If answer for Q 12 is no, who do you think is well benefited by the surveillance system?

a. Urban 2, the rural 3. Both

6. If yes for Q 12, do you think that rural and urban communities are equally benefited in surveillance system? 1. Yes 2. No, if no why _____

19.Timeliness:

a. Timeliness of reporting in the past one year (by Zone and Woreda) On time---------- 2. Late

b. Percent of woredas that report on time. ---------- c. Percent of HF that report on time. -------

20. Stability:

a. Was the new BPR restructuring affect the procedures and activities of the surveillance of these diseases? 1. Yes 2. No

b. Was there lack of resources that interrupt the surveillance system? 1. Yes 2. No

c. Was there any time /condition in which the surveillance is not fully operating? 1. Yes 2. No

d. Is there a surveillance officer or focal person (PHEM unit)? Yes/No Number _____

21. Strength and Weakness

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

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

3. What are the weaknesses of your surveillance system? _____

Annex 7: Health Profile Assessment Questionnaire

1. Historical aspects of the woreda

1. Woreda Name_____
2. How & why the name given_____
3. How and when the woreda was formed_____
4. Any other historical aspect about the worda_____

2. Geography and Climate

1. Woreda map_____
2. Location(distance) _____Direction _____
3. Altitude _____
4. Surface Area _____(_____% from the zone)
5. Town _____rural _____(land)

2. Geographical coordinate

1. Latitude _____
2. Longitude _____
3. Annual rain fall(average)_____
4. Annual temp(average)_____
5. Climatic zones_____ (%) _____ (%) _____ (%)

3. Woreda boundaries

a) North _____ C)South_____

b) East_____d) West_____

Kebele	Total Population	HEWs Population	Age Group				Sex		Residency	
			1_4	<15	15-49	>64	Male	Female	Urban	Rural
Total										

Population data by age and sex							
Sex	<1	1_5	15-24	25-34	35-49	50-64	>65
Male							
Female							
Total							

Characterestics	**Frequency**	**Percentage**
Ethnic/language		
Oromo		
Amhara		
Tigre		
Gurage		
Others		
Religion		
Orthodox		
Muslim		
Protestant		
Others		

Characteristics	**Frequency**	**Percentage**
Educational institution		
K.G		
Primarily School		
Secondary		
Preparatory		
College/ University		
TVET		
School health activities: Number of schools with Water supply		
Schools with functional latrines		
Schools with HIV/other Health clubs		

Water coverage

Characteristics	Frequency	Percentage
Total safe water coverage		
Safe water supply coverage by kebele		
Main source of water supply		
Kebeles getting safe water		
Population getting safe water		
Daily water consumption per day per person		

4. Education

School Enrolment	Sex		Percentage
	Male	Female	
	Frequency	Frequency	
KG			
1_8			
9_12			
TVT			
Collage/University			
School Age Children (target)			
School dropout in 6 months or year 2004			
If there is school dropout why			

5. Other Facilities

Characteristics	Frequency	Percentage
Transport		
Accessibility (main roads)		
Type of road		
How many kebeles have access to transportation		
Flow of transportation per day		
Telecommunication		
How many people have access to fixed telephone		
How many people have access to mobile phone (coverage)		
Post Office		
Bank		
Power supply		
How many house hold get power supply		

6. Disaster situation in the woreda

2. Was there any disaster (natural or manmade) in the woreda in the last one year? _____
3. Any recent disease outbreak/other public health emergency_____

If yes cases_____ and deaths_____

9. Vital Statics and Health Indicators

1. Infant Mortality Rate (IMR) _____(total <1 yr deaths this 2005yr_____)
2. Child Mortality Rate_____(this year's total <15 yr deaths_____)
3. Crude Birth Rate_____
4. Crude Death Rate_____ (total deaths 2005yr____)
5. Maternal Mortality Rate_____(2005 total maternal deaths_____)
6. Contraceptive prevalence rate_____
7. Contraceptive acceptance rate _____
8. ANC rate (how many of the total expected pregnancies attended 1st ANC) _____
9. ANC rate (how many of the total expected pregnancies attended 4th ANC) _____
10. Percentage of deliveries attended by skilled birth attendants_____
11. Percentage of deliveries attended by HEWs_____
12. Percentage of deliveries attended by TBA _____
13. Average family size_____

