Addis Ababa University, College of Health Sciences,

School of Public Health (SPH)

Ethiopian Field Epidemiology Training

Program (EFETP)

Compiled Body of Works in Field Epidemiology

By

Tsehay Ayele

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, 2016

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Advisors

Alemayehu Bekele. (MPH, PHD)

Million Tumato (MD, (MPH)

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Approval by Examining Board

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Chairman, School Graduate Committee

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Advisor

_____

Examiner

_____ _____

Examiner

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Addis Ababa

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List of abbreviation

AAU	**Addis Ababa University**
AFI	**Acute Febrile Illness**
AFP	**Acute Flaccid Paralysis**
AIDS	**Acquired Immune Deficiency Syndrome**
AOR	**Adjusted Odds Ratio**
ANC	**Ante Natal Care**
CDC	**Centers for Disease Control & prevention**
CFR	**Case Fatality Rate**
CI	**Confidence Interval**
CAR	**Contraceptive Acceptance Rate**
CVDP	**Circulating Vaccine Derived Polio**
DPHP	**Disease prevention &Health Promotion**
Dr	**Doctor**
EC	**Ethiopian Calendar**
EFETP	**Ethiopian Field Epidemiology Training Program**
EFY	**Ethiopian Fiscal Year**
EHNRI	**Ethiopian Health and Nutrition Research Institute**
EPHI	**Ethiopian Public Health Institute**
EPI	**Expanded Program of Immunization**
EPRP	**Epidemic Preparedness and Response Plan**
FDREMOH	**Federal Democratic Republic Ethiopia Ministry of Health**
FMOH	**Federal Ministry of Health**
FETP	**Field Epidemiology Training Program**
GPEI	**Global Polio Eradication Initiative**

GBS	**Guillain-Barre Syndrome**
Gov	**Government**
HC	**Health Center**
HEW	**Health Extension Worker**
HH	**House Hold**
HIV	**Human Immunodeficiency Virus**
HP	**Health Post**
HR	**Human Resource**
IDSR	**Integrated Disease Surveillance and Response**
IgM	**Immunoglobulin M**
IMR	**Infant Mortality Rate**
IPV	**Inactivated Poliovirus Vaccine**
IRS	**Indore Residual Spray**
ITN	**Insecticide Treated Net**
JSNA	**Joint Strategic Needs Assessment**
KT	**Kambata Tambaro**
KG	**Kedida Gamela**
MAM	**Moderate Acute Malnutrition**
MMR	**Maternal Mortality Ratio**
MOH	**Ministry Of Health**
MUAC	**Mid-Upper Arm Circumference**
OPD	**Out Patient Department**
OR	**Odds Ratio**
OPV	**Oral Polio Vaccine**
PAB	**Protected At Birth**

PF	**Plasmodium Falciparum**
PHCU	**Primary Health Care Unit**
PHEM	**Public Health Emergency Management**
PMTCT	**Prevention of Mother to Child Transmission**
PNC	**Post Natal Care**
PTB	**Pulmonary Tuberculosis**
PV	**Plasmodium Vivax**
RHB	**Regional Health Bureau**
RRT	**Rapid Response Team**
SAM	**Severe Acute Malnutrition**
SNNPR	**South Nations' Nationalities & Peopls Reign**
SIA	**Supplementary Immunization Activities**
Sp	**Special**
Sr. no	**Serial number**
TB	**Tuberculosis**
W/H	**Weight for Height**
WHO	**World Health Organization**
Wk	**Week**
WPV	**Wild Polio Virus**
WRA	**Women of Reproductive Age**
ZHD	**Zonal Health Department**

Executive summary

The current health service policy of Ethiopia gives emphasis to health promotion and prevention focusing on communicable diseases, nutritional disorders and environmental health problems without neglecting essential curative activities. In order to achieve this government of Ethiopia has outlined major strategies that include human resource development. Ethiopian Field Epidemiology Training Program, adapted from the United States Centers for Disease Control and Prevention (CDC) Epidemic Intelligence Service (EIS) was established in 2009 with the aim of producing skilled public health professionals who provide in-service assistance to advance and prevent public health problems and contribute to evidence-based decision-making. Since its inception the program has played a significant role in investigation of outbreaks of unknown causes, priority disease surveillance activities, strengthening of surveillance system and prevention and control measures of prioritized diseases.

From November, 2014 to May, 2016 I have stayed in Field Epidemiology Training Program, School of Public Health-AAU and at South Nations Nationalities Peoples (SNNP) Regional Health Bureau field bases. During my stay I have learnt a lot and carried out many public health activities. I have carried out two outbreak investigations, two surveillance data analysis, one surveillance system evaluation, one district health profile description; two scientific manuscript for peer reviewed journal, three abstracts for scientific conference, one blelg health need assessment and one epidemiological research proposals. In addition I have provided training for district and zonal surveillance focal persons and prepared six weekly epidemiologic bulletins of SNNP regions.

We have investigated two Measles outbreaks during field base residency. The investigations were performed by descriptive and analytical epidemiology methods to describe magnitude of the diseases and identify risk factors associated with diseases. Over the period of outbreak in East Badewacho woreda a total of 158 measles cases and 0 deaths were detected. The overall attack rate was 75.7/100,000 and the case fatality rate was 0%. Having contact with a person suspected to have measles, presence of measles case patient in the family and malnutrition were independent risk factors, and not-vaccinated for measles dependent risk factors and for contracting measles infection. We recommend enhanced routine immunization service, strengthened of surveillance and early reporting system and awareness creation to the community on mode of transmission, prevention and health seeking behavior. In Shashogo woreda a total of 44 measles cases with no deaths were identified. The overall attack rate of this outbreak was 3.5/100,000 population with the highest attack rate were

observed at Shamisa missie kebele with the attack rate of 288/100,000, Pop. 24 (54.5%) measles cases were not received measles vaccine, and 4 (9.1%) measles cases had unknown vaccination history. We recommend, ensuring that the vaccine efficacy is maintained at the kebele level, there should be a refrigerator at the health post. The measles vaccination coverage of the woreda must be improved.

We analyzed five years (2011 – 2015) suspected Measles surveillance data in South, Nations, Nationality, Peoples (SNNP) region to know the burden and trends of the disease. In the five years there were 13,270 suspected Measles cases in SNNP Region with a mean annual incidence of 15.2 suspected patients per 100,000 and 66 suspected deaths with case fatality rate of 0.4%. The magnitude of suspected measles in SNNPR region showed an increasing trend during the past five years except in 2015. We recommended the surveillance activities need improvement in early detection of cases, for the completeness of variables and specificity of reporting suspected measles cases especially during outbreaks. We analyzed nine years (2007 – 2015) suspected AFP surveillance data in South, Nations, Nationality, Peoples (SNNP) region to know the burden and trends of the disease. In the nine years there were 2,108 suspected AFP cases in SNNP Region, Out of the total cases, 2074 (98.4%) AFP cases were under 15 years old. The magnitude of suspected AFP in SNNPR region showed the highest attack rate in less than five years age group. We recommended active surveillance of all AFP cases is mandatory to get the Polio eradicated by health facilities, and districts, and improving data recording, and reporting system by health centers, woredas, and zones.

We conducted evaluation of surveillance system from March, 15-31, 2016 in Hadiya Zone, SNNP, and Region. The surveillance system of the zone was simple, flexible, useful and acceptable.

However, attributes like; data quality, timeliness, and representative require attention for improvement of surveillance process. The system needs to be improved through including timeliness measurement indicators and incorporating all private and NGO health facilities in surveillance reporting units.

We have collected and summarized health and other health related events, demographic, socioeconomic, political and cultural aspect of Kedida- Gamela woreda of West Kambata Tambaro Zone from February, 11-18, 2016. The leading cause for both, adult and less than 5 years children outpatient (OPD) and inpatient visit was malaria.

We have also prepared scientific manuscript for peer reviewed journals on measles outbreak

investigation and response in East Badewacho woreda , Hadiya zone, SNNP Region ,Surveillance data analysis of suspected measles cases in SNNP, region, from 2011 to 2015, Surveillance data analysis of suspected AFP cases in SNNP, region, from 2007 to 2015, four abstracts were prepared for scientific conference on measles outbreak

investigation and response in East Badewacho woreda , Hadiya zone, SNNP Region ,Surveillance data analysis of suspected measles cases in SNNP, region, from 2011 to 2015, Surveillance data analysis of suspected AFP cases in SNNP, region, from 2007 to 2015 .

Blelg Season need assessment was conducted in tow zones of South Nations Nationalities People Region (SNNPR), Sidama and Gedeo zones, south Ethiopia, to identify humanitarian needs including Health emergencies like disease outbreaks or wide spread malnutrition, that usually follow after emergency events due to natural or manmade disasters. We identified lack of emergency preparedness, shortage of emergency drugs and therapeutic feedings and medical equipment at both zonal level and many districts of these zones. Epidemiological research project proposal on Assessment of Prevalence and associated risk factors for malaria in Shashogo woreda, Hadiya zone, SNNP region was prepared. A Cross-sectional descriptive study will be used for this study and Multi-stage sampling technique will be used to get study subjects. The total of 766 households will be assessed in this study. The aim of this 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.

The total estimated budget required for the study is 11,730.USA Dollar. Additionally ten Weekly surveillance bulletin of SNNP region PHEM was also prepared. The bulletin serves to provide feedback on surveillance activities, and summarizes weekly surveillance data and performance of SNNPRHB/PHEM on epidemic prone diseases and other public health emergencies. Health and Nutrition emergency prevention and Response, Command Post ,activities were undertake in Hadiya, Kambata Tambaro zones and Halaba special woreda to coordinate, organize and strengthen the surveillances system of the zone, In South, Nations Nationality Peoples, Region /SNNPR/August-October 2015.

Chapter I – Outbreak/Epidemic Investigations

1.1 Measles Outbreak investigation in East Badewacho Woreda, Hadiya Zone, South, Nations, Nationalities, and Peoples, Region, (SNNPR), April, 2015

Abstract

Background: Measles is vaccine preventable diseases, which cause significant morbidity and mortality among children worldwide especially in developing countries like Ethiopia. In Southern Nation Nationalities and Peoples' Region outbreaks of measles occur every year. The aim was to rapidly investigate the outbreak epidemiologically and guiding response activities in the affected woreda, from March-April 2015.

Methods: We reviewed a line list and case register logbook of the districts, as the World Health Organization, measles case definition. We interviewed 50 cases and 100 controls, using a structured questionnaire. We applied a checklist to observe case managed health facility. We collected blood samples, transported and examined as per to standard. We used epi info 7 to analying the data.

Result: We identified 158 (five confirmed and 153 suspected) measles cases from line list, 86 (54.4%) were males, with median age of 6 years ranging from 7 months to 28 years. The most affected age was 5-9 years 90 (57%), with the age specific attack rate of 310/100,000.The epidemic peaked on 2/17/2015. We recruited 50 cases (median age of 5 years ranging from 1 year to 20 years), and 100 controls (median age 5 years ranging from 1 year to 14 years).Not-vaccinated for measles, [AOR=11.3, 95% CI (4-30.3)], Malnourished [AOR=8.6, 95% CI (3.8- 19.1)], and close Contact with cases, [OR=52.8, 95% CI (14.6, 190.3)], were factors significantly associated with the outbreak.

Conclusion: We confirmed measles IgM as etiologic agent. Not vaccinated, malnourished, and close contact with cases, were likely determinants for this outbreak. Improving measles vaccination coverage, avoiding close contact with cases, and Improving nutritional status to control measles outbreak is necessary.

Key words: Measles, Outbreak, East Badewacho, SNNPR, Ethiopia.

Introduction

Measles is an acute, highly contagious viral disease caused by measles virus. The measles virus is member of the genus Morbillivirus of the family Paramyxoviridae. Scholars believed that the virus appears to be antigenic ally stable because of no evidence that the viral antigens have significantly changed over time. However, sequential analysis of viral genes has shown that there are distinct lineages (genotypes) of wild type measles viruses. In consideration to this epidemiological information, identification of a specific virus genotype can suggest the origin of an outbreak [1].

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 the incubation period is 10 to 12 days from exposure to the onset of fever and other nonspecific symptoms and 14 days (range 7-18 days) from exposure to onset of rash. Clinically measles presented with prodromal symptoms of fever, malaise, cough, coryza (runny nose), and conjunctivitis [1-3].

Measles is vaccine preventable disease. Vaccination is one of the most effective prevention and control mechanisms available. The vaccine is made from a live attenuated virus. When children are correctly administered 0.5 ml of potent live attenuated measles vaccine subcutaneously, serologic studies have demonstrated that measles vaccines induce sero-conversion of 85% at 9 months and above 95% after 12 months of age. The peak antibody response occurs 6 to 8 weeks after infection or vaccination. Immunity conferred by vaccination against measles has been shown to persist for at least 20 years and is generally thought to be life-long for most individuals [1-3].

Infants born to mothers who have either had measles or been vaccinated are protected by Trans placental transferred antibody and Infants are generally protected until 5 to 9 months of age [1].

A second opportunity for vaccination is giving the chance for immunization of measles for the second time to children who may not have got the vaccine or failed to develop protection. The second opportunity can be provided through supplementary immunization activities (SIA) [1, 3].The fourth Millennium Development Goal (MDG 4) aims to reduce the under-five mortality rate by two-thirds between 1990 and 2015. Recognizing the potential of measles vaccination to reduce child mortality, and given that measles vaccination coverage can be considered a marker of access to child health services, routine measles vaccination coverage has been selected as an indicator of progress towards

achieving MDG 4[1-3]. The Measles initiative is a collaborative effort of UNICEF, WHO, the American Red Cross, the United States Centers for Disease Control and Prevention, and the United Nations Foundation.

Building on over a decade of experience in reducing measles mortality, the Measles Initiative advocates with governments and appeal to donors around the world for; two doses of measles vaccine, effective surveillance, rapid response to measles outbreaks, and effective treatment of measles cases. Epidemics of measles occur when the number of susceptible individuals in a population reaches a critical threshold. Outbreaks could occur in areas with lower vaccination coverage and higher malnutrition problem. As immunization coverage increases, the size of epidemics decreases. If the inter-epidemic period lengthens, the proportion of cases among older children increases [4].

Measles is a global health problem which accounts for more than 30 million cases and 0.9 million deaths every year, half of which in Africa. Measles is among the top five causes of death in children less than 5 years of age in many African countries. Currently outbreaks of measles reported in different states of the world. In US during January 1–August 24, 2013, a total of 159 cases were reported to CDC from 16 states and New York City. In South Africa between 2009 and 2011, with over 18,000 cases were recorded [5]. In Ethiopia outbreaks of measles reported every year. In 2014 there were 119 outbreaks with a total of 16,159(2,373 IgM confirmed and 13786 Epi-linked) measles cases [6].Measles outbreak is a yearly event in SSNNP in 2014, 47 suspected measles outbreak were reported from deferent district, 291 IgM confirmed and 3,263 Epi-linked measles cases with incidence of 20.1/100,000 population [7].

Rationale of the study

On March 1, 2015, the regional health bureau received a report of suspected outbreak of measles from East Badewacho Woreda Hadiya Zone. As soon as RHB received the suspected outbreak report a team was organized from a Variety of professionals from SNNP Regional Health Bureau/RHB and Hadiya Zone Health Department ZHD/ moved to the Woreda to control the outbreak, search additional cases, identify possible risk factors, and provide information for future disease prevention planning.

Objectives

General Objective

To assesse and control the outbreak of measles in East Badewacho Woreda and propose possible prevention and control measures.

Specific objectives

To confirm the presence an outbreak

To describe the magnitude of the outbreak by person, place, and time

To determine the factors associated with measles infection

To propose possible prevention and control measures

Methods/ material

Study setting/Study area: We conducted this study in East Badewacho woreda. The woreda is one of the eleven woredas in Hadiya zone, SNNPR, with a total population of 216,714, and 39 kebeles. The estimated population of <15 years age was 103,741(47.87%). The capital of the woreda is Shone. Administratively the Woreda has 39, (2 urban & 37 rural) Kebeles. In the Woreda, there are 37 HP, and 7 HC,

Shone is located 345 Km from Addis Ababa, 130 km from regional capital Hawassa and 100 km from the Zonal capital Hosanna, And bordered by Halaba Special and Kambata Tambaro zone to the north, Oromia region to the east, Wolyta zone to the south ,and west Badewacho woreda to the west.

Study population: The population in which cases and controls obtained was the population of East Badewacho Woreda 39 Kebeles with population of 216,714.

Study subjects: Individual's admitted with or treated for measles in Shone , Amburse , Korga , Edo Chefa, Ajeba and Hanida Health Centers and their control with the ratio of 1:2 from the same community residents. All active cases available in the above health institutions at the time of data collection included in the case control study.

Sample size: All available measles case in line list of the woreda (158), all available active cases at study period, (50), from health facilities and in house to house survey, and 100 controls from the nearest neighbors of the cases were used.

Study design: We used both descriptive cross-sectional and unmatched case-control studies from 2-12, March, 2015. Both primary data and secondary data were collected.

Sampling procedure: All active cases were included from the woreda PHEM line list, health facility and house to house search as soon as found with sign and symptoms of measles infection at the study period, controls were the nearest neighbors of cases who did not suffer from measles during the study, and We interviewed the mothers or care taker of cases and controls, below the age of 18 years. We collected, five blood serum samples from active measles cases as standard blood serum sample collection procedure, and sent to EHNRI, National lab for serologic investigation.

Study variables

Dependent variables

- Being a case or non-case of measles

Independent variables

- Socio-demographic characteristics of mothers/caretakers
- Educational level of parents/caretakers
- Occupational status of parents/caretakers
- Marital status of parents/caretakers
- Religion of parents/caretakers
- Age of case and control
- Sex of case and control
- Place of residence of case and control

Risk factors

- Measles Vaccination history and observation of vaccination card
- Travel history of case and control
- Contact history case and control
- Family size case and control
- Nutritional status case and control
- Health seeking behavior of mothers or care takers

- Knowledge of mothers/caretakers on measles infection, transmutation of measles, the right age of measles vaccination and measles is vaccine preventable dieses.
- Housing condition?(number of rooms, Ventilation and Illumination)
- Feeding practice?(Exclusive breast feeding, complimentary feeding)
- Receiving vitamin A in this 6 months

Diagnostic Methods for measles: Usually diagnosis is done using blood serum to confirm the presence of IgM anti-body. Thus in this outbreak 5 blood samples were taken and transported as standard laboratory procedure.

Standard Case 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.

Outbreak threshold WHO-AFRO defines an outbreak of measles as the occurrence of 3 or more IgM positive measles cases in a health facility or district in one month OR the occurrence of 5 or more reported suspected cases of measles in a health facility/district in a month.

Operational case definition:

A case: was defined as any person in Shashogo Woreda, who met with the standard WHO measles case definition, from February to April, 2015.

A control: was any person not having history and singe and symptom of measles and residing in the same community in the same period.

Unvaccinated*:* A child who does not receive any dose of measles vaccine

Vaccinated: Child who take at least one dose of the measles vaccine

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

Nutritional Status Assessment*;*

Nutrition indicators are an interpretation of nutrition indices based on cutoff points, Anthropometry is the measurement of the human body. Anthropometric measures are used to assess the nutritional status of individuals and population groups, and as eligibility criteria for nutrition support programs.

Common anthropometric measures are; Height, Weight and Mid-Upper Arm Circumference (MUAC). We assessed nutritional states of cases and controls, age of <18 years, used MUAC tape measurement for less than five years children's , and Weight for height for age group five and above, and Nutritional bilateral edema for all age groups.

Interpretation for Common anthropometric measurement; [World health Organization (WHO)]

MUAC: for age group 6 month-59 month,

MUAC: <11 cm= Sever Acute Malnutrition /SAM/, MUAC: 11 cm to 11.9 cm =Moderate Acute Malnutrition /MAM/, MUAC: ≥ 12 cm= NORMAL, Bilateral pitting edema implies severe acute malnutrition =SAM.

Children ≥ 6 months to 18 years of age W/H, W/H % < 70% =Marasmic (SAM), W/H % between 70% and 80% = MAM, W/H % ≥80% = NORMAL.

Cot off for acute malnutrition assessment:

Children ≥ 6 months to 18 years of age Weight for Height (W/H) < 70% of median, or Mid- Upper Arm Circumference (MUAC) < 11 cm for a child with a length > 65 cm and age of 6 to 59 months, Infant age <6 months with visible sever wasting, and, Nutritional bilateral edema for all age groups are categorized as; Sever Acute Malnutrition /SAM/

Children ≥ 6 months to 18 years of age ,W/H % between 70% and 80% of median , (MUAC)between *11-12 cm ,* for a child with a length > 65 cm and age of 6 to 59 months, and with no nutritional bilateral edema for all age groups, are categorized as, Moderate Acute Malnutrition /MAM/.

Children ≥ 6 months to 18 years of age, W/H % between ≥ 80% of median, (MUAC) ≥ *12 cm,* for a child with a length > 65 cm and age of 6 to 59 months, and with no nutritional bilateral edema for all age groups are categorized as Normal.

Data collection

We collected data from, East Badewacho woreda PHEM, Epidemic line lists and for case control study, collected from cases and controls using interview administered structured questionnaire. For cases and controls aged blow 18 years, we interviewed Mothers or caretakers. Also ,We reviewed register books, log books, individual folders, case based reports, and weekly reports, and discussion was made with the woreda head, PHEM staffs, and Health Center staffs , using check list, Observation of Health posts, households and discussion with district's officials and rapid response team was also undertaken. A case was any person who resided in East Badewacho woreda and who developed fever, rash (Maculopapular), and or cough, coryza, conjunctivitis (red eyes), or tested IgM positive, between epi week 6 to epi week 14, 2015. A control was any person who resided in the same community or village with cases in East Badewacho woreda but, who did not have history of measles infection within three months, no signs and symptoms of measles or tested IgM negative, in 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 four health centers and six health posts were reviewed and assessed, suspected cases were identified. Physical assessment and anthropometric measurements were made to assess the nutritional status of cases and controls.

In addition, we reviewed the five years woreda measles vaccination coverage. There was no the former Expanding Program of Immunization (EPI) registration book at any health facility level. Instead vaccination data was registering in the family folder at Health Post (HP) level and integrated

individual folder at Health Center (HC) level. 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. Even though recall every vaccination history was deficient. The administrative measles vaccination coverage rate was calculated by dividing the number of vaccinated children for the total eligible (annual targets).

Information on other variables for age less than 18 years was asked directly from the child's mother/caretaker. To determine the nutritional status of the case and control, we used physical assessment and anthropometric measurements; fore age group 6 month to 59 month used Mid- Upper Arm Circumference (MUAC) measurement, for age group five and above years Weight for Height (W/H) measurement, and for less than six months children's we used observing for Sevier wasting, and physical assessment for nutritional bilateral edema was use for all age category.

Inclusion and exclusion criteria

Inclusion criteria

Case: A case was any resident of east Badawacho woreda who tested and positive for IgM or had sign and symptoms of measles from 10, July to 31, October 2015 and who agreed to participate in the study.

Control: A control was any resident of Shashogo woreda 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 were not found at home during interview were excluded.

Data processing and Analysis

We used Epi-Info 7, Microsoft excel, and Arc GIS, to organize, analyze and display, tables ,figures ,and maps, and to calculating frequency, ratio, proportion, rate, odds ratio. Bi-varate 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.

Ethical clearance

We obtained Permission to carry out the study, from SNNP regional health bureau RHB, then from Hadiya Zone health department and East Badewacho 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.

Result

Descriptive epidemiology: We identified 158 (5 laboratory confirmed and 153 Epi-linked) measles case patients of 86(54.4%) were males, with median age of 6 years ranging from 7 months to 28 years. The most affected age group was 5-9 years 90 (57. %), with the age specific attack rate/ASAR of 310/100,000. From all measles case patients 77% (122) have at least one dose of measles vaccine exposure, 25 (15.6 %) case patients have unknown vaccination status, and 12 (7.4 %), not vaccinated. The index case was 6-year-old male who is IgM positive for measles specific antibody. He has no history of travel in areas where there is suspected or confirmed measles outbreak and has no clear contact with any suspected or confirmed measles case. He has history of 1 dose measles vaccine exposure.

Laboratory investigation: We collected 5 blood serum samples, and sent to EHNRI National lab, all were found to be positive for measles IgM antibody.

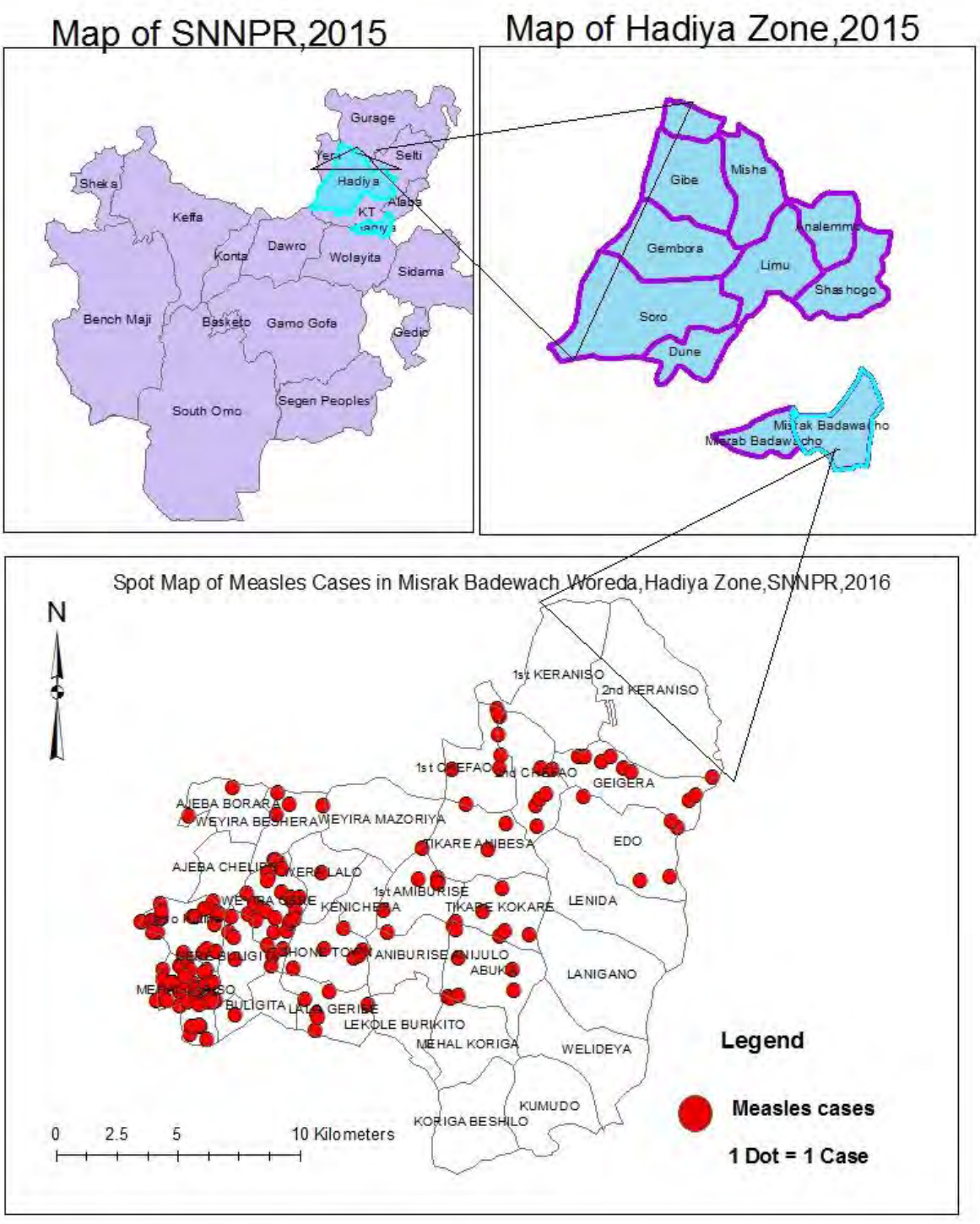

Figure 1.1 Depicting Maps of measles cases by kebele, East Badewacho, woreda SNNPR, April, 2015

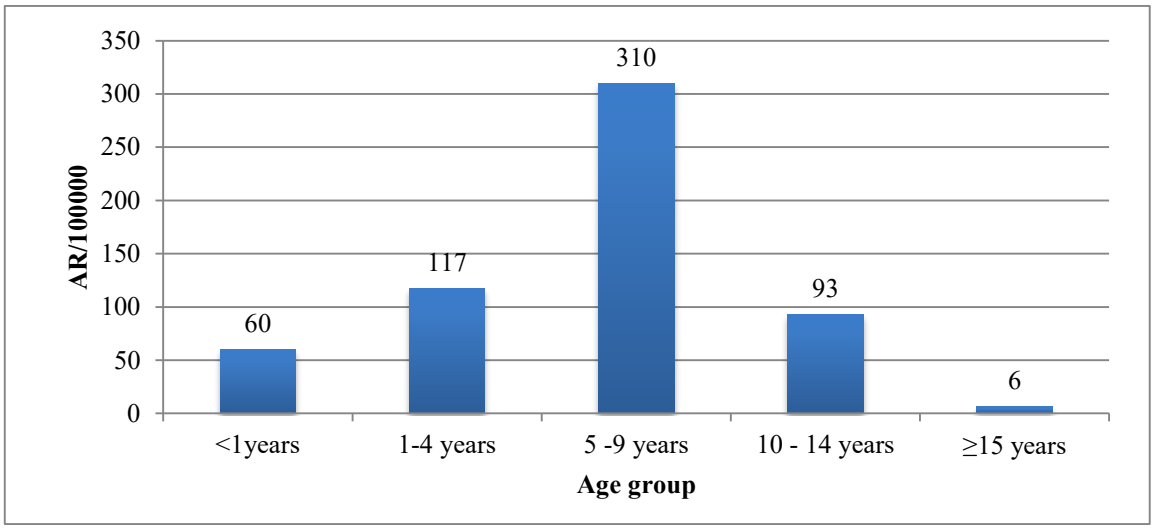

Figure 2: Attack rate of measles cases, by age group East Badewacho, SNNPR, 2015.

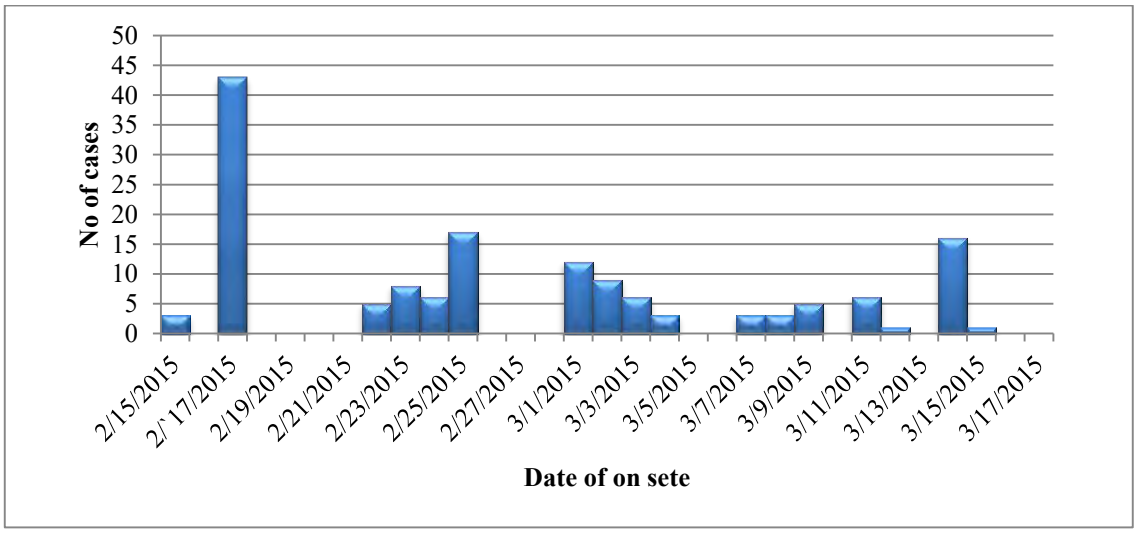

Figure 3: Showing Epi-Curve of measles cases by date of on set, East Badewacho woreda, SNNPR, 2015.

The epidemic was peaked on 2/17/2015 and lasted on 3/16/ 2015; however there was interruption of report throughout the outbreak.

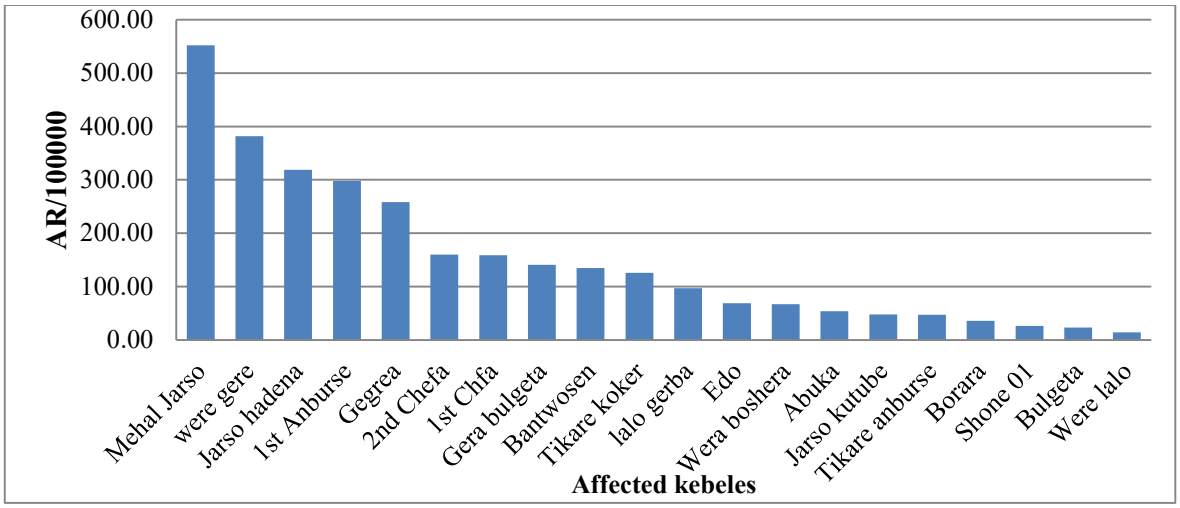

Figure 4: Attack rate of measles cases by 100,000 pop, East Badewacho, SNNPR, 2015.

We reviewed, five years the woreda measles vaccination coverage of under one-year age children, from 2011 to 2015, *Source* [East Badewacho Woreda Health office].

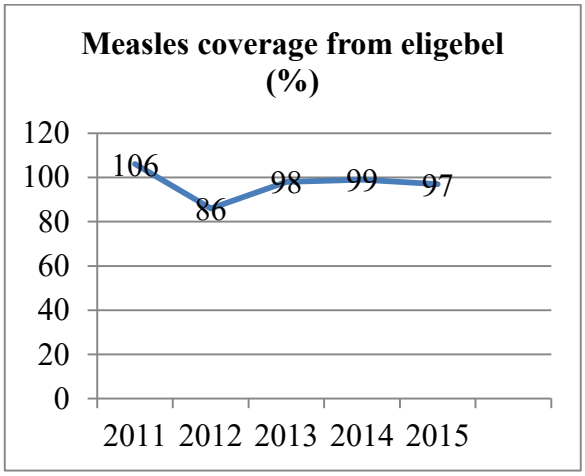

Figure 5: Measles vaccination five years measles vaccine coverage, East Badewacho, SNNPR, 2015.

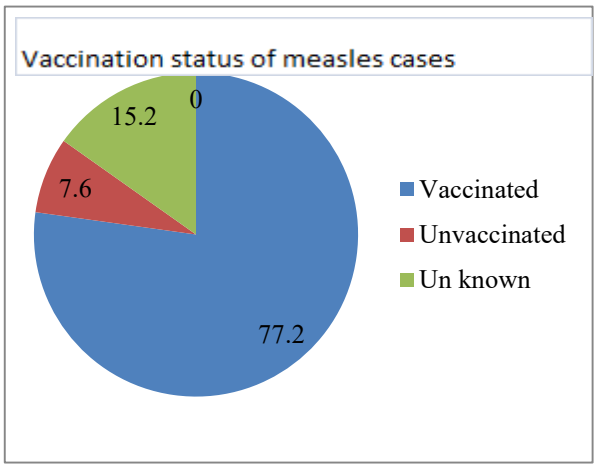

Figure Figure 6: Measles vaccination status for measles cases on line list from 2/15/2015 to 3/16/2015

Public health action

Prompt active case management and Measles mass vaccination were used to control the outbreak. Community also mobilized in reducing contact with active cases and early visiting health facility if there is suspected measles case. For mass vaccination there were 100,741 target age group (6 month to <15 Years). During the campaign a total of 65,933(66% of target groups) were vaccinated. For case management, ORS, TTC eye ointment, Vitamin A, antibiotics and supplementary food were used.

Case –control

For the case control study, we recruited 50 cases with median age of 5 years ranging from 1 year to 20 years, and 100 controls with median age of 5 years ranging from 1 year to 14 years. Sex distribution; 28(56%) of cases and 56(56%) of controls were Males.

Demographic Information

The demographic information were collected from cases and controls; that means it is collected from cases and controls who were adults; and for children <18 years from their mothers or care givers.

Table 1; Demographic information of cases and controls East Badewacho, woreda, SNNPR, 2015

Variable	Frequency			
	Case		Control	
Sex	Number	%	Number	%
Male	28	56	56	56
Female	22	44	44	44
Religion	Number	%	Number	%
Protestant	46	92	79	79
Orthodox	2	4	16	16
Muslim	1	2	4	4
Catholic	1	2	1	1
Others specify	0	0	0	0
Education Level of Mother	Number	%	Number	%
Unable to read and write	32	64	21	21
Primary	12	24	45	45
Secondary	6	12	33	33
Tertiary	0	0	1	1
Education Level of Father	Number	%	Number	%
Unable to read and write	19	38	11	11
Primary	14	28	38	38
Secondary	14	28	28	28
Tertiary	3	6	23	23

Marital status /parents	Number	%	Number	%
Married	50	100	100	100
Single	0	0	0	0
Widow	0	0	0	0
Divorced	0	0	0	0
Occupation of father	Number	%	Number	%
Farmer	43	86	55	55
GOV	3	6	25	25
Merchant	2	4	19	19
Daily laborer	1	2	0	0
Un employed	1	2	1	1
Occupation of mother	Number	%	Number	%
Farmer	0	0	1	1
House wife	44	88	94	94
GOV	1	2	0	0
Merchant	5	10	5	5
Daily laborer	0	0	0	0
Un employed	0	0	0	0
Ethnicity	Number	%	Number	%
Hadiya	50	100	82	82
Amhara	0	0	11	11
Gurage	0	0	3	3
Kambata	0	0	3	3
Siltie	0	0	1	1
Family size	Number	%	Number	%
< 5	4	8	8	8
>= 5	46	92	92	92

Clinical feature of the cases

Table 2: Description of Symptoms, Complication and Treatment for measles cases in East Badawacho, April, 2015

Symptoms	No	%	complications	No	%	Treatment	No	%
Fever	50	100	Malnutrition	29	58	Vitamin A	50	100
Rash	50	100	Ear discharge	22	44	TTC eye ointment	48	96
Cough	48	96	Diarrhea	19	38	Antipyretic	39	78
Conjunctivitis/red eye	47	94	Pneumonia	15	30	Antibiotics	32	64
Coryza(running nose)	37	74	Vomiting	8	16	Supplementary food	29	58
Others	0	0	Laryngo trahcial infection	1	2	ORS	24	48
			Blindness	0	0	Others	0	0

Table 3: Nutritional status description of cases and controls

MUAC measurement and bilateral edema for age group 6 to 59 months	**Case, n=26**		**Control, n=47**	
Nutritional Status	number	%	Number	%
< 11 cm	16	61.5	4	8.5
11 cm to 11.9 cm	0	0	2	4.3
≥ 12 cm	3	11.5	38	80.8
Bilateral edema	7	27	3	6.4
Total	26	100	47	100
W/H and bilateral edema for age group ≥ 5 years to 18 years	n=24	%	n=53	%
< 70%	3	12.5	0	0
Between 70 to 80 %	3	12.5	4	7.6
≥ 80%	17	70.8	49	92.5
Bilateral edema	1	4.2	0	0
Total	24	100	53	100
Nutritional Status	Number n=50	%	Number n=100	%
Normal	20	40	87	87
MAM	2	4	6	6
SAM	28	56	7	7
Total	50	100	100	100

MUAC--Mid-Upper Arm Circumference, W/H –Weight for Height, MAM--Moderate Acute Malnutrition, SAM – Sever Acute Malnutrition

Table 4: Number of Cases (n=50) and Controls (n=100) Paired with risk factors to Measles in East Badawacho Woreda, April, 2015

Variable	Response	Case	Control	OR	95% CI
Ever vaccinated for measles	No	24	6		
	yes	21	94	13.7	4.9- 37.7
Can I see Immunization card?	Yes	3	3	2.0638	0.4010-10.6161
	No	47	97		
Have you received vitamin A in this 6 month?	Yes	15	64	0.2411	0.1162-0.5101
	No	35	36		
Number of rooms in your house	1	37	46	3.1	1.4 -6.7
	2	12	47		
Number of persons per sleeping rooms	< 5	13	52	0.3243	0.1542-0.6824
	>= 5	37	48		
Dose each room has window?	Yes	10	69	0.1123	0.0499-0.2531
	No	40	31		
Acute malnutrition	Yes	27	12	9.1	3.9 - 20.9
	No	21	85		
Educational status of mother	Educated	18	79	0.1495	0.0705 - 0.3196
	Not Educated	32	21		
Educational status of Father	Educated	31	89		
	Not Educated	19	11	0.2017	0.0864 - 0.4707
How many months did you feed only breast	6 month	20	78		
	Less than or greater than 6 month	30	22	0.1880	0.0885-0.3931
Do you know the right age for measles vaccination?	Yes	22	91	0.0777	0.0321- 0.1880
	No	28	9		
Contact history with measles case	Yes	31	3	52.7544	14.6228 =190.3205
	No	19	97		

Table 5 : Multivariate analysis of risk factors for measles, East Badewacho Woreda, SNNP, 2015

Variable	AOR	95% CI
Ever vaccinated for measles = no	11.3	4.4 -30.7
Acute malnutrition = yes	8.6	3.8 – 19.1
Number of rooms in your house, ≤ 2	3.3	1.5 - 7.3
Number of persons per sleeping rooms, < 5	0.3806	0.1809 – 0.8008
Have you received vitamin A in this 6 month? = yes	0.2411	0.1162 - 0.5101
Do you know the right age for measles vaccination? = yes	0.0777	0.0321- 0.1880

Discussion

We confirmed the existence of outbreak of measles with highest incidence rate in age group (5-9 years) (310/100,000). However, the overall attack rate was 73/100,000/pop) whch was less than the study conducted in different areas areas (11-12). The five consecutive years of the woreda administrative one dose measles coverage report of the EFY of 2003 to 2007 was higher than measles vaccination coverage of the case-control study 115 (76.7%) were vaccinated, Even this was collected by mother or caretaker history recall, not by immunization card. According to the cases reported in the line list of the woreda, 23% of the cases were not vaccinated, and as the case-control report, 29{59%) of cases were not vaccinated even with one measles doses before this measles infection. The possible explanation for this could be the reported vaccination status may be false report.The big difference between the vaccination status of case-control study and the vaccination status filled in the woreda line list imply that the actual immunization coverage of the woreda could be low.

In multi-varate analysis, being vaccinated with measles vaccine, developing acute malnutrition, family size ≥ 5 house hold members, persons sleeping in one room per person five and more than five

persons, knowledge of mother or care takers on measles disease, receiving vitamin A in this 6 month, feeding only breast milk for six month and educational status of mother and father were associated risk factors for measles diseases. Being vaccinated for measles, reciving vitamin A in this 6 month, and feeding only breast milk for six month were found to be a protective factors from contracting the measles disease. It is consistent with study conducted in different areas(10-12). Developing acute malnutrition Children sleeping in one room per person five and more than five persons were more likely to contract measles.It is smilar with study conducted in different areas (13, 14). Lack of Knowledge of mother or caretaker on measles also was associated with measles outbreak. Children whose mothers don't know about common age for measles vaccination were also found to be more likely to develop measles It is consistent with study conducted in different areas (15-17).

Limitation: We could not interview all measles cases. Some of the cases were two month prior from investigation time be for the team reach to the area, for some of the cases we could not find in the house to house survey. The line list obtained from the woreda was incomplete, not includeing all standard variables also, Faced challenges to trace the cases from registered on the health center individual folders, and family folder in health post, and 144(96 %) of cases and controls vaccination cards were not find at the house holds visited to case search, for case- control house to house survey. Also there were Weak linkage between health center and health post level Poor documentation, and not using standardized line list formats at HP level, and shortage of measles vaccination antigen to cover all proposed age group.

Conclusion: We confirmed the existence and ethiolgyc agent of the outbreak.The most affected age group was 5-9 years, the most affected Kebele was Mahal Jars, and the, epidemic peaked on 2/17/2015. Being unvaccinated for measles vaccine, being malnourished, sleeping five and more persons per rooms, and Lack of knowledge of mothers or caretaker were associated risk factors for occurring measles outbreak in East Badewacho Woreda. Though the last five years administrative measles vaccination coverage was very high, the woreda line list indiktes 12(7.6%) unvaccinated, 25 (15.8%) Unknown vaccination status, and 122 (77 %) were vaccinated for measles vaccine. Even though in case control finding 29(58%) of cases were not vaccinated for measles vaccine, the report of the woreda measles coverage report could be questionable. Measles mass vaccination for age 6 month

to 14 years, prompt case management and vitamin A supplementation and supplementary food provision for malnourished children's was controlled the outbreak.

