Addis Ababa University, College of Health Sciences, School of Public Health

Ethiopian Field Epidemiology and Laboratory Training Program (EFELTP)

Compiled Body of Works in Field Epidemiology

By

Tessema Tarekegn

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

May 27,

2015

Addis Aba

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Advisors

Adamu Addissie. (MD, MPH, PhD)
Haftom Taame. (MPH)

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Ethiopian Field Epidemiology Training Program tessema2002@gmail.com

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Approval by Examining Board

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Chairman, School Graduate Committee

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Advisor

_____ _____

Examiner

_____ _____

Examiner

May 27, 2015

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List of Abbreviations

AFI ---------- Acute Febrile Illness

AFP ---------- Acute Flaccid Paralysis

AIDS ---------- Acquired Immunodeficiency Syndrome

ANC ----------Antenatal Care

AOR ---------- Adjusted Odds Ratio

ART ---------- Anti-Retrovirus Therapy

BPR ---------- Business Process Re-engineering

CA ---------- Contraceptive Acceptance Rate

CBN ---------- Community Based Nutrition

CDC ---------- Communicable Disease Control

CFR ---------- Case Fatality Rate

CHA ---------- Community Health Agency

CHP ---------- Community Health Promoter

CI---------- Confidence Interval

CSF----------Cerebro Spinal Fluid

Dr ---------- Doctor

EVB ---------- Ebola Virus Diseases

EFY ---------- Ethiopian Fiscal Year

EPHI ----------Ethiopian Public Health Institute

EPI ---------- Expanded Program of Immunization

EPRP ---------- Epidemic Preparedness and Response Plan

EC ---------- Ethiopian Calendar

FMOH ---------- Federal Ministry of Health

FETP ---------- Field Epidemiology Training Program

GBS ---------- Guillain-Barre Syndrome

GPEI---------- Global Polio Eradication Initiative

HC. ---------- Health Center

HH ---------- House Hold

HIV ---------- Human Immunodeficiency Virus

HO ---------- Health Office

HP ---------- Health Post

HW ---------- Health Worker

IDSR ---------- Integrated Disease Surveillance and Response

IgM ---------- Immunoglobulin M

IMR ---------- Infant Mortality Rate

IPD ---------- Inpatient Department

IPV----------Inactivated Polio Vaccine

IRS ---------- Indoor Residual Spraying

ITNs ---------- Insecticide Treated Nets

MCH ---------- Maternal and Child Health Care

MUAC ---------- Mid Upper Arm Circumference

NGO ---------- Nongovernmental Organization

OPV ---------- Oral Polio Vaccine

OPD ---------- Outpatient Department

OR ---------- Odds Ratio

OTP ---------- Outpatient Therapeutic Program

PHEM ---------- Public Health Emergency Management

PICT ---------- Provider Initiated Counselling and Testing

PMTCT ---------- Prevention of Mother to Child Transmission

PSNP ---------- Productive Safety Net Program

RDT ---------- Rapid Diagnostic Test

RHB ----------Regional Health Bureau

RRT ---------- Rapid Response Team

RTI ---------- Respiratory Tract Infection

RUTF ---------- --------- Ready to Use Therapeutic Food

SAM ---------- Severe Acute Malnutrition

SC ---------- Stabilization Center

SD ---------- Standard Deviation

SIA ---------- Supplementary Immunization Activities

SNNPR ---------- Southern, Nations, Nationalities, and Peoples Region

TB ---------- Tuberculosis

TTBA ---------- Trained Tradition Birth Attendant

UNICEF ---------- United Nations Children Emergency Fund

URTI ---------- Upper Respiratory Tract Infection

USAID ---------- United State Agency for International development

VCT ---------- Voluntary Counseling and Testing

WHO ---------- World Health Organization

WPV ---------- Wild polio virus

ZHD ---------- Zonal health department

Executive Summary

This body of work comprises of all my outputs that has been done during the two year stay. The components of my outputs were outbreak investigation, surveillance data analysis report, evaluation of surveillance system, health profile description report, scientific manuscripts for peer reviewed journals, abstracts for scientific presentation, narrative summary of disaster situation visited, protocol for epidemiologic research project, and other additional outputs like Ebola Virus disease (EVD) surveillance, and training report.

Outbreak Investigation I-1. Measles outbreak investigation was conducted in Halaba Special Woreda, SNNPR, 2014. A total of 46 measles cases and zero deaths were identified in the line list. Out of the total 17 laboratory sent specimens, 14 were IgM positive. The attack rate was highest in infants (85.3/100,000). We conducted a 1:3 unmatched case-control study. Being vaccinated with measles (OR=0.0312, 95% CI, 0.0111-0.0878), knowing the modes of transmission of measles (OR= 0.2727, 95% CI, 0.1229-0.6052), and knowing the right age of the child for measles (OR= 0.2045, 95% CI, 0.0881-0.4748) was a protective factor. Children living with a family size of five and more than five household members were more likely to contract measles (OR= 3.833, 95% CI, 1.7098-8.594).

Outbreak Investigation I-2. We conducted measles outbreak investigation in Kirara Health Center Catchment, Konta Special Woreda, SNNPR, 2014. A total of 333 measles cases and zero deaths were identified in the line list. Out of the total 6 laboratory sent specimens, 2 were IgM positive. For the rest samples the result was unknown. The attach rate was highest in infants (9.4/100). A total of 53 cases and 105 controls were employed into the case-control study. In multivariate analysis, Being vaccinated with measles (OR= 0.52, 95% CI (0.2693-0.9984), educational status (OR= 1.86, 95% CI (1.2836-2.6837), and history of travel to active measles area (OR= 2.2, 1.1183-4.3280) were significantly associated with contracting measles.

Surveillance Data Analysis II. A total of 1648 AFP cases were identified from 2007-2013. We described the AFP cases by person, place and time and determined the magnitude of AFP cases among zones in the region. Out of the total, 1621 (98.4%) AFP cases were under 15 years old and 9 AFP cases were age greater than 15 years. The most affected age group was 1-4. A child should receive at least 4-polio doses at his childhood. More than 54% of the AFP cases received

less than 4-polio doses. The non-AFP rate of the region was 2.9, and the highest incidence was reported in 2012(3.4/100,000). Sheka was the most affected zone (4.7/100,000) and Masha was the most affected district (11.3/100,000) in the region.

Evaluation of Surveillance System III. We evaluated a total of 41-surveillance units (3-woredas, 9-health centers, 27-health posts). The surveillance system should be evaluated periodically to improve quality, efficiency and usefulness. At 41(100%) evaluated surveillance units, standard case definition was used and available. Twenty (100%) health posts were using family folder for case registration. Except from zonal PHEM, no any evaluated reporting units were using the computer technology for data storage. Malaria surveillance data was no analyzed at Woreda, and health center level. Despite the presence of regular supportive supervision, a few surveillance units used epidemic preparedness plan, and no surveillance units used malaria monitoring chart. The malaria surveillance system in Kembata-Tembaro was, simple, acceptable, flexible, and stable, but not timely and not representative.

Health Profile Description Report IV. We conducted a rapid assessment from March 10-17/2013 to describe health profile in Kedida-Gamela district. The annual administrative coverage of the Contraceptive Acceptance Rate (CAR), ANC, skilled delivery, PNC, polio-3 and penta-3 and measles was 78.6%, 84%, 24.2%, 114%, 106.6% and 104.6% respectively. The annual TB detection rate was 32% against the district target (70%). Malaria was the top cause of morbidity in both adults and children and the priority problem including severe acute malnutrition in the district.

Scientific Manuscripts for Peer Reviewed Journals V. Scientific journals prepared to communicate findings help, and improve the health, safety, and well-being of the community. As a result we prepared to a peer reviewed journals on Measles outbreak investigation in halaba special Woreda, SNNPR, 2014.

Abstracts for Scientific Presentation VI. We prepared abstracts of measles outbreak investigation conducted in Halaba Special Woreda, and Acute Flaccid Paralysis data analysis conducted regionally (SNNPR).

Narrative Summary of Disaster Situation Visited VII. We participated in Belg assessment which was conducted in Gamo-Gofa and Wolayta zone. Kamba woreda and Merab-Abaya was

selected in Gamo-Gofa zone and Humbo and Boloso-Sore Woredas were selected from Wolayta zone. Malaria and severe acute malnutrition was the identified problem in the assessment area.

Proposal for Epidemiologic Research Project VIII.

Malaria remains a serious public health problem, causing 1.2 million deaths and 300 to 660 million clinical cases in tropical and subtropical areas each year. We designed a cross-sectional community and health facility based study to assess the malaria prevalence and risk factors in Kedida-Gamela district. We will use three stage cluster sampling technique (kebele, Villages, and Household). A single population proportion formula with a 95% confidence interval and prevalence of 50% with a margin of error 5.0% with a power of 80% will be used to calculate the sample size. $n = z^2\ pq/d^2 = (1.96)^2 * 0.5(11-0.5)/ (0.05)^2 = 384$. Because of the clustering effect the sample size, $n = 2*384 = 768$.

Other Additional Output Reports IX. During the residency period we conducted Ebola Virus Disease Surveillance in Lare Woreda, Pagak Land port entry, Gambella region, 2014. We also conducted public health emergency management (PHEM) officer and health facility focal persons training which was organized by SNNPR health bureau, and it an additional output.

Chapter I – Outbreak/Epidemic Investigations

1.1 Measles outbreak investigation in Halaba Special Woreda, South, Nations, Nationalities, and Peoples Region, 2014

Abstract

Background. Measles is a highly infectious viral disease that can cause permanent disabilities and death. We investigated measles outbreak to identify the magnitude and factors associated with measles in Halaba special woreda.

Methods. We conducted a 1:3 unmatched case control study. We used the WHO case definition. A control was any person residing in the same community not having a history of measles during the same period. If a controls developed a measles sign and symptom, they will be included as a cases. We used Mid Upper Arm Circumference (MUAC) to measure the nutritional status of case and control. Epi-Info and MS excel was used to calculate frequencies, ratio, rate, and odds ratios. We used advanced statistics in Epi-Info to calculate multivariate analysis. Case observation was made and medical registration books of health facilities were assessed and suspected cases were identified.

Result. We identified a total of 46 measles case including confirmed cases with zero death rate. Fourteen (30.4%) were not vaccinated, 37 (80.4%) were admitted, 13 (28.3%) of them developed eye infection. A total of 140 subjects made of 35 cases and 105 controls were recruited in a case-control study. Twenty seven (57.1%) cases and 65(61.9%) controls were males. The attack rate in infants was 85.3/100,000 population. Thirty (85.7%) of cases and 10(9.5%) of controls were unvaccinated. In multivariate analysis, being vaccinated with measles (OR=0.0312, 95% CI, 0.0111-0.0878), Knowing the right age for measles (OR= 0.2045, 95% CI, 0.0881-0.4748), knowing measles is vaccine preventable diseases (OR = 0.2857, 95% CI, 0.0924-0.8833), and knowing modes of transmission of measles (OR= 0.2727, 95% CI, 0.1229-0.6052) were protective f. Family size >= 5 (OR= 3.833, 95% CI, 1.7099-8.5940), was found to be significant risk factors.

Conclusion. We confirmed outbreak of measles with highest incidence rate in under one children. Unvaccination with measles vaccine, living five and more household members in rooms and Lack of knowledge of mother or caretaker were associated risk factors for occurring

measles outbreak. We recommended supplementary measles vaccination for under 15 children, strengthening of routine immunization defaulter tracing, and awareness creation in the community.

1.1.1 Introduction

Measles is a highly infectious viral disease caused by a Morbillivirus, which is a member of the genus Morbillivirus of the Paramyxoviridae family and for which humans are the only reservoirs. Transmission is primarily person-to-person via aerosolized droplets or by direct contact with the nasal and throat secretions of infected persons. In a non-immune person exposed to measles virus, after an incubation period of about 10 to 12 days (range 7-18 days), prodromal symptoms of fever, malaise, cough, coryza (runny nose), and conjunctivitis appear. Within 2 - 4 days of the prodromal symptoms, a rash made up of large, blotchy red spots (maculo-papular rash) appears behind the ears and on the face accompanied with a high fever. The rash spreads to the trunk and extremities and typically lasts 3-7 days. Individuals with measles are infectious 4 days before and 4 days after rash onset (1-5).

Many children experience uncomplicated measles. However, in about a third of the cases, measles is followed by at least one complication caused by disruption of epithelial surfaces and immunosuppression. These include pneumonia, ear and sinus infections, mouth ulcers, persistent diarrhea, and upper airway obstruction from croup (laryngo-tracheo-bronchitis). Less common complications include corneal drying that could progress to ulceration (keratomalacia) and blindness, protein energy malnutrition, convulsions and brain damage. Complications are more common in young children below 5 years of age and complication rates are increased in persons with immune deficiency disorders, malnutrition, vitamin A deficiency, and inadequate vaccination. Immune-compromised children and adults are at increased risk for severe infections and super infections. Unless managed early and aggressively, these complications may lead to death within the first month after the onset of rash. The case fatality from measles is estimated to be 3 – 5% in developing countries but may reach more than 10% in outbreaks especially when it is compounded by malnutrition.(1, 6, 7)

Globally, measles accounts for more than 30 million cases and 900,000 deaths every year, nearly half of which occur in Africa. Measles is among the top five causes of death in children less than 5 years of age in many African countries. Before the widespread availability of measles vaccine,

virtually all children contracted the disease. (2, 5,). Measles vaccination resulted in a 75% drop in measles deaths between 2000 and 2013 worldwide. In 2013, there were 145 700 measles deaths globally – about 400 deaths every day or 16 deaths every hour(8). In Ethiopia, the expected case-fatality rate is between 3% and 6%. The highest case-fatality rate occurs in infants 6 to 11 months of age, with malnourished infants at greatest risk. These rates may underestimate the true lethality of measles because of incomplete reporting of outcomes of measles illness. In certain high-risk populations, case-fatality rates as high as 30% have been reported in infants aged less than 1 year of age. Malnutrition (including vitamin A deficiency), underlying immunodeficiency and lack of access to medical care are all factors leading to the high case-fatality rates observed in many parts of the world. Infants born to mothers who have either had measles or been vaccinated are protected by transplacentally acquired maternal antibodies; that is they have passive immunity. This protection lasts six to nine months on average, after which the child becomes susceptible to measles infection. A person is naturally immune if he or she has had contact with the measles virus and has developed antibodies against it. Persons who have taken measles vaccine and have formed antibodies in response to the vaccine are also immune. Measles vaccines contain live, attenuated virus. In the African Region, it is recommended that the vaccine be administered at 9 months – the age when most children have lost their maternal antibodies. There is virtually no contra-indication to measles vaccination. When correctly administered at 9 months of age, measles vaccine confers life-long protection to approximately 85% of those vaccinated. Childhood immunization programs have led to a dramatic decrease in measles morbidity and mortality. Epidemics of measles occur when the number of susceptible individuals in a population reaches a critical threshold (the number of susceptible individuals exceeds the current cohort population). Outbreaks may occur in pockets of low coverage, which are likely to occur in certain geographic areas, such as urban slums, remote rural areas or islands, and in certain population groups with habitually low vaccination coverage rates such as ethnic and racial minorities, nomadic peoples, or persons with religious or philosophical objections to immunization. As immunization coverage increases, the size of epidemics decreases. In addition, the inter-epidemic period lengthens, and the proportion of cases among older children increases. Even with high routine measles vaccine coverage (1st opportunity) at nine months of age, susceptible individuals (un-vaccinated children within the community and children who have failed to develop antibodies following immunization since measles vaccine efficacy is only 85%

at 9 months of age) will accumulate with time leading to the occurrence of periodic outbreaks. The provision of a second opportunity is necessary to reach children that have never been vaccinated and children not protected after the first dose. In the African Region, this is provided through supplemental immunization activities (SIAs). The second opportunity serves to reduce the proportion of susceptible in a given population. It therefore helps to prevent measles outbreaks and, with high routine immunization coverage, favours the elimination of indigenous measles transmission. Catch-up campaigns (SIAs) to provide second opportunity for measles vaccination need to be organized in such a way as to target the age group in which at least 90% of measles cases are known to occur. In the African setting, this age group has included children aged 9 months to 14 years. After an initial wide age group catch-up supplemental immunization effort, periodic follow-up campaigns (conducted every three or four years) are needed to assure that the number of susceptible children does not build up to a critical level. Follow-up campaigns target children born after the previous catch-up campaign. (2, 5). In Ethiopia outbreaks of measles reported every year. In 2013/2014 nationally, there were 202 measles outbreaks reported with incidence of 1.6 and 1.9 per 100,000 population respectively. Out of these, 31 measles outbreaks have been occurred in South Nations, Nationalities and Peoples region (SNNPR) with incidence rate of 2.3 and 2.5 100,000 population respectively in the same period.(9)

Halaba Special Woreda is one of the 15 Zones & 4 Special Woredas in SNNPR. The woreda is found 83 km away from regional town, Hawassa. The measles vaccination coverage of the Woreda for the EFY of 2012, 2013, and 2014 (mid-year) was 96%, 92%, and 96% respectively. The administrative coverage rate was calculated by dividing the number of vaccinated children for the total eligible (annual targets). Administrative coverage will be overestimated by adding the non-eligible cohorts from bordering areas. The other may be due to inclusion of false report of the administrative report. The report under estimation may be one, due to missing the report. An investigation of the an outbreak was conducted in Halaba special woreda to determine factors associated with contracting measles in the district as well as to assess the district's preparedness and response to the outbreak.

1.1.2 Rational of the study

We were assigned to conduct measles outbreak investigation in Halaba special woreda in order identify the possible risk factor associated with measles outbreak, and identify gaps that need to be addressed to prevent further spread of the disease.

1.1.3 Objective

1.1.3.1 General objective

- To investigate measles outbreak in Halaba special woreda, SNNPR, April 7-15/2014

1.1.3.2 Specific objectives

a. To describe the magnitude of the outbreak by person, place, and time
b. To determine the factors associated with the outbreak
c. To provide the possible control and prevention measures based on identified gaps.

1.1.4 Methods

1.1.4.1 Study setting/Study area and population?

This study was conducted in Halaba special woreda, SNNPR with a total population of 305,555. The capital of the woreda is Halaba Kulito. Administratively the Woreda has 5 urban & 79 rural Kebeles. In the Woreda there were 79 HP, 10 HC and one district Hospital.

1.1.4.2 Study design

We conducted a 1:3 unmatched case-control study from 7-15 April 2014. Due to different reason we did not select matched case-control study. Because matching criteria is too strict to get controls, the other is we cannot examine risks associated with matching variable. In addition, matching may complicate analysis-may need to use conditional logistic regression. A case was any person who resided in Halaba special woreda and who developed fever, rash (maculo-papular), and or cough, coryza, conjunctivitis (red eyes), or tested IgM positive between 12 January and 15 April 2014. A control was any person who resided in the same community or village with cases in Halaba special woreda but, who did or do not have history of signs and symptoms of measles or tested IgM negative between similar period. If they develop sign and symptom, they will be a case. Case observation was made and active cases were searched for house to house. Medical registration books of one Hospital, four health centers and five health posts were assessed and suspected cases were identified. Mid Upper Arm Circumference (MUAC) measurement was employed to assess the nutritional status of both cases and controls.

1.1.4.3 Study subjects

Individuals admitted and treated in Halaba district Hospital, treated in their catchment four health centers, health posts and at their home during active cases searching and who are included in the line list, and their controls with the ratio of 1:3 from the community of the Halaba special district has included. Active cases available during the study period of the investigation were included in the study.

1.1.4.3 Sample size determination

The sample size was calculated using Stat calc. function of Epi-info version 7.1.4.0 using the confidence level of 95%, power of 80%, and assuming that a 75% prevalence of controls exposed, a previous contact with someone with a measles an AOR 9.4 gives a total sample of 140 (35 cases and 105 controls). The prevalence of previous study (30-cases, and 90-controls) was conducted in Tselemti woreda, north Ethiopia.

1.1.4.4 Sampling procedure

Cases were selected randomly using the lottery method where each name on the line list was allocated a number on pieces of paper which were put in a box and randomly picked and the name corresponding to that number was recruited into the study until the sample size was reached. Controls were neighbors of cases who did not suffer from measles during the study period. Three controls for one case per house hold was selected from the neighbors of cases.

1.1.4.5 Study variables

1.1.4.5.1 Dependent variables

- Case status of an individual

1.1.4.5.2 Independent variables

- Socio-demographic characteristics of mothers/caretakers
    - Educational level
    - Occupational status
    - Marital status
    - Religion
- Age of child
- Sex of child
- residence
- Risk factors
    - Vaccination history

- Travel history
- Contact history
- Family size
- Nutritional status
- Health seeking behavior
- Knowledge of mothers/caretaker

1.1.4.6 Data collection instrument

The questionnaires were developed in English and translated orally in to Halaba language and translated back in to English. The questionnaire included dependent and independent variables listed above.

1.1.4.7 Data collection

There was no the former EPI registration book at any health facility level. Instead vaccination data was registering in the family folder. Data on immunization history was collected in two ways. One was based on the availability of immunization card and the other was based on mother/caretaker verbal report. After a case/control was identified from the household, mother/caretaker of the case/control was asked for the presence of child's immunization card. For the child with immunization card, the information on the doses and types vaccine received by the child was copied from the card. If immunization card was unavailable for the child, the mother/caretaker was asked for immunization history. The number of doses the child took and how (the route of vaccine administered) the child took the vaccine was the way by which immunization history was asked. Information on other variables was asked directly from the child's mother/caretaker. To determine the nutritional status of the case and control, we measured mid upper arm circumference measurement by using 'MUAC' instrument.

1.1.4.8 Training of data collectors

Three data collector nurses from health centers and one supervisor from district health office were received one day training before data collection.

1.1.4.9 Operational definition

Suspected Measles cases at community level: A community member should report any person with *rash* and *fever* to a health worker and also advise the person to go to a health facility.

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

Confirmed 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; i.e., living in the same or in an adjacent district with a laboratory confirmed case where there is a likelihood of transmission; onset of rash of the two cases being within 30 days of each other.

Measles death: A measles death is defined as any death from an illness that occurs in a confirmed case or epidemiologically linked case of measles within one month of the onset of rash. The immediate and delayed complications of measles (like pneumonia, persistent diarrhea) may manifest and lead to death much later after the disappearance of the rash. Measles deaths are usually under-reported.

Suspected measles outbreak. Occurrence of five or more reported suspected measles cases in one month in a defined geographic area such as a Kebeles, health facility catchment area, or woreda.

Confirmed measles outbreak. Occurrence of three or more laboratory confirmed measles cases in one month in a defined geographic area such as a Kebeles, health facility catchment area or woreda.

Unvaccinated. A child who does not receive any dose of measles vaccines

Vaccinated. Child who take at least one dose of the measles vaccines

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

Coverage by history: Coverage will be calculated with numerator based on mothers or care taker report only

Knowledge of measles: If mother/care taker have awareness about, mode of transmission of measles diseases, sign and symptoms of measles diseases, prevention of measles diseases, the right age at the child begin, complete measles vaccination at right age considered as knowledgeable.

Vaccination coverage of measles: proportion of children took measles vaccination

Vaccination status: being vaccinated or unvaccinated with measles vaccine

1.1.4.10 Inclusion and exclusion criteria

Inclusion criteria

Case. A case was any resident of Halaba special woreda who tested and positive for IgM or had sign and symptoms of measles from 12, January to 15, April 2014 and who agreed to participate in the study.

Controls. A control was any resident of Halaba special district during the study who was a neighbor to a case and who did not develop signs and symptoms of measles and agreed to participate in the study.

Exclusion criteria

Cases and controls: Those who refused to participate in the study during interview were excluded.

1.1.4.11 Data processing and analysis

Data obtained was entered in to Epi-Info version 7.1.4.0 and we used Epi-info and excel for calculating frequency, ratio, proportion, rat, odds ratio. Bi-variate analysis was used to assess the association between dependent and independent variables. We used logistic regression found in advanced statistics in Epi-Info to run multivariate analysis.

1.1.5 Ethical clearance

Permission to carry out the study was obtained from SNNP regional health bureau, then from Halaba special woreda health office. Cooperation letter was written to the respective health facility by woreda health office. An informed oral consent was obtained from all study participants.

1.1.6 Result

1.1.6.1 Descriptive epidemiology

A total of 46 suspected and confirmed measles cases with zero death rate were identified during the investigation in the district. A 12year old male child index case was reported to Halaba district Hospital in 01/16/2014.Ha has no travel history of areas with active measles case. He has no history of vaccination with measles vaccine. Including the index, a total of seventeen specimen were collected and sent to EPHI, of which 14 were IgM positive. Out of the total 46 cases, 37 (80.4%) cases were admitted in Halaba district Hospital. The major cause for

admission reported by health facility were Pneumonia, diarrhea, and eye infection 13 (28.3%). Thirty two (69.6%) were males. The attack rate in under one children was 85 per 100,000 population. The district one measles dose administrative coverage for the EFY of 2012, 2013 and 2014 (mid-year) was 96%, 92%, and 96% respectively.

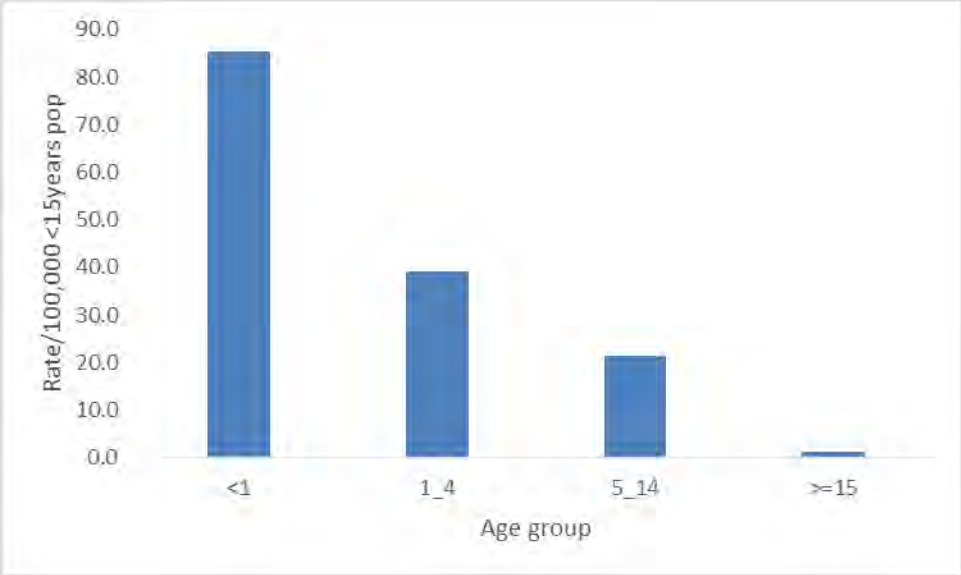

Figure 1: Attack rate of Measles Cases by Age group, Halaba Special Woreda, SNNPR, April, 2014.

Among 46 measles cases reported in the line list of the district, 14 (30.4%) measles cases received no measles vaccine, 3 (6.5%) cases received one measles dose, 2 (4.3%) measles cases received two measles doses, 22 (47.8%) measles cases received four measles doses, and 5 (10.9%) measles cases has unknown vaccination history. Out of the total 46 cases, 30 (65.2%) measles cases were reported from the district urban Kebeles, the rest 16 (34.8%) measles cases were from rural Kebeles. The index case was reported in epidemiological week-3. There were no reported measles cases from epidemiological week-4 to epidemiological week-6.

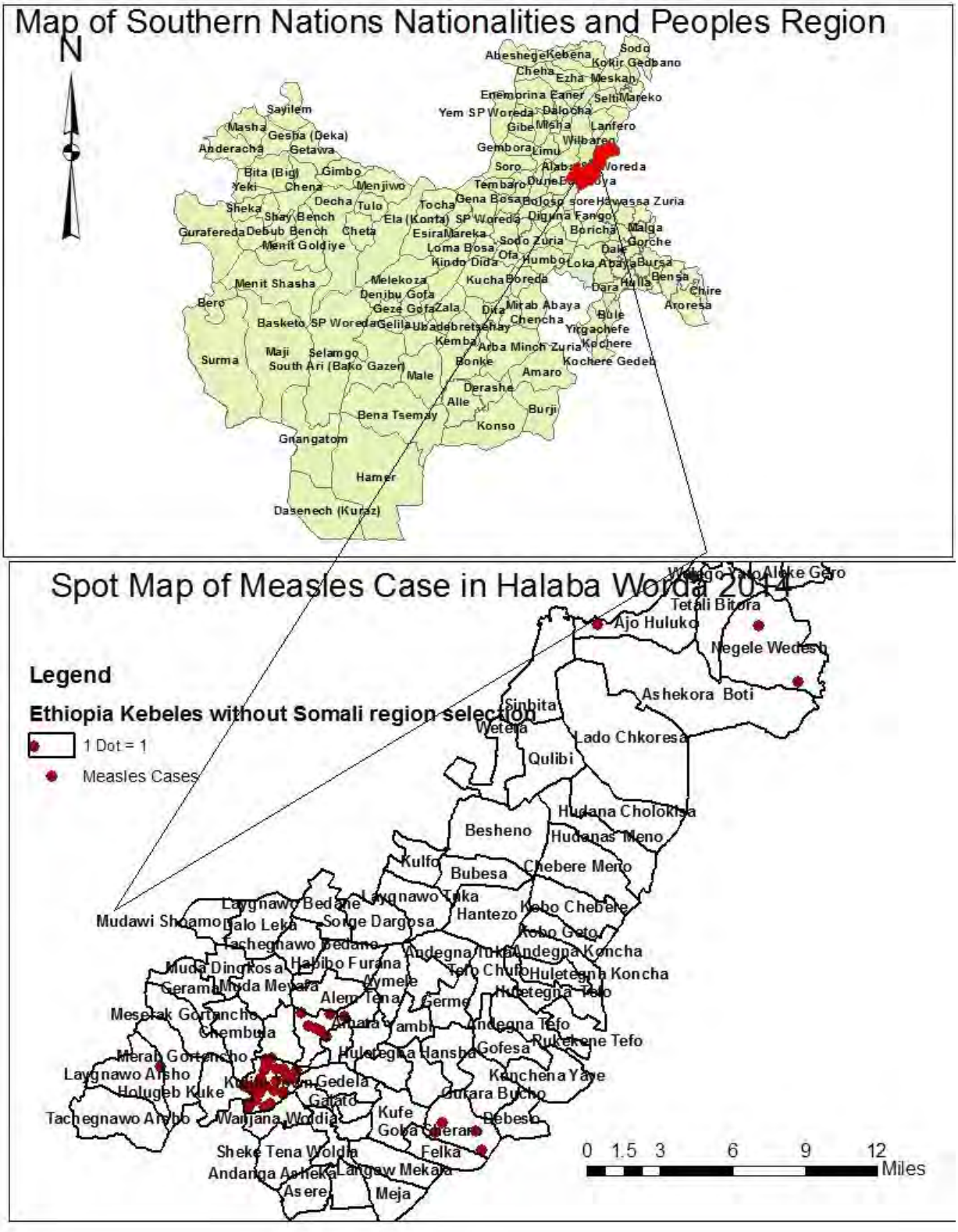

Figure 2: Spot Map of Measles cases by Kebele, Halaba Special Woreda, SNNPR, 2014

Table 1: Measles cases by month, Halaba special woreda, SNNPR, April, 2014

Month	Cases identified	Sample collected	IgM Pos.	IgM Neg.
Jan	3	3	2	1
Feb	12	2	2	0
March	16	8	7	1
April	15	4	3	1
T0tal	46	17	14	3

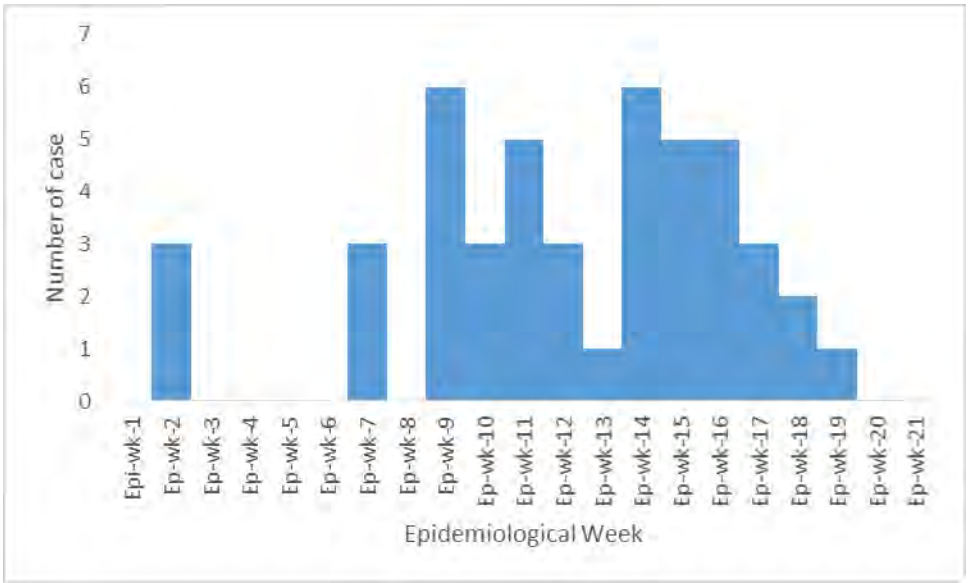

Figure 3: Measles cases by epidemiological weeks, Halaba Special Woreda, April 2014.

1.1.6.2 Public health action

Active case searching, case management at district Hospital, health centers, and health posts level, and vitamin-A supplementation for < 5 years in affected Kebeles were used to control the outbreak. Community mobilization was conducted to reduce and prevent contact with measles cases. For measles mass vaccination the woreda prepared micro-planning and sent to the regional PHEM. No measles vaccine was supplemented for the affected area.

1.1.6.3 Case-control study

We conducted a 1: 3 unmatched case-control study with a response rate of 100%. The median age of the cases was 4 years ranging from 4 month to 12 years, while that of controls was 6 years ranging from 9-month to 11 years. Fifteen (42.9%) cases and forty (38.09%) controls were females. 34 (97.1%) cases of respondents and 96 (91.4%) controls of respondents were married.13 (37.1%) cases and 42 (40.0%) controls were not attended any education. 30 (85.7%) of cases and 10 (9.5%) controls received no measles vaccine dose. 5(14.3%) cases and 70 (66.7%) controls were received one measles dose. Out of 35 measles cases, 34 (97.1%) cases got treatment, 32 (91.4%) of treated cases were recovered during the study period. The rest 3 (8.57%) cases were getting improvement at the time of study. 34 (97.1%) of cases believed that when they get sick, they will go health facility. one (2.9%) of cases decided to stay at home.32 (91.4%) of cases believed that treatment can reduce measles complications. The rest 3 (8.57%) provided home-made treatment like fluid, tea, and semi sold foods. The mid-upper arm circumference of 34 (97.14%) cases and 105 (100%) of controls were greater than 12 centimeter. For one (2.86%) case the MUAC was 10.5 centimeter.

Table 2: Demographic characteristics of Measles Cases and Controls, Halaba Special Woreda, SNNPR, April, 2014

Variable	Category	Case n= 35 (%)	Control n= 105 (%)
Sex	Female	15(42.9%	40(38.1%)
	Male	20(57.1%)	65(61.90%)
Marital status	Married	34(97.1%)	96(91.4%)
	Single	1(2.9%)	9(8.6%)
Occupation	Daily laborer	1(2.9%)	2(1.9%)
	Farmer	2(5.7%)	3(2.9%)
	Employed	0(0%)	8(7.6%)
	House wife	19(54.3%)	58(55.2%)
	Merchant	13(37.1%)	31(29.5%)
	Student	0(0%)	3(2.9%)
Level of education	No education	13(37.1%)	42(40%)
	Read and write	2(5.7%)	6(5.7%)
	Primary	16(45.7%)	46(43.8%
	Secondary and above	4(11.4%)	11(10.5%)
Religion	Muslim	15(42.9%)	49(46.7%)
	Orthodox	9(25.7%)	35(33.3%)
	Protestant	11(31.4%)	21(20%)
Family size	>= 5	23(65.7%)	35(33.33%)
	< 5	12(34.3%)	70(66.67%)

Table 3: Bivariate analysis of risk factors (case=35, controls=105) for measles, Halaba Special Woreda, SNNPR, April 2014.

Variable	Response	Case	Control	OR	95% CI
Ever vaccinated for measles	yes	5	95	0.0175	0.0056-0.0554
	no	30	10		
Family size	>= 5	23	35	3.83	1.7098-8.5941
	< 5	12	70		
Do you know modes of transmission of measles?	yes	14	77	0.2452	0.1075-0.5464
	no	21	28		
Do you know the sign and symptoms of measles?	yes	21	88	0.2898	0.1235-0.6952
	no	14	17		
Do you know measles is vaccine preventable?	yes	28	99	0.2424	0.0754-0.7798
	no	7	6		
Do you know the right age for measles vaccination?	yes	18	88	0.2045	0.0881-0.4748
	no	17	17		
How measles disease is prevented?	yes	14	82	0.1897	0.0817-0.4292
	no	21	23		

Table 4: Multivariate analysis of risk factors for measles, Halaba special Woreda, SNNPR, 2014

Variable	AOR	95% CI
Ever vaccinated for measles = yes	0.0312	0.0111-0.0878
Family size >= 5 members	3.833	1.7099-8.5940
Do you know modes of transmission of measles? = yes	0.2727	0.1229-0.6052
Do you know measles is vaccine preventable? = yes	0.2857	0.0924-0.8833
Do you know the right age for measles vaccination? = yes	0.2045	0.0881-0.4748

1.1.7 Discussion

We confirmed outbreak of measles with highest incidence rate in under one children. But, the overall attack rate was less than the study conducted in different areas (10). The three consecutive years of the district one measles dose administrative coverage report of the EFY of 2012, 2013, and the mid-year of 2014 respectively was higher than measles vaccination coverage of the case-control study. Even this was collected by mother or caretaker history, but not by immunization card. According to the cases reported in the line list of the district, around half of the cases were vaccinated with four measles doses before this measles infection. It is very difficult to conclude that any person who vaccinated with 4-measles dose can contract measles diseases. The possible explanation for this could be the children may receive impotent vaccine, the other could be the reported vaccination status may false report (incorrect vaccination history taking during case-investigation). The big difference between the vaccination status of case-control study and the vaccination status filled in the district line list imply that the actual immunization coverage of the district could be low.

In multi-variate analysis, being vaccinated with measles vaccine, family size five and greater than five house hold members, and knowledge of mother or care on measles disease were significantly associated risk factors for measles diseases (Table 3). Being vaccinated for measles was found to be a protective factor from contracting the measles disease. It is consistent with study conducted in different areas(10-12). Children living with a family size of five and more than five household members were more likely to contract measles. (13, 14). Lack of Knowledge of mother or caretaker on measles also was significantly associated with measles outbreak. Children whose mothers don't know about measles vaccination were also found to be more likely to develop measles(15-17).

1.1.8 Limitation.

Shortage of time during outbreak investigation

1.1.9 Conclusion.

Unvaccination with measles vaccine, living five and more household members in rooms and Lack of knowledge of mother or caretaker were associated risk factors for occurring measles outbreak in Halaba special Woreda.

1.1.10 Recommendation

To control the outbreak and prevent further distribution of the measles disease, we recommended mass vaccination for under 15 years in the district.

Moreover the health facilities should develop a plan for community sensitization, awareness creation and defaulter tracing by health extension workers.

The woreda health office should facilitate community mobilization conducted by health facilities.

Reference

1. www.en.wikipedia.org/wiki/Measles.
2. Africa World Health Oranizationg. Guidelines for Measles Surveillance, December 2004.
3. Edward P RG, David M, Geofrey G, Principles of Medicine in Africa. 2004.
4. Ministry of Health and child Welfare Z. Immunization in practice: A Practical Guide for Health workers, 2007.
5. Federal Democratic Republic of Ministry of Health E. Guideline on Measles Surveillance and Outbreak Management, 2012.
6. Africa WHOROF. Guidelines for Measles Surveillance, December 2004.
7. Federal Democratic Republic of Ministry of Health E. Guideline on Measles Surveillance and Outbreak Management, 2012.
8. http://www.who.int/mediacentre/factsheets/fs286/en/.
9. Public Health Emergency Management, Southern region Emergency Report, 2014.
10. Meaza Tilaye AB. Investigation of Measles Outbreak, Meta Robi District, Ethiopia, 2013.
11. Goitom Mehari ZH, A. Bekelle. Measles Outbreak investigation in Tselemti Woreda, Ethiopia, 2013.
12. NDODE Corlins Ebontane JMESBB-pAOBNAC. Investigation of a Measles Outbreak in the Nkolndongo health District, Yaounde Cameroon, Ethiopia, 2013.
13. BirhanuA.Beressa BKSKBHZHTD. Investigation of Measles outbreak -Abaya, Borena zone, South Eastern Oromia, Ethiopia 2013.
14. Goitom Mehari ZH, A. Bekelle. Measles Outbreak investigation in Tselemti Woreda, North Ethiopia, 2013.
15. Demisse A HZ. Measles Outbreak investigation in Gesha District, Kafa zone, Ethiopia, 2013.
16. Mehari G BA. Measles Outbreak investigation in Shire Zonal Prison, Ethiopia, 2013.
17. P.Nguku FLCAAENWKS. An outbreak of Measles in Kubau Local Government Area, Kaduna State, Nigeria, 2013.

1.2 Measles Outbreak Investigation in Kirara Health Center Catchment, Konta Special Woreda, Southern Nations, Nationalities, and Peoples Region, Ethiopia, 2014.

Abstract

Background. Measles is highly infectious and vaccine preventable diseases. A measles outbreak was detected at Kirara health center catchment, Konta special woreda with attack rate of 2.5/100 population and zero death rate. We investigated measles outbreak to determine factors associated with contracting measles in Kirara health center catchment.

Methods. A 1:2 unmatched case control study was conducted from 15-29 December 2014. A case was any person who resided in Kirara health center catchment who developed a sign and symptom of measles or tested IgM positive between 12 October and 27 December 2014. A control was any person who resided in the same community with cases in Kirara health center catchment who did or do not have history of signs and symptoms of measles or tested IgM negative between similar periods. If controls develop a measles clinical feature, they will be included in cases. We used Epi-info, and excel to calculate frequency, rate ratio, and odds ratios and bivariate analysis. Multivariate analysis was calculated by using Epi-Info advanced statistics of logistic regression.

Results. We identified a total of 333 measles cases including the confirmed cases. Forty five (13.5%) cases received no measles vaccine, 144 (43.2%) cases received one measles dose, 20 (6%) cases received two measles doses, 100 (30%) cases have unknown vaccination history. The attack rate in infants was 9.4%. The overall attack rate was 2.5%. The catchment average one dose measles coverage in 2012, 2013, and 2014 was 80%, 104%, and 89.5% respectively. A total of 53 cases and 105 controls were employed into the case-control study. 18(34%) cases and 54(51.4%) controls were vaccinated. Thirty one (58.5%) of cases, and 58 (55.2%) of controls were males. The absence of education for parents (AOR= 1.86, 95% CI (1.2836-2.6837), history of travel to areas with active measles case (AOR= 2.2, 95% CI, (1.1183-4.3280) was the risk factors for contracting measles diseases. Being vaccinated with measles (AOR= 0.5, 95% CI (0.2693-0.9984), knowing the modes of transmission of measles (AOR= 0.38, 0.1840-0.7814), knowing the right age of the child for measles vaccination (AOR=0.47, 95% CI 0.2243-0.9789),

and knowing measles diseases is vaccine preventable (AOR= 0.22, 95% CI, 0.0967-0.4792) were a protective factors.

Conclusions. We confirmed outbreak of measles with highest incidence rate in under one children. Being unvaccinated with measles, educational status of mother/care taker, contact history with active measles case and low awareness of mother or care taker on measles disease prevention were the factors associated with measles outbreak. We recommended supplementary vaccination for under 15 years children and community awareness creation by health extension worker.

1.2.1 Introduction

Measles is a highly infectious viral disease caused by a Morbillivirus, which is a member of the genus Morbillivirus of the Paramyxoviridae family and for which humans are the only reservoirs. Transmission is primarily person-to-person via aerosolized droplets or by direct contact with the nasal and throat secretions of infected persons. In a non-immune person exposed to measles virus, after an incubation period of about 10 to 12 days (range 7-18 days), prodromal symptoms of fever, malaise, cough, coryza (runny nose), and conjunctivitis appear. Within 2 - 4 days of the prodromal symptoms, a rash made up of large, blotchy red spots (maculo-papular rash) appears behind the ears and on the face accompanied with a high fever. The rash spreads to the trunk and extremities and typically lasts 3-7 days. Individuals with measles are infectious 4 days before and 4 days after rash onset. ([1] [2] [3] [4] [5])

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

is compounded by malnutrition.[1, 2, 5] In case with complications, the case fatality rate may rise to 20%-30%.