10. Immunization Coverage (for children and Women)

1. BCG _____ (__ %).
2. OPV0____ (____ %), OPV1_____ (___ %), OPV3_____ (___ %)
3. Penta1_____ (___ %), penta2 _____ (___ %) penta3_____ (___ %)
4. Measles_____ (___ %).
5. PCV-10-1_____(__%), PCV-10-3_____(___%)
6. TT2+P.W_____(__%),TT2+ N.P.W_____(___%)

11. Health Service

2. Type and Number of Health Institution

Type		umber	Total No. of beds
Gov. Hospital			
Gov. Health center	Type A		
	Type B		
Private H.Fs (clinics/diag. lab/drug stores)	Clinics (all type)		
	Diag. Lab.		
	Drug store		
Gov. Health posts			
NGOs	H.Ps		
	H.Cs		
	Hospitals		
	Clinics		

3. Health institution to pop ratio:

1. Hospital: Pop----------.
2. HC: Pop----------
3. HP: Pop----------
4. Health service coverage----------

4. Type and Number of health professionals

Type	No.	Remark
Specialist		
G.P		
HO		
Nurses (Deg. and Dip.)		
Mid wife (Deg. and Dip.)		
Lab. (Deg. and Dip.)		
Pharmacy (Deg. and Dip.)		
Env. Health (Deg. and Dip.)		
HIT		
Health education		
HEWs		
Others		

5. Health professional to population ratio

1. Doctor: pop. Ratio_____
2. Nurse: pop. Ratio____
3. Mid. Wife: pop. Ratio ____
4. HEW: pop. ratio_____

12. Top causes of morbidity

	Adult	Pediatrics/ < 5 years
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

14. Top ten causes of admissions (Morbidity)

	Adult	Pediatrics/ <5 year
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

15. Top ten causes of deaths (mortality)

	Adult	Pediatrics/ <5 year
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

13. Health budget allocation

Government

a) Total budget allocated for the woreda _____

b) Total budget allocated for health _____(____%)

Funds from NGO

a) Total _____ (purpose/programs)_____

14. Community Health Services

1. Status of services provided by community health workers namely:
2. No. of TBAs/TTBA_____ and their responsibility
3. No. of CHWs/CHPs_____ and their responsibility
4. Responsibility of HEWs_____
5. Others _____

15. Status of Primary Health Care Components – with focus on the eight PHC elements and MDG

1. MCH (Delivery, ANC, PNC)_____
2. FP(Methods)_____
3. EPI(outreach service, cold chain, vaccine: _____ _____
4. Environmental Health & sanitation.
5. Latrine coverage_____ & utilization rate_____
6. Solid waste management_____
7. Liquid waste management _____
8. others_____
9. Health Education (what, when, where, how and who conducted health education)_____

16. Endemic diseases

A). Malaria:

1. Total malariouskebeles_____& Pop at risk_____
2. ITNs coverage (including current dist)_____
3. Is there IRS this year(No of kebeles)_____
4. Total cases/yr_____ deaths/yr_____,<5yr cases_____ deaths_____
5. Malaria supplies (Coartem, RDT, etc) shortage _____
6. Other issues_____

B). TB/Leprosy:

1. Total TB cases_____
2. PTB negative_____
3. PTB positive_____
4. Extra PTB _____
5. TB detection rate _____

6. TB Rx completion rate _____
7. TB cure rate _____
8. TB Rx success rate _____
9. TB defaulter_____
10. Death on TB Rx_____
11. Total TB patients screened for HIV_____
12. Total Leprosy cases_____on Rx_____

C). HIV/AIDS

1. Total people screened for HIV (last one year)_____
2. VCT_____ PITC_____PMTCT_____
3. HIV prevalence_____
4. HIV Incidence (new cases/yr)_____
5. Total PLWHA_____
6. OnART_____on Pre-ART_____
7. Other HIV prevention activities_____