Recommendation

To control the outbreak and prevent further distribution of the measles disease, we recommended the woreda health office to strengthen the routine measles vaccination and provision of measles mass vaccination for less than 15 years in the woreda.

The woreda health office as well as health facilities should conduct periodic assessment for tracing unvaccinated children, which help to revised planning problems.

The woreda health office as well health facilities should report and investigate on time as PHEM standards,Suspected measles cases should be reportd and investigated on time as PHEM standard.

The woreda should assess and improve nutritional states of children.

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

The woreda should facilitate community mobilization to be conductd by health facilities.

The woreda health office as well health facilities should improve recording reporting and documentation of routine EPI and line listing.

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Annex 1 : Measles outbreak line list, East Badawacho Woreda, Hadiya Zone, SNNPR, 2015.

PHEM Line List – for Reporting from Health Facility to Woreda/zone/Region/PHEM and for Use during Epidemics														
Woreda/zone/Region: East Badawacho/Hadiya/SNNPR									Disease/Condition: confirmed Measles Outbreak					
S/No	(O) Out/ /(I) In-Patient	cod	Kebele/ PA's Town, House No.	Sex	Age		Date seen at health facility	Date of onset of disease	No of valid measles doses	Specimen taken(Yes/No) if yes, date collected	Lab results	Complication	Outcome (A/D)	Comments
					Years	Month								
1	O	eb-1	Wera Gere	M	10		2/19/2015	2/17/2015	1	yes	+ ve	yes	A	Diarrhea
2	O	eb- 2	Wera Gere	F	7		2/19/2015	2/17/2015	1	yes	+ ve	No	A	
3	O	eb- 3	Wera Gere	F	5		2/19/2015	2/17/2015	1	yes	+ ve	No	A	
4	O	eb-4	Wera Gere	M	3		2/19/2015	2/17/2015	1	yes	+ ve	yes	A	Pneumonia
5	O	eb-5	Wera Gere	F	10		2/19/2015	2/17/2015	1	yes	+ ve	No	A	
6	O	eb-6	Wera Gere	M	7		2/19/2015	2/17/2015	1	No	NA	No	A	
7	O	eb-7	Wera Gere	M	8		2/19/2015	2/17/2015	1	No	NA	No	A	
8	O	eb-8	Wera Gere	M	6		2/19/2015	2/17/2015	1	No	NA	No	A	
9	O	eb-9	Lalo Gerbo	M	7		2/19/2015	2/17/2015	1	No	NA	No	A	
10	O	eb-10	Lalo Gerbo	M	15		2/19/2015	2/17/2015	1	No	NA	No	A	
11	O	eb-11	Lalo Gerbo	F	4		2/19/2015	2/17/2015	1	No	NA	No	A	
12	O	eb-12	Lalo Gerbo	M	5		2/19/2015	2/17/2015	1	No	NA	yes	A	ear discharge
13	O	eb-13	Lalo Gerbo	M	6		2/19/2015	2/17/2015	1	No	NA	No	A	
14	O	eb-14	Lalo Gerbo	F	7		2/19/2015	2/17/2015	1	No	NA	No	A	
15	O	eb-15	Wera Lolo	F	4		2/19/2015	2/17/2015	1	No	NA	No	A	
16	O	eb-16	wera Gere	F	7		2/19/2015	2/17/2015	1	No	NA	No	A	
17	O	eb-17	wera Gere	F	12		2/19/2015	2/17/2015	1	No	NA	No	A	
18	O	eb-18	wera Gere	F	7		2/19/2015	2/17/2015	1	No	NA	No	A	
19	O	eb-19	Bantuwosen	F	6		2/19/2015	2/17/2015	1	No	NA	No	A	
20	O	eb-20	Bantuwosen	F	12		2/19/2015	2/17/2015	1	No	NA	yes	A	ear discharge
21	O	eb-21	Bantuwosen	M	10		2/19/2015	2/17/2015	1	No	NA	yes	A	Vomiting
22	O	eb-22	Shone 01	F	10		2/19/2015	2/17/2015	1	No	NA	yes	A	Pneumonia
23	O	eb-23	Wera Gere	F	6		2/21/2015	2/15/2015	1	No	NA	No	A	
24	O	eb-24	Wera Gere	M	8		2/21/2015	2/17/2015	1	No	NA	No	A	
25	O	eb-25	Wera Gere	F	6		2/21/2015	2/17/2015	1	No	NA	yes	A	Diarrhea

26	O	eb-26	Wera Gere	M	6		2/21/2015	2/17/2015	1	No	NA	No	A	
27	O	eb-27	Wera Gere	F	9		2/21/2015	2/17/2015	1	No	NA	No	A	
28	O	eb-28	Wera Gere	F	5		2/21/2015	2/17/2015	1	No	NA	yes	A	Pneumonia
29	O	eb-29	Wera Gere	M	6		2/21/2015	2/17/2015	0	No	NA	No	A	
30	O	eb-30	Wera Gere	F	7		2/21/2015	2/17/2015	1	No	NA	No	A	
31	O	eb-31	First Amburse	M	20		2/22/2015	2/17/2015	1	No	NA	No	A	
32	O	eb-32	First Amburse	M	20		2/22/2015	2/17/2015	1	No	NA	No	A	
33	O	eb-33	Bantuwosen	F	14		2/22/2015	2/17/2015	1	No	NA	No	A	
34	O	eb-34	Bantuwosen	M	5		2/22/2015	2/17/2015	1	No	NA	No	A	
35	O	eb-35	Mahal Jarso	M	17		2/22/2015	2/17/2015	1	No	NA	yes	A	ear discharge
36	O	eb-36	Mehal Jarso	M	9		2/22/2015	2/17/2015	1	No	NA	No	A	
37	O	eb-37	Mahal Jarso	F	15		2/22/2015	2/17/2015	1	No	NA	No	A	
38	O	eb-38	Mahal Jarso	F	16		2/23/2015	2/15/2015	0	No	NA	No	A	
39	O	eb-39	Mahal Jarso	F	10		2/23/2015	2/17/2015	0	No	NA	No	A	
40	O	eb-40	Mahal Jarso	M	6		2/23/2015	2/17/2015	0	No	NA	yes	A	Pneumonia
41	O	eb-41	Mahal Jarso	M	6		2/23/2015	2/17/2015	0	No	NA	No	A	
42	O	eb-42	Mahal Jarso	M	9		2/23/2015	2/17/2015	0	No	NA	yes	A	Pneumonia
43	O	eb-43	Tekare Anbese	F	5		2/23/2015	2/17/2015	0	No	NA	No	A	
44	O	eb-44	T/Anbese	F	6		2/23/2015	2/17/2015	0	No	NA	No	A	
45	O	eb-45	Shone 01	F	7		2/23/2015	2/17/2015	1	No	NA	No	A	
46	O	eb-46	Wera Gere	M	7		2/20/2015	2/17/2015	1	No	NA	yes	A	Diarrhea
47	O	eb-47	Wera Gere	F	12		2/20/2015	2/17/2015	1	No	NA	No	A	
48	O	eb-48	Wera Gere	F	7		2/20/2015	2/17/2015	1	No	NA	No	A	
49	O	eb-49	Wera Gere	M	6		2/20/2015	2/17/2015	1	No	NA	No	A	
50	O	eb-50	FirstAmburse	M	12		2/20/2015	2/17/2015	1	No	NA	yes	A	Pneumonia
51	O	eb-51	First Amburse	F	10		2/20/2015	2/17/2015	1	No	NA	No	A	
52	O	eb-52	Shone 01	M	10		2/20/2015	2/17/2015	1	No	NA	No	A	
53	O	eb-53	Wera Gere	M	6		2/20/2015	2/15/2015	1	No	NA	No	A	
54	O	eb-54	First Amburse	M	8		2/20/2015	2/17/2015	1	No	NA	No	A	
55	O	eb-55	First Amburse	F	6		2/20/2015	2/17/2015	1	No	NA	No	A	
56	O	eb-56	First Amburse	M	6		2/20/2015	2/17/2015	1	No	NA	No	A	
57	O	eb-57	First Amburse	M	9		2/20/2015	2/17/2015	2	No	NA	No	A	
58	O	eb-58	Jarso Hadean	M	5		2/21/2015	2/17/2015	0	No	NA	No	A	

59	O	eb-59	Jarso Hadena	M	6		2/21/2015	2/17/2015	0	No	NA	yes	A	Diarrhea
60	O	eb-60	Jariso Hadena	F	7		2/21/2015	2/17/2015	0	No	NA	No	A	
61	O	eb-61	Wera Boshera	M	10		2/24/2015	2/22/2015	1	No	NA	No	A	
62	O	eb-62	Shone 01	M	7		2/24/2015	2/22/2015	1	No	NA	No	A	
63	O	eb-63	Buligita	F	5		2/24/2015	2/22/2015	1	No	NA	No	A	
64	O	eb-64	Shone 01	M	3		2/24/2015	2/22/2015	1	No	NA	No	A	
65	O	eb-65	Gergera Buligita	M	10		2/24/2015	2/22/2015	1	No	NA	No	A	
66	O	eb-66	Mahal Jarso	M	7		2/25/2015	2/23/2015	1	No	NA	No	A	
67	O	eb-67	Mahal Jarso	M	5		2/25/2015	2/23/2015	1	No	NA	No	A	
68	O	eb-68	Jariso Hadena	F	8		2/25/2015	2/23/2015	1	No	NA	No	A	
69	O	eb-69	Jariso Hadena	F	4		2/25/2015	2/23/2015	1	No	NA	No	A	
70	O	eb-70	Jariso Hadena	F	8		2/25/2015	2/23/2015	1	No	NA	No	A	
71	O	eb-71	Jariso Hadena	F	6		2/25/2015	2/23/2015	1	No	NA	No	A	
72	O	eb-72	Jariso Hadena	F	10		2/25/2015	2/23/2015	1	No	NA	yes	A	Pneumonia
73	O	eb-73	jariso hadena	M	5		2/25/2015	2/23/2015	1	No	NA	No	A	
74	O	eb-74	Mahal Jarso	M	7		2/26/2015	2/24/2015	1	No	NA	No	A	
75	O	eb-75	jariso hadena	M	6		2/26/2015	2/24/2015	1	No	NA	No	A	
76	O	eb-76	jariso hadena	F	5		2/26/2015	2/24/2015	1	No	NA	No	A	
77	O	eb-77	jariso hadena	F	3		2/26/2015	2/24/2015	1	No	NA	No	A	
78	O	eb-78	jariso hadena	M	5		2/26/2015	2/24/2015	1	No	NA	No	A	
79	O	eb-79	Jariso Kutube	M	3		2/26/2015	2/24/2015	1	No	NA	No	A	Diarrhea
80	O	eb-80	Gegera Buligita	F	6		2/27/2015	2/25/2015	1	No	NA	No	A	
81	O	eb-81	Shone 01	M	5		2/27/2015	2/25/2015	2	No	NA	No	A	
82	O	eb-82	Gegera	M	3		2/27/2015	2/25/2015	1	No	NA	No	A	
83	O	eb-83	Gegera	M	8		2/28/2015	2/25/2015	1	No	NA	No	A	
84	O	eb-84	jariso hadena	M	13		2/28/2015	2/25/2015	1	No	NA	No	A	
85	O	eb-85	jariso hadena	M	0	7	2/28/2015	2/25/2015	1	No	NA	No	A	
86	O	eb-86	Gere Buligita	F	5		2/28/2015	2/25/2015	1	No	NA	No	A	
87	O	eb-87	Gere Buligita	M	5		2/28/2015	2/25/2015	1	No	NA	yes	A	Diarrhea
88	O	eb-88	Gere Buligita	M	6		2/28/2015	2/25/2015	1	No	NA	No	A	
89	O	eb-89	Gere Buligita	F	4		2/28/2015	2/25/2015	1	No	NA	No	A	
90	O	eb-90	Mahal Jarso	F	8		3/1/2015	2/25/2015	1	No	NA	No	A	
91	O	eb-91	Mahal Jarso	F	6		3/1/2015	2/25/2015	1	No	NA	No	A	

92	O	eb-92	Mahal Jarso	M	5		3/1/2015	2/25/2015	1	No	NA	No	A	
93	O	e-b93	Mahal Jarso	M	4		3/2/2015	2/25/2015	1	No	NA	No	A	
94	O	eb-94	Mahal Jarso	M	8		3/2/2015	2/25/2015	1	No	NA	No	A	
95	O	eb-95	W/boshera	M	7		3/2/2015	2/25/2015	1	No	NA	No	A	
96	O	eb-96	G/buligita	F	6		3/2/2015	2/25/2015	1	No	NA	No	A	
97	O	eb-97	Mahal Jarso	M	12		3/3/2015	3/1/2015	1	No	NA	yes	A	Pneumonia
98	O	eb-98	Mahal Jarso	M	7		3/3/2015	3/1/2015	1	No	NA	No	A	
99	O	99eb-	Mahal Jarso	M	8		3/3/2015	3/1/2015	1	No	NA	No	A	
100	O	eb-100	Mahal Jarso	F	5		3/3/2015	3/1/2015	1	No	NA	No	A	
101	O	eb-101	Mahal Jarso	F	6		3/3/2015	3/1/2015	1	No	NA	No	A	
102	O	eb-102	Mahal Jarso	M	7		3/3/2015	3/1/2015	1	No	NA	No	A	
103	O	eb-103	Mahal Jarso	F	6		3/3/2015	3/1/2015	1	No	NA	No	A	
104	O	eb-104	Mahal Jarso	M	7		3/3/2015	3/1/2015	1	No	NA	yes	A	
105	O	eb-105	Mahal Jarso	M	5		3/3/2015	3/1/2015	1	No	NA	No	A	Vomiting
106	O	eb-106	Mahal Jarso	M	2		3/3/2015	3/1/2015	1	No	NA	No	A	
107	O	eb-107	Mahal Jarso	M	4		3/3/2015	3/1/2015	1	No	NA	No	A	
108	O	eb-108	Mahal Jarso	F	10		3/3/2015	3/1/2015	1	No	NA	No	A	
109	O	eb-109	Mahal Jarso	F	15		3/4/2015	3/2/2015	1	No	NA	No	A	
110	O	eb-110	J/kutube	M	0	7	3/4/2015	3/2/2015	1	No	NA	No	A	
111	O	eb-111	Mahal Jarso	F	12		3/4/2015	3/2/2015	1	No	NA	yes	A	Pneumonia
112	O	eb-112	Mahal Jarso	F	10		3/4/2015	3/2/2015	1	No	NA	No	A	
113	O	eb-113	T/kokere	F	16		3/4/2015	3/2/2015	1	No	NA	No	A	
114	O	eb-114	T/kokere	M	8		3/4/2015	3/2/2015	1	No	NA	No	A	
115	O	eb-115	T/kokere	F	6		3/4/2015	3/2/2015	1	No	NA	No	A	
116	O	eb-116	T/kokere	F	5		3/4/2015	3/2/2015	1	No	NA	No	A	
117	O	eb-117	T/kokere	M	3		3/4/2015	3/2/2015	1	No	NA	No	A	
118	O	eb-118	2nd chefa	F	2		3/5/2015	3/3/2015	1	No	NA	No	A	
119	O	eb-119	2n d chefa	F	6		3/5/2015	3/3/2015	1	No	NA	No	A	
120	O	eb-120	1 st chefa	F	13		3/5/2015	3/3/2015	1	No	NA	yes	A	Vomiting
121	O	eb-121	1 st chefa	M	11		3/5/2015	3/3/2015	1	No	NA	No	A	
122	O	eb-122	1 st chefa	M	13		3/5/2015	3/3/2015	1	No	NA	No	A	
123	O	eb-123	Gagera	M	3		3/5/2015	3/3/2015	2	No	NA	No	A	
124	O	eb-124	Bantuwosen	F	4		4/9/2015	4/6/2015	0	No	NA	yes	A	Diarrhea

125	O	eb-125	J/hadana	F	10		4/9/2015	4/6/2015	1	No	NA	No	A	
126	O	eb-126	Mahal Jarso	F	8		4/9/2015	4/6/2015	1	No	NA	No	A	
127	O	eb-127	Mahal Jarso	F	8		3/11/2015	4/7/2015	1	No	NA	No	A	
128	O	eb-128	Mahal Jarso	M	8		3/11/2015	4/7/2015	1	No	NA	No	A	
129	O	eb-129	Mahal Jarso	F	6		3/11/2015	4/7/2015	1	No	NA	No	A	
130	O	eb-130	Mahal Jarso	M	1		3/12/2015	4/8/2015	1	No	NA	yes	A	Pneumonia
131	O	eb-131	1 st chefa	M	2		3/12/2015	4/8/2015	1	No	NA	No	A	
132	O	eb-132	1 st chefa	F	4		3/12/2015	4/8/2015	1	No	NA	No	A	
133	O	eb-133	2 nd Chefa	M	1		3/13/2015	4/8/2015	1	No	NA	No	A	
134	O	eb-134	2 nd Chefa	F	3		3/13/2015	4/8/2015	1	No	NA	No	A	
135	O	eb-135	Gegera	F	12		3/14/2015	3/11/2015	99	No	NA	yes	A	Diarrhea
136	O	eb-136	Edo	M	0	9	3/14/2015	3/11/2015	99	No	NA	No	A	
137	O	eb-137	Gegera	M	1		3/14/2015	3/11/2015	99	No	NA	No	A	
138	O	eb-138	Gegera	F	10		3/14/2015	3/11/2015	99	No	NA	No	A	
139	O	eb-139	2nd chefa	M	7		3/14/2015	3/11/2015	99	No	NA	No	A	
140	O	eb-140	Abuka	M	8		3/14/2015	3/11/2015	99	No	NA	No	A	
141	O	eb-141	Wera gere	M	6		3/16/2015	3/12/2015	99	No	NA	yes	A	Vomiting
142	O	eb-142	2 nd Chefa	F	1		3/17/2015	3/15/2015	99	No	NA	No	A	
143	O	eb-143	2 nd Chefa	F	4		3/17/2015	3/15/2015	99	No	NA	No	A	
144	O	eb-144	2nd Chefa	M	3		3/17/2015	3/15/2015	99	No	NA	No	A	
145	O	eb-145	1 st chefa	F	5		3/17/2015	3/15/2015	99	No	NA	yes	A	Diarrhea
146	O	eb-146	borera	F	6		3/17/2015	3/15/2015	99	No	NA	No	A	
147	O	eb-147	borera	M	0	9	3/17/2015	3/15/2015	99	No	NA	No	A	
148	O	eb-148	wera boshera	M	9		3/17/2015	3/15/2015	99	No	NA	No	A	
149	O	eb-149	wera boshera	M	10		3/17/2015	3/15/2015	99	No	NA	No	A	
150	O	eb-150	Gegera	F	8		3/17/2015	3/15/2015	99	No	NA	yes	A	Pneumonia
151	O	eb-151	Gegera	F	7		3/17/2015	3/15/2015	99	No	NA	No	A	
152	O	eb-152	Edo	M	3		3/17/2015	3/15/2015	99	No	NA	No	A	
153	O	eb-153	Abuka	M	3		3/17/2015	3/15/2015	99	No	NA	No	A	
154	O	eb-154	Abuka	F	6		3/17/2015	3/15/2015	99	No	NA	No	A	
155	O	ebe-155	Edo	F	5		3/17/2015	3/15/2015	99	No	NA	No	A	
156	O	eb-156	Edo	F	2		3/17/2015	3/15/2015	99	No	NA	No	A	
157	O	eb-157	Gegera	F	4		3/17/2015	3/15/2015	99	No	NA	yes	A	Vomiting

158	O	eb-158	Gegera	F	5		3/17/2015	3/15/2015	99	No	NA	No	A	

Annex 2: Measles outbreak investigation case-control study questionnaire for East badawacho and Shashogo, Woreda, Hadiya Zone, SNNPR, 2015.

Hello, my name is ----------, I work for the ministry of health. We are doing an investigation of measles outbreak. The purpose of these questions is to get information for public health action. Would you be willing to participate? If yes, ask screening questions. If No, thank the person for their time.

Case status = Case _____Control_____ ID___ date of Data collection __/___/__

Region_____ Zone_____ Woreda_____ Kebele _____ Got _____ Phone_____

Respondent status; 1. Case/control 2. Mother 3.Father 4. Caretaker

I. Socio-demographic Characteristics

S. No	Questions			Alternatives	
1.1	Sex			Male 2. Female	
1.2	Age			years_____ Months_____	
1.3	Occupation	Case/control	Mother	Father	Other
		Farmer House wife Student Unemployed Daily laborer Merchant Gov't 8. Other/ (specify)_	1. Farmer 2. House wife 3. Student 4. Unemployed 5. Daily laborer 6. Merchant	1. Farmer 2. Student 3. Unemployed 4. Daily laborer 5. Merchant 6. Gov't	1. Farmer 2. House wife 3. Student 4. Unemployed 5. Daily laborer 6. Merchant

			7. Gov't 8.(specify)_ _____	7. Other/ (specify)__	7. Gov't 8. Other/ (specify)_
1.4	Educationa l level	1. Unable to read and write 2. Read and write 3. Elementary 4. Secondary 5. Above secondary	1. Unable to read and write 2. Read and write 3. Elementary 4. Secondary 5. Above secondary	1. Unable to read and write 2. Read and write 3. Elementary 4. Secondary 5. Above secondary	1. Unable to read and write 2. Read and write 3. Elementary 4. Secondary 5. Above secondary
1.5	Marital status	1. Single 2. Married 3. Divorced 4. Widowed 5. Separated	1. Single 2. Married 3. Divorced 4. Widowed 5. Separated	1. Single 2. Married 3. Divorced 4. Widowed 5. Separated	1. Single 2. Married 3. Divorced 4. Widowed 5. Separated
1.6	Family size			_____	
1.7	Is there any sick person with rash, fever, running nose/Conjectivitis?			1. Yes 2. No	
1.8	If yes, number of sick person			_____	

II. Clinical History of Diseases :(for case only)

2.1	What was the symptom?	1. Fever *2.* Rash 3. Cough, 4. coryza (runny nose),

		5. Conjunctivitis (red eyes) *6.* Diarrhea 7. Ear discharge 8. Pneumonia 9. Blindness 10. Laringo tracheal infection 11. Vomiting 12. Other_____
2.2	Date of rash on set	/ /
2.3	Did you visit health facility	1 Yes 2 no
2.4	If yes to question number 2.3 mention the place	_____
2.5	Date seen at health facility	/ /
2.6	Home Visit by HEW	1 yes 2 no
2.7	Date visited by HEW	___/____/___
2.8	Did you (he/she) take treatment?	1. Yes 2. No
2.9	If yes, treatment taken	1. ORS 2. Antibiotics 3. Vitamin A 4. Supplementary food 5. TTC ointment 6. Anti pyretics 7. Others given_____
2.10	Did you recovered after the treatment?	1. cured 2. partially 3. deteriorated/disabled 4. death
2.11	How long does it take you to get to a health post?	☐ Less than 10 minutes ☐ 10-30 minutes ☐31 minutes – 1 hour ☐ More than 1 hour ☐ More than 2 hours ☐ Don't know
2.12	How long does it take you to get to a health centre?	☐ Less than 10 minutes ☐ 10-30 minutes ☐31 minutes – 1 hour ☐ More than 1 hour ☐ More than 2 hours ☐ Don't know
2.13	Was (NAME) admitted to a health facility?	1. Yes If Yes date admitted: _____/____/_____ 2. No

III. Risk factor

3.1	Did you ever vaccinated for measles?	Yes 2. No 3. Unknown 4. Not applicable
3.2	If yes last vaccination date	1. respondent recall_____ dd/mm/yy 2. vaccination card_____ dd/mm/yy
3.3	Number of vaccine doses received	1. 0 dose 2. 1 dose 3. 2 dose 4. 3 and above
3.4	Can I see your immunization card?	1 .yes 2 no if no go to question 3.5
3.5	Why does (NAME) not have an immunization card or certificate?	☐ Never went to get vaccinated ☐ Got vaccinated but was never given the card ☐ Lost the card ☐ Other _____
3.6	Did you have any travel history 7-18 days to areas with active measles cases before onset of symptoms?	1. Yes If Yes ,where _____ 2. No
3.7	Do you have any travel history four days before and after rash onset	Yes 2. No If yes where _____
3.8	Do you have any contact history with someone else four days before and after rash onset	Yes 2. No If yes with whom_____
3.9	Did you ever have measles infection?	1. Yes 2. No 3. I Don't know
3.10	Do you know modes of transmission for	1. Yes 2. No

	measles?	3. If yes specify_____
3.11	What is the common age for a child to be vaccinated with measles vaccine?	1. three month 2. six month 3. nine month 4. don't know
3.12	MUAC Measurement for age group 6 month to 59 month	<11 cm 11 to 11.9 cm ≥ 12 cm
3.13	Weight for Height W/H measurement for age group ≥ 6 month to 18 years and	< 70% between 70% and 80% ≥80%
3.14	Nutritional bilateral pitting edema For all age.	Yes 2. No
3.15	Infant age < 6 months with visible sever wasting,	Yes 2. No
3.16	Nutritional status	1. Normal 2. Moderate Acute Malnutrition/MAM 3. Severely Acute Malnutrition/SAM 4. not applicable
3.17	Had receive vitamin A supplementation within 6 months for your child?	Yes 2. No
3.18	Had receive deworming within 6 months for your child?	Yes 2. No
3.19	How many months did you feed only breast for your child	1 two month 2 three month 3 four month 4 six month 5 other-------

3.20	Number of rooms in your house /	_____
3.21	Dose each room has window	Yes 2. No
3.22	How often you open the windows	1. Every day 2. Some times
3.23	Number of persons per sleeping rooms	_____
3.24	Where did you go first when you get ill?	Health Facility 2. Traditional Healers 3. Holy Water 4. Stayed at home 5. Other :(Specify)_____
3.25	How do you think measles can be cured?	1. Using modern medicine 2. Using traditional Medicine 3. Holy water 4. By feeding nutritious foods 5. Keeping the sick person indoor 6. Other(Specify)_____

1.2 Measles outbreak investigation in Shashogo Woreda, Hadiya Zone, South, Nations, Nationalities, and Peoples Region, south Ethiopia, 2015

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 Shashogo woreda from October 14 to 31, 2015.

Method: We conducted both descriptive cross-sectional and a 1:2 unmatched case control study. We used the WHO case definition, A case of measles was defined as any resident of Shashogo woreda who tested and positive for IgM or had sign and symptoms of measles from 10, July to 31, October 2015. A control was any person residing in the same community not having a sign and symptoms and history of measles during the same period. If controls developed a measles sign and symptom, they will be included as a case. We used interview, physical assesment for age group < 6 month, and anthropometrics measurement; for age group 6 to 59 month physical assesment and MAUC measurement and for five years and above age used physical assesment and weight for Height (W/H) measurement to assesses the nutritional status of the cases and controls. Case observation, physical assessment, and History tacking was made, medical registration books of health facilities were assessed, and suspected cases were identified. Epi-Info and MS excel was used to organize, analyze and display data. We used advanced statistics in Epi-Info to calculate multivariate analysis.

Result: We identified a total of 44 measles case including seven confirmed cases with zero death rates. Twenty three (52.3%) were not vaccinated, 10 (22.7%) were admitted, 16 (36.4%) of them developed eye infection. A total of 60 subjects made of 20 cases and 40 controls were recruited in a case- control study. 12 (60 %) cases and 22 (55 %) controls were females. The specific age attack rate for (1 to 4) years was 129/100,000 population. 17 (85 %) of cases and twelve (30 %) of controls were unvaccinated. In multivariate analysis, being vaccinated with measles vaccine, (OR=0.0756, 95% CI, 0.0186-0.3071), knowledge of mother/caretakers, on measles is vaccine preventable diseases (OR = 0.1346, 95% CI, 0.0394-0.5181), and modes of transmission of measles (OR= 0.4928, 95% CI, 0.1653-1.4691) were protective factor. Sleeping in one room per person ≥ 6 persons, (OR= 3.0513, 95% CI, 0.6857-18.7055), and contact history with someone with measles disease (OR= 9.4444, 95% CI, 2.1252-56.4034), were found to be risk factors.

Conclusion: We confirmed outbreak of measles with seven laboratory confirmed cases for measles IgM positive result and highest incidence rate in (1 to 4) years age group with 129 /100,000 age specific attack rate . Not being vaccinated with measles vaccine, Being overcrowding household members in rooms, having contact with measles case and Lack of knowledge of mother or caretaker were associated risk factors for occurring measles outbreak.

We recommended supplementary measles vaccination for under 5 children, strengthening of routine immunization, defaulter tracing, and awareness creation in the community.

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 [1]. 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 immune-suppression. These include pneumonia, ear and sinus infections, mouth ulcers, persistent diarrhea, and upper airway obstruction from croup (Laringo-trachea-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. 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, 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 per 100,000 populations 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). The Federal Ministry of Health/ FMoH assigned teams to assess respond and report nutritional emergency and associated risk factors throughout the country; from August first to November 10, 2015 .We was assigned, in Halaba special woreda, Kambata Tambaro zone, and Hadiya zone. Shashogo woreda is one of hotspot woredas for nutrition emergency in Hadiya zone, and we have resved one case based reported and twenty line lies which was not reported, from the woreda Public Health Emergency Management, PHEM on October 13, 2015. The Investigation of an outbreak was conducted in Shashogo woreda to confirm the existence of the outbreak, to determine risk factors associated with contracting measles in the woreda as well as to assess the woredas preparedness and response to the outbreak.

Rational of the study

Shashogo woreda is one of hotspot woredas for nutrition emergency in Hadiya zone, and we have observed and resved one case based reported and twenty line lies which were not reported, from the woreda Public Health Emergency Management, PHEM on October 13, 2015. We conducted measles outbreak investigation in Shashogo woreda in order to confirm the existence of the etiologic agent, to describe the magnitude of the outbreak by person, place, and time, to factor associated with measles outbreak, and to assesses the preparedness status of the woreda PHEM system

Objective

General objective

To assesses measles outbreak in Shashogo woreda, and to assesses the preparedness status of the woreda PHEM system.

Specific objectives

- To identify the etiologic agent of the outbreak
- To describe the magnitude of the outbreak by person, place, and time
- To determine the factors associated with measles infection
- To assesses the preparedness status of the woreda PHEM system.

Material/ Methods

Study setting/Study area: We conducted this study in Shashogo woreda. The woreda is one of the eleven woredas in Hadiya zone, SNNPR, with a total population of 129,338. The capital of the woreda is Bonosha. Administratively the Woreda has 2 urban & 34 rural Kebeles. In the Woreda there are 34 HP and 5 HC.

It is located 224 Km from Addis Ababa, 117 km from regional capital Hawassa and 54 km from the Zonal capital Hosanna and bordered by Halaba Special Woreda to the south and the east, Lemo Woreda and Kembata-Tambaro Zone to the west, and Silete Zone to the north .

Study population

The population in which cases and controls obtained was the population of Shashogo Woreda 36, (34 rural and 2 urban) Kebeles with population of 129,338.

Study subjects: Individual's admitted with or treated for measles in Bonosha, Doiesha, Hireko, and Jamaya Health Centers and their control with the ratio of 1:2 from the same community residents. All active cases available in the above health institutions at the time of data collection included in the case control study.

Sample size: All available measles case in line list of the woreda (44), all available active cases at the study period (20), from health facilities and in house to house survey, and 40 controls from the nearest neighbors of the cases were used.

Study design: We conducted both, descriptive cross-sectional, and a 1:2 unmatched case-control studies from 14-31 October 2015. Both primary data and secondary data were collected.

Sampling procedure: All active cases were included from the woreda PHEM line list, and health facility and house to house search as soon as fined with sign and symptoms of measles infection at the study period, controls were the nearest neighbors of cases who did not suffer from measles during the study period, and We interviewed the mothers or care taker of case and controls, below the age of 18 years. We were collected, seven blood serum samples from active measles cases as standard blood serum sample collection procedure, and sent to SNNP Regional lab for serologic investigation.

Study variables

Dependent variables

Being a case or non-case of measles

Independent variables

- Socio-demographic characteristics of mothers/caretakers
- Educational level of parents/caretakers
- Occupational status of parents/caretakers
- Marital status of parents/caretakers
- Religion of parents/caretakers
- Age of case and control
- Sex of case and control
- Place of residence of case and control

Risk factors

- Measles Vaccination history and observation of vaccination cared
- Travel history of case and control
- Contact history case and control
- Family size case and control
- Nutritional status case and control
- Health seeking behavior of mothers or care takers
- Knowledge of mothers/caretakers on measles infection, transmutation of measles, the right age of measles vaccination and measles is vaccine preventable dieses.
- Housing condition?(number of rooms, Ventilation and Illumination)
- Feeding practice?(Exclusive breast feeding, complimentary feeding)

- Receiving vitamin A in this 6 months

Diagnostic Methods for measles: Usually diagnosis is done using blood serum to confirm the presence of IgM anti-body. Thus in this outbreak 7 blood samples were taken and transported as standard laboratory procedure.

Standard Case 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.

Outbreak threshold WHO-AFRO defines an outbreak of measles as the occurrence of 3 or more IgM positive measles cases in a health facility or district in one month OR the occurrence of 5 or more reported suspected cases of measles in a health facility/district in a month.

Operational case definition:

A case: was defined as any person in Shashogo Woreda, who met with the standard WHO measles case definition, from July to October, 2015.

A control: was any person not having history and singe and symptom of measles and residing in the same community in the same period.

Unvaccinated: A child who does not receive any dose of measles vaccine

Vaccinated: Child who take at least one dose of the measles vaccine

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

Nutritional Status Assessment;

Nutrition indicators are an interpretation of nutrition indices based on cutoff points, Anthropometry is the measurement of the human body. Anthropometric measures are used to assess the nutritional status of individuals and population groups, and as eligibility criteria for nutrition support programs.

Common anthropometric measures are; Height, Weight and Mid-Upper Arm Circumference (MUAC). We assessed nutritional states of cases and controls, age of <18 years, used MUAC tape measurement for less than five years children's , and Weight for height for age group five and above, and Nutritional bilateral edema for all age groups.

Interpretation for Common anthropometric measurement; [World health Organization (WHO)]

MUAC: for age group 6 month-59 month,

MUAC: <11 cm= Sever Acute Malnutrition /SAM/, MUAC: 11 cm to 11.9 cm =Moderate Acute Malnutrition /MAM/, MUAC: ≥ 12 cm= NORMAL.

Bilateral pitting edema implies severe acute malnutrition =SAM

Children ≥ 6 months to 18 years of age W/H

W/H % < 70% =Marasmic (SAM), W/H % between 70% and 80% = MAM, W/H % ≥80% = NORMAL

Cot off for acute malnutrition assessment;

Children ≥ 6 months to 18 years of age Weight for Height (W/H) < 70% of median, or Mid- Upper Arm Circumference (MUAC) < 11 cm for a child with a length > 65 cm and age of 6 to 59 months, Infant age <6 months with visible sever wasting, and, Nutritional bilateral edema for all age groups are categorized as; Sever Acute Malnutrition /SAM/

Children ≥ 6 months to 18 years of age ,W/H % between 70% and 80% of median , (MUAC)between *11-12 cm ,* for a child with a length > 65 cm and age of 6 to 59 months, and with no nutritional bilateral edema for all age groups, are categorized as, Moderat Acute Malnutrition /MAM/.

Children ≥ 6 months to 18 years of age, W/H % between ≥ 80% of median, (MUAC) ≥ *12 cm,* for a child with a length > 65 cm and age of 6 to 59 months, and with no nutritional bilateral edema for all age groups are categorized as Normal.

Data collection

We collected, Epidemic line lists from Shashogo woreda PHEM, and for case control study, data was collected from cases and controls using interview administered structured questionnaire. For cases and controls aged blow 18 years, we interviewed Mothers or caregivers. Also ,We reviewed register books, log books, individual folders, case based reports, and weekly reports, and discussion was made with the woreda head, PHEM staffs, and Health Center staffs , using unstructured check list, Observation of Health posts, households and discussion with district's officials and rapid response team was also undertaken. A line list of all cases was not available to identify cases. A case was any person who resided in Shashogo woreda and who developed fever, rash (maculo-papular), and or cough, coryza, conjunctivitis (red eyes), or tested IgM positive, between 5 July and 28 October 2015. A control was any person who resided in the same community or village with cases in Shashogo woreda but, who did not have history of signs and symptoms of measles or tested IgM negative, in 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 five health centers and six health posts were assessed and suspected cases were identified. Physical assessment and anthropometric measurement was employed to assess the nutritional status of cases and controls.

Also, we reviewed the five years woreda measles vaccination coverage. There was no the former Expanding Program of Immunization (EPI) registration book at any health facility level. Instead vaccination data was registering in the family folder at Health Post (HP) level and integrated individual

folder at Health Center (HC) level. 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. Even though recall every vaccination history was deficient. The administrative measles vaccination coverage rate was calculated by dividing the number of vaccinated children for the total eligible (annual targets).

Information on other variables for age less than 18 years was asked directly from the child's mother/caretaker. To determine the nutritional status of the case and control, we used physical assessment and anthropometric measurements; fore age group 6 month to 59 month, used Mid- Upper Arm Circumference (MUAC) measurement, for age group five and above years Weight for Height (W/H) measurement, and for less than six months children's we used observing for Sevior wasting, and physical assessment for nutritional bilateral edema was used for all age group.

Inclusion criteria

Case: A case was any resident of Shashogo woreda who tested and positive for IgM or had sign and symptoms of measles from 10, July to 31, October 2015 and who agreed to participate in the study.

Control: A control was any resident of Shashogo woreda 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.

Data processing and analysis: We used Epi-Info 7, Microsoft excel, and Arc GIS, to organize, analyze and display, tables ,figures ,and maps, and to calculating frequency, ratio, proportion, rat, odds ratio. Bi-variety 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.

Ethical clearance

Permission to carry out the study was obtained from SNNP regional health bureau, then from Hadiya Zone health department and Shashogo 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.

Result

Descriptive epidemiology

A total of 44 cases (which 7 positive for measles IgM and 37 epidemiologically linked) measles cases, of this 26(59%) female, with zero death rates were identified, between July and October. A 2 years old female child index case was reported to Bonosha health Center in 7/10/2015. She has no travel history to areas with active measles case. She has history of one dose of measles vaccine, Out of the total cases, admit ion was not reported, and all cases were treated in out-patients department (OPD) of Bonosha and Jamaya Health Centers. The major cause for treatment reported by health facility was Pneumonia, diarrhea, and eye infection. The highest attack rate was in age group (1- 4) years children, was 131 /100,000 population. Among 44 measles cases reported in the line list of the woreda, 24 (54.5%) measles cases were not received measles vaccine, 16 (36.4%) cases received at least one measles dose, 4 (9.1%) measles cases had unknown vaccination history. Out of the total 44 cases, 10 (22.7%) measles cases were reported from the woreda urban Kebeles, the remaining 34(77.3%) measles cases were from the rural Kebeles. The index case was reported on 5/6/2015. There were interruption cases reported through the outbreak.

During the study period we did not find rumor log book, no functional Raped Response Team (RRT) at the woreda, health center and health post level. There was written Epidemic Preparedness and Response Plan (EPRP), but there was no allocated budget, and logistics at hand. When we vested to HP Majority of HP was closed, even if we find opened Health posts, we did not find PHEM reporting format except weekly reporting format, and in the community, home to home vest we did not find Immunization cards. The five years administrative measles vaccination coverage of 2003, (95%), 2004, (96.7%), 2005, (107. %), 2006, (102%), and 2007 E.C was (96.6%).

Laboratory finding: We collected 7 blood serum samples, and sent to SNNP Regional lab, all were fund to be positive for measles IgM antibody

Table 6 : Measles cases by month, Shashogo woreda, Hadiya zone, SNNPR, October, 2015

Month	Cases identified	Sample collected	IgM Pos.	IgM Neg.
July	9	0	0	0
August	8	1	0	1
September	8	0	0	0
October	19	7	7	0
Total	44	8	7	1

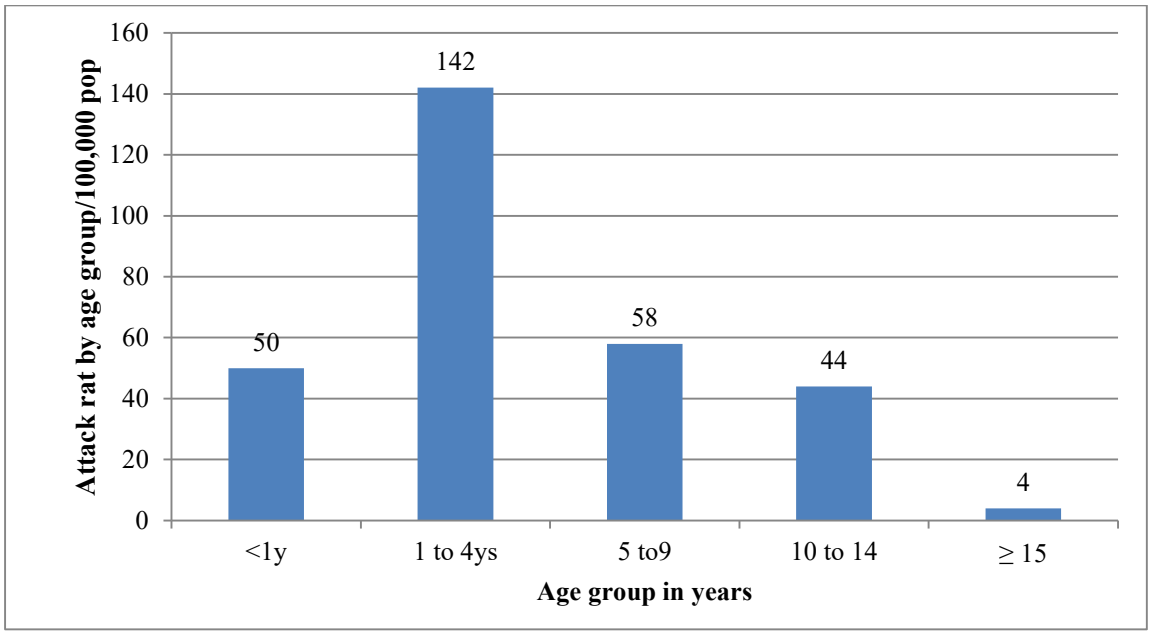

Figure 7: Attack rate of Measles Cases by Age group in years, Shashogo Woreda, Hadiya Zone SNNPR, October, 2015.

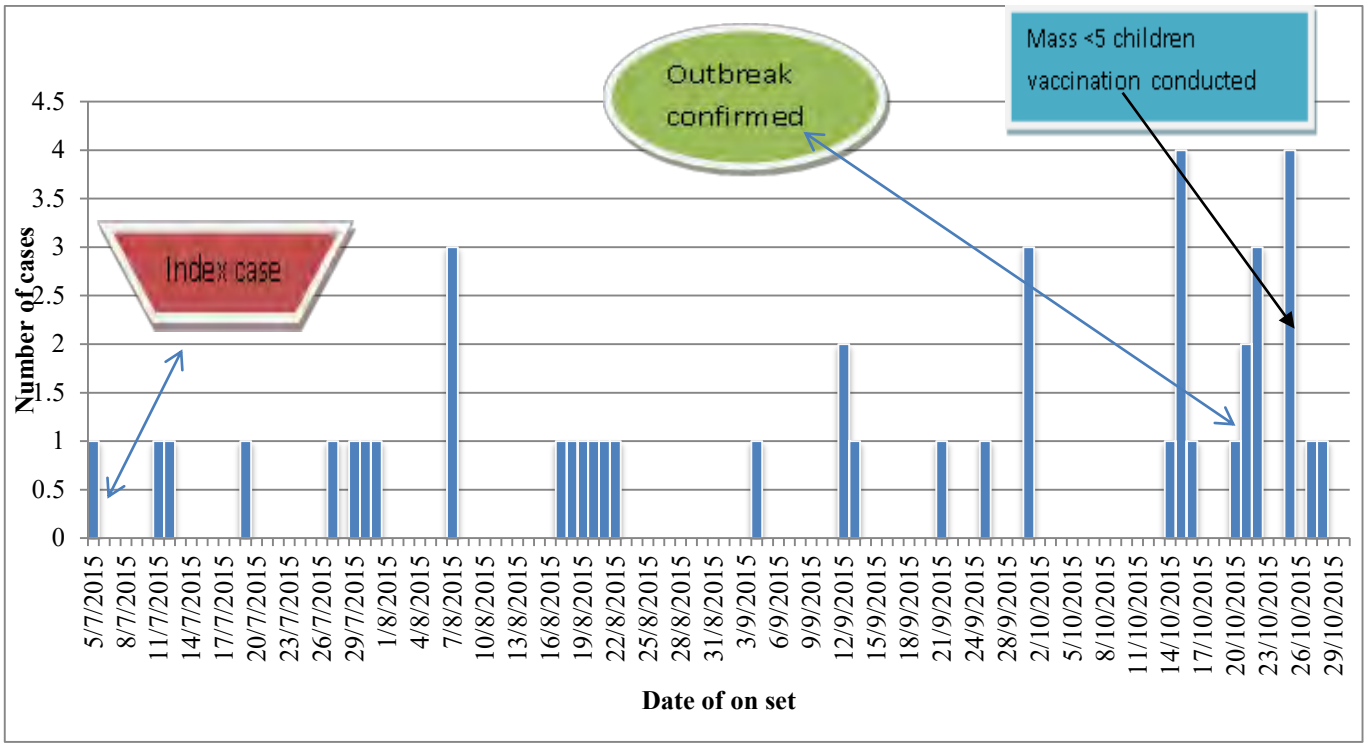

Figure 8: Showing Epidemiologic curve of measles cases by date of on set, Shashogo Woreda, Hadiya Zone October 2015.