Globally, measles accounts for more than 30 million cases and 900,000 deaths every year, nearly half of which occur in Africa. Measles is among the top five causes of death in children less than 5 years of age in many African countries. Before the widespread availability of measles vaccine, virtually all children contracted the disease. ([2, 5]

In Ethiopia, the expected case-fatality rate is between 3% and 6%. The highest case-fatality rate occurs in infants 6 to 11 months of age, with malnourished infants at greatest risk. These rates may underestimate the true lethality of measles because of incomplete reporting of outcomes of measles illness. In certain high-risk populations, case-fatality rates as high as 30% have been reported in infants aged less than 1 year of age. Malnutrition (including vitamin A deficiency), underlying immunodeficiency and lack of access to medical care are all factors leading to the high case-fatality rates observed in many parts of the world. [5]

Infants born to mothers who have either had measles or been vaccinated are protected by transplacentally acquired maternal antibodies; that is they have passive immunity. This protection lasts six to nine months on average, after which the child becomes susceptible to measles infection. A person is naturally immune if he or she has had contact with the measles virus and has developed antibodies against it. Persons who have taken measles vaccine and have formed antibodies in response to the vaccine are also immune.

Measles vaccines contain live, attenuated virus. In the African Region, it is recommended that the vaccine be administered at 9 months – the age when most children have lost their maternal antibodies. There is virtually no contra-indication to measles vaccination. When correctly administered at 9 months of age, measles vaccine confers life-long protection to approximately 85% of those vaccinated. Childhood immunization programs have led to a dramatic decrease in measles morbidity and mortality.

Epidemics of measles occur when the number of susceptible individuals in a population reaches a critical threshold. Outbreaks may occur in pockets of low coverage, which are likely to occur in certain geographic areas, such as urban slums, remote rural areas or islands, and in certain population groups with habitually low vaccination coverage rates such as ethnic and racial minorities, nomadic peoples, or persons with religious or philosophical objections to

immunization. As immunization coverage increases, the size of epidemics decreases. In addition, the inter-epidemic period lengthens, and the proportion of cases among older children increases.
Even with high routine measles vaccine coverage (1st opportunity) at nine months of age, susceptible individuals (un-vaccinated children within the community and children who have failed to develop antibodies following immunization since measles vaccine efficacy is only 85% at 9 months of age) will accumulate with time leading to the occurrence of periodic outbreaks.
The provision of a second opportunity is necessary to reach children that have never been vaccinated and children not protected after the first dose. In the African Region, this is provided through supplemental immunization activities (SIAs). The second opportunity serves to reduce the proportion of susceptible in a given population. It therefore helps to prevent measles outbreaks and, with high routine immunization coverage, favors the elimination of indigenous measles transmission.
Catch-up campaigns (SIAs) to provide second opportunity for measles vaccination need to be organized in such a way as to target the age group in which at least 90% of measles cases are known to occur. In the African setting, this age group has included children aged 9 months to 14 years. After an initial wide age group catch-up supplemental immunization effort, periodic follow-up campaigns (conducted every three or four years) are needed to assure that the number of susceptible children does not build up to a critical level. Follow-up campaigns target children born after the previous catch-up campaign.[2, 5]
In Ethiopia outbreaks of measles reported every year. In 2013/2014 nationally, there were 202 measles outbreaks reported with incidence of 1.6 and 1.9 respectively in two consecutive years. Out of these, 31 measles outbreaks have been occurred in South Nations, Nationalities and Peoples region (SNNPR) with incidence rate of 2.3 and 2.5 respectively in the same period.[6]

Konta special woreda is one of the special Woreda among 15 zones and 4-special woreda in SNNPR. The woreda is 595 km from Addis Ababa. The total population of the woreda is 115,022 with urban and rural population proportion of 10.3%, and 89.7% respectively. There are a total of 35 Kebeles in the Woreda with 2 urban, and 33 rural Kebeles. There are 4-health centers, one primary Hospital, 45-health posts, and 5-private health facilities in the Woreda. Kirara health center is one of the health center in Konta special Woreda and found in north direction of the Woreda. The boundaries of the health center are Chida health center in South,

and Oromia region in the North, East, and West direction respectively. The health center catchment is about 1545m above sea level.

The measles vaccination coverage of the health center for the last three years (2012-2014) was 80%, 104% and 89.5% respectively. Each three catchment Kebeles has only a 2013 and 2014 first quarter EPI data. Based on this data, in 2013 the measles vaccination coverage of Bekeferda, Mojo, and Kirara kebele was 68%, 132.7%, and 107.4% respectively. In 2014 the first quarter EPI report of the three Kebeles indicated that the routine measles vaccination coverage for Bekeferda, Mojo, and Kirara was 50%, 133%, and 93% respectively. The 2012 measles SIA campaign report indicated that the coverage in Bekeferda, Mojo, and Kirara Kebele was 95%, 102%, and 155% respectively. An investigation of the an outbreak was conducted in Kirara health center catchment to determine factors associated with contracting measles in the catchment as well as to assess the district's preparedness and response to the outbreak.[7]

1.2.2 Rational of study

An unusual increase in the number of cases is reported in Konta special Woreda of SNNPR from October to December 2014. The team organized from EPHI and FETP cohort-5 residents assigned to conduct an outbreak investigation in the woreda in order to search and manage additional cases, identify the possible risk factor, and identify gaps in the immunization program that need to be addressed to prevent further spread of the disease.

1.2.3 Objective.

1.2.3.1 General objective

To investigate the suspected measles outbreak in Kirara health center catchment, Konta special Woreda, SNNPR, December 15-29/2014

1.2.3.2. Specific Objectives

a. To describe the magnitude of the outbreak by person, place, and time.
b. To identify the risk factor associated for the outbreak
c. To provide the possible control and prevention measures based on identified gaps

1.2.4 Methods and Materials

1.2.4.1 Study design and Period. We used both descriptive and analytic study to identify the magnitude of the disease and associated risk factors. Patient observation was made and active-cases were searched for house to house. Medical registration-books were assessed and suspected

measles cases were identified. A 1:2 unmatched case control study was conducted from 15-19 December 2014. A case was any person who resided in Kirara health center catchment who developed fever, rash (maculo-papular), and or cough, coryza, conjunctivitis (red eyes), or tested IgM positive between 12 October 2014 and 27 December 2014. A control was any person who resided in the same community or village with cases in Kirara health center catchment who did or do not have history of signs and symptoms of measles or tested IgM negative between similar period.

1.2.4.2 Inclusion criteria

Cases: Any resident of Kirara health center catchment, Konta special woreda who tested positive for IgM or had symptoms of measles from 12 October to 26 December 2014 and who agreed to participate in the study was included.

Controls: A control was any resident of Kirara health center catchment, Konta special woreda during the study who was neighbor to a case and who did not develop signs and symptoms of measles and agreed to participate in the study.

Exclusion criteria

Cases and controls: Those cases and controls who refused to participate in the study were considered to be excluded.

The sample size was calculated using Statcalc function of Epi-info version 7.1.4.0 using the confidence level of 95% and a power of 80%. To estimate a sample size, we used a 66.67% prevalence of controls exposed (25 cases and 50 controls) in which the study was conducted in Sodo-town, (unvaccinated with measles vaccine and an AOR 3.7). Cases were selected randomly using random number table. Controls were neighbors of cases who did not suffer from measles during the period of the study. Structured interviewer administered questionnaire (back translated in to the local language-Konta) was used to collect data on factors associated with contracting measles, community knowledge and practices on measles for both cases and controls. As a risk factor mid upper arm circumference (MUAC) of a cases and a control was measured for malnutrition status in order to compare cases and controls.

1.2.4.3 Study area

The study was conducted in Kirara health center catchment, Konta special woreda of SNNPR.

1.2.4.4 Study population

The population in which cases and controls obtained was the population of the Kirara health center catchment which is 13,212, Konta special woreda, SNNPR

1.2.4.5 Study Subjects

Individuals admitted or treated in the catchment health facility, and at their home and who are included in the line list, and their controls with the ratio of 1:2 from the community of the three Kebele has included. Active cases available during the study period of the investigation were included in the study.

1.2.4.6 Operational definition

Suspected Measles cases at community level: A community member should report any person with *rash* and *fever* to a health worker and also advise the person to go to a health facility.

Suspected measles case: Can be defined as any person in Kirara health center catchment who meet the WHO standard measles case definition in the study period.

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; i.e., living in the same or in an adjacent district with a laboratory confirmed case where there is a likelihood of transmission; onset of rash of the two cases being within 30 days of each other.

Measles death: a measles death is defined as any death from an illness that occurs in a confirmed case or epidemiologically linked case of measles within one month of the onset of rash. The immediate and delayed complications of measles (like pneumonia, persistent diarrhea) may manifest and lead to death much later after the disappearance of the rash. Measles deaths are usually under-reported.

Suspected measles outbreak: Occurrence of five or more reported suspected measles cases in one month in a defined geographic area such as a Kebeles, health facility catchment area, or woreda.

Confirmed measles outbreak: Occurrence of three or more laboratory confirmed measles cases in one month in a defined geographic area such as a Kebeles/ health facility catchment / woreda.

Unvaccinated- a child who does not receive any dose of measles vaccines

Vaccinated- a child who take at least one dose of the measles vaccines

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

Coverage by history: Coverage will be calculated with numerator based on mothers or care taker report only

Knowledge of measles: If mother/care taker have awareness about, mode of transmission of measles diseases, sign and symptoms of measles diseases, prevention of measles diseases, age at the child begin, complete measles vaccination at right age considered as knowledgeable.

Vaccination coverage of measles: proportion of children took measles vaccination

Vaccination status: being vaccinated or unvaccinated with measles vaccine.

1.2.4.7 Data quality and Collection

Data was obtained by trained FETP residents and one surveillance officer from Ethiopian Public Health Institution (EPHI) by using interview administered structured questionnaire. Questionnaire was changed in to the local language orally by using health extension workers and back translated to Amharic then to English language.

1.2.4.8 Data processing and analysis

Data obtained was entered in to Epi-Info version 7.1.4.0 and we used Epi-info and excel for calculating frequency, ratio, proportion, rat, odds ratio. For multivariate analysis, we used advanced statistics of logistic regression in Epi-Info version 7.1.4.0.

1.2.5 Ethical clearance

Permission to carry out the study was obtained from EPHI, then from Konta special woreda. An informed oral consent was obtained from all study participants.

1.2.6 Result

1.2.6.1 Descriptive epidemiology

Person. We identified a total of 333 suspected measles cases with zero death rate including 2-confirmed and 23-Epi linked cases with a median age 5-years ranging from 3month to 37 years. A total of 6 specimen were collected and sent to EPHI. Only two samples were notified as IgM positive. For the rest samples the result were unknown.170 (51.1%) cases were males whereas 163 (48.9%) cases were females. The index case was 12 year old male child who come from Bekeferda rural Kebele reported to Kirara health in October 12/2014. He has no history of travel to areas with active measles and has no contact history with any suspected and or confirmed

measles cases. No specimen was taken from the index case. He has been vaccinated with measles.

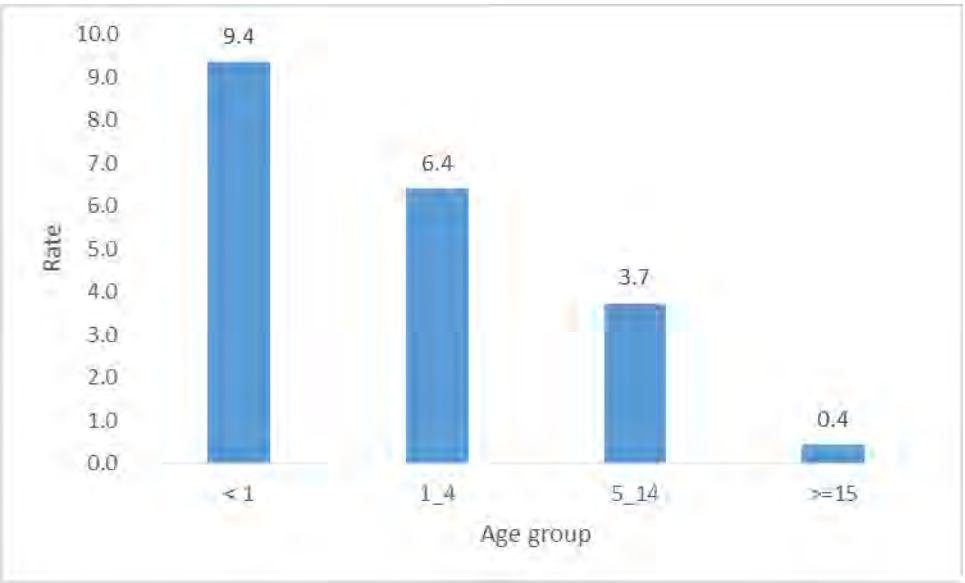

Figure 4: Attack rate of Measles Cases by Age Group, Kirara Health center, Konta Special Woreda, SNNPR, December 25, 2014

Out of the total suspected 333 measles cases, 45 (13.5%) cases received no measles vaccine, 144 (43.2%) cases received one measles dose, 20 (6%) cases received two measles doses, 100 (30%) cases have unknown vaccination history, 3 (0.9%) cases were less than 9-months, and 21 (6.31%) cases were missed variables. From the total, 140 (42%) measles cases visited and treated at health facility level (74 (22.2%) at health center level, 66 (19.8%) at health posts level). 139(99.3%) cases visited health facility treated at outpatient department. The rest cases who were not visited to the health facility treated in their home by health workers during house to house active case searching.

Table 5: Measles case attack rate by Kebele, Kirara health center, Konta special Woreda, SNNPR, December 2014

Kebele	Attack Rate/100 population
Bekeferda	**4.6**
Mojo	**3.0**
Kirara	**0.2**
Overall	**2.5**

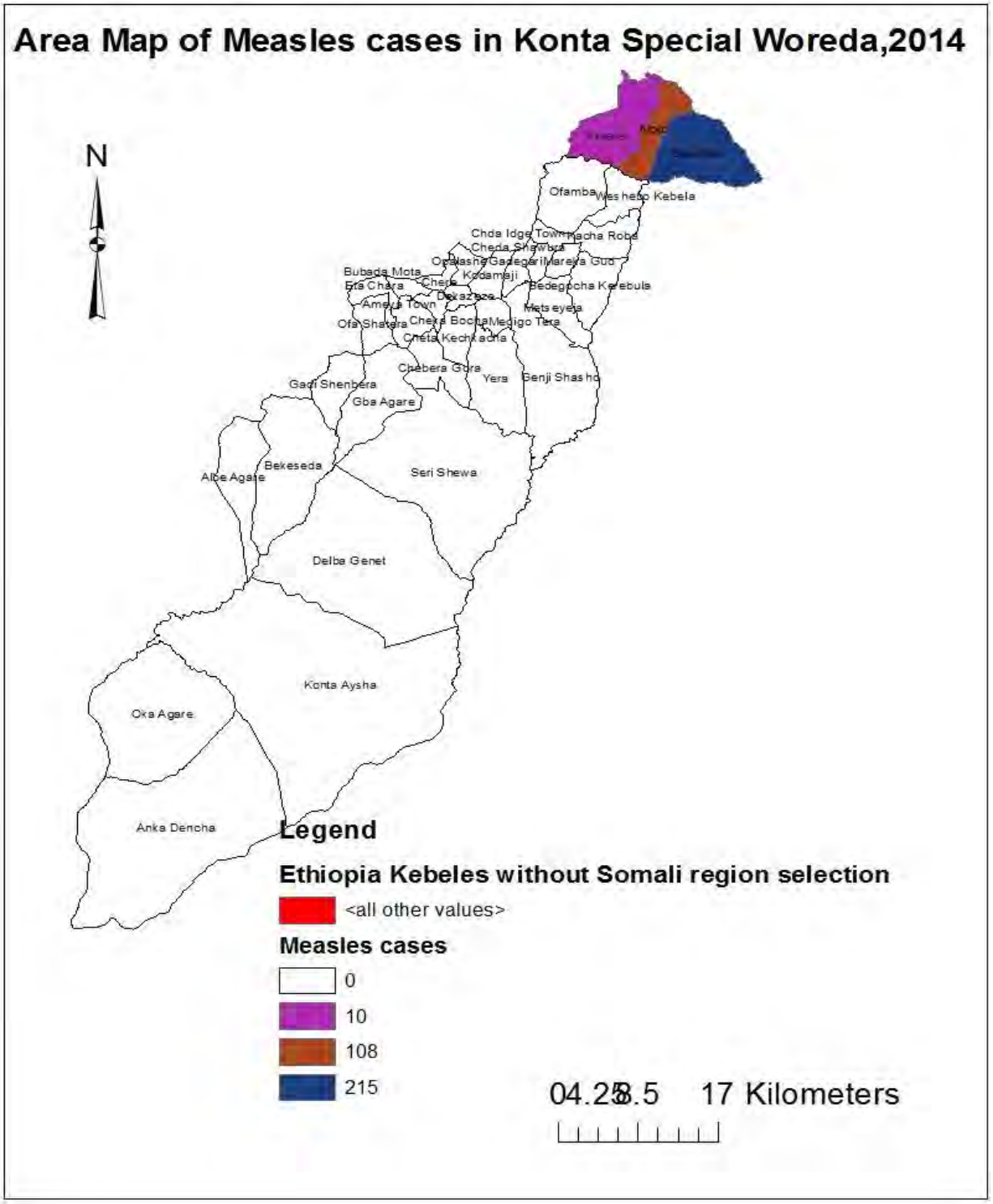

Figure 5: Spot map of Measles cases by Kebele, Kirara Health Center Catchment, Konta Special Woreda, SNNPR, 2014

Time.

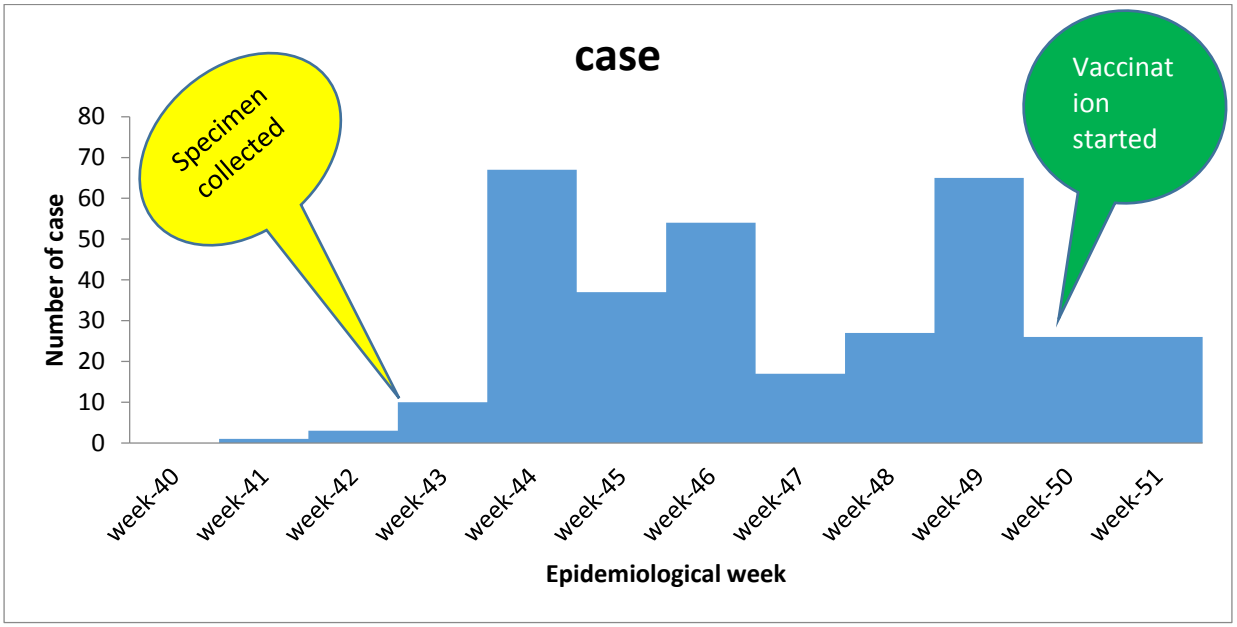

Figure 6: Suspected measles cases by EPI-week, Kirara health center catchment, Konta special woreda, SNNPR, December 2014

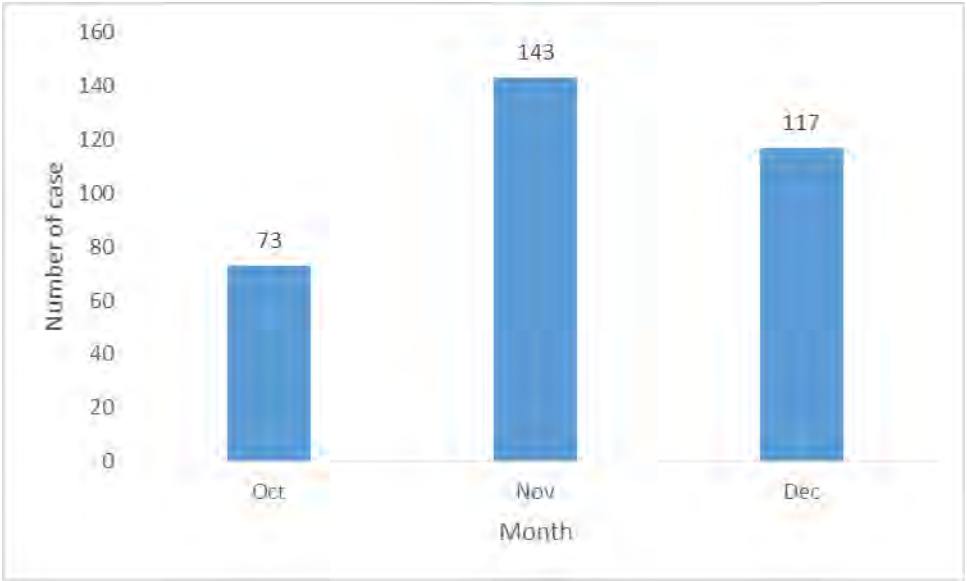

Figure 7: Suspected measles cases by month, Kirara health center catchment, Konta special Woreda, SNNPR, December 2014

1.2.6.2 Case-Control study

A total of 53 cases and 105 controls were recruited into the study with response rate of 100%. The median age of the cases was 4-year ranging from six month to 13 years, while that of controls was 6-year ranging from 7-month to 14 years. 31 (58.5%) of cases, and 58 (55.2%) of controls were males. Out of the respondents of cases, 29 (54.7%) were farmers, 22 (41.5%) were house wives, one (1.9%) was employed, and one (1.9%) was student. From the total respondents of controls, 64 (61.0%) were house wives, 29 (27.6%) were farmers, 10 (9.5%) were student, and 2 (1.9%) were employed. 53 (100%) of cases and 96 (91.4%) of controls are married. 50 (94%) of cases and 96 (91.4%) of controls belong to Konta ethnic group and 3 (6.0%) of cases and 9 (8.6%) of controls are Amhara and Tigre and Oromo ethnic group respectively. 37 (70%) of cases and 59 (56.2%) of controls were protestants, while 16 (30%) of cases and 35 (33.3%) of controls were orthodox religion followers. 158 (100%) of both cases and controls were nourished children.

Table 6: Bivariate analysis of risk factors (cases=53, controls=105) for measles, Kirara health center, Konta special woreda, SNNPR, December 2014.

Variable	Response	Case	Control	OR	95% CI
Ever vaccinated for measles	**yes**	**18**	**54**		
	no	**35**	**51**	**0.49**	**0.2448-0.9638**
Educational status	**educated**	**24**	**28**		
	no	**29**	**77**	**2.3**	**1.1386-4.5490**
Travel history of active measles case area	**Yes**	**33**	**45**		
	No	**20**	**60**	**2.2**	**1.1183-4.3281**
Do you know modes of transmission of measles?	**Yes**	**14**	**51**		
	No	**39**	**54**	**0.380**	**0.1849-0.7814**
Do you know measles is vaccine preventable?	**Yes**	**31**	**92**		
	No	**22**	**13**	**0.199**	**0.0897-0.4420**
Do you know the right age for measles vaccination?	**Yes**	**12**	**43**		
	No	**41**	**63**	**0.43**	**0.2023-0.9088**

Table 7: Multivariate analysis of risk factors for measles, Kirara Health Center, Konta Special Woreda, SNNPR, December 2014

Exposure	AOR	95% CI
Ever vaccinated for measles = yes	0.52	0.2693- 0.9984
Educational status = no education	1.86	1.2836-2.6837
History travel of active measles cases area = yes	2.2	1.1183-4.3280
Do you know modes of transmission of measles? = yes	0.38	0.184-0.7814
Do you know measles is vaccine preventable? = yes	0.22	0.0967-0.4792
Do you know the right age for measles vaccination? = yes	0.47	0.2243-0.9789

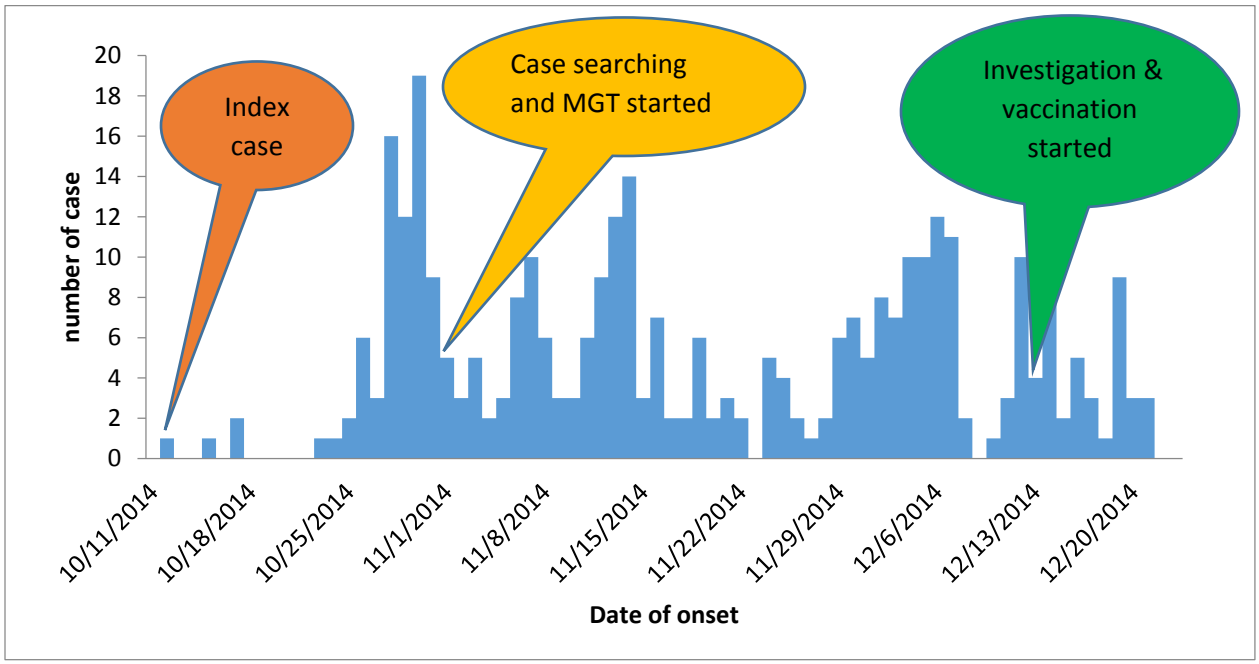

Figure 8: Suspected Measles cases by date of onset, Kirara Health Center Catchment, Konta special Woreda, SNNPR, December 2014

1.2.7 Discussion

We confirmed an outbreak of measles in Kirara health center catchment with highest incidence rate in infants (9.4/100). The health center catchment for the last three years (2012-2014) one measles dose administrative coverage was 80%, 104%, and 89.5% respectively. In addition to this, the 2013 measles supplementary immunization campaign (SIA) report indicated that the coverage was greater than 95%.[8] But the measles vaccination coverage rate for the cases was 34%, while that of controls was 51.4%. This indicated that the actual measles vaccination coverage may be very low. Being unvaccinated with measles was found to be a risk factor for contracting measles. This is consistent with study conducted in different areas. [9] [10] [11] [12]. Family educational status was significantly associated with measles cases.[9] [10] [13] [11, 14] In addition, Contact with active measles case was significantly associated with contracting measles in this study [14] [15] [16]. Knowledge on modes of transmission, prevention, and knowing the right age for the measles vaccination was a protective factor. Knowledge among controls was higher than that of cases.[17]

1.2.8 Limitation

Shortage of time and difficult topography to address most cases

1.2.9 Conclusion

We confirmed outbreak of measles with highest incidence rate in under one children. Being unvaccinated with measles, educational status of mother/care taker, contact history with active measles case and low awareness of mother or care taker on measles disease prevention were the factors associated with measles outbreak.

1.2.10 Recommendation

In order to control and prevent the outbreak, we recommended supplementary measles vaccination for under 15 years in the affected and surrounding Kebeles.

In addition to this, health center should plan community awareness creation and defaulter tracing by health extension workers and health development army.

Reference

1. www.en.wikipedia.org/wiki/Measles.
2. Africa, W.H.O.R.O.F., *Guidelines for Measles Surveillance* December 2004.
3. Edward P, R.G., David M, Geofrey G: , *Principles of Medicine in Africa.* 2004. **3rd edition**
4. Ministry of Health and child Welfare, Z., *Immunisation in practice: A Practical Guide for Health workers;* , 2007.
5. Federal Democratic Republic of Ministry of Health, E., *Guideline on Measles Surveillance and Outbreak Managment*, 2012.
6. Public Health Emergency Managment, S., *Emergency Report*, 2014.
7. Konta Special Woreda Health Office; *Annual Plan Versus Performance*, 2013/2014.
8. Health, K.s.w., *Annual Konta special Woreda Health Office Report*, 2014.
9. Authors: Daba M. Feyissa, W.D., T. Deti, Y. Genemo, *Measles Outbreak Investigation and Response in Arsi Zone, Oromia Region.* 2013.
10. A. B. Woyessa1, A.A., *Measles outbreak investigation - Keffa zone, SNNP regional state, Ethiopia*, 2012.
11. Fatima L. Cheshi, A.A., E.N.Waziri, K. Sabitu, P. Nguku, *An outbreak of Measles in Kubau Local Government Area, Kaduna State, Northern Nigeria.* February, 2013.
12. Kufakwanguzvarova W Pomerai1*, R.F.M.a.N.T.G., *Measles outbreak investigation in Zaka, Masvingo Province, Zimbabwe.* 2010.
13. 1 BirhanuA.Beressa, B.K.S.K.B.H.Z.H.T.D., *Investigation of Measles outbreak -Abaya, Borena zone, South Eastern Oromia, Ethiopia* . 2013.
14. Goitom Mehari, Z.H., A. Bekelle, *Measles Outbreak investigation in Tselemti Woreda, North Ethiopia.* 2013.
15. Nuruddeen Aliyu, A.Z.K., P.C. Chigbu, P. Nguku, K. Sabitu, U.M Ango, B. Idris, A. Shehu., *Measles Outbreak investigation in Sokoto State - Nigeria.* . February, 2013.
16. NDODE Corlins Ebontane, J.M.E.S.B.B.-p.A.O.B.N.A. and Christine, *Investigation of a Measles Outbreak in the Nkolndongo health District, Yaounde, Cameroon:.* 2013.
17. Qidwai W, S.A.S., Ayub S, Salma A: , *Knowledge, Attitude and Practices Regarding Immunisation among family Practice.* 2010.

Chapter II – Surveillance Data Analysis Report

2.1 Acute Flaccid Paralysis Data Analysis Report in Southern, Nations, and Nationalities, and Peoples Region, Ethiopia, 2014.

Executive Summary

Poliomyelitis is vaccine preventable disease, targeted for eradication worldwide. Globally, since1988 the incidence of poliomyelitis has dropped by >99%, and the number of countries with endemic polio from 125 to just 3. As of 14 January 2014 the number of detected polio cases has increased to 385. Ethiopia reported ten wild polio cases from Somali region since August 2013 after 4 years free of active polio cases. Active surveillance of acute flaccid paralysis (AFP) cases is one of the strategies devised to eradicate polio. The goal of AFP surveillance is to report and investigate any case of AFP, irrespective of the etiology or the agent that causes the paralysis. Poliomyelitis is one of the National priority disease followed on a daily base by the public health emergency management system of Ethiopia as well as SNNPR. We conducted a retrospective secondary data analysis using 2007-2013 WHO AFP surveillance data of South Nation Nationalities and Peoples' Region. We described the AFP cases by person, place and time and determined the magnitude of AFP cases among zones in the region. The most affected age group was 1-4 followed by the age group of 5-9 and 10-14 with a median age of 4±SD 3.78. 716(59%) of AFP cases male populations. More than 54% of AFP cases received less than 4-polio doses. 11% of cases have unknown vaccination history. The polio vaccination coverage of the cases was lower than EDHS 2005, EDHS 2011, EPI coverage survey 2012 and administrative EPI coverage of the national as well as the regional report of 2005 and 2006 EFY. The non-AFP rate of the region was 2.9, and the highest incidence was reported in 2012(3.4/100,000). Sheka is the most affected zone (4.7/100,000) and Masha was the most affected district (11.3/100,000) in the region. Ten districts reported the non-AFP rate below 1/100,000. Majority of the cases (54.49%) received only zero to three polio doses, which is below the standard. Significant number of districts reported the non-AFP rate of less than two and even less than one per 100,000 population under 15 years. In addition to this, there are hard to reach areas that make polio eradication strategy challenging in the region. We recommended supplementary polio doses and strengthening surveillance system in order to reduce vulnerability to wild polio virus.

2.1.1 INRODUCTION

The burden of disease in south nations, nationalities peoples region as measured by premature death from all causes, comes primarily from preventable causes is dominated by communicable diseases, reproductive health problems and nutritional deficiencies. The leading causes of morbidity and mortality are mostly attributable to lack of clean drinking water, poor sanitation, and low public awareness of nutrition, environmental health and personal hygiene practices (1). One of the diseases which come or aggravated from the above mentioned risk factors is polio. The distribution of polio has been increased in 2013 as many African regions have reported significant number of cases. Especially countries in the horn of Africa like Somalia, Kenya, South Sudan and Ethiopia were the countries reported Polio outbreaks in 2013. The outbreak in Ethiopia was occurred in Somali region and 10 cases were reported so far. Poliomyelitis is one of the National priority disease followed on a daily base by the public health emergency management system of Ethiopia. More over the country has been implementing the global strategies devised for polio eradication. One of these strategies is active surveillance of acute flaccid paralysis (AFP) cases that helps to report and investigate any case of AFP, irrespective of the etiology or the agent that causes the paralysis. SNNPR is one of an integral part of the country implementing the active surveillance of acute flaccid paralysis strategy for polio eradication. The presence of unimmunized children, hard to reach areas, and poor surveillance system is a challenge for polio eradication(2).

2.1.1.1 *Literature Review*. Poliomyelitis is fecal-oral transmitted disease. Higher population density and poor sanitation conditions exacerbate transmission and high prevalence of diarrhea leading to more frequent infectious contacts and increase levels of excreted polio virus in the environment. Poliomyelitis is a highly infectious disease caused by wild poliovirus types 1, 2 and 3. Following infection, the virus is shed intermittently in excrement for several weeks with little or no symptoms in majority of cases. The initial symptoms of poliomyelitis include fever, fatigue, headache, vomiting, neck stiffness and pain in the limbs. Less than 1% of the infected persons develop irreversible paralysis. Poliomyelitis mainly affects children less than five years. 5%-10% of those paralyzed by the virus die as a result of breathing complications(3-5). Factors that increase the risk of polio infection or the severity of the disease include immune deficiency(6) , malnutrition(7), physical activity immediately following the onset of

paralysis(8),skeletal muscle injury due to injection of vaccine or therapeutic agents and pregnancy(8).

AFP is caused by many conditions including, Poliomyelitis, Guillain-Barre Syndrome (GBS) and Transverse myelitis. All unimmunized persons are susceptible to poliomyelitis. Epidemiologic evidence shows that infants born to mothers with antibodies are protected naturally against paralytic polio for a few weeks. However, any immunity conferred during the early neonatal period is short lived highlighting the importance of OPV immunization as early as possible in the newborn. Immunity is obtained through infection with the wild virus and/ or through immunization. Immunity following natural infection (including in apparent and mild infections) or a completed series of immunizations with live oral polio vaccine (OPV) results in both humoral and local intestinal cellular responses. Such immunity persists for many years and can serve to block infection with subsequent wild viruses. Vaccination with the inactivated poliovirus vaccine (IPV) confers humoral immunity, but relatively less intestinal immunity; thus, vaccination with IPV does not provide resistance to carriage and spread of wild polio virus in the community. There is no cross- immunity between poliovirus types– immunity is type specific(9).

Still polio is endemic to South Asia and Africa, particularly Pakistan and Nigeria, but rare in western world. After the widespread use of poliovirus vaccine, its incidence declined in many industrialized countries. Polio eradication remains one of the top priorities for WHO in the African Region. Its eradication began in 1988 with the Global Polio Eradication Initiative (GPEI). At that time, polio paralyzed nearly 1000 children every day. It is estimated that for every reported case, there are 200 asymptomatic carriers. As a result of many efforts, wild poliovirus cases have decreased by more than 99%. As of 2013, polio remains endemic in only three countries; Nigeria, Pakistan, and Afghanistan; but after 4 year effort to eradicate polio in Ethiopia, nine active polio cases detected in August 2013 from Somali region of Warder Zone, which is duo to importation. Globally as of 3 June 2015 a total of 385 Wild Polio Virus(WPV) and 55 Circulating Vaccine Derived Polio(cVDP) was detected. Among this 19 WPV was due to importation. The rest 340 WPV was detected in endemic countries.

Immunization of children against vaccine preventable is essential to reducing infant and child morbidity and mortality. Differences in vaccination coverage among subgroups useful for

planning purpose, resource allocation for priority areas, monitoring and evaluation of immunization programs(10).

The polio vaccine coverage for children age 12-23months who received polio-0, 1, 2, 3, and not vaccinated children at national level (N=1877)was 17.4%, 74.3%, 64.6%, 44.7%, and 34.9% respectively whereas SNNPR, (N=408) polio-0, 1, 2 3, and not vaccinated children were 21.0%, 75.3%, 66.6%, 50.2% and 21.7% respectively (12). Percentage of children age 12-23 who received polio-0, 1, 2, 3, and not vaccinated polio at national level (N=1930) was19.7%, 80.9%, 67.4%, 43.1%, and 16.0% while percentage of children received polio-0, 1, 2, 3, and not vaccinated was 18.8%. 85.6%, 74.7%, 46.9%, and 11.6% respectively (10)

The national Penta-1 and penta-3 coverage was 80% and 65.7% respectively whereas the SNNPR penta-1 and penta-3 coverage was 85%, and 79.3% respectively (14).Even after 3-doses of trivalent OPV, there is a wide variation in the percentage of children seroconverting with rates of 73%, 90%, and 70% for type 1, 2,and 3 respectively. Due to this multiple dose of polio is necessary more than 90% of children to develop immune response. However there is no guarantee that it would not be detected in the other regions of the country. Active surveillance of acute flaccid paralysis (AFP) cases is one of the strategies devised to eradicate polio. The goal of good AFP surveillance is to report and investigate any case of AFP, irrespective of the etiology or the agent that causes the paralysis. Poliomyelitis is one of the National priority disease followed on a daily base by the public health emergency management system of Ethiopia. SNNPR is one of the risk regions of Ethiopia as there are many hard to reach and silent areas in the region.

Ongoing analysis of surveillance data is important for detecting outbreaks and unexpected increases or decreases in disease occurrence, monitoring disease trends, and evaluating the effectiveness of disease control programs and policies. Analyses should be performed at regular intervals to identify changes in disease reporting(11, 12).

2.1.2 Purpose

After the widespread use of polio eradication strategy in different regions of Ethiopia, a wild polio virus (WPV) is detected in Somali regions of Ethiopia due to importation. Moreover AFP surveillance data in SNNPR has not analyzed. There is no guarantee that the wild polio virus would not be detected in SNNP region. In order to tackle this problem early and facilitate polio eradication end game regular analysis of AFP surveillance data is crucial. Surveillance data

analysis is important to see the burden of disease, efficiency and effectiveness of systems and interventions, identifying gaps and challenges, devising possible solutions and corrective measures. Thus this surveillance data analysis will help to determine the magnitude of acute flaccid paralysis detected by surveillance system, characterize the epidemiology of AFP cases, immunization activities and to suggest corrective measures and solutions so as to achieve the polio eradication goal in SNNPR.

2.1.3 Objectives

2.1.3.1 General objective. To analyze surveillance data of AFP in south nations, nationalities and peoples region from 2007 to 2013.

2.1.3.2 Specific

- To describe AFP cases by person, place, and time in the region.
- To identify the incidence of AFP cases among zones and districts of SNNP region
- To propose correction measures to strengthen AFP surveillance in the region

2.1.4 Materials and Method

2.1.4.1 Study design and period

We conducted a retrospective secondary surveillance data analysis from 2007-2013.

2.1.4.2 Study population

We used population of under 15 years of age in the region within same period as study population.

2.1.4.3 Data collection and analysis

During our study we have tried to see different source of data. Finally in consultation with the Regional PHEM head, mentors and WHO staff, we have decided to review surveillance data from the Public Health Emergency management surveillance data base and WHO AFP/Polio line list data. However the regional AFP/polio surveillance data base had limited number of variables. The available variables in the polio data base were number of cases and deaths by reporting zones and special Woreda, and reporting time only. The WHO data base had more variables than the PHEM surveillance data. More over the data source was obtained from the National polio referral laboratory through WHO surveillance unit and thus it was more reliable

and complete compared to the PHEM data. So that considering these advantages we used seven years (2007-2013) WHO AFP surveillance datafrom14-zones, and 8- special Woredas from 2007-2010 which later on the number of zone and special Woredas were changed to 15- and 4respectively. Data captured and analysis was done using Microsoft Office Excel 2013 and EpiInfo™7.1.3.0. The data was described by person, place and time. A retrospective secondary epidemiological and laboratory surveillance data of AFP reported from mentioned zones and special woredas of SNNPR during 2007-2013 was reviewed and descrbed by person,place and time.

2.1.4.4 Findings dissemination. Written report, both hard and soft copies, will be prepared and shared to Addis Ababa University, School of Public Health, Ethiopian Field Epidemiology Training Program Resident coordinators, mentors, advisors, PHEM/ SNNPR Regional Health Bureau, and other concern body.

2.1.4.5 Inclusion criteria. All AFP reported cases and deaths from 2007 – 2013 in SNNPR

2.1.4.6 Exclusion criteria. All cases and deaths reported to SNNPR RHB before 2007and after 2013.

Case definition

- Acute flaccid paralysis is defined as sudden onset of weakness and floppiness in any part of the body in a child < 15 years of age or paralysis in a person of any age in whom a clinician suspects a polio
- Polio-0 is a polio vaccine given at birth
- Low polio dose is a polio vaccine (dose) given less than four times during childhood
- An importation event is defined as the detection of >1 polio cases that occur in a country as a result of WPV transmission that genetic analysis shows to have originated in another country.
- An outbreak associated with an importation event is defined as >2 polio cases caused by WPV related to the imported WPV.

2.1.5 Ethical clearance

A protocol for the AFP/polio surveillance data analysis was developed and submitted to the regional PHEM FETP field supervisor for approval. After permission was obtained from the field bases, we communicated with south region technical team for data sharing as the regional

health bureau. PHEM data base had no AFP line list and the database contains only aggregated cases and deaths.

2.1.6 Result

2.1.6.1 by person. We identified a total of 1,648 AFP cases reported from 2007-2013.Out of the total cases, 1621 (98.4%) AFP cases were under 15 years old and 9 AFP cases were age greater than 15 years old, and the rest 18 AFP cases were missed variables. The median age of the cases is 4with SD of ±3.78 ranging from one month to 14.8years respectively.

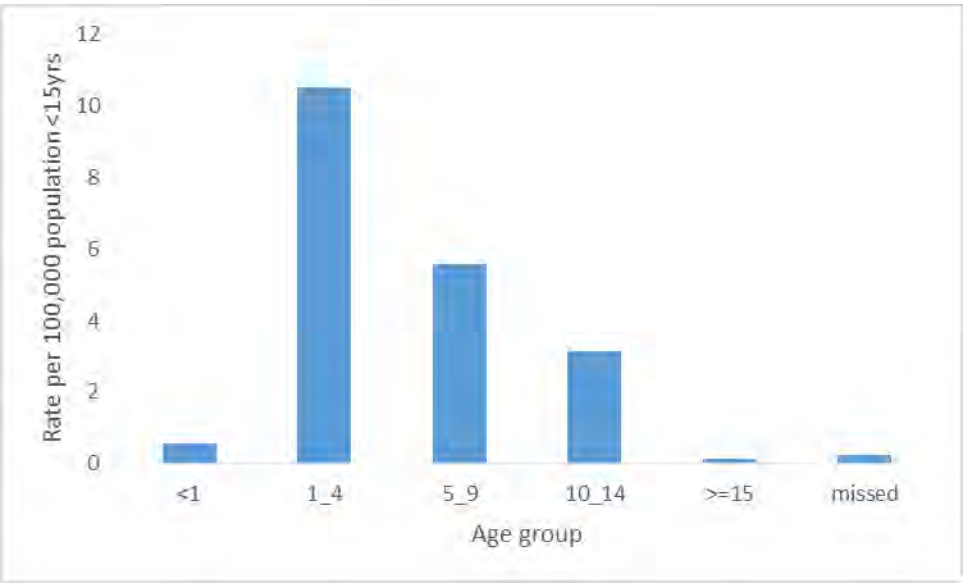

Figure 9: Acute Flaccid Paralysis cases by age group SNNPR, Ethiopia, 2007-2013.