D). Nutrition

1. Total OTP sites_____, total admissions to OTP/yr_____
2. Total SC sites,_____, Newly opened/yr_____, total admissions to SC/yr_____
3. Is there TSF (targeted supplementary feeding) program in the woreda_____
4. CBN program_____ PSNP_____other_____

17. Essential drugs (shortage) _____

Annex 2: Schedule for work plan Conducting Health Profile Data Assessment in Dukem Woreda, East Shewa Zone, Oromia Region, Ethiopia, April 2014

S/No	List of Activities	April 29-31	May 1-10	May 11-15	May 16-22	May23-31
1	Collect Data					
2	Process data and make preliminary interpretation					
3	Analyze data and Write report					
4	Disseminate and discuss of the analyzed data and preliminary recommendation with Health Staff, Policy makers/managers/others					

Budget Break down For Health profile Assessment surrounding Finfine Special Zone Dukem town, Oromia region, Ethiopia 2014

Nº	Activities	Unit per price	Total price	Remark
1	Data collector	400	15*100=6000	
2	Car rent &fuel	2800	15*2800=42,000	
3	stationary	100	15*100=1500	
4	miscellaneous	300	15*300=4500	
5	Total	3600	54,000	
6	Contingency 5%	5%	2700	
7	Grand total		56,700	

Annex 8: Budget Proposal for Assessments of Cold Chain Management in Addis Ababa

Item/Description	**Number**	**No of days**	**Allowance per day**	**Total cost in Birr**	**Remark**
Investigator	1	30	400	12,000	
Data collector	10	15	290	43,500	
Training	10	1	290	2,900	
Vehicle	2	15	500	15,000	
Total	0	0	0	73,400	
Contingency	0	0	0	7340	
Grand Total	**0**	**0**	**0**	**80,740**	

Annex 9: Work Plan for Assessments of Cold Chain Management in Addis Ababa

Major Activities	**Time line**							
	October				**November**			
	Wk 1	**Wk 2**	**Wk 3**	**Wk 4**	**Wk 1**	**Wk 2**	**Wk 3**	**Wk 4**
Develop proposal								
Literature Review								
Data Collection								
Data Entry								
Data Analysis								
Report Writing								
Dissemination of findings								

Annex 10: Questionnaire for assessments of Cold Chain Management in Addis Ababa

Name of health facility _____ Date of assessment_____

Refrigerator/cold chain check list

Item/Indicator	Yes	No
Refrigerators/freezers correctly situated		
Room cool and properly ventilated		
Working thermometer in each refrigerator/freezer		
Refrigerator temperature in correct range		
Freezer (if used) temperature in correct range		
Temperature record sheet(s) correct and up to date		
All vaccines in stock and suitable quantities		
All vaccines correctly stored		
BCG/measles diluents stored beside its vaccine		
Vaccine stock record books correct and up to date		
Vaccine stock record book includes diluents stock		
OPV Vial Monitors all unchanged		
Cold Chain Monitor Cards (if used) all white		
Cold Chain Monitor Cards (if used) correctly filled in		
Sufficient frozen icepacks in freezer		
(Household refrigerator) Water containers in bottom		
(if observed) Cold box/vaccine carrier correctly loaded with vaccine and icepacks		
(if observed) Vaccines correctly handled during immunization session		
Sufficient stock of syringes and needles		
Used syringes and needles discarded safely		
Same quantity used syringes as inject able imms. given today		

(if seen used) Steam sterilizer properly used		

National immunization days and mass campaigns

1. Did you conduct national immunization days and mass campaign? 1. Yes___2. No___
2. If yes, did you use Extra Cold Chain Monitor Cards? 1. Yes_____2. No_____ (If yes observe)
3. Were vaccinators trained? 1. Yes_____2. No___
4. Check for Records of quantity of vaccine received, distributed , used and any remaining afterwards_____
5. Should be kept separately from vaccine records for the RI program? 1. Yes___ 2. No____