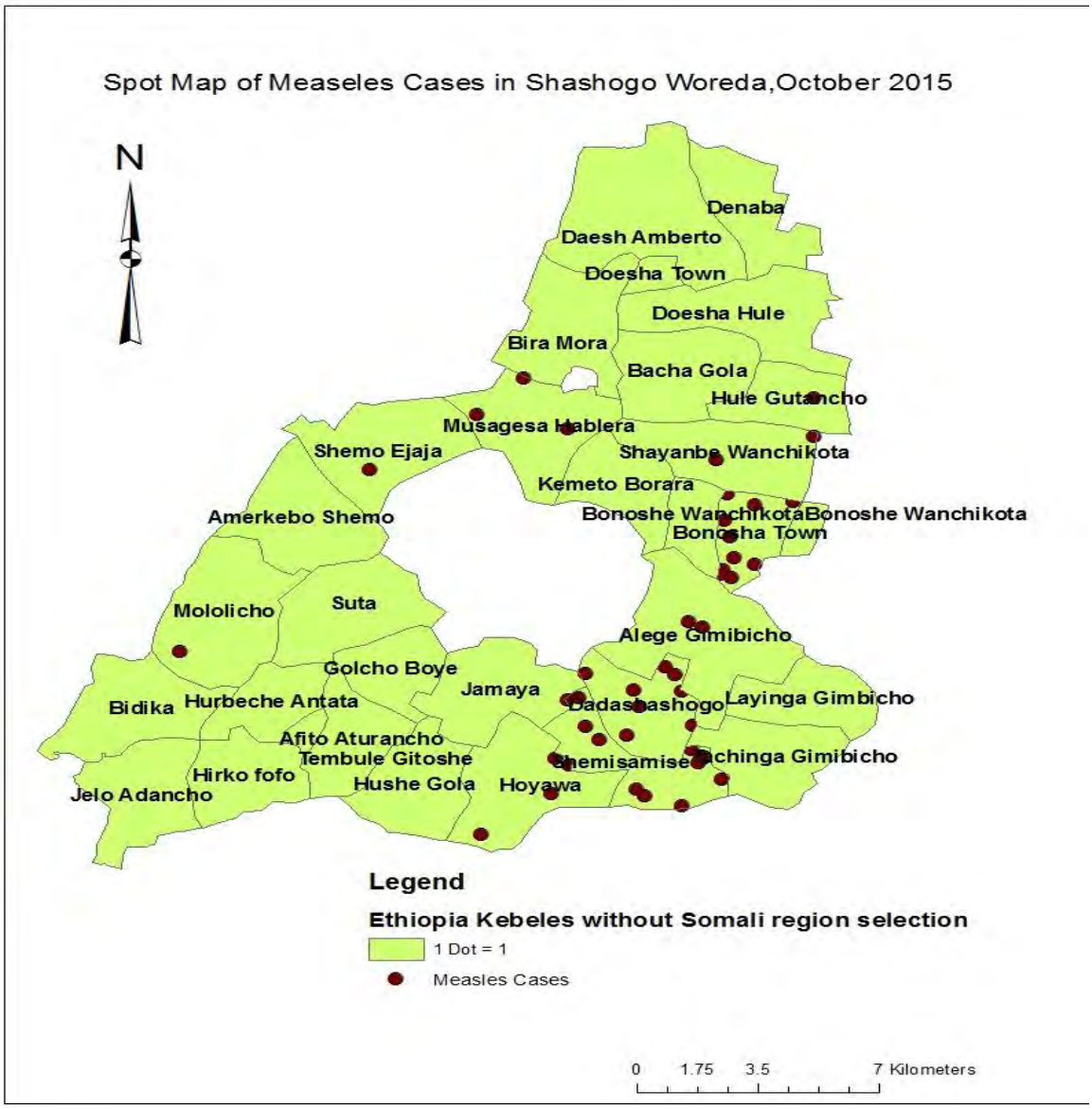

Figure 9 Depicting; spot Map of Measles cases by Kebele, Shashogo Woreda, Hadiya zone, SNNPR, October, 2015

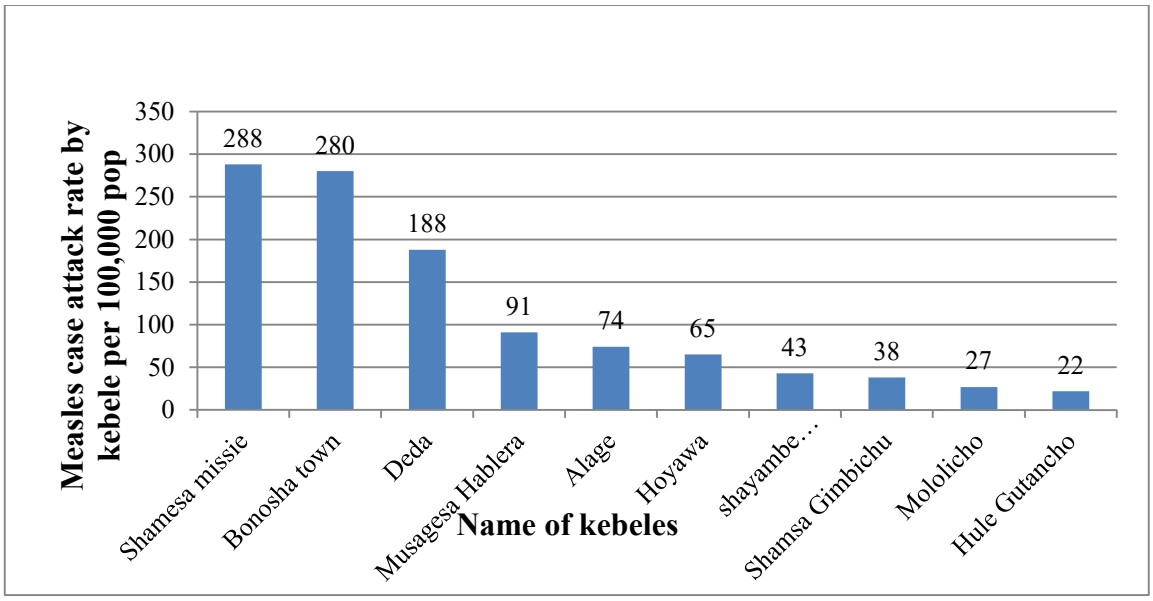

Figure 10 Attack rate of Measles Cases by kebele, Shashogo Woreda, Hadiya Zone SNNPR, October, 2015

Shamesamissie, Bonosha town and Deda kebeles are most affected, and 2014/2015 measles vaccination coverage was 113%, 67% and 103% respectively.

Public health action

Active case searching, case management at-health centers, and health posts level, and vitamin-A supplementation [1]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, and the regional PHEM, supply the measles vaccination as micro-planning for all age group of 9 month to 59 month children were supplemented in all kebeles at the woreda, also mass screening was conducted for malnutrition at the same time for the same cohort.

Case-control study

We conducted a 1: 2 unmatched case-control study. The median age of the cases was 5 years ranging from 2 years to 17 years, while that of controls was 3 years ranging from 1 year to 11 years. Twelve (60%) cases and twenty three (57.5%) controls were females. 19 (95 %) cases of respondents and

39(97.5%) controls of respondents were married. 13 (65%) cases and 20 (50. %) controls were not attended any education. 17 (85. %) of cases and 13 (32.5%) controls received no measles vaccine dose. 3(15%) cases and 27 (67.5%) controls were received one measles dose. Out of 20 measles cases, 14 (70 %) cases got treatment, 12(85.7%) of treated cases were recovered during the study period. The rest 8 (40 %) cases were getting improvement at the time of study. 12 (60%) of cases believed that when they get sick, they will go health facility. eight (40 %) of cases decided to stay at home. 14 (70 %) of cases believed that treatment can reduce measles complications. The rest 6 (30%) provided home-made treatment like fluid, tea, and semi sold foods. The mid-upper arm circumference of 19 (95%) cases and 40 (100%) of controls were greater than 12 centimeter. For one (5%) case the MUAC was 11.5 centimeter

Table 7 Nutritional status of Measles Cases and Controls, Shashogo Woreda, Hadiya Zone, SNNPR, October, 2015

Nutritional status	case n=20		control n=40	
	no	%	no	%
Normal	19	95	40	100
Moderate Acute Malnutrition /MAM	1	5	0	0
Sevier Acute Malnutrition/SAM	0	0	0	0

Table 8 Demographic characteristics of Measles Cases and Controls, Shashogo Woreda, SNNPR, 2015

Variable	Category	Case n= 20 (%)	Control n= 40 (%)
Sex	Female	12(60%)	23(57.5%)
	Male	8(40%)	17(42.5%)
Marital status	Married	19 (95%)	39 (97.5%)
	Separated	0 (0 %)	1 (2.5%)
	Single	1 (5%)	0 (0 %)
Occupation	Farmer	6 (35%)	6(15%)
	House wife	13(65%)	32 (80%)
	Merchant	0(0%)	2 (5%)
	Student	1 (5%)	0 (0%)

Level of education	Illiterate	13(65%)	20(50%)
	Read and write	0 (0%)	1 (2.5%)
	Primary	5(25%)	8(20 %)
	Secondary and above	2(10%)	11(27.5%)
Religion	Muslim	12 (60%)	11(27.5 %)
	Orthodox	0 (0 %)	2(5 %)
	Protestant	8(40 %)	27(67.5 %)
Family size	>= 6	17(85%)	26(65%)
	< 6	3 (15%)	14(35 %)

Table 9: Bi-varate analysis of risk factors (case=20, controls=40) for measles, Shashogo Woreda, SNNPR, 2015.

Variable	Response	Case	Control	OR	95% CI
Ever vaccinated for measles	No	15	12	11.2	2.7-53.1
	Yes	3	27		
Family size	>= 6	17	26	3.0512	0.76-12.23
	< 6	3	14		
Do you know modes of transmission of measles?	Yes	7	23	0.4	0.13-1.2
	No	13	17		
Educational status	Not educated	13	20	1.8571	0.6-5.87
	Educated	7	20		
Do you know measles is vaccine preventable?	No	13	8	7.4	2.2-24.7
	Yes	7	32		
Do you know the right age for measles vaccination?	Yes	4	18	0.3056	0.0866-1.0776
	No	16	22		
Do you know how measles disease is prevented?	Yes	8	19	0.7368	0.2480-2.1889
	No	12	21		
Contact history with measles case	Yes	17	15	9.5238	2.3668-37.7024
	No	3	25		

Table 10: Multivariate analyses of risk factors for measles infection, Shashogo Woreda, Hadiya zone, SNNPR, October 2015.

Variable	AOR	95% CI
Ever vaccinated for measles = No	11.7	2.9-47.4
Living in room ≥ 6 persons	3.01	0.7 -12.2
Do you know measles is vaccine preventable? =No	13.7	2.9 – 64.1
Do you know the right age for measles vaccination? = yes	0.3056	0.0666-1.07758

Challenges identified

For some of the cases we could not find in the house to house survey. The vaccination history was obtained from line list were incomplete (not include last name of the case, the villages (got), Face challenges to trace the cases registered on the health center individual folder.) and vaccination cards were not find at all HH visited to case search , for case- control house to hose survey. Also there were Weak linkage between health center and health post(referral) Poor documentation ,and not using standardized line list formats at HP level and the suspected cases were reported after 2 menthes of detection the suspected cases by the woreda and Zonal PHEM..

Discussion

This investigation was carried out to assess the distribution of measles infection and risk factors associated in the Woreda, the overall attack rate (34/100,000/pop) was less than the study conducted in different areas (Meta Robi District, 2013) [10],possible reason for low attack rate, could be, delayed staring of investigation and limited sample size.

In multi-variety analysis, being vaccinated with measles vaccine, knowledge of mother or care takers on measles disease and educational status of mother or care takers, were associated risk factors for

measles Infection. Being vaccinated for measles was found to be a protective factor from contracting the measles infection. It is consistent with study conducted in Halaba special woreda south Ethiopia, 2014 [18]]. Living in one room, six and more persons were more likely to contract measles concistant with studys in deffren areas. (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 It is consistent with study conducted in(Gesha Distract Kafa zone, south Ethiopia (15).

Limitations: Delayed in starting of the investigation leads, most of the cases were cured, so we cannot used as a case which prevented to collect enough cases, And absence of records of cases in the Health centers, and health posts. The above reasons result the study in to limited sample size.

Conclusions: Based on the case definition of measles, and laboratory IgM result, we confirmed the existence of the outbreak, by measles IgM, measles cases, of this above half were females, from July 7 to October 31, 2015. The most affected age was (1- 4) years age children's. Over all AR was 34/100.000/pop, Shamesa missie, Bonosha town, and Dada, were the most affected kebeles. Most of the study populations were not vaccinated. The prominent risk facto associated with the outbreak fund to be, being not vaccinated for measles vaccine. The reported measles vaccine coverage rate for the woreda was falsely high. Measles mass vaccination for age 6 month to 59 months, prompt case management and vitamin A Prophylaxes supplementation was controlled the outbreak.

Recommendation: Even though this outbreak was easily managed, the woreda health office and the health extension workers at the kebele should strive to create community awareness on measles infection, its transmission and control activities. The health workers at the kebele level should also encourage the community to visit the nearby health institutions as early as possible whenever there is occurrence of measles signs and symptoms. To ensure that the vaccine efficacy is maintained at the kebele level, there should be a refrigerator at the health post. The measles vaccination coverage of the woreda must be improved. Since children who had taken measles vaccine were also infected by the disease, further studies on vaccine efficacy/potency should also be undertaken. At all level of the woreda health unit, Recording reporting and documentation of routine EPI and line listing of outbreaks must be improved.

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Annex 3. Measles cases line list, Shashogo Woreda, Hadiya Zone, April SNNPR, 2015.

PHEM Line List – for Reporting from Health Facility to Woreda/zone/Region/PHEM and for Use during Epidemics													
Woreda/zone/Region: Shashogo /Hadiya/SNNPR									Disease/Condition: confirmed Measles Outbreak				
S/N	(O)/I)	Cod	Kebele	Sex	Age **		Date seen at health facility	Date of onset of disease	No of valid measles doses	Specimen taken(Yes/No) if yes, date collected	Lab results	Complication (yes/No | Outcome A) Live (/Dead	Comments
					Years	Month								
1	O	Sha-1	Deda	f	2		7/10/2015	7/5/2015	1	No	NA	No	A	
2	O	Sha-2	Shamsa missie	f	10		7/13/2015	7/11/2015	99	No	NA	No	A	
3	O	Sha-3	Deda	f	3		7/16/2015	7/12/2015	0	No	NA	No	A	
4	O	Sha-4	Shamsa missie	f	12		7/15/2015	7/13/2015	99	No	NA	yes	A	Pneumonia
5	O	Sha-5	Deda	m	2		7/22/2015	7/19/2015	0	No	NA	No	A	
6	O	Sha-6	Shamsa missie	f	2		7/31/2015	7/27/2015	1	No	NA	No	A	
7	O	Sha-7	Musagesa Hablera	m	10		7/31/2015	7/29/2015	1	No	NA	No	A	
8	O	Sha-8	Deda	m	0	7	8/1/2015	7/30/2015	0	No	NA	No	A	
9	O	Sha-9-	Shamsa Gimbichu	f	1		8/3/2015	7/31/2015	1	No	NA	No	A	
10	O	Sha-10	Shamsa missie	f	4		9/14/2015	8/7/2015	1	No	NA	No	A	
11	O	Sha-11	Deda	f	4		8/10/2015	8/7/2015	1	No	NA	No	A	
12	O	Sha-12	Bonosha keneba	f	3		8/20/2015	8/7/2015	0	No	NA	Yes	A	Pneumonia
13	O	Sha-13	Musagesa Hablera	f	1		8/21/2015	8/17/2015	1	No	NA	No	A	
14	O	Sha-14	Bonosha keneba	m	9		8/18/2015	8/18/2015	1	8/18/2015	Poset ive	Yes	A	Pneumonia
15	O	Sha-15	Musagesa Hablera	m	7		8/22/2015	8/20/2015	1	No	NA	No	A	
16	O	Sha-16	Alage	f	1		8/26/2015	8/21/2015	1	No	NA	No	A	
17	O	Sha-17	Alage	f	0	11	8/27/2015	8/22/2015	0	No	NA	No	A	
18	O	Sha-18	Deda	m	11		8/31/2015	9/4/2015	99	No	NA	No	A	
19	O	Sha-19	Bonosha keneba	f	3		8/15/2015	9/12/2015	0	No	NA	No	A	
20	O	Sha-20	Shayambe washkuta	f	3		9/15/2015	9/12/2015	0	No	NA	No	A	
21	O	Sha-21	Shayambe washkuta	m	3		9/15/2015	9/13/2015	0	No	NA	No	A	
22	O	Sha-22	Bonosha keneba	f	1		9/25/2015	9/21/2015	0	No	NA	Yes	A	

23	O	Sha-23	Bonosha keneba	f	5		9/28/2015	9/26/2015	1	10/14/2015	+ve	No	A	
24	O	Sha-24	Hule Gutancho	m	12		10/3/2015	10/1/2015	99	No	NA	No	A	
25	O	Sha-25	Bonosha keneba	f	7		10/1/2015	10/1/2015	0	10/14/2015	+ve	No	A	
26	O	Sha-26	Bonosha keneba	f	9		10/1/2015	10/1/2015	0	10/14/2015	+ve	No	A	
27	O	Sha-27	Bonosha keneba	f	2		10/15/2015	10/14/2015	0	10/15/2015	+ve	No	A	
28	O	Sha-28	Shamsa missie	m	18		10/16/2015	10/15/2015	0	10/19/2015	+ve	Yes	A	Pneumonia
29	O	Sha-29	Shamsa missie	m	15		10/16/2015	10/15/2015	0	10/19/2015	+ve	Yes	A	Pneumonia
30	O	Sha-30	Shamsa missie	m	13		10/16/2015	10/15/2015	0	10/19/2015	+ve	Yes	A	Pneumonia
31	O	Sha-31	Shamsa missie	f	3		10/16/2015	10/15/2015	0	No	NA	No	A	
32	O	Sha-32	Deda	m	3		10/19/2015	10/16/2015	0	No	NA	No	A	
33	O	Sha-33	Deda	f	5		10/21/2015	10/20/2015	0	No	NA	No	A	
34	O	Sha-34	Shamsa missie	m	4		10/23/2015	10/21/2015	0	No	NA	No	A	
35	O	Sha-35	Hoyawa	f	1		10/23/2015	10/21/2015	0	No	NA	Yes	A	ear discharge
36	O	Sha—36	Hoyawa	m	13		10/23/2015	10/22/2015	0	No	NA	No	A	
37	O	Sha-37	Hoyawa	f	3		10/23/2015	10/22/2015	0	No	NA	No	A	
38	O	Sha-38	Hoyawa	f	5		10/23/2015	10/22/2015	0	No	NA	No	A	
39	O	Sha-39	Molelicho	m	12		10/26/2015	10/25/2015	0	No	NA	No	A	
40	O	Sha-40	Shamsa missie	m	18		10/26/2015	10/25/2015	1	No	NA	No	A	
41	O	Sha-41	Shamsa missie	f	9		10/26/2015	10/25/2015	1	No	NA	No	A	
42	O	Sha-42-	Shamsa missie	f	9		10/26/2015	10/25/2015	1	No	NA	No	A	
43	O	Sha-43	Bonosha keneba	m	2		10/28/2015	10/27/2015	1	No	NA	No	A	
44	O	Sha-44-44	Bonosha keneba	f	8		10/29/2015	10/28/2015	0	No	NA	No	A	

Chapter II – Surveillance Data Analysis Report

2.1 Description of Southren Nations Nationalits peples Region /SNNPR Measles Surveillance, 2011– 2015

Tsehay Ayele, Alemayehu Bekele

Abstract

Background: Measles is a well-known vaccine preventable disease, which cause significant morbidity and mortality among children worldwide especially in developing countries like Ethiopia. The Ethiopia Ministry of Health (MOH), as well, Southren Nations Nationalits pepouls Region /SNNPR, included measles as one of the immediately reportable diseases in the surveillance system. The aim of this study was to assess the measles trend in the Southren Nations Nationalits pepouls Region /SNNPR, describe measles epidemiologically and identify locations where occurrence of cases is high for providing further investigation of causes.

Methods: We used a Descriptive study on the Regional measles surveillance, data of 2011-2015, from Junary- Febreary 2016, in Hawassa, Ethiopia. We used the database for analyzing of variables, we used the Regional Public Health Emergency Management, and measles guideline for case definitions, and the final classification of cases by the laboratory as it was kept in the database. We used Microsoft Excel, and Arc GIS to analyze and to present the findings.

Results: A total of 13,270 cases and 57 deaths (CFR=0.43%) were reported during 2011-2015. 95.42 % (12,662) were from rural site, 51% (6768) were females; the median age was 5 years old. 1-4 years age constitutes, 3091(23.3%).from total suspected cases, measles IgM positive cases accounted 1074 (8.1%), the highest attack rate was (210.4/100,000 pop) was in Kafa zone. The Regional measles vaccine coverage reached to 97% in 2015 but four zones were under 80%. The highest number of cases and incidence [3584(20 per 100,000 population)] was reported in year 2014. The five years Epi-curve peaks in Jan- 2012.1287(9.7%) cases get two or more vaccine doses, 3123 (23.5%) get one dose, 5177(39%)were not vaccinated, and 3639(27.8%) with unknown vaccination status. 69 (44.2%) districts ,were reported measles outbreaks, from 2011-2015, All zones reported measles outbreak, except Shake zone, Basketo and Yem special woredas.

Conclusion & recommendations: Generally, there was a trend of increment of cases in the months of January, February and March. The regional vaccination coverage showed progress year to year though the vaccination coverage of two zones and two SP woredas was still less than 80%. The age group 1-4 years was the most affected by measles from all other age categories; however 28% (3722) suspected cases age variable was missed on the line list, and 66.6% of the cases were not vaccinated for measles or with unknown status of vaccination.

Kafa zone constituted the highest percent (17.2%) of the suspected measles cases, and Sidama zone constituted the highest percent (19.5%) of laboratory confirmed measles cases, also the highest attack rate was observed in Gesha woreda, Kafa zone. Outbreaks which occurred in fifteen woredas, in five zones were responsible for the highest peaks of the regional epidemic curve of the five years period. Therefore, zones should be strengthened for the improvement of measles vaccination coverage. The surveillance activities need improvement in early detection of cases, for the completeness of variables and specificity of reporting suspected measles cases especially during outbreaks. The seasonality of disease transmission or occurrence of outbreaks could indicate when to conduct SIAs and needs further investigation and research to find out causes of outbreaks for the identified locations.

Key words: Measles, regional surveillance, vaccination coverage, SNNPR

Introduction

Measles is a highly infectious viral disease caused by a Morbillivirus and for which humans are the only reservoirs. 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, maculo-papular rash appears behind the ears and on the face. The rash spreads to the trunk and extremities and typically lasts 3-7 days [1]. Most persons recover from measles without complications. Some complications are associated with measles due to transient suppression of cellular immunity, which is a characteristic feature of the disease. Frequent complications in children less than five years of age include otitis media (5% -15%) and pneumonia (5% -10%) [2]. Transmission is primarily person-to-person via aerosolized droplets or by direct contact with the nasal and throat secretions of infected persons. Individuals with measles are infectious 4 days before through 4 days after rash onset [1].

Despite the existence of a safe, effective, and inexpensive vaccine, measles is still not being controlled in many parts of the world. However the use of measles vaccine over the last 30 years has reduced global measles morbidity by 74 % and mortality by 85%, compared with the pre-vaccine era [3].The World Health Organization (WHO) estimates that almost one million measles-related deaths occur each year, the majority (85%) in Africa and Asia [4.5].

Measles is widely known in Ethiopia, besides SNNPR and it has many names in various ethnic languages, e.g., Kufign, Huffana, Ossama or Shifto. In 1980 Ethiopia introduced measles vaccination as part of the Expanded Programme on Immunization (EPI) [6]. A single dose of measles vaccine is recommended at 9 months of age [7, 8].Several developed and developing countries follow a strategy that differs in timing and in the number of doses delivered either through routine immunization or supplemental mass immunization campaigns [9].In determining the age for vaccination, countries must balance the consequences of an older age (lack of protection in the early months of life) and a younger age (reduced effectiveness). In many countries, where morbidity and mortality due to measles are uncommon in infants, choose an older age for vaccination (e.g., age 12 or 15 months). In other countries, where a high number of deaths due to measles occur in children aged <9 months, a younger age for vaccination has been advocated [10, 11].

However, during supplemental immunization campaigns, a single dose of measles is given, irrespective of the immunization and disease history status, to all children in the target age group [12]. A study conducted in Ethiopia showed also that campaign vaccination elevated immunity in the target ages by between 30% and 50% according to age group, or an average of around 40% [13].

In Ethiopia as well in SNNPR the importance of disease surveillance in guiding health planning and interventions was recognized for a long time and “Quarantine" rules were proclaimed in 1947 with emphasis on surveillance. Another legal notice was issued in 1951, binding all public health practitioners in the country to report communicable diseases. ***The "Public Health Proclamation No. 200/2000” orders any individual who knows the existence of communicable diseases in his/her vicinity to report immediately to the nearest health institution and the institution receiving the report to take the necessary measures and report to the appropriate health authority***. In 1948 an anti-epidemic service was established to deal with prevention and control of communicable diseases. In 1951, 35 priority diseases were selected and classified into first and second class to be notified to MOH, immediately or weekly as necessary. In the mid- 1970` s the anti-epidemic unit was converted to epidemic control and surveillance unit under communicable diseases control division and vertical programs were conducting their own disease specific surveillance. After the health system reform in 1994 nineteen diseases (including those which were under vertical programs) were selected for surveillance and measles also one of the priorities [4].

According to the National PHEM guide line, every suspected measles case should be detected, reported using the cases based form and undergo laboratory investigation (or the first five cases in the situation of outbreaks) and during an outbreak all cases must be entered on a line listing, investigated and reported to next higher level [1 5 , 16]

SNNPR has experienced numerous measles outbreaks and increasing morbidity. As a vaccine preventable disease, measles surveillance data analysis is critical to guide intervention and vaccination activities. So the aim of the study was to assess the measles trend in the Region, describe measles epidemiologically and identify locations where occurrence of cases is high for providing further investigation of causes.

Objectives

General objective: To analyze surveillance data of Measles, in south, nations, nationalities, and peoples, region, from 2011 to 2015.

Specific

- To describe Measles cases by person, place, and time in the region.
- To identify the incidence of Measles cases among zones and districts(woredas) of the region
- To propose correction measures to strengthen Measles control strategies in the region

Methods and Materials

Study area, population and period

South Nations Nationalits People Region (SNNPR) is administratively sub-divided into forteen Zones, four special woredas and one city administration, and according to the 2007 Population and Housing Census projection, with a total population of 18,276,000, with average annual growth rate of 2.5%. 50.2% (9,174,552) were females, 15.61% (2,852,884) of the population was under age 5 years old , (47.48% was under age 15 years old, 19.27%(3.521,785) was between 15 and 25 years old ,and 33.25%(6,076,770) was in the age group of ≥ 25 years ,and the proportion of aged ≥ 65 years was 3.2 %(584,832) [16]. The regional measles surveillance data was analyzed from Junary to Fubrary 2016 in Hawasa, Ethiopia.

Design and data collection: A Descriptive study was undertaken on the regional measles surveillance data of SNNPR from 2011-2015. Although the type of data was secondary, we passed through certain procedural pathways to have it. First, we developed a concept paper and reviewed by Field base supervisor of Hawassa field base, SNNPR. Then the Regional/PHEM approved the request of a five year regional measles data base to carry out this study. We analyzed such as age, sex, date of onset of illness, reporting zone and, woreda, date of sample collection, no of vaccine doses, final classification of cases and presence of outbreaks.

Case definitions: The national Public Health Emergency Management and measles guideline was used for the case definitions and the final classification of cases by the laboratory as it was kept in the data base [6, 17, and 18].According to the Federal ministry of health of Ethiopia-Public health emergency management, measles is one of the immediately reportable diseases under surveillance. Suspected

cases and deaths of fever with rash illness filled with case-based reporting form with serum sample collected are sent and tested for IGM antibody at Central (EPHI) virology laboratory. Line listing was also used during an outbreak for reporting of cases.

Community Suspected case: Any person with fever and rash.

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

All suspected cases of measles are finally classified based on the adequacy of the blood specimen collected, and sample taken or not in to the following categories;

Laboratory confirmed suspected measles case that investigated, including the collection of an adequate blood specimen (5 ml), and has serological confirmation of recent measles virus infection (IgM positive).

Epidemiologically linked: A suspected measles case that has not had a blood specimen taken for serologic confirmation, but is linked to a laboratory confirmed case (definitive serologic evidence of recent measles virus infection). Linked is interpreted as being in the same geographic area (place) during the infectious period (time) of a laboratory-confirmed case (person), i.e., in the same district within 30 days.

Discarded: A suspected measles case that has been completely investigated, including the collection of adequate blood specimen (5 ml), but lacks serologic evidence of recent measles virus infection(i.e., IgM negative).

Clinical / Compatible: A suspected measles case that has not had a blood specimen taken for serologic confirmation and cannot be epidemiologically linked to a laboratory-confirmed case.

Data analysis: We used Microsoft Excel, and Arc GIS to analyze and to present the findings.

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Ethical issue:

A protocol for the Measles 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.

Results

According to the regional measles surveillance data which include case based and line listing; a total of 13,270 cases and 57 deaths were reported throughout the region during 2011 -2015. Of the total suspected cases about 95.42 % (12,660) were from rural site, and 4.58 % (610) from urban. About 51% (6768) were females, median age was 5 years old and the age ranges from 1 month to 98 years old.

The Regional measles vaccine coverage increased from 41 % in 2003 to 97 % in 2015 and an increased number of reported cases were also observed from 2011 to 2014. In the five years of reporting period, only 9.8% (1287) cases get two or more vaccine doses, 23.5 % (3123) get one dose, 39 % (5177) cases were not vaccinated and 26.5 % (3670) cases were, with unknown vaccination status.

It was observed that the cumulative number of suspected cases for five years was continuously increasing on January and February.

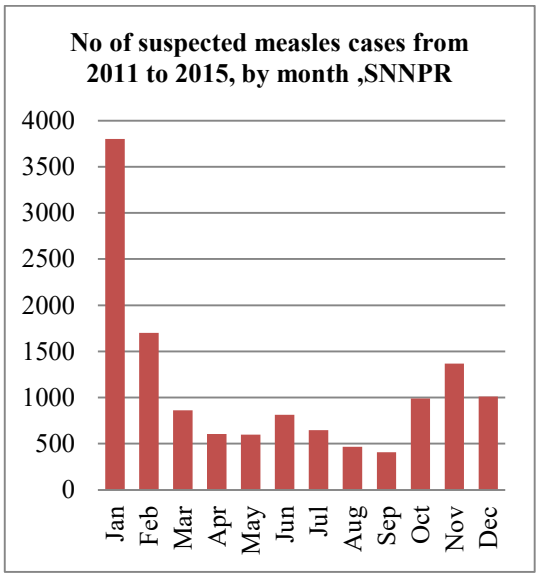


Figure 11: Number of suspected Measles cases from 2011 to 2015by month,

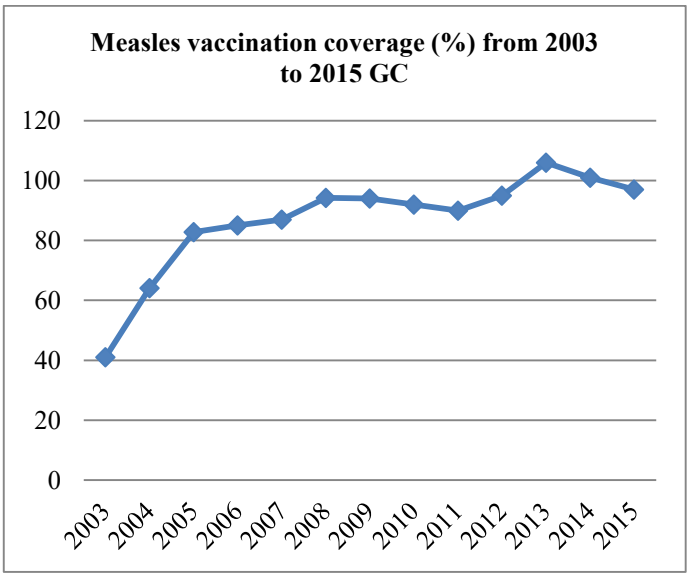


Figure 12: Trend of immunization coverage, from 2003-2015, in SNNPR

The highest number of cases and incidence [3584, (20.1 per 100,000 population)] was reported in year 2014.

Table 11 Distribution of cases per 100,000 populations per year, 2011-2015, Ethiopia

Year	SNNPR total Population	Cases	Cases per 100,000 population
2011	16,554,460	1286	7.77
2012	16,979,984	2982	17.56
2013	17,407,068	2928	16.82
2014	17,837,005	3584	20.1
2015	18,276,000	2490	13.62

In each month of the five-year period, a minimum of 18-suspected, cases was reported to the region. As it is shown in the epidemic curve, the highest peak was in January 2012 with 1,888 case which is (14%) of the all five years suspected cases , In 2014 Above half of the months experienced occurrence of the outbreak throughout the region.

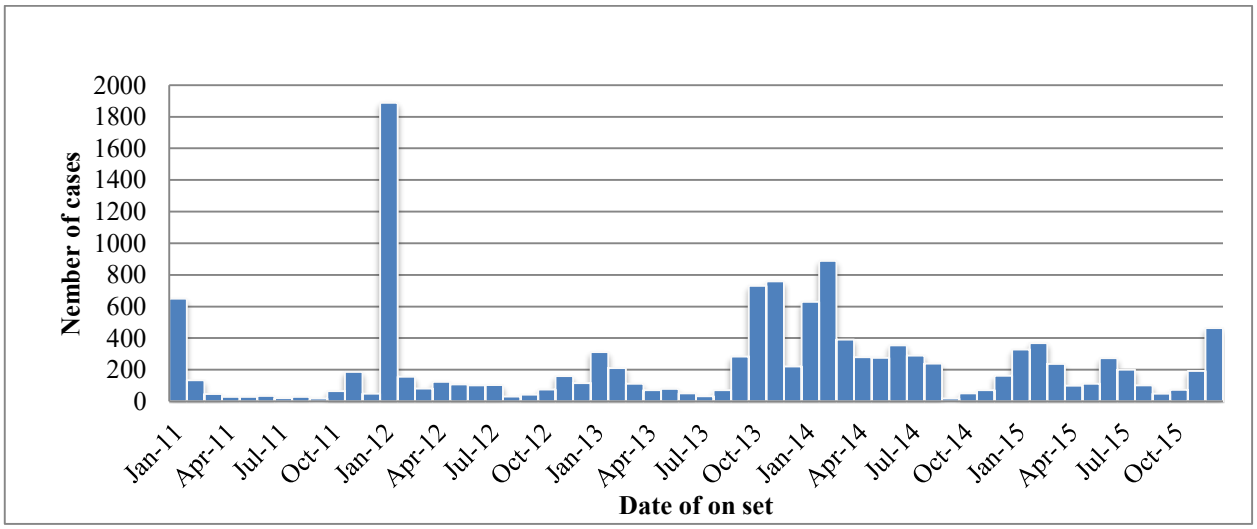


Figure 13 Showing Epi-curve of suspected measles cases by date of onset, in SNNPR, Ethiopia, from 2011-2015,

Through filtration of the data base for these specific months which showed the highest peaks in the epidemic curve(Jun-2012),the outbreak in Gesha woreda in Kafa zone, accounted, 77% of all the cases responsible for the epidemic , Kindo didaye, Boloso bonbe, Damot sorea and Damot woyede woredas ,in Wolayta zone, Aleta chiko ,Arbegona Hula and Hawasa zuria woredas in Sidama zone, Loma woreda in Dawuro zone, Kucha, Bonke and Chencha woredas in Gamo Ggofa zone,Gedeb, Wonago and bulle woredas in Gedeo zone, Hawasa city and Halaba special woreda were reported high number of cases using line listing form in which an outbreak indicated by their respective Epi-curves ,and for these specific months which showed the highest peaks in the epidemic curve was, 1888 cases ,Jan 2012, 829 cases, Feb 2014, 759 cases ,Nov 2013, Oct 2013,730 cases and 650 cases Jan 2011 .

Kafa zone accounted 97.8% (1843) and, Gesha woreda from respective zone accounted 1386 (75%) with attack rate of 145/10,000 population, Although in 2014 the highest reported number of cases 3584 (27%) of total cases, which Wolayta zone accounted 31.4 %(1127), and 10 zones and 40 woredas were affected by the outbreak during this year, using line listing form in which an outbreak indicated by their respective Epi-curves.

The outbreak in Gesha woreda, Kafa zone, started on 1/1/2012 and the highest peak was on 1/16/2012 and then continued to 2/14/2012.As it evidenced by the Epi-curve at least 40 cases per day were reported even after the highest peak.

A total of 7730 suspected cases were reported during the four months of an outbreak. 70% (5155) cases were under 15 years old, 45.8%(3542) were not vaccinated, 20.2%(1568) get one dose, 8.5%(656) get 2 doses ,1.2%(96) get ≥3 doses ,and 24.2% (1868) unknown status of measles vaccination.

In Kafa zone,Gesha woreda, a total of 1292 cases were reported in January 1 to 29, 2012. During this period 91.4 % (1183) unvaccinated, 6.5 %(84) get one dose, and 1.94% (25) get ≥2 doses of measles vaccination of the cases reported using a line list form.

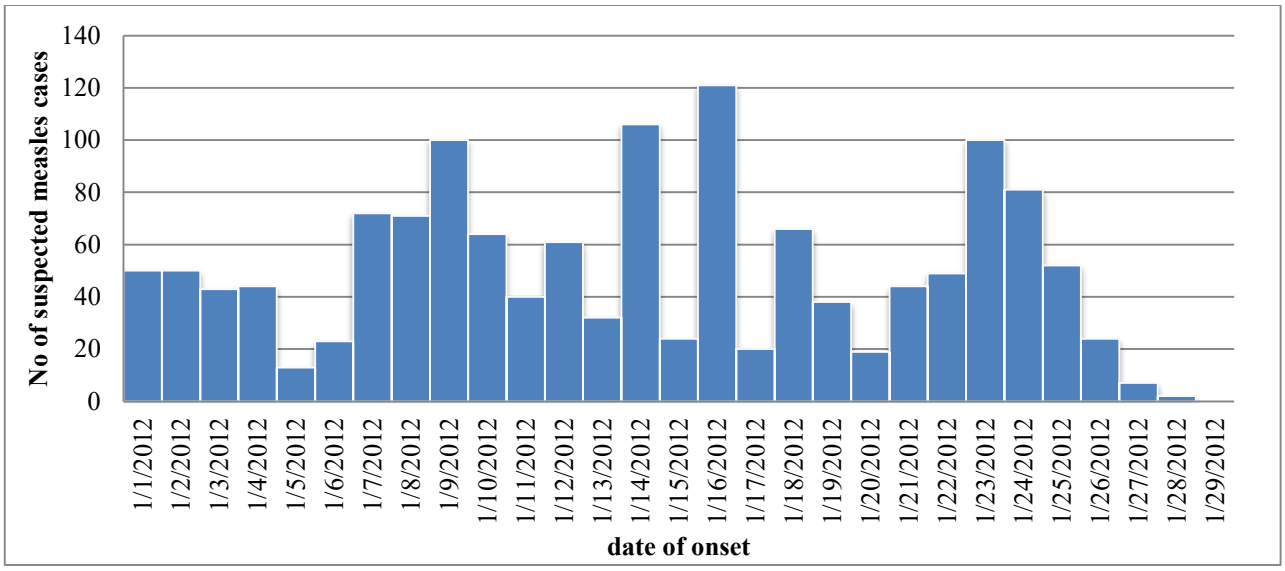


Figure 14 Showing Epicurve of measles outbreak by date of onset, in Gesha woreda Kafa Zone, SNNPR, 2012

In Kafa zone, Gesha woreda, a total of 1292 cases were reported in January 1 to 29, 2012. During this period 91.4 % (1183) unvaccinated, 6.5 %(84) get one dose, and 1.94% (25) get ≥2 doses of measles vaccination of the cases reported using a line list form.

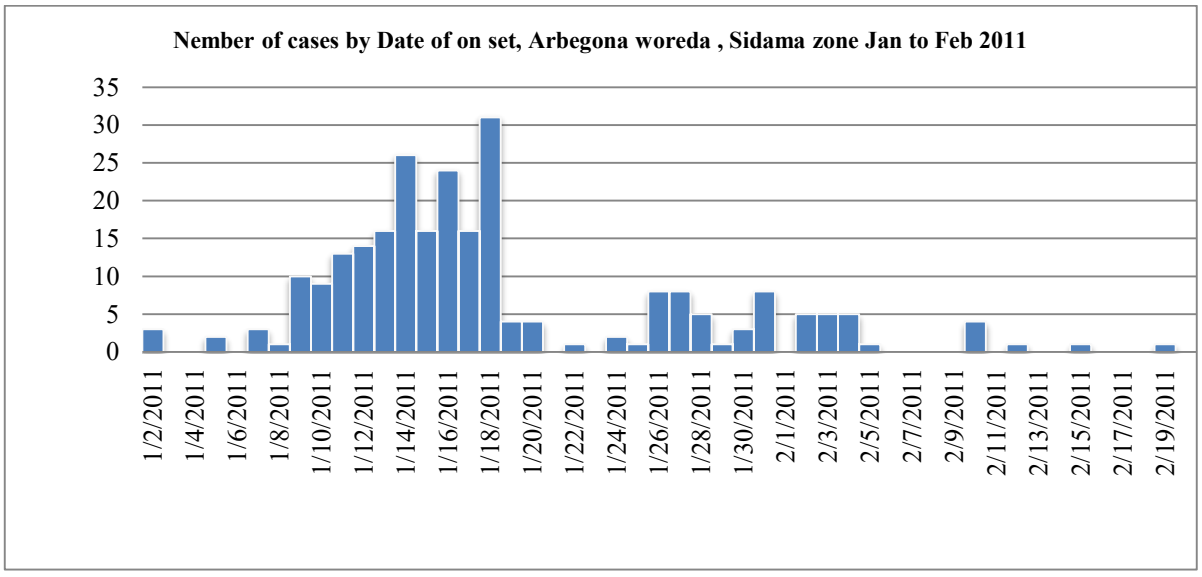


Figure 15Showing Epicurve of measles outbreak by date of onset in Arbegona woreda, Sidama zone, SNNP, Jan-Feb, 2011

In Sidama zone,Arbegona, a total of 1292 cases were reported in January 1 to 29, 2012. During this period 91.4 % (1183) unvaccinated, 6.5 %(84) get one dose, and 1.94% (25) get ≥2 doses of measles vaccination of the cases reported using a line list form.

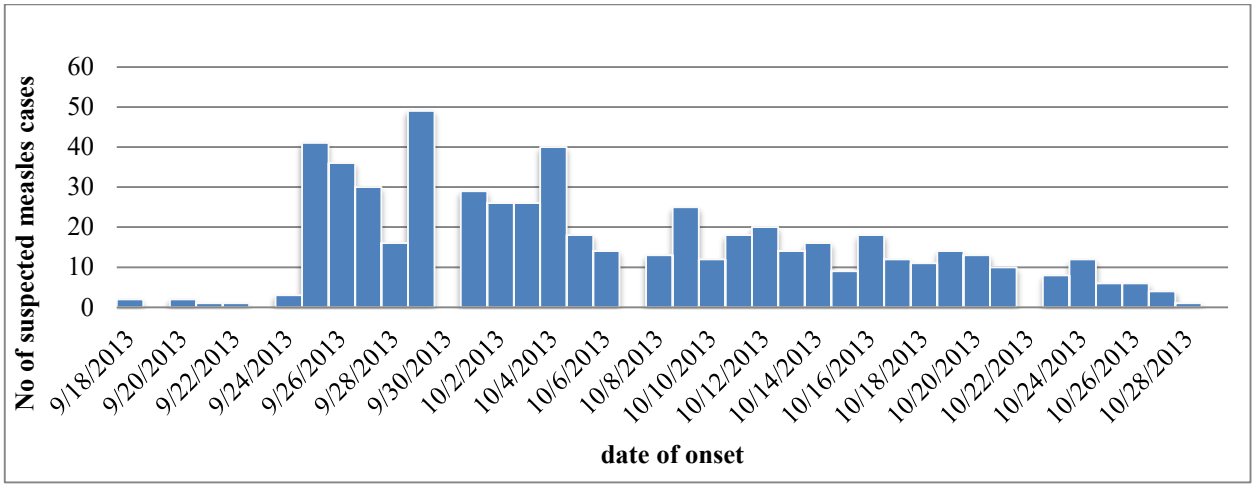


Figure 16. Showing Epicurve of Measles outbreaks in Kindo didaye woreda Wolayta zone, SNNPR, Ethiopia, Sep-October, 2013

In Wolayta zone, Kindo didaye woreda, an outbreak occurred in Sep-Oct 2013. 54% (321) cases were males, 7.9% (47) unvaccinated, 62% (309) get one dose, 23.2 %(142) get 2 doses, and 16.3% (97) unknown status of measles vaccination, and 90 %(536) cases were under the age of 15 years.