The incidence rate of AFP cases among infants was one per 100,000. Of the total 1648 reported AFP cases, 141(8.6%) cases received zero polio doses, 80(4.9%) cases received one polio dose, 147(8.9%) cases received two polio dose, 530(32.2%), cases received three polio doses, 318(19.3%) case received four polio doses, 188(11.4%) cases received five polio doses , 32(1.9% cases received six polio doses, 16(1.0%) cases received seven polio doses, 3(0.2%) cases received eight polio doses, 5(0.3%) cases received nine polio doses, 1(0.1%) cases received fifteen doses, 3(0.2%) cases are misses variables and 184(11.2%) cases have unknown vaccination history. Out of the total 1204, 59% were males.

Of the total 1648 reported AFP cases, 986(59.8%) cases developed fever at onset of paralysis, 181(6.4%) cases did not develop fever at onset of paralysis, 480(29%) AFP cases were missed

variables and only 1(0.1%) AFP case was unknown history of fever at onset. 22(1.3%) cases affected their limbs asymmetrically, 60(3.6%) AFP cases affected their limbs symmetrically, and 133(8.1%) AFP cases affected their all limbs, 10(0.6%) cases affected their 3-limbs, and 24 (1.5%) cases affected only their one limb, and 897 (54.4%) AFP cases were missed variables. Out the total 149 follow up conducted cases, 49(32.9%) AFP cases developed residual paralysis, 87(58.4%) improved their initial paralysis, 8(5.4%) cases lost to follow up, and 3(3.4%) died before follow up. Out of 1648 reported AFP cases, there was no confirmed case for the last seven years. Out of the total cases 40(2.4%) were suspected polio virus, 1212(73.5%) were negative for polio cases, 121(7.3%) were NPENT, and 275(16.7%) were missed variables.

2.1.6.2 by Place.

Table 8: Expected AFP cases by Zones and Special Woredas, SNNPR, 2007-2013

Zone/ special woreda	2007	2008	2009	2010	2011	2012	2013	TOT
Alaba	1	2	2	2	2	2	2	13
Amaro	1	2	2	2	2			9
Hawassa town administration	1	2	2	2	2	3	3	15
Basketo	0	0	0	0	0	1	1	2
Bench maji	2	4	4	6	6	5	6	33
Burji	0	0	0	0	0			0
Dawro	2	4	4	5	5	5	5	30
Derashe	1	2	2	2	2			9
Gamogofa	8	16	16	18	18	19	19	114
Gedeo	4	8	8	9	9	9	9	56
Guraghe	8	16	16	13	13	15	16	97
Hadiya	7	14	14	12	12	13	13	85
Kefa	4	8	8	9	10	9	9	57
Kembata tembaro	4	8	8	8	8	7	7	50
Konso	1	2	2	2	2			9
Konta	0	0	0	0	0	1	1	2
South omo	2	4	4	6	6	7	7	36
Segen						9	9	18
Sheka	1	2	2	2	2	1	1	11
Sidama	14	28	28	30	30	33	33	196
Silti	4	8	8	8	8	9	9	54
Wolayta	8	16	16	16	16	15	15	102
Yem	0	0	0	0	0	1	1	2
Total	73	146	146	152	153	164	166	1000

Table 9: Reported AFP cases by Zones and Special Woredas, SNNPR, 2007-2013

Zone/special woreda	2007	2008	2009	2010	2011	2012	2013	Total
ALABA	6	4	2	2	4	3	2	23
AMARO	4	4	2	2	2			14
AWASSA CA	3	2	1	3	3	4	3	19
BASKETO		3	1			1		5
BENCH MAJI	9	8	5	10	15	9	3	59
BURJI	2	1	2	1	1			7
DAWRO	6	8	6	7	8	9	13	57
DERASHE	4	3	2	2	3			14
GAMO GOFA	19	25	21	32	26	37	27	187
GEDEO	10	12	12	11	10	15	16	86
GURAGHE	19	24	26	21	26	33	27	176
HADIYA	16	17	19	16	17	20	17	122
KEFA	10	10	11	15	21	13	15	95
KEMBATA/TEMBARO	13	12	11	10	12	12	8	78
KONSO	4	3	2	5	5			19
KONTA		1	2	1		1	2	7
S OMO	4	8	5	10	9	15	10	61
Segen						10	11	21
SHEKA	2	4	9	12	2	5	1	35
SIDAMA	39	34	28	34	41	52	45	273
SILTI	20	12	10	20	13	16	18	109
WOLAYTA	25	26	17	28	21	33	27	177
YEM	1			1	1		1	4
Grand Total	216	221	194	243	240	288	246	1648

Table 10: Incidence rate per 100,000 population of AFP cases by zones and special Woreda and by age group, SNNPR, 2007-2013

Zone/SP.wor	Age group					
	<1years	1_4years	5_9years	10_14yrs	>=15yrs	misses
Alaba	0.0	10.7	6.6	0.8	0.8	0.0
Amaro	0.0	9.0	6.4	2.6	0.0	0.0
Hawassa t	1.5	2.9	5.9	3.7	0.0	0.0
Basketo	0.0	13.5	3.4	0.0	0.0	0.0
Ben. Maji	0.0	7.8	3.8	5.2	0.0	0.3
Burji	0.0	16.9	3.4	3.4	0.0	0.0
Dawro	1.2	10.2	8.6	2.3	0.0	0.0
Derashe	0.0	13.4	4.0	1.3	0.0	0.0
G.Gofa	1.1	11.8	6.5	2.8	0.1	0.2
Gedeo	0.2	10.9	4.8	2.4	0.0	0.4
Guraghe	1.0	13.2	6.3	5.1	0.3	0.4
Hadiya	0.2	9.2	7.1	1.8	0.2	0.5
Kefa	0.9	8.9	5.9	4.8	0.3	0.0
Kt	0.8	11.2	7.6	1.7	0.0	0.3
Konso	0.0	8.1	6.5	0.8	0.0	0.0
Konta	0.0	6.3	2.1	4.2	0.0	2.1
S omo	0.7	10.3	5.0	4.3	0.0	0.0
Segen	0.0	3.4	1.5	1.5	0.0	0.0
Sheka	1.9	12.5	11.5	6.7	1.0	0.0
Sidama	0.5	9.2	4.8	3.2	0.0	0.1
Silte	0.0	18.6	5.9	2.5	0.3	0.5
Wolayta	0.5	13.0	4.8	3.5	0.1	0.3
Yem	0.0	7.1	2.4	0.0	0.0	0.0
Grand total	0.7	10.5	5.6	3.2	0.2	0.3

The incidence rate in Silte zone (18.6%), Burji woreda (16.9%), Basketo special woreda (13.5%), Derashe district (13.4%), Gurage zone (13.2%), and Wolayta zone was (13.0%)

respectively. In between 2007 and 2013 SNNPR the region has achieved the non AFP rate of 100% in most zones.

Table 11: Non-AFP rate by zones and special Woreda, SNNPR, 2007-2013

Zone	Expected	Reported	Non-AFP rate
ALABA	13	22	2.6
AMARO	9	14	3.6
AWASSA CA	15	19	2.0
BASKETO	2	5	2.4
BENCH MAJI	33	58	2.4
BURJI	0	7	4.7
DAWRO	30	57	3.2
DERASHE	9	14	3.8
GAMO GOFA	114	184	3.2
GEDEO	56	84	2.6
GURAGHE	97	171	3.7
HADIYA	85	119	2.6
KEFA	57	94	2.9
KEMBATA-TEMBARO	50	76	3.0
KONSO	9	19	3.1
KONTA	2	6	1.8
S OMO	36	61	2.9
Segen	18	21	3.2
SHEKA	11	34	4.7
SIDAMA	196	272	2.5
SILTI	54	106	3.9
WOLAYTA	102	174	3.1
YEM	2	4	1.4
SNNPR	1000	1621	2.8

Non-AFP rate by Woreda.

Benchi-Maji zone woredas.

Bero district reported 8.9/100,000 population, which was the highest rate in the zone, Majidistrict reported 6.5/100,000, Bench District reported 6.1/100,000, Mizan-Aman town reported 3.2/100,000, She-Bench District reported 2.6/100,000, Surma district reported 2.2/100,000, Debub-Bench district reported 1.8/100,000, Semen-Bench district reported 1.3/100,000, Menit-Goldia district reported 1.2/100.000, Sheko District reported 1.1/100,000 and Gurafereda district reported 0.8/100,000.

Dewuro zone woredas. Tocha and Lomma woreda reported each non-AFP rate of around 1/100,000 under 15 year's population. The rest district reported the non-AFP rate below 1/100,000 population, which was below the standard.

Gamo-Gofa zone Woredas. Merab-Abaya district reported 7.3, Kucha reported 4.7, Arbaminich-Zuria Woreda reported 4.3, Chencha reported 3.9, Oyida reported 3.3, Uba-Dedretsehay reported 3.2, and Kamba, Deramala, and Melokoza districts reported the non-AFP rate of 1.9, 1.7, and 0.9 per 100,000 population respectively.

Gedeo zone Woredas.

The highest non-AFP rate is reported from Bulle district, which is 4.9/100,000. Wonago woreda reported 4.0/100,000, Kochore woreda reported 2.7/100,000, Dillazuria reported 2.5, Dilla town reported 2.3 and Gedeb woreda reported 1.9/100,000.

Sheka zone Woredas. Masha woreda reported 11.3/100,000, Yeki woreda reported 4.5/100,000, and Andracha woreda reported 2.3/100,000.

Guraghe zone Woredas. Wolkite town reported 7.6, Mareko district reported 7.3, Butajira town reported 6.6, Endaghane Woreda reported 6.1, Mihurina-Aklil reported 5.0, Sodo reported 4.5, Cheha reported 4.2, Mesken woreda reported 3.4, Enamorna-Ener woreda reported 2.9, Abeshege district reported 2.7, Kabena woreda reported 1.6, and Kokir-Gedebano Woreda reported 1.2/100,000 population.

Kembata-Tembaro zone Woredas. Kedida-Gamela district reported is 6.4, Kacha-Bira district reported 3.3, Tembaro district reported 3.3, Hadero-Tuntozuria district reported 2.5, Damboya

district reported 2.3, Doyogena district reported 1.7, Angacha district reported 1.6, and Durame town reported 1.1/100,000 under 15 years population.

Hadiya zone Woredas. Misrak-Badewacho woreda reported 6.2, Merab-Badewacho woreda reported 3.3, Lemo woreda reported 3.0, Hossana town reported 2.7, Anilemo and Misha woredas each reported 2.6, Gomboraworeda reported 1.8/100,000 population, Shashogo woredas reported 2.1, Duna and Soro woredas each reported 1.7/100,000 population.

Kefa zone Woredas. Bitta woreda reported 8.1/100,000, Adiyo district reported 6.7, Gesha woreda reported 3.9, Gewata woreda reported 3.0, Chena woreda reported 2.9, Cheta woreda reporte 2.5, Decha woreda reported 2.3, Gimbo woreda reported 1.8, Bonga town reported 1.3, and Tello woreda reported 0.9/100,000 under 15 years population.

South-Omo zone Woredas. The highest rate was reported from Ngangatom woreda, which is 6.2/100,000 population.

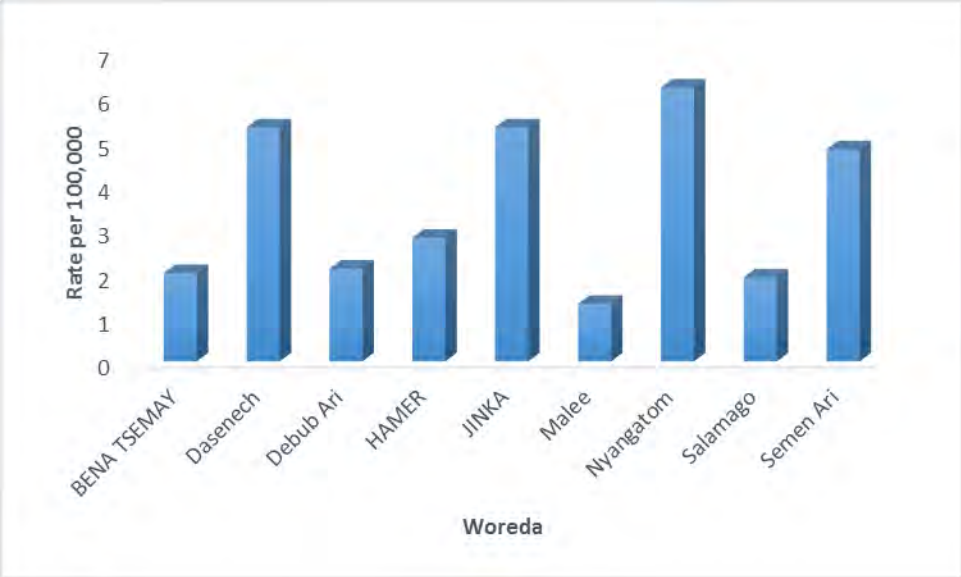

Figure 10: Non-AFP cases by woreda, South-Omo, SNNPR, 2007-2013

Sidama zone Woredas. Dale woreda reported the non AFP rate of 6.1/100,000, Alete-Chuko reported 5.4, Loko-Abaya reported 4.4, Hawassa zuria reported 3.3, Boricha woreda reported 3.0, Bensa and Dara woredas reported each 2.4, and Alete-Chuko and Bona zuria woreda reported each 2.1/100,000 under 15 years population. The rest 10 woredas reported below 2/100,000 population.

Silte zone Woredas. Out of the woredas, Dalecha woreda reported 7.6, Lanfro woreda reported 6.6, Silti woreda reported 4.4, Alechoworero and Merab-Azernet woreda reported each 2.7, Sankura woreda reported 2.3, Misrak-Azernet woreda reported 2.2, and Hulbareg woreda reported 1.0.

Hawassa town administration. The non-AFP rate of Hawassa town administration for the last seven years (2007-2013) was 2.0/100,000, 15years population.

Wolayta zone woredas. Zonally the non-AFP rate was 3.2/100,000 population in the region. Sodo zura woreda reported 4.8, Offa reported 4.7, Doguno-Fango woreda reported 4.3, Hombo wpreda reported 4.1, Damot-Gale woreda reported 3.9, Kindo-Koysha woreda reported 3.5, Damot-Pulasa reported 3.3, Bolosso-Sore woreda reported 2.9, Kindo-Didaye reported 2.8, Damote woyde reported 2.6, Sodo town reported 2.5, Areke town reported 1.9, and Damot sore reported 1.3 per 100,000 under 15 years population.

Segen zone Woredas. The non-AFP rate of Segen zone in between 2012and 2013 was 3.2/100,000 under 15 years population.

Special Woredas. Burji woreda reported 4.4, Amaro woreda reported 3.5, Konso and Derashe woredas each reported 3.3, Basketo reported 2.4, Konta Special woreda reported 2.1, and Yem Special woreda reported 1.4/100,000 population.

By residence. Out of the total 1648 reported AFP cases, 1597 (96.9%) were reported from rural Kebeles, the rest 51(3.1%) cases reported from urban areas. From the total reported urban AFP cases the highest rate 9 (17.6%) was reported from Wolayta zone, 7 (13.7%) cases each reported from Gedeo and Hadiya zone respectively, and 6 (11.8%) cases reported from Gamo-Gofa zone.

By reporting institution. All AFP cases were investigated in government and private health institution. No one of AFP case was reported from Holly water site. One thousand and forty three (63.3%) AFP cases reported by the health center, 242(14.7%) AFP cases reported by Hospitals, 29(1.8%) cases reported by Private clinics, 12(0.7%) cases reported by Woreda health office, 52(3.2%) reported cases by health posts and 270(16.4%) were missed variables.

2.1.6.3 Time.

The region reported the highest incidence rate in 2012.

Figure 11: Trend of non-AFP rate, SNNPR, 2007-2013

Table 12: Non-AFP rate by year and zone/special Woreda, SNNNPR, 2007-2013

Zone	2007	2008	2009	2010	2011	2012	2013	Total
ALABA	5.4	3.5	1.7	1.7	3.2	1.6	1.5	2.6
AMARO	5.6	5.4	2.6	2.6	2.5			3.7
AWASSA CA	2.4	1.6	0.8	2.2	2.2	2.8	2.0	2.0
BASKETO	0.0	10.7	3.5	0.0	0.0	3.2	0.0	2.5
BENCH MAJI	2.9	2.5	1.5	2.9	4.2	2.5	0.8	2.5
BURJI	7.4	3.6	7.0	3.4	3.3			4.9
DAWRO	2.5	3.3	2.4	2.7	3.0	3.3	4.7	3.2
DERASHE	5.9	4.3	2.8	2.7				3.9
GAMO GOFA	2.5	2.9	2.6	3.7	3.0	4.2	3.0	3.1
GEDEO	2.4	2.3	2.7	2.4	2.1	3.1	3.2	2.6
GURAGHE	2.9	3.2	4.0	3.1	3.8	4.7	3.7	3.6
HADIYA	2.5	2.4	3.0	2.5	2.5	2.9	2.4	2.6
KEFA	2.1	2.3	2.5	3.3	4.4	2.7	3.0	2.9
KT	4.0	3.6	3.2	2.8	3.0	2.9	2.1	3.1
KONSO	3.6	2.6	1.7	4.1	4.0	3.2	0.0	3.2
KONTA	0.0	0.0	4.3	2.1	0.0	2.0	3.8	1.7
S OMO	1.4	2.8	1.7	3.3	2.9	4.7	3.0	2.8
Segen						3.1	3.3	3.2
SHEKA	2.1	3.1	8.9	11.5	1.9	4.5	0.9	4.7
SIDAMA	2.7	2.3	1.9	2.2	2.6	3.2	2.7	2.5
Silte	5.3	3.0	2.6	5.1	3.2	3.6	4.2	3.9
WOLAYTA	3.3	3.3	2.2	3.4	2.6	3.9	3.1	3.1
YEM	2.6	0.0	0.0	2.4	2.3	0.0	2.2	1.4
Grand Total	2.9	2.8	2.5	3.1	2.9	3.4	2.9	2.9

Duration of case investigation following notification. Out of the total 1648 AFP cases 1085 (65.8%) cases investigated less than or equal to two days following notification, 38 (2.3%) cases investigated greater than or equal to 3 days, for 88 (5.3%) AFP cases date of investigation preceded date of notification. Between 2007 and 2008the date of notification for 437 (26.5%) AFP cases had been missed.

Interval between first and second stool collection. Between 2009 and 2013, 1228 (74.5%) cases of stool collected within 24-48hrs interval. In 2007 and 2008 for 420 (25.5%) date of first stool collected is missed.

Stool arrival. Out of the total 1648 AFP cases 1182(71.2%) cases of stool specimen arrived less than or equal to three days duration, 27(1.6%) cases of AFP stool specimen arrived between 4 and 11 days duration, for 439(26.6%) the date received at national lab is not filled (missed variables).

Days between onset of paralysis and second stool collection. For 1138 (69%) of AFP cases the duration is less than or equal to 14 days, for 70 (4.2%) of AFP cases the duration is greater than 15 days, and for 440 (26.7%) of AFP cases days between date of onset of paralysis is not field.

Figure 12: AFP cases by month, SNNPR, 2007-2013.

2.1.7 Discussion. We identified a total of 1648 AFP cases in the region from 2007-2013. The most affected age group was 1_4 followed by the age group of 5_9 and 10_14 respectively. Sheka zone was (4.7/100,000) the most affected area among zones. Out of regional districts, Masha district was (11.3/100,000) the most affected one, whereas Burji special woreda was (4.7/100,000) the most affected woreda among special woredas. There were 18-districts and 2-special woredas in the region which have reported the non-AFP rate below the WHO standards (<2/100,000) which needs a great attention. Regionally the highest incidence (3.4/100,000) was reported in 2012. A few number of AFP cases were reported from urban Kebeles indicating that urban should not be neglected during surveillance. When we compare the immunization coverage of AFP cases reported between 2007 and 2013 with EDHS 2005 national, polio-zero is lower than by 8.8%, polio-1 is lower than by 69.4%, polio-2 is lower than by 55.7%, and polio-3 is lower than by 12.5%. When we compare the immunization coverage of AFP cases with EDHS 2005 SNNPR, AFP cases of polio-zero is lower than by 12.4%, polio-1 is lower than by 70.4%, polio-2 is lower than by 57.7%, and Polio-3 is lower than by 18%(13).

Comparing the EDHS 2011 report of national immunization coverage with AFP cases, the coverage of polio-zero in AFP cases is lower than by 11.1%, polio-1 is lower than by 76%, polio-2 is lower than by 58.5%, and polio-3 is lower than by 10.9% whereas comparing the EDHS 2011 SNNPR report with AFP cases, the immunization coverage of AFP cases of polio-zero is lower than by 10.2%, polio-1 is lower than by 80.7%, polio-2 is lower than by 65.5%, and polio-3 is lower than by 14.7%. When we compare the national EPI coverage survey 2012, the coverage of penta-1 and penta-3 of AFP cases which was assumed to be similar with polio-1 and polio-3, which was lower than the national coverage by 75.1%, and 33.5% respectively whereas the immunization coverage of AFP cases of penta-1 and penta-3 is lower than the SNNPR coverage by 80.1% and 17.1%respectively(14). The 2012 MOH administrative report indicated that the national coverage of penta-3 was higher than penta-3 of AFP cases by at least 44.8%(15). Significant number of children have been received low polio dose. Children who received 4 and more polio dose less than 50%, which was below the WHO standard. The possible reason for the low polio dose was there were significant number of children who took only either of one or two polio doses, the other may be poor case investigation. The regional trend of non-AFP rate met the WHO minimum standard. But when we look at the non-AFP rate of certain Woredas per 100,000 population, it was below the WHO standard.

2.1.8 Limitation

- During the data collection the regional data base has a few variables, and has no its own line list and this urges us to find other sources of data, which contains several variables and this step took several days (time waste).
- The line list contains several blank variables which made the result interpretation different than the complete line list (data).
- The variables of line list in all years was not uniform this urges us to reject the variable that was absent in one year and accept the years that contain variables.

2.1.9 Conclusion.

The most affected age group was 1_4. Regionally the highest non-AFP rate was reported in 2012. Sheka zone reported the highest incidence in the region. There were significant number of districts that did not meet the WHO standard. I.e. there were districts and special woredas that reported the non-AFP rate below 2/100,000 population <15 years. There was low vaccination coverage among children of all age groups in which only 34.5% were vaccinated with 4 and more polio doses. The majority of cases have been vaccinated with less than 4-polio doses.

2.1.10 Recommendation

- Supplementary polio immunization of under-five children by RHB
- Active surveillance of all AFP cases is mandatory to get the Polio eradicated by health facilities, and districts
- Monitoring and evaluation, and regular supportive supervision of EPI Program by RHB, zones, woredas, health centers.
- Improving data recording, and reporting system by health centers, woredas, and zones.

References

1. Southern Nations Nationalities and Peoples Region (SNNPR), Health profile. 2002.
2. SLM. Krugman's infectious diseases of children.ISBN 0-323-01756-8:pp. 81-97.
3. Vaccine-derived polioviruses and the endgame strategy for global polio eradication.Annu Rev Microbiol59:587-635.
4. Chronic progressive poliomyelitis secondary to vaccination of an immunodeficient child". 2006.
5. Reduced secretory antibody response to live attenuated measles and polio virus vaccine in malnourished children. 2006.
6. Mechanism of injury-provoked poliomyelitis. 2004.
7. Factors influencing the occurrence of illness during naturally acquired poliomyelitis virus infection. 2006.
8. WHO. Eradicating polio in Africa region. Annual report 2011
9. EFMOH. National guide line for acute flaccid paralysis surveillance. October 2009.
10. Global Polio Eradication Initiative available at http://www.polioeradication.org
11. Prevention CfDCa. Polio in Somalia, Kenya, Ethiopia". January 22, 2014.
12. Ethiopia CG. Cross border transmission of Wild Polio Virus (WPV) and immunization service delivery in CGPP Project implementation international border areas in Ethiopia. June 2012.
13. Ethiopian Demographic and health Survey (EDHS). 2005.
14. Ethiopian Demographic Health Survey (EDHS). 2011.
15. National EPI Coverage Survey 2012.

Chapter III – Evaluation of Surveillance System

3.1 Evaluation of Malaria surveillance system in Kembata-Tembaro zone, SNNPR, 2014

Abstract

Background: Public health surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health. The evaluation focuses on how well the system operates to meet its purpose and objectives. Therefore, the surveillance system should be evaluated periodically to improve quality, efficiency and usefulness. We evaluated malaria surveillance system to describe the existing surveillance system for malaria in Kembata-Tembaro zone.

Methods: A cross-sectional study design was applied to assess the core and supportive function, and key attributes of the surveillance system for malaria. The zonal PHEM and Hospital surveillance units were purposively included in the study. Based on 2014 annual performance, one best, one better, and one poor performance surveillance units were selected from woreda PHEM. In similar manner from each selected woreda three health centers and three health posts from each selected health centers were evaluated. Data was obtained through observation, review of document, interview of officers and focal persons. We used Microsoft excel to calculate proportion rate and ratio, and to construct figure and tables. Ethical clearance was obtained from EPHI, then Kembata-Tembaro zone health department PHEM.

Result: We evaluated a total of 41-surveillance units. Thee zonal PHEM reported 833 clinical malaria cases, 18,262 confirmed cases, 265 admissions and one death. Kacha-Bira district reported 65 (7.8%) clinical cases, 3028 (16.6%) confirmed cases, and zero deaths. Kedida-Gamela district reported 38 (4.6%) clinical cases, 5221 (28.6%) confirmed cases, and zero admissions, and deaths. No malaria cases were reported from private health facility. At 41(100%) evaluated surveillance units, standard case definition was used and available. 27(100%) health posts used family folder for case registration, 9(100%) health centers, one hospital used family folder, OPD and IPD abstract register. 9(100%) health centers and 3(100%) woreda health office used hard copy of report format for surveillance data storage. For case confirmation, all health posts used RDT, health centers used RDT and microscope, and Hospital

used microscope. Despite the presence of trained personnel, 13(100%) Health centers, one Hospital, and 3(100%) woreda health office did not analyze the surveillance data. 5(35.7%) surveillance units prepared epidemic preparedness plan. Standards and guidelines were available at evaluated surveillance units. Supportive supervision conducted regularly at visited area. Written feedback given by higher level was observed at evaluated surveillance units. Communication facilities were accessible at all level. Report completeness of health posts was 93.3%, health centers, 97.9%, Hospital, woreda, zonal PHEM each was 100%. No indicator was available to measure timeliness. The surveillance system was helpful to detect cases early on time to permit accurate diagnosis, to estimate the magnitude of morbidity and mortality. The case definition was easy for case detection, the formats allowed professionals to fill data. 23(85.2%) health posts reported incomplete data. 9(100%) health centers, and 2966.7%) woreda health office reported complete and clear data. The surveillance system did not include all private health facilities in evaluated areas

Conclusion. In the presence of consistent supportive supervision, feedback, continuous monitoring and evaluation, the surveillance data was not analyzed, a few surveillance units used epidemic preparedness plan, and no surveillance units used malaria monitoring chart. Health centers, Hospital, woreda and zonal PHEM should analyze surveillance data, and should prepare EPRP plan. All surveillance units should prepare malaria monitoring chart in their office. Private health facilities should be included in reporting units. The malaria surveillance system in in Kembata-Tembaro was, simple, acceptable, flexible, and stable, but not timely and not representative.

3.1.1 Introduction

Public health surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health[1-4]. The importance of conducting public health surveillance evaluation is to guide immediate action for events of public health importance, measure the burden of disease, detect new emerging health events, identify the population at risk, monitor trends of burden of diseases or other health event, detect outbreaks/epidemics/pandemics, guide the planning, implementation, and evaluation of programs to prevent and control disease or other health problem, injury, or adverse exposure, detect changes in health practices, prioritize the allocation of health resources, provide a basis for epidemiologic research hypothesis, and evaluate public policy. Evaluation of a public health surveillance system focuses on how well the system operates to meet its purpose and objectives. The purpose of evaluating a surveillance system is to promote the best use of public health resources by ensuring that only important problems are under surveillance and that surveillance systems operate efficiently[5]

The public health system is continually challenged by recurrent and unexpected disease outbreaks and is facing the challenge of managing health consequences of natural and human made disasters, emergencies, crisis, and conflicts. PHEM is designed to ensure rapid detection of any public health threats, preparedness, and other related to logistic and fund administration, and prompt response to and recovery from various public health emergencies ranging from recurrent epidemics, nee emerging infections, nutritional emergencies, chemical spills, and bioterrorism. The system comprised of emergency preparedness, early warning, response, and recovery. Surveillance of priority diseases is the major component of early warning. Malaria is of the reportable priority diseases and public health problem in Ethiopia. Information on the number and distribution of malaria cases and deaths is critical for the design and implementation of prevention and control programs[6].

Malaria is one of the most severe public health problems worldwide. It is a leading cause of morbidity and mortality in many developing countries, where young children and pregnant women are the groups most affected. 3.4 billion People (half the world's population) live in areas at risk of malaria transmission in 106 countries and territories[7]. Malaria kills a child somewhere in the world every minute. It infects approximately 219 million people each year (a

range of 154 – 289 million), with an estimated 66,000 deaths, mostly children in Africa. 90% of malaria deaths occur in Africa, where malaria accounts for about one in six of all childhood deaths. The disease also contributes greatly to anemia among children — a major cause of poor growth and development. The cost for malaria intervention is the **remaining challenge.** It is estimated that a US $5.1 billion is required annually to achieve universal coverage and fully scale-up malaria interventions around the world[8].

Malaria is ranked as the leading communicable disease in Ethiopia, accounting for about 30% of the overall Disability Adjusted Life Years lost[9]. **Malaria transmission in Ethiopia is unstable. Around 52 million people (68%) live in malaria endemic area, mostly an altitude of below 2000 meters[10].** Enhanced surveillance for malaria cases and deaths aides' ministry of health to determine which areas and/or population groups are most affected and enables countries to monitor changing disease patterns. Strong malaria surveillance systems also help countries design effective health interventions and evaluate the impact of their malaria control programs. Malaria surveillance is currently weakest in countries with the highest malaria burden, interpreting it difficult to accurately assess disease trends and plan interventions. At present, only one tenth of the 219 million cases that are estimated to occur each year are detected and reported through national malaria surveillance systems. (WHO's uncertainty range for malaria cases is 154 million to 289 million.) Only 58 of the 99 countries with ongoing malaria transmission produce sufficiently complete and consistent data on malaria that allow a reliable assessment of malaria trends over time[11].

3.1.2 Rational of the study

The public health system of the South Nations, Nationalities, and peoples region (SNNPR) is continuously challenged by different recurrent and unexpected disease outbreaks and is facing the challenges of managing health consequences in different parts of SNNP regions of zones. Malaria is one of the health challenge and selected priority disease in the region. Kembata-Tembaro zone is one of the 15 zones and 4 special woreda in the region. Still malaria is the public health problem among priority diseases in the zone. The surveillance system evaluation of the zone has not yet been done in the area. The surveillance system of the area should be evaluated regularly. As a result it is difficult to estimate how much the surveillance system is strong or not to tackle these health event problem. So this cross-sectional study is designed to evaluate malaria surveillance in this zone.

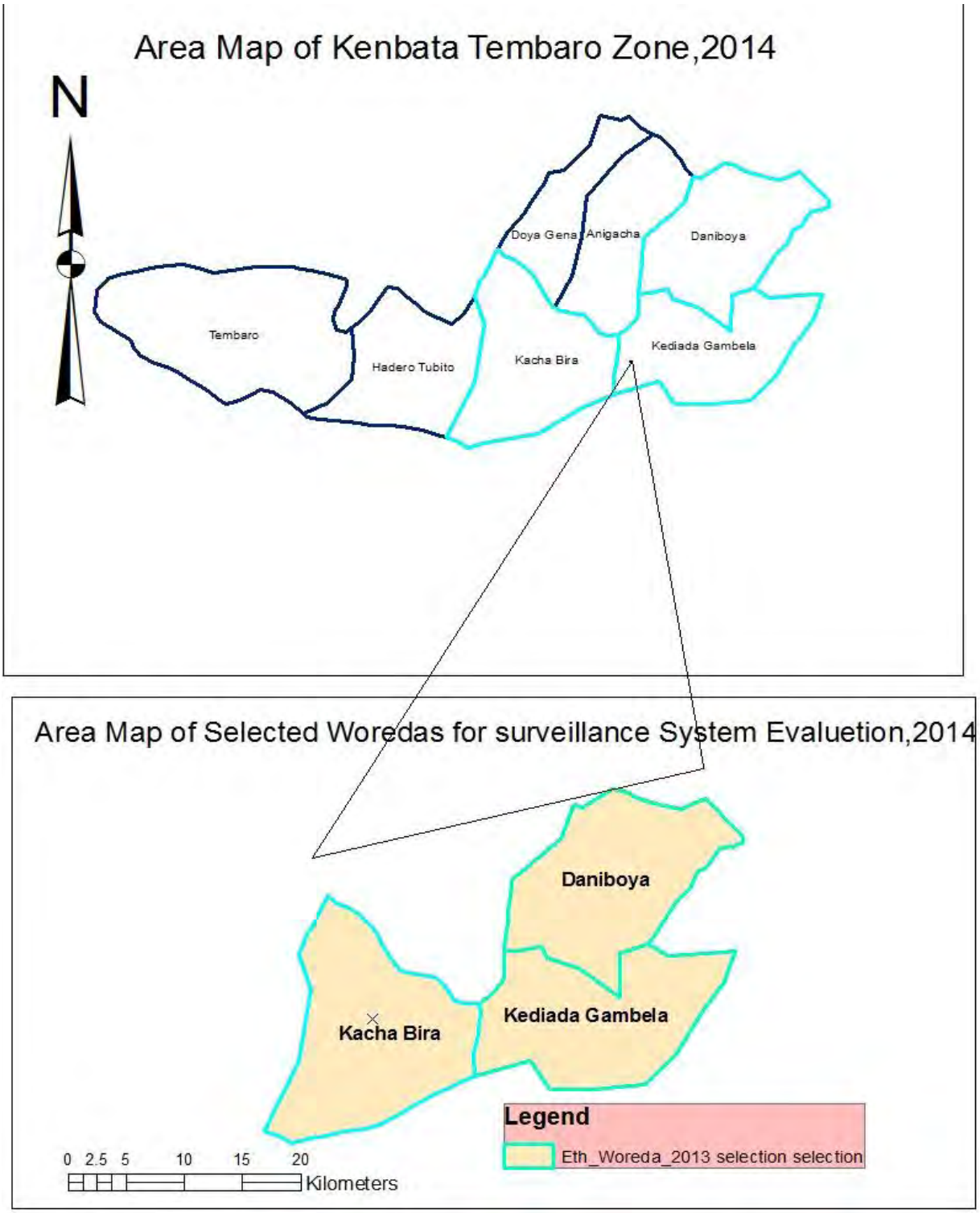

Figure 13: Area Map of selected woredas for Malaria Surveillance Evaluation, Kembata-Tembaro zone, SNNPR, 2014

3.1.3 Objectives.

3.1.3.1 General objective.

- To evaluate the surveillance system for malaria in Kembata-Tembaro zone, SNNPR, December 9-23/2014.

3.1.3.2 Specific objectives.

- To describe the existing surveillance system for malaria in Kembata-Tembaro zone.
- To assess core and supportive functions of the system
- To assess surveillance system key attributes

3.1.4 Methods

3.1.4.1 Study setting. The study was conducted in Kembata-Tembaro zone. The total population of the zone was 843,168 with 135,786 (16.1%) urban and 707,376 (83.9%) rural. Administratively there were 7-rural Woreda and 1-town administration. Durame town administration and 6- rural woredas are known malaria endemic areas. Out of these areas, 4-rural woredas are hot spot woredas (Kedida-Gamela, Kacha-Bira, Hadero-Tunto, and Tembaro). Regarding to health facility distribution in the zone, there was 1-Hospital, 33-governmental health centers, 3-NGOs health centers, and 133- health posts. Zonal health department, zonal Hospital, woreda health office, health centers, and health posts were taken as the study units of the surveillance system evaluation.

3.1.4.2 Study design. We used a cross-sectional descriptive study design using the CDC "updated guideline for evaluating public health surveillance system" published in 2001 as a frame work for evaluation[5].

3.1.4.3 Study period. We conducted the surveillance system evaluation from December 9-23/2014 in Kembata-Tembaro zone, SNNPR.

3.1.4.4 Sample size determination. Including zonal health department and zonal Hospital, we identified a total of 41(58% reporting units among the selected woredas) by their performance.

3.1.4.5 Sampling technique. Before selection of a sample we conducted a discussion with zonal PHEM core process for sampling selection. A total of 41-reporting units were identified for this surveillance system evaluation. Zonal health department and zonal Hospital was included

purposely by discussion. 3-Woreda health office, 9-health centers, and 27-health posts were selected based on their past year (2014) performance. Based on their performance, we identified three reporting units from each woreda health office, health centers, and health posts (1-best, 1-better, and 1-poor performance).

3.1.4.6 Data collection. We obtained data through observation, review of document, review of outputs, quantitative interviews of the PHEM officers, disease prevention and health promotion, and IDSR focal persons in health centers and health posts.

3.1.4.7 Data analysis and presentation. We used Micro-soft Excel 2013 to calculate frequency, ratio, rate, and proportion. We also used Microsoft excel to construct tables and figures.

3.1.5 Ethical issue. Official permission was obtained from Ethiopian Public Health institution, RHB, and then from the respective selected institutions for evaluation.

3.1.6 Result

In 2014 Kembata-Tembaro zone received a surveillance report from a total of 166 reporting units (133-health posts, 29-governmental health centers, three non-governmental health centers, and one Hospital, no private health facilities were included in the reporting units).

The population resided in the zone was the population under surveillance for malaria disease surveillance. We conducted surveillance system evaluation at 41 reporting units (27-health posts, 9-health centers, 3-woreda health office, zonal hospital and zonal health department.

3.1.6.1 Malaria. In 2014 Kembata-Tembaro zone reported a total of 833 clinical malaria cases, 18,262 confirmed malaria cases (examined by microscope or RDT), 265 inpatient cases, and 1 death cases through surveillance units.

Kacha-Bira woreda. The district reported 65 (7.8%) clinical cases, 3028 (16.6%) confirmed malaria cases, 168 (63.4%) inpatient cases, and zero deaths.

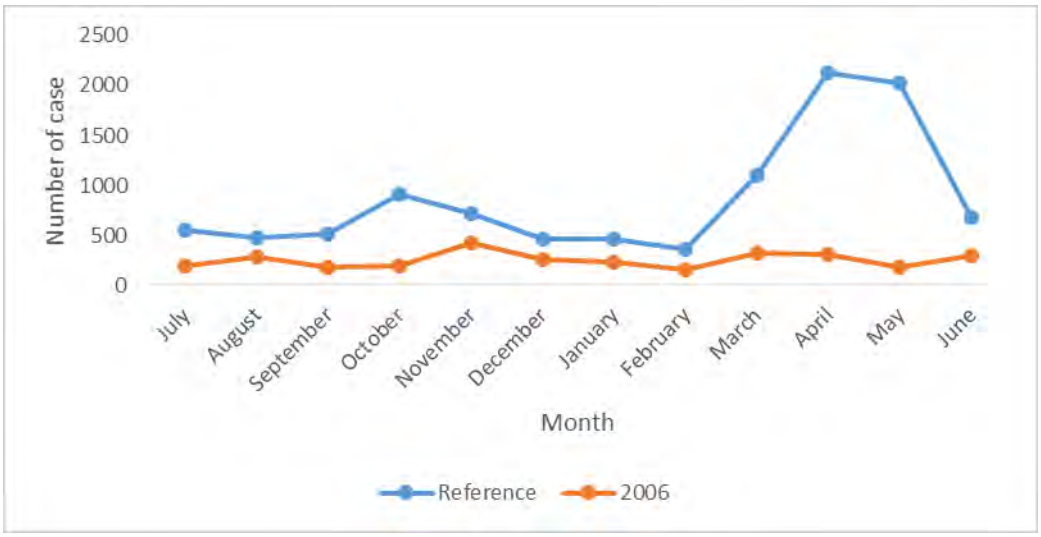

Figure 14: Malaria monitoring chart by month, Kacha-Bira Woreda, Kembata-Tembaro zone, SNNPR, 2014

Kedida-Gamela Woreda. The district reported 38 (4.6%) clinical cases, 5221 (28.6%) confirmed malaria cases, and zero inpatient and death cases.

Figure 15: Malaria monitoring chart by month, Kedida-Gamela district, Kembata-Tembaro zone, SNNPR, 2014

Damboya Woreda. The Woreda reported zero clinical cases, 1713 (9.4%) confirmed malaria cases, and zero admission and death cases through surveillance units.

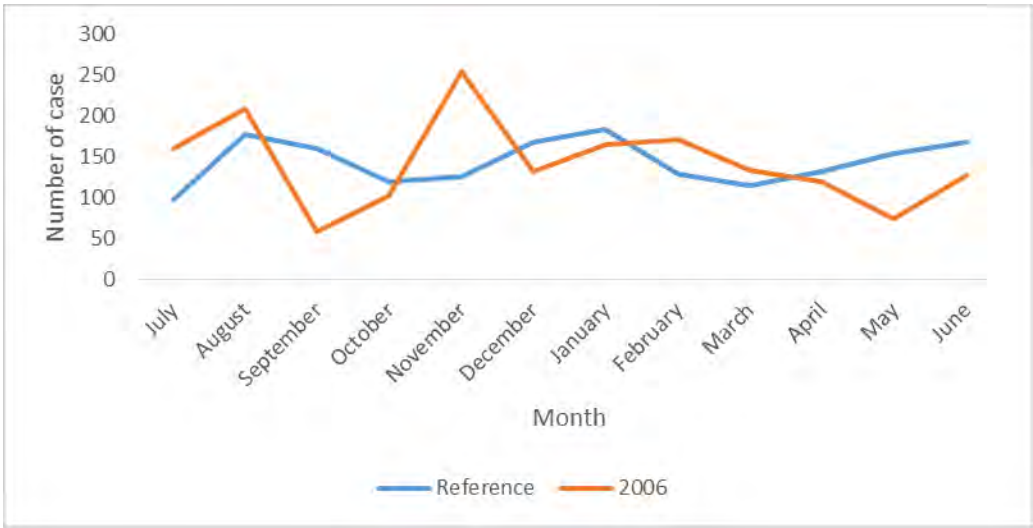

Figure 16: Malaria monitoring chart by month, Damboya Woreda, Kembata-Tembaro zone, SNNPR, 2014

Malaria prevalence. In 2013/2014, Kedida-Gamela district reported malaria prevalence of 43.7 per 1000 population, Kacha-Bira woreda reported the malaria prevalence of 21.5 per 1000 population, and Damboya district reported a malaria prevalence of 17.1 per 1000 population

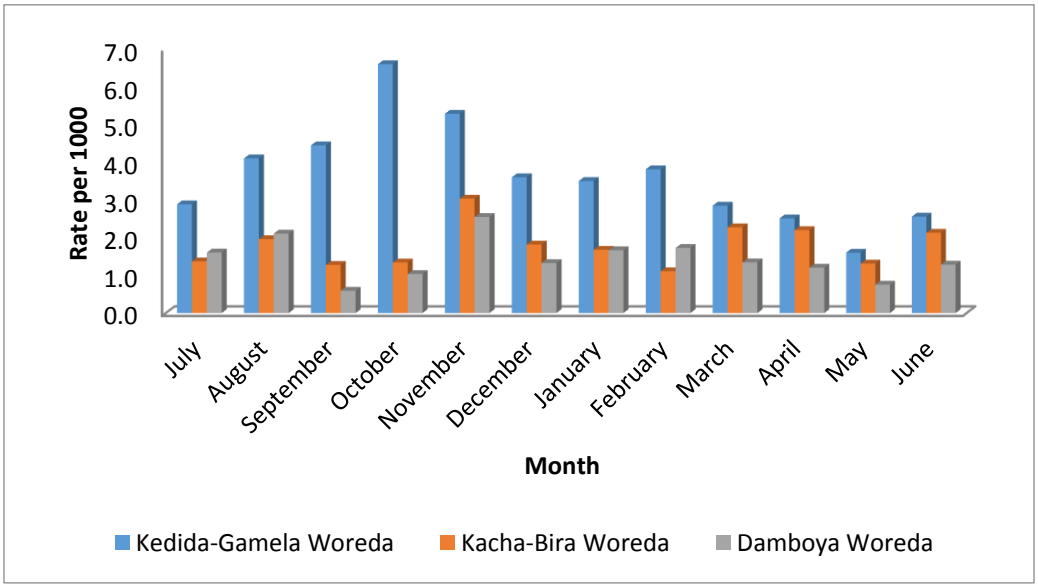

Figure 17: Malaria prevalence by month and Woreda, Kedida-Gamela, Kacha-Bira, and, Damboya, Kembata-Tembaro zone, SNNPR, 2014

3.1.6.2 Core functions of surveillance system

Case detection.