6. Interviewed health personnel Sex 1. Male_____ 2. Female _____Profession_____

7. Are you assigned permanently or 2. Substitute to cover their duties when there were absent

8. Did you trained on cold chain management in the past one year? 1. Yes___ 2. No_____
9. Where did you collect your vaccine?_____
10. How often do you take delivery of your vaccine vials? Monthly _____every 2 months___ every 3 months____ as needed_____
11. How do you collect the vaccine? 1. Cold box___ 2. Vaccine carrier____ 3. foam pad___
12. How do you manage vaccine during national holidays and weekend? _____

Item/Indicator	**Yes**	**No**
Cold chain tools in vaccination rooms		
No expired diluents		
No expired vaccine		
No food		
No light exposure		
Hand wash		
Carrier arrangement		
Suitable ice bag		
Good freezing indicator		
Good VVM		
Good card monitor		
Record expiry date		
Record arrival date		
Record vaccine name and number		
Good arrange aeration		
No vaccine in the bottom		

No vaccine in the door or back		
Proper site of vaccine		
Fire extinguishers with valid expiry dates		
Refrigerator maintenance and temperature monitoring		
Storing and handling vaccines		
Stored vaccines in a single refrigerator/freezer unit		
Thermometers in all facilities		
keep up-to-date temperature cards		

Item/Indicator	**Yes**	**No**
Refrigerator for vaccines should be placed in a cool room, away from direct heat or sunlight, at least 20cm from the wall with at least 40 cm of clear space above it		
Indices concerning refrigerator maintenance		
Keeping the refrigerator for vaccine free from dust, and what to do in the event of a break down.		
The refrigerator temperature settings were found to be within the normal range (2-8° C).		
Thermometers, temperature charts, freezing indicators were kept,		
There was proper maintenance of the correct temperature in cold boxes and vaccine carriers.		
Recorded the temperature twice a day.		
Signed their documents		
State the correct temperature range (2°-8°C) for the storage of vaccines.		
Recorded room temperature or humidity.		
Cold chain tools in government and private clinics		
Cold box Vaccine carrier Ice bag Water bottles		
VVM		
Temperature monitor card		
Freezing indicator		
Vaccine monitoring, handling and observed storage conditions Appropriate handling and usage of the vaccine during the vaccine sessions. Availability of guideline Adherence to the guidelines on quality is important and guarantees the potency of the vaccines		
Vaccines are to be arranged by expiry dates with dilutes close to the proper vaccine vials. Adhered to the MOH official guidelines for cold chain maintenance Storage of the vaccines on the proper shelves of the refrigerator was appropriate A close inspection of the arrangement of vaccine packages according to expiry dates so that those close to expiry would be easily accessible for use		
vaccines were stored in the door compartments of the refrigerator and bottom Spaces between products stored in the refrigerator to allow circulation of air		

Waste disposable Strict protocol for the management of waste in the vaccination rooms to decrease the possibility of infections		
Waste separated into infectious and non infectious receptacles Mismanagement of healthcare waste puts healthcare workers, patients and the community at risk. Immunization waste includes syringes and needles, empty vaccine vials and ampoules, syringe wrappers, cotton swabs, syringe caps, and packaging used safe disposable boxes		
Hand washing after each child vaccinated		

NB: GHF= Government Health Facility PHF= Private Health Facility

Observational Cold Chain Checklist

1.Here are the 10 most important things you can do to safe guard your vaccine supply.1. Yes ____ 2. No _____

1. We have detailed written standard operating procedures for general and emergency vaccine management.

2. We have a designated (and back - up) person in charge of the handling and storage of our vaccines.

3. Our refrigerator for vaccines is either household - style or commercial - style, NOT dormitory - style. The freezer compartment has a separate exterior door. ___

4. We store vaccines in the middle of the refrigerator or freezer, and NOT in the door. We do NOT store any food or drink in the refrigerator or freezer.

5. We stock, rotate, and use our supply so that vaccine with the shortest expiration date is placed in front and used first.

6. We post a sign on the refrigerator door showing which vaccines should be stored in the refrigerator and which should be stored in the freezer.

7. We post a temperature log on the refrigerator door on which we record the refrigerator and freezer temperatures twice a day and we know whom to call if the temperatures go out of range.