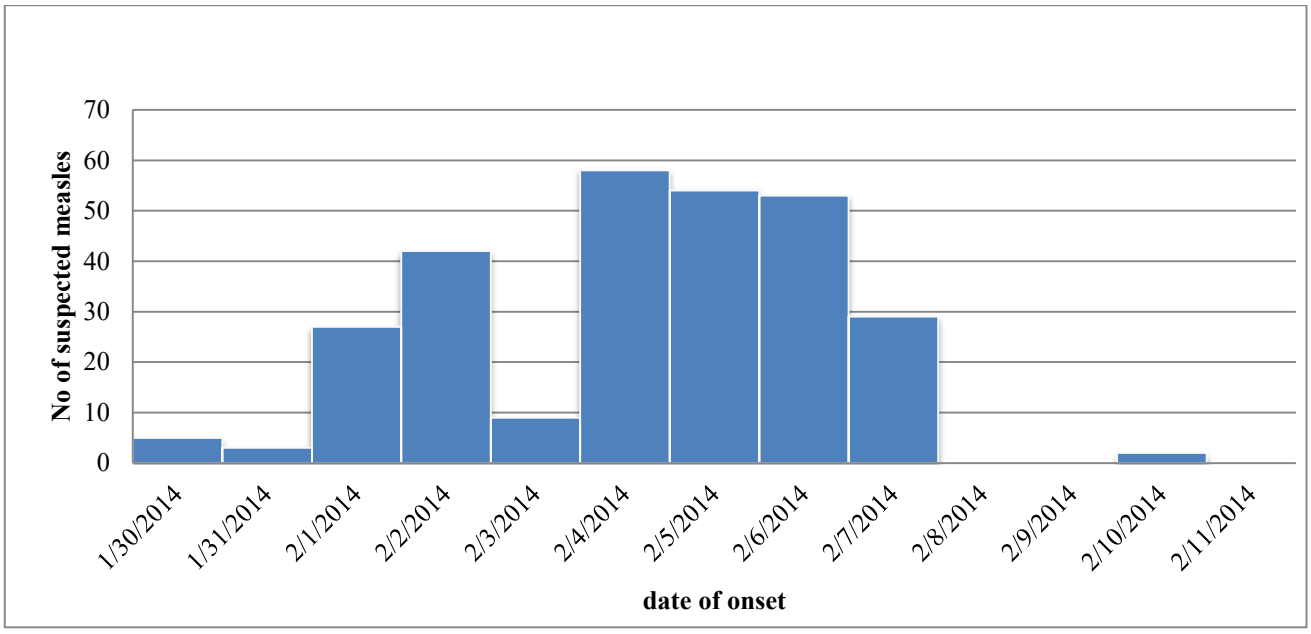


Figure 17 Showing Epicurve of measles outbreak by date of onset in Loma woreda Dawuro Zone, SNNPR, Ethiopia, Febreary 2011

In Dawuro zone, Loma woreda, outbreak occurred in Jan-Feb 2014. 51% (184) cases were males, 38.1% (138) not vaccinated, 36.7% (133) get oneor more dose, and 25.2% (91) unknown status of measles vaccination, andall cases missed age variabl.

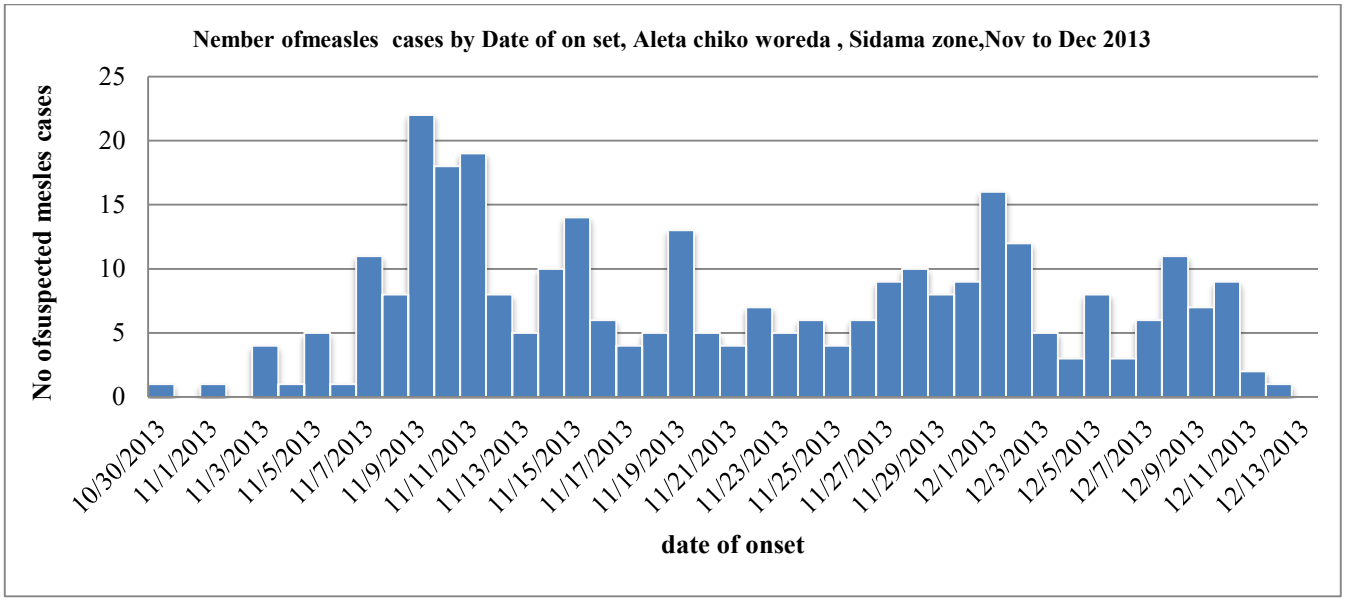


Figure 18 Showing Epicurve of measles outbreak by date of onset in Chiko woreda Sidama Zone, SNNPR, Ethiopia, Oct to Dec 2013

In Sidama zone Chiko woreda, outbreak occurred in Oct-Dce 2013. Accounted 10% of the total 2013, 66.2 % (210) not vaccinated, 29.4 % (93) gat at list one dose, 4.4 %(14) unknown status of measles vaccination, and 90.8 %(288) cases were missed age variable.

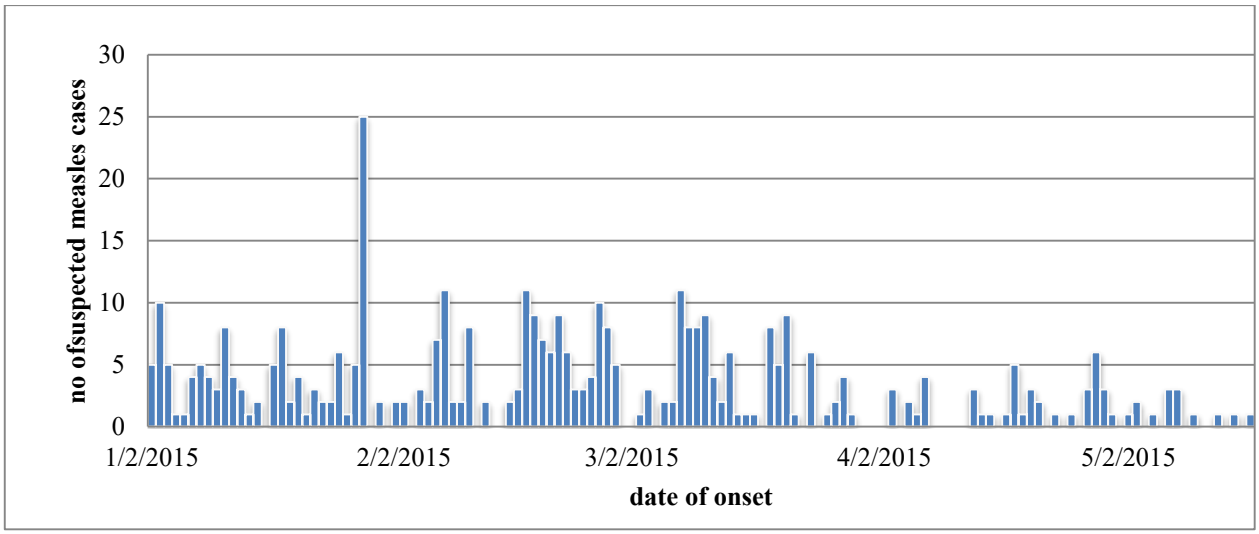


Figure 19 Showing Epicurve of measles outbreak by date of onset in Halaba special woreda, SNNPR, Ethiopia, from Jan to May 2015.

In 2015 here was also an outbreak in Halaba (111) with unknown vaccination status and special woreda with 421 reported suspected cases. 54.2(228) cases were less than five years old age 69% (290) were males, 39.7% (167) unvaccinated, group.

32.8 (143) gat one and more doses, and 26.4%

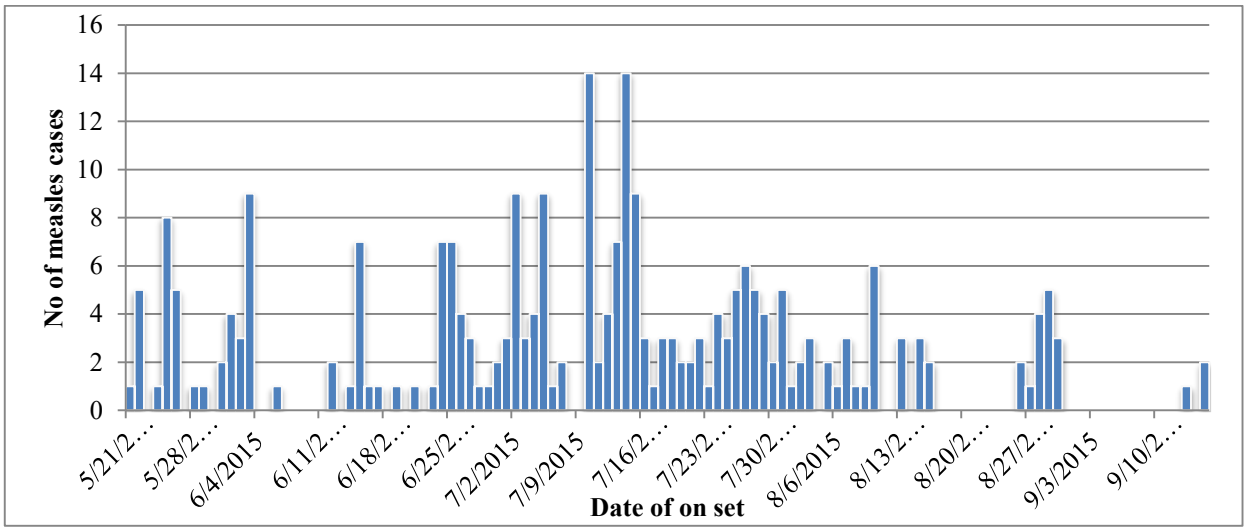


Figure 20 Showing Epicurve of measles outbreak by date of onset, in Bonke woreda Gamo Gofa Zone, SNNPR, May to Sep, 2015

In Gamo Gofa zone Bonke woreda, outbreak occurred in May-Sep 2015. Accounted 20% of the total 2015, 24 % (119) not vaccinated, 48.5 % (240) gat at list one or more dose, 27.5 %(136) unknown status of measles vaccination.

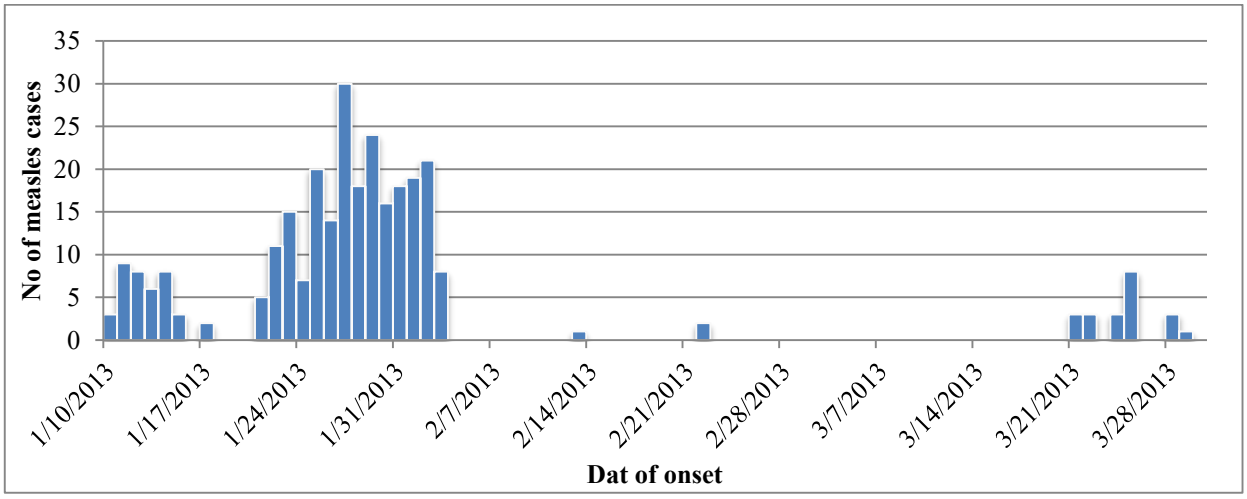


Figure 21 Showing Epicurve of measles outbreak by date of onset in Chencha woreda, Gamo Gofa Zone, SNNPR, Jan to May 2013

In Gamo Gofa zone, Chencha woreda, outbreak occurred in Jan-March 2013. 46% (133) cases were females, 54.5% (158) not vaccinated, 29.3% (85) get one or more dose, and 16.2% (47) unknown status of measles vaccination, and 31.7% cases were less than 5 years.

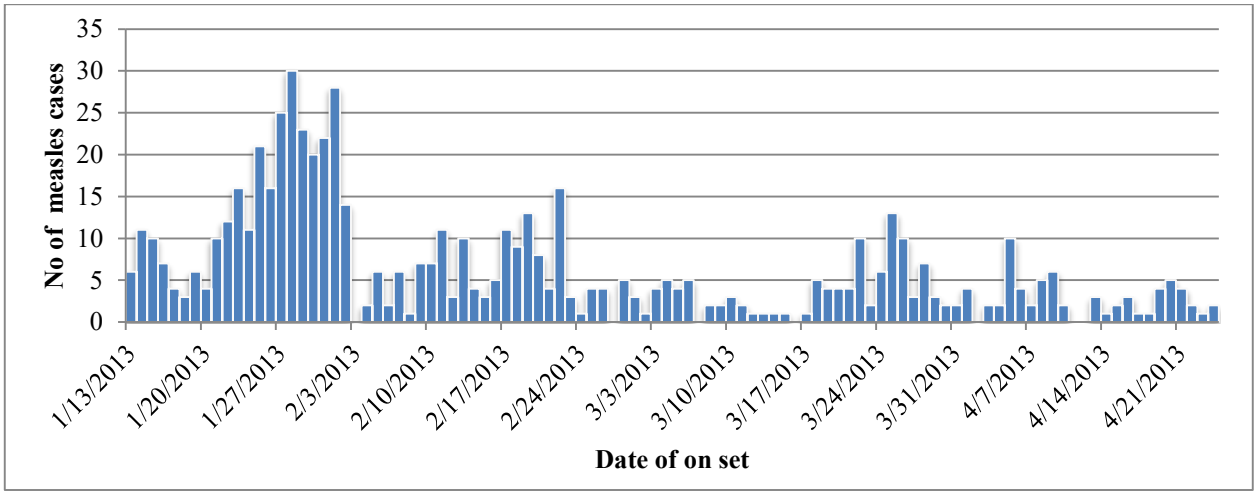


Figure 22 Showing Epicurve of measles outbreak by date of onset in Kucha woreda, Gamo Gofa Zone, SNNPR Jan to Apr, 2013

Thirteen cases from Halaba special woreda, 5 from Aleta chiko, and 8 from Arbegona woreda, Sidama zone, 8 from Gesha woreda, Kafa zone, 7 from Loma, Dawuro zone and, 6 from Kindo didaye woreda, Wolyta zone, 19 from Bonke, 19 from, Chencha, and 22 from, Kucha woredas, of Gamo Gofa zone were confirmed for measles IgM antibody collected during the occurrence of increased number of cases as depicted in the respective Epi-curves shown above.

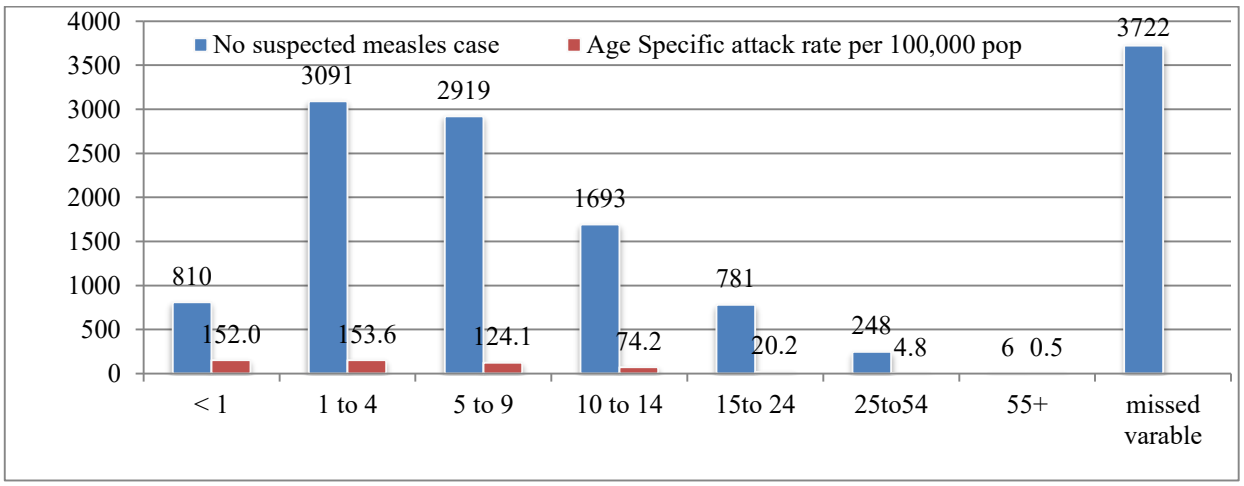


Figure 23 Distribution of, Measles suspected cases, by age category, No of suspected cases and age specific attack rate/100,000 pop, 2011-2015, SNNPR, 2011 to 2015

During 2011-2015 period, of the totale suspected measles cases 1 to 4 years age groups constitute 23.3 % (3091) and 28.3%(304) of the confirmed cases by laboratory measles IgM antibody

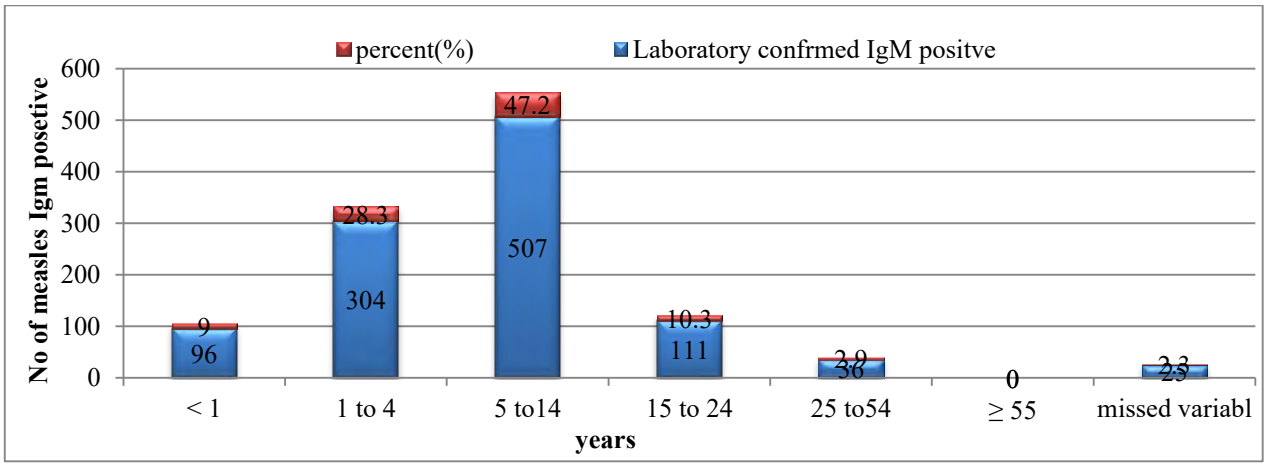


Figure 24 Distribution of laboratory confirmed measles cases by age category 2011-2015, SNNPR, Ethiopia

Of the total measles IgM Posetive cases from 2011 to 2015,37.2%(400) were less than 5 years ,and 2%(25) Measles IgM Posetive cases miss age variable.

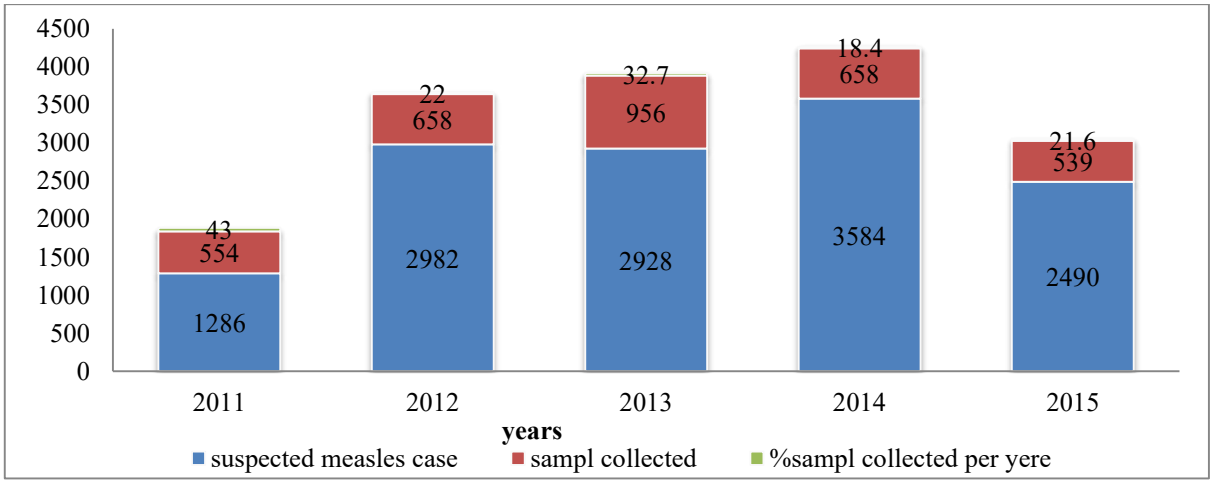


Figure 25 Frequency of samples collected and total suspected cases per year, 2011-2015, SNNP, Ethiopia

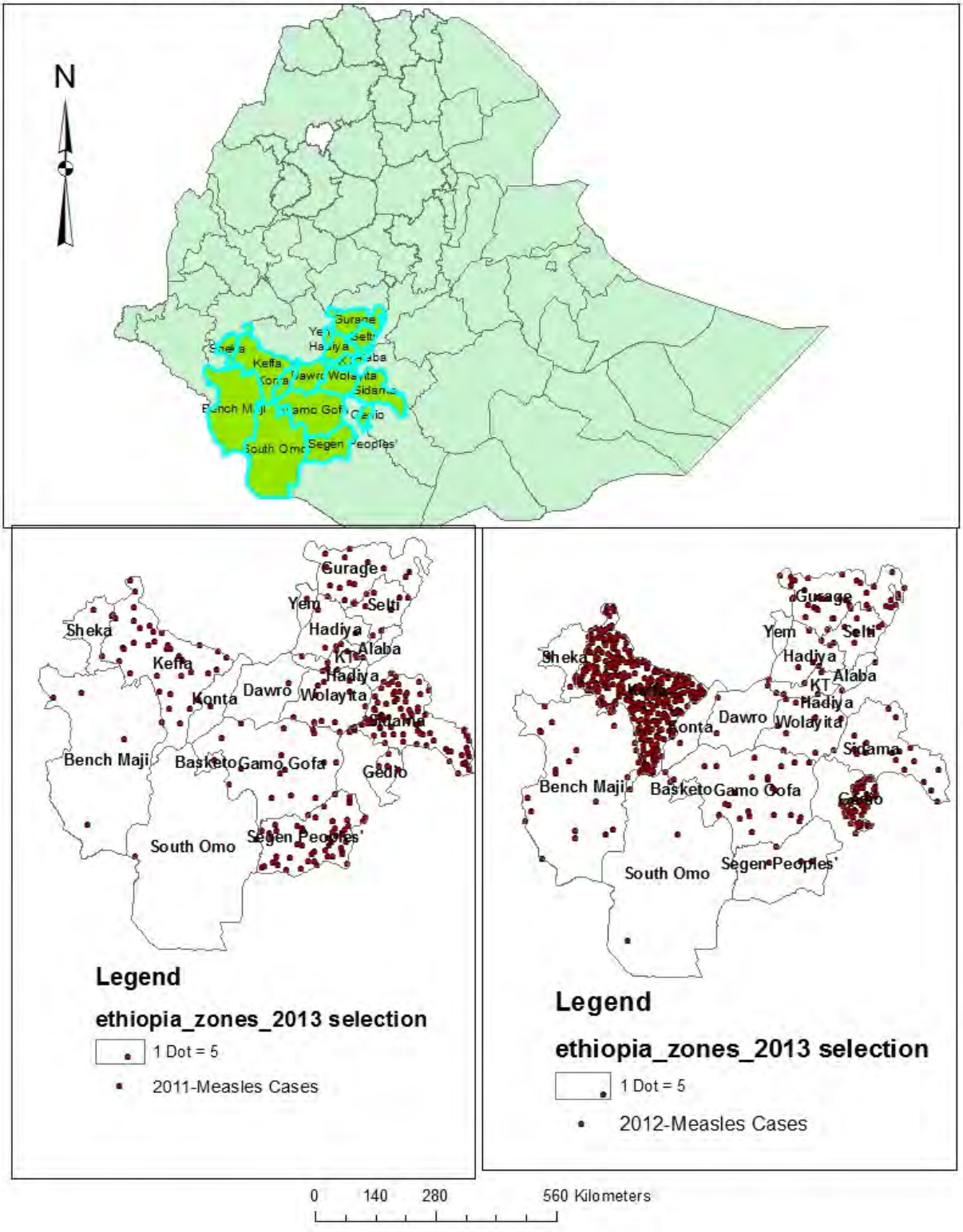
A total of 3385 serum samples were collected and sent to the national laboratory(EHNRI).The highest annual proportion of samples collected was 48 %(554) in 2011 followed by 32.7%(956) in 2013, and

the highest [47% (258)] confirmed cases of measles IgM antibody was reported in 2015 and the least [12.8% (71)] was in 2011. 50.9 % (557) of measles IgM confirmed cases were males during 2011-201

Table 12 Frequency of measles cases by final classification from 2011-2015, SNNPR, Ethiopia

Year	No of specimen collected	Confirmed (IGM +ve)	Discarded (IGM -ve)	Epi linked	Clinical / compatible	Total Cases	IgM positive rate (%)
2011	554	71	47	574	188	1286	5.5
2012	658	109	534	2181	74	2982	3.6
2013	956	345	601	1920	17	2928	11.6
2014	658	291	250	695	2238	3584	8.1
2015	548	258	260	1859	62	2490	10.4
Total	3385	1074	1692	7229	2579	13270	8.1

Number of Measles cases by Zone in SNNPR from 2011-2012,2016



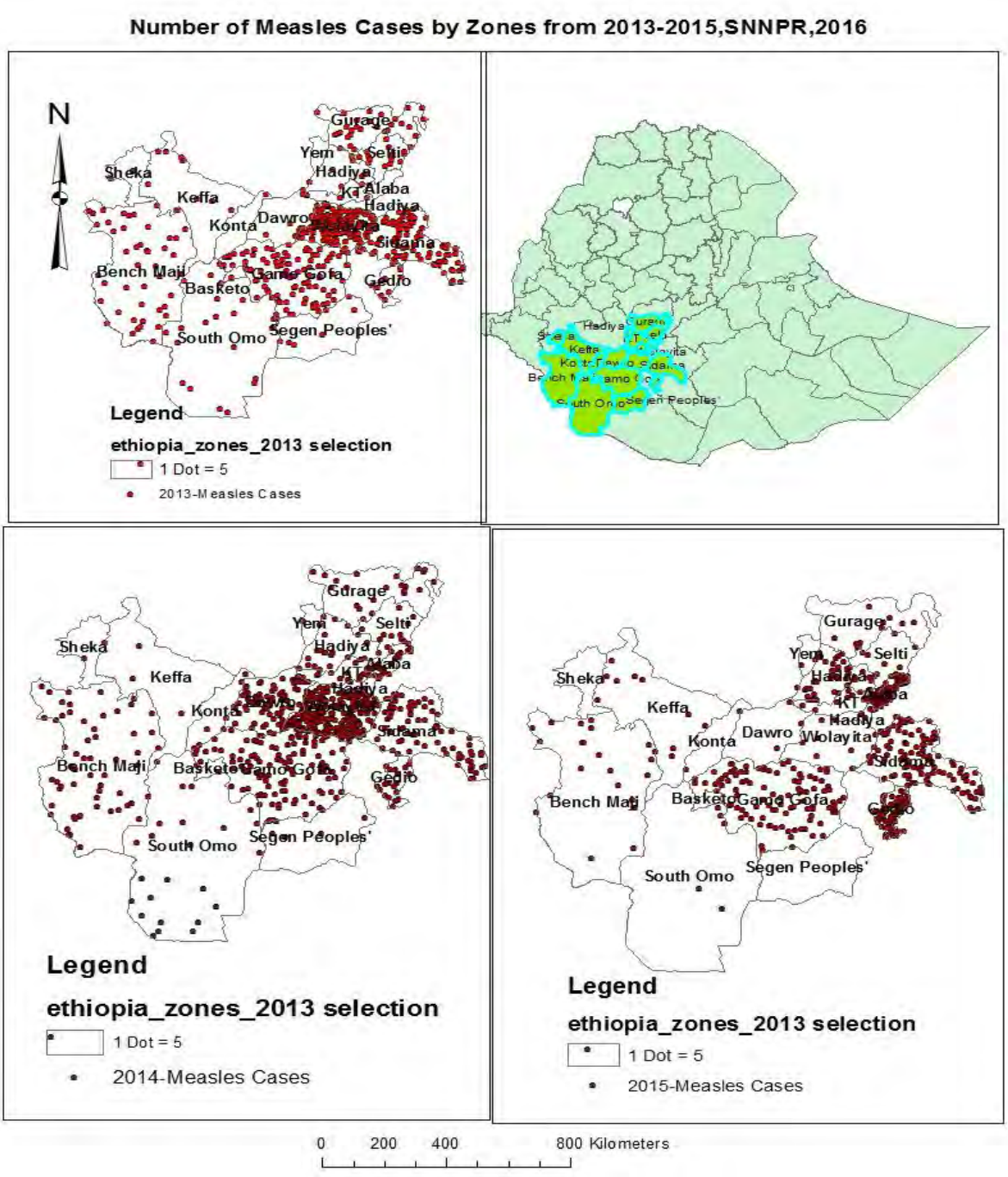


Figure 26Depicting; spot Map of Measles cases distribution by Zone/SP woreda and by years, SNNPR, February, 2016

From all zones and SP woredas, Kafa zone ranked first by notifying 16.9 % (2239) of the regional total suspected cases during the five years period. Konta SP and Basketo SP Woredas detected the highest [45.2% (14)] and lowest [0% (0)], and Silite and Kafa zones detected the highest [34.4% (99)] and lowest [0.9 % (20)], proportion of confirmed IgM positive of their own total suspected cases

respectively. But from total regional confirmed IgM positive cases Sidama Zone accounted first with a proportion of 19.5%(209) and lowest 0.2% (2) is from Shaka zone.

Table 13 Distribution of measles cases by Zones and special woredas, and final classification, 2011-2015, SNNPR, Ethiopia

Zone/SP woreda	Confirmed IgM +ve No (%)	Discarded IgM +ve No (%)	Epi-linked No (%)	Clinical /Compatible No (%)	Pending Lab result	Total suspected cases No (%)
BASKETO	0	17(85)	0	0	3(15)	20(0.15)
BENCH MAJI	59(7.9)	49(6.6)	362(48.6)	260(34.9)	15(20)	745(5.60)
DAWURO	24(5.6)	24(5.6	5(1.2)	365(86.3)	10(2.4)	423(3.2)
GAMO GOFA	126(6.8)	167(9)	1297(70.1)	210(11.3)	50(2.7)	1850(13.9)
GEDEO	114(14)	111(13.6)	515(63.3)	60(7.4)	13(1.6)	813(6.1)
GURAGEA	96(16.4)	342(58.4)	16(2.7)	109(18.6)	29(4.9)	586(4.4)
HADIYA	62(15.1)	58(14.1)	249(60.7)	19(4.6)	24(5.8)	410(3)
HALABA	34(5.6)	25(4)	535(87.4)	3(0.5)	15(2.4)	612(4.6)
HAWASA	19(5.1)	52(14)	289(77.7)	3(0.80	9(2.4)	372(2.7)
KAFA	20(0.9)	92(4.1)	2059(91.9)	29(1.2)	39(1.7)	2239(16.9)
KAMBATA TAMBARO	47(21.7)	67(31)	0	80(37)	22(10.2)	216(1.6)
KONTA	14(45.2)	3(9.6)	0	8(25.8)	6(19.3)	31(0.23)
SEGEN	23(6.5)	57(16.2)	248(70.4)	6(1.7)	18(5.1)	352(2.6)
SHAKA	2(5)	32(80)	0	4(10)	2(5)	40(0.3)
SIDAMA	209(10.9)	260(13.6)	1148(60.2)	247(12.9)	44(2.3)	1908(14.4)
SILLTE	99(34.4)	121(42)	0	45(15.6)	23(8)	288(2.1)
SOUTH OMO	11(4.4)	107(43.3)	73(29.5)	1(0.4)	55(22.3)	247(1.9)
WOLAITA	112(5.3)	104(4.9)	729(34.7)	1226(58.3)	32(1.5)	2103((15.8)
YEM	3(20)	6(40)	0	3(20)	3(20)	15(0.1)
Regional total	1047(8.1)	1694(12.8)	7369(55.5)	2831(21.3)	412(3.1)	13,270(100)

All zones/special woredas, and 156 woredas in the region reported cases in each year and at least in one year respectively. In all five years period the highest attack rate were, Kafa zone (0.19%) in 2012, Halaba SP woreda (0.148%) in 2015, and Hawasa city administration (0.14%) in 2013, and in 2014 the attack rate was distributed nearly most of the zones.

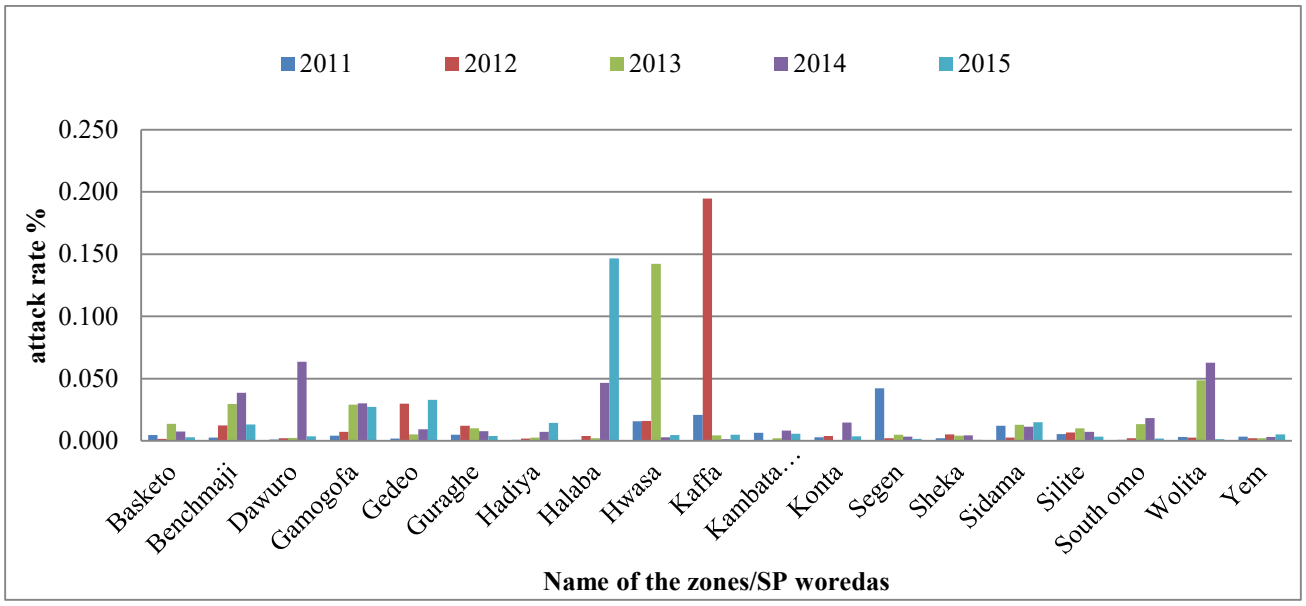


Figure 27 Measles attack rate (percent per population) by zone and SP woreda and by year from 2011-2015, SNNPR, Ethiopia

From five years aggregated, the highest attack rate (0.21%) observed in Kafa and in Halaba SP (0.202%), and Hawasa city (0.172%). Kafa zone reported the highest number of cases 2339 (16.9%) from the total cases reported in the region during 2011-2015

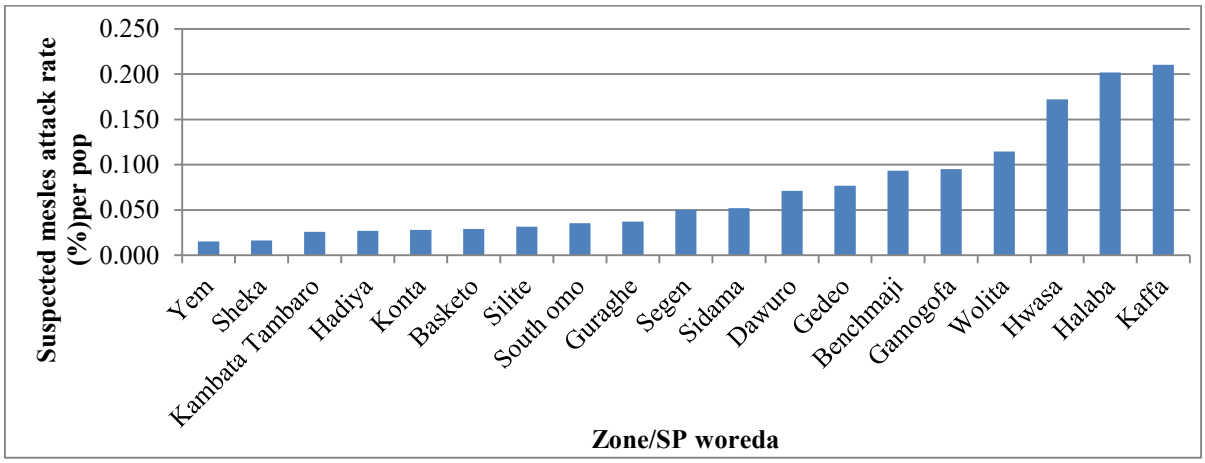


Figure 28 Five years Measles attack rate (%) by zone and woreda, from 2011-2015, SNNPR, Ethiopia

From 156 woredas reported during 2011-2015, a total of 13,270 cases were notified. Gesha woreda constituted the highest, [1624 (12.2%)] number of cases, followed by Kucha [618(4.66 %)], Halaba SP woreda, 612(4.6%), Kindo didaye, [598(4.5%), and Bonke 531(4.0%). In 2011 25.6% (40) of woredas had zero report of measles cases followed by 23.1 % (36) in 2012, in 2013, 19.2% (30),in 2014,18.6% (29), but in 2015 increased number of woredas with zero report, 48 (30.8%) woredas had zero report of suspected measles cases (Figure 2.2.12).

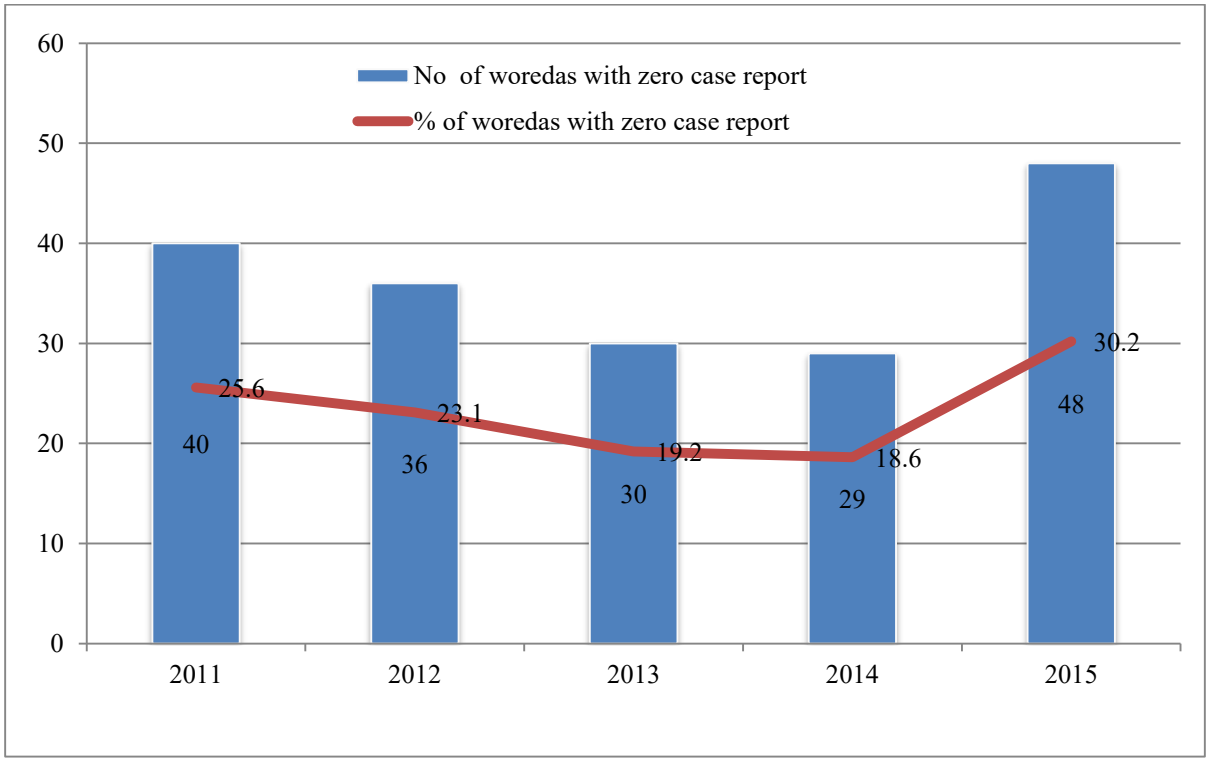


Figure 29 Frequency of woredas with zero report of suspected measles cases from 2011-2015, SNNPR, Ethiopia

From the total of 13,270 registered suspected measles cases, 9892(74.5%) were reported using line listing forms and 3379(25.5%) were using case based. 22 % (2072) of the reports using the line listing were from Kafa zone. Basketo and Yem Special woredas, and Shaka zone had zereo report of line listing based data .91(58.3%) woredas reported measles outbreaks from 2011-2015, from which Gesha

1624(16.4%), Kucha 618(6.2%), Halaba 612 (6.18%), Kindo didaye 598 (6%) and Bonke 531(5.4%).Except Shaka zone, Basketo and Yem special woredas all Zones and special woredas reported cases of an outbreak at least in one year from 2011-2015. Sidama, Gamo Gofa, and Bench Maji zones reported an outbreak in all four years except in 2011, for Gamo Gofa and Banch maji, and in 2012 for Sidama zone.

Table 14 Report of cases on outbreaks by Zone and special woreda, from 2011-2015, SNNPR

Zone/Sp woreda	2011	2012	2013	2014	2015
Basketo	0	0	0	0	0
Benchmaji	0	49	196	279	90
Dawuro	0	0	0	362	0
Gamogofa	0	66	420	512	480
Gedeo	0	243	0	50	264
Gurage	0	63	0	11	0
Hadiya	0	0	0	70	190
Halaba	0	0	0	109	425
Hawasa	15	0	0	0	0
Kafa	156	1903	0	0	18
Kambata Tambaro	0	0	0	26	35
Konta	0	0	0	7	0
Segen	248	0	0	0	0
Sheka	0	0	0	0	0
Sidama	311	0	304	289	449
Silete	0	0	0	26	0
South omo	0	0	41	73	0
Wolyta	0	0	725	1112	0
Yem	0	0	0	0	0
Regional	733	2324	1686	2926	1951

From 12 zones, 57 deaths were reported during 2011-2015 in which the highest was reported from Gamo Gofa Bench Maji zones each zone accounted equally 11 deaths (19.3%) ,followed by South omo and Segen zones ,each 7(12.3%) and Halaba special woreda by 6 cases (10.5%). The overall case fatality for the five consecutive years of the region was 0.43%.