Case detection is the process of identifying cases and outbreaks. For malaria case detection, the WHO malaria standard case definitions was available in 41(100%) evaluated reporting units.

Two types of standard case definition of immediately and weekly reportable diseases/ conditions were posted at all evaluated reporting health units. These were Standard case to be used at health centers and above, which is prepared only in English and a simplified case definition called, a community case definition for immediately and weekly reportable diseases / conditions for health posts and community level, which is prepared both in English and Amharic.

Standard case definition used for malaria at health center and above

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

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

Community case definitions used for malaria at health post and community level

Suspected. Any person with fever OR fever with headache, back pain, chills, vomiting OR

Confirmed. Suspected case confirmed by RDT.

Using these standard case definitions, in 2014 a total of 61,018 (51.4%) suspected fever cases examined by RDT or microscopy, 8,711 (47.7%) confirmed cases, 534 (48.6%), clinical cases, 185 (69.8%) inpatient cases and 1(0.4%) death were reported through surveillance system from evaluated reporting units (n= 37). The proportion was calculated from zonal reported cases.

Case registration

Case registration is the process of recording the cases identified. At health post level, 27 (100%) identified cases were recorded in the family folder. 100% health centers (n=9) and Hospital (n= 1) were using malaria registration book given by regional health bureau for laboratory results, outpatient (OPD) and inpatient (IPD) abstract books for OPD and IPD malaria cases.

Case confirmation

Case/outbreak confirmation refers to the epidemiological and laboratory capacity for confirmation. In the evaluated surveillance units /health facilities (n= 37), cases were confirmed at health post, health center, and Hospital level. 27 (100%) health posts were using RDTs, 9 (100%) health centers were using both RDT and microscopy, Hospital was using only microscopy to confirm malaria cases. In 2006/2014 EFY the evaluated surveillance units confirmed a total of 8,711 malaria cases (4,679 = PF, 4,032 = PV). No outbreak was detected and confirmed through these evaluated reporting units. In the absence of RDT, health posts were referring cases to health center.

Reporting.

Reporting is the process by which surveillance data moves through the surveillance system from the point of generation.

Table 13: Reported malaria cases through surveillance system, Kembata-Tembaro zone, SNNPR, 2014.

Reporting unit	Outpatient Department (OPD)			IPD	
	Tested (RDT/microscopy)	Clinical	Confirmed	case	death
Kacha-Bira	26,452	65	3,028	168	0
Kedida-Gamela	17, 572	38	5,221	0	0
Damboya	10,619	0	1,713	0	0
Durame Hospital	6,375	431	116	17	0
Angacha	11,345	2	2,717	0	0
Hadero-Tunto	12,055	45	2,000	0	0
Durame Town	14,708	390	1,144	0	0
Tembaro	16,175	2	3,013	80	1
Doyogena	3,313	55	647	0	0
Zone	118,614	833	18,262	265	1

Data analysis and interpretation.

Surveillance data should be analyzed routinely and the information interpreted for use in public health actions. No analysis were conducted at health post level. Analysis of surveillance data were expected from health centers and above. But out of the total evaluated surveillance units (health centers, Hospital, woreda health office, and zonal health department), 1/14 (7.1%) of reporting unit analyzed the routine surveillance data and used for public health action.

Epidemic Preparedness.

Epidemic preparedness is the existing level of preparedness for potential epidemics and includes availability of preparedness plans, stockpiling, designation of isolation facilities, setting aside of resources for outbreak response. Out of the total evaluated surveillance units excluding health posts, 6/14 (42.9%) prepared their epidemic plan (1-HC, 3-woreda health office, and zonal department). 27 (100%) health posts established epidemic management committee at kebele level, which was led by Kebele chairman. No written regular minutes were observed at health post level. But they said that "we discussed several times at kebele level the minute book is in kebele manager office". Out of the rest evaluated reporting units, 12/14 (85.7%) units built their rapid response team (9(100%) HC, 2 (66.7%) woreda health office, 1(100%) zonal PHEM, and 0% Zonal hospital). For woreda health office, epidemic management committee was built at woreda administrative office, which was led by woreda chief administrator. 14 (100%) of the evaluated reporting units (HC, WoHO. Zone, and Hospital) had no scheduled regularly meeting time, and the minute was recorded/written irregularly. 3 (100%) woreda health office and zonal health department were established multi-sectorial preparedness and response task force. 3 (100%) woreda health office were supported by external non-governmental partner, called world vision, Ethiopia, which was supporting indoor residual spray program by paying the per diem for training and spraying every year. 3 (100%) woreda health office were allocated budget for emergency response. 9 (100%) health centers, and woreda health office were available motor vehicle for emergency condition.

Response and control

The surveillance system was providing data for public health action. Woreda health office and zonal health department were using this data for response and control activities.

Feedback.

No written feedback was given at all for health development armies at village level. 27 (100%) health posts were providing oral feedbacks to health development army. 13/14 (92.9%) health centers, woreda health office, and zonal health department were giving written feedbacks every quarter. To monitor the given feedbacks at health center level one health workers was assigned. At woreda health office and zonal health department level, one or more officers were assigned to each and every health center and woreda respectively.

3.1.6.3 Supportive function of surveillance system.

Standards and guidelines

Standards, norms and guidelines are necessary for implementing, monitoring and evaluating surveillance and response systems. Out of the visited surveillance units, for 41 (100%) health facilities, woreda health office, and zonal health department, the national guidelines were available and using the standard case definition for priority diseases. 41 (100%) health facilities, woreda health office, and zonal department posted the cases definition for all diseases in the wall. For all health centers, Hospital, woreda health office, and zonal health department the case-based reporting formats were observed in their office. Guidelines for specimen collection, handling and transportation to the next level were available in 8/9 (88.9%) health centers, and 3 (100%) woreda health office, 1 (100%) Hospital and 1 (100%) zonal health department. The line lists for reporting outbreaks were not available in 1/9 (11.1%) of health centers, 100% woreda health office, Hospital, and zonal health department.

Training.

Training refers to the needs for capacity building for staff involved with surveillance and response systems through knowledge transfer. Health development armies were trained by health extension worker and one health worker assigned from the satellite health center. 24 (88.9%) of health post extension workers, 10 (100%) of health center and Hospital focal persons, and 6(100%) of PHEM officers at woreda and zonal health department were trained and gave orientation for their working staffs after training. No laboratory professionals were trained on public health surveillance. Out of the total 17 surveillance staff excluding health extension worker 10 (58.8%) got computer skill by themselves. Most skilled were from zonal health department and woreda health office.

Supervision.

Supportive supervision helps to strengthen the capacity of staff and ensure that the right skills are used appropriately, the necessary logistics are in place, and that planned activities are implemented according to schedule. Health posts have no formal supervision plan for development armies. They were giving supportive supervision for health development armies at a time of contact/during home visit. But no supervisory checklist was observed at any health post level. 27 (100%) health post were supervised every quarter by their health center, and woreda health office. 8/9 (88.9%) of health centers were developed supervision plan for health posts. 9 (100%) of health centers conducted supervision for health posts. One health center did conduct the supervision without developing a plan. 8/9 (88.9%) of health centers notified their supervision plan prior to supervision.

The zonal health department supportive supervision schedule for all woredas was observed in their office. The written and phone call plan for supervision was provided prior to supervision for all woreda health office. A minimum of two health centers from each selected woreda were included in one quarter supervision. In similar manner at least two health posts were included from each supervised/selected health center. Five to ten Households from each supervised health posts were observed/supervision conducted in each selected woreda in one quarter. The health centers, woreda health office, and zonal health department were using the standardized checklist given from higher levels. The supportive supervision feedback given at each level was observed at all evaluated surveillance units.

Communication facilities.

In order to support the function of reporting and feedback in any surveillance system, an appropriate and effective medium for communication at each level of surveillance should be defined, instituted and maintained. Health development army (HAD) was providing the routine report from their village by means of hard copy and oral report. Friday was the report day for HDA. Health posts were providing the routine report by two means. One was by using hard copy. The other was by means of their mobile phones. The report day for health post was Monday morning up to mid-day. 27 (100%) Health posts were using mobile phone access. Out of the total health centers, 2/9 (22.2%) were using hard copy, fixed line and mobile phone for routine report. The rest 7/9 (77.8%) were using hard copy, and mobile phone. The report day for health centers was from Monday afternoon to Wednesday mid-day local time. Woreda health

office were using fixed line and mobile phone. Zonal health department and Hospital were using electronic mail, fixed line, mobile phone, fax, and hard copy.

Resources

Surveillance and response activities can only be performed if the required and appropriate financial, human and logistic resources are in place.

Human resources.

27 (100%) health posts, 9 (100%) health centers, 3 (100%) woredas, Hospital and zonal health department were using the expected human resources based on BPR structure.

Logistic resources.

For surveillance system activities, all woreda health office, and zonal health department used technologies that facilitate documentation, analysis, reporting and communication (computer, printer, photocopy machine, telephone, and fax machine). Health posts and health centers were not using any of the technologies.

Budget (financial resources).

In all evaluated woreda the budget were allocated for emergency condition by health centers, Hospital, woreda health office, and zonal health department.

Monitoring and evaluation

Monitoring

At all level (health posts, health centers, and woredas) the health worker were assigned to monitor all planned activities. At health post level one health worker from the catchment health center was assigned to monitor all activities in the kebele and support health extension workers three times per a week. At woreda health offices level at least two focal person was assigned to follow up the whole health center catchment two to three times per a week. The zonal health department was assigned one or two focal person for monitoring and continuous follow up for each woreda two to three times per a week. Malaria monitoring/ norm chart was not used at all evaluated surveillance units.

Evaluation.

All the surveillance units were evaluating their performance on a quarterly base along with other core processes, and NGOs.

Co-ordination

It is necessary to ensure effective coordination between implementers and stakeholders for effective and efficient implementation of surveillance and response systems. 3 (100%) woreda health office and zonal health department were working along with rural development, education office, water office, NGOs like world vision, WHO etc.

3.1.6.4 Surveillance quality

Completeness of reporting sites/surveillance forms

Completeness of reporting sites is the proportion of reporting sites that submitted the surveillance report irrespective of the time when the report was submitted.

Health posts were reported an average of 93.3% completeness of reporting site ranging from 78.9% to 100%. The average completeness of the health center was 97.97%. The percentage completeness of reporting sites of woreda health office, zonal health department and Hospital was 100%.

Timeliness of reporting.

It is the single most important measure of timeliness whether data are submitted in time to begin investigations and implement control measures. No any evaluated surveillance units were prepared measurement for timeliness of any surveillance report.

Usefulness of surveillance system and surveillance data

41 (100%) of respondents were accepted as the surveillance system and its data was helpful to detect cases early on time to permit accurate diagnosis, to estimate the magnitude of morbidity and mortality, permit assessment of the effect of prevention and control program, and estimate research intended to lead to prevention and control.

Simplicity of the system

Simplicity is the structure of the system and the ease of implementation. At all evaluated surveillance units, the cases definition was easy for case detection, the surveillance formats allowed all professionals to fill data, was easy to record and report data on time, allowed

updating data on the formats, the time to fill the format was 5-15 minutes. But confirmation of measles IgM antibody, meningococcal meningitis and AFP/polio was too long (one to two moths).

Acceptability of the system

Acceptability of a system is a reflection of the willingness of the surveillance staff to implement the system, and of the end users to accept and use the data generated through the system. At all evaluated reporting sites all reporting agents accepted and well engaged. Health posts, health centers, woreda health offices, and zonal health department were using the surveillance data for prevention and control. Health professionals were using the standard case definition to identify cases. All reporting units were using the given surveillance reporting formats.

Flexibility of the surveillance system

The surveillance system was easy to add new diseases or to remove an existing one. It was easy for modification of frequency of reporting frequency. Can be operated with other system. There was possibility to incorporate new variable for a diseases or an event.

Sensitivity in surveillance case definition

Malaria cases were identified using the standard case definition in all evaluated reporting units. Malaria monitoring threshold were using to detect malaria outbreaks. Data reported by surveillance system was used for immediate public health action. Temphos spray was applied in evaluated woreda in stagnant water surface by identifying the mosquito larva in water body surface through surveillance.

Stability

Still the system was not interrupted due to lack of resources. In the absence of budget from donor, the government was running all activities along with other integrated services.

Data quality

23 (85.2%) health posts reported incomplete surveillance report. 27 (100%) of them reported clear records to read and understand. 9 (100%) of health centers sent complete and clearly recorded report for woreda health office. 2 (66.7%) of woreda health office sent complete and clear data report to zonal health office.

Representative.

Representativeness is the degree to which the reported cases reflect the occurrence and distribution of all the cases in the population under surveillance. At health post level the surveillance report incorporated the population under surveillance. Non-governmental health facilities were also included in all surveillance reports. But the private health facilities found at kebele, and woreda level were not included in surveillance report. Still people were using private health facilities for malaria and other disease treatment.

3.1.7 Discussion

Public health surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health [1-4]. The recommended WHO case definition for malaria was available and used for malaria case detection at all evaluated surveillance units. Cases were registered in family folder, and registration books at health facility level. Woreda health office were using hard copy of report format for malaria surveillance data storage. Malaria cases were confirmed at all nearest health facility level. Not need to refer malaria case for confirmation to distant health facilities. By using the malaria monitoring chart (figure. 12), malaria outbreak was seen in Kedida-Gamela district between October and December 2013/2014. In similar manner the 2013/2014 malaria case line of the new year crossed the reference line in between October and December, and January and March. This also show that there was malaria outbreak in Damboya woreda. The outbreak “case building " was detected by two woredas without. The prevalence of malaria in 2013/2014 was high in Kedida-Gamela district relative to Kacha-Bira and Damboya districts. Computers and trained personnel were available at woreda health office. But, surveillance data was not entered in to the computer and analyzed by person, place, and time. No surveillance data was interpreted and used for public health action. Epidemic management and rapid response team were established in almost all reporting units. Only one health center (Adilo Hc) used epidemic preparedness plan. No rapid response team was conducted scheduled regular meeting. Standards and guidelines were available in all health facility and office level. The trained staff was working in surveillance system. Supportive supervision was conducted at all level regularly. Written feedback given by higher level was observed at health facility and office level. Communication facilities were accessible at all level. Human, logistic resources (computer technologies), and financial

resources were available at all levels except health centers and health posts. Monitoring and evaluation was conducted at health facilities, and office level. Almost all reporting units met the minimum WHO standard of completeness. Timeliness was not measured at surveillance reporting units. The respondents accepted as the surveillance system and data was useful to detect cases early to permit accurate diagnosis, to estimate the magnitude of morbidity and mortality and so on. Case definition was understood at all levels. Standardized tools were in place (formats, line lists). Reporting formats were easy to fill. Communication channels between all levels were well established. The surveillance system staff was well engaged in surveillance data reporting. Stakeholders were using data for public health action. Case definition was used by surveillance staff. The system was easy for modification of frequency of reporting and can be operated with other system. The formats were possible to incorporate new variables. Malaria surveillance case definition was sensitive and detected cases in different geographic areas. The system was donor dependent (UNICEF, World Vision). Still incomplete data was reported from health posts. As a result at higher level the report completeness will be below the standard. Data from private health facilities were not included in the surveillance reporting [4-5].

3.1.8 Limitation

We could not calculate sensitivity and specificity in terms of case detection. Because we could not get variables required for calculating sensitivity and specificity.

We did not measure the timeliness of the evaluated surveillance units. Because the variable to measure timelines of the system was not available.

3.1.9 Conclusion

The standard case definition was available and used consistently at all levels. Although there were functioning computers, skilled personnel in different surveillance units, the surveillance system was no using the current technologies to store, analyze and interpret data for public health action. Moreover there was inadequate capacity to function even with the existing computer. Epidemic preparedness plan was prepared in a few surveillance units. Epidemic and rapid response team was not conducting scheduled regular meeting. The supportive supervision and its feedback was consistent at all level. Monitoring and evaluation was well established. But the surveillance units were not used malaria monitoring/norm chart for malaria case monitoring. Standards, guide lines, and formats available at all level. There was an access of communication

for surveillance units. Completeness can be calculated from surveillance data for data quality. But it is difficult to calculate timeliness. As a result timely action will not be undertaken. The malaria surveillance system in Kembata-Tembaro zone is useful, complete, easy to implement, acceptable, flexible, stable, but poor quality data, not timely, not representative.

3.1.10 Recommendation

- To capacitate the new surveillance staff, and to refresh/update the existing one training should be facilitated by woreda and zonal health department with the computer technologies,
- Epidemic preparedness plan should be prepared and used by health centers, and woredas to response emergency condition
- Malaria monitoring tool should be prepared and posted on the wall at all surveillance units for easy track of malaria changes.
- To measure timeliness indicators should be prepared by all surveillance units
- All private health facilities should be incorporated in to surveillance reporting units

Reference

1. Thacker SB. Historical development. In: Teutsch SM, C.R., eds. , *Principles and practice of public health surveillance,* NY: Oxford University Press, : New York, 2000.
2. Buehler JW. Surveillance. In: Rothman KJ, G.S., *Modern epidemiology,* PA: Lippencott-Raven,: Philadelphia,1998.
3. Teutsch SM, T.S. and *Planning a public health surveillance system.* , in *Epidemiological Bulletin;* Pan American Health Organization, 1995, p. 1--6.
4. World Health Organization; *communicable disease surveillance and response systems*, 2006.
5. CDC, *Updated guidelines for evaluating public health surveillance systems* July 27, 2001. p. (1-35).
6. *Public health emergency management guidelines for Ethiopia*, 2012.
7. http//www.cdc.gov/malaria_worldwide/impact.html *World health organization's world malaria report*, 2013.
8. http//www.unicef.org/health/index_malaria.html, M.H.U.a.a.
9. Ethiopia Malaria Operational Plan, 2014
10. Malaria Guideline in Ethiopia, 2012; 3rd edition.
11. http//www.who.int/malaria/areas/surveillance/overview/en/

Chapter IV – Health Profile Description Report

4.1 Health Profile Description of Kedida-Gamela Woreda

Executive Summary. Health profile is a system of collecting and organizing or summarizing health and others health related events to describe health and others health related conditions. Public health surveillance officials used identified and prioritized information as a basis for planning, implementation and evaluation of public health surveillance program conducting at community level. We conducted a rapid assessment from March 10-17/2013 to describe health profile in Kedida-Gamela district. The size of the population was 106,174 with male to female ratio of 0.9 to 1.We used standard checklist to collect data from woreda health office, education office, water office, rural development, finance and economic development, and revenue authority. Informed consent was obtained from the district health office, then the other district office was communicated by health office for smooth co-operation. We used interview, discussion, and observation to review data with office heads, and experts. Micro Soft excel 2013 is used to compile and analyze data. Out of 34 schools sixteen (47.1%) schools have access to water. All schools (100%) have latrines. Fifty percent health centers and none of the health posts have access to water supply. 3(75%) health centers and three health posts (16.7%) have access to electricity. The annual administrative coverage of the CAR, ANC, skilled delivery, PNC, polio-3 and penta-3 and measles was 78.6%, 84%, 24.2%, 114%, 106.6% and 104.6% respectively. The annual TB detection rate was 32% against the district target (70%). But the cure rate and success rate was 95%, and 98% respectively. In TB treatment zero death and defaulter rate was reported in the district in the year. Malaria is the top cause of morbidity in both adults and children. Malaria outbreak was occurred for the last two years. Out of 39, 249 tested people for HIV, (with a male to female ratio of 1 to 1.3), 2 males and 3-females were test reactive and linked with Durame hospital ART clinic. The severe acute malnutrition was worsening from 2011-2013. We recommended the effective use of malaria prevention and control measure, screening patients with cough of 2or more week's duration, and early screening of malnutrion at community level by health posts and health centers, and treating severely malnourished children in health posts and health centers to reduce the identified priority problems.

4.1.1 Introduction

Kembata-Tembaro is one of 15-zones and 4-special woreda in South, Nations, Nationalities, and peoples region (SNNPR). Kedida-Gamela district is one of seven districts found in Kembata-Tembaro zone. The district is found at zonal town, Durame. Administratively the district comprised of 18- Kebeles. Health profile description is the collection, organizing or summarizing of health and health related data to assess effectiveness of a policy, programs or project in terms of its potential effects on the health of a population and the distribution of those effects within the population. In epidemiologic point of view, it is crucial to prioritizes health and others health related condition prevailing in the community. Knowing the Health profile of a specific area helps a Public Health official to prioritize resource allocation and take appropriate Public Health actions effectively and efficiently.

4.1.2 Purpose

Health profile description helps to determine the effectiveness of policies, programs and projects to improve the health and social services of a given population by assessing the existing health service coverage, the developmental activities, social services, major health problems, risk factors and indicates areas that needs attention or focus to improve the health status of the specifically identified community or population. Moreover the health profile of the district has not yet been done in the area. So this rapid assessment was designed to describe the health profile of Kedida-Gamela district.

4.1.3 Objectives

4.1.3.1 General objective

- To assess the health profile of Kedida-Gamela district, Kembata-Tembaro Zone, SNNPR, 2014

4.1.3.2 Specific

- To describe health indicators and health related issue of the district.
- To determine the trend of primary health component.
- To identify problems for priority setting.

4.1.4 Method

Study setting. We conducted a rapid assessment in Kedida-Gamela district. The total population of the district was 106,174.

4.1.4.1 Study period. We conducted the rapid assessment in Kedida-Gamela district from March 10-17/2014, Kembata-Tembaro zone, SNNPR.

4.1.4.2 Sample size determination. We used only Kedida-Gamela district. In the district for data collection, we included woreda health office, education office, water office, rural development, finance and economic development, and revenue authority.

4.1.4.3 Sampling technique. Because of the absence of vehicle in afield base, the nearest district, Kedida-Gamela was selected.

4.1.4.4 Data collection. *We used standardized checklist to collect secondary data from different office.* Data available in health office, education office, agriculture office, finance office, revenue authority branch were collected using a standard checklist by reviewing secondary data, observation, and interview of key informants in the relevant sectors of the district with office heads and experts.

4.1.4.5 Data analysis and presentation. We used Microsoft excel to compile the data, to calculate, frequency, ratio, proportion, and rate. We also used the Microsoft excel office to construct figures and tables.

4.1.5 Ethical issue. Official permission was obtained from the regional public health emergency core process to Kembata-Tembaro. Cooperation letter was written to Kedida-Gamela district health office, then the district notified to the selected woreda office through phone calling.

4.1.6 Result

Climatic condition. The district has an annual rainfall of 4000mm-1,450 mm with annual temperature of 24°c -26°c.

Political administration. Administratively there are seventeen rural and one urban Kebele in the district. Holegeba-Zato Kebele is the furthest Kebele in the woreda, which is 30km away from the woreda center. Zato-Shodera the nearest Kebele in the woreda, which is 2.5 km from the

woreda center. Garame-Ambericho and Langute-Chafe Kebeles have no road access in the district.

Boundary. The boundaries of the district are Damboya district in North, Kacha-Bira district in South, Halaba special woreda in East, Misrak-Badewacho district in West, and Angacha district in Northwest.

Table 14: Population and population structure of Kedida-Gamela district, Kembata-Tembaro zone, SNNPR, 2013.

Item	Number	percent
Total population	106,174	100
Male population	51,026	48.1
Female population	55, 148	51.9
Urban population	5,484	5.2
Rural population	100,690	94.8
Total households	21,668	
Under one years	3,426	3.26
Under three years	8,823	8.31
Under five years	16,563	15.6
Under fifteen years	51,792	48.78
Women of child bearing age	24,738	23.3
Pregnant women	3,822	3.6

Ethnicity and religion.

The ethnic groups in the district were Kembata, Hadiya, Halaba, and Wolayta. Kembata is the dominant ethnic group in the area. The official language in the district was Amharic. The religious groups in the district are protestant, orthodox, Muslim, catholic and others.

Economy. The source of income in the district was agriculture, and trade. Agriculture was the major source for income. The economic level in the district assumed that it was classified as high, medium, and low based on size of farmland. The residents who have more than four

hectare farmland (0.7%) are categorized as high tax payers, those who have 1.5-4 hectare (16%) categorized as medium tax payers and those who have less than 1.5 hectare (83.3%) categorized as low tax payers. was 2.9%.

Budget. The district allocated the operational and workers salary budget. The budget showed 10% increment from the previous year. Out of the total budget 20,000 (0.51%) was allocated for emergency condition in the district, especially for indoor residual spray.

Education. There were a total of 33governmental and one non-governmental schools in the district. In 2005/2013 a total of 21,212 students were enrolled in education Program. Among the total students 11, 677 (55.1%) were males, and 9,535 (44.9%) were females. 20,800 (98.1%) students were enrolled in primary level (1-8), 343 (1.6%) students were enrolled in secondary schools (9-10), and 69 (0.3%) students were enrolled in preparatory schools (11-12). Out of students enrolled in primary school 11,447 (55%) were male students and 9,353 (45%) were female students. Out of students enrolled in secondary and preparatory schools230 (55.8%) were male students, and 182 (44.2%) were female students.

13 (72.2%) Kebeles each accessed with two schools, 5 (27.8%) Kebeles each accessed with one school. Out of the total schools in the district 16 (47.1%) schools have had access to safe water supply, whereas the rest 18 (52.9%) schools have not had access to safe water supply. All schools have had latrine and mobile telecommunication access in the district. But schools with access to electricity was 6 (17.7%). 18(82.3%) of schools were no access for electricity. 4 (11.8%) of schools were no road access. 30 (88.2%) schools have had road access.

HIV-AIDS club, sport club, environmental health club, eye health care club, gender council club and others were non-educational activities in the schools. . The main task of each club was training of students in each mentioned activity based on their schedule. At time of the study all clubs were functional. Almost all districts have had access to mobile telecommunication.

Health.

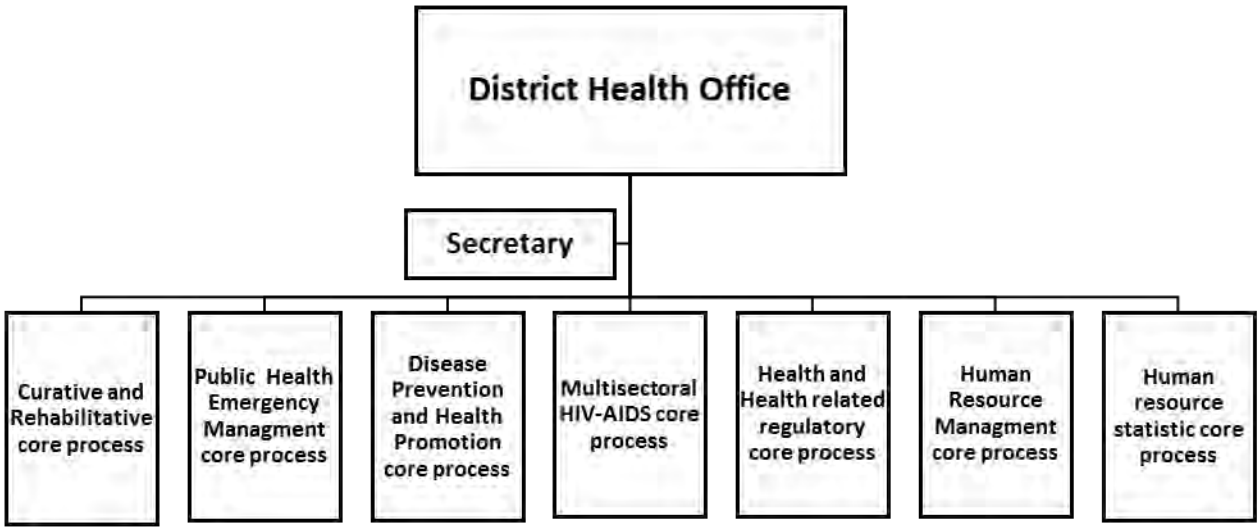

Figure 18: Organization structure of Kedida-Gamela health district system, Kembata-Tembaro zone, SNNPR, 2013.

There were a total of 24 governmental and private health facilities in the district. These were 4-health centers, 18-health posts, one rural drug vender, and one diagnostic laboratory. The health center to population ratio was 4.2 whereas the health post to population ratio was 21.2. All health centers have had access to road and mobile telecommunication. Three of them (75%) have had access to electricity. Two of them (50%) have had access to water supply. All health posts have had access to mobile telecommunication and transportation for motor cycle, but around 50% of them have had access to transportation for car. 3(16.7%) health posts have had access to electricity. None of the health posts have had access to water supply.

Disaster status in the district. There were no history of any disaster in the district in 2013.

Vital statistics and indicators. In 2013 the contraceptive acceptance rate, the antenatal care coverage, the postnatal care coverage, was 78.6%, 84%, 114% respectively. The immunization coverage for polio-3, penta-3, and measles was 100. The coverage of skilled delivery attended by health worker between 2011 and 2013 was 3%, 6%, and 24.2%. But the annual target was 40% up to mid-year, then 60% annually.

Based on business process re-engineering structure, health officers were 81.3%, clinical nurses, laboratories, druggists, and environmental health workers each profession was 100%, mid-wife nurses were 7 (58.3%), rural health extension workers were 94.8%, urban health extension workers were 100% with 57% other supportive staff. Health center to population ratio was 93% and health post to population ratio was 94.3%. The health service coverage of the district was 94%.

Table 15: Top ten causes of morbidity in adults, Kedida-Gamela district, Kembata-Tembaro zone, SNNPR, 2013.

Cause of morbidity	Proportion (%)
Malaria	46.4
Typhoid fever	22.94
Acute febrile illness (AFI)	6.45
Upper respiratory infection (URTI)	6.4
Pneumonia	4.2
Trauma	2.01
Intestinal parasite	2
Urinary tract infection (UTI)	1.5
Dental and gum disease	0.68
Diarrhea	0.65
Others	6.7

Table 16: Top five morbidity causes in children Kedida-Gamela district, Kembata-Tembaro zone, SNNPR, 2013

Cause of morbidity	Proportion (%)
Malaria	57.4
Pneumonia	15.5
Upper respiratory tract infection	8.8
Acute febrile illness	4.4
Intestinal parasites	3.86
Others	10

There were no admission cases and deaths recorded in all health facilities.

Community health service.

"The total community health services have implementing by the lead of health extension workers. The district has signed the agreement with traditional birth attendants/TBAs/ not to attend birth at home from mid-year of 2012. Some of TBAs who violate the agreement were attending birth partially at home. The home delivery for the year 2012 and 2013 was 684 (32.8%), and 326 (15.6%) respectively. Formerly the community health agents /CHW/ or promoters or innovators, currently health development army were assisting the health extension workers by training their village residents about health extension Program, transferring information from HEWs to villages and vice versa. Other health workers and supportive staff in the health facilities and woreda office were actively participating and performing their plan based on action plan designed" said, woreda health vice head. There was no supportive document to prove that the activities were done as mentioned by woreda health office vice head.

Status of primary health care components.

Environmental health.

The district has declared all the Kebeles from defecating everywhere in the field. The latrine access between 2011 and 2013 was 98%, 100%, and 100%. The utilization rate in similar period was 97%, 100%, and 100%. All schools and health facilities were accessed with VIP latrines. The community were using common pit latrine. To sustain or maintain this activity, the district was implementing the maintenance of latrine and community sensitization in each and every Kebeles. Malaria prevention activities and health education were implementing in the district. There was no written document to prove that these activities have done as mentioned here.

Malaria

10 (55.6%) of the district kebeles (Holegeba-Zato, Adilo, Hamido, Odame, Gesh-Golla, Langute-Chafe, Sheshera, Bezena-Benare, Aze-Deboo, and Zato-Shodera) were known identified ten top malarious Kebeles sequentially based on the incidence of malaria in the district. In previous years malaria was known epidemic disease in the district.

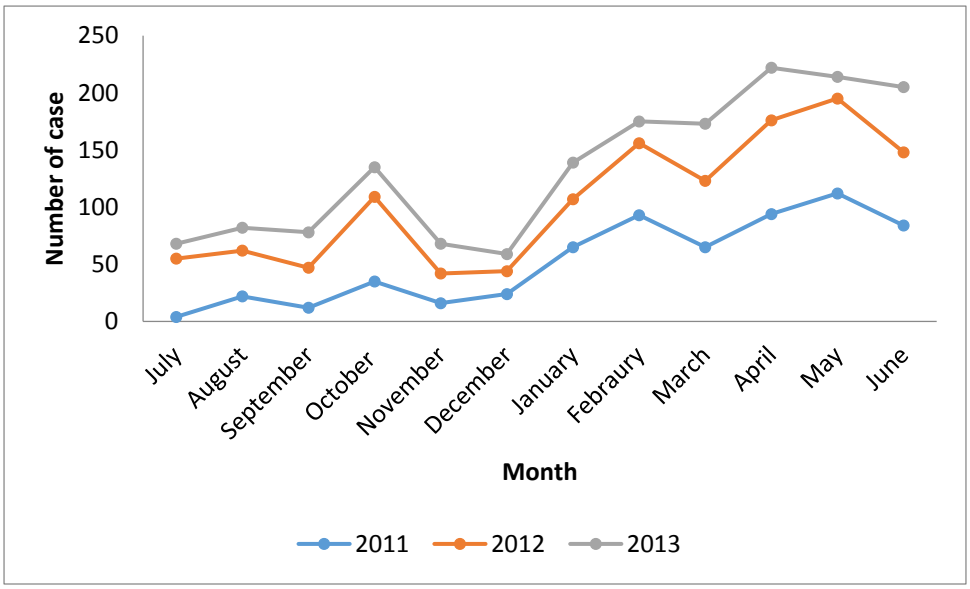

Figure 19: Trend of confirmed malaria cases, Kedida-Gamela district, Kembata-Tembaro, SNNPR, 2011-2013.

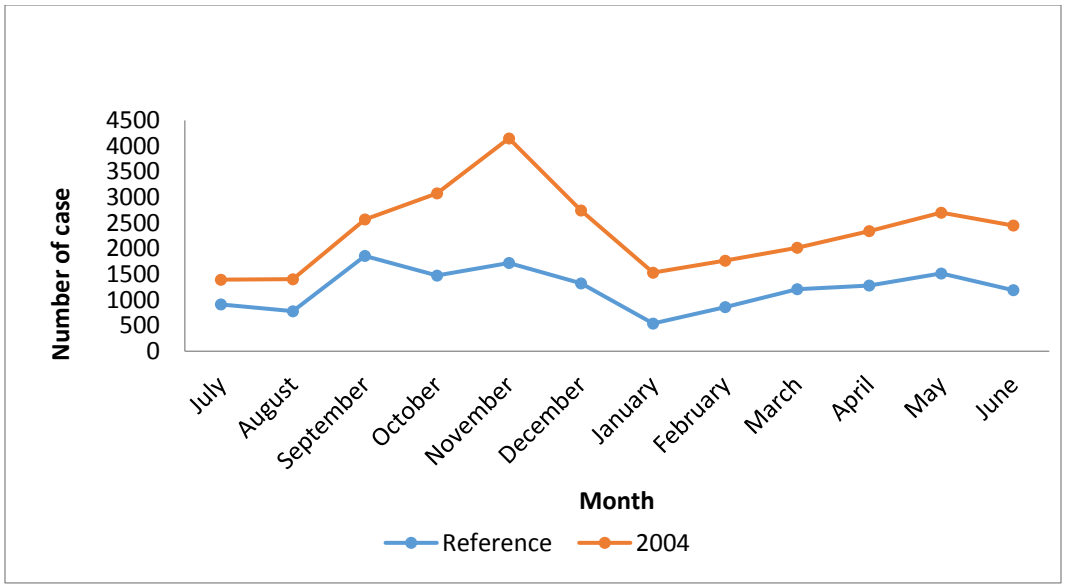

Figure 20: Malaria monitoring chart using 2011 as a reference in Kedida-Gamela district, Kembata-Tembaro zone, SNNPR

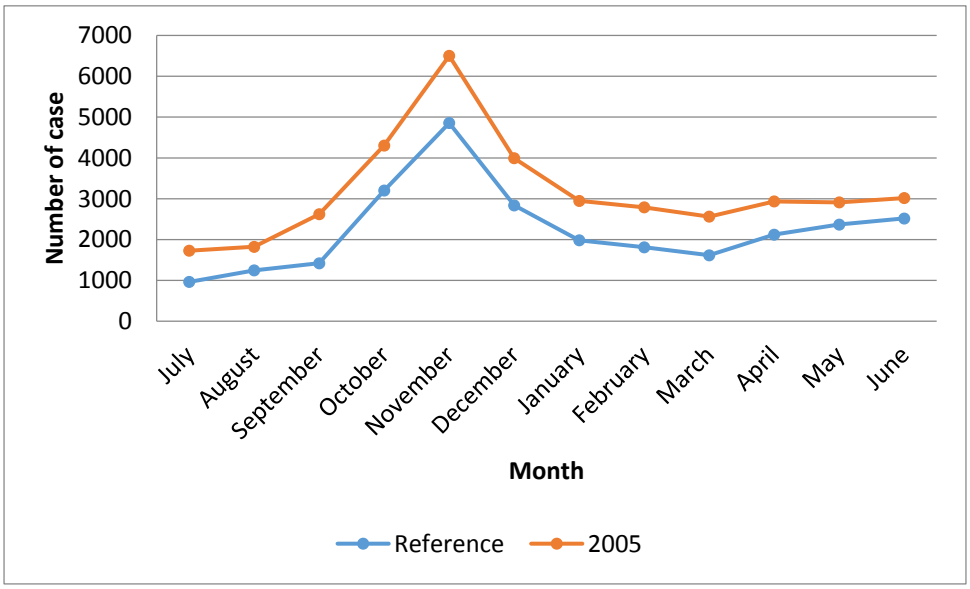

Figure 21: Malaria monitoring chart using 2012 as a reference in Kedida-Gamela district, Kembata-Tembaro zone, SNNPR

Indoor residual spray. List of chemicals used since the start of indoor residual spray were DDT, Deltha-methrine, Propoxture, and bindocarb. DDT used for more than 8 years, Deltha-methrine used for two years, Propoxture for one year, Abet chemical (Temphos) for focal spray, and bindocarb for one year. The major source of malaria transmission were the presence of stagnant water in nine (90%) of the ten prevalent Kebeles in the district.

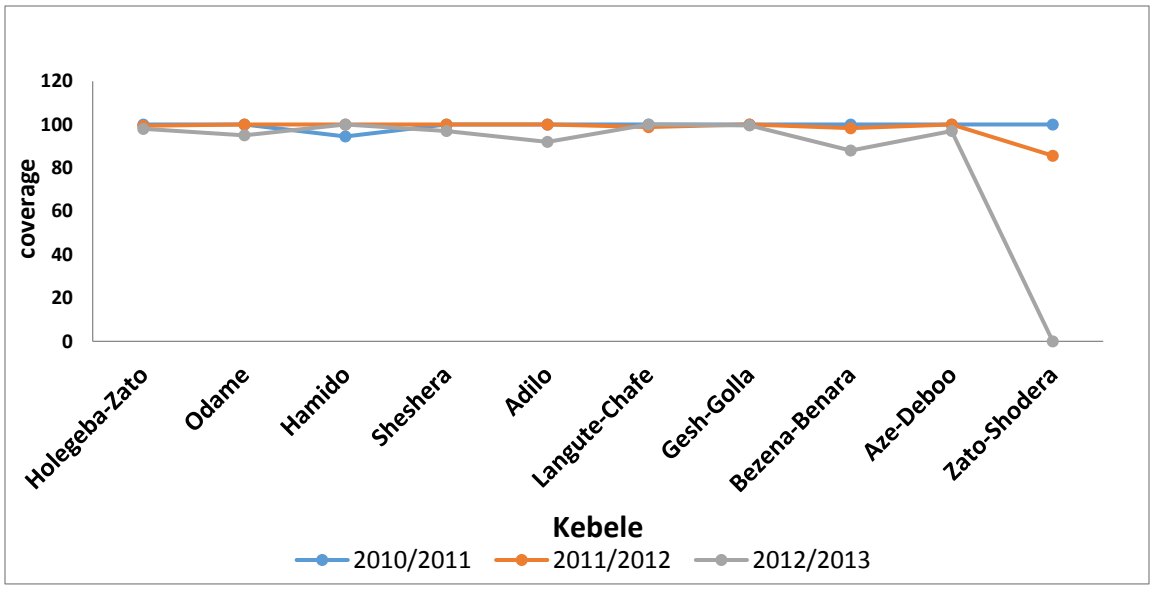

Figure 22: Trend of Indoor residual spray coverage, Kedida-Gamela district, Kembata-Tembaro zone, SNNPR, 2011-2013

Long Lasting Insecticide Nets (LLINs). The LLINs coverage for the last three cosequative years (2012-2014) was 100%. But the utilization rate in the same three cosequative years was 91%, 89% and 93%.

Tuberculosis and Leprosy. There were 88 tuberculosis cases in the district. Out of these, 46(52.3%) were pulmonary positive, 24(27.3%) were pulmonary negative and 18(20.4%) were extra-pulmonary cases. The district TB detection rate was 32%. The annual district target was 70%. TB cure rate and success rate was 95%, and 98% respectively. There was no TB defaulter and death cases registered in the district. All TB patients (100%) were screened for HIV/AIDS. There were no leprosy cases in the district.

HIV/AIDS. A total of 39, 24 people were tested for HIV/AIDS. Out of the total screened 1,760 (850 males and 910 females) people were tested in outpatient department (PIHCT), 33,008 (16,564 males and 16,444 females) were tested in VCT, and 4,481 tested were PMTCT. Among tested individuals 2-males and 1-female in PIHCT and VCT, and 2-females were positive in PMTCT program. The incidence rate of HIV was 0.013% in 2013 E.C. There were no ART clinic in the district. All test reactive patients are linked to Durame Hospital (nearest ART clinic).

Malnutrition. Severe acute malnutrition rate per 1000 population was decreasing from 2011 to 2013. It was high in between August to November and March to May in each and every year.

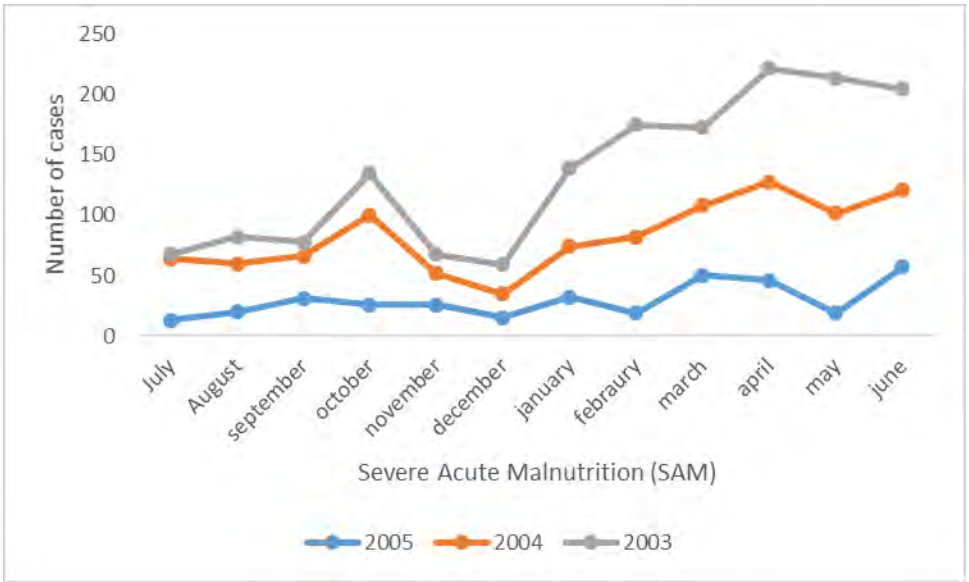

Figure 23: Trend of severe malnutrition cases Kedida-Gamela district, Kembata-Tembaro, SNNPR 2011-2013

4.1.7 Discussion.

Despite the presence of high coverage of indoor residual spray and long lasting insecticide treated nets, still malaria was the top cause of morbidity in both adults and children. This description was similar with the health profile description conducted in different areas(1-4). Moreover, malaria outbreak was occurred for the last two years (2011and 2013) (1). The assumption behind the increment of malaria case number was due to the presence of stagnant water in the community and the other may be due to poor management of malaria prevention and

control measures. There was low TB detection rate in the district, against the woreda and zonal target line and similar in health profile description conducted in different areas(5). In similar manner, the skilled delivery did not meet the annual target of the woreda as well as the zone (1-2). Although the severe acute malnutrition was decreasing from year to year (2011-2013), still it was one of the public health problem in the district (1).

4.1.8 Limitation

Shortage of time to conduct the health profile rather than office level.

Absence of long term year data at visited area to describe the trend.