8. We keep a thermometer in the refrigerator and the temperature is maintained at 36 to 46°F (2 to 8°C).

9. We keep a thermometer in the freezer and the temperature is maintained at - 4 to 14°F (20 to - 10°C).

10. In the event of a refrigerator failure, we take the following steps:

We place the vaccines in a location with adequate refrigeration, note the refrigerator and freezer temperature, mark exposed vaccines and separate them from undamaged vaccines, and contact

USAMMA DOC to determine how to handle the affected vaccines.

Annex 11: Budget Proposal For Assessments Of Dengue Fever In Dire Dawa, 2015

Item/Description	Number	No of days	Allowance per day	Total cost in Birr
Investigator	1	30	400	12000
Data collector	4	25	290	29000
Supervisor	2	25	290	14500
Training	6	1	290	1740
Trainer	1	1	400	400
Photo copy paper	5	120	0	600
Vehicle	1	25	1000	25000
For dissemination of findings			8000	8000
Total				89240
Contingency				8924
Grand Total				100,164

Annex 12: Work Plan For Assessments Of Dengue Fever In Dire Dawa, 2015

Major Activities			**Time line**			
	Feb	**March**	**April**	**June**	**July**	**Aug**
Develop proposal						
Literature Review						
Training for data collectors						
Data Collection						
Data Entry						
Data Analysis						
Report Writing						
Dissemination of findings						

Annex 13: Budget proposal for assessments of immunization status in slum area Addis ababa

Item/Description	**Number**	**No of days**	**Allowance per day**	**Total cost in Birr**	**Remark**
Data collector	15	15	290	65250	
Training	20	1	290	5800	
Vehicle	1	15	2300	34,500	
Total	-	-	-	115550	
Contengency	-	-	-	11555	
Grand TOTAL	**-**	**-**	**-**	**129,105**	

Annex 14: Work Plan For Assessments Of Immunization Status In Slum Area Addis Ababa

Major Activities	Time line							
	October				November			
	Wk 1	Wk 2	Wk 3	Wk 4	Wk 1	Wk 2	Wk 3	Wk 4
Develop proposal								
Literature Review								
Data Collection								
Data Entry								
Analysis								
Report Writing								
Dissemination of findings								

Annex 15: Questionnaire on Immunization Rates in Informal and Formal Settlements

Subcity_____ Woreda_____

1. Sex of child

1. Male_____2. Female

2. Age of child in month's _____

3. Ethnicity

Oromo_____Amhara_____Tigre_____Gurage_____Others(Specify)_____

4. Did your child immunized

1. Yes_____ No_____

5. If Q#4 is not immunized reason for not immunized

1. Caregivers' fears of side effects

2. Conflicting priorities

3. Large family size

4. Lack of support from husbands and paternal grandmothers

5. Others (Specify)_____

6. Availability of a vaccination record document

1. Yes_____2. No_____

7. What are the objectives of immunization?

1. I Don't know
2. Prevent disease
3. For health (without precision)
4. It's for a specific disease (mainly polio)
5. Education of the father
6. Not educated
7. Educated

8. Education of the mother

1. Not educated
2. Educated

9. Birth place 1. Born at health facilities__ 2. Born out of health facilities_____

10.Born at health facilities Formal (1. Yes, 2 No)

11. Informal settlements (1. Yes, 2 No)

12. Born outside health facilities Formal (1. Yes, 2 No)

Informal settlements (1. Yes, 2 No)

Distance from household to vaccination site

1. 0-250 meters
2. >250-500 meter
3. >500-750 meter
4. >750-1000 meter
5. >1000 +meter

13. Monogamous parents 1. Yes____ 2. No____

14. Polygamous parents 1. Yes__ 2. No___

a) Religion b) Muslim

c) Protestant d) Orthodox e) Others

15. Occupation

1. Merchant
2. Government employee
3. Others (specify)_____

16.Economic statuses(Yearly income in Birr)

1st quartile (< 5000 Birr/year)

2nd quartile (5000 to 9999 Birr/Month)

2. 3rd quartile (10000 to 500000 Birr/Month)

3. 4th quartile- (> 500000 Birr/year)

18. Information on Immunization

1. Exposure to media

2. Maternal healthcare utilization

3. Maternal age

4. From workplace