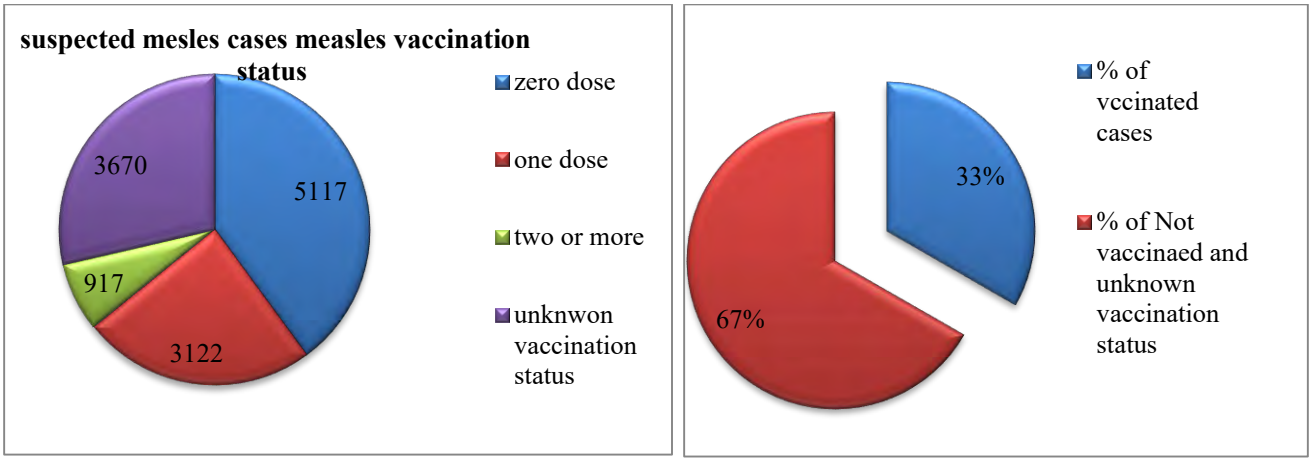


Figure 30: Proportion of vaccination status of suspected measles cases, from 2011-2015, SNNPR, Ethiopia

From the total of 13,270 registered suspected measles cases, 3122 (23.5%) got at least one dose of measles vaccine, 1287 (9.8%) got two or more doses, 5177 (39%) were not vaccinated for measles vaccine and 3683 (27.6%) were with unknown vaccination status for measles vaccine. From total reported (810), less than one year suspected cases, 428(52.8%) and 199(24.8%) were, not vaccinated and unknown vaccination status respectively.

Table 15: Description of measles vaccination status by age category, from 2011-2015, SNNPR, Ethiopia

Age category	zero dose	(%)	one dose	(%)	two or more doses	(%)	unknown vaccination status	(%)	Total cases	(%)
<1	428	52.8	139	17.2	44	5.4	199	24.6	810	6.10
1 to 4	1014	32.8	974	31.5	339	11.0	764	24.7	3091	23.29
5 to 9	1100	37.7	740	25.4	293	10.0	786	26.9	2919	22.00
10 to 14	611	36.1	350	20.7	136	8.0	596	35.2	1693	12.76
15-24	301	38.5	88	11.3	43	5.5	349	44.7	781	5.89
25-54	134	54.0	9	3.6	13	5.2	78	31.5	248	1.87
≥55	3	50.0	2	33.3	0	0.0	1	16.7	6	0.05

Missed variable	1586	42.6	820	22.0	419	11.3	897	24.1	3722	28.05
Total	5177	39	3122	23.5	1287	9.8	3670	27.6	13270	100

Discussion

Measles Immunization coverage of SNNP, Region showed a progress from 41% in 2003 to 97% in 2015. Recently the African regional goal of a >90% measles immunization national level coverage and >80% in all districts was adopted by the Federal Ministry of Health of Ethiopia [15].

Nonetheless notification of measles cases increased year to year with a decline in 2015. It was also depicted by the Epi-curve that SNNPR experienced outbreaks in all five years 2011-2015 of January to February. This could probably be improvement of measles surveillance activities such as notification of any suspected cases of measles. In Basketo special woreda for example, 17 (85%) of the reported suspected cases were classified as discarded from 2011-2015 which might indicate an increase in awareness of for notifying suspected cases of measles. As it was evidenced, among the total cases 39% (5177) were not vaccinated and 27.7% (3683) with unknown vaccination status; low immunization coverage and inadequate vaccine efficacy could be the main contributing factors for the occurrence of outbreaks and increment of measles cases in the region. The seasonality trend of the disease or Increase number of cases from January to February could not be explained within the scope of this work.

The two highest peaks of the Epi-curve, in January 2012 and 2014 were due to the outbreaks of Gesha, and Kucha, and Damot sorea woredas. Cases were not evenly distributed by age and the most affected age group was observed from 1-4 years throughout the five years period. This could be be because of the immaturity of immune system in this age group and it is also documented that in developing countries the most vulnerable children are between the ages of 9 months and 5 years [19].

Though an increased number of suspected measles cases notified in 2012 and 2014, the laboratory confirmed cases (3.6% & 8.1% respectively) were lower than the restof the three years. This could be due to the occurrence of outbreaks in 2012 and 2014, which minimized the number of serum samples collected, i.e., no more serum sample collection after five laboratory confirmed cases during an outbreak.

The cumulative case fatality rate in five years period was too low (0.43%). This could be under reporting of deaths and weak surveillance activities to detect a case early which is a common situation like other causes of deaths in the country or it could be also due to improvement of case management in health facilities.

All big zones such as Sidama, Gamo Gofa, Gurage, and Kafa had low performance or proportion of detection of confirmed IgM positive cases. This could be the fact that in big zones the notification of suspected cases was high and especially because of the occurrence of outbreaks in each year result in an increment of a denominator.

The highest attack rate (1.3%) in Gesha and Halaba special woreda (0.15%) could not be explained at this point; however the **probable** hypothesis might be still due to cold chain management failure or presence of many susceptible groups in the community.

One zone and two special woredas (Sheka, Basketo and Yem) had zero report of measles cases in line listing form (outbreak) different from the rest of all other zones and special woredas. But the absence of outbreak in these zone and special woredas in five years period couldn't be explained so far.

Primary indictors for the performance of measles surveillance such as (i) a greater than 80 % of reported measles cases with a blood specimen collected within 28 days of rash onset excluding epidemiologically linked cases from the denominator, (ii) a target of >80% of districts that have reported at least one case of measles (or >1 reported case per 100,000 population) with a blood specimen per year, (iii) Annualized rate of investigation (with blood specimens) of suspected measles cases or a > 1 case investigated with blood specimen per 100,000 populations per year were tried to be assessed.

From the supplemental performance indicators of measles surveillance the target which indicate a 90% or more arrival of samples to the national laboratory in a good condition (i.e., adequate volume, no leakage, not desiccated) was found to be 99.9% (11829), 17.12 % (3000) of measles cases were laboratory confirmed which was above the target set by the FMOH of Ethiopia and WHO [6], i.e.> 10%.

Conclusion

A total of 13,270 suspected and 1074 (8.1%) laboratory (IgM antibody) confirmed measles cases were notified at regional level during 2011-2015. The overall case fatality rate was 0.43% for the same year's period. Generally there was a trend of increment of cases in the months of January, February and March.

The national vaccination coverage showed progress year to year though the vaccination coverage, of two zones and two special woredas was still < 80 %. In five zones [Kafa, Gamo Gofa, Wolyta, Sidama, and Dawuro] eleven woredas (Gesha, Kucha, Bonke, Chencha, Kindo Didaye, Damot Sorea, Damot woyede, Boloso Bombe, Alata chiku, Arbegona, Hula and Loma), Hawasa city and Halaba special woreda were identified as places which were responsible for the highest peaks in the regional epidemic curve of the five years period because of the occurrence of outbreaks.

The age group 1-4 years was the most affected by measles from all other age categories and 62.2% of the cases were not vaccinated for measles or with unknown status of vaccination. Kafa zone constituted most of the suspected and the highest attack rate. Sidama zone constituted the highest proportion of laboratory confirmed measles cases. Sheka zone, Basketo, and Yem special woredas had no report of cases of an outbreak.

Recommendations

The SNNPR, PHEM and other partners should collaborate and strengthen zones/special woredas, for the improvement of measles vaccination coverage. The seasonality of disease transmission or occurrence of outbreaks could indicate when to conduct SIAs and needs further investigation and research. The surveillance activities need improvement in early detection of cases, for the completeness of variables and specificity of reporting suspected measles cases especially during outbreaks. Improvement in the database management for ease analysis i.e, for example health facility names were inconsistent and districts were not filled. Further investigation or research better be conducted find out causes of outbreaks for the identified locations.

Acknowledgements

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Annex 4 Distribution of suspected measles cases by zones/special woredas, and by data type, from 2011-2015, SNNPR, Ethiopia.

Zone/SP /woreda	2011			2012			2013			2014			2015		
	line list	case base	Total	line list	case base	Total	line list	case base	Total	line list	case base	Total	line list	case base	Total
Basketo	0	3	3	0	1	1	0	9	9	0	5	5	0	2	5
Benchmaji	0	19	19	49	44	93	196	29	225	279	23	302	90	16	106
Dawuro	0	6	6	0	12	12	0	13	13	362	8	370	0	22	22
Gamo Gofa	0	75	75	66	64	130	420	122	542	512	60	572	480	51	531
Gedeo	0	19	19	243	53	296	0	53	53	50	46	96	264	85	349
Gurage	0	72	72	63	116	179	0	152	152	11	109	120	0	63	63
Hadiya	0	13	13	0	28	28	0	37	37	70	41	111	190	31	221
Halaba	0	12	12	0	11	11	0	5	6	109	29	138	425	20	445
Hawasa	15	16	31	0	32	32	0	19	293	0	6	6	0	10	10
Kafa	156	45	201	1903	22	1925	0	45	45	0	14	14	18	36	54
Kambata Tambaro	0	49	49	0	34	34	0	18	18	26	42	68	35	12	47
Konta	0	3	3	0	4	4	0	4	4	7	9	16	0	4	4
Segen	248	21	269	0	14	14	0	34	34	0	24	24	0	11	11
Sheka	0	5	5	0	12	12	0	10	10	0	11	11	0	2	2
Sidama	311	91	402	0	91	91	304	151	455	289	123	412	449	99	548
Silite	0	45	45	0	58	58	0	88	88	26	39	65	0	32	32
South omo	0	6	6	0	14	14	41	49	90	73	51	124	0	13	13
Wolyta	0	53	53	0	46	46	725	127	852	1112	15	1127	0	25	25
Yem	0	3	3	0	2	2	0	2	2	0	3	3	0	5	5
Total	733	553	1286	2324	657	2982	1686	965	2928	2926	655	3584	1951	534	2490

Annex 5 Trend of measles vaccination coverage (%) by Zones/SP woreda, from 2003-2015, SNNPR,

Zone/SP /woreda	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Basketo	34	29.2	54.4	82	71	73.5	72	77	72	58	77.4	80	77
Benchmaji	48	71	78.3	63	70	84.3	79	96	103	85	104	98	93
Dawuro	63	82.4	71.8	93	100	94.7	85	95	97	100	101.3	91	78
Gamo Gofa	48	50	73.7	66	71	72.9	89	94	88	94	98	99	100
Gedeo	32	40.3	74.9	72	74	90.3	89	72	93	89	106	106	104
Gurage	42	57.6	73.1	68	75	92.4	119	90	90	97	102.4	101	96
Hadiya	54	72.4	88.9	106	95	101.4	107	90	98	92	102	101	96
Halima	33	55.6	66.3	80	78	85.7	93	77	89	92	92.1	100	92
Hawasa	0	0	84.3	109	70	426	66	94	75	96	104	108	105
Kafa	38	57.2	62.3	65	79	84.1	87	79	62	106	98.5	90	90
Kambata Tambaro	50	65.5	82.8	95	100	117	119	89	104	99	103	100	100
Konta	61	47.3	79	66	91	83.8	88	63	92	67	88	88	88
Segen	52.2	48.2	84.5	86.2	69.7	64.5	69	92.5	72	94	98	106	102
Sheka	52	48.2	61.8	108	76	73	63	69	58	71	82	63	51
Sidama	55	69.7	104	109	95	103.7	81	104	89	95	95	101	97
Silete	45	78.9	84.5	92	100	111.1	129	92	91	106	110	116	107
South omo	19	30.3	55.3	53	55	63.8	72	73	76	91	111	112	103
Wolyta	43	81.6	90.8	99	100	115.8	114	101	105	100	106	100	100
Yem	57	54.6	70	64	60	58.6	42	49	31	78	70	86	71
Total	41	64.1	82.8	85	87	94.2	94	92	90	95	106	101	97

Annex 6 Distribution of Age variable missed, suspected measles cases, percent (%), and proportion by zones/special woredas, 2011-2015, SNNPR

zone/SP woreda	No of reported suspected measles cases	No of age variable missed suspected measles cases	Percent(%) from own reported cases	Proportion of age missed variable
Basketo	20	2	10	0.05
Benchmaji	745	269	36	7.2
Dawuro	423	363	85.8	9.7
Gamogofa	1850	605	32.7	13.2
Gedeo	813	104	12.8	2.8
Gurage	586	29	4.9	0.6
Hadiya	410	15	3.6	0.4
Halaba	612	58	9.5	1.5
Hawasa	372	119	32	9.2
Kafa	2239	7	0.3	0.2
Kambata Tambaro	216	15	6.9	0.4
Konta	31	7	22.6	0.2
Segen	352	3	0.3	0.08
Sheka	40	0	0	0
Sidama	1908	892	46.7	24
Silete	288	31	10.2	0.08
South omo	247	79	32	2.1
Wolyta	2103	1125	53.4	30.2
Yem	15	4	26.7	0.1
Region total	13270	3722	28	100

2.2 Acute Flaccid Paralysis Surveillance Data Analysis Report of nine years, (2007-2015), Southe, Nations, Nationalities, and Peoples, Region, Ethiopia, 2016.

Abstract

Background: Poliomyelitis is vaccine preventable disease, targeted for eradication worldwide. Globally, since 1988 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.

Method: We conducted a retrospective secondary data analysis using 2007-2015 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.

Result: 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 years, and 1241 (58.9%) of AFP cases were 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 populations 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 poliovirus to propose correction measures to strengthen AFP surveillance in the region.

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 get aggravated from the above mentioned risk factors is polio. The distribution of polio has 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 that reported Polio outbreaks in 2013. The outbreak in Ethiopia occurred in Somali region and 10 cases were reported. Poliomyelitis is one of the National priority disease followed on a daily base by the public health emergency management system of Ethiopia. Moreover 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).

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 oral polio vaccine (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 (c VDP) 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 12-23 months 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) was 19.7%, 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 sero converting 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).

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. There is no guarantee that the wild polio virus would not be detected 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.

Objectives

General objective: To analyze surveillance data of AFP in south nations, nationalities and peoples region from 2007 to 2015.

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

Materials and Method

Study design and period: We conducted a retrospective secondary surveillance data analysis from 2007-2015.

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

Data collection and analysis

During our study, we have tried to see different source of data. Finally, in consultation with the Regional PHEM head, and WHO staff, we have decided to review surveillance data from the Public Health Emergency management surveillance database and WHO AFP/Polio line list data. However, the regional AFP/polio surveillance database had limited number of variables. The available variables in the polio database were number of cases and deaths by reporting zones, special Woreda, and reporting time only. The WHO database had more variables than the PHEM surveillance data. More over the data obtained from the National polio referral laboratory, WHO surveillance unit and thus it was more reliable and complete compared to the PHEM data. So that considering these advantages we used nine years (2007-2015) WHO AFP surveillance data from 14-zones, and 8- special Woredas from 2007-2010 which later on the number of zone and special Woredas were changed to 15- and 4 respectively. We used office Excel and Epi info 7 to capture and analysis. The data, we described a retrospective secondary epidemiological and laboratory surveillance data, of AFP reported from mentioned zones and special woredas, of SNNPR during 2007-2015, by person, place and time.

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.

Inclusion criteria: All AFP reported cases and deaths from 2007 – 2015 in SNNPR

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 polio

Polio-zero 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 > one 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 > two polio cases caused by Wailed Polio Virus/WPV related to the imported WPV.

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 database had no AFP line list and the database contains only aggregated cases and deaths.

Result

We identified 2,108 AFP cases reported from 2007-2015. Out of the total cases, 2074 (98.4%) AFP cases were under 15 years old and 12(0.6%)AFP cases were age greater than 15 years old, and the rest 22(1.0%) AFP cases were missed variables. The median age of the cases is 4 years, ranging from one month to 16 years.

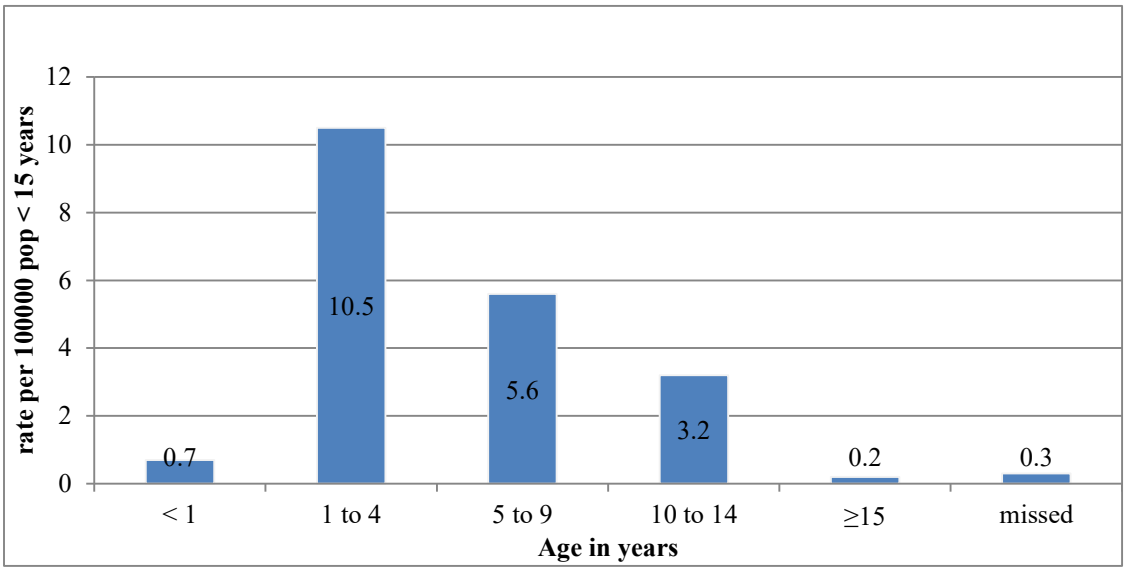

Figure 31 Acute Flaccid Paralysis cases by age group SNNPR, Ethiopia, 2007-2015.

The incidence rate of AFP cases among infants was 0.7 per 100,000 POP. Of the total 2108 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, 57% were males.

Of the total 2108 reported AFP cases, 1355(64.3%) cases developed fever at onset of paralysis, 246(11.7%) cases did not develop fever at onset of paralysis, 506(24%) AFP cases were missed variables and only 1(0.04%) AFP case was unknown history of fever at onset. 31(1.5%) cases affected their limbs asymmetrically, 139(6.6%) AFP cases affected their limbs symmetrically, and 224(10.6%) AFP cases affected their all limbs, 23(1.1%) cases affected their 3-limbs, and 126(6.0%) cases affected only their one limb and 901 (42.7%) AFP cases were missed variables. Out the total 176 follow up conducted cases, 58(32.9%) AFP cases developed residual paralysis, 105(59.6%) improved their initial paralysis, 8(4.5%) cases lost to follow up, and 3(1.7%) died before follow up. Out of 2108 reported AFP

cases; there was no confirmed case for the last nine years. Out of the total cases 62(2.9%) were suspected polio virus, 1622(76.9%) were negative for polio cases, 156(7.4%) were NPENT, and 278(13.2%) were missed variables.

Table 16 Expected AFP cases by Zones and Special Woredas, SNNPR, 2007-2015

Zone/Sp woreda	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Alaba	1	2	2	2	2	2	2	2	3	18
Amaro	1	2	2	2	2					9
Hawassa	1	2	2	2	2	3	3	3	3	21
Basketo	0	0	0	0	0	1	1	1	1	4
Bench maji	2	4	4	6	6	5	6	6	7	45
Burji	0	0	0	0	0	-	-	-	-	0
Dawuro	2	4	4	5	5	5	5	5	5	40
Derashe	1	2	2	2	2	-	-	-	-	9
Gamogofa	8	16	16	18	18	19	19	19	19	154
Gedeo	4	8	8	9	9	9	9	10	10	76
Gurage	8	16	16	13	13	15	16	16	16	129
Hadiya	7	14	14	12	12	13	13	14	14	113
Kafa	4	8	8	9	10	9	9	10	10	77
K/T	4	8	8	8	8	7	7	7	7	64
Konso	1	2	2	2	2	-	-	-	-	9
Konta	0	0	0	0	0	1	1	1	1	4
South omo	2	4	4	6	6	7	7	7	7	52
Segen	-	-	-	-	-	9	9	9	9	36
Sheka	1	2	2	2	2	1	1	2	2	15
Sidama	14	28	28	30	30	33	33	34	35	265
Siltie	4	8	8	8	8	9	9	9	10	73
Wolayta	8	16	16	16	16	15	15	16	16	134
Yem	0	0	0	0	0	1	1	1	1	4
Total	65	130	130	134	135	145	147	154	156	1195

Table 17 Reported AFP cases by Zones and Special Woredas, SNNPR, 2007-2015

Zone/special woreda	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
ALABA	6	4	2	2	4	3	2	3	3	29
AMARO	4	4	2	2	2	-	- -	-	-	14
AWASSA CA	3	2	1	3	3	4	3	3	4	26
BASKETO		3	1			1		1	0	6
BENCH MAJI	9	8	5	10	15	9	3	10	12	81
BURJI	2	1	2	1	1	--	-	-	-	7
DAWRO	6	8	6	7	8	9	13	12	6	75
DERASHE	4	3	2	2	3	-	-	-	-	14
GAMO GOFA	19	25	21	32	26	37	27	29	17	233
GEDEO	10	12	12	11	10	15	16	10	12	108
GURAGHE	19	24	26	21	26	33	27	25	24	225
HADIYA	16	17	19	16	17	20	17	22	21	165
KEFA	10	10	11	15	21	13	15	13	18	126
KEMBATA/TEMBARO	13	12	11	10	12	12	8	14	10	102
KONSO	4	3	2	5	5	-	-	-	-	19
KONTA		1	2	1		1	2	0	0	7
S OMO	4	8	5	10	9	15	10	10	11	82
Segen	-	-	-	-	-	10	11	11	5	37
SHEKA	2	4	9	12	2	5	1	6	2	43
SIDAMA	39	34	28	34	41	52	45	45	44	362
SILTI	20	12	10	20	13	16	18	11	11	131
WOLAYTA	25	26	17	28	21	33	27	18	15	210
YEM	1	0	0	1	1	0	1	0	2	6
Total	216	221	194	243	240	288	246	243	217	2108

Table 18 Incidence rate/ 100,000 populations of AFP cases by zones and special Woreda and age SNNPR, 2007-2015

Zone/SP.	Age group					
	< 1 years	1- 4 years	5-9 years	10-14 years	≥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
Kafa	0.9	8.9	5.9	4.8	0.3	0.0
K/T	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 2015 SNNPR the region has achieved the non AFP rate of 100% in most zones.

Table 19 AFP rate by zones and special Woreda, SNNPR, 2007-2015

Zone	Expected	Reported	Non-AFP rate
ALABA	17	29	2.53
AMARO	9	14	3.74
AWASSA CA	21	26	2.31
BASKETO	3	6	2.27
BENCH MAJI	45	81	2.56
BURJI	0	7	4.94
DAWRO	40	75	3.14
DERASHE	9	14	3.14
GAMO GOFA	154	233	2.98
GEDEO	76	108	2.51
GURAGHE	129	225	3.55
HADIYA	113	165	2.67
KEFA	77	126	2.73
KEMBATA-TEMBARO	64	102	3.07
KONSO	9	19	3.84
KONTA	4	7	1.36
S OMO	52	82	2.90
Segen	36	37	2.80
SHEKA	15	43	4.41
SIDAMA	265	362	2.52
SILTI	73	131	3.56
WOLAYTA	134	209	2.83
YEM	4	6	1.53
SNNPR	1195	2108	2.80

AFP rate by Woreda:

Bench-Maji zone woredas: Bero district reported 13.9/100,000 <15 population, which was the highest rate in the zone, Mizan-Aman reported 13.1/100,000, Sheko district reported 6.9/100,000,majia District reported 5.5/100,000, She-Bench town reported 4.4/100,000, South-Bench District reported 3.2/100,000, Surma district reported 2.2/100,000, Semen-Bench district reported 1.3/100,000, and Gurafereda district reported 0.8/100,000.

Dewuro zone woredas: Loma Distract reported 3.5/100,000 <15 populations Essare District Reported 3.2/100,000, Genabosa district reported 2.5/100,000 Tocha district reported 1.8/100,000 and Maraka districts reported each non-AFP rate of 1.7/100,000 under 15 year's population. Tercha city reported the non-AFP rate below 1/100,000 population.

Gamo-Gofa zone Woredas: Merab-Abaya district reported 7.8, Kucha reported 3.8, Arbaminich-Zuria Woreda reported 3.6, Chencha reported 3.4, Oyida reported 3.2, Uba-Dedretsehay reported 2.7, and Kamba, Deramala, and Melokoza districts reported the non-AFP rate of 1.9, 1.7, and 0.9 per 100,000 populations respectively.

Gedeo zone Woredas: The highest non-AFP rate is reported from Bulle district, which is 4.3/100,000. Wonago woreda reported 3.6/100,000, Kochore woreda reported 2.7/100,000, and Dilla zuria reported 2.6 Dilla town reported 2.4/100,000, Yirga cheffe woreda reported 1.3/100,000, and Gedeb woreda reported 1.2/100,000.

Gurage zone Woredas:

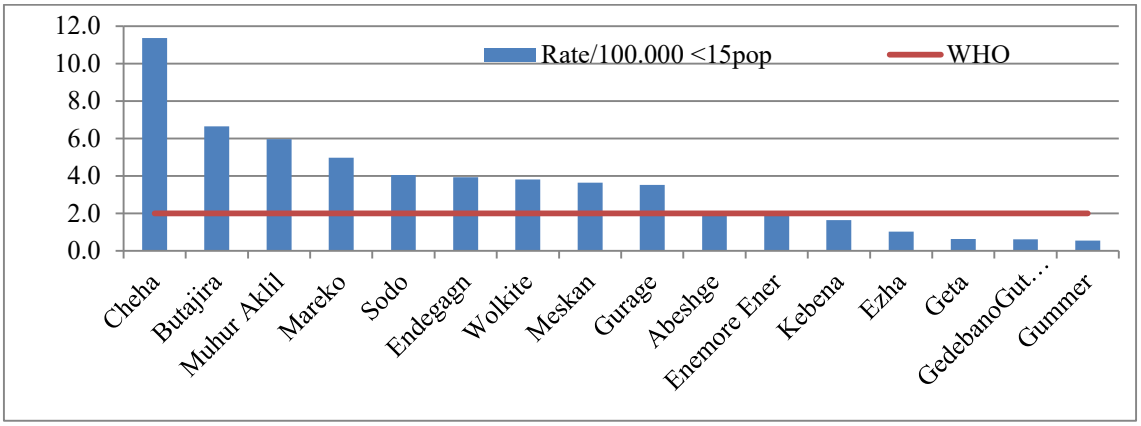

Figure 32: AFP cases by woreda, Gurage SNNPR, 2007-2015

Sheka zone Woredas. Masha woreda reported 6.95/100,000, Yeki woreda reported 4.5/100,000, Andracha woreda reported 2.9/100,000, and Tepi Town reported 1.8/100,000.

Kambata-Tembaro zone Woredas: The highest AFP rate is reported from Tembaro district, which is 6.15/100,000. Kedida-Gamela district reported 3.75/100,000, Hadero-Tuntozuria district reported 2.75/100,000, Damboya district reported 2.2, Kacha-Bira district reported 2.15, Dura me Town reported 2.05/100,000, Angacha district reported 1.3/100,000, and Doyogena district reported 0.85/100,000, under 15 years population.

Hadiya zone Woredas: EastBadewacho woreda reported 5.6/100,000, Anilemo district reporte 4.45/100,000, Merab-Badewacho woreda reported 3.75, Shashogo woredas reported 3.1, Hossana town reported 2.95 Gomboraworeda reported 1.84, Lemo woreda reported 1.8, and Misha, Duna and Soro woredas each reported 1.7/100,000 <15 years population.

Kafa zone Woredas: Adiyo district reported 5.2/100,000, Gesha woreda reported 4.5, Bitta woreda reported 4.2,Chena woreda reported 4.1, Gewata woreda reported 3.9, Gimbo woreda reported 3.3, Cheta woreda reporte 2.5, Decha woreda reported 2.3, , Bonga town reported 2.2, and Tello woreda reported 0.5/100,000 under 15 years population.

South-omo zone Woredas: The highest rate was reported from Jinka Town, which is 14.1/100,000 <15years population.

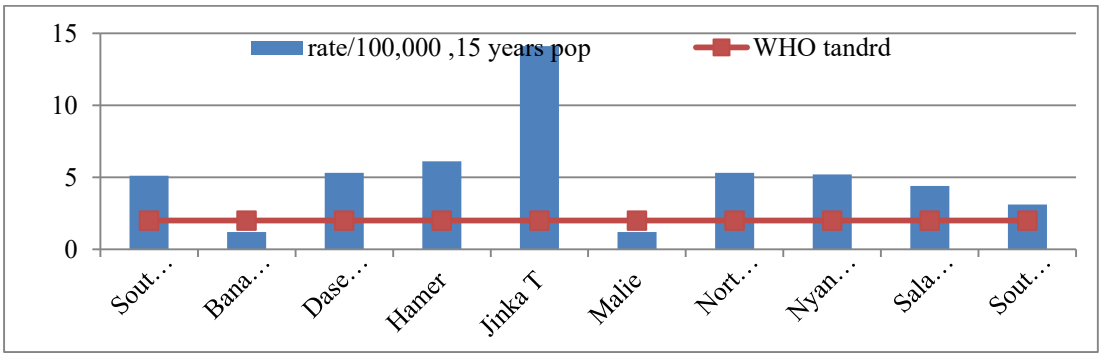

Figure 33: AFP cases by woreda, South-omo, SNNPR, 2007-2015

Silte zone Woredas:

The highest rate was reported from Worabe Town, which is 8.3/100,000 <15 years population, followed by, Dalecha woreda, 6.2, Lanfro woreda reported 5.3, Misrak-Azernet woreda reported 3.5, Sankura woreda reported 2.7, Silti woreda reported 2.6, Merab-Azernet woreda reported 2.1, Alechoworero reported, 1.8 and, Hulbareg woreda reported 0.5

Sidama zone Woreda: The highest rate was reported from loka abya district, which is 7.5/100,000 <15 years population

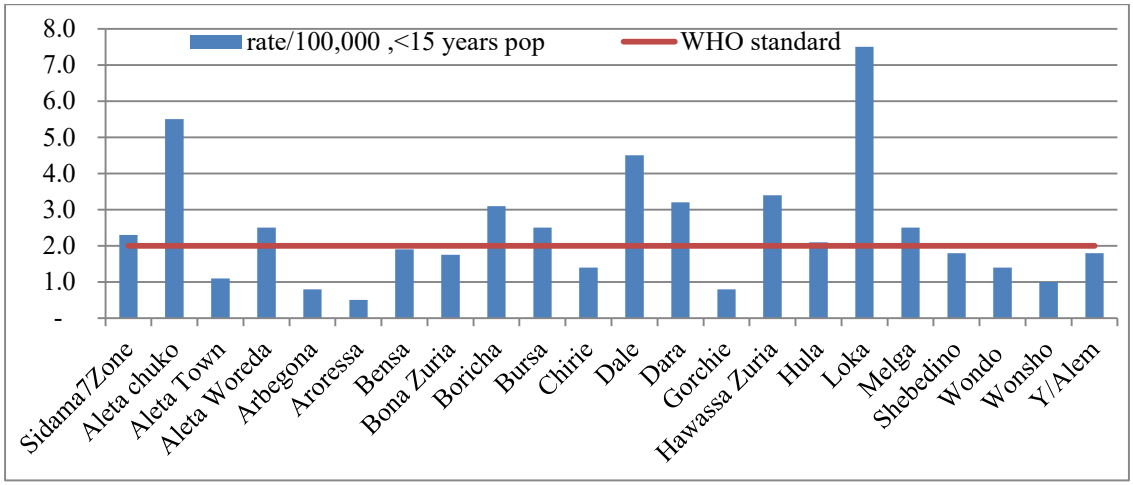

Figure 34 AFP cases by woreda, Sidama zone, SNNPR, 2007-2015.

The AFP rate of Hawassa town administration for the last nine years (2007-2015) was 22.3/100,000, < 15 years population.

Wolayta zone woredas: The highest rate was reported from Boloso Bonbe district, which is 4.5/100,000 <15 years population, and Bodity Town had zero report in this nine years,2007-2015

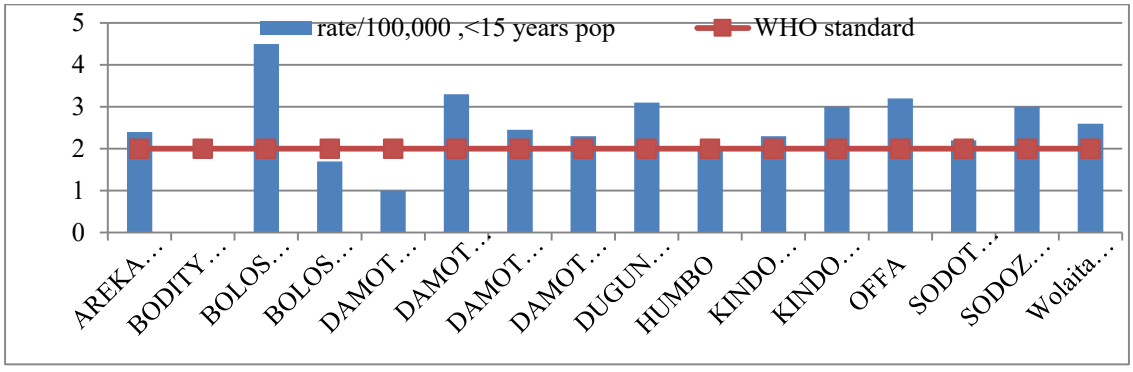

Figure 35 AFP cases by woreda, Wolayta zone, SNNPR, 2007-2015.

Segen zone Woredas. The highest AFP rate was reported from Burji district reported which is 3.8/100, 000, 15 years. Darashe district reported, 3.7, Konso district reported 3.4, and Amaro district reported 3.1/100,000<15 years population. Ale woreda had zero report.

Special Woredas: Halaba Special woreda reported 2.7, Basketo special woreda reported 1.9, Yem Special woreda reported 1.8, and Konta Special woreda reported 1.1/100,000 <15 years population. Except Halaba all special woredas reported under the WHO standard.

Out of the total 2108 reported AFP cases, 2014 (95.5%) were reported from rural Kebeles, the rest 94(4.5%) cases reported from urban areas. From the total reported urban AFP cases the highest rate 13 (13.8%) was reported from Gamo Gofa zone, 12 (12.7%) was reported from Wolayta 10(10.6%) was reported from Hadiya 9(9.6%) cases each reported from Gedeo and Hawassa city respectively, and 8 (8.5%) cases reported from South-omo 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. 1376 (65.3%) AFP cases reported by the health center, 310(14.7%) AFP cases reported by Hospitals, 38(1.8%) cases reported by Private clinics, 43(2 %) cases reported by Woreda health office, 67(3.2%) reported cases by health posts and 274(13%) were missed variables.

The region reported the highest incidence rate in 2012

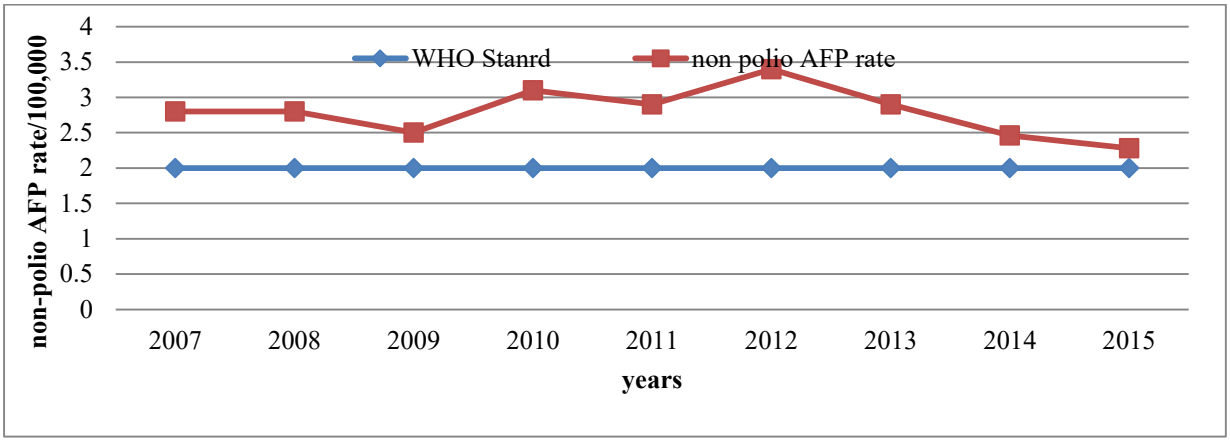

Figure 36: Trend of AFP rate, SNNPR, 2007-2015

Table 20: AFP rate by year, and zone/special Woreda, SNNNPR, 2007-2015

Zone/ Sp	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
ALABA	5.4	3.5	1.7	1.7	3.2	1.6	1.5	2.07	2.07	2.53
AMARO	5.6	5.4	2.6	2.6	2.5					3.74
AWASSA CA	2.4	1.6	0.8	2.2	2.2	2.8	2	2.91	3.88	2.31
BASKETO	0	10.7	3.5	0	0	3.2	0	3.05	0.00	2.27
BENCH MAJI	2.9	2.5	1.5	2.9	4.2	2.5	0.8	2.62	3.15	2.56
BURJI	7.4	3.6	7	3.4	3.3					4.94
DAWRO	2.5	3.3	2.4	2.7	3	3.3	4.7	4.23	2.11	3.14
DERASHE	5.9	4.3	2.8	2.7	0					3.14
GAMO GOFA	2.5	2.9	2.6	3.7	3	4.2	3	3.12	1.83	2.98
GEDEO	2.4	2.3	2.7	2.4	2.1	3.1	3.2	1.98	2.37	2.51
GURAGHE	2.9	3.2	4	3.1	3.8	4.7	3.7	3.33	3.20	3.55
HADIYA	2.5	2.4	3	2.5	2.5	2.9	2.4	3.00	2.87	2.67
KEFA	2.1	2.3	2.5	3.3	4.4	2.7	3	1.77	2.46	2.73
K/T	4	3.6	3.2	2.8	3	2.9	2.1	3.51	2.50	3.07
KONSO	3.6	2.6	1.7	4.1	4					3.84
KONTA	0	0	4.3	2.1	0	2	3.8	0.00	0.00	1.36
S OMO	1.4	2.8	1.7	3.3	2.9	4.7	3	3.00	3.31	2.90
Segen						3.1	3.3	3.29	1.49	2.80
SHEKA	2.1	3.1	8.9	11.5	1.9	4.5	0.9	5.11	1.70	4.41
SIDAMA	2.7	2.3	1.9	2.2	2.6	3.2	2.7	2.57	2.51	2.52
Silte	5.3	3	2.6	5.1	3.2	3.6	4.2	2.52	2.52	3.56
WOLAYTA	3.3	3.3	2.2	3.4	2.6	3.9	3.1	2.05	1.60	2.83
YEM	2.6	0	0	2.4	2.3	0	2.2	0.00	4.29	1.53
Grand Total	2.9	2.8	2.5	3.1	2.9	3.4	2.9	2.45	2.28	2.80

Duration of case investigation following notification: Out of the total 2108 AFP cases 1523 (72.3%) cases investigated less than or equal to two days following notification, 48 (2.3%) cases investigated greater than or equal to 3 days, for 100 (4.7%) AFP cases date of investigation preceded date of notification. Between 2007 and 2008 the date of notification for 437 (20.7%) AFP cases had been missed.

Interval between first and second stool collection: Between 2014 and 2015,460 (100 %) cases of stool collected within 24-48 hrs intervals, between 2009 and 2013, 1228 (74.5%) cases of stool collected within 24-48 hrs intervals. In 2007 and 2008 for 420 (25.5%) date of first stool collected is missed.

Stool arrival. Out of the total 2108 AFP cases 1632(77.4%) cases of stool specimen arrived less than or equal to three days duration, 37(1.8%) cases of AFP stool specimen arrived between 4 and 11 days duration, for 439(20.8%) the date received at national lab is not filled (missed variables).

Days between onset of paralysis and second stool collection: For 1588 (75.3%) of AFP cases the duration is less than or equal to 14 days, for 80 (3.8%) of AFP cases the duration is greater than or equal to 15 days, and for 440 (26.7%) of AFP cases days between date of onset of paralysis is variable was missed.

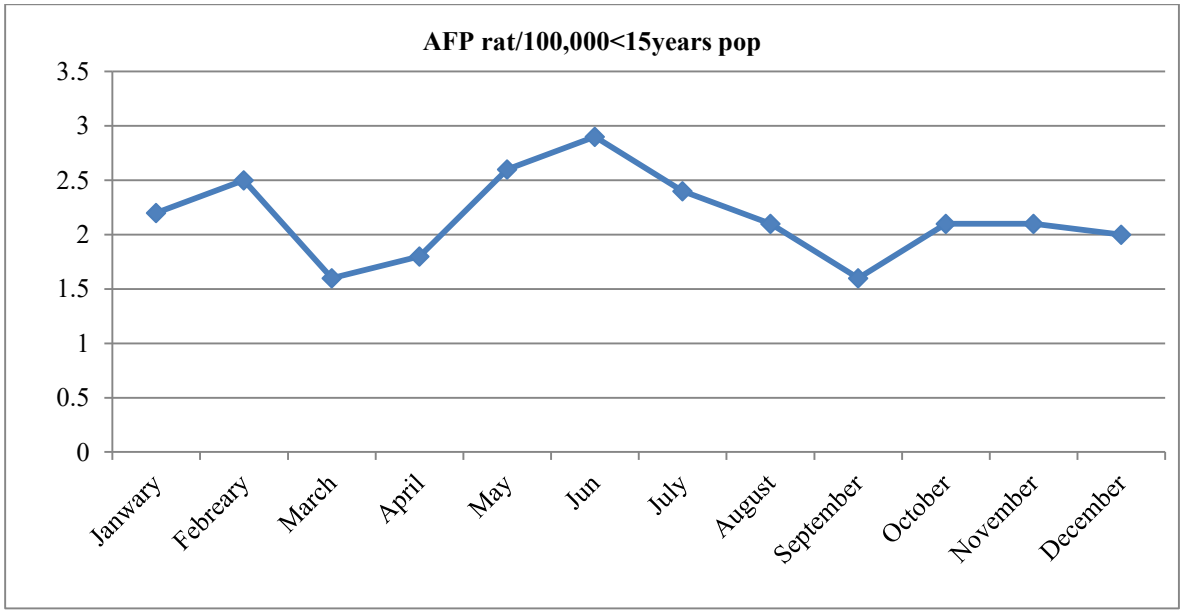

Figure 37: AFP cases by month, SNNPR, 2007-2015.

Discussion:

We identified a total of 2108 AFP cases in the region from 2007-2015. The most affected age group was 1 - 4 followed by the age group of 5_9 and 10_14 respectively. Sheka zone was (4.41/100,000) the most affected area among zones, followed by Gurage 3.55/100,000. Out of regional districts, Bero in Kafa, 13.9/100,000 the most affected district followed by, Chaha district in Gurage 11.4/100,000, Loka abaya districts in Sidama zone, 7.5/100,000, and Masha district in shaka zone 6.95/100,000 ,15 years population.

Among urban reported Jinka Town in south-omo zone was 14.1/100,000, the most affected, followed by Mizan-Aman Town in Bench-Maji, 13.1/100,000, and Worabe Town in silite zone, 8.6/100,000, Loka abaya districts in Sidama zone, 7.5/100,000, and Masha district in shaka zone 6.95/100,000, <15 years population. There were 38-districts and 2-special woredas in the region which have reported the non-AFP ratbelow the WHO standard, of thes 11(28%) were from sidama zone which is 48% of its districts. (<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 2015 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 numbers 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 numbers 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 populations, it was below the WHO standard.

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.

Conclusion: The most affected age group was 1- 4years. Regionally the highest non-AFP rate was reported in 2012. Sheka zone reported the highest incidence in the region. There was 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.

Recommendation

Supplementary polio immunization of under-five children by RHB should prvided, 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.

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Chapter III – Evaluation of Surveillance System

3.1 Evaluation of Malaria surveillance system in Hadiya zone, SNNPR, 2015

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 Hadiya zone.

Methods: We 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 perform ire, we was selected, one best, one better, and one poor performance surveillance units from woreda PHEM totally three, in similar manner from each selected woreda, three health centers totally nine and three health posts totally twenty seven from each selected health centers were assessed. We obtained data through observation, review of document, interview of officers and focal persons. We have used Microsoft Office Excel and Epi-Info 7 soft ware to enter, organize and analyze the data appropriately. Ethical clearance was obtained from SNNP Regional Health Bureau/RHB Public Health Emergency Management PHEM, and then from the respective selected institutions for evaluation.