4.1.9 Conclusion.

Malaria, and severe acute malnutrition (SAM) was the identified priority problem in the district followed by low performance of skilled delivery service and TB detection rate. Malaria was the major health problem in Kedida-Gamela district both in adults and children.

4.1.10 Recommendation.

Effective use of malaria prevention and control measure to reduce malaria incidence should be focused by the community, health posts, health center and woreda health office.

Screening of patients with cough of two or more weeks duration by health development armies, health posts and health centers.

Refreshment training of HEWs by woredas, zones, NGOs and, TBAs, and health development armies by HEWs and health centers to increase delivery service.

Early screening of children in CBN Program by health extension workers.

Regular supportive supervision for health posts by Health centers and district health office, woreda health office by zone.

Reference.

1. Kedida-Gamela Woreda Health Office annual report. 2013.
2. Desalegn D, Fikire I, Health Profile description of Misrak Badewacho Woreda, Hadiya zone. 2012.
3. Daniel T, Merawi A, Jemal H. Health Profile description of Shebedino Woreda , Sidama zone. 2013.
4. Million T, Adamu A, Luce R. Health Profile description of Sidama zone. 2012.
5. Nigatu T, Desalegn D, Boulanger L. Health profile Description of Sodo Woreda Gurage zone. 2014.
6. Kedida-Gamela Woreda Education office annual report, 2013
7. Kedida-Gamela Woreda Finance and economic Development Office annual report, 2013
8. Kedida-Gamela Woreda Revenue Authority Office annual report, 2013

Chapter V – Scientific Manuscripts for Peer reviewed Journals

5.1 Measles outbreak investigation in Halaba Special Woreda, South, Nations, Nationalities, and Peoples Region, 2014.

Authors: Tessema T.Burye [1], H.Taame[2], D. Dalecha [3], Y. Mogessie [4]

Address: EFTP, School of Public health, Addis Ababa University, 2- Ethiopian Public Health Institute, Addis Ababa, 3 EFTP, School of Public health, Addis Ababa University, 4- EFTP, School of Public health, Addis Ababa University.

Name of EFETP: Ethiopian Field Epidemiology Training Program.

E-mail tessema2002@gmail.com, Tell +251 926 45 44 45/0912 165 468

Title: Measles outbreak investigation in Halaba Special Woreda, South Nation Nationalities and People Region, Ethiopia 2014.

Key words. Measles, Outbreak, case-control study.

Abstract

Background. Measles is a highly infectious viral disease that can cause permanent disabilities and death. We investigated measles outbreak to identify the magnitude and factors associated with measles in Halaba special woreda.

Methods. We conducted a 1:3 unmatched case control study. We used the WHO case definition. A control was any person residing in the same community not having a history of measles during the same period. We used Mid Upper Arm Circumference (MUAC) to measure the nutritional status of case and control. Epi-Info and MS excel was used to calculate frequencies, ratio, rate, and odds ratios. We used advanced statistics in Epi-Info to calculate multivariate analysis. Case observation was made and medical registration books of health facilities were assessed and suspected cases were identified.

Result. We identified a total of 46 measles case including confirmed cases with zero death rate. Fourteen (30.4%) were not vaccinated, 37 (80.4%) were admitted, 13 (28.3%) of them developed eye infection. A total of 140 subjects made of 35 cases and 105 controls were recruited in a case-control study. Twenty seven (57.1%) cases and 65(61.9%) controls were males. The attack rate in infants was 85.3/100,000 population. Thirty (85.7%) of cases and 10(9.5%) of controls were unvaccinated. In multivariate analysis, being vaccinated with measles (OR=0.0312, 95% CI,

0.0111-0.0878), Knowing the right age for measles (OR= 0.2045, 95% CI, 0.0881-0.4748), knowing measles is vaccine preventable diseases (OR = 0.2857, 95% CI, 0.0924-0.8833), and knowing modes of transmission of measles (OR= 0.2727, 95% CI, 0.1229-0.6052) were protective f. Family size >= 5 (OR= 3.833, 95% CI, 1.7099-8.5940), was found to be significant risk factors.

Conclusion. We confirmed outbreak of measles with highest incidence rate in under one children. Unvaccination with measles vaccine, living five and more household members in rooms and Lack of knowledge of mother or caretaker were associated risk factors for occurring measles outbreak. We recommended supplementary measles vaccination for under 15 children, strengthening of routine immunization defaulter tracing, and awareness creation in the community.

5.1.1 Introduction

Measles is a highly infectious viral disease caused by a Morbillivirus, which is a member of the genus Morbillivirus of the Paramyxoviridae family and for which humans are the only reservoirs. Transmission is primarily person-to-person via aerosolized droplets or by direct contact with the nasal and throat secretions of infected persons. In a non-immune person exposed to measles virus, after an incubation period of about 10 to 12 days (range 7-18 days), prodromal symptoms of fever, malaise, cough, coryza (runny nose), and conjunctivitis appear. Within 2 - 4 days of the prodromal symptoms, a rash made up of large, blotchy red spots (maculo-papular rash) appears behind the ears and on the face accompanied with a high fever. The rash spreads to the trunk and extremities and typically lasts 3-7 days. Individuals with measles are infectious 4 days before and 4 days after rash onset (1-5).

Many children experience uncomplicated measles. However, in about a third of the cases, measles is followed by at least one complication caused by disruption of epithelial surfaces and immunosuppression. These include pneumonia, ear and sinus infections, mouth ulcers, persistent diarrhea, and upper airway obstruction from croup (laryngo-tracheo-bronchitis). Less common complications include corneal drying that could progress to ulceration (keratomalacia) and blindness, protein energy malnutrition, convulsions and brain damage. Complications are more common in young children below 5 years of age and complication rates are increased in persons

with immune deficiency disorders, malnutrition, vitamin A deficiency, and inadequate vaccination. Immune-compromised children and adults are at increased risk for severe infections and super infections. Unless managed early and aggressively, these complications may lead to death within the first month after the onset of rash. The case fatality from measles is estimated to be 3 – 5% in developing countries but may reach more than 10% in outbreaks especially when it is compounded by malnutrition.(1, 6, 7)

Globally, measles accounts for more than 30 million cases and 900,000 deaths every year, nearly half of which occur in Africa. Measles is among the top five causes of death in children less than 5 years of age in many African countries. Before the widespread availability of measles vaccine, virtually all children contracted the disease. (2, 5,). Measles vaccination resulted in a 75% drop in measles deaths between 2000 and 2013 worldwide. In 2013, there were 145 700 measles deaths globally – about 400 deaths every day or 16 deaths every hour(8). In Ethiopia, the expected case-fatality rate is between 3% and 6%. The highest case-fatality rate occurs in infants 6 to 11 months of age, with malnourished infants at greatest risk. These rates may underestimate the true lethality of measles because of incomplete reporting of outcomes of measles illness. In certain high-risk populations, case-fatality rates as high as 30% have been reported in infants aged less than 1 year of age. Malnutrition (including vitamin A deficiency), underlying immunodeficiency and lack of access to medical care are all factors leading to the high case-fatality rates observed in many parts of the world. Infants born to mothers who have either had measles or been vaccinated are protected by transplacentally acquired maternal antibodies; that is they have passive immunity. This protection lasts six to nine months on average, after which the child becomes susceptible to measles infection. A person is naturally immune if he or she has had contact with the measles virus and has developed antibodies against it. Persons who have taken measles vaccine and have formed antibodies in response to the vaccine are also immune. Measles vaccines contain live, attenuated virus. In the African Region, it is recommended that the vaccine be administered at 9 months – the age when most children have lost their maternal antibodies. There is virtually no contra-indication to measles vaccination. When correctly administered at 9 months of age, measles vaccine confers life-long protection to approximately 85% of those vaccinated. Childhood immunization programs have led to a dramatic decrease in measles morbidity and mortality. Epidemics of measles occur when the number of susceptible individuals in a population reaches a critical threshold. Outbreaks may occur in pockets of low

coverage, which are likely to occur in certain geographic areas, such as urban slums, remote rural areas or islands, and in certain population groups with habitually low vaccination coverage rates such as ethnic and racial minorities, nomadic peoples, or persons with religious or philosophical objections to immunization. As immunization coverage increases, the size of epidemics decreases. In addition, the inter-epidemic period lengthens, and the proportion of cases among older children increases. Even with high routine measles vaccine coverage (1st opportunity) at nine months of age, susceptible individuals (un-vaccinated children within the community and children who have failed to develop antibodies following immunization since measles vaccine efficacy is only 85% at 9 months of age) will accumulate with time leading to the occurrence of periodic outbreaks. The provision of a second opportunity is necessary to reach children that have never been vaccinated and children not protected after the first dose. In the African Region, this is provided through supplemental immunization activities (SIAs). The second opportunity serves to reduce the proportion of susceptible in a given population. It therefore helps to prevent measles outbreaks and, with high routine immunization coverage, favours the elimination of indigenous measles transmission. Catch-up campaigns (SIAs) to provide second opportunity for measles vaccination need to be organized in such a way as to target the age group in which at least 90% of measles cases are known to occur. In the African setting, this age group has included children aged 9 months to 14 years. After an initial wide age group catch-up supplemental immunization effort, periodic follow-up campaigns (conducted every three or four years) are needed to assure that the number of susceptible children does not build up to a critical level. Follow-up campaigns target children born after the previous catch-up campaign. (2, 5)In Ethiopia outbreaks of measles reported every year. In 2013/2014 nationally, there were 202 measles outbreaks reported with incidence of 1.6 and 1.9 respectively in two consecutive years. Out of these, 31 measles outbreaks have been occurred in South Nations, Nationalities and Peoples region (SNNPR) with incidence rate of 2.3 and 2.5 respectively in the same period.(9)

Halaba Special Woreda is one of the 15 Zones & 4 Special Woredas in SNNPR. The woreda is found 83 km away from regional town, Hawassa. The measles vaccination coverage in 2012, 2013, and 2014 mid-year was 96%, 92%, and 96% respectively. The administrative coverage rate was calculated by dividing the number of vaccinated children for the total eligible (annual targets). Administrative coverage will be overestimated by adding the non-eligible cohorts from bordering areas. The other may be due to inclusion of false report of the administrative report.

The report under estimation may be one, due to missing the report. An investigation of the an outbreak was conducted in Halaba special woreda to determine factors associated with contracting measles in the district as well as to assess the district's preparedness and response to the outbreak.

5.1.2 Rational of the study

We assigned to conduct measles outbreak investigation in Halaba special woreda in order identify the possible risk factor associated with measles outbreak, and identify gaps that need to be addressed to prevent further spread of the disease.

5.1.3 Objectives.

5.1.3.1 General objective

- To investigate measles outbreak in Halaba special woreda, SNNPR, April 7-15/2014

5.1.3.2 Specific objectives

- To describe the magnitude of the outbreak by person, place, and time
- To determine the factors associated with the outbreak
- To search for additional cases

5.1.4 Methods and Materials

5.1.4.1 Study area and Population

This study was conducted in Halaba special woreda, SNNPR with a total population of 305,555. The capital of the woreda is Halaba Kulito. Administratively the Woreda has 5 urban & 79 rural Kebeles. In the Woreda there were 79 HP, 10 HC and one district Hospital.

5.1.4.2 Study design

We conducted a 1:3 unmatched case-control study from 7-15 April 2014. A case was any person who resided in Halaba special woreda and who developed fever, rash (maculo-papular), and or cough, coryza, conjunctivitis (red eyes), or tested IgM positive between 12 January and 15 April 2014. A control was any person who resided in the same community or village with cases in Halaba special woreda but, who did or do not have history of signs and symptoms of measles or tested IgM negative between similar period. Case observation was made and active cases were searched for house to house. Medical registration books of Hospital, health centers and health posts were assessed and suspected cases were identified. Mid Upper Arm Circumference (MUAC) measurement was employed to assess the nutritional status of both cases and controls.

5.1.4.3 Study subjects

Individuals admitted or treated in Halaba district Hospital, in their catchment health centers, health posts and at their home during active cases searching and who are included in the line list, and their controls with the ratio of 1:3 from the community of the Halaba special district has included. Active cases available during the study period of the investigation were included in the study.

5.1.4.4 Sample size determination

The sample size was calculated using Stat calc function of Epi-info version 7.1.4.0 using the confidence level of 95%, power of 80%, and assuming that a 75% controls prevalence of a previous contact with someone with a measles an AOR 9.4 gives a total sample of 140 (35 cases and 105 controls).

5.1.4.5 Sampling procedure

Cases were selected randomly using the lottery method where each name on the line list was allocated a number on pieces of paper which were put in a box and randomly picked and the name corresponding to that number was recruited into the study until the sample size was reached. Controls were neighbours of cases who did not suffer from measles during the study period. Three controls for one case per house hold was selected from the neighbours of cases.

5.1.4.6 Study variables

5.1.4.6.1 Dependent variables

- Case status of an individual

5.1.4.6.2 Independent variables

- Socio-demographic characteristics of mothers/caretakers
    - Educational level
    - Occupational status
    - Marital status
    - Religion
- Age of child
- Sex of child
- residence
- Risk factors
    - Vaccination history

- Travel history
- Contact history
- Family size
- Nutritional status
- Health seeking behavior
- Knowledge of mothers/caretaker

5.1.4.7 Data collection instrument

The questionnaires were developed in English and translated orally in to Halaba language and translated back in to English. The questionnaire included dependent and independent variables listed above.

5.1.4.8 Data collection

Data on immunization history was collected in two ways. One was based on the availability of immunization card and the other was based on mother/caretaker verbal report. After a case/control was identified from the household, mother/caretaker of the case/control was asked for the presence of child's immunization card. For the child with immunization card, the information on the doses and types vaccine received by the child was copied from the card. If immunization card was unavailable for the child, the mother/caretaker was asked for immunization history. The number of doses the child took and how (the route of vaccine administered) the child took the vaccine was the way by which immunization history was asked. Information on other variables was asked directly from the child's mother/caretaker. To determine the nutritional status of the case and control, we measured mid upper arm circumference measurement by using 'MUAC' instrument.

5.1.4.8.1 Training of data collectors

Three data collector nurses from health centers and one supervisor from district health office were received one day training before data collection.

5.1.4.9 Operational definition

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

Suspected measles case at health facility. Any person with fever and Maculopapular (non-vesicular) generalized rash and cough, coryza or conjunctivitis (red eyes) OR any person in whom a clinician suspects measles.

Confirmed 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; i.e., living in the same or in an adjacent district with a laboratory confirmed case where there is a likelihood of transmission; onset of rash of the two cases being within 30 days of each other.

Measles death. A measles death is defined as any death from an illness that occurs in a confirmed case or epidemiologically linked case of measles within one month of the onset of rash. The immediate and delayed complications of measles (like pneumonia, persistent diarrhea) may manifest and lead to death much later after the disappearance of the rash. Measles deaths are usually under-reported.

Suspected measles outbreak. Occurrence of five or more reported suspected measles cases in one month in a defined geographic area such as a Kebeles, health facility catchment area, or woreda.

Confirmed measles outbreak. Occurrence of three or more laboratory confirmed measles cases in one month in a defined geographic area such as a Kebeles, health facility catchment area or woreda.

Unvaccinated. A child who does not receive any dose of measles vaccines

Vaccinated. Child who take at least one dose of the measles vaccines

Coverage by card only. Coverage will be calculated with numerator based only on documented measles dose, excluding from the numerator those vaccinated by history.

Coverage by history. Coverage will be calculated with numerator based on mothers or care taker report only

Knowledge of measles. If mother/care taker have awareness about, mode of transmission of measles diseases, sign and symptoms of measles diseases, prevention of measles diseases, the right age at the child begin, complete measles vaccination at right age considered as knowledgeable.

Vaccination coverage of measles. Proportion of children took measles vaccination

Vaccination status. Being vaccinated or unvaccinated with measles vaccine.

5.1.4.10 Inclusion and exclusion criteria

5.1.4.10.1 Inclusion criteria

Case. A case was any resident of Halaba special woreda who tested and positive for IgM or had sign and symptoms of measles from 12, January to 15, April 2014 and who agreed to participate in the study.

Controls. A control was any resident of Halaba special district during the study who was a neighbor to a case and who did not develop signs and symptoms of measles and agreed to participate in the study.

5.1.4.10.2. Exclusion criteria

Cases and controls: Those who refused to participate in the study during interview were excluded.

5.1.4.11 Data processing and analysis

Data obtained was entered in to Epi-Info version 7.1.4.0 and we used Epi-info and excel for calculating frequency, ratio, proportion, rat, odds ratio. Bi-variate analysis was used to assess the association between dependent and independent variables. We used logistic regression found in advanced statistics in Epi-Info to run multivariate analysis.

5.1.5 Ethical clearance

Permission to carry out the study was obtained from SNNP regional health bureau, then from Halaba special woreda health office. Cooperation letter was written to the respective health facility by woreda health office. An informed oral consent was obtained from all study participants.

5.1.6 Result

5.1.6.1 Descriptive epidemiology

A total of 46 suspected and confirmed measles cases with zero death rate were identified during the investigation in the district. A 12year old male child index case was reported to Halaba district Hospital in 01/16/2014.Ha has no travel history of areas with active measles case. He has no history of vaccination with measles vaccine. Including the index, a total of seventeen specimen were collected and sent to EPHI, of which 14 were IgM positive. Out of the total 46 cases, 37 (80.4%) cases were admitted in Halaba district Hospital. The major cause for

admission reported by health facility were Pneumonia, diarrhoea, and eye infection. 32 (69.6%) were males. The attack rate in under one children was 85 per 100,000 population. The district one measles dose administrative coverage for the EFY of 2012, 2013 and 2014 (mid-year) was 96%, 92%, and 96% respectively.

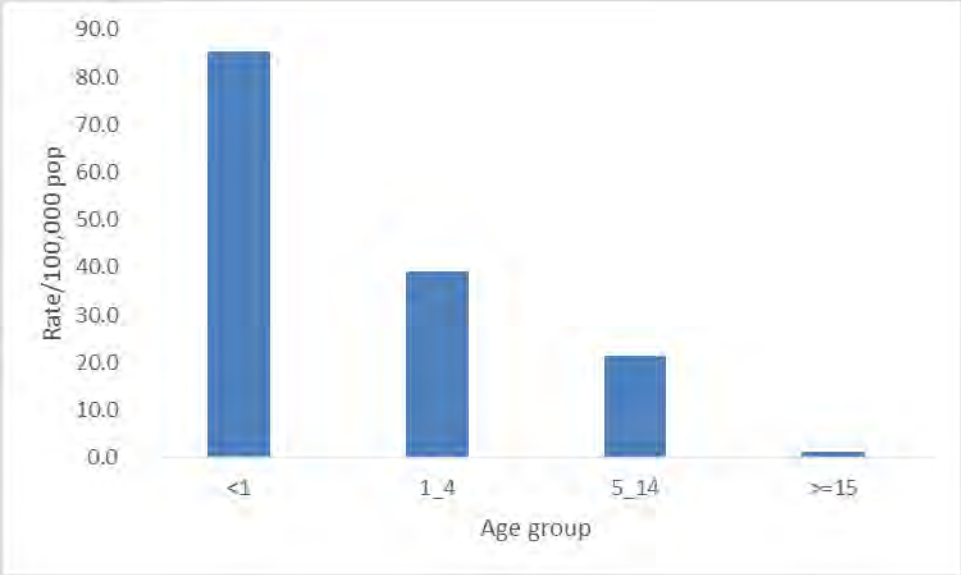

Figure 24: Attack rate of Measles Cases by Age group, Halaba Special Woreda, SNNPR, April, 2014

Among 46 measles cases, 14 (30.4%) measles cases received no measles vaccine, 3 (6.5%) cases received one measles dose, 2 (4.3%) measles cases received two measles doses, 22 (47.8%) measles cases received four measles doses, and 5 (10.9%) measles cases has unknown vaccination history. Out of the total 46 cases, 30 (65.2%) measles cases were reported from the district urban Kebeles, the rest 16 (34.8%) measles cases were from rural Kebeles. The index case was reported in epidemiological week-3. There were no reported measles cases from epidemiological week-4 to epidemiological week-6.

Table 17: Measles cases by month, Halaba special woreda, SNNPR, April, 2014

Month	Cases identified	Sample collected	IgM Pos.	IgM Neg.
Jan	**3**	**3**	**2**	**1**
Feb	**12**	**2**	**2**	**0**
March	**16**	**8**	**7**	**1**
April	**15**	**4**	**3**	**1**
T0tal	**46**	**17**	**14**	**3**

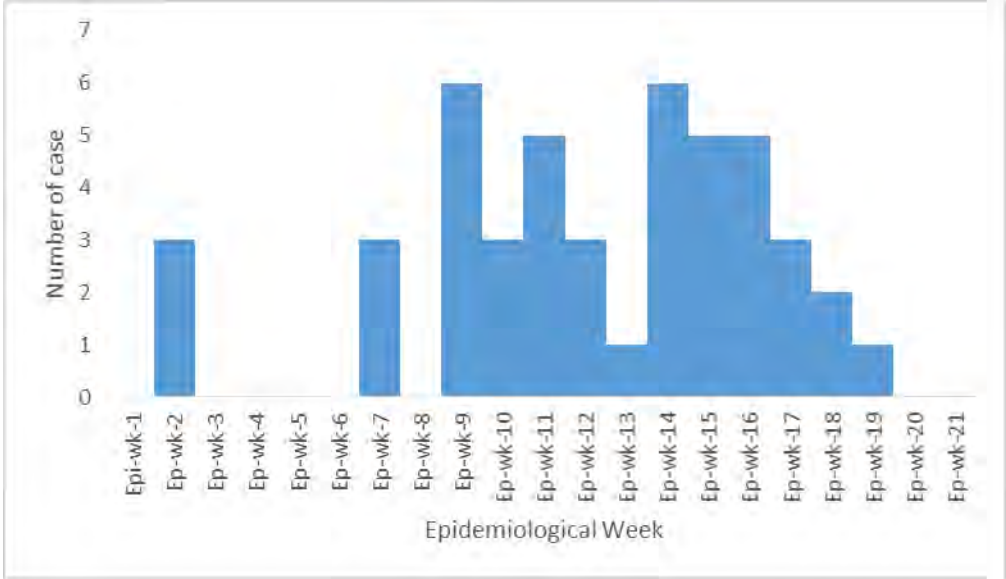

Figure 25: Measles cases by epidemiological weeks, Halaba special woreda, SNNPR, April, 2014

5.1.6.2 Public health action

Active case searching, case management at district Hospital, health centers, and health posts level, and vitamin-A supplementation for < 5 years in affected Kebeles were used to control the outbreak. Community mobilization was conducted to reduce and prevent contact with measles cases. For measles mass vaccination the woreda prepared micro-planning and sent to the regional PHEM. No measles vaccine was provided from the regional level.

5.1.6.3 Case-control study

We conducted a 1: 3 unmatched case-control study with a response rate of 100%. The median age of the cases was 4 years ranging from 4 month to 12 years, while that of controls was also 6 years ranging from 9-month to 11 years. Fifteen (42.9%) cases and forty (38.09%) controls were

females. 34 (97.1%) cases of respondents and 96 (91.4%) controls of respondents were married.13 (37.1%) cases and 42 (40.0%) controls were not attended any education. 30 (85.7%) of cases and 10 (9.5%) controls received no measles vaccine dose. 5(14.3%) cases and 70 (66.7%) controls were received one measles dose. Out of 35 measles cases, 34 (97.1%) cases got treatment, 32 (91.4%) of treated cases were recovered during the study period. The rest 3 (8.57%) cases were getting improvement at the time of study. 34 (97.1%) of cases believed that when they get sick, they will go health facility. one (2.9%) of cases decided to stay at home.32 (91.4%) of cases believed that treatment can reduce measles complications. The rest 3 (8.57%) provided home-made treatment like fluid, tea, and semi sold foods. The mid-upper arm circumference of 34 (97.14%) cases and 105 (100%) of controls were greater than 12 centimeter. For one (2.86%) case the MUAC was 10.5 centimeter.

Table 18: Demographic characteristics of measles cases and controls, Halaba special woreda, SNNPR, April, 2014

Variable	Category	Case n= 35 (%)	Control n= 105 (%)
Sex	Female	15(42.9%	40(38.1%)
	Male	20(57.1%)	65(61.90%)
Marital status	Married	34(97.1%)	96(91.4%)
	Single	1(2.9%)	9(8.6%)
Occupation	Daily laborer	1(2.9%)	2(1.9%)
	Farmer	2(5.7%)	3(2.9%)
	Employed	0(0%)	8(7.6%)
	House wife	19(54.3%)	58(55.2%)
	Merchant	13(37.1%)	31(29.5%)
	Student	0(0%)	3(2.9%)
Level of education	No education	13(37.1%)	42(40%)
	Read and write	2(5.7%)	6(5.7%)
	Primary	16(45.7%)	46(43.8%
	Secondary and above	4(11.4%)	11(10.5%)
Religion	Muslim	15(42.9%)	49(46.7%)
	Orthodox	9(25.7%)	35(33.3%)
	Protestant	11(31.4%)	21(20%)
Family size	>= 5	23(65.7%)	35(33.33%)
	<5	12(34.3%)	70(66.67%)

Table 19: Bivariate analysis of risk factors (cases= 35, controls = 105) for measles, Halaba special woreda, SNNPR, April 2014.

Variable	Response	Case	Control	OR	95% CI
Ever vaccinated for measles	yes	5	95	0.0175	0.0056-0.0554
	no	30	10		
Family size	>= 5	23	35	3.83	1.7098-8.5941
	< 5	12	70		
Do you know modes of transmission of measles?	yes	14	77	0.2452	0.1075-0.5464
	no	21	28		
Do you know the sign and symptoms of measles?	yes	21	88	0.2898	0.1235-0.6952
	no	14	17		
Do you know measles is vaccine preventable?	yes	28	99	0.2424	0.0754-0.7798
	no	7	6		
Do you know the right age for measles vaccination?	yes	18	88	0.2045	0.0881-0.4748
	no	17	17		
How measles disease is prevented?	yes	14	82	0.1897	0.0817-0.4292
	no	21	23		

Table 20: Multivariate analysis of risk factors for measles, Halaba special Woreda, SNNPR, 2014

Variable	AOR	95% CI
Ever vaccinated for measles = yes	0.0312	0.0111-0.0878
Family size >= 5 members	3.833	1.7099-8.5940
Do you know modes of transmission of measles? = yes	0.2727	0.1229-0.6052
Do you know measles is vaccine preventable? = yes	0.2857	0.0924-0.8833
Do you know the right age for measles vaccination? = yes	0.2045	0.0881-0.4748

5.1.7 Discussion

We confirmed outbreak of measles with highest incidence rate in under one children. But, the overall attack rate was less than the study conducted in different areas (10). The three consecutive years of the district one measles dose administrative coverage report of the EFY of 2012, 2013, and the mid-year of 2014 respectively was higher than measles vaccination coverage of the case-control study. Even this was collected by mother or caretaker history, but not by immunization card. According to the cases reported in the line list of the district, around half of the cases were vaccinated with four measles doses before this measles infection. It is very difficult to conclude that any person who vaccinated with 4-measles dose can contract measles diseases. The possible explanation for this could be the children may receive impotent vaccine, the other could be the reported vaccination status may false report (incorrect vaccination history taking during case-investigation). The big difference between the vaccination status of case-control study and the vaccination status filled in the district line list imply that the actual immunization coverage of the district could be low.

In bi-variate analysis, being vaccinated with measles vaccine, family size five and greater than five house hold members, and knowledge of mother or care on measles disease were significantly associated risk factors for measles diseases (Table 3). Being vaccinated for measles was found to be a protective factor from contracting the measles disease. It is consistent with study conducted in different areas(10-12). Children living with a family size of five and more than five household members were more likely to contract measles. (13, 14). Lack of Knowledge of mother or caretaker on measles also was significantly associated with measles outbreak. Children whose mothers don't know about measles vaccination were also found to be more likely to develop measles(15-17).

5.1.8 Conclusion

Unvaccination with measles vaccine, living five and more household members in rooms and Lack of knowledge of mother or caretaker were associated risk factors for occurring measles outbreak.

5.1.9 Recommendation

To control the outbreak and prevent further distribution of the measles disease, we recommended mass vaccination for under 15 years in the district. Moreover the health facilities should develop a plan for community sensitization, awareness creation and defaulter tracing by health extension workers. The woreda health office should facilitate community mobilization conducted by health facilities.

Reference

1. www.en.wikipedia.org/wiki/Measles
2. Africa World Health Oranizationg. Guidelines for Measles Surveillance, December 2004.
3. Edward P RG, David M, Geofrey G, Principles of Medicine in Africa. 2004.
4. Ministry of Health and child Welfare Z. Immunization in practice: A Practical Guide for Health workers, 2007.
5. Federal Democratic Republic of Ministry of Health E. Guideline on Measles Surveillance and Outbreak Management, 2012.
6. Africa WHOROF. Guidelines for Measles Surveillance, December 2004.
7. Federal Democratic Republic of Ministry of Health E. Guideline on Measles Surveillance and Outbreak Management, 2012.
8. http://www.who.int/mediacentre/factsheets/fs286/en/.
9. Public Health Emergency Management, Southern region Emergency Report, 2014.
10. Meaza Tilaye AB. Investigation of Measles Outbreak, Meta Robi District, Ethiopia, 2013.
11. Goitom Mehari ZH, A. Bekelle. Measles Outbreak investigation in Tselemti Woreda, Ethiopia, 2013.
12. NDODE Corlins Ebontane JMESBB-pAOBNAC. Investigation of a Measles Outbreak in the Nkolndongo health District, Yaounde Cameroon, Ethiopia, 2013.
13. BirhanuA.Beressa BKSKBHZHTD. Investigation of Measles outbreak -Abaya, Borena zone, South Eastern Oromia, Ethiopia 2013.
14. Goitom Mehari ZH, A. Bekelle. Measles Outbreak investigation in Tselemti Woreda, North Ethiopia, 2013.
15. Demisse A HZ. Measles Outbreak investigation in Gesha District, Kafa zone, Ethiopia, 2013.
16. Mehari G BA. Measles Outbreak investigation in Shire Zonal Prison, Ethiopia, 2013.
17. P.Nguku FLCAAENWKS. An outbreak of Measles in Kubau Local Government Area, Kaduna State, Nigeria, 2013.

5.2 Acute Flaccid Paralysis in South, Nations, Nationalities, and Peoples Region, Ethiopia, 2014

Abstract

Background. Poliomyelitis is vaccine preventable disease, targeted for eradication worldwide. Globally, since 1988 its annual case incidence has dropped from 350,000 to 223 in 2012. Since August 2013, Ethiopia detected 10 wild polio cases from Somali region. We conducted a seven years acute flaccid paralysis (AFP) surveillance data analysis of South Nation Nationalities and Peoples Region (SNNPR) to describe by person, place, and time

Methods. We reviewed a secondary retrospective AFP Surveillance data in the region from 2007-2013.We used WHO AFP case definition. We took a population of under 15 years in the same period. We analyzed AFP surveillance data to identify the incidence of AFP cases among zones and districts of SNNP region. We categorized the Variables and used Epi-Info™-7.1.3.0 and excel to calculate rates, frequencies, mean, and median.

Result. We identified 1,648 AFP cases with non AFP rate of 2.9/100,000. 716(59%) of cases were males. 1621(98.4%) were under 15 years. The median age was 4 with SD of 3.78 ranging from 1month to 28 years. The incidence rate among 1-4 age group is 11. 318(19.3%) cases received four polio doses with a mean dose of 3.1 $\pm$ SD 1.5. Sheka zone reported non AFP rate of 4.7/100,100. Masha district reported non-AFP rate of 11 per 100,000 respectively. Esera, Gurefereda, and Mereka districts each reported non AFP rate of <1/100,000.

Discussion. There were children who received 1-3 doses, which is below the WHO standard. Even after 3 doses of polio vaccine, those who don't sero-convert accumulate and increase the non-immunized children. Moreover there were silent districts in the region. We recommend multiple polio doses and strengthening surveillance system in order to facilitate polio eradication.

Key words: Acute Flaccid Paralysis, Surveillance, poliomyelitis, Eradication

Words=271

5.2.1 INRODUCTION

The burden of disease in south nations, nationalities peoples region as measured by premature death from all causes, comes primarily from preventable causes is dominated by communicable diseases, reproductive health problems and nutritional deficiencies. The leading causes of morbidity and mortality are mostly attributable to lack of clean drinking water, poor sanitation, and low public awareness of nutrition, environmental health and personal hygiene practices (1). One of the diseases which come or aggravated from the above mentioned risk factors is polio. The distribution of polio has been increased in 2013 as many African regions have reported significant number of cases. Especially countries in the horn of Africa like Somalia, Kenya, South Sudan and Ethiopia were the countries reported Polio outbreaks in 2013. The outbreak in Ethiopia was occurred in Somali region and 10 cases were reported so far. Poliomyelitis is one of the National priority disease followed on a daily base by the public health emergency management system of Ethiopia. More over the country has been implementing the global strategies devised for polio eradication. One of these strategies is active surveillance of acute flaccid paralysis (AFP) cases that helps to report and investigate any case of AFP, irrespective of the etiology or the agent that causes the paralysis. SNNPR is one of an integral part of the country implementing the active surveillance of acute flaccid paralysis strategy for polio eradication. The presence of unimmunized children, hard to reach areas, and poor surveillance system is a challenge for polio eradication(2).

5.2.1.1 Literature Review. Poliomyelitis is fecal-oral transmitted disease. Higher population density and poor sanitation conditions exacerbate transmission and high prevalence of diarrhea leading to more frequent infectious contacts and increase levels of excreted polio virus in the environment. Poliomyelitis is a highly infectious disease caused by wild poliovirus types 1, 2 and 3. Following infection, the virus is shed intermittently in excrement for several weeks with little or no symptoms in majority of cases. The initial symptoms of poliomyelitis include fever, fatigue, headache, vomiting, neck stiffness and pain in the limbs. Less than 1% of the infected persons develop irreversible paralysis. Poliomyelitis mainly affects children less than five years. 5%-10% of those paralyzed by the virus die as a result of breathing complications(3-5). Factors that increase the risk of polio infection or the severity of the disease include immune deficiency(6) , malnutrition(7), physical activity immediately following the onset of

paralysis(8),skeletal muscle injury due to injection of vaccine or therapeutic agents and pregnancy(8).

AFP is caused by many conditions including, Poliomyelitis, Guillain-Barre Syndrome (GBS) and Transverse myelitis. All unimmunized persons are susceptible to poliomyelitis. Epidemiologic evidence shows that infants born to mothers with antibodies are protected naturally against paralytic polio for a few weeks. However, any immunity conferred during the early neonatal period is short lived highlighting the importance of OPV immunization as early as possible in the newborn. Immunity is obtained through infection with the wild virus and/ or through immunization. Immunity following natural infection (including in apparent and mild infections) or a completed series of immunizations with live oral polio vaccine (OPV) results in both humoral and local intestinal cellular responses. Such immunity persists for many years and can serve to block infection with subsequent wild viruses. Vaccination with the inactivated poliovirus vaccine (IPV) confers humoral immunity, but relatively less intestinal immunity; thus, vaccination with IPV does not provide resistance to carriage and spread of wild polio virus in the community. There is no cross- immunity between poliovirus types– immunity is type specific(9).

Still polio is endemic to South Asia and Africa, particularly Pakistan and Nigeria, but rare in western world. After the widespread use of poliovirus vaccine, its incidence declined in many industrialized countries. Polio eradication remains one of the top priorities for WHO in the African Region. Its eradication began in 1988 with the Global Polio Eradication Initiative (GPEI). At that time, polio paralyzed nearly 1000 children every day. It is estimated that for every reported case, there are 200 asymptomatic carriers. As a result of many efforts, wild poliovirus cases have decreased by more than 99%. As of 2013, polio remains endemic in only three countries: Nigeria, Pakistan, and Afghanistan; but after 4 year effort to eradicate polio in Ethiopia, nine active polio cases detected in August 2013 from Somali region of Warder Zone, which is duo to importation.

Immunization of children against vaccine preventable is essential to reducing infant and child morbidity and mortality. Differences in vaccination coverage among subgroups useful for planning purpose, resource allocation for priority areas, monitoring and evaluation of immunization programs(10).

The polio vaccine coverage for children age 12-23months who received polio-0, 1, 2, 3, and not vaccinated children at national level (N=1877)was 17.4%, 74.3%, 64.6%, 44.7%, and 34.9% respectively whereas SNNPR, (N=408) polio-0, 1, 2 3, and not vaccinated children were 21.0%, 75.3%, 66.6%, 50.2% and 21.7% respectively (12). Percentage of children age 12-23 who received polio-0, 1, 2, 3, and not vaccinated polio at national level (N=1930) was19.7%, 80.9%, 67.4%, 43.1%, and 16.0% while percentage of children received polio-0, 1, 2, 3, and not vaccinated was 18.8%. 85.6%, 74.7%, 46.9%, and 11.6% respectively (10)

The national Penta-1 and penta-3 coverage was 80% and 65.7% respectively whereas the SNNPR penta-1 and penta-3 coverage was 85%, and 79.3% respectively (14).Even after 3-doses of trivalent OPV, there is a wide variation in the percentage of children seroconverting with rates of 73%, 90%, and 70% for type 1, 2,and 3 respectively. Due to this multiple dose of polio is necessary more than 90% of children to develop immune response. However there is no guarantee that it would not be detected in the other regions of the country. Active surveillance of acute flaccid paralysis (AFP) cases is one of the strategies devised to eradicate polio. The goal of good AFP surveillance is to report and investigate any case of AFP, irrespective of the etiology or the agent that causes the paralysis. Poliomyelitis is one of the National priority disease followed on a daily base by the public health emergency management system of Ethiopia. SNNPR is one of the risk regions of Ethiopia as there are many hard to reach and silent areas in the region.

Ongoing analysis of surveillance data is important for detecting outbreaks and unexpected increases or decreases in disease occurrence, monitoring disease trends, and evaluating the effectiveness of disease control programs and policies. Analyses should be performed at regular intervals to identify changes in disease reporting(11, 12).

5.2.2 Purpose

After the widespread use of polio eradication strategy in different regions of Ethiopia, a wild polio virus (WPV) is detected in Somali regions of Ethiopia due to importation. Moreover AFP surveillance data in SNNPR has not analyzed. There is no guarantee that the wild polio virus would not be detected in SNNP region. In order to tackle this problem early and facilitate polio eradication end game regular analysis of AFP surveillance data is crucial. Surveillance data analysis is important to see the burden of disease, efficiency and effectiveness of systems and interventions, identifying gaps and challenges, devising possible solutions and corrective

measures. Thus this surveillance data analysis will help to determine the magnitude of acute flaccid paralysis detected by surveillance system, characterize the epidemiology of AFP cases, immunization activities and to suggest corrective measures and solutions so as to achieve the polio eradication goal in SNNPR.

5.2.3 Objectives

5.2.3.1 General objective. To analyze surveillance data of AFP in south nations, nationalities and peoples region from 2007 to 2013.

5.2.3.2 Specific

- To describe AFP cases by person, place, and time in the region.
- To identify the incidence of AFP cases among zones and districts of SNNP region
- To propose correction measures to strengthen AFP surveillance in the region

5.2.4 Materials and Method

5.2.4.1 Study design and period

We conducted a retrospective secondary surveillance data analysis from 2007-2013.

5.2.4.2 Study population

We used population of under 15 years of age in the region with in same period as study population.

5.2.4.3 Data collection and analysis

During our study we have tried to see different source of data. Finally in consultation with the Regional PHEM head, mentors and WHO staff, we have decided to review surveillance data from the Public Health Emergency management surveillance data base and WHO AFP/Polio line list data. However the regional AFP/polio surveillance data base had limited number of variables. The available variables in the polio data base were number of cases and deaths by reporting zones and special Woreda, and reporting time only. The WHO data base had more variables than the PHEM surveillance data. More over the data source was obtained from the National polio referral laboratory through WHO surveillance unit and thus it was more reliable and complete compared to the PHEM data. So that considering these advantages we used seven years (2007-2013) WHO AFP surveillance datafrom14-zones, and 8- special Woredas from

2007-2010 which later on the number of zone and special Woredas were changed to 15- and 4respectively. Data captured and analysis was done using Microsoft Office Excel 2013 and EpiInfo™7.1.3.0. The data was described by person, place and time. A retrospective secondary epidemiological and laboratory surveillance data of AFP reported from mentioned zones and special woredas of SNNPR during 2007-2013 was reviewed and descrbed by person,place and time.

*5.2.4.4 Findings **dissemination*** Written report, both hard and soft copies, will be prepared and shared to Addis Ababa University, School of Public Health, Ethiopian Field Epidemiology Training Program Resident coordinators, mentors, advisors, PHEM/ SNNPR Regional Health Bureau, and other concern body.

5.2.4.5 Inclusion criteria. All AFP reported cases and deaths from 2007 – 2013 in SNNPR

5.2.4.6 Exclusion criteria. All cases and deaths reported by all zones and special Woredas to SNNPR RHB before 2007and after 2013.

5.2.5 Operational definition

- Acute flaccid paralysis is defined as sudden onset of weakness and floppiness in any part of the body in a child < 15 years of age or paralysis in a person of any age in whom a clinician suspects a polio.
- Polio-0 is a polio vaccine given at birth
- Low polio dose is a polio vaccine (dose) given less than four times during childhood
- An importation event is defined as the detection of >1 polio cases that occur in a country as a result of WPV transmission that genetic analysis shows to have originated in another country.
- An outbreak associated with an importation event is defined as >2 polio cases caused by WPV related to the imported WPV.

5.2.6 Ethical clearance

A protocol for the AFP/polio surveillance data analysis was developed and submitted to the regional PHEM FETP field supervisor for approval. After permission was obtained from the field bases, we communicated with south region technical team for data sharing as the regional

health bureau. PHEM data base had no AFP line list and the database contains only aggregated cases and deaths.

5.2.7 Result

5.2.7.1 by person. We identified a total of 1,648 AFP cases reported from 2007-2013.Out of the total cases, 1621 (98.4%) AFP cases were under 15 years old and 9 AFP cases were age greater than 15 years old, and the rest 18 AFP cases were missed variables. The median age of the cases is 4with SD of ±3.78 ranging from one month to 14.8years respectively.

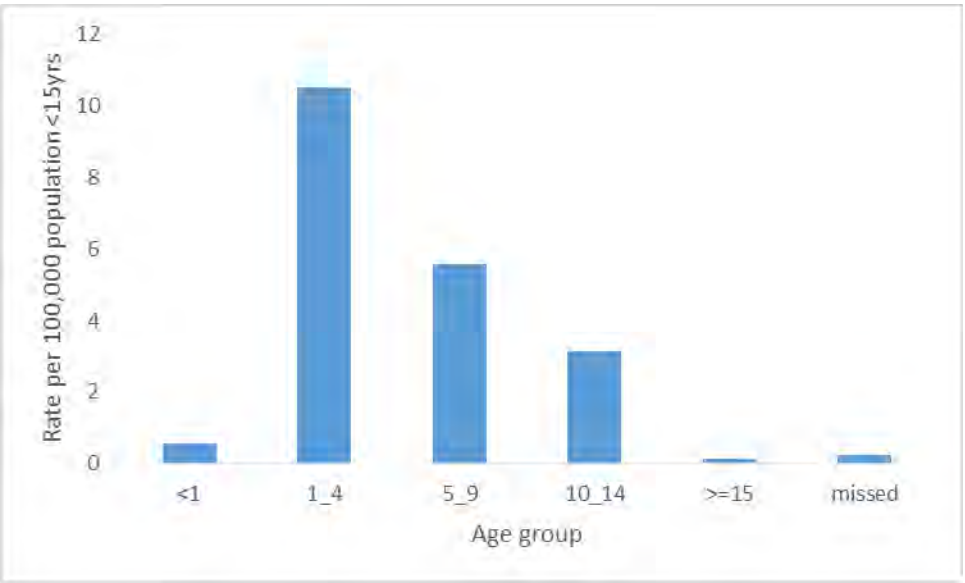

Figure 26: Acute Flaccid Paralysis cases by age group SNNPR, Ethiopia, 2007-2013.

The incidence rate of AFP cases among infants was one per 100,000. Of the total 1648 reported AFP cases, 141(8.6%) cases received zero polio doses, 80(4.9%) cases received one polio dose, 147(8.9%) cases received two polio dose, 530(32.2%), cases received three polio doses, 318(19.3%) case received four polio doses, 188(11.4%) cases received five polio doses , 32(1.9% cases received six polio doses, 16(1.0%) cases received seven polio doses, 3(0.2%) cases received eight polio doses, 5(0.3%) cases received nine polio doses, 1(0.1%) cases received fifteen doses, 3(0.2%) cases are misses variables and 184(11.2%) cases have unknown vaccination history. Out of the total 1204, 59% were males.