Result: We evaluated a total of 41-surveillance units. The zonal PHEM reported 1,397 clinical malaria cases, 28,683 confirmed cases, 14 admissions and no death. Shashogo woreda reported 646 (46.2%) clinical cases, 7,969 (27.8%) confirmed cases, no admissions and deaths. East Badawacho Woreda reported 42(3%) clinical cases, 5,816 (20.6%) confirmed cases, and no admissions and deaths. Soro woreda reported 50(3.6%) clinical cases, 3,696 (20.6%) confirmed cases, and no admissions and deaths. Zonal/Nigest Elani Hospital reported 93(6.7%) clinical case, 168 (0.6%) malaria confirmed cases, 13(92.9%) admission and Zero death. Malaria cases were not reported from private health facility. At 41(100%) evaluated surveillance units, standard case definition was used and available. Twenty seven (100%) health posts used family folder for case registration, 9(100%) health centers, one hospital used Integrated Individual folder, OPD and IPD abstract register. Nine (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, 9(100%) Health centers, 1 Hospital, and 3(100%) woreda health office did not analyze the surveillance data. 7(17%) surveillance units prepared Emergency Preparedness and Response Plan/EPRP. Standards and guidelines were available at all evaluated surveillance units. Supportive supervisions conducted regularly at visited area. Written feedback given by higher level were observe at evaluated surveillance units. Communication facilities were accessible at all level. Report completeness of, health posts was 92.6%, 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 3(100%) woreda health office reported complete and clear data. The surveillance system did not include all private health facilities in evaluated areas

Conclusion: Dispite the presence of consistent supportive supervision, feedback, continuous monitoring and evaluation, the surveillance data were not analyzed, a few surveillance units used epidemic preparedness plan, and no surveillance units used updated malaria-monitoring chart. Health centers, Hospital, woreda and zonal PHEM should analyze surveillance data, and should prepare epidemic preparedness and response plan/EPRP. All surveillance units should prepare malaria-monitoring chart and should update the charts regulaly. Private and Non Governmental organization/NGO health facilities should be included in reporting units. The malaria surveillance system in Hadiya was, simple, acceptable, flexible, and stable, but not timely and not representative.

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. Public Health Emergency management/PHEM unit 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 one 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].

Rational of the study:

The public health system of the South Nations, Nationalities, and Peoples Region (SNNPR) were continuously challenged by different recurrent and unexpected disease outbreaks and is facing the challenges of managing health consequences in different parts of SNNP region of zones. Malaria is one of the health challenge and selected priority disease in the region. Hadiya zone is one of the 15 zones and 4 special woreda in the region. Still malaria is the public health problem among priority diseases and it is the first among top disease for above ten continuous years until 2014 GC, in the zone [12].We believe that malaria could be used as proxy indicators of the surveillance system of the Zone. Use of the collected data at the local level as evidence for public health decision making were not assessed in the recent years; Surveillance system evaluation is not done in the area; and little is known about the effectiveness and efficiency of the system. Therefore, this cross-sectional study was designed to evaluate malaria surveillance in this zone.

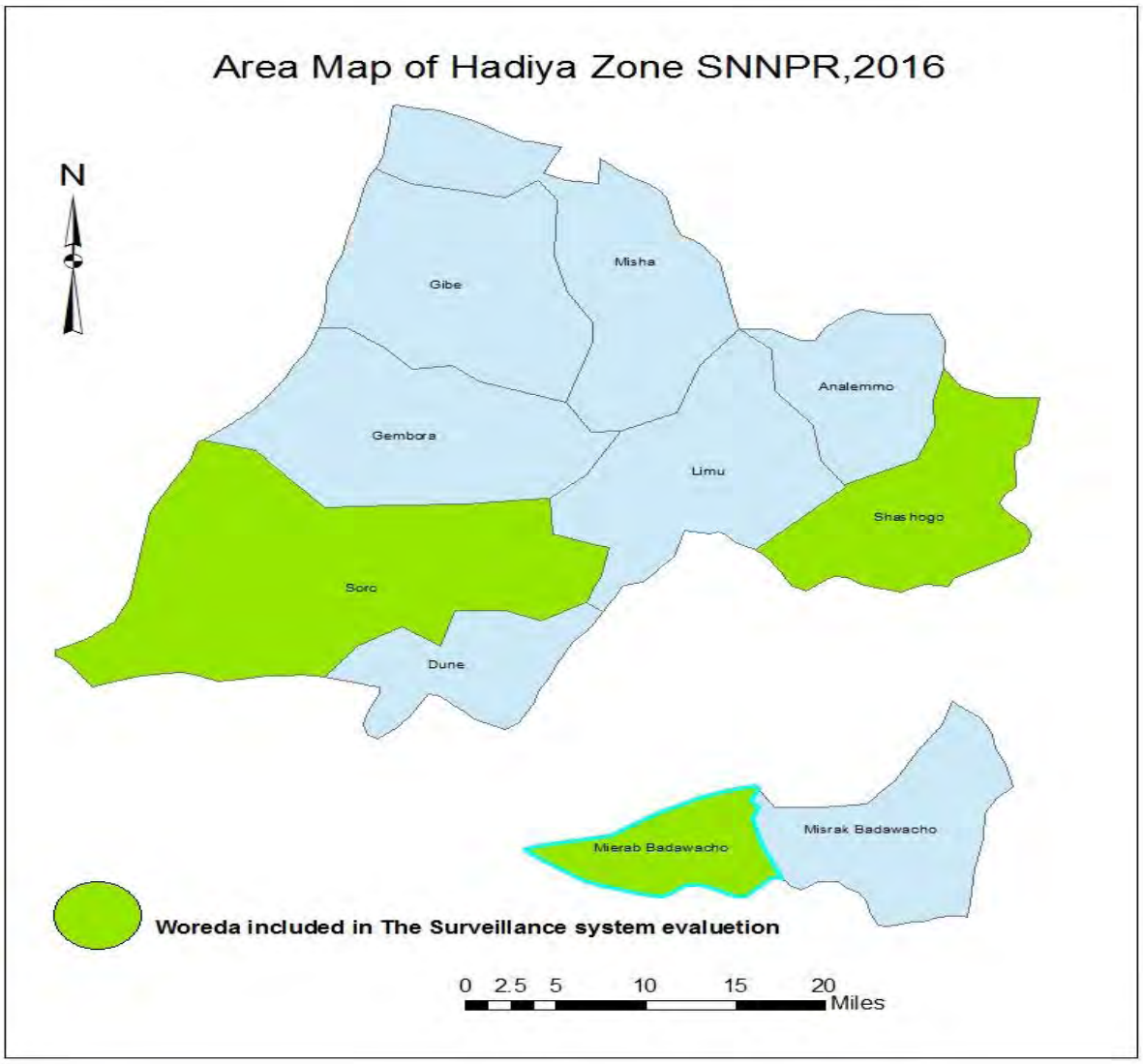


Figure 38 AreaMap of selected woredas for Malaria Surveillance Evaluation, Hadiya Zone, SNNPR, 2015

Objectives:

General objective:

To assess the performance of core activities and attributes of surveillance system of malaria, in Hadiya zone, SNNPR, March, 2015

Specific objectives:

To assess the attributes of the surveillance system of the selected disease in the study area,

To assess the core activities such as case detection, reporting analysis and response surveillance system in the study area,

To assess the usefulness, quality and utility of surveillance system in early detection of diseases and outbreaks, to decreasing morbidity and mortality

Methods/Material

Study setting: We conducted the study in Hadiya zone,with the total population of1,594,908 with 781,505 (49%) male and 773.052 (47.48%) <15 years age group, (projection from the 2007 census) [13]. Administratively there were 10-rural Woreda and 1-town administration. Hossana town administration and all woredas are known malaria endemic areas. Out of these areas, 6-rural woredas are malaria hot spot woredas (Shashogo, East badawacho Soro, West Badawacho, Ani Lemo, and Gibe [14]. Regarding to health facility distribution in the zone, there were 2-Hospitals, 61-governmental health centers, 3-NGOs health centers, 309- health posts and 64 private clinics [12]. Zonal health department, zonal Hospital, three woredas Health offices, nine Health Centers, and Twenty-seven Health posts were taken as the study units of the surveillance system evaluation. We employed the surveillance system evaluation on Malaria based on three main elements:

Description of the importance of the disease and the relevance of the Surveillance system

Description of the surveillance system

Description of the performance and attributes of the surveillance system

We assessed the structure and the core activities of the surveillance system in the Zone and in the study facilities in particular to describe the surveillance system of the Zone. The core activities and components included were case definitions, flow charts of the surveillance system (participating

agencies and information flow in the surveillance system), population under surveillance, case detection, data collection, reporting, analysis, and result dissemination and resources used in the surveillance system. The evaluation of the performance and attributes of the surveillance system involved assessment of the usefulness of the surveillance system, simplicity of the system, flexibility, quality of the data, acceptability, representativeness, timeliness and stability of the surveillance system.

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].

Study period. We conducted the surveillance system evaluation March, 15-31, 2016

Sample size: Including Zonal Health Department and Zonal Hospital, we identified 41 reporting units were selected, by their previous year performance.

Sampling technique: Before selection of a sample size, we conducted a discussion with Zonal PHEM core process for sampling selection. We identified total of 41-reporting units for this surveillance system evaluation. We included Zonal health department and zonal Hospital purposely by discussion. We selected 3-Woreda health office, 9-health centers, and 27-health posts based on their past year (2015) 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 performing).

Data collection methods:

Primary data collection tools: Data were collected using structured questionnaire and observation checklist. The principal investigator collected data. We adapted our questionnaires according to our objectives from the WHO/CDC Guideline [5] and made interview to the surveillance officers or focal persons in the selected health units.

Secondary data: We used different data sources such as; annual performance reports of the Woredas, Zone, and region, data from the Regional electronic Integrated Diseases Surveillance and Response (eIDSR) (2009-2015) database, SNNP Regional electronic Health Management Information System/eHMIS (2009-2015) database.

Involvement of stakeholders: Before the start of the evaluation activities, We discussed with the SNNP Regional health bureau PHEM head on selection of a zone to be included in the study and to ensure that

the evaluation of the system addresses appropriate questions and attributes to produce useful and acceptable findings. Moreover, we discussed the objectives and purpose of the evaluation with Hadiya ZHD head and PHEM focal persons; selected Woreda health offices heads and surveillance focal persons and selected health facilities heads and surveillance focal persons. All individuals assigned and engaged on surveillance system of the selected health units participated in the evaluation process.

Data processing and analysis: We used Microsoft Office Excel, organize and analyze the data.

Dissemination of the Study: The finding of the study were submitted in both hard and soft copy to the AAU- SPH and at theassessed Woreda health offices, Hadiya Zonal Health Department/ZHD, SNNP Regional health bureau and EFETP resident coordinators, Mentors and advisors in soft copy.

Ethical clearance: We obtained official permission from SNNP Regional Health Bureau/RHB Public Health Emergency Management PHEM, and then from the respective selected institutions for evaluation.

Result

Description of the importance of malaria, in Hadiya Zone; and the relevance of the Surveillance system:

In 2015 Hadiya zone received a surveillance report from 372 reporting units (309-health posts, 61-governmental health centers, and 2-Hospital, was 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, 1-zonal hospital and Zonal Health Department/ZHD. In the Zone, Malaria is the major disease burden of all the 20 priority diseases under surveillance in the nation and the first top morbidity case, for above ten years until 2006 EFY.

Malaria: In Hadiya zone, because of the climatic and environmental changes, 80% of the zone is malarious and 75% of the populations are at risk of malaria [14]. From WHO epidemiologic week 1-53 (Jan-Dec 2015 a total of 104,263 cases of suspected and confirmed malaria were reported [15]. From these 14 inpatient cases, 102,866 cases of fever suspected for malaria, 12,786 cases positive for P*lasmodium Falciparum (PF)* and 15,897 were positive for P*lasmodium vivax (PV).*

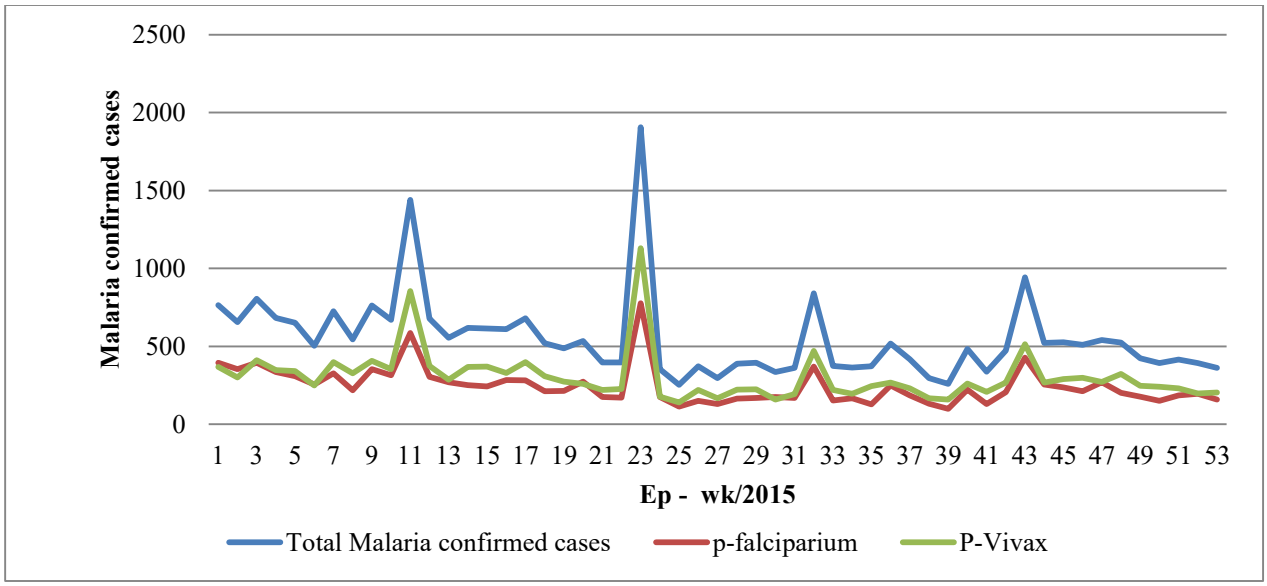


Figure 39: Weekly Confirmed cases of malaria in Hadiya zone, Jan-Dec 2015

In 2015 Hadiya zone reported 1,397 clinical malaria cases, 102,866 febrile case, 28,683 confirmed malaria cases (examined by microscope or RDT), 14 inpatient cases, and no death through surveillance units.

East-Badawacho woreda: In the woreda all 39 kebeles are malarias, ther were outbreak in epidemiologic week 23/2015 and reported 42 (3.0 %) clinical cases, 5958 (20.8%) confirmed malaria cases, no inpatient cases, and death.

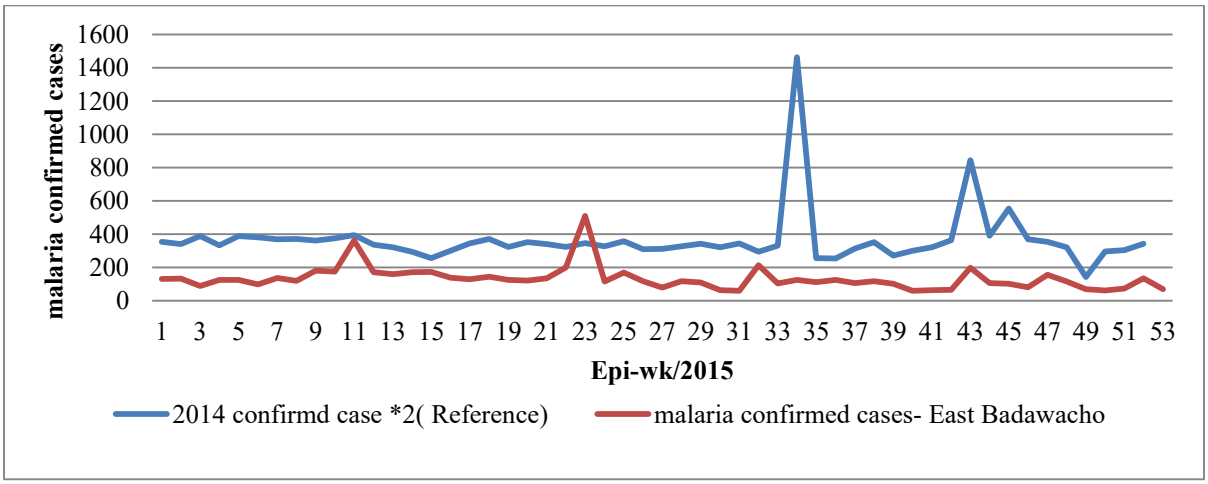


Figure 40: Malaria monitoring chart by WHO epi- week East Badawacho Woreda, SNNPR, 2015

Shashogo Woreda. In the woreda all 36 kebele are malarias, The woreda malaria monitoring chart indicts malaria case bullet in epi-wk 23/2015, and reported 646 (46.2%) clinical cases, 7,969 (27.8%) confirmed malaria cases, and no inpatient case, and death.

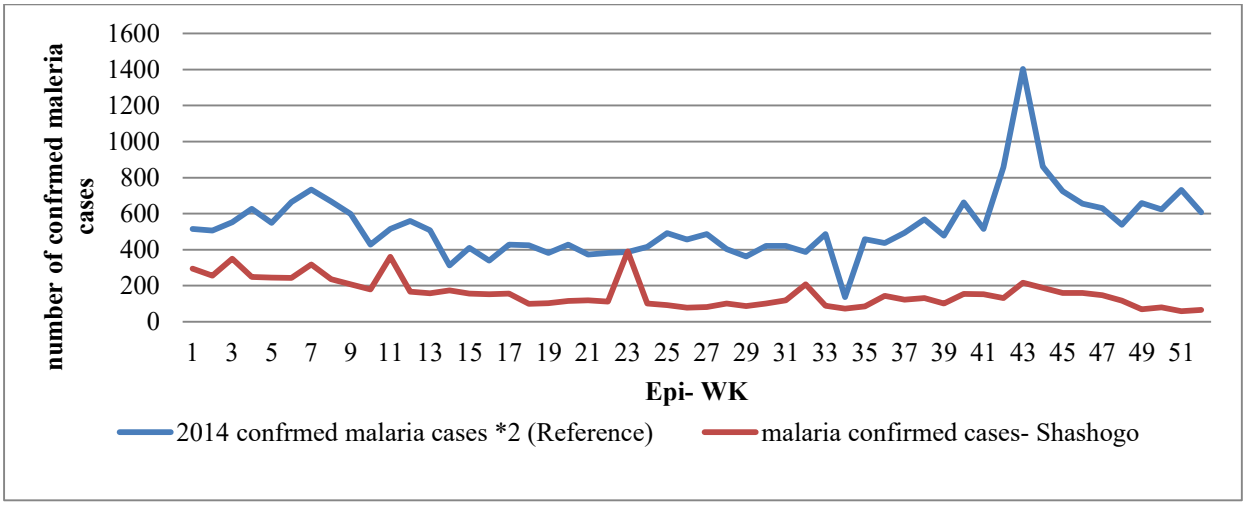


Figure 41: Malaria monitoring chart by WHO epi- wk, Shashogo Woreda, Hadiya Zone, SNNPR, 2015

Soro Woreda. In the woreda 49 kebele, 27 (55%) kebeles are malarias, The woreda malaria monitoring chart indicts malaria case bullet in epi-wk 11 and occurrence of outbreak in epi-wk 23/2015, and reported 50(3.6%) clinical cases, 3,646 (12.7%) confirmed malaria cases, and no admission and death through surveillance units.

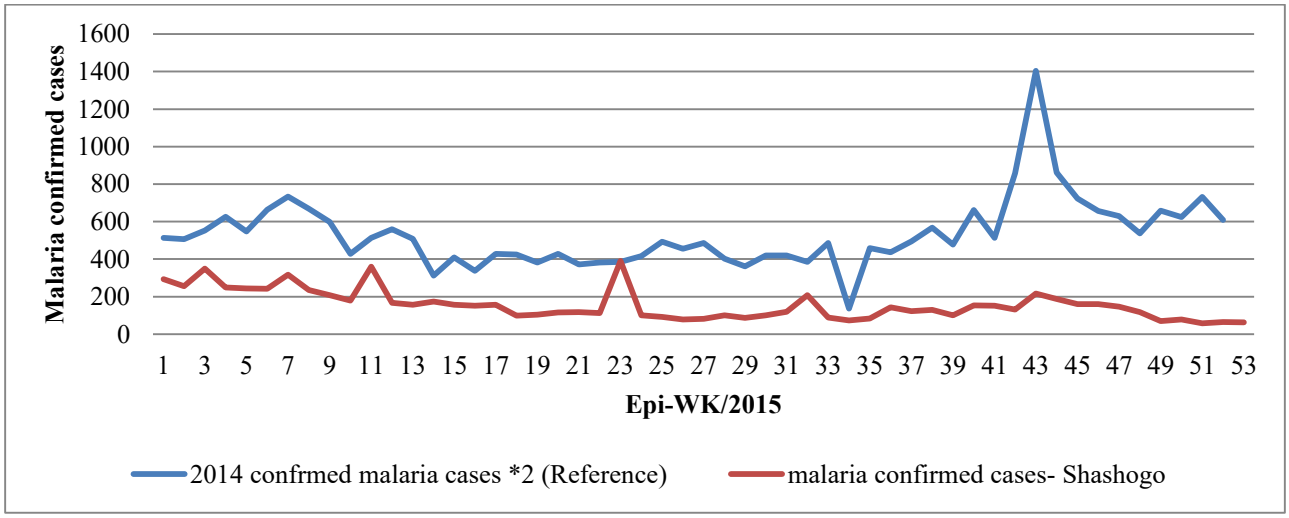


Figure 42: Malaria monitoring chart by Epidemiologic week, Soro woreda, Hadiya Zone, SNNPR, 2015

Malaria prevalence: In 2015, East Badawacho Woreda reported malaria prevalence of 2853.7 per 100,000 populations, Shashogo woreda reported the malaria prevalence of 6821.5/100,000 population, and Soro woreda reported a malaria prevalence of 1604.8/100,000 population

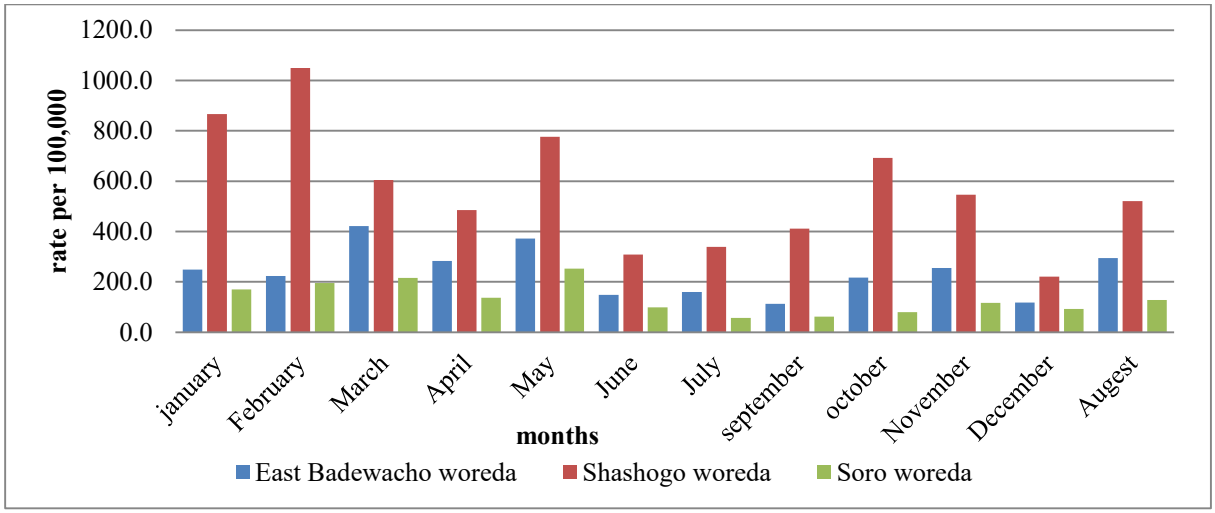


Figure 43: Malaria prevalence by month and Woreda, East Badawacho, Shashogo, and, Soro woredas, Hadiya Zone, SNNPR, 2015

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 29 (70.7%) 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 in both 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.

Confirmed: Suspected case confirmed by RDT

Using these standard case definitions, in 2015 a total of 51,332 (49.9%) suspected fever cases examined by RDT or microscopy, 17,699 (61.7%) confirmed cases, 834 (59.7%) clinical cases, 13(92.9 %) inpatient cases and 0 death were reported through surveillance system from evaluated reporting units (n= 37). We had calculated the proportion from zonal reported cases.

Case registration: Case registration is the process of recording the cases identified. At health post level (n=27), 24(88.9%) identified cases were recorded in the family folder. The rest 3(11.1%) health posts were not recorded in the family folder the reported case 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.

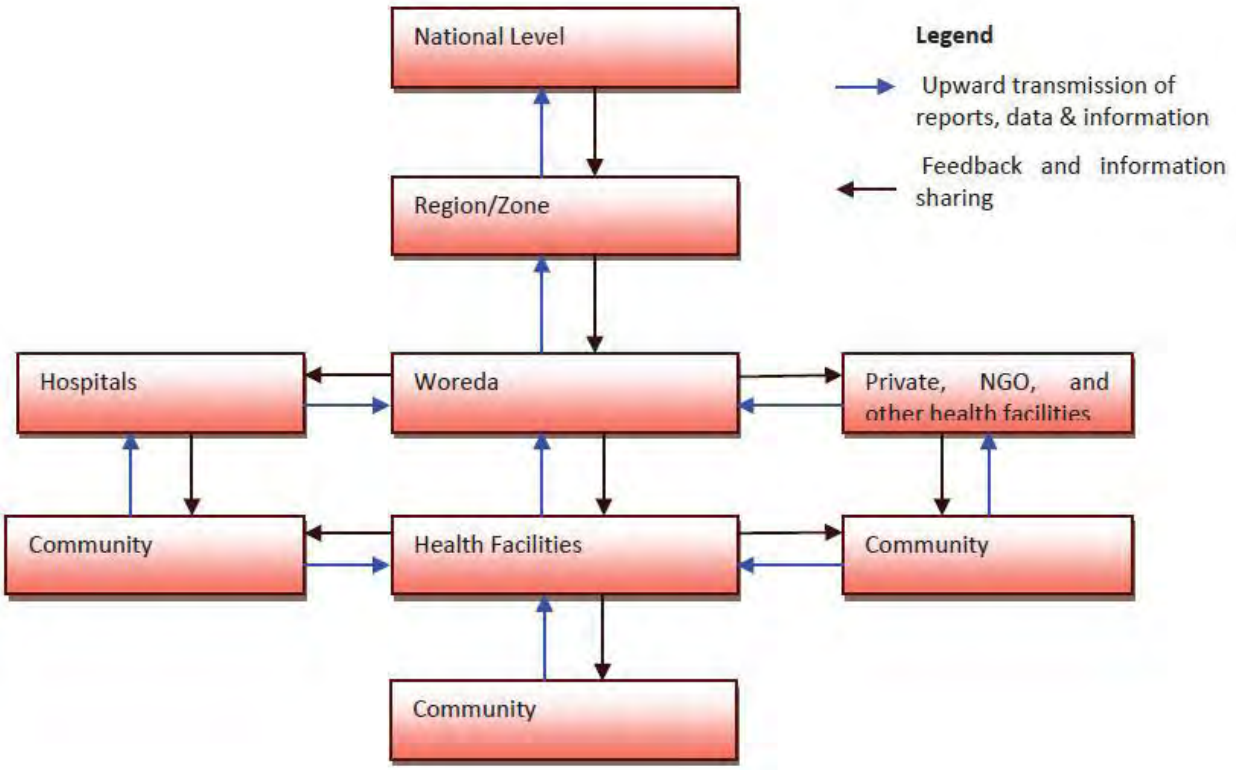
Case confirmation: Case/outbreak confirmation refers to the epidemiological and laboratory capacity for confirmation. In the evaluated surveillance units /health facilities (n= 37), cases were confirmed at health post, health center, and Hospital level. 27 (100%) health posts were using RDTs, 9 (100%) health centers were using both RDT and microscopy and, Hospital was using only microscopy to confirm malaria cases. In 2015 the evaluated surveillance units confirmed a total of 17.699 malaria cases (8,356 = PF, 9,345 = PV). Outbreak was detected and confirmed in and East Badawacho and Soro woredas through these evaluated reporting units. In the absence of RDT, health posts were referring cases to health center.

Operation and reporting of surveillance system

The formal flow of surveillance data is usually from reporting site to the next level up to the national level and to WHO. The community and health facilities at the lowest level particularly health posts are the main source of information about the occurrence of health related events. The information collected from this site is collected and compiled in standardized forms, analyzed and then forwarded to the woreda health office by health centers. The district level compiles, analyzes and sent the data to the zonal level by using a standard form. Similarly the zonal level compiles and analyzes the report and

sends the compiled data to the region by using a standard form and internet, from which the national level receives the compiled data.

The zonal and regional levels usually send the report to the next level by email. Feedback and information sharing follow the same route, but in the reverse direction.



Source: Ethiopian National PHEM Guideline

Figure 44: Data and information flow chart of surveillance system indicating varying cycles at various levels

Reporting periodicity

The identified 21 diseases and health conditions under surveillance of Ethiopia are classified in to two reporting periods (14 immediately reportable and 7 weekly reportable) depending on their epidemic potential, diseases targeted for elimination and eradication.

Table 21: List of reportable diseases/ conditions in Ethiopia

Immediately Reportable Diseases & conditions	Weekly Reportable Diseases & conditions
1. Acute Flaccid Paralysis (AFP) / Polio	15. Dysentery
2. Anthrax	16. Malaria
3. Avian Human Influenza	17. Meningococcal Meningitis
4. Cholera	18. Relapsing fever
5. Dracunculiasis / Guinea worm	19. Severe Malnutrition
6. Measles	20. Typhoid fever
7. NNT	21. Typhus
8. Pandemic Influenza A	
9. Rabies	
10. Smallpox	
11. SARS	
12. VHF	
13. Yellow fever	
14 .Maternal death	

Source: Ethiopian National PHEM Guideline

Immediately reporting

Currently 14 diseases or events are identified to be reported immediately to the next reporting level. For the immediately reportable diseases, a single suspected case is considered as a suspected outbreak. A single occurrence of these diseases needs to be reported from the community, health post or health center to district health office within 30 minutes, from the district health office to zone/region level within 30 minutes, similarly from zonal health office to region within another 30 minutes, then from the regional health bureau to the national within another 30 minutes and finally from the FMOH to the WHO within 24 hour. The information can be reported by means of available convenient methods; like telephone, radiophone, email, fax or mobile short message service (3).

Weekly reporting: Currently seven diseases and health conditions are identified to be reported weekly to the next reporting level. The total number of cases and deaths occurred within the week (Monday toSunday) needs to be reported; from the health facilities to district health office every Monday till mid-day, from the district health office to zone/region level every Tuesday till mid-day, from zonal level to

region every Wednesday till midday, then from the regional health bureau to national PHEM every Thursday and finally from the FMOH to stakeholders every Friday (3). Reporting is the process by which surveillance data moves through the surveillance system from the point of generation.

Table 22Reported malaria cases through surveillance system, Hadiya zone, SNNPR, 2015.

Reporting unit	Outpatient Department (OPD)		IPD		
	Tested (RDT/microscopy)	Clinical	Confirmed	case	death
Anna Lemo	3.103	11	656	0	0
Duna	1.094	23	305	0	0
Gibe	3,964	0	949	0	0
Gombora	7,013	31	1,443	0	0
Hosana Town Ad.	19,448	387	2,786	6	0
Limo	4,867	298	1,239	0	0
Mirab Badawacho	9,352	-36	2,707	0	0
Misha	578	-11	242	0	0
Misrak Badawacho	14,330	42	5,916	0	0
Nigest Elani Hospital	4,952	97	164	13	0
Shashego	25,970	645	7,969	0	0
Shone hospital	2,115	1	661	1	0
Soro	6,080	50	3,646	0	0
Zone	102.866	1,397	28,683	14	0

Data analysis

Surveillance data collection either by immediately or weekly reporting system is not an end by itself. The collected data needs to be analyzed (by time place person), interpreted and used for action and decision making starting from local to the central level in order for the values of the data to be realized. At all level of the zone, surveillance data did not analyzed weekly by time, place, and person except some performed analysis for malaria weekly to monitor its trends.

Weekly malaria trend analysis was done by all assessed woreda health offices, 4 (40%) of health facilities (health centers & hospital) and 9(33.3%) health posts. According to the respondents, the responsible person for surveillance data analysis is PHEM focal person at all level of the health system.

All of the assessed health facilities and health offices have appropriate denominators needed for surveillance data analysis.

Outbreak investigation: Investigating and managing an outbreak appropriately is essential to minimize morbidity and mortality by aborting the outbreak early before it spreads in the area. The zonal health office responded that they had investigated two measles outbreaks at different woreda and used the findings for intervention; however, there was no written report or document about outbreak investigation seen during the assessment. The outbreaks occurred in two different woredas in the current year prior to this assessment with a total number of 158 cases from East Badawacho woreda and 44 cases from Shashogo woreda. All assessed district health offices haven't ever performed outbreak investigation.

Epidemic Preparedness and Management

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, 7/14 (50%) prepared their Epidemic preparedness and response plan /EPRP/ (2-HC, 3-woreda health office, 1-Hospital and zonal health department). 27 (100%) health posts established epidemic management committee at kebele level, however no written document (recorded minute book) observed at health post level at the visited time. Still, they said, "we discussed several times at kebele level. Out of the rest evaluated reporting units, 10/14 (71.4%) units established their rapid response team /RRT (5/9(55.6%) HC, 3 (100%) woreda health office, 1(100%) zonal PHEM, and 1(100%) zonal hospital). For woreda health office, epidemic management committees were built at woreda Health office, which was led by woreda health office head. 14 (100%) of the evaluated reporting units (HC, woreda health office 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 offices were not allocated budget for emergency response. Six (66.7%) health centers and all woreda health office were available motor vehicle for emergency condition.

Table 23: Availability of resource needed for surveillance, Hadiya Zone, SNNP, Ethiopia 2015

S.N	Material	Zone n=1	Woreda n=3	Health center n=9	Health post n- 27	Hospital n=1
1	Electricity	1(100 %)	3(100%)	3(33.3%)	3(11.1%)	1(100 %)
2	Computers	1(100 %)	3(100%)	1(11.1)	N/A	1(100 %)
3	Printers	1(100 %)	3(100%)	1(11.1)	N/A	1(100 %)
4	Stationary	1(100 %)	3(100%)	9(100)	3(33.3%)	1(100 %)
5	Vehicles (Ambulance)	1(100 %)	3(100%)	0	N/A	1(100 %)
6	Motorcycle	1(100 %)	3(100%)	2(22.2%)	N/A	1(100 %)
7	Fax	1(100 %)	3(100%)	0	N/A	1(100 %)
8	Telephone/cell phone	1(100 %)	3(100%)	9(100)	27(100%)	1(100 %)
9	Calculator	1(100 %)	3(100%)	9(100)	27(100%)	1(100 %)

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. 10/14 (71.4%) 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 were as assigned.

Supportive functions 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 25 (58.3%) health facilities, woreda health office, and zonal health department, the national guidelines were available and using the standard case definition for priority diseases. 35 (85%) health facilities, woreda health office, and zonal department posted the cases definition for all diseases in the wall. For 6/9(66.7%) 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 6/9 (66.7%) health centers, and 3 (100%) woreda health office, 1 (100%) Hospital and 1(100%) zonal health department. The line lists for reporting outbreaks

were available in 5/9 (55.6%) 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/HDA was trained by health extension worker/HEW and one health worker assigned from the satellite health center. 33/40 (82.5%) of health extension workers, 10 (100%) of health center and Hospital focal persons, and 8(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 18 surveillance, staff excluding health extension worker 10 (55.6%) 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 HDAs. They were giving supportive supervision for health development armies at a time of contact/during home visit. However, no supervisory checklist was used at any health post level. 27 (100%) health post were supervised every quarter by their health center, and woreda health office. 4/9 (44.4%) of health centers were developed supervision plan for health posts. 9 (100%) of health centers conducted supervision for health posts. 4/9 (44.4%) of health centers notified their supervision plan prior to supervision.

The zonal health department supportive supervision schedule for all woredas was observed. The written and phone call 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 supervised 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 (HDA) 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 offices were using fixed line, mobile phone and hard copy. 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 Business process reengineering /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 not allocated for emergency condition by health centers, and woreda health office, but ther was allocated budget by zonal health department level and Hospital

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 days per a week. At woreda health offices, level at least two focal was assigned to follow up the whole health center catchment two to days per a week. The zonal health department assigned one focal person for monitoring and continuous follow up for each woreda at list two times per a week. Malaria monitoring/ norm chart was not used appropriately at all evaluated surveillance units, except zonal health department and Shashogo woreda health office.

Evaluation: All the surveillance units were evaluating their performance on a quarterly base along with other core processes.

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 Integrated Family Health Program /IFHP/] , WHO etc.

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. However, 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.

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

Data quality23 (85.2%) health posts reported incomplete surveillance report. 20 (74%) of them reported clear records to read and understand. 5 (55.5%) of health centers sent complete and clearly recorded report for woreda health office. 3 (100%) 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 organization/NGO health facilities and private health facilities was not included in surveillance reports. Still people were using private and NGO health facilities for malaria and other disease treatment.

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 was using hard copy of report format for malaria surveillance data storage. Malaria cases were confirmed at all health facility level. Not need to refer malaria case for confirmation to distant health facilities. By using the malaria-

monitoring chart, malaria outbreak was seen in East Badewacho woreda and soro woreda in epidemiologic week 23; also case bulleted in Shashogo woreda was seen at the same epi-wk. Malaria case bulleted was also seen in Soro and East Badawacho woreda in epi-wk 11/2015. The prevalence of malaria in 2015 was high in Shashogo woreda relative to East Badewacho and Soro woreda. Computers and trained personnel were available at woreda health office. However, surveillance data did not entered in to the computer (eIDSR database) and analyzed by person, place, and time. No surveillance data was interpreted and used for public health action at health facility level as per standard. Epidemic management and rapid response team were established in almost all reporting units. However, no any reporting health unit 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 power, logistic resources (computer technologies), and financial resources were available at woreda and zonal levels. 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 lick, case-based, line lists, etc…). Reporting formats were easy to fill. Communication channels between all levels were well established. The surveillance system staff was well engaged in 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. 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 and NGO health facilities were not included in the surveillance reporting [4-5].

Limitation: We could not calculate sensitivity and specificity in terms of case detection,because we could not get variables required for calculating sensitivity ,specificity and, beside that did not measure the timeliness of the evaluated surveillance units, because the variable to measure timelines of the system was not available.

Conclusion: The standard case definition was available and used consistently at all levels. Although there were functioning computers, but no skilled personnel in different surveillance units, the surveillance system was no using the current technologies electronic Integrated Dieses Surveillance and Response (eIDSR) database to store, analyze and interpret data for public health action. Moreover there was inadequate capacity to function even with the existing computer. Epidemic preparedness and response plan was prepared in a few surveillance units. Epidemic rapid response team was not conducting scheduled regular meeting. The supportive supervision and its feedback were 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 Hadiya zone is useful, complete, easy to implement, acceptable, flexible, stable, but not timely, and not representative.

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, especially on eIDSR database, RHB should conduct regular and periodical supportive supervision, monitoring and support by identifying needed gaps .Epidemic preparedness and response plan should be prepared and used by all health units to response emergency condition as per standard. Malaria monitoring tool should be prepared, posted on the wall, updated regular and used at all surveillance units for easy tracking of malaria changes. To measure timeliness indicators should be prepared by all surveillance units. All private and NGO health facilities should incorporated in to surveillance reporting units

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11.**WHO** urges **malaria**-endemic countries to strengthen their disease **surveillance**, health ... **Overview** of **malaria surveillance.**

12 Hadiya zone annual report of 2007 EFY

13 South Nations Nationalities peoples SNNP Regional Health Bureau RHB e HMIS data base 2009 to 2016

14 SNNPR PHEM eIDSR data base 2009 to 2016

Annex 7visited Health Facility, Hadiya zone September 2015

S.N	Woreda ,Zone & Hospital	Health Center	Health post	Remark
1	East Badawacho	Chefa	1st ChafA,1ST Keranso &2nd Chafa	
		Edo	Edo, Geigera &Langano	
		Korga	Akorga, mahal korga &Kumudo	
2	Shashogo	Bonosha	Dada,Alage &shamsa Gimbitu	
		Hirko	Bidika,Hiriko andJello	
		Jemmaya	Jamaya, Hoyawa & Shemisamise	
3	Soro	Gimbichu	1st hankota, Sondu & Sigeda	
		Akamo	1st Akamo, 2nd Akamo & Ele	
		Jajura	1st Jajura,2nd Jajura & Bure	
4	Zonal Health Department	-	--	
5	Nigist Eleni Hospital	--	---	
Total	5	9	27	41

Annex 8:Questionnaire for the Health Post

Respondents name ___Date of data collection ---------- Woreda _____ HP ----------

Catchment pop---------- M-------- F ---------- Address phone no _____ e-mail ____# HDA __

PART ONE: Observe all documents and reports

Communication and reporting system assessment

Which communication material did you have? E-mail wired phone mobile radio fax other----------

Did you have address of HC/Woreda PHEM officers? ☐ Yes ☐ No

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----------

When are you expected to receive weekly report from HPs? ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday

When are you expected to send weekly report to the HC/Woreda PHEM unit? ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday

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

If yes, to whom did you send? ----------

Assessment of availability of Surveillance Documentation, Registers, and Formats

Do you have National Guide line for surveillance? ☐ Yes ☐ No ☐ Not Applicable

If No, what did you use for priority health events? ----------

Did you have standard case definition for all country priority diseases? ☐ Yes ☐ No ☐ NA

Was the case definition posted? ☐ Yes ☐ No

If answer for Q2 is No, for which disease(s) did you lack the case definition?

Did you have line list for reporting outbreaks? ☐ Yes ☐ No ☐ Not Applicable

Training, computer/ calculator, data analysis assessment

Have you trained on surveillance system? ☐ Yes ☐ No

How the data entry and compilation is accomplished? ☐ Manual ☐calculator/Computer ☐ other---

Did you analyze data of the surveillance system? ☐ Yes ☐ No

Did you have denominators for data analysis? ☐Total pop ☐male ☐female ☐<5☐ pregnant

Did you notify the results of your analysis to the health development armies☐ Yes ☐ No

Case detection, reporting, confirmation and assessment

Had you detected any case in 2007 EFY?☐ Yes ☐No, list if any

If yes, did you report it on time? ☐ Yes ☐ No

Did you have case detection check list (guide line)? ☐ Yes ☐ No

If no, how did you know possible factors for the outbreak?

Who was responsible to detect any case? ☐ HDA ☐ HEWs ☐ HC ☐ woreda ☐ other----------

Had you faced any challenge in case detection in 2007 EFY? ☐ Yes ☐ No

If yes, list the challenges and action taken ----------

Supervision and feedback assessment

Had you reviewed about surveillance practice by HCs, Woreda or partner?☐ Yes ☐ No

Were you supervised by higher level officers in 2007 EFY? ☐ Yes ☐ No

If yes how many times in 2007 EFY? ----------

Had you received feedback from higher level supervisors in 2007 EFY?☐ Yes ☐ No

If is yes how many feedbacks did you received in 2007 EFY? ----------

How did you improve the weakness of supervision given by feedbacks? ----------
---

PARYT-TWO

IS THE SURVEILLANCE SYSTEM HELP FUL?

To detect cases early on time to permit accurate diagnosis? ☐ Yes ☐ No

To estimate the magnitude of morbidity and mortality?☐ Yes ☐ No

Permit assessment of the effect of prevention and control programs? ☐ Yes ☐ No

Describe Each System Attributes:

Simplicity:

Is the case definition easy for case detection by HEWs and HDAs? ☐ Yes ☐ No

Does the surveillance system allow all levels of professionals to fill data? ☐ Yes ☐ No

Does the surveillance system help to record and report data on time? ☐ Yes ☐ No

Does the surveillance system have necessary information for investigation? ☐ Yes ☐ No

Does the surveillance system allow updating data on the cases? ☐ Yes ☐ No

How long does it take to fill the format? ☐<5 min ☐5 to 10 min ☐ 10 to 15 min ☐>15 min

How long does it take to have laboratory confirmation/ RDT test? ----------

Flexibility

Can the current reporting formats be used for other newly occurring health event (disease) without much difficulty? ☐ Yes ☐ No

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 ----------Is the system easy to add new variables? ☐ Yes ☐ No

Is the surveillance system easy to integrate with other systems? ☐ Yes ☐ No

Is the surveillance system easy to add new disease on report? ☐ Yes ☐ No

Is the system easy to add new information technology? ☐ Yes ☐ No

Data quality

Are all reported forms Complete? ☐ Yes ☐ No

If answer for Q1 is No, how many unfilled spaces are in your 2007 EFY report? ----------

Percentage of unknown or blank responses to variables from the total reports of 2007 EFY report---

Percent of reports which are complete (that is with no blank or unknown responses) from the total --

Is the recorded data clear to read and understand? ☐ Yes ☐ No

If No, how many records is not clear/are difficult to understand in 2007 EFY report? --------Percent of records which are difficult to read/ understand. ----------

Acceptability

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

If yes, how many are active participants (of the expected)? ----------

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: ----------

Did all participants using the community case definition to identify cases? ☐ Yes ☐ No

Did all the reporting agents send their report using the current and appropriate surveillance reporting format? ☐ Yes ☐ No

Did all the health development armies aware about the surveillance system? ☐ Yes ☐ No

Representativeness

Was the surveillance system enabled to follow the health and health related events in the whole community? ☐ Yes ☐ No

If answer for Q1 is no, who do you think is well benefited by the surveillance system? ☐ The urban ☐ the rural ☐ both

Are all the Socio demographic variables included in the surveillance reporting format? ☐ Yes ☐ No

If the answer for Q3 is No, which a) Sex---- b) age group---C) ethnic group----d) religion---- is less represented?