Of the total 1648 reported AFP cases, 986(59.8%) cases developed fever at onset of paralysis, 181(6.4%) cases did not develop fever at onset of paralysis, 480(29%) AFP cases were missed variables and only 1(0.1%) AFP case was unknown history of fever at onset. 22(1.3%) cases

affected their limbs asymmetrically, 60(3.6%) AFP cases affected their limbs symmetrically, and 133(8.1%) AFP cases affected their all limbs, 10(0.6%) cases affected their 3-limbs, and 24 (1.5%) cases affected only their one limb, and 897 (54.4%) AFP cases were missed variables. Out the total 149 follow up conducted cases, 49(32.9%) AFP cases developed residual paralysis, 87(58.4%) improved their initial paralysis, 8(5.4%) cases lost to follow up, and 3(3.4%) died before follow up. Out of 1648 reported AFP cases, there was no confirmed case for the last seven years. Out of the total cases 40(2.4%) were suspected polio virus, 1212(73.5%) were negative for polio cases, 121(7.3%) were NPENT, and 275(16.7%) were missed variables

5.2.7.2 by Place.

Table 21: Expected AFP cases by zones and special woredas, SNNPR, 2007-2013

Zone/ special woreda	2007	2008	2009	2010	2011	2012	2013	TOTAL
Alaba	1	2	2	2	2	2	2	13
Amaro	1	2	2	2	2			9
Hawa town administration	1	2	2	2	2	3	3	15
Basketo	0	0	0	0	0	1	1	2
Bench maji	2	4	4	6	6	5	6	33
Burji	0	0	0	0	0			0
Dawro	2	4	4	5	5	5	5	30
Derashe	1	2	2	2	2			9
Gamogofa	8	16	16	18	18	19	19	114
Gedeo	4	8	8	9	9	9	9	56
Guraghe	8	16	16	13	13	15	16	97
Hadiya	7	14	14	12	12	13	13	85
Kefa	4	8	8	9	10	9	9	57
Kembata tembaro	4	8	8	8	8	7	7	50
Konso	1	2	2	2	2			9
Konta	0	0	0	0	0	1	1	2
South omo	2	4	4	6	6	7	7	36
Segen						9	9	18
Sheka	1	2	2	2	2	1	1	11
Sidama	14	28	28	30	30	33	33	196
Silti	4	8	8	8	8	9	9	54
Wolayta	8	16	16	16	16	15	15	102
Yem	0	0	0	0	0	1	1	2
Total	73	146	146	152	153	164	166	1000

Table 22: Reported AFP cases by zones and special Woredas, SNNPR, 2007-2013

Zone/special woreda	2007	2008	2009	2010	2011	2012	2013	Total
ALABA	6	4	2	2	4	3	2	23
AMARO	4	4	2	2	2			14
AWASSA CA	3	2	1	3	3	4	3	19
BASKETO		3	1			1		5
BENCH MAJI	9	8	5	10	15	9	3	59
BURJI	2	1	2	1	1			7
DAWRO	6	8	6	7	8	9	13	57
DERASHE	4	3	2	2	3			14
GAMO GOFA	19	25	21	32	26	37	27	187
GEDEO	10	12	12	11	10	15	16	86
GURAGHE	19	24	26	21	26	33	27	176
HADIYA	16	17	19	16	17	20	17	122
KEFA	10	10	11	15	21	13	15	95
KEMBATA/TEMBARO	13	12	11	10	12	12	8	78
KONSO	4	3	2	5	5			19
KONTA		1	2	1		1	2	7
S OMO	4	8	5	10	9	15	10	61
Segen						10	11	21
SHEKA	2	4	9	12	2	5	1	35
SIDAMA	39	34	28	34	41	52	45	273
SILTI	20	12	10	20	13	16	18	109
WOLAYTA	25	26	17	28	21	33	27	177
YEM	1			1	1		1	4
Grand Total	216	221	194	243	240	288	246	1648

Table 23: Incidence rate per 100,000 population of AFP cases by zones and special Woreda and by age group, SNNPR, 2007-2013

Zone/SP.wor	Age group					
	<1years	1_4years	5_9years	10_14yrs	>=15yrs	misses
Alaba	0.0	10.7	6.6	0.8	0.8	0.0
Amaro	0.0	9.0	6.4	2.6	0.0	0.0
Hawassa t	1.5	2.9	5.9	3.7	0.0	0.0
Basketo	0.0	13.5	3.4	0.0	0.0	0.0
Ben. Maji	0.0	7.8	3.8	5.2	0.0	0.3
Burji	0.0	16.9	3.4	3.4	0.0	0.0
Dawro	1.2	10.2	8.6	2.3	0.0	0.0
Derashe	0.0	13.4	4.0	1.3	0.0	0.0
G.Gofa	1.1	11.8	6.5	2.8	0.1	0.2
Gedeo	0.2	10.9	4.8	2.4	0.0	0.4
Guraghe	1.0	13.2	6.3	5.1	0.3	0.4
Hadiya	0.2	9.2	7.1	1.8	0.2	0.5
Kefa	0.9	8.9	5.9	4.8	0.3	0.0
Kt	0.8	11.2	7.6	1.7	0.0	0.3
Konso	0.0	8.1	6.5	0.8	0.0	0.0
Konta	0.0	6.3	2.1	4.2	0.0	2.1
S omo	0.7	10.3	5.0	4.3	0.0	0.0
Segen	0.0	3.4	1.5	1.5	0.0	0.0
Sheka	1.9	12.5	11.5	6.7	1.0	0.0
Sidama	0.5	9.2	4.8	3.2	0.0	0.1
Silte	0.0	18.6	5.9	2.5	0.3	0.5
Wolayta	0.5	13.0	4.8	3.5	0.1	0.3
Yem	0.0	7.1	2.4	0.0	0.0	0.0
Grand total	0.7	10.5	5.6	3.2	0.2	0.3

The incidence rate in Silte zone (18.6%), Burji woreda (16.9%), Basketo special woreda (13.5%), Derashe district (13.4%), Gurage zone (13.2%), and Wolayta zone was (13.0%) respectively. In between 2007 and 2013 SNNPR the region has achieved the non AFP rate of 100% in most zones.

Table 24: Non-AFP rate by zones and special Woreda, SNNPR, 2007-2013

Zone	Expected	Reported	Non-AFP rate
ALABA	13	22	2.6
AMARO	9	14	3.6
AWASSA CA	15	19	2.0
BASKETO	2	5	2.4
BENCH MAJI	33	58	2.4
BURJI	0	7	4.7
DAWRO	30	57	3.2
DERASHE	9	14	3.8
GAMO GOFA	114	184	3.2
GEDEO	56	84	2.6
GURAGHE	97	171	3.7
HADIYA	85	119	2.6
KEFA	57	94	2.9
KEMBATA-TEMBARO	50	76	3.0
KONSO	9	19	3.1
KONTA	2	6	1.8
S OMO	36	61	2.9
Segen	18	21	3.2
SHEKA	11	34	4.7
SIDAMA	196	272	2.5
SILTI	54	106	3.9
WOLAYTA	102	174	3.1
YEM	2	4	1.4
SNNPR	1000	1621	2.8

Non-AFP rate by Woreda.

Benchi-Maji zone Woredas

Bero district reported 8.9/100,000 population, which was the highest rate in the zone, Majidistrict reported 6.5/100,000, Bench District reported 6.1/100,000, Mizan-Aman town reported 3.2/100,000, She-Bench District reported 2.6/100,000, Surma district reported 2.2/100,000, Debub-Bench district reported 1.8/100,000, Semen-Bench district reported 1.3/100,000, Menit-Goldia district reported 1.2/100.000, Sheko District reported 1.1/100,000 and Gurafereda district reported 0.8/100,000.

Dewuro zone Woredas. Tocha and Lomma woreda reported each non-AFP rate of around 1/100,000 under 15 year's population. The rest district reported the non-AFP rate below 1/100,000 population, which was below the standard.

Gamo-Gofa zone Woredas. Merab-Abaya district reported 7.3, Kucha reported 4.7, Arbaminich-Zuria Woreda reported 4.3, Chencha reported 3.9, Oyida reported 3.3, Uba-Dedretsehay reported 3.2, and Kamba, Deramala, and Melokoza districts reported the non-AFP rate of 1.9, 1.7, and 0.9 per 100,000 population respectively.

Gedeo zone Woredas.

The highest non-AFP rate is reported from Bulle district, which is 4.9/100,000. Wonago woreda reported 4.0/100,000, Kochore woreda reported 2.7/100,000, Dillazuria reported 2.5, Dilla town reported 2.3 and Gedeb woreda reported 1.9/100,000.

Sheka zone Woredas. Masha woreda reported 11.3/100,000, Yeki woreda reported 4.5/100,000, and Andracha woreda reported 2.3/100,000.

Guraghe zone Woredas. Wolkite town reported 7.6, Mareko district reported 7.3, Butajira town reported 6.6, Endaghane Woreda reported 6.1, Mihurina-Aklil reported 5.0, Sodo reported 4.5, Cheha reported 4.2, Mesken woreda reported 3.4, Enamorna-Ener woreda reported 2.9, Abeshege district reported 2.7, Kabena woreda reported 1.6, and Kokir-Gedebano Woreda reported 1.2/100,000 population.

Kembata-Tembaro zone Woredas. Kedida-Gamela district reported is 6.4, Kacha-Bira district reported 3.3, Tembaro district reported 3.3, Hadero-Tuntozuria district reported 2.5, Damboya district reported 2.3, Doyogena district reported 1.7, Angacha district reported 1.6, and Durame town reported 1.1/100,000 under 15 years population.

Hadiya zone Woredas. Misrak-Badewacho woreda reported 6.2, Merab-Badewacho woreda reported 3.3, Lemo woreda reported 3.0, Hossana town reported 2.7, Anilemo and Misha woredas each reported 2.6, Gomboraworeda reported 1.8/100,000 population, Shashogo woredas reported 2.1, Duna and Soro woredas each reported 1.7/100,000 population.

Kefa zone Woredas. Bitta woreda reported 8.1/100,000, Adiyo district reported 6.7, Gesha woreda reported 3.9, Gewata woreda reported 3.0, Chena woreda reported 2.9, Cheta woreda reporte 2.5, Decha woreda reported 2.3, Gimbo woreda reported 1.8, Bonga town reported 1.3, and Tello woreda reported 0.9/100,000 under 15 years population.

South-Omo zone Woredas. The highest rate was reported from Ngangatom woreda, which is 6.2/100,000 population.

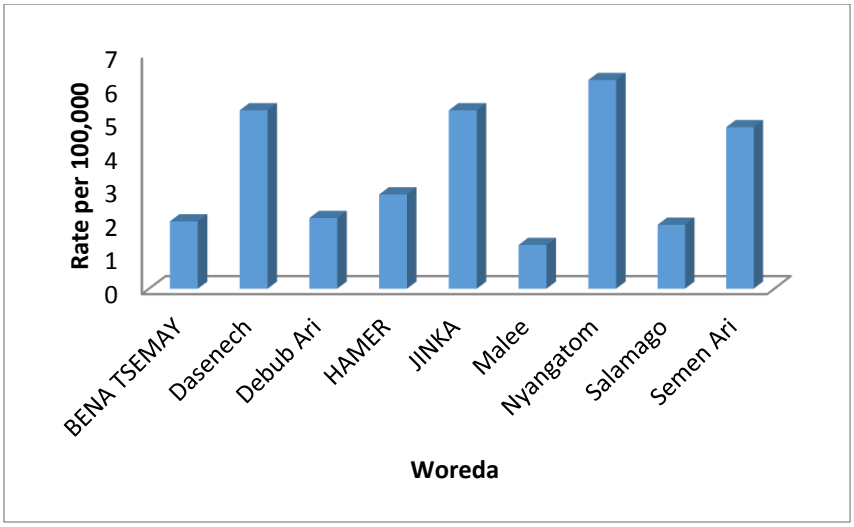

Figure 27: Non-AFP cases by woreda, South-Omo, SNNPR, 2007-2013

Sidama zone Woredas. Dale woreda reported the non AFP rate of 6.1/100,000, Alete-Chuko reported 5.4, Loko-Abaya reported 4.4, Hawassa zuria reported 3.3, Boricha woreda reported 3.0, Bensa and Dara woredas reported each 2.4, and Alete-Chuko and Bona zuria woreda

reported each 2.1/100,000 under 15 years population. The rest 10 woredas reported below 2/100,000 population.

Silte zone Woredas. Out of the woredas, Dalecha woreda reported 7.6, Lanfro woreda reported 6.6, Silti woreda reported 4.4, Alechoworero and Merab-Azernet woreda reported each 2.7, Sankura woreda reported 2.3, Misrak-Azernet woreda reported 2.2, and Hulbareg woreda reported 1.0.

Hawassa town administration. The non-AFP rate of Hawassa town administration for the last seven years (2007-2013) was 2.0/100,000, 15years population.

Wolayta zone Woredas. Zonally the non-AFP rate was 3.2/100,000 population in the region. Sodo zura woreda reported 4.8, Offa reported 4.7, Doguno-Fango woreda reported 4.3, Hombo wpreda reported 4.1, Damot-Gale woreda reported 3.9, Kindo-Koysha woreda reported 3.5, Damot-Pulasa reported 3.3, Bolosso-Sore woreda reported 2.9, Kindo-Didaye reported 2.8, Damote woyde reported 2.6, Sodo town reported 2.5, Areke town reported 1.9, and Damot sore reported 1.3 per 100,000 under 15 years population.

Segen zone. The non-AFP rate of Segen zone in between 2012and 2013 was 3.2/100,000 under 15 years population.

Special Woredas. Burji woreda reported 4.4, Amaro woreda reported 3.5, Konso and Derashe woredas each reported 3.3, Basketo reported 2.4, Konta Special woreda reported 2.1, and Yem Special woreda reported 1.4/100,000 population.

By residence. Out of the total 1648 reported AFP cases, 1597 (96.9%) were reported from rural Kebeles, the rest 51(3.1%) cases reported from urban areas. From the total reported urban AFP cases the highest rate 9 (17.6%) was reported from Wolayta zone, 7 (13.7%) cases each reported from Gedeo and Hadiya zone respectively, and 6 (11.8%) cases reported from Gamo-Gofa zone.

By reporting institution. All AFP cases were investigated in government and private health institution. No one of AFP case was reported from Holly water site. 1043(63.3%) reported from the health center, 242(14.7%) reported from Hospitals, 29(1.8%) reported from Private clinics, 12(0.7%) reported from health office, 52(3.2%) reported from health office and 270(16.4%) were missed variables.

5.2.7.3 Time.

The region reported the highest incidence rate in 2012.

Figure 28: Trend of non-AFP rate, SNNPR, 2007-2013

Table 25: Non-AFP rate by year and zone/special Woreda, SNNNPR, 2007-2013

Zone	2007	2008	2009	2010	2011	2012	2013	Total
ALABA	5.4	3.5	1.7	1.7	3.2	1.6	1.5	2.6
AMARO	5.6	5.4	2.6	2.6	2.5			3.7
AWASSA CA	2.4	1.6	0.8	2.2	2.2	2.8	2.0	2.0
BASKETO	0.0	10.7	3.5	0.0	0.0	3.2	0.0	2.5
BENCH MAJI	2.9	2.5	1.5	2.9	4.2	2.5	0.8	2.5
BURJI	7.4	3.6	7.0	3.4	3.3			4.9
DAWRO	2.5	3.3	2.4	2.7	3.0	3.3	4.7	3.2
DERASHE	5.9	4.3	2.8	2.7				3.9
GAMO GOFA	2.5	2.9	2.6	3.7	3.0	4.2	3.0	3.1
GEDEO	2.4	2.3	2.7	2.4	2.1	3.1	3.2	2.6
GURAGHE	2.9	3.2	4.0	3.1	3.8	4.7	3.7	3.6
HADIYA	2.5	2.4	3.0	2.5	2.5	2.9	2.4	2.6
KEFA	2.1	2.3	2.5	3.3	4.4	2.7	3.0	2.9
KT	4.0	3.6	3.2	2.8	3.0	2.9	2.1	3.1
KONSO	3.6	2.6	1.7	4.1	4.0	3.2	0.0	3.2
KONTA	0.0	0.0	4.3	2.1	0.0	2.0	3.8	1.7
S OMO	1.4	2.8	1.7	3.3	2.9	4.7	3.0	2.8
Segen						3.1	3.3	3.2
SHEKA	2.1	3.1	8.9	11.5	1.9	4.5	0.9	4.7
SIDAMA	2.7	2.3	1.9	2.2	2.6	3.2	2.7	2.5
Silte	5.3	3.0	2.6	5.1	3.2	3.6	4.2	3.9
WOLAYTA	3.3	3.3	2.2	3.4	2.6	3.9	3.1	3.1
YEM	2.6	0.0	0.0	2.4	2.3	0.0	2.2	1.4
Grand Total	2.9	2.8	2.5	3.1	2.9	3.4	2.9	2.9

Duration of case investigation following notification. Out of the total 1648 AFP cases 1085 (65.8%) cases investigated less than or equal to two days following notification, 38 (2.3%) cases investigated greater than or equal to 3 days, for 88 (5.3%) AFP cases date of investigation preceded date of notification. Between 2007 and 2008the date of notification for 437 (26.5%) AFP cases had been missed.

Interval between first and second stool collection. Between 2009 and 2013, 1228 (74.5%) cases of stool collected within 24-48hrs interval. In 2007 and 2008 for 420 (25.5%) date of first stool collected is missed.

Stool arrival. Out of the total 1648 AFP cases 1182(71.2%) cases of stool specimen arrived less than or equal to three days duration, 27(1.6%) cases of AFP stool specimen arrived between 4 and 11 days duration, for 439(26.6%) the date received at national lab is not filled (missed variables).

Days between onset of paralysis and second stool collection. For 1138 (69%) of AFP cases the duration is less than or equal to 14 days, for 70 (4.2%) of AFP cases the duration is greater than 15 days, and for 440 (26.7%) of AFP cases days between date of onset of paralysis is not field.

Figure 29: AFP cases by month, SNNPR, 2007-2013.

5.2.8 Discussion.

We identified a total of 1648 AFP cases in the region from 2007-2013. The most affected age group was 1_4 followed by the age group of 5_9 and 10_14 respectively. Sheka zone was (4.7/100,000) the most affected area among zones. Out of regional districts, Masha district was (11.3/100,000) the most affected one, whereas Burji special woreda was (4.7/100,000) the most affected woreda among special woredas. There were 18-districts and 2-special woredas in the region which have reported the non-AFP rate below the WHO standards (<2/100,000) which needs a great attention. Regionally the highest incidence (3.4/100,000) was reported in 2012. A few number of AFP cases were reported from urban Kebeles indicating that urban should not be neglected during surveillance.

When we compare the immunization coverage of AFP cases reported between 2007 and 2013 with EDHS 2005 national, polio-zero is lower than by 8.8%, polio-1 is lower than by 69.4%, polio-2 is lower than by 55.7%, and polio-3 is lower than by 12.5%. When we compare the immunization coverage of AFP cases with EDHS 2005 SNNPR, AFP cases of polio-zero is lower than by 12.4%, polio-1 is lower than by 70.4%, polio-2 is lower than by 57.7%, and Polio-3 is lower than by 18%(13).

Comparing the EDHS 2011 report of national immunization coverage with AFP cases, the coverage of polio-zero in AFP cases is lower than by 11.1%, polio-1 is lower than by 76%, polio-2 is lower than by 58.5%, and polio-3 is lower than by 10.9% whereas comparing the EDHS 2011 SNNPR report with AFP cases, the immunization coverage of AFP cases of polio-zero is lower than by 10.2%, polio-1 is lower than by 80.7%, polio-2 is lower than by 65.5%, and polio-3 is lower than by 14.7%. When we compare the national EPI coverage survey 2012, the coverage of penta-1 and penta-3 of AFP cases which was assumed to be similar with polio-1 and polio-3, which was lower than the national coverage by 75.1%, and 33.5% respectively whereas the immunization coverage of AFP cases of penta-1 and penta-3 is lower than the SNNPR coverage by 80.1% and 17.1%respectively(14). The MOH 2005 EFY administrative report indicated that the national coverage of penta-3 was higher than penta-3 of AFP cases by at least 44.8%(15). Significant number of children have been received low polio dose. Children who received 4 and more polio dose less than 50%, which was below the WHO standard. The

possible reason for the low polio dose was there were significant number of children who took only either of one or two polio doses, the other may be poor case investigation,

The regional trend of non-AFP rate met the WHO minimum standard. But when we look at the non-AFP rate of certain Woredas per 100,000 population, it was below the WHO standard.

5.2.9 Limitation

- During the data collection the regional data base has a few variables, and has no its own line list and this urges us to find other sources of data, which contains several variables and this step took several days (time waste).
- The line list contains several blank variables which made the result interpretation different than the complete line list (data).
- The variables of line list in all years was not uniform this urges us to reject the variable that was absent in one year and accept the years that contain variables.

5.2.10 Conclusion.

The most affected age group was 1_4. Regionally the highest non-AFP rate was reported in 2012. Sheka zone reported the highest incidence in the region. There were significant number of districts that did not meet the WHO standard. I.e. there were districts and special woredas that reported the non-AFP rate below 2/100,000 population <15 years. There was low vaccination coverage among children of all age groups in which only 34.5% were vaccinated with 4 and more polio doses. The majority of cases have been vaccinated with less than 4-polio doses.

5.2.11 Recommendation

- Supplementary polio immunization of under-five children by RHB
- Active surveillance of all AFP cases is mandatory to get the Polio eradicated by health facilities, and districts
- Monitoring and evaluation, and regular supportive supervision of EPI Program by RHB, zones, woredas, health centers.
- Improving data recording, and reporting system by health centers, woredas, and zones.

References

1. Southern Nations Nationalities and Peoples Region (SNNPR), Health profile. 2002.
2. SLM. Krugman's infectious diseases of children.ISBN 0-323-01756-8:pp. 81-97.
3. Vaccine-derived polioviruses and the endgame strategy for global polio eradication.Annu Rev Microbiol59:587-635.
4. Chronic progressive poliomyelitis secondary to vaccination of an immunodeficient child". 2006.
5. Reduced secretory antibody response to live attenuated measles and polio virus vaccine in malnourished children. 2006.
6. Mechanism of injury-provoked poliomyelitis. 2004.
7. Factors influencing the occurrence of illness during naturally acquired poliomyelitis virus infection. 2006.
8. WHO. Eradicating polio in Africa region. Annual report 2011
9. EFMOH. National guide line for acute flaccid paralysis surveillance. October 2009.
10. Global Polio Eradication Initiative available at http://www.polioeradication.org
11. Prevention CfDCa. Polio in Somalia, Kenya, Ethiopia". January 22, 2014.
12. Ethiopia CG. Cross border transmission of Wild Polio Virus (WPV) and immunization service delivery in CGPP Project implementation international border areas in Ethiopia. June 2012.
13. Ethiopian Demographic and health Survey (EDHS). 2005.
14. Ethiopian Demographic Health Survey (EDHS). 2011.
15. National EPI Coverage Survey 2012.

Chapter-VI Abstracts for Scientific Presentation

6.1 Measles outbreak investigation in Kirara Health Center Catchment, Konta Special Woreda, South, Nations, Nationalities, and Peoples Region, Ethiopia, 2014.

Authors: Tessema T.Burye [1], H.Taame[2], A. Bekele [3], Y. Mogessie [4]

Address: EFTP, School of Public health, Addis Ababa University, 2- Ethiopian Public Health Institute, Addis Ababa, 3 Ethiopian Public Health Institute, 4- Amaya, Konta Special Woreda Health Office.

Name of EFETP: Ethiopian Field Epidemiology Training Program.

E-mail tessema2002@gmail.com, Tell +251 926 45 44 45/0912 165 468

Title: Measles outbreak investigation in Halaba Special Woreda, South Nation Nationalities and People Region, Ethiopia 2014.

Key words. Measles, Outbreak, case-control study.

Abstract

Background. Measles is highly infectious and vaccine preventable diseases. A measles outbreak was detected at Kirara health center catchment, Konta special woreda with attack rate of 2.5/100 population and zero death rate. We investigated measles outbreak to determine factors associated with contracting measles in Kirara health center catchment.

Methods. A 1:2 unmatched case control study was conducted from 15-19 December 2014. A case was any person who resided in Kirara health center catchment who developed a sign and symptom of measles or tested IgM positive between 12 October and 27 December 2014. A control was any person who resided in the same community with cases in Kirara health center catchment who did or do not have history of signs and symptoms of measles or tested IgM negative between similar periods. If controls develop a measles clinical feature, they will be included in cases. We used Epi-info, and excel to calculate frequency, rate ratio, and odds ratios and bivariate analysis. Multivariate analysis was calculated by using Epi-Info advanced statistics of logistic regression.

Results. We identified a total of 333 measles cases including the confirmed cases. Forty five (13.5%) cases received no measles vaccine, 144 (43.2%) cases received one measles dose, 20 (6%) cases received two measles doses, 100 (30%) cases have unknown vaccination history. The attack rate in infants was 9.4%. The overall attack rate was 2.5%. The catchment average one

dose measles coverage in 2012, 2013, and 2014 was 80%, 104%, and 89.5% respectively. A total of 53 cases and 105 controls were employed into the case-control study. 18(34%) cases and 54(51.4%) controls were vaccinated. Thirty one (58.5%) of cases, and 58 (55.2%) of controls were males. The absence of education for parents (AOR= 1.86, 95% CI (1.2836-2.6837), history of travel to areas with active measles case (AOR= 2.2, 95% CI, (1.1183-4.3280) was the risk factors for contracting measles diseases. Being vaccinated with measles (AOR= 0.5, 95% CI (0.2693-0.9984), knowing the modes of transmission of measles (AOR= 0.38, 0.1840-0.7814), knowing the right age of the child for measles vaccination (AOR=0.47, 95% CI 0.2243-0.9789), and knowing measles diseases is vaccine preventable (AOR= 0.22, 95% CI, 0.0967-0.4792) were a protective factors.

Conclusions.

We confirmed outbreak of measles with highest incidence rate in under one children. Being unvaccinated with measles, educational status of mother/care taker, contact history with active measles case and low awareness of mother or care taker on measles disease prevention were the factors associated with measles outbreak. We recommended supplementary vaccination for under 15 years children and community awareness creation by health extension worker.

6.2 Acute Flaccid Paralysis Data Analysis in Southern, Nations, Nationalities, and Peoples Region, Ethiopia, 2014

Authors: Tessema T.Burye [1], H.Taame[2], D. Dalecha [3], Y. Mogessie [4]

Address: EFTP, School of Public health, Addis Ababa University, 2- Ethiopian Public Health Institute, Addis Ababa, 3 Addis Ababa University, School of Public Health, 4- Amaya, Konta Special Woreda Health Office.

Name of EFETP: Ethiopian Field Epidemiology Training Program.

E-mail tessema2002@gmail.com, Tell +251 926 45 44 45/0912 165 468

Title: Acute Flaccid Paralysis Data Analysis, South Nation Nationalities and People Region, Ethiopia 2014.

Key words: Acute Flaccid Paralysis, Surveillance, poliomyelitis, Eradication

Abstract

Background. Poliomyelitis is vaccine preventable disease, targeted for eradication worldwide. Globally, since 1988 its annual case incidence has dropped from 350,000 to 223 in 2012. Since August 2013, Ethiopia detected 10 wild polio cases from Somali region. We conducted a seven years acute flaccid paralysis (AFP) surveillance data analysis of South Nation Nationalities and Peoples Region (SNNPR) to describe by person, place, and time

Methods. We reviewed a secondary retrospective AFP Surveillance data in the region from 2007-2013.We used WHO AFP case definition. We took a population of under 15 years in the same period. We analyzed AFP surveillance data to identify the incidence of AFP cases among zones and districts of SNNP region. We categorized the Variables and used Epi-Info™-7.1.3.0 and excel to calculate rates, frequencies, mean, and median.

Result. We identified 1,648 AFP cases with non AFP rate of 2.9/100,000. 716(59%) of cases were males. 1621(98.4%) were under 15 years. The median age was 4 with SD of 3.78 ranging from 1month to 28 years. The incidence rate among 1-4 age group is 11. 318(19.3%) cases received four polio doses with a mean dose of 3.1 $\pm$ SD 1.5. Sheka zone reported non AFP rate of 4.7/100,100. Masha district reported non-AFP rate of 11 per 100,000 respectively. Esera, Gurefereda, and Mereka districts each reported non AFP rate of <1/100,000.

Discussion. There were children who received 1-3 doses, which is below the WHO standard. Even after 3 doses of polio vaccine, those who don't sero-convert accumulate and increase the non-immunized children. Moreover there were silent districts in the region. We recommend multiple polio doses and strengthening surveillance system in order to facilitate polio eradication.

Words=271

Chapter-VII Narrative Summary of Disaster Situation Visited

7.1 Human Health and Nutrition Need Assessment in Gamo-Gofa, and Wolayta Zone, SNNPR, 2014

7.1.1. Background

Southern Nations, Nationalities and People region (SNNPR) is one of the big and diversified region of the country with a total of 15 zones, 4-special Woredas, and 136 Woredas. The region is located Southern and South-Western part of Ethiopia. The total area of the region estimated to be 110,931.9 Sq. Km which is 10% of the country and inhabited by a population size of about 18,395,297 in 2014, which was 20% of the country's total population. The population density of the region became 142 persons per sq.km, which makes the region one of the most populous parts of the country.

7.1.2 Objectives

7.1.2.1 General objective.

- Human health and nutrition need assessment in Gamo-Gofa and Wolayta zone, from 8-22/2014, SNNPR

7.1.2.2 Specific objectives

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

7.1.3 Methods

7.1.3.1 Study setting. The assessment was conducted in Gamo-Gofa and Wolayta zones. Kamba and Merab-Abaya districts were the selected woredas in Gamo-Gofa zone. The total population of Kamba woreda was 190,253 whereas that of Merab-Abaya was 91,911. Boloso-Sore and Humbo woreda were the selected districts in Wolayta zone. The total population of Humbo woreda was 153,286, whereas that of Boloso-Sore woreda was 202, 086.

7.1.3.2 Study period. The assessment was conducted from June 6-21/2006 Gamo-Gofa, and Wolayta zone, SNNPR.

7.1.3.3 Sample size determination. Two woredas from each zone were selected based on emergency health and nutrition problems in the area in consultation with the FMOH, RHB, and ZHDs.

7.1.3.4 Data collection.

Briefing by different sectors of the zone was the initial activity before departing to the selected Woredas and also debriefing by the assessment team was done at last and discussions have conducted about the findings of the assessment. We used the checklist already prepared by Ethiopian Public health institute. The assessment was done by interviewing responsible persons from different units of health sector (Woreda health office heads, experts/officers, selected household members) as well as reviewing secondary health and nutrition data using the questionnaire developed by EPHI. Physical observation on ITNs utilization and malnutrition status was conducted.

7.1.3.5 Data analysis and presentation. We used Microsoft excel to compile, and analyse data. We also used Microsoft PowerPoint for findings presentation.

7.1.4 Result.

7.1.4.1 Gamo-Gofa Zone

Gamo-Gofa zone was one of the 15 zones and 4-special Woredas in SNNPR. The total population of the zone was 2,019,687. Administratively the zone has 13 Woredas and two town administrations. There were 341 health posts, 68 health centers and one Hospital. Malaria, measles, meningitis, acute watery diarrhea (AWD), severe acute malnutrition (SAM), and population conflicts were identified risk factors /problems in the zone. 12 (80%) of woredas were identified malarious area. Malaria risk population in the zone was 1,466, 506. 13(86.7%) woredas were history of measles outbreak in the area. 11(73.3%) woredas were risk area for meningococcal meningitis identified by zonal public health emergency. 5(33.3%) woredas were identified risk areas for acute watery diarrhea. 13(86.7%) woredas were risk area for population conflict.

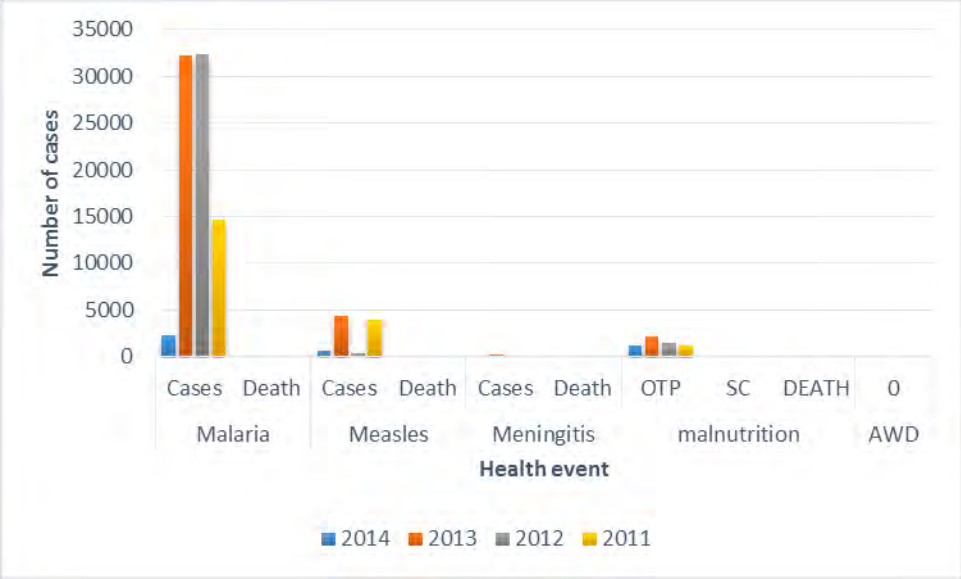

Figure 30: Trend of cases and deaths of malaria, measles, meningitis, malnutrition, and AWD by year, Gamo-Gofa zone, SNNPR, 2014.

7.1.4.2. Kamba Woreda. Coordination.

The woreda was conducting a multisectoral PHEM co-ordination forum. The woreda did not prepare emergency preparedness and response plan. The woreda allocated emergency response fund for emergency condition. For emergency drug 40,796 ETB, was allocated, but they did not use it. For Indoor residual spray 50, 000ETB was allocated.

Morbidity report.

Table 26: Top 5-causes of morbidity in under 5years, Kamba Woreda, Gamo-Gofa zone, January-May, 2014

Disease	Male	Female	Total	Percent
Malaria	417	226	643	23.6
Pneumonia	227	185	412	15
Diarrhea	177	138	315	11.5
Helimenthiasis	127	67	194	7.11
Acute febrile Illness	112	80	192	7.03
All others	576	398	974	35.7

Table 27: Top ten causes of morbidity in adults, Kamba Woreda, Gamo-Gofa zone, 2014

	Disease	Male	Female	Total	Percent
1	Malaria	845	634	1479	24.4
2	Typhoid fever	388	405	793	13.1
3	Acute febrile Illness	391	289	680	11.24
4	Trauma	300	163	463	7.7
5	Pneumonia	186	239	425	7.02
6	Helimenthiasis	176	144	320	5.3
7	Dyspepsia	57	104	161	2.7
8	Skin and subcutaneous diseases	78	71	149	2.5
9	Musculoskeletal diseases	75	54	129	2.13
10	Disease of eye and adnexa	58	70	128	2.12
	All other	639	686	1325	21.89

Emergency drugs and supplies. Emergency drug and other supply were available for the last one month only. But no observation was conducted due to the absence of store man at the time of assessment.

Risk factors for epidemic to occur. Malaria. Out of the total woreda Kebeles 27/39 (69.23%) were malaria endemic. The total malaria endemic population was 121, 788 with total malaria endemic households 24, 358. Five Kebeles were sprayed in 2013/2014.There were breeding sites in the Kebeles. These were Irrigation canals, Stagnant water, Interrupting river, and Low ITNs coverage (<60%), last distributed year 2009.

Observation report. Absence of ITNs and latrine at some visited household level was seen

Current malaria prevention and control status. Sensitization manual prepared at woreda level and was planned to conduct malaria prevention and control activities.

Acute Watery Diarrhea/AWD/. No acute watery diarrhea outbreak has happened in the woreda for the last months. But the latrine coverage was 78. The latrine utilization coverage of the woreda was not calculated/measured/unknown. The woreda estimated that "it could be less than 65%". There was no data that showed safe water coverage in the woreda.

7.1.4.3 Merab-Abaya woreda.

Co-ordination. The woreda was conducting a multisectoral PHEM co-ordination forum. The woreda did not prepare emergency preparedness and response plan. The woreda allocated 80,00ETB for emergency response (especially for indoor residual spray)

Morbidity report.

Table 28: Top 5-causes of morbidity in under 5years, Merab-Abaya woreda, Gamo-Gofa zone, January-May 2014

Disease	Male	Female	Total	Percent
AFI	211	171	382	17.7%
Diarrhea	219	116	335	15.5%
Pneumonia	166	131	297	13.8%
All Respiratory disease	167	117	284	13.15%
Malaria	157	116	273	12.6%

Table 29: Top ten causes of morbidity in adults, Merab-Abaya woreda, Gamo-Gofa zone, 2014

	Disease	Male	Female	Total
1	AFI	48	469	887
2	Malaria	375	290	665
3	Typhoid fever	277	299	576
4	Trauma	278	127	405
5	Pneumonia	114	111	225
6	Skin and subcutaneous infection	122	86	208
7	All other respiratory diseases	97	90	187
8	Violence and other intentional injury	97	53	150
9	Disease of muskulo-skeletal and system and connective tissue	69	70	139
10	Urinary tract infection	36	93	129
	All others	452	587	1039

Measles cases. There was measles outbreak (44 cases) with zero death detected in the last five months in the woreda.

Emergency drug and other supply. For the last five months zero stock was observed in the woreda.

Risk factors for epidemic to occur

Malaria: All the woreda Kebeles 24 (100%) were malaria endemic. 16 (66.7%) hot spot Kebeles were selected by woreda. The total population of the hot spot Kebeles was 60,172. There were 9 (37.5%) Kebeles with irrigation canals. Number of Kebeles has boundary with Lake Abaya was 11 (45.8%). Number of Kebeles with stagnant water for agricultural purpose was 2 (8%). Number of Kebeles with Interrupting River was 5 (20.8%). The ITNs coverage of the woreda was less than 80%. For ITNs coverage there was no data.

Observation report. Absence of ITNs, and latrine, was observed. Recently at household level no malaria case was detected.

Gamo-Gofa zone PHEM. There was a multisectoral co-ordination forum for the sector, which was irregular. The zone prepared the epidemic preparedness and response plan.

7.1.4.2 Wolayta zone.

Wolayta zone is one of the 15 zones and 4-special Woredas in SNNPR. The total population of the zone was 1,908,085. Administratively the zone has 14 Woredas and three town administrations. There were 489 health posts, 70 health centers and three government Hospitals. Malaria, measles, meningitis, and severe acute malnutrition were the identified risk factor in the zone. Has good functional multisectoral co-ordination for the sector with frequency of regular meeting. Measles outbreak was occurred in between 12/19-2/16/2014 with a total of 1230 cases and zero deaths. The zonal PHEM developed emergency preparedness and response plan, but the budget was not allocated for the emergency condition. 11 woredas were malaria risk, and 9-woredas were risk for meningitides.

7.1.4.2.1 Humbo woreda.

Co-ordination. The woreda was conducting a multi-sectorial PHEM co-ordination forum intermittently. The woreda public health emergency developed epidemic preparedness and response plan. The woreda has no allocated the fund for emergency condition.

Risk factors for epidemic to occur.

Malaria. The total population resided in the woreda was the risk population. 5 (12.2%) Kebeles were using irrigation for agricultural purpose. 4 (9.7%) Kebeles have boundaries with Lake Abaya. There were interrupting rivers in the woreda. The ITNS coverage was 100%. The IRS coverage was 46%.

Observation report. Households were using ITNS. Absence of latrine in some households observed

Table 30: Top ten and five causes of morbidity in adults and under 5years children, Humbo woreda, Wolayta zone, January-May, 2014

10-Top causes of morbidity in adults	5-Top causes of morbidity in under five year children
Malaria	Malaria
Typhoid fever	Pneumonia
AFI	Skin infection
Pneumonia	AFI
Respiratory diseases	Diarrhea
Trauma	
Unspecified parasitic diseases	
UTI	
Dyspepsia	
Skin infection	

7.1.4.2.2 Boloso-Sore woreda.

Co-ordination. The Woreda has conducting a multi-sectorial PHEM co-ordination forum intermittently. No EPRP Plan was prepared. The woreda has allocated 350,000 ETB for indoor residual spray.

Risk factor for epidemic to occur.

Malaria. The woreda was malaria endemic. Irrigation, stagnant water, and interrupting rivers were the risk factor.

Observation. No field observation was conducted.

Table 31: Top five causes of morbidity in under 5years, Boloso-Sore woreda, Wolayta zone, SNNPR, January-May, 2014

Disease	Male	Female	Total	Percent
Pneumonia	266	210	476	28.2%
Malaria	245	198	443	26.3%
Diarrhea	87	53	140	8.3%
Skin infection	56	41	97	5.7%
Other respiratory diseases	33	26	59	3.5%

Table 32: Top ten causes of morbidity in adults, Boloso-Sore woreda, Wolayta zone, 2014

	Disease	Male	Female	Total	Percent
1	Malaria	662	598	1260	38.3
2	Pneumonia	216	170	386	11.7
3	Acute febrile illness	192	156	348	10.6
4	Trauma	200	136	346	10.5
5	Infection of skin and SC tissue	161	119	280	8.5
6	Typhoid fever	73	89	162	4.9
7	Helimenthiasis	82	77	159	4.8
8	All respiratory disease	58	56	124	3.8
9	Diarrhea (non-bloody)	69	50	119	3.6
10	Diarrhea with bloody(dysentery)	46	58	104	3.2
	Total	1759	1509	3288	100.0

7.1.4.3 Woreda summary.

7.1.4.3.1 Co-ordination. In all woredas co-ordination was well functional and integrated. Only Humbo woreda developed EPRP plan. 3 (75%) woredas were allocated budget for emergency condition. Malaria was the top cause for morbidity both in adults and under five children in all woredas for the last five months. Measles outbreak was reported from Merab-Abaya woreda of Gamo-Gofa zone. No AWD, and meningococcal meningitis cases were reported from the four woredas. Irrigation, stagnant water, low LTNs coverage, and interrupting rivers were the major risk factors for malaria for the five months in four woredas.

7.1.4.3.2 Malaria.

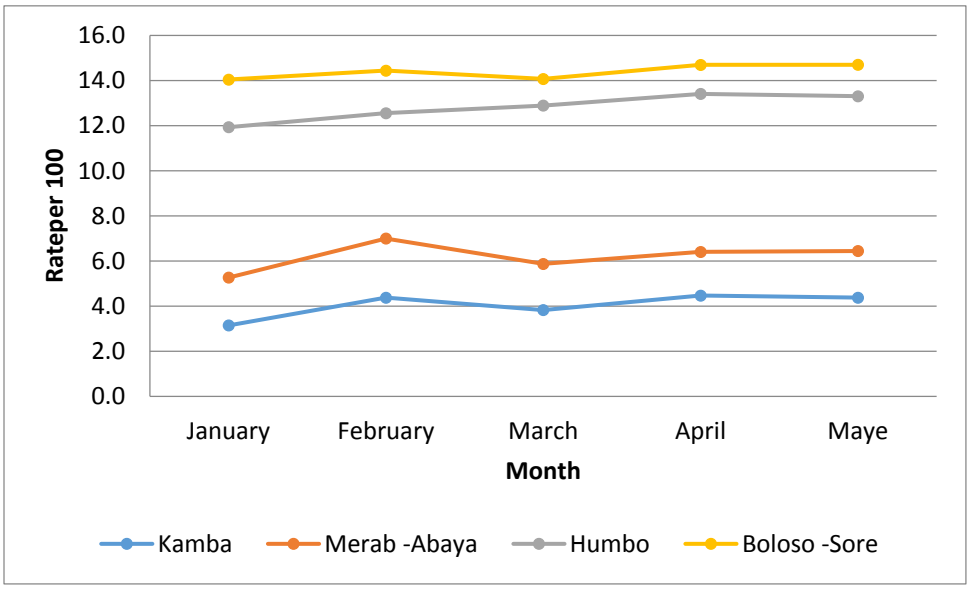

Figure 31: Trend of malaria cases, Kamba, Merab-Abaya, Humbo, and Boloso-Sore, SNNPR, 2014

7.1.4.3.3 Severe Acute Malnutrition. In all (4) woreda RUTF, F-75, and F-100 were available for severe acute malnutrition cases. Children discharged from OTP program were not linked with supplementary feeding program.

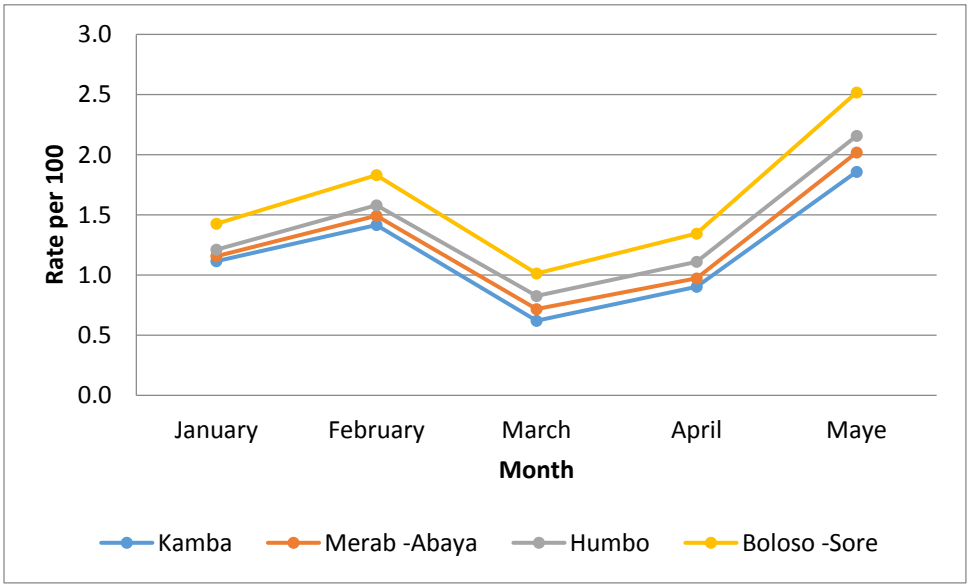

Figure 32: Trend of Severe acute malnutrition cases, Kamba, Merab-Abaya, Humbo, and Boloso-Sore woreda, SNNPR, 2014

7.1.4.3.4 Availability of emergency drugs and medical supplies. No woreda has prepared drug and supplies for emergency condition in each zone.

7.1.4.4 Zonal summary.

7.1.4.4.1 Gamo-Gofa zone.

Was functional multisectoral co-ordination. No regular meeting was conducting. Only one outbreak was detected in Merab-Abaya woreda. No emergency drugs and medical supplies (EPRP) plan. No emergency drugs and medical supplies were available at zonal level.

Table 33: Type of risk factors in Gamo-Gofa zone, SNNPR, January-May, 2014.

Type of risk	Number of woreda
AWD	5
Meningitides	11
Measles	13
Malaria	12
Population conflict	13

7.1.4.5 Wolayta zone. Were functional multisectoral co-ordination and were conducting regular meeting. Between February and March 2013, a total of 1,230 measles case was reported. The zonal PHEM developed EPRP plan. Emergency drugs and medical supplies were available for the five months.

Table 34: Type of risk factors in Wolayta zone, SNNPR, January-May, 2014.

Type of risk	**Number of woreda**
AWD	5
Meningitis	9
Measles	13
Malaria	11

7.1.4.5 Regional summary.

The regional PHEM was conducting functional multi-sectorial co-ordination. Was conducting regular meeting. There was measles and meningitis outbreaks in the region for the last five months. EPRP plan was prepared. Emergency drugs and medical supplies were available for the last months.

Table 35: Risk identified by estimated beneficiaries, and budget, SNNPR, 2014

Risk identified	Estimated beneficiaries	Required finance
Flood	100,000	4,667,983
Measles	2,182,534	13,527,973
Malaria	459,526	3,213,245
Drought	80,000	--------
meningitis	6,000	1,261,805

Reference

1. Kamba woreda health office 2006/2013 Mid-year plan versus performance report.
2. Merab-Abaya woreda health office 2006/2013 Mid-year plan versus performance report.
3. Gamo-Gofa zone health department 2006/2013 Mid-year plan versus performance report
4. Humbo woreda health office 2006/2013 Mid-year plan versus performance report.
5. Boloso-Sore woreda health office 2006/2013 Mid-year plan versus performance report.
6. Wolayta zone health department 2006/2013 Mid-year plan versus performance report.
7. SNNPR PHEM 2006/2013 EPRP repot.

Chapter VIII – Proposal for Epidemiologic Research Project.

8.1 Assessment of prevalence and associated risk factors for malaria in Kedida-Gamela district, Kembata-Tembaro, SNNPR, Ethiopia, 2014

8.1.1 Introduction.

Southern Nations, Nationalities, and peoples region (SNNPR) is found in southern part of the country and 280 kilometer far from Addis Ababa, the capital city of Ethiopia, and known malaria prevalent region. Kembata-Tembaro zone is one of the 15-zones and 4-special Woreda in the region and 240 km far from the regional town, Hawassa, and 360 km from the central town of the country. The zone has 7- Woredas (Kedida-Gamela, Kacha-bira, Hadero-Tunto, Tembaro, Doyogena, Angacha, and Damboya) and one town administration, Durame, zonal town. Except Doyogena Woreda, in all woredas and Durame town administration malaria is Endemic. Out of these, 4 (Kedida-Gamela, Kacha-birra, Hadero-Tunto, and Tembaro) woredas are known malaria endemic and hot spot woredas in the region as well as in the country.

In 2013/2014 Kedida-Gamela district reported a total of 3,340 clinical and confirmed malaria cases with zero death, of which 2,664(79.76%) was plasmodium falciparum(Pf), 638(19.1%) plasmodium vivax(Pv.), and 38(1.14%) clinically treated cases were reported to the national Public Health Emergency Management center.

8.1.2 Literature review

Malaria is a leading cause of mortality and morbidity in many developing countries, where young children and pregnant women are the groups most affected[1]. In 2012, there were about 219 million cases and an estimated 660,000 deaths due to malaria globally with about 90% of these cases occurring in Africa[2, 3].Malaria remains a serious public health problem, causing 1.2 million deaths and 300 to 660 million clinical cases in tropical and subtropical areas each year[4]. More than 90% of the lethal cases occur in children under five years of age in Africa[5]. According to records from the Ethiopian Federal Ministry of Health, about 75% of the geographic area of the country has significant malaria transmission risk (defined as areas <2,000 m), with about 57.3 million (68%) of the country's total population living in these areas, making malaria the leading public health problem in Ethiopia. On average, 60%-70% of malaria cases have been due to P. falciparum, with the remainder caused by P. vivax. Anopheles arabiensis is the main malaria vector; An. pharoensis, An. funestus and An. nili play a role as secondary

vectors. The FMOH reported a total of 3,384,589 malaria cases from July 2011-June 2012, with 1,793,832 (53.0%) of these laboratory confirmed, with 1,061,242 (59.2%) *P. falciparum* and 732,590 (40.8%) P.vivax. Ethiopia reported 936 malaria deaths in 2011, according to the 2012 World Malaria Report. Malaria transmission peaks bi-annually from September to December and April to May, coinciding with the major harvesting seasons. This has serious consequences for Ethiopia's subsistence economy and for the nation in general. Major epidemics occur every five to eight years with focal epidemics as the commonest form. Early diagnosis and prompt treatment is one of the key strategies in controlling malaria. Indoor Residual Spraying (IRS) and Long-Lasting Insecticidal nets (LLINs) are major malaria vector control tools in Ethiopia [6-8].

8.1.3 Statement of the problem

Globally (2012), 219 million malaria cases and 660 deaths were occurred, of which 90% was in Africa. 75% of the geographical area (<200m) of Ethiopia has significant malaria transmission risk. About 57.3(68%) million of the population is living in this area, making malaria is the leading public health problem. South Nations, Nationalities, and Peoples region has intense malaria transmission (<1500m, with rainfall >1000mm). Kedida-Gamela Woreda is one of 4- hot spot Woredas in Kembata-Tembaro zone. During health profile description, despite the presence of high ITNs and IRS coverage, there was an increase of malaria morbidity in the Woreda (2011-2013). Moreover malaria is the top morbidity cause among top ten causes of morbidity in the district for the last 3 years. In addition to these, there was high malaria positivity rate than other hotspot woredas in the zone in2014.The cause for the increase of the malaria in the district is unknown and no study has conducted in the area till today regarding malaria.

8.1.4 Rational of the study.

For the three years (2011-2013) the coverage of indoor residual spray was greater than 90%. The coverage of long lasting insecticide treated nets between 2012 and 2014 was 100%. The utilization coverage of the long lasting insecticide treated nets in 2012, 2013, and 2014 was 91%, 89%, and 93% respectively. In addition to these malaria was the top diseases among top ten diseases in similar periods. Moreover, there was high malaria morbidity data report than other districts in the zone.

8.1.5 Significance of study.

The study will be used as an input for the district as well as for other districts in the zone to fill the gap identified and may be the baseline for further study (research)

8.1.6 Purpose of the study.

During health profile description (2013) in the district, the coverage for IRS, and ITNs for the last three years (2011, 2012, and 2013) was greater than 90% and 80% respectively. Regardless of high coverage of the indoor residual spray, long-lasting insecticide bed nets distribution, and environmental management activities, the malaria morbidity data reported from the district health facility indicated that there was epidemic in the last three consecutive years and was the first among the top ten cause of morbidity in 2013/2014 in the district. There was high plasmodium falciparum rate and high positivity rate reported were RDT or microscopically confirmed in 2013/2014 than other hot spot Woreda. Neither the IRS and bed net coverage was verified by an independent study except the administrative report. So that community and facility based study could help to get reliable information to determine the effectiveness of the malaria control program and factors associated with the high malaria prevalence in the district.

8.1.7 Objectives

8.1.7.1 General objective.

To assess malaria prevalence and risk factors in Kedida-Gamela district, Kembata-Tembaro zone, SNNPR, 2014/2015

8.1.7.2 Specific objectives.

To determine malaria prevalence by species in Kedida-Gamela district

To determine factors associated with high malaria morbidity in Kedida-Gamela district

8.1.8 Methods

8.1.8.1 Study area and population

The will be conducted in Kedida-Gamela district, Kembata-Tembaro zone. The population of the district will be considered as the study population.

8.1.8.2 Study design and period

We will use cross-sectional community and health facility based study in Kedida-Gamela district from June to October.

8.1.8.3 Sampling technique and sample size

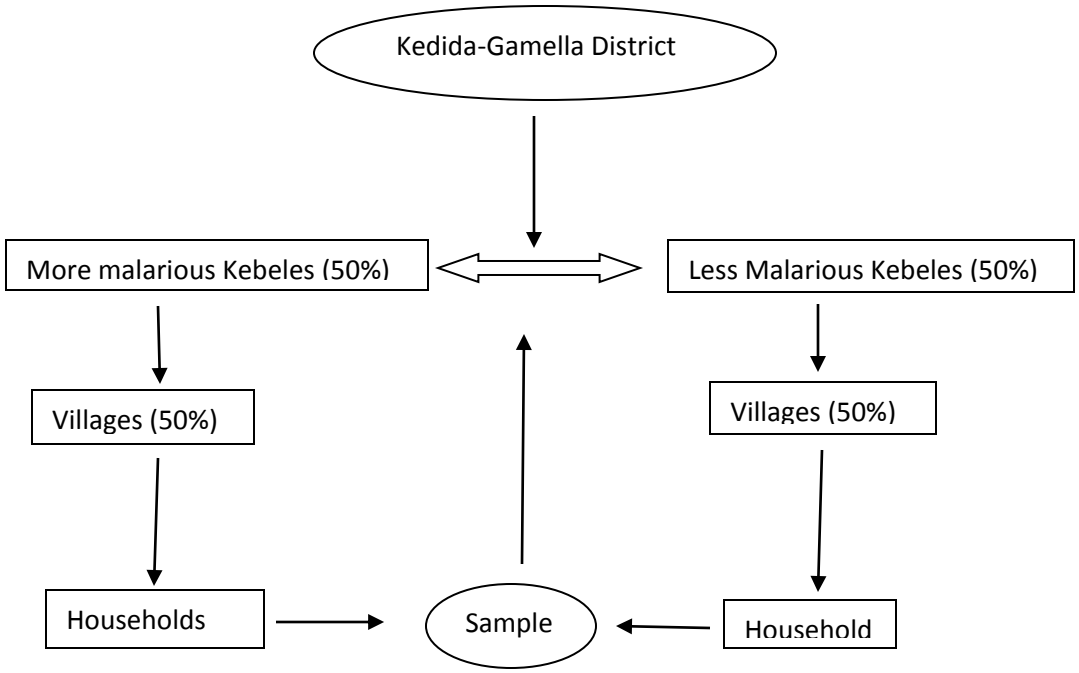

Figure 33: Conceptual Framework of Sampling technique, Kedida-Gamella Woreda, Kembata-Tembaro Zone, SNNPR, 2014

There are 18- Kebeles and 160 villages in the district. We will use three stage cluster sampling technique (Kebele, Villages and Households). The Kebeles, villages and households are the first, second and third clusters. Of these 9(50%) of the Kebeles, 76(50%) villages of each Kebele and households in selected villages will be included in the study. From Each cluster five with high and 4 with low malaria prevalence will be selected. A single proportion formula with a 95% confidence interval (CI) prevalence of 50% with margin of error 5.0%, and power of 80% will be used to calculate sample size. Based on this the sample size can be calculated as follows.

$N= z^2pq/d^2 = (1.96)^2*0.5(1-0.5)/ (0.05)^2 = 384$. Because of cluster sampling in the study we used 2 as a design effect and it will be 768 households.

To determine each malaria species in the district, we will use recent malaria morbidity data of the selected household retrospectively from health facility (health post, and health centers, hospital) which will be tested either by RDT/microscope.

A systematic random sampling method will be used to select the households in the selected villages. The total number of the sample size for the village will be divide to the number of

household in the village to get the interval. The first household will be selected by spinning a pen standing at the health center begin from the nearest household where the head of the pen pints. Then, households will be selected based on the interval calculated. Only one household member will be included from the selected households.

Individuals who were test positive for the last six months from selected household and for malaria either by RDT/microscope during health facility based data collection will be classified in to cases and those who were tested by either RDT/microscope but negative test result will classified in to controls. This laboratory based malaria data will be used to employ case-control study to associate independent variables in the study.

8.1.8.4 Data quality, collection and management

Data will be collected by using both quantitative and qualitative methods. The quantitative component will comprise of a household survey that include questions on household socio-demographic and economic characteristics(age, sex, occupation, educational level, marital status, ethnicity, religion, income, housing structure, structure of the roof of house, number of sleeping beds,) knowledge, attitude, and practice factors(LLINs coverage, use, and perceptions, use and perception on IRS, presence and use of repellant, cause and mode of transmission of malaria, recognition of malaria sign and symptoms), behavioral factors(use of governmental and private health facilities, health seeking behavior, correct use of malaria medication when he/she get ill with malaria, taking full course of malaria medication, use of traditional medicine, travel history to malarious area, working times), geographic factors(presence of stagnant water, distance of stagnant water from living house, presence of interrupted river, distance of interrupted river from living house, elimination and draining of stagnant water and interrupted river. Qualitative component of the household survey will include observation of the presence and use of nets, open ended question related to use and non-use of LLIs, observation of the correct hanging of bed nets, and procedure of hanging of bed nets. The dependent variables (test positives and negative results) will be associated with independent variables by using 2x2 table and logistic regression model.

A pre-test will be employed in ten household in the nearest Kebele of the district. Training will be given for both data collectors and supervisors. Three supervisors will be assigned for each

nine data collectors. This study will obtain data from community and health facility using a pretested and structured questionnaire.

Data completeness will be verified first by field supervisor, then by principal investigator. Data entry and cleaning will be done by using Epi Info version 7.1.3.0(CDC). Descriptive statics analysis will be performed by using Epi Info version 7.1.3.0 and Microsoft excel professional plus 13. Bi-variate analysis will be conducted using Epi Info version 7.1.3.0. Categorical variables will be coded and categorized, then multivariate analysis will be conducted by using SPSS static version 20.0.

8.1.8.5 Finding dissemination

Written report, both hard and soft copies, will be prepared and shared to Addis Ababa University, School of Public Health, Ethiopian Field Epidemiology Training Program Resident coordinators, mentors, advisors, public health emergency management of core process(PHEM) of South, Nations, Nationalities, and regional health bureau(SNNP RHB), Kedida-Gamela district and other concern body.

8.1.8.6 Operational definition.

Hot spot area: A small cluster of households typically less than 1km2 near a mosquito breeding site, but within a larger area of malaria transmission.

Case definitions: Confirmed malaria cases: Suspected malaria case in which malaria parasites have been demonstrated in a patient's blood by microscopy or a rapid diagnostic test.

Negative malaria cases: are cases test negative reported by RDT/microscopy.

Breeding site: Small, temporary/permanent, and sunlit water collections such as rain pools for breeding mosquitoes

Indoor residual spray: the application of long-acting chemical insecticides on the walls and roofs of all houses and domestic animal shelters in a given area, in order to kill adult vector mosquitoes that land and rest on these surfaces

Long Lasting Insecticide: protecting people from being bitten by infected mosquitoes.

8.1.9 Ethical clearance.

Ethical approval of the study will be obtained from South, Nations, Nationalities, and peoples regional health bureau, and Individual informed consent also will be obtained verbally from selected household owner, In addition, minors gave verbal assent

8.1.10 Work plan

Table 36: Work plan for malaria prevalence and risk factor assessment, Kedida-Gamela district, Kembata-Tembaro zone, SNNPR, 2015

Activities		Month/2015				
	February	March	April	May	June-July	August-Sept
Literature review						
Proposal writing & submission						
Supervisors and data collector training						
Data collection and entry						
Data analysis						
Draft report preparation						
Final report submission						

8.1.11 Budget breakdown

Table 37: Budget breakdown for malaria prevalence and risk factor assessment, Kedida-Gamela district, Kembata-Tembaro zone, SNNPR, 2015

S.N	Activity	Quantity	Unit	days	Unit cost	Total cost in $
1	Data collectors training	9	Dollar	2	7.5	135
2	Perdium for data collection	9	Dollar	12	7.5	810
3	Supervisors training	3	Dollar	2	10	60
4	Perdium for supervision	3	Dollar	12	10	360
5	For investigator training	1	Dollar	2	30	60
6	For investigator supervision	1	Dollar	14	30	420
7	For investigator data analysis	1	Dollar	24	30	720
8	For data entry	1	page	12	7.5	90
9	Fuel cost of 900 liter	1	liter	15	53	795
10	Car rent	1	Dollar	15	75	1125
11	A4 Paper 1390x4 page	1	page	1	278	278
12	Clerk for writing	1	Dollar	12	7.5	90
13	Printing and padding of 10 pc.	1	pc	1	50	50
	Grand total		Dollar			4993

Reference.

1. www.cdc.gov/malaria_world wide/impact-html
2. Organization, W.H., *Worl malaria report*, 2012: Geneva, Switzerland.
3. Vannice KS, B.G., Kenmore BD, Moorthy VS: , *accelerating development of second-generation malaria vaccines.* MALVAC 2012 Scientific forum:, 2012. **11:**: p. 372.
4. Lopez AD, M.C., Ezzati M, Jamison DT, Murray CJL:, *Global and regional burden of diseases and risk factors, 2001:.* systematic analysis of population health data. Lancet, 2006,. **367:**: p. 1747-1757.
5. Snow RW, G.C., Noor AM, Myint HY, Hay SI: , *The global distribution of clinical episodes of Plasmodium falciparum malaria.* Nature ,, 2005. **434:**: p. 214-217.
6. Adhanom TDW, W.H., Getachew A, Seboxa T:, *Malaria*. Epidemiology and Ecology of Health and Disease in Ethiopia, ed. H.D. Berhane Y, Kloos H Vol. 1st edition. 2006:, Ababa Addis, Ethiopia:: PLC; Shama. 556-576.
7. (FMH):, F.M.o.H., *Malaria and Other Vector-borne Diseases Control* 1999.: Addis Ababa, Ethiopia:.
8. Health, F.M.o., *Ethiopia Malaria Operational Plan*, 2014: Addis Ababa, Ethiopia. p. 13.

Chapter IX – Other Additional Outputs Report

9.1 Ebola Virus Diseases (EVD) Surveillance.

9.1.1Background

Gambella region is one of the nine region and two town administration in Ethiopia. The region is found in western part of Ethiopia. It is about 776 kilometer from Addis Ababa. Administratively there were three zones, (Agnua-zone, Neur-zone and Majaing-zone), 12-woredas, one special woreda and one town administration. Regarding to healthy facility, there are one Hospital (Gambella Hospital), ---- HCs and ---- HPs. In the region there are two known and three temporary land-port entries. Lare district is found in Neur zone of Gambella region, which is 74 kilometer from the Gambella region. The woreda has a population of 44,465. Administratively there are 26 rural Kebeles, and 02 urban Kebeles. Regarding to health facility distribution in the district, there 2-health centers, 10-health posts, 3-private clinics, and 1-rural drug vender. There are 75 health extension workers in the district. Pagak land-port entry site is found in Lare woreda, and 17-Kilometer from the center of the woreda. The security forces are controlling the land-port entry site of Pagak. It is 867 kilometer from Addis Ababa. The other land-port entry site in Lare district is Jekwoa, which is also 17-kilometer from the center of lare woreda. There were around 60 and more people to enter in to Ethiopia by using the local boat.

9.1.1.1What is Ebola hemorrhagic fever?

Ebola hemorrhagic fever (Ebola HF) is a severe, often-fatal disease in humans and non-human primates (monkeys, gorillas, and chimpanzees) that has appeared sporadically since its initial recognition in 1976. The disease is caused by infection with Ebola virus, named after a river in the Democratic Republic of the Congo (formerly Zaire) in Africa, where it was first recognized. The virus is one of two members of a family of RNA viruses called the Filoviridae.

There are five identified subtypes of Ebola virus. Four of the five have caused disease in humans:

A. Ebola-Zaire,
B. Ebola-Sudan,
C. Ebola-Ivory Coast
D. Ebola-Bundibugyo.

E. The fifth, Ebola-Reston, has caused disease in non-human primates, but not in humans.

9.1.1.2 Where is Ebola virus found in nature? The exact origin, locations, and natural habitat (known as the "natural reservoir") of Ebola virus remain unknown. However, on the basis of available evidence and the nature of similar viruses, researchers believe that the virus is zoonotic (animal-borne) with four of the five subtypes occurring in an animal host native to Africa. A similar host, most likely in the Philippines, is probably associated with the Ebola-Reston subtype, which was isolated from infected cynomolgous monkeys that were imported to the United States and Italy from the Philippines. The virus is not known to be native to other continents, such as North America.

9.1.1.3 Where do cases of Ebola hemorrhagic fever occur? Confirmed cases of Ebola HF have been reported in the Democratic Republic of the Congo, Gabon, Sudan, the Ivory Coast, Uganda, and the Republic of the Congo. No case of the disease in humans has ever been reported in the United States. Ebola-Reston virus caused severe illness and death in monkeys imported to research facilities in the United States and Italy from the Philippines; during these outbreaks, several research workers became infected with the virus, but did not become ill.

9.1.1.4 Epidemiology of Ebola virus disease (EVD) as of 10 September 2014

- 1976, Ebola first appeared in 2 simultaneous outbreaks in Sudan and Democratic Republic of Congo
- Since Ebola discovery in 1976 until December 2013: 23 outbreaks, 2388 human cases including 1590 deaths have occurred
- The 2014 current Ebola outbreak began in Guinea in December 2013.
- As of 27 August 2014, the four countries Guinea, Sierra Leone, Liberia and Nigeria reported 3069cases and 1552 deaths.
- As of 10 September 2014 Guinea, Liberia, Sierra Leone, Democratic Republic of Congo, Nigeria, and Senegal reported the cumulative number of 4872 cases and 2445 deaths.
- As of 10 September 2014 Guinea, Liberia, Sierra Leone continue to report new confirmed cases of Ebola virus disease.
- Nigeria and Senegal have not reported new confirmed cases of Ebola virus disease since 5 September 2014 and 29 August 2014 respectively.

9.1.1.5 How is Ebola virus spread?

Infections with Ebola virus are acute. There is no carrier state. Because the natural reservoir of the virus is unknown, the manner in which the virus first appears in a human at the start of an outbreak has not been determined. But the virus can be transmitted in several ways.

- Personal contact. Example; Contact with body fluids of Ebola virus infected patient
- Exposure to unsterilized objects Example; Needles infected with Ebola virus
- Nosocomial transmission Example; exposure to infectious tissues, reuse of infected needles and syringes
- Funeral exposures Example; Preparation of body for burial.

9.1.1.6 General diagnostic tests

- Viral isolation* – only in BSL4 laboratory
- Molecular detection – RT-PCR and Real-time RT-PCR (detects virus)
- Antigen ELISA (detects virus)
- IgM ELISA (detects early antibody)
- IgG ELISA (detects late antibody)
- IFA (Indirect Fluorescent Antibody)
- IHC (Immunohistochemistry)

9.1.1.7 How is Ebola hemorrhagic fever prevented?

The Ebola virus disease and its nosocomial transmission is prevented by using locally available materials and few financial resources. But EVD can be prevented using

- Personal Protective Equipment/PPE/
- Complete equipment sterilization
- Medical staff training
- Strict sanitation practice Example; proper cleaning and disposal of objects
- Quarantine of Ebola patient

Based on these evidence EPHI has deployed us Gambella region to enhance Ebola surveillance in local Land Port entry areas. By consultation with Gambella RHB-PHEM, we assigned to Pagak land-port of entry site.

9.1.2 Objective.

9.1.2.1 General objective.

- To prevent the spread of Ebola virus disease (EVD) in Ethiopia by early detection and Isolation of persons entering Ethiopia who are at risk of having EVD at major land ports of entry, Pagak Land port, Lare woreda, Gambella region, 2014.

9.1.2.2 Specific objectives.

- To establish Ebola surveillance in Pagak Land port entry area.
- To conduct Screening of persons entering in Pagak land port
- To Mobilize the Lare woreda government staff and community.

9.1.3 Methods and Materials.

Ebola surveillance teams have got a highlight orientation from Ethiopia Public Health institution (EPHI) prior to start journey in Addis Ababa. We planned to start a journey on 27 August 2014. We travelled a total of two days journey from Addis Ababa to Jimma and Jimma to Gambella. Immediately arriving at Gambella region, we communicated with Gambella RHB PHEM core processes owner. Introduction and briefings have given by regional PHEM core process owner. The teams have identified the local partners in Gambella region in collaboration with regional health bureau and meeting has conducted to identify known Land Ports entry sites in Gambella region. Ebola task force committee has established on time to facilitate Ebola prevention and control at regional level. Action plan has designed by the team members. Resources have mapped with partners. Health professionals from nearby Land Port entry site health facilities, 4-health professionals from each health facility, a total of 14 have trained on Ebola surveillance and screening by RHB. Visiting to Land Port entry sites has conducted by surveillance team in collaboration with partners. Briefings and introduction have conducted at woreda level. Woreda task force committee has established and sensitized at the same time. Selection of screening and isolation sites has conducted. Construction of screening and isolation shelters took about a week. Until to start of construction of screening shelter, we discussed with local security forces to start screening in security force shelter and we used the security force shelter as temporarily and later we built the screening shelter and we continued screening. While local health professionals are screening, we were giving health education for local communities. At the end debriefings has

given for woreda health office and regional health bureau. Handover of the Pagak Land Port entry site for the coming EFETP resident team has held on.

9.1.3.1 Surveillance.

Public health surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health. Producing information for action for use in public health action to reduce morbidity and mortality and to improve health.

9.1.3.2 Action plan for Ebola surveillance and preparedness.

Epidemiological week-35 (First week) has only five days

- Travelling to Gambella
- Informing the RHB as we arrived at Gambella region
- Designing Action plan and preparation for the next week.

Epidemiological week-36 (second week)

- Introduction and briefings by RHB public emergency management core process owner about land-ports of Gambella region.
- Identification and assigning of the land-port of entry sites for Ebola screening team
- Identification of partners and stakeholders in the regions
- Introduction with partners and establishing of task force in the region
- Resource mapping in the region
- Identification of health facility care providers for Ebola training from nearby land-port entry site and Gambella town including Gambella Hospital
- Visiting the land-port entry sites

Epidemiological week-37 (3rd-week)

- Introduction and briefings by woreda administrative council and woreda health office about land-port entry sites in the district.
- Introduction and briefing for security forces by Ebola screening team

- Formulation of Ebola surveillance and preparedness committee in lare woreda
- Establishing the screening site
- Site orientation for local screening health professionals (for nurses)
- starting of the Screening at land-port of entry site
- sensitization of the local community
- Sensitization of health care providers in Lare district.
- Preparation of isolation site.

Epidemiological week-38 (4th-week)

- Continue screening
- Continue awareness creation in local area
- Preparation for handovering by local health workers
- Final report to RHB PHEM.

9.1.3.3 Ebola Surveillance report one, Pagak land-port entry site.

As the EBOLA virus outbreak had been occurred in Africa especially, Western Africa including Liberia and Sierra Leone and Congo DR, the Ethiopian government had been working to prevent the disease. One of the strategies to prevention the disease is establishing screening sites in border areas and in international flights. Out of the border sites the Gambela site is the main one.

The EPHI sent an emergency screening group, in August 27/2014 containing four members of EFTP 5th cohort residences to work in two sites in the Gambela front. The group was equipped only with thermometer, guideline and questionnaire. After two day long journey, the team arrived in Gambela town in August 28, 2014. There were no any problem in the journey except minor accident with Bajaj of the first car and punishing by traffic of the same care, while he was stopping in prohibited area. And there was electrical problem in the same car and waiting about 20 minutes to solve it before arriving Bedele.

The group was requested to provide tents for the team. But it was difficult to overhand it due to time issue and the assumption of may be providing in the site. Mosquito nets and other important malaria protective materials were not equipped to the team.

In the Gambela site there are about five entry sites. The major entry sites are the Burbe and Pagag entry sites which are 192 km and 92 Km far away from Gambela respectively.

Each steps of our activities was as following

August 28, 2014.

As soon as arriving to Gambela the team informed to the PHEM focal person and he was appointed to meet us in 28/08/2014 7:30 am.

August 29, 2014

Meeting was conducted by the specified day morning. Information was shared with the regional PHEM.

The main organization and sectors found in the meeting was

- The regional bureau health sectors
- WHO
- UNCR
- UNICEF
- ARA 9Adninistrative for Refugues
- MSF
- IOM
- ACF 9 Action Center Fair)
- OXFAM
- HAPCO
- EPHI EVOLA screening team

Information shared by the regional PHEM were

1- Establishing of EBOLA preventive Task Force
2- Sensitization of the outbreak to leaders
3- Isolation site was selected and prepared around Gambela Town
4- One team was sent to oversee conditions in one entry site (PAGAK)
5- The PPE materials at hand was only two goggle,200 pair gloves and 50 face masks

6- Their expectation of PPE providing was from EPHI, and the main issue was the shortage of these materials.

9.1.3.4 Action Plan for the meeting

In the meeting the following actions was planned to done in as quickly as possible

1- Planning training to screening teams of the border area health professionals by 2-3/09/2014 and WHO and MSF will support to the training
2- Teams was established to visit the entry sites by land and helicopter
3- Sharing and selecting two main entry sites to the EPHI team
    a. Pagak (Weste of Ganbella) Entry site Dr Desta and Mr. TESSMA
    b. Burbe (South West of Gambela) entry site Mr. TASEW and DEREJE
4- The tents for screening were issued in the meeting. It was decided to find tents in the sites that were used for other activities by the regional health bureau, if it was in healthy condition. And the visiting team took as assignment to find these tents on the sites

August 30, 2014

The two teams sending from EPHI was starting in their site starting from this day. So their activities and reports will be separately. From this day all activities written in this report will be the PAGAK's team.

Dr Desta was participating in Gambela Joint Multi-Sector weekly meeting which are the joint of WHOM, RHB, UNCR, UNICEF, ARRA, WASH, ACE and OXFAM.

The main agenda of the meeting was

- The Hepatitis E outbreak response plan
- The cholera vaccination campaign
- The malaria disease condition and some possible solutions
- Measles outbreak condition and measures

At this meeting there were no issues about EBOLA. Any way there was no new case occurrence at the refugee camps except exceeding of malaria from week to week.

After the meeting our team was visiting the PAGAK entry site cooperating with WHO.

- We made communication and share information with OXFAM workers, Security personnel and MSF.
- Isolation site and screening site was selected
- The previous tents planted by RHB was at place
- The area was highly affected by heavy flood and the camps service was rebuilding in another site
- The people were moving freely in the border like one kebele people.

9.1.3.5 Challenges

- The freely movement of the people without any restriction in land port entry site
- Accommodation for the screening members
- PPE materials were not available to start our mission
- Flood is a challenge to prepare screening and isolation sites

9.1.3.6 Opportunities

- Sensitization of the leaders
- Planning for training
- Establishing of Tasking Force
- Too many Stockholders and NGO's
- Committed regional and national government
- Committed and willingness of the teams

9.1.4 Recommendation

- Continue screening by using the security forces
- Discussion held on PPE with local partners and RHB
- Communication conducted with EPHI

9.1.3.7 Ebola Surveillance report- two, Pagak land-port entry site.

9.1.3.7.1 Communication

We try to communicate with woreda administrative, woreda health office, woreda PHEM, Regional PHEM, and partners (ARRA, and UNICEF) on

How to hand over the screening by the woreda and the region

The main challenge to hand over the screening by the woreda were

i. Transport facility which was solved to transport by UNICEF vehicles
ii. Daily allowance which was solved by the regional PHEM discussing with responsible organizations for screening team.

b. Requesting the tent, that was provided by the regional PHEM discussing with UNICEF
c. About sensitization and health education (see below)
d. Establishing of new site, this was not practicable due to the flood problem in the different land port entry site (see below)
e. Meeting was conducted with Lare Woreda Task Force with the following agendas
    i. Action plan to construct tents for isolation, screening shelter and the resource for constructing these constructions
    ii. Action plan for sensitization and creating awareness to the woreda people

9.1.3.7.2 Screening

Screening was conducted throughout the week from 15/9/2014 to 30/9/201. A total of 2782 people screened during this period. 3(0.1%) febrile cases were identified, 1 was RDT test positive for malaria. Febrile cases are testing in MSF clinic and treating with antimalarial if positive. Most of the migrants were from South Sudan Upper Nile State of Malakahal, Mangog, Metya, Mywood, and Pagak Zone. Individuals were also come from Kenya, Seraleon, and Nigeria which were months and years back. Other minor numbers of migrants also were from other states of South Sudan. No mass deaths or illness of people or primates was observed by the migrants. There were no unknown cases or deaths in the refugee camps

9.1.3.7.3 Health Education

We planned in the woreda to give health education to all health professionals, and other community people. But the health professional health education was not conducted due to poor coordination of the Woreda Health Office. Sensitization for the community was conducted successfully using the opportunity of celebration of cultural "Yegnwak" traditional religious holiday. It was conducted in two sites based on their culture and praying with them. The

traditional leaders permitted us to give the health education about Ebola. At the last they made pray for their God to prevent the disease.

Figure 34: Ebola health education in Yegnwak religious Cultural Holiday, Lare Woreda, Gambella, Ethiopia, 2014 (Site 1)

A total of 2,535 community members, defense health professionals, and government staffs were participated during awareness creation in Lare woreda from 15-21/9/2014. Out of these 1468(57.9%), were males whereas 1067(42.1%) were females.

Figure 35: Ebola sensitization in Yegnwak religious Cultural Holiday, Lare Woreda, Gambella, Ethiopia, 2014 (Site 2)

9.1.3.8 Searching for New Land-port entry Site

We found another Land-port that was the entry site of migrants from South Sudan. About 60 – 120 (two to three Bus) population enters through it the local people and the drivers said. It is located in the Eastern part of Lare Woreda, which is 17 Km far away from Lare and 92 Km from Gambella town. People crossed Baro River by traditional boats (see photos). No security or shelter at the site.

Figure 36 Jekawo Land-port entry, Lare Woreda, Gambella, Ethiopia, 2014

9.1.3.9 Preparing Proposal for screening and isolation

The challenges faced us during our stay was delaying responses to construct the screening site and the Isolation Center. We construct the temporary screening site using the local workers and collecting woods and plastics from areas damaged by the flood. We provide about 800 Birr from our pocket. Still until 20 September 2014 the Isolation Center and Quarantine Center are not constructed. Even the Screening Center may need modification. The following proposal was prepared. It is not included the budget for health professionals and also about the Quarantine Center.

9.1.3.10 Screening and isolation proposal

Table 38: Screening and isolation proposal for Pagak land-port entry site, Gambella, Ethiopia, 2014

1-Constructing the Ebola Isolation Center					
No	Type of activity	Quantity	Price for each in Et. Birr	Total price	Remark
1	Tents	2	Requested from aid		For case and staffs
2	Transportation of the tents	2X2	20	80	
3	Cleaning the site/labor	10	100X20X2	2000	
4	Planting of the tents	2	300X2	600	
Sub Total				**2680**	
Hand washing facilities					
1	Roto 500 liter	1	4000	4000	
2	Modified plastic with pipe (Jerican) for hand washing (chlorine 0.05%)	2	50	100	
3	Jerican for washing materials (chlorine 0.5%)	2	50	100	
4	Jerican for rinsing	2	50	100	
5	Plastic dishes for liquid disposal	6	20	120	
Sub Total				**4420**	
Latrines and disposals					

1	Pit Latrine for digging	2	1000	2000	
2	Wood for pit latrine	30	100	3000	
3	Plastic in meter			50	
4	Nail in Kg	6	50	300	
5	Laborer	2	600	1200	
Sub Total				**6550**	
Others					
1	Pits for solid waste disposal	2	100	200	
2	Basket for garbage	2	50	100	
3	Plastic for garbage covering	100	5	500	
4	Mattress	12	500	6000	10 for case. 2 for staff
5	Pillow	12	100	1200	
6	Sheets	24	300	7200	
7	Mosquito nets	12			
8	Battery charge able	2	150	300	
9	Solar Battery	1	4000	4000	
10	Jog	4	20	80	
11	Plastic chair	14	400	5600	
12	Plastic Table	2	500	1000	
Sub Total				**26180**	
Human Resource					
1	Nurses	4			Daily allowance for 2 per day
2	Ho	2			Daily allowance per day
3	Cleaner	2			

4	Daily Laborer	1			
Screening Center					
1	Nurses	4			2 per shift
Constructing the shelter					
2	Wood	25	100	2500	
3	Plastic in meter	50 m			Better to request from UNHCR
4	Nail in kg	3	50	150	
5	Laborer			600	
6	Plastic Table	2	500	1000	
7	Plastic Chair	4	400	1600	
Sub Total				**5850**	
Grand Total				**45,680**	

9.1.3.11 Handover of the Ebola Surveillance to Lare Woreda

In Lare Woreda there are four clinical nurses who have trained about Ebola by the Regional PHEM. We gave them additional screening practice and identifying suspected cases. We also explained them how to fill formats and the method of verifying febrile case by linking with MSF clinic. Reporting system is link with Woreda PHEM and also with hotline number 8335.

Figure 37 Screening by local health professional for EVD, Pagak land-port entry site, Gambella, Ethiopia, Sept. 2014

References

1. Interim Guideline Infection Prevention, Control and Case Management of Ebola Viruses
2. Ebola-fact –booklet 07
3. WHO/AFRO Response to the Ebola Virus Disease (EVD) outbreak An update by the Regional Director 12 September 2014
4. Guidance for Ebola screening activities at Land Ports of entry in Ethiopia 26,August 2014

9.2 Training of Public Health Emergency Management Officers, and Focal persons.

Preparedness is defined as the range of "deliberate, critical tasks and activities necessary to build sustain, and improve the operational capability to prevent, protect against, respond to, and recover from incidents". The public health emergency preparedness includes putting in place the necessary logistics and funding, building the essential systems specific to protection, prevention and response, equipping public health personnel and respondents with the necessary knowledge and tools, and educating the public on related measures to be taken to prevent and control the event.

Outbreak investigation is a set of procedures used to identify public health threat. The purpose of outbreak investigation is

- Stop the outbreak
    - Ensure public health/prevent spread of diseases
    - Determining the risk for the diseases (person, place, and time).
    - Identifying the risk factor that increase diseases risk
- Prevent future outbreak
- Improve surveillance and outbreak detection

9.2.1 Rational for training.

High turnover of staff from PHEM to horizontal and health facility was observed in lower level surveillance units. In addition to this, there was e outbreaks of measles, and meningococcal meningitides in different parts of the region. During the outbreak time the region identified that

- Outbreaks were not early detected and reported to the next level.
- Line lists were not properly recorded using the standard line list
- Surveillance data was not analyzed and used for action
- The RRT was not functional well in lower level. As a result of this, the regional PHEM organized the 6-days training for PHEM officers and health facility focal persons.

We conducted the training in Yirgalem [l]Fura[l] training center. The purpose of the was

- ✓ To have common understanding in above mentioned diseases
- ✓ To identify thresholds of each of each diseases
- ✓ How to analyze, interpret and use the surveillance data
- ✓ Prepare and present malaria monitoring chart
- ✓ How to record and report cases using the standard line list

Topic covered by the training was

1. Epidemiology of Meningococcal meningitides.
2. Meningococcal meningitides post epidemic management
3. Meningococcal meningitides surveillance
4. Measles epidemic prevention and control
5. Epidemiology of malaria
6. Malaria epidemic management
7. Rapid response team and their responsibility

   Period January 22-25/2014

Participants were from

- Sidama zone, Zonal PHEM, all woredas, and selected health facilities
- Hawassa town administration

Participant's number

- ❖ Planned = 55
- ❖ Attended = 50

The pretest mean result = 60%, whereas, the post test result was 85%.

9.3 Ebola virus disease (EVD) hotline (8335) calls response data analysis, Ethiopian Public Health Institute, Ethiopia, Feb/2015

9.3.1 Introduction

Ebola hemorrhagic fever (Ebola HF) is a severe, often-fatal disease in humans and non-human primates (monkeys, gorillas, and chimpanzees) that has appeared sporadically since its initial recognition in 1976. The disease is caused by infection with Ebola virus, named after a river in the Democratic Republic of the Congo (formerly Zaire) in Africa, where it was first recognized. The virus is one of two members of a family of RNA viruses called the Filoviridae. There are five identified subtypes of Ebola virus. Four of the five have caused disease in humans. These are Ebola-Zaire, Ebola-Sudan, Ebola-Ivory Coast, Ebola -Bundibugyo. The fifth, Ebola-Reston, has caused disease in non-human primates, but not in humans. The exact origin, locations, and natural habitat (known as the "natural reservoir") of Ebola virus remain unknown. However, on the basis of available evidence and the nature of similar viruses, researchers believe that the virus is zoonotic (animal-borne) with four of the five subtypes occurring in an animal host native to Africa. A similar host, most likely in the Philippines, is probably associated with the Ebola-Reston subtype, which was isolated from infected cynomolgous monkeys that were imported to the United States and Italy from the Philippines. The virus is not known to be native to other continents, such as North America. Confirmed cases of Ebola HF have been reported in the Democratic Republic of the Congo, Gabon, Sudan, the Ivory Coast, Uganda, and the Republic of the Congo. No case of the disease in humans has ever been reported in the United States. Ebola-Reston virus caused severe illness and death in monkeys imported to research facilities in the United States and Italy from the Philippines; during these outbreaks, several research workers became infected with the virus, but did not become ill.

9.3.2 Epidemiology of Ebola virus disease (EVD)

In 1976 Ebola first appeared in two simultaneous outbreaks in Sudan and Democratic Republic of Congo. Since Ebola discovery in 1976 until December 2013: 23 outbreaks, 2388 human cases including 1590 deaths have occurred. The 2014 current Ebola outbreak began in Guinea in December 2013.

9.3.3 Objectives.

- Analyze Ebola virus disease Hotline (8335) data, Ethiopian Public Health Institute, Ethiopia, 2015

9.3.3.1 Specific objectives

- To describe the data by person Place and time in EPHI
- To recommend suggested solutions bases on identified gaps

9.3.4 Method

We conducted eight month retrospective secondary Hotline data collected in Ethiopian Public Health institute from July/2014-february/2015. We used the data collected throughout the country (from all Ethiopian regions). The pivot analysis of Microsoft office 2013 version was used to analyze the data. Both the computer and hard copy were used to store data in Ethiopian Public health institute.

As of February 19/2015, a total of **5,639** EVD hotline calls responded. From the total calls 1905 (33.8%) were information, 20 (0.4%) were rumors, 75 (1.3%) were irrelevant and unnecessary information, and 3,639 (64.5%) were missed calls.

Out of the total responded calls, 2356 (41.8%) calls were about sign and symptoms of Ebola virus, 955 (16.9%) calls were about prevention and control of Ebola virus, 2509 (44.5%) calls were about modes of transmission of Ebola virus disease, 334 (5.9%) were about distribution of Ebola, 50(0.9%) were about Ebola diagnosis, 402 (7.1%) were about ethology of Ebola, 789 (14.0%) were about treatment of Ebola, 1451 (25.7%) were about status of Ebola in Ethiopia, 275 (4.9%) were about the definition of Ebola, 29 (0.5%), were about flight from West Africa, 377 (6.7%) were about the preparedness of Ebola, 56 (1.0%) were about the objective of hotline 8335 number, 507 (9.0%), were about the source of Ebola, 266 (4.7%) were about countries affected, 146 (2.6%) were about time Ebola outbreak reported first, and 140 (2.5%) were about country reported Ebola outbreak first.