Timeliness

Does your health post report on time? ☐ Yes ☐ No

Percent of reports sent to Health center/ Woreda in 2007 EFY on time. ----------

Completeness

Are all reports sent complete? ☐ Yes ☐ No

Number of weekly reports sent in last 6 month. ----------

Stability

Was any new restructuring affected the procedures and activities of the surveillance? ☐ Yes ☐ No

Was there lack of resources that interrupt the surveillance system? ☐ Yes ☐ No

Was there any time /condition in which the surveillance is not fully operating? ☐ Yes ☐ No

If the answer for Q3 is yes, explain why? ----------

Sensitivity

Does the case definition able to pick all cases? ☐ Yes ☐ No

What was the total Malaria cases occurred in your HP in 2007 EFY? _____

What was the total numbers of suspected malaria cases examined by RDT in last 6 month?

How many of those cases were laboratory confirmed? PF_____ PV_____ Mixed_____ Total_____

Was there Malaria epidemic in your catchment are in last year? ☐ Yes ☐ No

If yes, how many out breaks? ----------

Annex 9: QUESTIONNAIRE FOR HEALTH CENTER

Respondent_____ Name of HC _____Woreda_____-Catchment population _____M_____ F _____Number of Kebeles ____NO of HP____ no of HDA ____Office phone no ____ cell phone no _____ e-mail_____

PART ONE: Observe all documents and reports

Communication and reporting system assessment

Which communication material did you have? E-mail fixed phone mobile radio fax other----------

Number of health posts that have access of communication facilities----------

If No, how did you communicate----------?
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----------

Did you have address of HP and woreda PHEM focal persons? ☐ Yes ☐ No

When are you expected to receive weekly report from HPs? ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday

When are you expected to send weekly report to the woreda PHEM unit? ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday

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

If yes, to whom did you send? ----------

If no, why ----------

Assessment of availability of Surveillance Documentation, Registers, and Forms

Was there a National Guide line for surveillance? ☐ Yes ☐ No ☐ Not Applicable

If No, what did you use for priority health events? ----------

Did you have standard case definition for all country priority diseases? ☐ Yes ☐ No ☐ NA

Was the case definition posted? ☐ Yes ☐ No

If no, for which disease(s) did you lack the case definition?

Did you have case based reporting formats? ☐ Yes ☐ No ☐ NA

Was there guide line for specimen collection, handling and transportation to the next level? Yes /No

Did you have line list for reporting outbreaks? ☐ Yes ☐ No ☐ Not Applicable

If No, for which diseases you lack? ----------

Did you have outbreak investigation guide line? ☐ Yes ☐ No

If no, how did you prevent, control, and investigate it? ----------

Did you have a rumor logbook? ☐ Yes ☐ No

Training, computer skill, and data analysis assessment

Did you have IDSR focal person in 2007? ☐ Yes ☐ No

If yes, did he conduct training? ☐ Yes ☐ No

Did you give any onsite orientation about surveillance system for your staff and HEWs? Yes / No

If no, why----------

Did you have a computer, photocopier, printer, data manager?

Do you have a computerized surveillance network? ☐ Yes ☐ No

Did you compile surveillance data? ☐ Yes ☐ No

How the data entry and compilation is accomplished? ☐ Manual ☐ Computer ☐ other----------

Did you have computer skill on ☐Ms Word ☐Ms excel ☐ MS power point ☐ Epi-info

Did you analyze data of the surveillance system including trend analysis? ☐ Yes ☐ No

If yes, did you describe data by ☐ time ☐ place ☐person

If no, how did you use data for action----------

Did you have denominators for data analysis? Total pop, male, female,<5,PW, < 1 years

Please indicate the frequency of your data analysis. ☐Weekly☐ every two week ☐ Monthly ☐ quarterly ☐every 6 month ☐ annually ☐ No regular time

Did you notify the results of your analysis to lower level PHEM? ☐ Yes ☐ No

If no, why? Less attention, lack of knowledge, time shortage, not familiar, shortage of material, other

Epidemic Preparedness and response assessment

Did you have plan for epidemic preparedness and response☐yes☐ No

If No, how did you implement priority problems? ----------

Did you have emergency stocks of drugs and supplies? ☐ Yes ☐ No

If No, how did you control epidemics? ----------

Have you experienced shortage of drugs, vaccines and supplies in current year? ☐ Yes ☐ No

Was Rapid response team (RRT) built in your office? ☐ Yes ☐ No ☐ I do not know

Did the RRT have regularly scheduled meeting time during epidemics? ☐ Yes ☐ No

If no, how did you control emergency events? ----------

Did you have case management protocol for epidemic prone diseases?☐ Yes☐ No ☐ I do not know

Did partners working together with your office on emergencies? ☐ Yes ☐ No

If yes, what type of supports did they give to your office?

Was there a budget for epidemic response? ☐ Yes ☐ No

Did you have a vehicle assigned for emergencies (PHEM)? ☐ Yes ☐ No ☐ Not applicable

If answer for Q13 is NO, how did you address emergencies?

Case detection, reporting, and 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 last year? ☐ Yes ☐No, if yes the response time --------

Where was laboratory confirmation of cases? ☐Regionallab ☐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 last year? ☐ Yes ☐ No

If yes, List the challenges and action taken----------

Supervision and feedback assessment

Did you have supervision plan in 2007 EFY? ☐ Yes ☐ No

If yes, did you supervise HHs and HPs according to your plan in last year? ☐ 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 last 6 month_____?

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 last 12 month?

Have received supervision plan from higher level?? ☐ Yes ☐ No

Have you received feedback from higher level supervisors in last year? ☐ 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 last year? Yes ☐ No

If no, how did you implement case searching?

Have you faced any challenge on supervision and feedback in last 12 months? ☐ Yes ☐ No

If yes, list challenges and action taken----------

PARYT-TWO

IS THE SURVEILLANCE SYSTEM Helpful?

To detect outbreaks early on time to permit accurate diagnosis? ☐ Yes ☐ No

To estimate the magnitude of morbidity and mortality?☐ Yes ☐ No

Permit assessment of the effect of prevention and control programs? ☐ Yes ☐ No

To estimate research intended to lead to prevention and control? ☐ Yes ☐ No

System Attributes:

Simplicity:

Is the case definition easy for case detection by all level health professionals? ☐ Yes ☐ No

Does the surveillance system allow all levels of professionals to fill data? ☐ Yes ☐ No

Does the surveillance system easy to record and report data on time? ☐ Yes ☐ No

Does the surveillance system have necessary information for investigation? ☐ Yes ☐ No

Does the surveillance system allow updating data on the cases? ☐ Yes ☐ No

How long does it take to fill the format? ☐<5 min ☐5 to 10 min ☐ 10 to 15 min ☐>15 min

How long does it take to have laboratory confirmation/RDTs? ----------

Flexibility

Can the current reporting formats be used for other newly occurring health event (disease) without much difficulty? ☐ Yes ☐ No

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 ----------Is the system easy to add new variables? ☐ Yes ☐ No

Is the surveillance system easy to integrate with other systems? ☐ Yes ☐ No

Is the surveillance system easy to add new disease on report? ☐ Yes ☐ No

Is the system easy to add new information technology? ☐ Yes ☐ No

Data quality

Are all reported forms Complete? ☐ Yes ☐ No

If answer for Q1 is No, how many unfilled spaces are in your last 12 month report? ----------

Percentage of unknown or blank responses to variables from the total reports of last 12 month reports---

Percent of reports which are complete (that is with no blank or unknown responses) from the total---

Is the recorded data clear to read and understand? ☐ Yes ☐ No

If no, how many records is not clear/are difficult to understand in last 12 month report? -----

Percent of records which are difficult to read/ understand ----------

Acceptability

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

If yes, how many are active participants (of the expected)? ----------

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: ----------

Were all participants using the standard case definition to identify cases? ☐ Yes ☐ No

Were all the reporting agents send their report using the current and appropriate surveillance reporting format? ☐ Yes ☐ No

Were all the health professionals aware about the surveillance system? ☐ Yes ☐ No

Was all PHEM officers send report on time? ☐ Yes ☐ No

Representativeness

Was the surveillance system enabled to follow the health and health related events in the whole community? ☐ Yes ☐ No

If no, who do you think is well benefited by the surveillance system? ☐Urban☐ rural ☐both

Are all the Socio demographic variables included in the surveillance reporting format? ☐ Yes ☐ No

If no, which a) Sex---- b) age group---C) ethnic group----d) religion---- is less represented?

Timeliness

Are all reporting sites reporting on time? ☐ Yes ☐ No

Percent of reporting sites that report on time in last 12 months? ----------

Completeness

Are all reporting sites reporting including private facilities? ☐ Yes ☐ No

Percent of Health posts that send report of each week in last 12 months. ----------

Stability

Was any new restructuring affected the procedures and activities of the surveillance? ☐ Yes ☐ No

Was there lack of resources that interrupt the surveillance system? ☐ Yes ☐ No

Was there any time /condition in which the surveillance is not fully operating? ☐ Yes ☐No

If the answer for Q3 is yes, explain why? ----------

Sensitivity

Does the malaria case definition able to pick all cases? ☐ Yes ☐ No

What was the total Malaria cases occurred in your HC catchment in last 12 month? _____

What were the total numbers of suspected malaria cases examined by RDT or Microscopy in last 12 month ---?

How many of those cases were laboratory confirmed? PF_____ PV_____ Mixed_____ Total_____

Was there Malaria epidemic in your catchment are in last year? ☐ Yes ☐ No

If yes, how many out breaks? ----------

Annex 10: QUESTIONNAIRE FOR HOSPITAL

Respondent ---------- Office no ----------Cell phone ---------- e-mail ----------

Hospital ---------- Catchment population-------- M--------F ----------

PART ONE:

Observe all documents and reports

Communication and reporting system assessment

Which communication material did you have? E-mail fixed phone mobile radio fax other

How frequently you communicated with the zonal PHEM officers on emergencies and other daily activities? ☐ Daily ☐ weekly ☐ every 2 week ☐ monthly ☐ quarterly ☐ every 6 month ☐ yearly ☐ others----------

Did you have address of zonal and regional PHEM focal persons? ☐ Yes ☐ No

When are you expected to send weekly report to the woreda PHEM unit? ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday

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 Hospital level that have arisen through the surveillance system? ☐ Yes ☐ No

If yes, to whom did you send? ----------

If no, why ----------

Assessment of availability of Surveillance Documentation, Registers, and Forms

Is there a National Guide line/manual for surveillance? ☐ Yes ☐ No ☐ unknown

If no, what did you use for priorities health events?

Did you have standard case definition for all country priority diseases? ☐ Yes ☐ No ☐ NA

Was the case definition posted? ☐ Yes ☐ No

If no, for which disease(s) did you lack the case definition.

Did you have case based reporting formats? ☐ Yes ☐ No ☐ NA

Was there guide line for specimen collection, handling and transportation to the next level? Yes no

Did you have line list for reporting cases? ☐ Yes ☐ No ☐ Not Applicable

If no, for which disease/event you lack?

Did you have outbreak investigation guideline? ☐ Yes ☐ No

If no, how do you prevent, control, and investigate it?

Did you have a rumor logbook? ☐ Yes ☐ No

Training, Computer skill, and Data analysis assessment

Number of focal person assigned based on the structure ----------

Number of trained surveillance officer/ focal person on PHEM?☐ Yes ☐ No

Did you give any onsite orientation about surveillance system for staff? ☐ Yes ☐ No

If no, why? ----------

Did you have computer, photocopier, printer, data manager?

Do you have a computerized surveillance network? ☐ Yes ☐ No

Was surveillance data compiled? ☐ Yes ☐ No

How the data entry and compilation is accomplished? ☐ Manual ☐ Computer ☐ other----------

Did you have computer skill on ☐ Ms. Word☐ Ms. excel ☐ MS power point ☐Epi-info

Did you analyze data of the surveillance system including trend analysis? ☐ Yes ☐ No

If yes, did you describe data by ☐ time ☐ place ☐person?

If no, how did you use data for action? ----------

Did you have denominators for data analysis? ☐Total pop ☐male ☐female ☐<5☐ 1 years

Please indicate the frequency of your data analysis. ☐Weekly☐ Monthly ☐ every two week ☐ quarterly ☐every 6 month ☐ annually ☐ No regular time

Did you notify the results of your analysis to the case teams? ☐ Yes ☐ No

If no, why? Less attention, lack of knowledge, time shortage, not familiar, shortage of material, other

Epidemic Preparedness and response assessment

Did you have plan for epidemic preparedness and response plan and ☐ Yes ☐ No

If no, how did you implement public health priorities? ----------

Did you have emergency stocks of drugs and supplies? ☐ Yes ☐ No

If No, how did you control emergency events? ----------

Have you experienced shortage of drugs, ITNs and other supplies in last 12 months? ☐ Yes ☐ No

Was Rapid response team (RRT) built in your Hospital? ☐ Yes ☐ No ☐ Not Applicable

Did the RRT have regularly scheduled meeting time during epidemics? ☐ Yes ☐ No

If no, how did/do you control and prevent emergency events? ----------

Did you have case management protocol for epidemic prone diseases?☐ Yes☐ No ☐ Not Applicable

Did the partners working together with your Hospital on emergencies? ☐ Yes ☐ No

If yes, what type of supports did you get for emergency?

Did the budget allocated for epidemic/emergency response? ☐ Yes ☐ No

Who had the authority to mobilize the emergency finance? ----------

Case detection, reporting, confirmation and Outbreak investigation assessment

Did you detect any priority diseases case in last 12 months ☐ Yes ☐ No

Did/ do you register any detected cases ☐ Yes ☐ No

Did/ do you report any case to the higher level? ☐ Yes ☐ No

Where did confirmation of laboratory cases? ☐Regional lab ☐ Hospital ☐ EPHI ☐HC ☐other---

Have you faced any challenge in laboratory confirmation?

If yes, list the challenges and action taken----------

Supervision and feedback assessment

Have you reviewed about surveillance practice by higher level supervision in last 12 month?☐ Yes ☐ No

How many times did you supervised by higher level officers in last 12 months? ----------

Have you received schedule of supervision from higher level in last 12 month?

Have you received feedback from higher level supervisors in last 12 month? ☐ 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 last 12 months? ☐ Yes ☐ No

If no, how did you implement case searching plan activities?

Have you faced any challenge on supervision and feedback in last 12 months? ☐ Yes ☐ No

If yes, list the challenges and actions taken? ----------

PART-TWO

IS THE SURVEILLANCE SYSTEM HELPFUL?

To detect outbreaks early on time to permit accurate diagnosis? ☐ Yes ☐ No

To estimate the magnitude of morbidity and mortality?☐ Yes ☐ No

Permit assessment of the effect of prevention and control programs? ☐ Yes ☐ No

To estimate research intended to lead to prevention and control? ☐ Yes ☐ NoDescribe Each System Attributes:

Simplicity:

Is the case definition easy for case detection by all level health professionals? ☐ Yes ☐ No

Does the surveillance system allow all levels of professionals to fill data? ☐ Yes ☐ No

Does the surveillance system help to record and report data on time? ☐ Yes ☐ No

Does the surveillance system have necessary information for investigation? ☐ Yes ☐ No

Does the surveillance system allow updating data on the cases? ☐ Yes ☐ No

How long does it take to fill the format? ☐<5 min ☐5 to 10 min ☐ 10 to 15 min ☐>15 min

How long does it take to have laboratory confirmation? ----------

Flexibility

Can the current reporting formats be used for other newly occurring health event (disease) without much difficulty? ☐ Yes ☐ No

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 ----------

Is the system easy to add new variables? ☐ Yes ☐ No

Is the surveillance system easy to integrate with other systems? ☐ Yes ☐ No

Is the surveillance system easy to add new disease on report? ☐ Yes ☐ No

Is the system easy to add new information technology? ☐ Yes ☐ No

Data quality

Are all reported forms Complete? ☐ Yes ☐ No

If No, how many unfilled spaces are in your last 12 months report? ----------

Percentage of unknown or blank responses to variables from the total reports of 2006 EFY report---

Percent of reports which are complete (that is with no blank or unknown responses) from the total --

Is the recorded data clear to read and understand? ☐ Yes ☐ No

If No, how many records is not clear/are difficult to understand in last 12 month report? -------

Percent of records which are difficult to read/ understand. ----------

Acceptability

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

If yes, how many are active participants (of the expected)? ----------

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

Were all the health professionals aware about the surveillance system? ☐ Yes ☐ No

Was all PHEM officers send report on time? ☐ Yes ☐ No

Representativeness

Was the surveillance system enabled to follow the health and health related events in the whole community? ☐ Yes ☐ No

If no, who do you think is well benefited by the surveillance system? ☐Urban☐ rural ☐ both

Are all the Socio demographic variables included in the surveillance reporting format? ☐ Yes ☐ No

If No, which a) Sex---- b) age group---C) ethnic group----d) religion---- is less represented?Timeliness

Are all reporting sites reporting on time? ☐ Yes ☐ No

Percent of reporting sites that report on time. ----------

Completeness

Are all reporting sites reporting? ☐ Yes ☐ No

Percent of HF/woreda that send report of each week in last 12 months. ----------

Stability

Was any new restructuring affected the procedures and activities of the surveillance? ☐Yes ☐No

Was there lack of resources that interrupt the surveillance system? ☐ Yes ☐ No

Was there any time /condition in which the surveillance is not fully operating? ☐ Yes ☐ No

If yes, explain why? ----------

Sensitivity

Does the malaria case definition able to pick all cases? ☐ Yes ☐ No

What was the total Malaria cases occurred in 2014? _____

What were the total numbers of suspected malaria cases examined by RDT or Microscopy? ____

How many of those cases were laboratory confirmed? PF___PV__ Mixed__ Total_____

Were there Malaria epidemic in the zone last 12 months? ☐ Yes ☐ No

If yes, how many out breaks?

Annex 11 QUESTIONNAIRE FOR WEREDA HEALTH OFFICE

Respondent(s) ----------Woreda _____Total population ----------no Kebele----------Urban_____ rural _____ Male _____ Female --------no HC------no HP ----- no HAD ----------Number of private health facilities --------- NGOS----- Phone number ----------e-mail -----

PART ONE: Observe all documents and reports

Communication and reporting system assessment

Which communication material did you have? E-mail fixed phone mobile radio fax other--

Number of HPs, and HCs that have communication facilities (list) ----------

Did you have address of HP, HC, zonal PHEM officers? ☐ Yes ☐ No

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----------

When are you expected to send weekly report to the zonal PHEM unit? ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday

When are you expected to receive weekly report from HCs/HPs? ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday

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

If yes, to whom did you send? ----------

If no, why----------

Assessment of availability of Surveillance Documentation, Registers, and Forms

Was there a National Guide line/manual for surveillance? ☐ Yes ☐ No ☐ unknown

If no, what did you use for priorities health events?

Did you have standard case definition for all country priority diseases? ☐ Yes ☐ No ☐ NA

Was the case definition posted? ☐ Yes ☐ No

If answer for Q2 is No, for which disease(s) did you lack the case definition?

Did you have case based reporting formats? ☐ Yes ☐ No ☐ NA

Was there guide line for specimen collection, handling and transportation to the next level? ☐Yes ☐ No ☐ NA

Did you have line list for reporting cases? ☐ Yes ☐ No ☐ Not Applicable

If no, for which disease/event you lack?

Did you have outbreak investigation guideline? ☐ Yes ☐ No

If no, how do you prevent, control, and investigate it?

Did you have a rumor logbook? ☐ Yes ☐ No

Training Computer skill, and Data analysis assessment

Number of PHEM officer assigned based on BPR structure ----------

Number of trained surveillance officer on PHEM? ☐ Yes ☐ No

Did you give any onsite orientation about surveillance system for HC and HEWs? ☐ Yes ☐ No

If no, why? ----------

Did you have computer, photocopier, printer, data manager?

Do you have a computerized surveillance network? ☐ Yes ☐ No

Did you compile surveillance data? ☐ Yes ☐ No

How the data entry and compilation is accomplished? ☐ Manual ☐ Computer ☐ other-------

Did you have computer skill on ☐ Ms. Word☐ Ms. excel ☐ MS power point ☐Epi-info

Did you analyze data of the surveillance system including trend analysis☐ Yes ☐ No

If yes, did you describe data by ☐ time ☐ place ☐person?

If no, how did you use data for action? ----------

Did you have denominators for data analysis? Total pop male female <5 years <1 years other

Please indicate the frequency of your data analysis. ☐Weekly☐ Monthly ☐ every two week ☐ quarterly ☐every 6 month ☐ annually ☐ No regular time

Did you notify the results of your analysis to the lower level PHEM? ☐ Yes ☐ No

If no, why? Less attention, lack of knowledge, time shortage, not familiar, shortage of material, other

Epidemic Preparedness and response assessment

Did you have plan for epidemic preparedness and response☐yes☐ No

If no, how did you implement public health priorities? ----------

Did you have emergency stocks of drugs and supplies? ☐ Yes ☐ No

If no, how did you control epidemics? ----------

Have you experienced shortage of drugs, ITNs and supplies in last year ☐ Yes ☐No?

Was an epidemic management committee built in your office? ☐ Yes ☐ No ☐ I do not know

Did the epidemic management committee have regularly scheduled meeting time?☐ Yes ☐ No

Was Rapid response team (RRT) built in your office? ☐ Yes ☐ No ☐ I do not know

Did the RRT have regularly scheduled meeting time during epidemics? ☐ Yes ☐ No

If no, how did/ do you control emergency events? ----------

Did you have case management protocol for epidemic prone diseases?☐ Yes☐ No ☐ I do not know

Did your PHEM have multi-sectorial emergency preparedness and response task force? ☐ Yes ☐ No ☐ Not Applicable

Did the partners working together with your office on emergencies? ☐ Yes ☐ No

If yes, what type of supports did you get for emergency?

Was the budget allocated for epidemic/emergency response? ☐ Yes ☐No ☐I do not know

Did you have a vehicle for emergencies (PHEM)? ☐ Yes ☐ No ☐ Not applicable

If no, how did you address emergencies?

Case detection, reporting, confirmation and Outbreak investigation, assessment

Did you detect any priority diseases case in last 12 months? ☐ 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 last 12 months? ☐ Yes ☐No, if yes, the response time---

Where did confirmation of laboratory cases? ☐Regional lab ☐ Hospital ☐ EPHI ☐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 last 12 month? ☐ Yes ☐ No

If yes, List the challenges and action taken----------

Supervision and feedback assessment

Did you have supervision plan in last 12 month? ☐ Yes ☐ No

If yes, did you supervise the HHs, HPs, and HCs according to your plan in last 12 month? ☐ Yes ☐ No

If no, how did you give a support? ----------

Did you notify your supervision plan prior to supervision? ☐ Yes ☐ No

If no, why----------

Did you have supervision checklist? ☐ Yes ☐ No

If no, how did you supervise the health facilities without checklist? ----------

Did you send feedback to HCs and HPs indicating their strong and weak sides? ☐ Yes ☐ No

If no, why? ----------

If yes, for how many of HP and HCs did you send a feedback in last 12 months_____?

Did you have a follow up mechanism to improve limitations indicated by supervision?☐ Yes ☐ No

Did you review about surveillance practice by higher level supervision in last 12 month?☐ Yes ☐ No

How many times did you supervised by higher level officers in last 12 month? ----------

Have you received schedule of supervision from higher level in last 12 month?

Have you received feedback from higher level supervisors in last 12 months☐ 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 last 12 months? ☐ Yes ☐ No

If no, how did you implement case searching plan activities?

Have you faced any challenge on supervision and feedback in last 12 months? ☐ Yes ☐ No

If yes, list the challenges and actions taken? ----------

PART-TWO

IS THE SURVEILLANCE SYSTEM HELPFUL?

To detect outbreaks early on time to permit accurate diagnosis? ☐ Yes ☐ No

To estimate the magnitude of morbidity and mortality?☐ Yes ☐ No

Permit assessment of the effect of prevention and control programs? ☐ Yes ☐ No

To estimate research intended to lead to prevention and control? ☐ Yes ☐ No

Describe Each System Attributes:

Simplicity:

Is the case definition easy for case detection by all level health professionals? ☐ Yes ☐ No

Does the surveillance system allow all levels of professionals to fill data? ☐ Yes ☐ No

Does the surveillance system help to record and report data on time? ☐ Yes ☐ No

Does the surveillance system have necessary information for investigation? ☐ Yes ☐ No

Does the surveillance system allow updating data on the cases? ☐ Yes ☐ No

How long does it take to fill the format? ☐<5 min ☐5 to 10 min ☐ 10 to 15 min ☐>15 min

How long does it take to have laboratory confirmation? ----------

Flexibility

Can the current reporting formats be used for other newly occurring health event (disease) without much difficulty? ☐ Yes ☐ No

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 --------

Is the system easy to add new variables? ☐ Yes ☐ No

Is the surveillance system easy to integrate with other systems? ☐ Yes ☐ No

Is the surveillance system easy to add new disease on report? ☐ Yes ☐ No

Is the system easy to add new information technology? ☐ Yes ☐ No

Data quality

Are all reported forms Complete? ☐ Yes ☐ No

If No, how many unfilled spaces are in your last 12-month report? ----------

Percentage of unknown or blank responses to variables from the total reports of last 12 months report---

Percent of reports which are complete (that is with no blank or unknown responses) from the total--

Is the recorded data clear to read and understand? ☐ Yes ☐ No

If No, how many records is not clear/are difficult to understand in last 12 month report? ----

Percent of records which are difficult to read/ understand. ----------

Acceptability

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

If yes, how many are active participants (of the expected)? ----------

If No, what is the reason for their poor participation in the surveillance activity?

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

No feedback / or recognition given by the higher bodies for their contribution

Reporting formats are difficult to understand

Report formats are time consuming

Other: ----------

4. Were all participants using the standard case definition to identify cases? ☐ Yes ☐ No

Were all the reporting agents send their report using the current and appropriate surveillance reporting format? ☐ Yes ☐ No

Were all the health professionals aware about the surveillance system? ☐ Yes ☐ No

Was all PHEM officers send report on time? ☐ Yes ☐ No

Representativeness

Was the surveillance system enabled to follow the health and health related events in the whole community? ☐ Yes ☐ No

If no, who do you think is well benefited by the surveillance system?☐Urban ☐rural ☐ both

Are all the Socio demographic variables included in the surveillance-reporting format? ☐ Yes ☐ No

If No, which a) Sex---- b) age group---C) ethnic group----d) religion---- is less represented?

Timeliness

Are all reporting sites reporting on time? ☐ Yes ☐ No

Percent of reporting sites that report on time. ----------

Completeness

Are all reporting sites reporting? ☐ Yes ☐ No

Percentof Health facilities that send report of each week in last 12 months? ----------

Stability

Was any new restructuring affected the procedures and activities of the surveillance? ☐ Yes ☐ No

Was there lack of resources that interrupt the surveillance system? ☐ Yes ☐ No was there any time /condition in which the surveillance is not fully operating? ☐ Yes ☐ No

If yes, explain why? ----------

Sensitivity

Does the malaria case definition able to pick all cases? ☐ Yes ☐ No

What was the total Malaria cases occurred in your woreda in last 12 month? _____

What were the total numbers of suspected malaria cases examined by RDT or Microscopy? ____

How many of those cases were laboratory confirmed? PF___PV__Mixed___ Total_____

Were there Malaria epidemic in your woreda in last year? ☐ Yes ☐ No

If yes, how many out breaks? ----------

Annex 12 QUESTIONNAIRE FOR ZONAL HEALTH DEPARTMENT

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

Urban__ rural ___ Male _____ Female ___ ____ woreda _____HC----HP ----HAD ---------- Private health facilities ---- NGOS--- Cell phone no _____e-mail _____

PART ONE: Observe all documents and reports

Communication and reporting system assessment

Which communication material did you have? E-mail fixed line mobile radio fax other---

Number of HP, HC, woreda, and hospitals that have communication facilities ----------

Did you have address of HF, woreda, Hospital and regional PHEM officers? ☐Yes ☐ No

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----------

When were you expected to send weekly report to the regional PHEM unit? ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday

When are you expected to receive weekly report from woredas/town administration? ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday

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

If yes to who did, you sent? ----------

If no, why? ----------

Assessment of availability of Surveillance Documentation, Registers, and Forms

Is there a National Guide line/manual for surveillance? ☐ Yes ☐ No ☐ unknown

If no, what did you use for priorities health events?

Did you have standard case definition for all country priority diseases? ☐ Yes ☐ No ☐ NA

Dose the case definition posted. ☐ Yes ☐ No

If answer for Q2 is No, for which disease(s) did you lack the case definition?

Did you have case based reporting formats? ☐ Yes ☐ No ☐ NA

Was there guide line for specimen collection, handling and transportation to the next level? Yes no

Did you have line list for reporting cases? ☐ Yes ☐ No ☐ Not Applicable

If no, for which disease/event you lack?

Did you have outbreak investigation guideline? ☐ Yes ☐ No

If no, how do you prevent, control, and investigate it?

Did you have a rumor logbook? ☐ Yes ☐ No

Training, Computer skill, and Data analysis assessment

Number of PHEM officer assigned based on the structure ----------

Number of trained surveillance officer on PHEM? ☐ Yes ☐ No

Did you give any onsite orientation about surveillance system for officers? ☐ Yes ☐ No

If no, why? ----------

Did you have computer, photocopier, printer, data manager?

Do you have a computerized surveillance network? ☐ Yes ☐ No

Was surveillance data compiled? ☐ Yes ☐ No

How the data entry and compilation is accomplished? ☐ Manual ☐ Computer ☐ other-------

Did you have computer skill on ☐ Ms. Word☐ Ms. excel ☐ MS power point ☐Epi-info

Did you analyze data of the surveillance system including trend analysis? ☐ Yes ☐ No

If yes, did you describe data by ☐ time ☐ place ☐person?

If no, how did you use data for action? ----------

Did you have denominators for data analysis? ☐Total pop ☐male ☐female ☐<5☐ 1 years

Please indicate the frequency of your data analysis. ☐Weekly☐ Monthly ☐ every two week ☐ quarterly ☐every 6 month ☐ annually ☐ No regular time

Did you notify the results of your analysis to the lower level? ☐ Yes ☐ No

If no, why? Less attention, lack of knowledge, time shortage, not familiar, shortage of material, other

Epidemic Preparedness and response assessment

Did you have plan for epidemic preparedness and response plan ☐ Yes ☐ No

If no, how did you implement public health priorities? ----------

Did you have emergency stocks of drugs and supplies? ☐ Yes ☐ No

If No, how did you control emergency events? ----------

Have you experienced shortage of drugs, ITNs and other supplies in last 12 months? ☐ Yes ☐ No

Did an epidemic management committee was built at zonal level? ☐ Yes ☐ No ☐ I do not know

Did the epidemic management committee have regularly scheduled meeting time? ☐Yes☐ No

Did Rapid response team (RRT) was built in your office? ☐ Yes ☐ No ☐ Not Applicable

Did the RRT have regularly scheduled meeting time during epidemics? ☐ Yes ☐ No

If no, how did/do you control and prevent emergency events? ----------

Did you have case management protocol for epidemic prone diseases?☐ Yes☐ No ☐ Not Applicable

Did your PHEM have multi-sectorial emergency preparedness and response task force? ☐ Yes ☐ No ☐I do not know

Were the partners working together with your office on emergencies? ☐ Yes ☐ No

If yes, what type of supports did you get for emergency?

Had the budget allocated for epidemic/emergency response? ☐ Yes ☐ No

Who had the authority to mobilize the emergency finance? ☐ Zonal head ☐ Zonal PHEM head☐ experts ☐ other----------

Did you have a vehicle for emergencies (PHEM)? ☐ Yes ☐ No ☐ Not applicable

If answer for Q17 is NO, how did you address emergencies?

Case detection, reporting, confirmation and Outbreak investigation assessment

Did you detect any priority diseases case in last 12 months ☐ 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 last 12 months? ☐ Yes ☐No, list if any and response time

Where did confirmation of laboratory cases? ☐Regional lab ☐ Hospital ☐ EPHI ☐ HC ☐ other---

Who is responsible to investigate an outbreak? ☐ RRT ☐ HEWs ☐ staffs of woreda health office ☐ experts organized randomly ☐ health facility staffs☐ other-------

Have you faced any challenge in outbreak investigation in last 12 months? ☐ Yes ☐No

If yes, list the challenges and action taken----------

Supervision and feedback assessment

Did you have supervision plan in last 12 month? ☐ Yes ☐ No

If yes, did you supervise HHs, HPs, HCs, woredas, and Hospitals? Yes NO

If no, how did you supervise? ----------

Did you notify your supervision plan prior to supervision? ☐ Yes ☐ No

If no, why? ----------

Did you have supervision checklist? ☐ Yes ☐ No

If No, how did you supervise woredas and health facilities? ----------

Did you send feedback to the lower level indicating their strong and weak sides? ☐ Yes ☐ No

If no, why? ----------

If yes, for how many of them did you send a feedback in last 12 month_____?

Did you have a follow up mechanism to improve limitations indicated by supervision?☐ Yes ☐ No

Have you reviewed about surveillance practice by higher-level supervision in last 12 months?☐ Yes ☐ No

How many times did you supervised by higher-level officers in last 12 months? ----------

Have you received schedule of supervision from higher level in last 12 months?

Have you received feedback from higher level supervisors in 2007 EFY? ☐ 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 last 12 months? ☐ Yes ☐ No

If no, how did you implement case searching plan activities?

Have you faced any challenge on supervision and feedback in last 12 months? ☐ Yes ☐ No

If yes, list the challenges and actions taken? ----------

PART-TWO

IS THE SURVEILLANCE SYSTEM HELPFUL?

To detect outbreaks early on time to permit accurate diagnosis. ☐ Yes ☐ No

To estimate the magnitude of morbidity and mortality?☐ Yes ☐ No

Permit assessment of the effect of prevention and control programs? ☐ Yes ☐ No

To estimate research intended to lead to prevention and control. ☐ Yes ☐ No

Describe Each System Attributes:

Simplicity:

Is the case definition easy for case detection by all level health professionals? ☐ Yes ☐ No

Does the surveillance system allow all levels of professionals to fill data? ☐ Yes ☐ No

Does the surveillance system help to record and report data on time? ☐ Yes ☐ No

Does the surveillance system have necessary information for investigation? ☐ Yes ☐ No

Does the surveillance system allow updating data on the cases? ☐ Yes ☐ No

How long does it take to fill the format? ☐<5 min ☐5 to 10 min ☐ 10 to 15 min ☐>15 min

How long does it take to have laboratory confirmation? ----------

Flexibility

Can the current reporting formats be used for other newly occurring health event (disease) without much difficulty? ☐ Yes ☐ No

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 ----------

Is the system easy to add new variables? ☐ Yes ☐ No

Is the surveillance system easy to integrate with other systems? ☐ Yes ☐ No

Is the surveillance system easy to add new disease on report? ☐ Yes ☐ No

Is the system easy to add new information technology? ☐ Yes ☐ No

Data quality

Are all reported forms Complete? ☐ Yes ☐ No

If No, how many unfilled spaces are in your 2007 EFY report? ----------

Percentage of unknown or blank responses to variables from the total reports of last 12 months report ---

Is the recorded data clear to read and understand? ☐ Yes ☐ No

If No, how many records is not clear/are difficult to understand in last 12 months report? ---

Percentage of records, which are difficult to read/ understood ----------

Acceptability

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

If yes, how many are active participants (of the expected)? ----------

If No, what is the reason for their poor participation in the surveillance activity?

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

No feedback / or recognition given by the higher bodies for their contribution

Reporting formats are difficult to understand

Report formats are time consuming

Other: ----------

4. Were all participants using the standard case definition to identify cases? ☐ Yes ☐ No

5. Were all the reporting agents sent their report using the current and appropriate surveillance-reporting format? ☐ Yes ☐ No

Were all the health professionals aware about the surveillance system? ☐ Yes ☐ No

Was all PHEM officers send report on time? ☐ Yes ☐ No

Representativeness

Were the surveillance system enabled to follow the health and health related events in the whole community? ☐ Yes ☐ No

If no, whom did you think well benefited by the surveillance system? ☐Urban☐ rural ☐both

Are all the Socio demographic variables included in the surveillance-reporting format? ☐ Yes ☐ No

If No, which a) Sex---- b) age group---C) ethnic group----d) religion---- is less represented?

Timeliness

Are all reporting sites reporting on time? ☐ Yes ☐ No

Percent of reporting sites that report on time. ----------

Completeness

Are all reporting sites reporting? ☐ Yes ☐ No

Percentage of HF/ woreda that sent report of each week, in last 12 months. ----------

Stability

Was any new restructuring affected the procedures and activities of the surveillance? ☐Yes ☐No

Was there lack of resources that interrupt the surveillance system? ☐ Yes ☐ No

Was there any time /condition in which the surveillance is not fully operating? ☐Yes ☐ No

If yes Q no three, explain why? ----------

Sensitivity

Does the malaria case definition able to pick all cases? ☐ Yes ☐ No

What was the total Malaria cases occurred in last 12 months? _____

What were the total numbers of suspected malaria cases examined by RDT or Microscopy? ____

How many of those cases were laboratory confirmed? PF__ PV __Mixed__ Total_____

Were there Malaria epidemic in the zone last 12 months? ☐ Yes ☐ No

If yes, how many out breaks? ---------

Chapter IV – Health Profile Description Report

4.1. Kedida Gamela woreda Health profile, Kambata Tambaro zone, South Nations Nationalities People Region, (SNNPR) Ethiopia, February 2015

Executive Summary

Background: Health profile description provides a snapshot of the overall health and health related situation of population in a woreda.However in resource meager countries like Ethiopia such information especially at Woreda level usually are not commonly available .This study was conducted to provide health profile description of Kedida Gamela Woreda which ultimately will help for health development planning.

Methods: Descriptive study was conducted in Kedida Gamela Woreda from February 11-18 /2015.The information was collected from health, agriculture, Culture and tourism, water resource management, finance and economy and education office annual reports and documents. Both qualitative and quantitative data were obtained using health profile data collection checklists. Data was analyzed and organized using excel.

Result: Population of the Woreda in 2013/2014 based on 2007 census projection estimated to be 109, 270.From the total population 102,713(94 %) live in rural. The Woreda is administered with 18 rural and one urban kebeles. There were 19 health posts and 4 health centers. Access to drinking water supply and excreta disposal was 29.6% and 100% respectively. At Woreda level all 19 kebeles graduated as open defecation free kebeles. Top ten leading morbidity in both adult and less than five years outpatient department was malaria. There are 10 (52.6%) malaria prone kebeles. The 2013/2014 ITNs distribution and IRS spray coverage were100 %. Majority of nationally notify able diseases burden showed increment in the last two years excluding malaria.

Measles, PCV3 and full vaccination coverage was 102.4%,100.82 % and 97.7 % respectively and health workers density per 1000 population was 1.38.

Conclusion: Malaria is number one priority health problem in the woreda followed by other infectious diseases. It is possible to reduce the disease burden through regular Monitoring and evaluation of

primmer health care activities at all level and empowering the community in the disease prevention and control programs including intensification of community based integrated disease surveillance.

Introduction

Health Profiles are designed to help local government and health services identify problems in their areas and decide on how to tackle them. Health profile is base for formulation and implementation of policy and strategy by generating evidence-base data. The promotion and application of epidemiological methods is the need of the day for public health programmers. One of these methods is the health profile description that highlights several important aspects of public health data. Data will be collected, analyzed, and disseminated for decisions resulting from best information available. Morbidity, mortality, socio-demographic and vital statistics and other data will be collected, and that will help us to address important public health problems and to facilitate effective public health action [1,2].

Health profiles are produced at local authority level because they are intended for use by elected councilors, directors of public health, council officers and other members of the Joint Strategic Needs Assessment (JSNA) process and by members of the health and wellbeing boards. Health profiles are now an established part of planning for health improvement [2]. Districts are the lowest autonomous governmental structures which run majority of public health activities [2].

Woreda health data are important for advocacy, planning, implementation and evaluation of health care program [2-4].

Rationale of the study

Health profile provides a snapshot of the overall health of the local population, and highlight potential problems through comparison with other areas and with the national average. However in low income countries like Ethiopia such information especially at district level is usually not complete and comprehensive [6, 7].Therefore this study was conducted to generate relevant health information which helps the Woreda public health officials and other stakeholders to improve the public health services.

Objectives

General objective

To describe health profile of Kedida Gamela Woreda from 02/11-18/2015

Specific objectives

To describe the socio-demographic status of the Woreda

To describe the disease burden of the Woreda

To describe primary health care services status in the Woreda

To determine priority health problems in the Woreda

Methods

Study setting

From February 11-18 /2015 health and health related data were collected in Kedida Gamela woreda. Kedida Gamela Woreda is one of the 8th Woredas in Kambata Tambaro zone, Southern Nations Nationalities and peoples Region. The Woreda has a total population size of 109, 270 of this, 54,416 (49.8%), 54,854(50.2%) were Males and Females respectively and administered with 18 rural and 1 urban Kebeles [13].

Study Design: A descriptive study design was employed to describe the health profile of the Woreda.

Data collection methods and source : Interview and standard check list were the main tools for data collection. The data source was the Woreda Health Office, Education Office, Finance Office, Water Office, Agricultural Office, and reports from National Central Statistics Agency of 2007 Census.

Data analysis and organization: - 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. We also used Arc Map to describe the administrative area of the woreda.

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

Results

Description of the district

Geographic and Demographic Characteristics: Kedida Gamela Woreda is one of the 8 Woredas in Kambata Tambaro Zone. The woreda is surrounding the Zonal capital Dura-me. It has a population of 109, 270. Durame found 125km far from Hawasa which is capital of SNNPR and 350 km far from Addis Ababa. The name Kedida Gamela Originated from Kedida the widest kebele in the woreda and Gamela is the name of Small Mountain found in Yebu kebele, in the woreda. The woreda is bordered by: - Damboia woreda in (Kambata Tembaro Zone) in the north ; Kacha birra woreda in (Kambata Tembaro Zone)in the south west; Angech wored in (kambata Tembaro Zone) in the north west; Halaba special woreda in the North east ; and East Badeawacho woreda in (Hadia zone) in the south east.

Climatic condition of the Woreda is 5% Dega (High land) and 95% weyinadega (Middel land). Altitude Woreda is situated from 1600-3028 m above sea level. The annual rainfall ranges from 900ml-1400ml with average of 1140 ml. The average temperature is 12-25oc Residents of Kedida Gamela settled in each climatic zone 5% Dega zone and 95% in weyinadega zone.

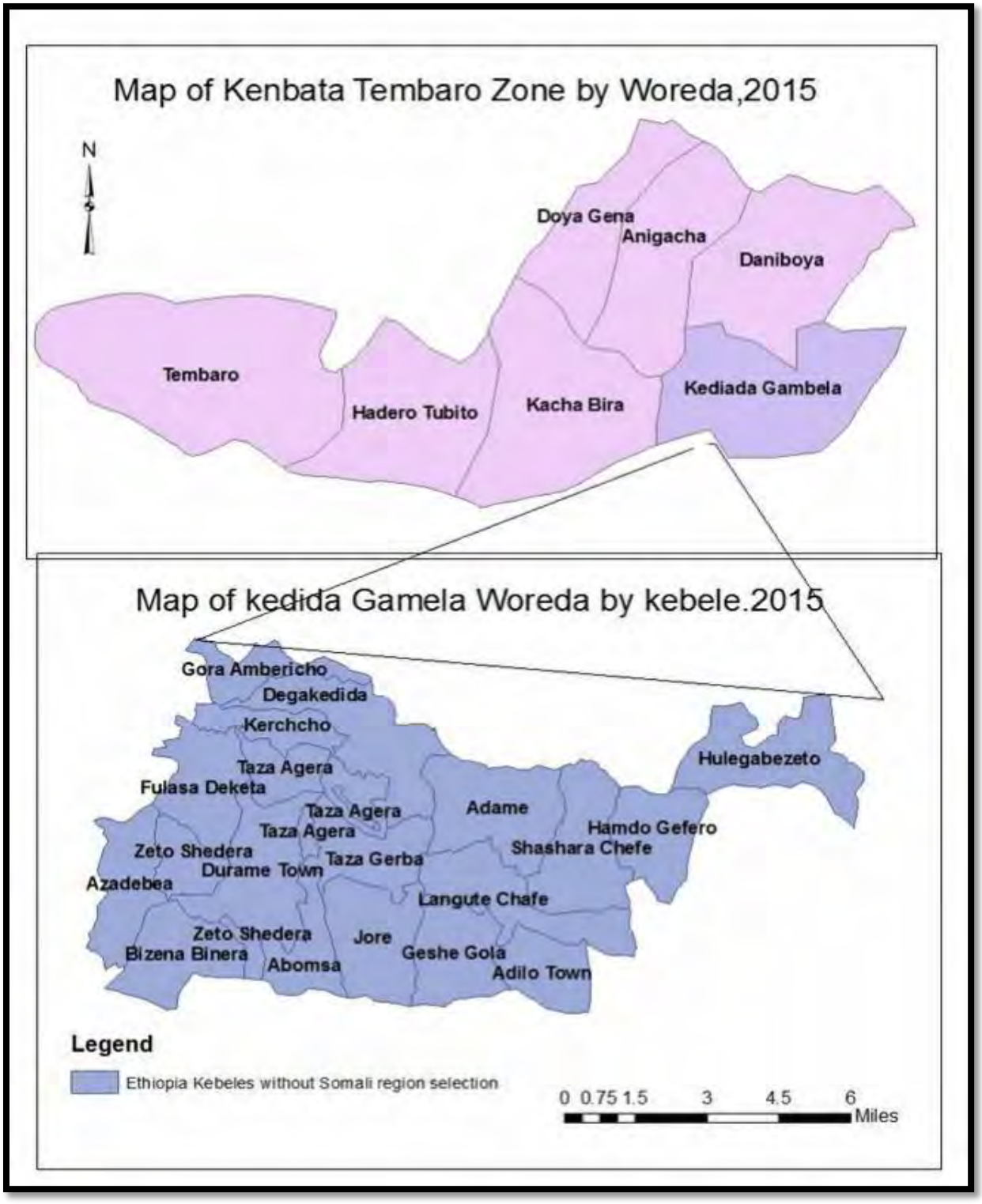

Figure Showing Map of Kedida Gamela Woreda by kebele, Kambata Tambaro Zone, February 2015

Population of the Woreda in 2013/2014 based on 2007 census projection estimated to be 109, 270 of Which 54,416(49.8%) males and 54,853 (50.2 %) females. Children < 15 years were 47.86% and adults

>= 60 years were 3.87%, Female to Male ratio and dependency ratio were, 1:0.995 and 51.47% respectively. From the total population 6,781 (6.2%) live in urbane and 102,489 (93.8%) live in the rural. The Woreda was administered with 17 rural and one urban kebeles.