Table 39: Ebola hotline (8335) call response by region, Ethiopian Public Health Institute, Ethiopia, 2014/2015

REGION	COUNT	%
ADDIS ABABA	610	10.8
AFAR	70	1.2
AMHARA	1791	31.8
BENISHENGUL	324	5.7
DIRE DAWA	143	2.5
GAMBELA	256	4.5
HARARE	40	0.7
OROMIA	1343	23.8
SNNPR	706	12.5
SOMALI	36	0.6
TIGRAY	192	3.4
MISSED	128	2.3
GRAND TOTAL	5639	100.0

Table 40: Ebola hotline (8335) call by month, Ethiopian Public Health Institute, Ethiopia, 2014/2015

MONTH	COUNT	%
JANUARY	792	14.0
FEBRUARY	279	4.9
JULY	39	0.7
AUGUST	71	1.3
SEPTEMBER	780	13.8
OCTOBER	1477	26.2
NOVEMBER	740	13.1
DECEMBER	1196	21.2
(MISSED)	265	4.7
GRAND TOTAL	5639	100.0

9.3.5 Limitation

- Incomplete data recording
- The data base did not contain some variables (Eg. age, sex, small geographic area, like zone, Woreda
- In the presence of computer, some respondents were using hardcopy to record the data

9.3.6 Recommendation

- All important variables (person, place) should be included in the data base
- The data recording system should be improved as if as possible.

Annex 1: Measles outbreak investigation case-control study questionnaire for Halaba and Konta Special Woreda, 2014.

Case status = Case _____Control_____ Case ID---------- Patient Name_____ Date of Collection (MM/DD/YYYY: __/__/____Region_____ Zone_____ _____Woreda_____ _____ Kebele _____ _____ Got_____ Respondent status, case----------father----------mother---------- other (Specify):----------

1. Socio-demographic Characteristics

S. No	Questions	Alternatives
1.1	Sex of cases or control	1. Male 2. Female
1.2	Age of cases or control	years_____ Months_____
1.3	Occupation of respondent	1. Farmer 2. House wife 3. Student 4. Unemployed 5. Daily laborer 6. Merchant 7. Gov't 8. Other (specify)_____
1.4	Educational level of respondent	1. Illiterate 2. Read and write 3. Elementary 4. Secondary 5. Above secondary
1.5	Marital status of respondent	1. Single 2. Married 3. Divorced 4. Widowed 5. Separated
1.6	Ethnicity of cases or control	1. Sidama 2.Other
1.7	Religion of case or control	1. Protestant 2. Christian. 3. Muslim 4.Other
1.8	Family size of a case or control	_____
1.9	Is there any sick person with rash, fever, running nose/conductivities (illness)?	1. Yes 2. No
2.0	If yes, number of sick person	_____

2. Clinical History of Diseases.

2.1	What was the symptom of illness?	1.fever *2.*Rash 3.cough, 4.coryza (runny nose), 5. conjunctivitis (red eyes) *6.*Diarrhea 7.Ear discharge 8. pneumonia 9.Blidness 10. Laringo tracheal infection 11.Vomitting Others_____
2.2	Date of rash on set	___/___/____
2.3	Date seen at health facility	___/___/_____
2.4	Did you (he/she) take treatment?	1. Yes 2. No
2.5	If yes, treatment taken	1.ORS 2.Antibiotics 3.Vitamin A 4.Supplementary food 5. TTC ointment 6.Anti pyretics 7.Others given_____
2.6	Did you recovered after the treatment?	1.cure 2. partially 3. deteriorated/disabled 4.death

3. Risk factor

3.1	Did you ever vaccinated for measles?	1.Yes 2.No 3.Unknow 4.Not applicable
3.2	If yes last vaccination date	1.patient recall_____ dd/mm/yy 2. vaccination card_____ dd/mm/yy
3.3	Number of vaccine doses received	zero dose 2.one dose 3.two doses 4.three and above doses
3.3	Did you have any travel history 7-18 days to areas with active measles cases before onset of symptoms?	1.Yes 2.No If Yes where _____
3.4	Do you have any travel history four days before and after rash onset	1.Yes 2. No If yes where _____
3.5	Do you have any contact history with someone else four days before and after rash onset	1.yes 2.No If yes with whom_____
3.6	If Yes to question 3.5 place of travel	1.School 2.Neighbor 3.Market 4.Other_____
3.7	Do you know modes of transmission for measles?	1.Yes 2.No 3. If yes specify_____
3.8	Did you ever have measles infection?	1.Yes 2.No 3. I Don't know
3.9	Nutritional status of the cases/ MAUC measurement	1.Normal 2.Moderate

		3.Severely malnourished
3.10	How many people are living together in one house with you:	_____
3.11	What is the estimated area of the house?	_____
3.12	Where did you go first when you get ill with measles?	1. Health Facility 2. Traditional Healers 3. Holy Water 4. Stayed at home 5. Other :(Specify)_____
3.13	Do you Know measles is vaccine preventable?	1. Yes 2. No 3. I Don't Know
3.14	Do you Know the right age for Measles Vaccination? If Yes, Tell Me:----------	1. Yes 2. No
3.15	Can You Tell me the sign and symptoms of Measles?	-
3.16	Can you Tell me How Measles Transmits?	
3.17	Can you tell me How Measles could be prevented?	
3.18	Do you think that treatment can reduce Measles complication, disability and death?	1. Yes 2. No 3. I do not know
3.19	Did you admitted in health facility	1. Yes 2. No

Annex 2: Questionnaire for evaluation of zonal PHEM malaria surveillance system.

Respondent(s) ---------- Zone ----------Total population ----------Kebele--------

Urban __ rural ___ Male _____ Female ____ HC----HP ----HAD ----------

Private health facilities ---- NGOS--- Cell phone no _____e-mail _____

PART ONE: Observe all documents and reports

A. Communication and reporting system assessment

1. Which communication material did you have? E-mail fixed line mobile radio fax other-----
2. Number of HP, HC, woreda, and hospitals that have communication facilities ----------
3. Did you have address of Hf, woreda, Hospital and regional PHEM officers? ☐ Yes ☐ No
4. How frequently you communicate with woreda and regional PHEM officers on emergencies and other daily activities? ☐ Daily ☐ weekly ☐ every 2 week ☐ monthly ☐ quarterly ☐ every 6 month ☐ yearly ☐ others----------
5. When are you expected to send weekly report to the regional PHEM unit? ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday
6. When are you expected to receive weekly report from woredas/town administration? ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday
7. 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
8. If yes to whom did you send? ----------
9. If no, why? ----------

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

1. Are there a National Guide line/manual for surveillance? ☐ Yes ☐ No ☐ unknown
2. If no, what did you use for priorities health events?
3. Did you have standard case definition for all country priority diseases? ☐ Yes ☐ No ☐ NA
4. Was the case definition posted? ☐ Yes ☐ No
5. If answer for Q2 is No, for which disease(s) did you lack the case definition?
6. Did you have case based reporting formats? ☐ Yes ☐ No ☐ NA
7. Was there guide line for specimen collection, handling and transportation to the next level?

8. Did you have line list for reporting cases? ☐ Yes ☐ No ☐ Not Applicable
9. If no, for which disease/event you lack?
10. Did you have outbreak investigation guideline? ☐ Yes ☐ No
11. If no, how do you prevent, control, and investigate it?
12. Did you have a rumor logbook? ☐ Yes ☐ No

C. <u>Training, Computer skill, and Data analysis assessment</u>

1. Number of PHEM officer assigned based on the structure ----------
2. Number of trained surveillance officer on PHEM? ☐ Yes ☐ No
3. Did you give any onsite orientation about surveillance system for officers? ☐ Yes ☐ No
4. If no, why? ----------
5. Did you have <u>computer</u>, <u>photocopier</u>, <u>printer</u>, <u>data manager</u>?
6. Do you have a computerized surveillance network? ☐ Yes ☐ No
7. Was surveillance data compiled? ☐ Yes ☐ No
8. How the data entry and compilation is accomplished? ☐ Manual ☐ Computer ☐ other------
9. Did you have computer skill on ☐ Ms. word ☐ Ms. excel ☐ MS power point ☐ Epi-info
10. Did you analyze data of the surveillance system including trend analysis? ☐ Yes ☐ No
11. If yes, did you describe data by ☐ time ☐ place ☐ person
12. If no, how did you use data for action? ----------
13. Did you have denominators for data analysis? ☐ total pop ☐ male ☐ female ☐ <5
14. Please indicate the frequency of your data analysis. ☐ weekly ☐ Monthly ☐ every two week ☐ quarterly ☐every 6 month ☐ annually ☐ No regular time
15. Did you notify the results of your analysis to the lower level? ☐ Yes ☐ No
16. If no, why? Less attention, lack of knowledge, time shortage, not familiar, shortage of material, other

D. <u>Epidemic Preparedness, and response assessment</u>

1. Did you have plan for epidemic preparedness and response plan and ☐ Yes ☐ No
2. If no, how did you implement public health priorities? ----------
3. Did you have emergency stocks of drugs and supplies? ☐ Yes ☐ No
4. If No, how did you control emergency events? ----------
5. Have you experienced shortage of drugs, ITNs and other supplies in 2006 EFY? Yes no
6. Was an epidemic management committee built at zonal level? ☐ Yes ☐ No ☐ I do not

7. Did the epidemic management committee have regularly scheduled meeting time?☐ Yes No
8. Was Rapid response team (RRT) built in your office? ☐ Yes ☐ No ☐ Not Applicable
9. Did the RRT have regularly scheduled meeting time during epidemics? ☐ Yes ☐ No
10. If no, how did/do you control and prevent emergency events? ----------
11. Did you have case management protocol for epidemic prone diseases?☐ Yes ☐ No ☐ Not Applicable
12. Did your PHEM have multi-sectorial emergency preparedness and response task force? ☐ Yes ☐ No ☐ I do not know
13. Did the partners working together with your office on emergencies? ☐ Yes ☐ No
14. If yes, what type of supports did you get for emergency?
15. Did the budget allocated for epidemic/emergency response? ☐ Yes ☐ No
16. Who had the authority to mobilize the emergency finance? ☐woreda head ☐ woreda health department ☐ experts ☐ other----------
17. Did you have a vehicle for emergencies (PHEM)? ☐ Yes ☐ No ☐ Not applicable
18. If answer for Q17 is NO, how did you address emergencies?

E. <u>Case detection, reporting, confirmation and Outbreak investigation assessment</u>

1. Did you detect any priority diseases case in 2006 EFY ☐ Yes ☐ No
2. Did/ do you register any detected cases ☐ Yes ☐ No
3. Did/ do you report any case to the higher level? ☐ Yes ☐ No

Have you investigated any outbreak in 2006 EFY? ☐ Yes ☐ No , list if any and response time

4. Where did confirmation of laboratory cases? ☐ regional lab ☐ Hospital ☐ EPHI ☐ HC ☐ other---
5. Who is responsible to investigate an outbreak? ☐ RRT ☐ HEWs ☐ staffs of woreda health office ☐ experts organized randomly ☐ health facility staffs ☐ other-------
6. Have you faced any challenge in outbreak investigation in 2006 EFY? ☐ Yes ☐ No
7. If yes, list the challenges and action taken----------

F. <u>Supervision and feedback assessment</u>

1. Did you have supervision plan in 2006 EFY? ☐ Yes ☐ No
2. If yes, did you supervise HHs, HPs, HCs, woredas, and Hospitals? Yes NO
3. If no, how did you supervise? ----------

4. Did you notify your supervision plan prior to supervision? ☐ Yes ☐ No
5. If no, why? ----------
6. Did you have supervision checklist? ☐ Yes ☐ No
7. If No, how did you supervise woredas and health facilities? ----------
8. Did you send feedback to the lower level indicating their strong and weak sides? ☐ Yes No
9. If No, why? ----------
10. If yes, for how many of them did you send a feedback in 2006 EFY_____
11. Did you have a follow up mechanism to improve limitations indicated by supervision? ☐ Yes ☐ No
12. Have you reviewed about surveillance practice by higher level supervision in 2006? Yes No
13. How many times did you supervised by higher level officers in 2006 EFY? ----------
14. Have you received schedule of supervision from higher level in 2006?
15. Have you received feedback from higher level supervisors in 2006 EFY? ☐ Yes ☐ No
16. What action did you take to improve the limitation of the feedback given by higher level? ----
17. Did you have active case search plan in 2006 EFY? ☐ Yes ☐ No
18. If no, how did you implement case searching plan activities?
19. Have you faced any challenge on supervision and feedback in 2006 EFY? ☐ Yes ☐ No
20. If yes, list the challenges and actions taken? ----------

PART-TWO

IS THE SURVEILLANCE SYSTEM HELPFUL?

1. To detect outbreaks early on time to permit accurate diagnosis? ☐ Yes ☐ No
2. To estimate the magnitude of morbidity and mortality? ☐ Yes ☐ No
3. Permit assessment of the effect of prevention and control programs? ☐ Yes ☐ No
4. To estimate research intended to lead to prevention and control? ☐ Yes ☐ No

Describe Each System Attributes:

I. Simplicity:

1. Is the case definition easy for case detection by all level health professionals? ☐ Yes ☐ No
2. Does the surveillance system allow all levels of professionals to fill data? ☐ Yes ☐ No

3. Does the surveillance system help to record and report data on time? ☐ Yes ☐ No
4. Does the surveillance system have necessary information for investigation? ☐ Yes ☐ No
5. Does the surveillance system allow updating data on the cases? ☐ Yes ☐ No
6. How long does it take to fill the format? ☐ <5 min ☐5 to 10 min ☐ 10 to15min☐ >15 min
7. How long does it take to have laboratory confirmation? ----------

II. Flexibility

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

III. Data quality

1. Are all reported forms Complete? ☐ Yes ☐ No
2. If No, how many unfilled spaces are in your 2006 EFY report? ----------
3. Percentage of unknown or blank responses to variables from the total reports of 2006 EFY report---
4. Percent of reports which are complete(that is with no blank or unknown responses) from the total --
5. Is the recorded data clear to read and understand? ☐ Yes ☐ No
6. If No, how many records are not clear/are difficult to understand in 2006 EFY report? --------
7. Percent of records which are difficult to read/ understand. ----------

IV. Acceptability

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

2. If yes, how many are active participants (of the expected)? ----------

3. If No, what is the reason for their poor participation in the surveillance activity?

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

B) No feedback / or recognition given by the higher bodies for their contribution

C) Reporting formats are difficult to understand

D) Report formats are time consuming

E) Other: ----------

4. Were all participants using the standard case definition to identify cases? ☐ Yes ☐ No

5. Were all the reporting agents send their report using the current and appropriate surveillance reporting format? ☐ Yes ☐ No

7. Were all the health professionals aware about the surveillance system? ☐ Yes ☐ No

8. Was all PHEM officers send report on time? ☐ Yes ☐ No

V. Representativeness

1. Was the surveillance system enabled to follow the health and health related events in the whole community? ☐ Yes ☐ No
2. If no, who do you think is well benefited by the surveillance system? ☐ urban ☐ rural ☐ both
3. Are all the Socio demographic variables included in the surveillance reporting format? ☐ Yes ☐ No
4. If No, which a) Sex---- b) age group---C) ethnic group----d) religion---- is less represented?

VI. Timeliness

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

VII. Completeness

1. Are all reporting sites reporting? ☐ Yes ☐ No

2. Percent of HF/woreda that send report of each week in 2006 EFY. ----------

VIII. Stability

1. Was any new restructuring affected the procedures and activities of the surveillance? ☐ Yes ☐ No
2. Was there lack of resources that interrupt the surveillance system? ☐ Yes ☐ No
3. Was there any time /condition in which the surveillance is not fully operating? ☐ Yes ☐ No
4. If yes, explain why? ----------

Annex 3: Questionnaire for evaluation of Woreda PHEM malaria surveillance system.

Respondent(s) ----------Woreda _____Total population ----------Kebele--------

Urban _____ rural _____ Male _____ Female --------HC------ HP ----- HAD ----------

Number of private health facilities --------- NGOS----- Phone number ----------e-mail ----------

PART ONE: Observe all documents and reports

G. Communication and reporting system assessment

10. Which communication material did you have? E-mail Fixed phone mobile radio fax other--
11. Number of HPs, and HCs that have communication facilities (list)----------
12. Did you have address of HP, HC, zonal PHEM officers? ☐ Yes ☐ No
13. How frequently you communicate with the zonal PHEM officers and HC on emergencies and other daily activities? ☐ Daily ☐ weekly ☐ every 2 week ☐ monthly ☐ quarterly ☐ every 6 month ☐ yearly ☐ others----------
14. When are you expected to send weekly report to the zonal PHEM unit? ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday
15. When are you expected to receive weekly report from HCs/HPs? ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday
16. 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
17. If yes, to whom did you send? ----------
18. If no, why----------

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

13. Were there a National Guide line/manual for surveillance? ☐ Yes ☐ No ☐ unknown
14. If no, what did you use for priorities health events?
15. Did you have standard case definition for all country priority diseases? ☐ Yes ☐ No ☐ NA
16. Was the case definition posted? ☐ Yes ☐ No
17. If answer for Q2 is No, for which disease(s) did you lack the case definition?
18. Did you have case based reporting formats? ☐ Yes ☐ No ☐ NA

19. Was there guide line for specimen collection, handling and transportation to the next level? ☐ Yes ☐ No ☐ NA
20. Did you have line list for reporting cases? ☐ Yes ☐ No ☐ Not Applicable
21. If no, for which disease/event you lack?
22. Did you have outbreak investigation guideline? ☐ Yes ☐ No
23. If no, how do you prevent, control, and investigate it?
24. Did you have a rumor logbook? ☐ Yes ☐ No

I. Training Computer skill, and Data analysis assessment

17. Number of PHEM officer assigned based on BPR structure ----------
18. Number of trained surveillance officer on PHEM? ☐ Yes ☐ No
19. Did you give any onsite orientation about surveillance system for Hc and HEWs? Yes☐ No
20. If no, why? ----------
21. Did you have computer, photocopier, printer, data manager?
22. Do you have a computerized surveillance network? ☐ Yes ☐ No
23. Did you compile surveillance data? ☐ Yes ☐ No
24. How the data entry and compilation is accomplished? ☐ Manual ☐ Computer ☐ other----
25. Did you have computer skill on ☐ Ms. word ☐ Ms. excel ☐ MS power point ☐ Epi-info
26. Did you analyze data of the surveillance system including trend analysis ☐ Yes ☐ No
27. If yes, did you describe data by ☐ time ☐ place ☐ person
28. If no, how did you use data for action? ----------
29. Did you have denominators for data analysis? total pop male female <5 1years other
30. Please indicate the frequency of your data analysis. ☐ weekly ☐ Monthly ☐ every two week ☐ quarterly ☐every 6 month ☐ annually ☐ No regular time
31. Did you notify the results of your analysis to the lower level PHEM? ☐ Yes ☐ No
32. If no, why? Less attention, lack of knowledge, time shortage, not familiar, shortage of material, other

Epidemic Preparedness, and response assessment

19. Did you have plan for epidemic preparedness and response ☐ Yes ☐ No
20. If no, how did you implement public health priorities? ----------
21. Did you have emergency stocks of drugs and supplies? ☐ Yes ☐ No

22. If no, how did you control epidemics? ----------
23. Have you experienced shortage of drugs, ITNs and supplies in 2006 EFY? ☐ Yes ☐ No
24. Was an epidemic management committee built in your office? ☐ Yes☐ No☐ I do not know
25. Did the epidemic management committee have regularly scheduled meeting time Yes☐ No
26. Was Rapid response team (RRT) built in your office? ☐ Yes ☐ No ☐ I do not know
27. Did the RRT have regularly scheduled meeting time during epidemics? ☐ Yes ☐ No
28. If no, how did/ do you control emergency events? ----------
29. Did you have case management protocol for epidemic prone diseases? Yes No I do not know
30. Did your PHEM have multi-sectorial emergency preparedness and response task force? ☐ Yes ☐ No ☐ Not Applicable
31. Did the partners working together with your office on emergencies? ☐ Yes ☐ No
32. If yes, what type of supports did you get for emergency?
33. Was the budget allocated for epidemic/emergency response? ☐ Yes ☐ No ☐ I do not konw
34. Did you have a vehicle for emergencies (PHEM)? ☐ Yes ☐ No ☐ Not applicable
35. If no, how did you address emergencies?

D. Case detection, reporting, confirmation and Outbreak investigation, assessment

1. Did you detect any priority diseases case in 2006 EFY ☐ Yes ☐ No
2. Did/ do you register any detected cases ☐ Yes ☐ No
3. Did/ do you report any case to the higher level? ☐ Yes ☐ No
4. Have you investigated any outbreak in 2006 EFY? ☐ Yes ☐ No , if yes, the response time--
5. Where did confirmation of laboratory cases? ☐ regional lab ☐ Hospital ☐ EPHI ☐ HC
6. Who is responsible to investigate an outbreak? ☐ RRT ☐ HEWs ☐ staffs of woreda health office ☐ experts organized randomly ☐ health facility staffs ☐ other----------
7. Did you faced any challenge in outbreak investigation in 2006 EFY? ☐ Yes ☐ No
8. If yes, List the challenges and action taken----------

E. Supervision and feedback assessment

21. Did you have supervision plan in 2006 EFY? ☐ Yes ☐ No
22. If yes, did you supervise the HHs, HPs, and HCs according to your plan in 2006 EFY? ☐ Yes ☐ No

23. If no, how did you give a support? ----------
-
24. Did you notify your supervision plan prior to supervision? ☐ Yes ☐ No
25. If no, why----------
26. Did you have supervision checklist? ☐ Yes ☐ No
27. If no, how did you supervise the health facilities without checklist? ----------
28. Did you send feedback to HCs and HPs indicating their strong and weak sides? ☐ Yes ☐ No
29. If no, why? ----------
30. If yes, for how many of HP and HCs did you send a feedback in 2006 EFY_____
31. Did you have a follow up mechanism to improve limitations indicated by supervision? ☐ Yes ☐ No
32. Did you review about surveillance practice by higher level supervision in 2006?☐ Yes ☐ No
33. How many times did you supervised by higher level officers in 2006 EFY? ----------
34. Have you received schedule of supervision from higher level in 2006?
35. Have you received feedback from higher level supervisors in 2006 EFY? ☐ Yes ☐ No
36. What action did you take to improve the limitation of the feedback given by higher level? ----
37. Did you have active case search plan in 2006 EFY? ☐ Yes ☐ No
38. If no, how did you implement case searching plan activities?
39. Have you faced any challenge on supervision and feedback in 2006 EFY? ☐ Yes ☐ No
40. If yes, list the challenges and actions taken? ----------

PART-TWO

IS THE SURVEILLANCE SYSTEM HELPFUL?

5. To detect outbreaks early on time to permit accurate diagnosis? ☐ Yes ☐ No
6. To estimate the magnitude of morbidity and mortality? ☐ Yes ☐ No
7. Permit assessment of the effect of prevention and control programs? ☐ Yes ☐ No
8. To estimate research intended to lead to prevention and control? ☐ Yes ☐ No

Describe Each System Attributes:

IX. Simplicity:

8. Is the case definition easy for case detection by all level health professionals? ☐ Yes ☐ No
9. Does the surveillance system allow all levels of professionals to fill data? ☐ Yes ☐ No
10. Does the surveillance system help to record and report data on time? ☐ Yes ☐ No
11. Does the surveillance system have necessary information for investigation? ☐ Yes ☐ No
12. Does the surveillance system allow updating data on the cases? ☐ Yes ☐ No
13. How long does it take to fill the format? ☐ <5 min ☐5 to 10 min ☐ 10 to15min ☐ >15 min
14. How long does it take to have laboratory confirmation? ----------

X. **Flexibility**

1. Can the current reporting formats be used for other newly occurring health event (disease) without much difficulty? ☐ Yes ☐ No

2. Did you think that any change in the existing procedure of case detection and reporting formats will be difficult to implement? ☐ Yes ☐ No , Add your explanation --------

3. Is the system easy to add new variables? ☐ Yes ☐ No

4. Is the surveillance system easy to integrate with other systems? ☐ Yes ☐ No

5. Is the surveillance system easy to add new disease on report? ☐ Yes ☐ No

6. Is the system easy to add new information technology? ☐ Yes ☐ No

XI. Data quality

8. Are all reported forms Complete? ☐ Yes ☐ No
9. If No, how many unfilled spaces are in your 2006 EFY report? ----------
10. Percentage of unknown or blank responses to variables from the total reports of 2006 EFY report---
11. Percent of reports which are complete(that is with no blank or unknown responses) from the total--
12. Is the recorded data clear to read and understand? ☐ Yes ☐ No
13. If No, how many records are not clear/are difficult to understand in 2006 EFY report? --------

14. Percent of records which are difficult to read/ understand. ----------

XII. Acceptability

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

5. If yes, how many are active participants (of the expected)? ----------

6. If No, what is the reason for their poor participation in the surveillance activity?

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

B) No feedback / or recognition given by the higher bodies for their contribution

C) Reporting formats are difficult to understand

D) Report formats are time consuming

E) Other: ----------

4. Were all participants using the standard case definition to identify cases? ☐ Yes ☐ No

5. Were all the reporting agents send their report using the current and appropriate surveillance reporting format? ☐ Yes ☐ No

6. Were all the health professionals aware about the surveillance system? ☐ Yes ☐ No

7. Was all PHEM officers send report on time? ☐ Yes ☐ No

XIII. Representativeness

5. Was the surveillance system enabled to follow the health and health related events in the whole community? ☐ Yes ☐ No

6. If no, who do you think is well benefited by the surveillance system? ☐ urban ☐rural ☐ both

7. Are all the Socio demographic variables included in the surveillance reporting format? ☐ Yes ☐ No

8. If No, which a) Sex---- b) age group---C) ethnic group----d) religion---- is less represented?

XIV. Timeliness

3. Are all reporting sites reporting on time? ☐ Yes ☐ No

4. Percent of reporting sites that report on time. ----------

XV. Completeness

3. Are all reporting sites reporting? ☐ Yes ☐ No

4. Percent of Health facilities that send report of each week in 2006 EFY. ----------

XVI. Stability

5. Was any new restructuring affected the procedures and activities of the surveillance? ☐ Yes ☐ No
6. Was there lack of resources that interrupt the surveillance system? ☐ Yes ☐ No
7. Was there any time /condition in which the surveillance is not fully operating? ☐ Yes ☐ No
8. If yes, explain why? ----------

XVII. Sensitivity

1. Does the malaria case definition able to pick all cases? ☐ Yes ☐ No
2. What was the total Malaria cases occurred in your woreda in 2006 EFY? _____
3. What were the total numbers of suspected malaria cases examined by RDT or Microscopy? ____

Annex 4: Questionnaire for evaluation of Health center and Hospital malaria surveillance system.

PART ONE: **Observe all documents and reports**

Communication and reporting system assessment

1. Which communication material did you have? E-mail fixed phone mobile radio fax other----------
2. Number of health posts that have access of communication facilities----------
3. If No, how did you communicate----------?
4. How frequently you communicated with the Woreda PHEM officers on emergencies and other daily activities? ☐ Daily ☐ weekly ☐ every 2 week ☐ monthly ☐ quarterly ☐ every 6 month ☐ yearly ☐ others----------
5. Did you have address of HP and woreda PHEM focal persons? ☐ Yes ☐ No
6. When are you expected to receive weekly report from HPs? ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday
7. When are you expected to send weekly report to the woreda PHEM unit? ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday
8. 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
9. If yes, to whom did you send? ----------
10. If no, why ----------

Assessment of availability of Surveillance Documentation, Registers, and Forms

1. Were there a National Guide line for surveillance? ☐ Yes ☐ No ☐ Not Applicable
2. If No, what did you use for priority health events? ----------
3. Did you have standard case definition for all country priority diseases? ☐ Yes ☐ No ☐ NA
4. Was the case definition posted? ☐ Yes ☐ No
5. If no, for which disease(s) did you lack the case definition?
6. Did you have case based reporting formats? ☐ Yes ☐ No ☐ NA
7. Was there guide line for specimen collection, handling and transportation to the next level? Yes No
8. Did you have line list for reporting outbreaks? ☐ Yes ☐ No ☐ Not Applicable
9. If No, for which diseases you lack? ----------
10. Did you have outbreak investigation guide line? ☐ Yes ☐ No

11. If no, how did you prevent, control, and investigate it? ----------
12. Did you have a rumor logbook? ☐ Yes ☐ No

Training, computer skill, and data analysis assessment

1. Did you have IDSR focal person in 2006? ☐ Yes ☐ No
2. If yes, did he conduct training? ☐ Yes ☐ No
3. Did you give any onsite orientation about surveillance system for your staff and HEWs? ☐ Yes ☐ No
4. If no, why ----------
5. Did you have a computer, photocopier, printer, data manager?
6. Do you have a computerized surveillance network? ☐ Yes ☐ No
7. Did you compile surveillance data? ☐ Yes ☐ No
8. How the data entry and compilation is accomplished? ☐ Manual ☐ Computer ☐ other----------
9. Did you have computer skill on ☐ Ms word ☐ Ms excel ☐ MS power point ☐ Epi-info
10. Did you analyze data of the surveillance system including trend analysis? ☐ Yes ☐ No
11. If yes, did you describe data by ☐ time ☐ place ☐ person
12. If no, how did you use data for action----------
13. Did you have denominators for data analysis? Total pop, male, female, <5 , PW, < 1years
14. Please indicate the frequency of your data analysis. ☐ weekly ☐ every two week ☐ Monthly ☐ quarterly ☐every 6 month ☐ annually ☐ No regular time
15. Did you notify the results of your analysis to lower level PHEM? ☐ Yes ☐ No
16. If no, why? Less attention, lack of knowledge, time shortage, not familiar, shortage of material, other

Epidemic Preparedness, and response assessment

1. Did you have plan for epidemic preparedness and response ☐ Yes ☐ No
2. If No, how did you implement priority problems? ----------
3. Did you have emergency stocks of drugs and supplies? ☐ Yes ☐ No
4. If No, how did you control epidemics? ----------
5. Have you experienced shortage of drugs, vaccines and supplies in 2006 EFY? ☐ Yes ☐ No
6. Was Rapid response team (RRT) built in your office? ☐ Yes ☐ No ☐ I do not know
7. Did the RRT have regularly scheduled meeting time during epidemics? ☐ Yes ☐ No
8. If no, how did you control emergency events? ----------
9. Did you have case management protocol for epidemic prone diseases?☐ Yes☐ No ☐ I do not know
10. Did partners working together with your office on emergencies? ☐ Yes ☐ No

11. If yes, what type of supports did they give to your office?
12. Was there a budget for epidemic response? ☐ Yes ☐ No
13. Did you have a vehicle assigned for emergencies (PHEM)? ☐ Yes ☐ No ☐ Not applicable
14. If answer for Q17 is NO, how did you address emergencies?

Case detection, reporting, case confirmation and Outbreak investigation assessment

Did you detect any priority diseases case? ☐ Yes ☐ No

Did/ do you register any detected cases ☐ Yes ☐ No

Did/ do you report any case to the higher level? ☐ Yes ☐ No

Have you investigated any outbreak in 2006 EFY? ☐ Yes ☐ No , if yes the response time ----------

Where was laboratory confirmation of cases? ☐ regional lab ☐Hospital ☐ EHNRI ☐ HC ☐ other----

Who is responsible to investigate an outbreak? ☐ RRT ☐ HEWs ☐ staffs of woreda health office ☐ experts organized randomly ☐ health facility staffs ☐ other----------

Did you face any challenge in outbreak investigation in 2006 EFY? ☐ Yes ☐ No

yes, List the challenges and action taken----------

Supervision and feedback assessment

Did you have supervision plan in 2006 EFY? ☐ Yes ☐ No

If yes, did you supervise HHs, and HPs according to your plan in 2006 EFY? ☐ Yes ☐ No

If No, how did you support them? ----------

Did you notify your supervision plan prior to supervision? ☐ Yes ☐ No

If no, why? ----------

Did you have a supervision checklist? ☐ Yes ☐ No

If no, how did you supervise without checklist? ----------
--

Did you send feedback of supervision to HP indicating their strong and weak sides? ☐ Yes ☐ No

If No, why? ----------

If yes, for how many HPs did you send a feedback in 2006 EFY_____?

If yes, did you have the follow up mechanism check list? ☐ Yes ☐ No

Did you review about surveillance practice by higher level supervision? ☐ Yes ☐ No

How many times did you supervise by higher level officers/woreda/zone in 2006 EFY?

Have received supervision plan from higher level? ? ☐ Yes ☐ No

Have you received feedback from higher level supervisors in 2006 EFY? ☐ Yes ☐ No

Did you have a mechanism for improving the weakness of feedback given? ☐ Yes ☐ No

What action did you take to improve the limitation of the feedback given by higher level? ----------

Did you have active case search plan in 2006? Yes ☐ No

If no, how did you implement case searching?

Have you faced any challenge on supervision and feedback in 2006 EFY? ☐ Yes ☐ No

If yes, list challenges and action taken----------

--

PARYT-TWO

IS THE SURVEILLANCE SYSTEM Helpful?

1. To detect outbreaks early on time to permit accurate diagnosis? ☐ Yes ☐ No
2. To estimate the magnitude of morbidity and mortality? ☐ Yes ☐ No
3. Permit assessment of the effect of prevention and control programs? ☐ Yes ☐ No
4. To estimate research intended to lead to prevention and control? ☐ Yes ☐ No

System Attributes:

I. Simplicity:

1. Is the case definition easy for case detection by all level health professionals? ☐ Yes ☐ No
2. Does the surveillance system allow all levels of professionals to fill data? ☐ Yes ☐ No
3. Does the surveillance system easy to record and report data on time? ☐ Yes ☐ No
4. Does the surveillance system have necessary information for investigation? ☐ Yes ☐ No
5. Does the surveillance system allow updating data on the cases? ☐ Yes ☐ No
6. How long does it take to fill the format? ☐ <5 min ☐5 to 10 min ☐ 10 to15min ☐ >15 min
7. How long does it take to have laboratory confirmation/RDTs? ----------

II. Flexibility

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

III. Data quality

1. Are all reported forms Complete? ☐ Yes ☐ No
2. If answer for Q1 is No, how many unfilled spaces are in your 2006 EFY report? ----------

3. Percentage of unknown or blank responses to variables from the total reports of 2006 EFY report---
4. Percent of reports which are complete(that is with no blank or unknown responses) from the total---
5. Is the recorded data clear to read and understand? ☐ Yes ☐ No
6. If no, how many records are not clear/are difficult to understand in 2006 EFY report? --------
7. Percent of records which are difficult to read/ understand. ----------

IV. Acceptability

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

2. If yes, how many are active participants (of the expected)? ----------

3. If No, what is the reason for their poor participation in the surveillance activity?

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

B) No feedback / or recognition given by the higher bodies for their contribution

C) Reporting formats are difficult to understand

D) Report formats are time consuming

E) Other: ----------

4. Were all participants using the standard case definition to identify cases? ☐ Yes ☐ No

5. Were all the reporting agents send their report using the current and appropriate surveillance reporting format? ☐ Yes ☐ No

6. Were all the health professionals aware about the surveillance system? ☐ Yes ☐ No

7. Was all PHEM officers send report on time? ☐ Yes ☐ No

V. Representativeness

1. Was the surveillance system enabled to follow the health and health related events in the whole community? ☐ Yes ☐ No
2. If no, who do you think is well benefited by the surveillance system? ☐urban ☐ rural ☐ both
3. Are all the Socio demographic variables included in the surveillance reporting format? ☐ Yes ☐ No
4. If no, which a) Sex---- b) age group---C) ethnic group----d) religion---- is less represented?

VI. Timeliness

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

VII. Completeness

1. Are all reporting sites reporting including private facilities? ☐ Yes ☐ No

2. Percent of Health posts that send report of each week in 2006 EFY. ----------

VIII. Stability

9. Was any new restructuring affected the procedures and activities of the surveillance? ☐ Yes ☐ No

10. Was there lack of resources that interrupt the surveillance system? ☐ Yes ☐ No
11. Was there any time /condition in which the surveillance is not fully operating? ☐ Yes ☐ No
12. If the answer for Q3 is yes, explain why? ----------

IX. Sensitivity

1. Does the malaria case definition able to pick all cases? ☐ Yes ☐ No
2. What was the total Malaria cases occurred in your HC catchment in 2006 EFY? _____
3. What were the total numbers of suspected malaria cases examined by RDT or Microscopy in 2006 ---
4. How many of those cases were laboratory confirmed? PF_____ PV_____ Mixed_____ Total_____
5. Was there Malaria epidemic in your catchment are in 2006EFY? ☐ Yes ☐ No
6. If yes, how many out breaks? --------

Annex 5: Questionnaire for evaluation of Health post malaria surveillance system.

Respondents_____Date of data collection ----------

Woreda _____ HP ----------Catchment population ---------- M-------- F ----------

Address phone no _____ e-mail _____

PART ONE: Observe all documents and reports

Communication and reporting system assessment

1. Which communication material did you have? E-mail wired phone mobile radio fax other----------
2. Did you have address of HC/Woreda PHEM officers? ☐ Yes ☐ No
3. How frequently you communicate with the HC/ Woreda PHEM officers on emergencies and other daily activities? ☐ Daily ☐ weekly ☐ every 2 week ☐ monthly ☐ quarterly ☐ every 6 month ☐ yearly ☐ others----------
4. When are you expected to receive weekly report from HPs? ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday
5. When are you expected to send weekly report to the HC/ Woreda PHEM unit? ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday
6. 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
7. If yes, to whom did you send? ----------

Assessment of availability of Surveillance Documentation, Registers, and Formats

1. Do you have National Guide line for surveillance? ☐ Yes ☐ No ☐ Not Applicable
2. If No, what did you use for priority health events? ----------
3. Did you have standard case definition for all country priority diseases? ☐ Yes ☐ No ☐ NA
4. Was the case definition posted? ☐ Yes ☐ No
5. If answer for Q2 is No, for which disease(s) did you lack the case definition?
6. Did you have line list for reporting outbreaks? ☐ Yes ☐ No ☐ Not Applicable
7. **Training, computer/ calculator, data analysis assessment**

1. Have you trained on surveillance system? ☐ Yes ☐ No
2. How the data entry and compilation is accomplished? ☐ Manual ☐ calculator/Computer ☐ other---

3. Did you analyze data of the surveillance system? ☐ Yes ☐ No
4. Did you have denominators for data analysis? ☐ total pop ☐ male ☐ female ☐ <5 ☐ pregnant
5. Did you notify the results of your analysis to the health development armies ☐ Yes ☐ No

Case detection, reporting, confirmation and assessment

1. Had you detected any case in 2006 EFY? ☐ Yes ☐ No , list if any
2. If yes, did you report it on time? ☐ Yes ☐ No
3. Did you have case detection check list (guide line)? ☐ Yes ☐ No
4. If no, how did you know possible factors for the outbreak?
5. Who was responsible to detect any case? ☐ HDA ☐ HEWs ☐ Hc ☐ woreda ☐ other----------
6. Had you faced any challenge in case detection in 2006 EFY? ☐ Yes ☐ No
7. If yes, list the challenges and action taken ----------

1. Supervision and feedback assessment

1. Had you reviewed about surveillance practice by HCs, Woreda or partner? ☐ Yes ☐ No
2. Were you supervised by higher level officers in 2006EFY? ☐ Yes ☐ No
3. If yes how many times in 2006 EFY? ----------
4. Had you received feedback from higher level supervisors in 2006 EFY? ☐ Yes ☐ No
5. If is yes how many feedbacks did you received in 2006 EFY? ----------
6. How did you improve the weakness of supervision given by feedbacks? ----------

PARYT-TWO

IS THE SURVEILLANCE SYSTEM HELP FUL?

1. To detect cases early on time to permit accurate diagnosis? ☐ Yes ☐ No
2. To estimate the magnitude of morbidity and mortality? ☐ Yes ☐ No
3. Permit assessment of the effect of prevention and control programs? ☐ Yes ☐ No

Describe Each System Attributes:

I. Simplicity:

1. Is the case definition easy for case detection by HEWs and HDAs? ☐ Yes ☐ No
2. Does the surveillance system allow all levels of professionals to fill data? ☐ Yes ☐ No
3. Does the surveillance system help to record and report data on time? ☐ Yes ☐ No
4. Does the surveillance system have necessary information for investigation? ☐ Yes ☐ No
5. Does the surveillance system allow updating data on the cases? ☐ Yes ☐ No
6. How long does it take to fill the format? ☐ <5 min ☐5 to 10 min ☐ 10 to15min ☐ >15 min

7. How long does it take to have laboratory confirmation/ RDT test? ----------

II. Flexibility

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

III. Data quality

1. Are all reported forms Complete? ☐ Yes ☐ No
2. If answer for Q1 is No, how many unfilled spaces are in your 2006 EFY report? ----------
3. Percentage of unknown or blank responses to variables from the total reports of 2006 EFY report---
4. Percent of reports which are complete(that is with no blank or unknown responses) from the total --
5. Is the recorded data clear to read and understand? ☐ Yes ☐ No
6. If No, how many records are not clear/are difficult to understand in 2006 EFY report? --------
7. Percent of records which are difficult to read/ understand. ----------

IV. Acceptability

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

2. If yes, how many are active participants (of the expected)? ----------

3. If No, what is the reason for their poor participation in the surveillance activity?

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

B) No feedback / or recognition given by the higher bodies for their contribution

C) Reporting formats are difficult to understand

D) Report formats are time consuming

E) Other: ----------

4. Did all participants using the community case definition to identify cases? ☐ Yes ☐ No

5. Did all the reporting agents send their report using the current and appropriate surveillance reporting format? ☐ Yes ☐ No

6. Did all the health development armies aware about the surveillance system? ☐ Yes ☐ No

V. Representativeness

1. Was the surveillance system enabled to follow the health and health related events in the whole community? ☐ Yes ☐ No
2. If answer for Q1 is no, who do you think is well benefited by the surveillance system? ☐ The urban ☐ the rural ☐ both
3. Are all the Socio demographic variables included in the surveillance reporting format? ☐ Yes ☐ No
4. If the answer for Q3 is No, which a) Sex---- b) age group---C) ethnic group----d) religion---- is less represented?

VI. Timeliness

1. Does your health post report on time? ☐ Yes ☐ No
2. Percent of reports sent to Health center/ Woreda on time. ----------

VII. Completeness

1. Are all reports sent complete? ☐ Yes ☐ No
2. Number of weekly reports sent in 2006 EFY. ----------

VIII. Stability

1. Was any new restructuring affected the procedures and activities of the surveillance? ☐ Yes ☐ No
2. Was there lack of resources that interrupt the surveillance system? ☐ Yes ☐ No
3. Was there any time /condition in which the surveillance is not fully operating? ☐ Yes ☐ No
4. If the answer for Q3 is yes, explain why? ----------

IX. Sensitivity

1. Does the case definition able to pick all cases? ☐ Yes ☐ No
2. What was the total Malaria cases occurred in your HP in 2006 EFY? _____
3. What was the total numbers of suspected malaria cases examined by RDT in 2006 EFY?
4. How many of those cases were laboratory confirmed? PF_____ PV_____ Mixed_____ Total_____
5. Was there Malaria epidemic in your catchment are in 2006 EFY? ☐ Yes ☐ No
6. If yes, how many out breaks? ----------

Annex 5. Questionnaire for prevalence and risk factors of malaria in Kedida-Gamela district

Part I- Socioeconomic status of study

Questions	Answer/s
1. Name of project site	----------
2. Number of household members	----------
3. Age of the participant	----------
4. Sex of the participant	1. Male 2. female
5. Religion	----------
6. Ethnicity	----------
7. Marital status	----------
8. Educational level of the participant	----------
9. Your income in a month (ETB)	----------
10. Educational	----------
11. What is the housing structure/	1. Local material constructed, 2. Iron corrugated 3.
12. What is number of sleeping beds	----------
13. Does the house has openings other than doors and windows?	1. Yes 2. No
14. Type of house roof	1. Mud 2. Thatch 3. Corrugated 4. Other
15. The number of windows in the house	----------(count)

Part II- Questions of Knowledge, attitude, practice, behavioral, geographic (observe)

Questions	Answer/s
1. Did you have bed net?	1. Yes 2. No 3. I do not know
2. The number of bed nets in the house	----------
3. Who is using the bed net at night time?	----------
4. If yes, did you slept under it in the previous night	1. Yes 2. No
5. Did the bed net hanged correctly	1. Yes 2. No
6. Do you believe that bed prevent mosquito biting?	1. Yes 2. No
7. Did you spray your house this year?	1. Yes 2. No
8. Do you believe that IRS is important for malaria prevention?	1. Yes 2. No
9. What would be the cause of malaria?	
10. Tell me the s/s of malaria?	
11. Was there any person ill in the last 6-month?	1. Yes 2. No
12. Distance from the nearest health facility	----------
13. If yes, where did he/she go?	1. Gov. 2. Private Hf 3. Traditional
14. If yes, did you get the drug?	1. Yes 2. No 3. I used traditional one 4. I did not used the drug
15. Is there stagnant water near to house	1. Yes 2. No 3. I do not know
16. If yes, the distance from living house?	----------
17. Is there interrupted river near to house	1. Yes 2. No

Declaration.

I, the undersigned, declare that this is my original work and has never been presented by another person in this or any other University and that all the source materials and references used for this thesis have been duly acknowledged.

Name: _____

Signature: _____

Place: _____

Date of Submission: _____

The thesis has been submitted for examination with my approval as a university advisor.

Name of advisor: _____

Signature: _____

Date: _____