Table: Population structure by Kebele of KG Woreda, KT zone, SNNPR, 2014/ 2015

S. no	Name of kebele	Population			Remark
		Male	Female	Total	
1	Holageba Zato	1,904	1,905	3,809	
2	Hmido	1,763	1,836	3,566	
3	Shashara	2,207	2,216	4,423	
4	Odame	2,709	2,720	5,429	
5	Langute Chafe	2,998	3,012	6,010	
6	Adilo	3,383	3,398	6,781	Urban- kebele
7	Geshgola	3,399	3,112	6,211	
8	Jore	4,898	5,117	1,0012	
9	Abonsa	2,973	2,995	5,968	
10	Bezena Benara	3,605	3,620	7,225	
11	Aze dobo	3,686	3,702	3,783	
12	Zato Shodera	2,760	2,771	5,531	
13	Fulasa Deketa	3,063	3,077	6,140	
14	Teza Agara	2,396	2,407	4,803	
15	Teza Gerba	4,273	4,291	8,564	
16	Kerchicho	3,255	3,268	6,523	
17	Dega Kedida	4,764	4,784	9,548	
18	Garameba Ambericho	2,259	2,269	4,528	
	Total	54,408	54,762	109,270	

Table 24Population structure by age group of KG Woreda, KT zone, SNNPR, 2013/ 2014

Age group	Number	Percentage (%)
<1 year	3,606	3.3%
<5 years	17,046	15.6 %
5-14 years	35,251	32.26%
<15	52,297	47.86%
15 – 64	54,284	49.14%
>=65	4,229	3.00
WRA (15-49)	25,460	23.3%

Source: Woreda Health Office

Education

Modern educational system was started in 1947 at Benara Bezena junior school (1 - 8). In the Woreda junior secondary school (9-10) was started in1974. In the Woreda there are four junior (9-10), twenty-five elementary (1-8), four first cycle (1- 4) and 1 preparatory schools available of which 32(94%) were governmental. General Enrolment Rate (GER) of School for the year 2013/2014 was above 100% which was irrespective of age out of corresponding primary school age population (14).The school dropout was 5% and 3.8% in2012/ 2013 and 2013/2014 mid-semesters respectively. In 2013/2014 the highest dropout rate was recorded among grade one students. Among dropout students in both physical years 53% and52 % were females respectively. In2013/2014 from the total students 20442(51%) were males. Teacher student ratio in primary school (1- 8) was 1:56 and in junior and preparatory (9-10 and 11-12) is 1:40 in 2013/14 (13). There were different type of health serves in those schools like health education, peer education, Anti helminthes and Vitamin A distribution for <5 children, And also there were different types of clubs like;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.

Socio-economic: The main economic source of the Woreda is traditional agriculture practice. Agricultural practices (crop production and animal husbandry) are the main activities. Crops like Maize,

Teff, Roots like Potato, sweet potato and godeera, Stem and root like Inset, and animal husbandry like cow, goat and sheep are commonly practiced economic activities. Fruit production like papaya, Avocado &banana, for cash started in the recent few years.

Infrastructures: In the Woreda some of the basic infrastructures like electric power supply available for one urban and severural Kebeles. Telecommunication (land telephone is available in the main town (Dura me) and the other urban kebele Adilo town and 100% mobile coverage.

Health system and health status: The District health system performs Primary Health Care Unit (PHCU) activities which designed in the national health tire system. After decentralization districts have power to decide on their budget so as to run any public health important activities. For 2013/2014 fiscal year 5,275,303.35 (10.4%) of the Woreda budget was allocated to the Woreda health office. From allocated budgets salary and duty allowance 88.9% and running cost 11.1 %. Each Health centers (Adilo, Bezena benara, Dega kedida and Sheshera) have accounted that can deposit incomes collected by each health centers and they have utilized their revenue as running cost as standard of healthcare financing manual. Majority of the health activities are community-centered which focused on prevention and control. To improve the public health training the health extension packages have been given to households. Trained and graduated households teach their neighbors (the one to five net work members), about how to perform the basic health practices like appropriate bed net utilization, appropriate latrine utilization, hand washing practice, safe drinking water storage, and cleaning indoors and outdoors of their residency compound.

The Woreda health office structure:-

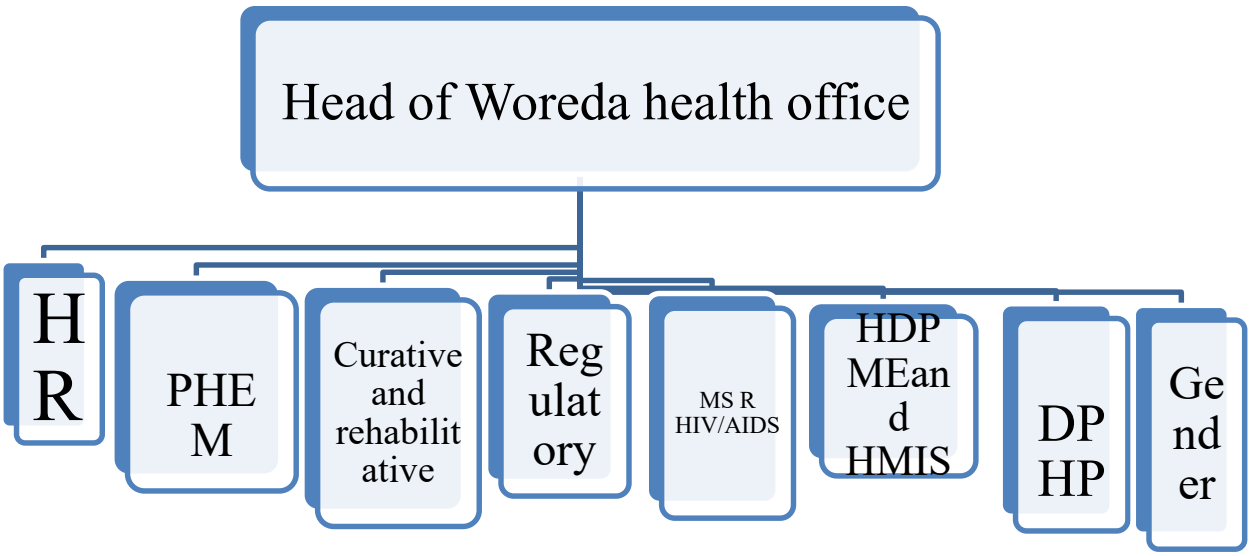

Figure 45:Organogram of tht woreda Health System of KG Woreda, SNNPR, 2014/2015

Table 25 Type and number of functional health facilities in KG Woreda, KT zone SNNPR 2014/2015

Type of health facility	Number	Remark
Primary Hospital	0	
Health centers	4	Gov
Health Posts	19	Gov
lower clinics	2	Private
Drug vender	1	Private

Table 26 Type and number of health professionals, and proportion to the population, KG Woreda, KT zone ,2014/ 2015

Type of health Professional	No	Health professional to population ratio	Health workers/1000 Population	2009 national Indicator
Physician	0	--	--	--
Health officers	19	1:5751	0.1739	0.0205
Nurses (Clinical& public)	60	1:1821	0.5491	0.2576
Midwife nurses	10	1:10927	0.0915	0.0176
HEW	42	1:2601	0.3843	0.3943
Pharmacy technician	11	1:9934	0.1007	0.0258
Lab technician	9	1:12141	0.0824	0.0249
Environmental health all type	2	1:54635	0.0169	0.0159
Total	153		1.4	0.7757

Table 27 Status of basic health services and indicators K/ G Woreda, KT zone 2014/2015

Indicators	Status of Woreda	Remark
CAR	73%	WoHO annual report of 2013/2014
ANC1st	96%	"
ANC 4th	84%	"
PMTCT	93%	"
Skilled Delivery	31%	"
Maternal mortality ratio	No report	" Institutional
Early neonatal death	No report	" Institutional
Infant mortality rate	-	Data not available
PNC	98%	2013/2014
PCV3	98%	"
Measles	98%	"
Protected at birth(from tetanus)	93%	"
Fully Immunized	98%	"

Hygiene and sanitation practices like constructing pit latrines in areas where people gathering and road sides are constructed. At Woreda level 18 (100%) kebeles graduated as open defecation free kebeles. Access to excreta disposal and drinking water supply coverage was 100% and 43.6% respectively.

Table 28:The top leading causes of < 5 children clinic visit KG Woreda, 2013/2014

Rank	Disease	Number of cases	
		Number	%
1	Malaria all type	1610	28,5
2	All respiratory disease - as [HMIS]inductor	1081	19.13
3	Pneumonia	793	14.04
4	Acute febrile illness (AFI)	606	10.73
5	Diarrhea (non-bloody)	435	7.7
6	Helminthiasis	268	4.74
7	Trauma (injury, fracture, etc)	160	2.83
8	Other or unspecified disease of the eye and adnexa	156	2.7
9	Infections of the skin and subcutaneous tissue	116	2.05
10	Diarrhea with bloody (dysentery)	94	1.66
	All of the above cases	5319	94.14
	Total all of the other cases	331	5.86
	Total of all cases	5650	100

Table 29: The top leading causes of outpatient in KG Woreda, 2012/2013 & 2013/2014

Rank	Disease	No of cases	%	Disease	No of cases	%
1	Malaria all type	8,539	44	Malaria all type	5073	25.6
2	Typhoid fever	4117	21	Typhoid fever	4313	21.8
3	Helminthiasis	1173	6	Acute febrile illness (AFI)	2539	12.8
4	Acute febrile illness (AFI)	1162	5.9	Helminthiasis	1503	7.3
5	Trauma (injury, fracture ,etc)	674	3.5	All respiratory disease	1242	6.28
6	All respiratory disease- as [HMIS]inductor	658	3.4	Trauma (injury, fracture ,etc)	819	4.14
7	Pneumonia	556	2.9	Pneumonia	635	3.21
8	Urinary tract infection	458	2.4	Other or unspecified infectious	533	2.69

				and parasitic dieses		
9	Other or unspecified disease of the eye and adnexa	176	0.9	Urinary tract infection.	523	2.64
10	Dyspepsia	176	0.9	Infections of the skin and subcutaneous tissue	390	1.97
	Total of all of the above cases	17,689	91	Total of all of the above cases	17,57	88.8
	Total all of the other cases	1,762	9	Total all of the other cases	2,214	11.1
	Total of all cases	19,451	100	Total of all cases	19,78	100

Malaria

Malaria is the leading top ten causes of outpatient visit in the Woreda. 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 46Malaria monitoring chart by month, Kedida-Gamela district, Kembata-Tembaro zone, SNNPR, 2014

Indoor residual spray: List of chemicals used since the start of indoor residual spray was 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.

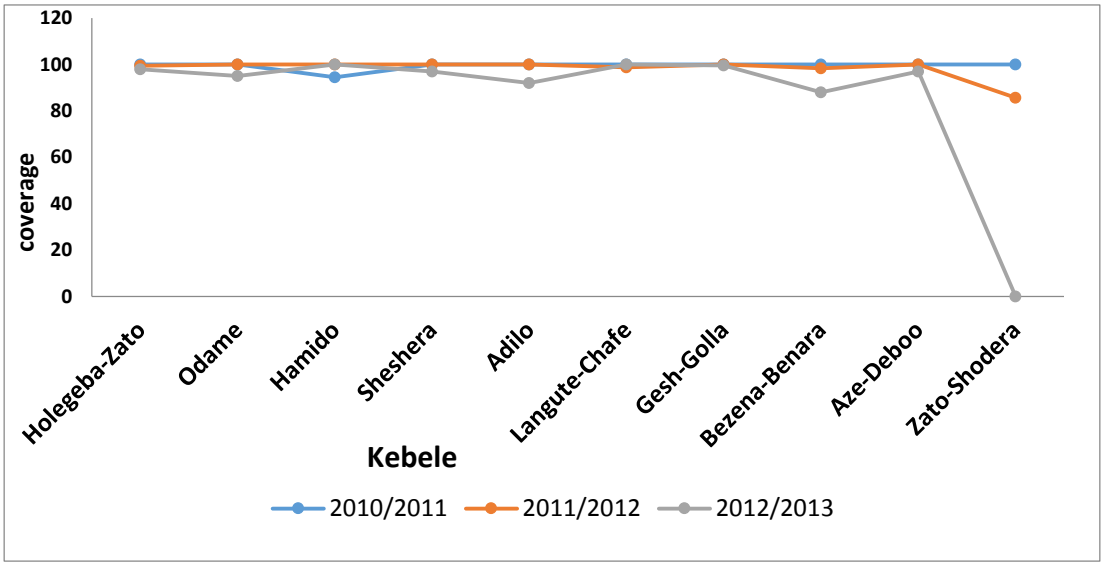

Figure 47: Trend of Indoor residual spray coverage, Kedida-Gamela district, Kembata-Tembaro zone, SNNPR, 2011-2013

Long Lasting Insecticidal Nets (LLINs). The LLINs coverage for the last three consecutive years (2012-2014) was 100%. But the utilization rate in the same three consecutive 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, 248 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 2005 E.C. All test reactive patients are linked to Dura me 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.

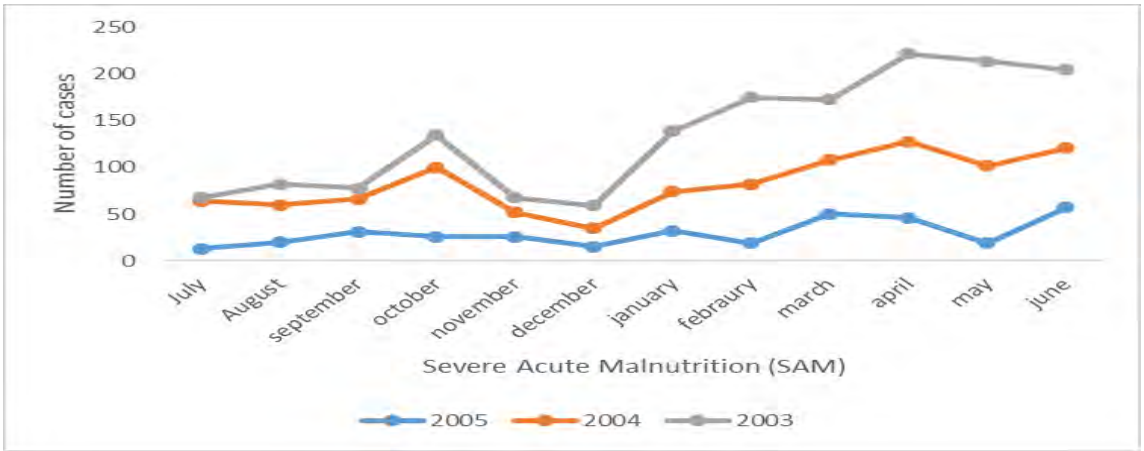

Figure 48: Trend of severe malnutrition cases Kedida-Gamela woreda, Kembata-Tembaro, SNNPR

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 (2012and 2014) (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 problems in the district (1).

Limitation: We could not describe mortality rate for specific indicators (Maternal mortality ratio MMR, infant mortality rate (IMR) and under five mortality) because data was not available at woreda health office, No study document on the main socio economic status of the woreda is conducted, Absence of Vital registration specifically at district level and at visited health facility.

Conclusion: Malaria and severe acute malnutrition (SAM) were 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.

Recommendation: Effective use of malaria prevention and control measure to reduce malaria incidence should be focused by the community, health posts, and health center and woreda health office. Patients with cough of two or more week's duration should bescreened by health development armies, health posts and health centers.Delivery service should be increase.Early and regular screening of children in CBN Program by health extension workers should be mandatory.Regular supportive supervision for health posts by Health centers and district health office, woreda health office by zone.

Action points

Key health problems.	**Agreed measures for action**	**By when? (Specific date)**	**Responsible? (woreda, HO/ ,ZHD or, RHB)**
Malaria	Effective use of malaria prevention and control measure	From 15, March, 2015	The Woreda Health office Health Centers, HEW, and HDA
Malnutrition	Early screening of children	Every work days	HEW, HAD and Wer HO
low detection of Tb	To Screening of patients with cough	From 22 February, 2015, every work day	The Woreda Health office Health Centers, HEW, and HDA
low performance of skilled delivery	To improve performance of skilled delivery	From 28 February, 2015, every work day	The Woreda Health office Health Centers,

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Annex 13: Data Collection Tool for Health Profile Description

Health Profile of _____ District Name of the data collector----------

Date: ----------Respondent (s):----------

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

Map of the Woreda----------Location _____ _____ _____

Altitude _____Annual rain fall_____ Mean annual temperature in ^{O}C ---------
---Climatic zones_____ _____ _____ The major crops in the area
----

Main food crops of the area----------

Political and Administrative Organization

No of Kebeles----------Urban----------Rural----------

Nearest Kebele---------- (---------Km from the Woreda center)

Remote Kebele---------- (----------km from the Woreda center)

List their names _____

_____

Woreda boundary including degree:

North ----------South----------East----------West

Population and population structures

Total population_____ Total HH ----------

Population by Kebele ----------

Male _____Female _____

Under 1years _____Under 3 yrs. ----------Under 5yrs----------Under 15yrs----------

Women of childbearing age (15-49years) ---------Pregnant women ----------Above 64yrs. --------

Sex ratios_____ urban_____ rural_____,

Ethnic composition _____ _____ _____

Languages of the district----------

Official language (Work language) ----------

Religion –Protestant----------Orthodox----------Muslim----------catholic ------- other

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

Average income/year _____Source

Economic status?

High----------Low----------Medium---------- other

Productivity----------

Education

Total Number of Schools _____ Gov._____NGOs. Private Schools _____

KG ___ Gov._____NGOs. Private Schools_____

Primary ____ Gov._____NGOs. Private Schools_____

Secondary __ Gov._____NGOs. Private Schools_____

Preparatory __ Gov._____NGOs. Private Schools_____

Total Enrollment

KG M_____ F_____ Total_____

Primary M_____ F_____ Total_____

Secondary M_____ F_____ Total_____

Preparatory M_____ F_____ Total_____

School distribution by Kebele----------

Number of Schools with access to water----------

Reasons f or absence of water for certain schools----------

Types of School clubs Available (Number &Name)_____

_____

_____

School clubs (activities) other than education and their major and current functionalities

Schools access to road---------- Access to Tel. ---------- Access to electricity (Main and/or Generator Supply) --------

Literacy status (%) ----------Illiterate (%) ----------

Schools with Access to Latrine Facility:

One Block Latrine for the school as a whole:_____

Two Block Latrine for Male & Female Separated:_____

No Latrine at all: _____

Total Dropout rate (Total Registered during the year - Total Completed)_____

Proportion of Female dropout rate_____

Possible reasons for dropout rate_____

_____

Facilities (Transport, Telecommunication, Power supply,)

Woreda district health structure

Number of health facility in the district

	Gov	NGOs	Private	Standard	
HOSP	-------	--------	-------	Pop ratio---------	--------
HCS	-------	--------	-------	Pop ratio---------	--------
HPS	-------	--------	-------	Pop ratio---------	--------
Clinics		----------	-------		
Diagnostic lab		----------	------		

How many of the health centers have access to

transportation_____ (%), telecommunication---------- (%), Electricity_____ (%)

Water facility---------- (%)

How many HPs have access to transport-------, telephone---------- power? --------- water?

Water Sources

Types of Water supply Sources Available:_____

_____

Number of Water schemes Constructed during the year:_____

Functional water sources during the year_____

Non Functional water sources during the year _____

Reason for non-functionality_____

_____

Average Cost needed per Water scheme for construction:_____

Average service year/duration of one Water scheme:_____

Number of Kebeles with Protected water supply source:_____(Lists of these Kebeles_____

_____

_____

_____)

Water supply coverage of the woreda during 2013/14:_____

What are the Water sources of population uncovered in the supply?_____

_____

_____

_____

Possible reasons for the shortage of water_____

_____

_____

_____

Disaster Status in the area was there any disaster in the district in the last years? _____

Vital Statistics and Health Indicators

Infant Mortality Rate----------Child Mortality Rate----------

Crude Birth Rate----------Crude Death Rate----------

Maternal Mortality Rate----------Contraceptive Prevalence rate_____

ANC coverage----------Delivery coverage----------

PNC coverage ----------Immunization Coverage;

Polio 3 ----------Pentavalent3_____Measles ----------

Health staff to population ratio for each profession:

Health officers ----------Nurses --------Midwifery --------Medical lab_____

Pharmacy _____Env'tal ___ HEWs, rural --------- Urban---------

Others----------

Health Services

Health institution to population ratio _____Health service coverage----------

Top and leading causes of OPD visit in adults and children

1. _____ 1, --------

2. _____ 2, --------

3. _____ 3, --------

4. _____ 4, ---------,

5. _____ 5, ---------,

6. _____ 6, others-----

7. _____ 7, Admission causes in Children----------

8. _____ ----------

9. _____ 8, Death cause----------

10. _____ ----------

12. Others----------

13. Admission causes----------
---

14. Death cause----------

Health budget allocation from last year------

Health budget for emergency condition------

15. Community Health Services;

Status of services provided by community health workers namely:

HDA ----------

HEWs ----------

Other ----------

16. Status of Primary Health Care Components – with focus on the eight PHC elements

MCH/FP trend 3 or years (recent to last)

EPI

PV1 ----------

Polio3 ----------

PCV3----------

Measles ----------

Environmental Health

Health Education

Endemic diseases;

Malaria

Identified Malarias Kebele in the district ----------

Recent trends of 3(5) yrs. malaria data. ----------

_____

Malaria prevention and control

IRS coverage trends (3/5) yrs

List of chemicals used since the start of IRS and their use of duration in the district.

ITNs distribution recent 3/5 year coverage

Environmental management

TB/Leprosy

Total TB cases_____ PTB negative_____ PTB positive____ Extra PTB _____

TB detection rate trend----------

TB treatment success rate trend ----------

TB cure rate---------- TB defaulter rate _____Death on Treatment _____

TB cases screened for HIV_____TB cases positive for HIV----------

Leprosy cases----------

HIV/AIDS;

HIV tested/screened trend and population type (student, rural pop, urban pop, HF visitors)

HIV screened age group----------

HIV positives trend and age group----------

PW screened trend----------Pw +ve trend----------

HIV Incidence trend ----------

Pw ever enrolled in PMTCT----------

PLWHA ever enrolled in ART_____PLWHA currently enrolled in Art----------

PIHCT screened _____PIHCT +ve ----------

VCT screened----------VCT +ve----------

Nutritionalstatus in the district.

Malnutrition cases admitted to OTP trend----------

Sc admission trend----------

Epidemic prone diseases ----------

What do you think the main problems of the district ----------
---

Discussion of the highlights and the main findings of the health profile assessment and description

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

Chapter V – Scientific Manuscripts for Peer reviewed Journals

5.1. Measles Outbreak investigation in East Badewacho Woreda, Hadiya Zone, South, Nations, Nationalities, and Peoples Region, 2015

Tsehay Ayele 1, Alemayehu Bekele 2, Million Tumato 3

Abstract

Background: Measles is vaccine preventable diseases, which cause significant morbidity and mortality among children worldwide especially in developing countries like Ethiopia. In Southern Nation Nationalities and Peoples' Region outbreaks of measles occur every year. The aim was to rapidly investigate the outbreak epidemiologically and guiding response activities in the affected district, from March-April 2015.

Material and Methods: We reviewed a line list and case register logbook of the districts, as the World Health Organization, measles case definition. We interviewed 50 cases and 100 controls, using a structured questionnaire. We applied a checklist to observe case managed health facility. We collected blood samples, transported and examined as per standard. We used epi info 7 to analysis.

Result: We identified 158 (five confirmed and 153 suspected) measles cases, 86(54.4%) were males, with median age of 6 years ranging from 7 months to 28 years. The most affected age was 5-15 years 117(74. %), with the age specific attack rate of 292/100,000. the epidemic was peaked on 2/17/2015. We recruited 50 cases (median age of 5 years ranging from 1 year to 20 years), and 100 controls (median age 5 years ranging from 1 year to 14 years).Not-vaccinated for measles, [AOR=21.6, 95% CI (7.9, 58.7)], Malnourished [AOR=10.0385, 95% CI (4.5, 22.2)], and close Contact with cases, [AOR=52.8, 95% CI (14.6, 190.3)], were showed significantly associated with the outbreak.

Conclusion: We confirmed measles IgM as etiologic agent. Not-vaccinated, malnourished, and close contact with cases, were likely determinants for this outbreak. Improving measles vaccination coverage, avoiding close contact with cases, and Improving nutritional status to control measles outbreak is necessary.

Key words: Measles, Outbreak, East Badawacho, SNNPR, Ethiopia.

Ethiopian Field Epidemiology Training Program (EFETP), School of Public Health, Addis Ababa University: Correspondence author address: Tsehay Ayele, Email: shayeayele@yahoo.com

Introduction

Measles is an acute, highly contagious viral disease caused by measles virus. The measles virus is member of the genus Morbillivirus of the family Paramyxoviridae. Scholars believed that the virus appears to be antigenic ally stable because of no evidence that the viral antigens have significantly changed over time. However, sequential analysis of viral genes has shown that there are distinct lineages (genotypes) of wild type measles viruses. In consideration to this epidemiological information, identification of a specific virus genotype can suggest the origin of an outbreak [1].

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 the incubation period is 10 to 12 days from exposure to the onset of fever and other nonspecific symptoms and 14 days (range 7-18 days) from exposure to onset of rash. Clinically measles presented with prodromal symptoms of fever, malaise, cough, coryza (runny nose), and conjunctivitis [1-3].

Measles is vaccine preventable disease. Vaccination is one of the most effective prevention and control mechanisms available. The vaccine is made from a live attenuated virus. When children are correctly administered 0.5 ml of potent live attenuated measles vaccine subcutaneously, serologic studies have demonstrated that measles vaccines induce sero-conversion of 85% at 9 months and above 95% after 12 months of age. The peak antibody response occurs 6 to 8 weeks after infection or vaccination. Immunity conferred by vaccination against measles has been shown to persist for at least 20 years and is generally thought to be life-long for most individuals [1-3].

The fourth Millennium Development Goal (MDG 4) aims to reduce the under-five mortality rate by two-thirds between 1990 and 2015. Recognizing the potential of measles vaccination to reduce child mortality, and given that measles vaccination coverage can be considered a marker of access to child health services, routine measles vaccination coverage has been selected as an indicator of progress towards achieving MDG 4[1-3].

Measles is a global health problem which accounts for more than 30 million cases and 0.9 million deaths every year, half of which in Africa. Measles is among the top five causes of death in children less than 5 years of age in many African countries. Currently outbreaks of measles reported in different states of the world. In US during January 1–August 24, 2013, a total of 159 cases were reported to CDC from 16

states and New York City. In South Africa between 2009 and 2011, with over 18,000 cases were recorded [5]. In Ethiopia outbreaks of measles reported every year. In 2014 there were 119 outbreaks with a total of 16,159(2,373 IgM confirmed and 13,786 Epi-linked) measles cases [6].Measles outbreak is a yearly event in SSNNP in 2014, 47 suspected measles outbreak were reported from deferent district, 291 IgM confirmed and 3,263 Epi-linked measles cases with incidence of 20.1/100,000 population [7].

Methods/ material

Study setting/Study area: We were conducted this study in East Badewacho woreda, with a total population of 216,714, and administered with 39 kebeles, of this 10,835(5%) were urban dwellers, 106,928(49.8%), were Males and The estimated population of <15 years age were 103,741(47.87%). The capital of the woreda is shone.

Study population: The population in which cases and controls obtained was the population of East Badewacho Woreda 39 Kebeles with population of 216,714.

Study subjects: Individual's admitted with or treated for measles in Shone , Amburse , Korga , Edo Chefa, Ajeba and Hanida Health Centers and their control with the ratio of 1:2 from the same community residents. All active cases available in the above health institutions at the time of data collection included in the case control study.

Sample size : All available measles case in line list of the woreda (158), all available active cases at study period, (50), from health facilities and in house to house survey, and 100 controls from the nearest neighbors of the cases were used.

Study design: We used both descriptive cross-sectional and unmatched case-control studies from 2-12, March, 2015. Both primary data and secondary data were collected.

Sampling procedure: All active cases were included from the woreda Public Health Emergency Management (PHEM) line list, health facility and house to house survey with sign and symptoms of measles infection, controls were the nearest neighbors of cases who did not suffer from measles during the study, and We interviewed the mothers or care taker of cases and controls, below the age of 18 years.

Diagnostic Methods for measles: Usually diagnosis is done using blood serum to confirm the presence of IgM anti-body. Thus in this outbreak 5 blood samples were taken and transported as standard laboratory procedure.

Operational case definition:

A case:was defined as any person in East Badawacho Woreda, who met with the standard WHO measles case definition, from Feb to April, 2015.

A control:was any person not having history and singe and symptom of measles and residing in the same community in the same period.

Not vaccinated**:** A child who does not receive any dose of measles vaccine

Vaccinated: Child who take at least one dose of the measles vaccine

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.

Data collection

We collected, Epidemic line lists from East Badewacho woreda PHEM, and for case control study, collected from cases and controls using interview administered structured questionnaire, for cases and controls aged blow 18 years, and we interviewed Mothers or caretakers. Also ,We reviewed register books, log books, individual folders, case based reports, and weekly reports, and discussion was made with the woreda head, PHEM staffs, and Health Center staffs , using check list, Observation of Health posts, households and discussion with district's officials and rapid response team was also undertaken. A case was any person who resided in East Badawacho woreda and who developed fever, rash (maculo-papular), and or cough, coryza, conjunctivitis (red eyes), or tested IgM positive, between epi week 6 to epi week 14, 2015. A control was any person who resided in the same community or village with cases in East Badawacho woreda but, who did not have history of measles infection within three months, no signs and symptoms of measles or tested and measles IgM negative, in similar period. Physical assessment and anthropometric measurements were made to assess the nutritional status of cases and controls.

In addition, we reviewed the five years woreda measles vaccination coverage. 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. Even

though recall every vaccination history was deficient. The administrative measles vaccination coverage rate was calculated by dividing the number of vaccinated children for the total eligible (annual targets).

Information on other variables for age less than 18 years was asked directly from the child's mother/caretaker. To determine the nutritional status of the case and control, we used physical assessment and anthropometric measurements; fore age group 6 month to 59 month used Mid- Upper Arm Circumference (MUAC) measurement, for age group five and above years Weight for Height (W/H) measurement, and for less than six months children's we used observing for Sevior wasting, and physical assessment for nutritional bilateral edema was use for all age category.

Inclusion and exclusion criteria

Inclusioncriteria

Case: A case was any resident of Shashogo woreda who tested and positive for IgM or had sign and symptoms of measles from 10, July to 31, October 2015 and who agreed to participate in the study.

Control: A control was any resident of Shashogo woreda 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.

Data processing and Analysis: We used Epi-Info 7, and Microsoft excels, to organize, analyze and display.

Ethical clearance: We obtained Permission to carry out the study, from SNNP regional PHEM. Than cooperation letter was written to the respective health units. An informed oral consent was obtained from all study participants.

Result

Descriptive epidemiology

We identified 158 (5 laboratory confirmed and 153 Epi-linked) measles case patients of 86(54.4%) were males, with median age of 6 years ranging from 7 months to 28 years. The most affected age group was 5-15 years 117(74. %), with the age specific attack rate/ASAR of 292/100,000. From all measles case patients 77% (122) have at least one dose of measles vaccine exposure, 25 (15.6 %) case patients have unknown vaccination status, and 12 (7.4 %), not vaccinated. The index case was 6-year-old male who is IgM positive for measles specific antibody. He has no history of travel in areas where there is suspected or confirmed measles outbreak and has no clear contact with any suspected or confirmed measles case. He has history of 1 dose measles vaccine exposure.

Laboratory Result: We collected 5 blood serum samples, and sent to EHNRI National lab, all were fund to be positive for measles IgM antibody.

The epidemic was peaked on 2/17/2015 and lasted on 3/16/ 2015; however there was interruption of report throughout the outbreak.

We reviewed, five years the woreda measles vaccination coverage from 2003 to 2007 EFY of under one-year age children, which is 106% in 2003,86%,2004, 98% in 2005, 99% in 2006 and 97% in 2007 EC, *Source* [East Badawacho Woreda Health office]. Cases from woreda line list vaccination status was as follow; one or more measles vaccine received were, 122(72.2%), 24 (15.2%), were unknown vaccination status, and 12(7.6%) were not vaccinated.

Table 1: trends of measles case and sever acute malnutrition in East Badawacho woreda, from 2013 to 2015 and, [From woreda annual report].

Year	Measles cases	SAM (OTP)	SAM (SC)
2013	1	43	0
2014	76	231	13
2015	248	1196	108

Case –control study,

For the case control study, we recruited 50 cases with median age of 5 years ranging from 1 year to 20 years, and 100 controls with median age of 5 years ranging from 1 year to 14 years. Sex distribution; 28(56%) of cases and 56(56%) of controls were Males. Of thes 150 study subjects 142(94.6%) were did not had Immunization card at hand of their parents or caretaker.

Table 30: Demographic Information of Study subjects

Variable	Frequency			
	Case		Control	
Sex	Number	%	Number	%
Male	28	56	56	66
Female	22	44	44	44
Religion	Number	%	Number	%
Protestant	46	92	79	79
Orthodox	2	4	16	16
Muslim	1	2	2	4

Catholic	1	2	1	1
Others spesify	0	0	0	0
Education Level of Mother	Number	%	Number	%
Unable to read and write	32	64	21	21
Primary	12	24	45	45
Secondary	6	12	33	33
Tertiary	0	0	1	1
Education Level of Father	Number	%	Number	%
Unable to read and write	19	38	11	11
Primary	14	28	34	34
Secondary	14	28	28	28
Tertiary	3	6	23	23
Marital status /parents	Number	%	Number	%
Married	50	100	100	100
Single	0	0	0	0
Widow	0	0	0	0
Divorced	0	0	0	0
Occupation of father	Number	%	Number	%
Farmer	43	86	55	55
GOV	3	6	25	25
Merchant	2	4	19	19

Daily laborer	1	2	0	0
Un employed	1	2	1	1
Occupation of mother	Number	%	Number	%
Farmer	0	0	1	1
House wife	44	88	94	94
GOV	1	2	0	0
Merchant	5	10	5	5
Daily laborer	0	0	0	0
Un employed	0	0	0	0
Ethnicity	Number	%	Number	%
Amhara	0	0	11	11
Gurage	0	0	3	3
Hadiya	50	100	82	82
Kambata	0	0	3	3
Silete	0	0	1	1
Family size	Number	%	Number	%
< 5	4	8	8	8
≥ 5	46	92	92	92

Table 31: Multivariate analysis of risk factors for measles, East badawacho Woreda, Hadiya zone, SNNP, April 2015

Variable	AOR	95% CI
Ever vaccinated for measles = yes	0.0462	0.0170 - 0.1254
Number of vaccine dose resaved, ≥ 2 dose	0.0530	0.0203 - 0.1382
Acute malnutrition = yes	10.0385	4.4555 - 22.6170
Number of rooms in your house, ≥2	3.4306	1.6070 - 7.3238
Number of persons per sleeping rooms, < 5	0.3806	0.1809 – 0.8008
Have you received vitamin A in this 6 month? = yes	0.2411	0.1162 - 0.5101
Do you know the right age for measles vaccination? = yes	0.0777	0.0321- 0.1880
Contact history with measles case = yes	52.7544	14.6228 =190.3205

Discussion

We confirmed the existence of outbreak of measles with highest incidence rate in age group (5-15 years) (307/100,000). However, the overall attack rate was 43.4/100,000/pop) was less than the study conducted in different areas (10). The five consecutive years of the woreda administrative one dose measles vaccine coverage report of the EFY of 2003 to 2007 was higher than measles vaccination coverage of the case-control study. Even this was collected by mother or caretaker history recall, not by immunization card. According to the cases reported in the line list of the woreda, 23% of the cases were not vaccinated, and as the case-control report, 59% of cases were not vaccinated even with one measles doses before this measles infection. The possible explanation for this could be the reported vaccination status may false report. 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 woreda could be low.

In multi-variety analysis, being vaccinated with measles vaccine, developing acute malnutrition, family size ≥ 5 house hold members, persons sleeping in one room per person five and more than five persons, knowledge of mother or care takers on measles disease, resaving vitamin A in this 6 month, feeding only breast for six month and educational status of mother and father were associated risk factors for measles diseases. Being vaccinated for measles, resaving vitamin A in this 6 month, and feeding only breast for six month was found to be a protective factor from contracting the measles disease. It is consistent with study conducted in different areas(10-12). Developing acute malnutrition Children sleeping in one room per person five and more than five persons were more likely to contract measles. (13, 14). Lack of Knowledge of mother or caretaker on measles also was associated with measles outbreak. Children whose mothers don't know about common age for measles vaccination were also found to be more likely to develop measles(14-15).

Conclusion & Recommendations

We confirmed measles IgM as etiologic agent. Not-vaccinated, malnourished, and close contact with cases, were likely determinants for this outbreak. Improving measles vaccination coverage, avoiding close contact with cases, and Improving nutritional status to control measles outbreak is necessary.

Acknowledgements

The authors would like to acknowledge the SNNP Regional, PHEM bureau and East Badawacho woreda Health Office. We also thank Dr Alemayehu Bekele for his meticulous advice and encouragement, and Dr Million Tomato too.

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5.2 AcuteFilacedParalysisReport in South, NationNationality,People,Region, Ethiopia, April 2016.

Tsehay Ayele 1, Alemayehu Bekele 2, Million Tomato 3

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 nine 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 2007-2015. 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 and excel to calculate rates, frequencies, mean, and median.

Result: We identified 2,108 AFP cases with non AFP rate of 2.8/100,000. 1241(59%) of cases were males. 2074(98.4%) were under 15 years. The median age was 4 with SD of 3.78 ranging from 1 month to 28 years. The incidence rate among 1-4 age groups is 10.5. 54% of AFP cases received less than 4-polio doses. 11% of cases have unknown vaccination history. Sheka is the most affected zone (4.7/100,000) and Jinka town is the most affected district 14/100,000. Ten districts reported the non-AFP rate below 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=267

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. Moreover 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).

Materials and Method

Study design, period and area: We conducted a retrospective secondary surveillance data. A nine years AFP surveillance data was reviewed from March 20-April 7, 2016 in South Nations Nationality peoples Region (SNNPR), PHEM. Hawasa city is the capital of SNNP regional state and 280 Km far from Addis Ababa with a total population of around 18.276,000.

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

Data collection and analysis: During our study, we have tried to see different source of data. Finally, in consultation with the Regional PHEM head, and WHO staff, we have decided to review surveillance data from the Public Health Emergency management surveillance database and WHO AFP/Polio line list data. However, the regional AFP/polio surveillance database had limited number of variables. The available variables in the polio database were number of cases and deaths by reporting zones and special Woreda, and reporting time only. The WHO database had more variables than the PHEM surveillance data. More over the data 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 nine years (2007-2015) WHO AFP surveillance data from 14-zones, and 8- special Woredas from 2007-2010 which later on the number of zone and special Woredas were changed to 15- and 4 respectively. We used office Excel and Epi info 7 to capture and analysis, the data. We described a retrospective secondary epidemiological and laboratory surveillance data, of AFP reported from mentioned zones and special woredas, of SNNPR during 2007-2015, by person, place and time.

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.

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 database had no AFP line list and the database contains only aggregated cases and deaths.

Result

We identified 2,108 AFP cases reported from 2007-2015. Out of the total cases, 2074 (98.4%) AFP cases were under 15 years old and 12(0.6%)AFP cases were age greater than 15 years old, and the rest 22(1.0%) AFP cases were missed variables. The median age of the cases is 4 years, ranging from one month to 28 years.

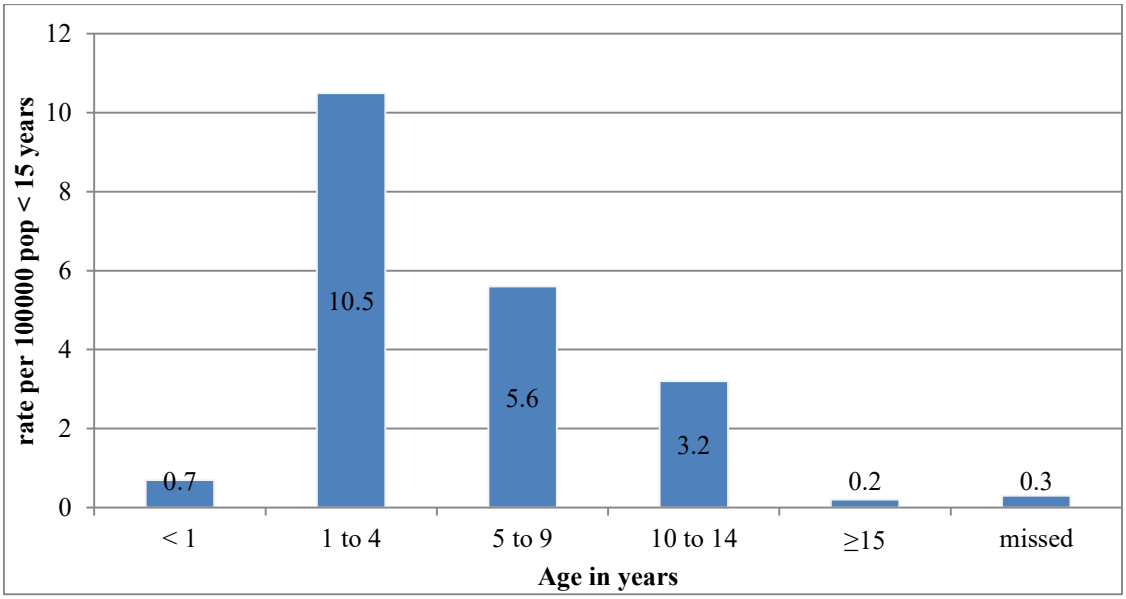

Figure 49 Acute Flaccid Paralysis cases by age group SNNPR, Ethiopia, 2007-2015.

The incidence rate of AFP cases among infants was 0.7 per 100,000 POP. Of the total 2108 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, 57% were males.

Of the total 2108 reported AFP cases, 1355(64.3%) cases developed fever at onset of paralysis, 246(11.7%) cases did not develop fever at onset of paralysis, 506(24%) AFP cases were missed

variables and only 1(0.04%) AFP case was unknown history of fever at onset. 31(1.5%) cases affected their limbs asymmetrically, 139(6.6%) AFP cases affected their limbs symmetrically, and 224(10.6%) AFP cases affected their all limbs, 23(1.1%) cases affected their 3-limbs, and 126(6.0%) cases affected only their one limb and 901 (42.7%) AFP cases were missed variables. Out the total 176 follow up conducted cases, 58(32.9%) AFP cases developed residual paralysis, 105(59.6%) improved their initial paralysis, 8(4.5%) cases lost to follow up, and 3(1.7%) died before follow up. Out of 2108 reported AFP cases; there was no confirmed case for the last nine years. Out of the total cases 62(2.9%) were suspected polio virus, 1622(76.9%) were negative for polio cases, 156(7.4%) were NPENT, and 278(13.2%) were missed variables.

Table 32: Non-AFP rate by zones and special Woreda, SNNPR, 2007-2015

Zone	Expected	Reported	Non-AFP rate
ALABA	17	29	2.53
AMARO	9	14	3.74
AWASSA CA	21	26	2.31
BASKETO	3	6	2.27
BENCH MAJI	45	81	2.56
BURJI	0	7	4.94
DAWRO	40	75	3.14
DERASHE	9	14	3.14
GAMO GOFA	154	233	2.98
GEDEO	76	108	2.51
GURAGHE	129	225	3.55
HADIYA	113	165	2.67
KEFA	77	126	2.73
KEMBATA-TEMBARO	64	102	3.07
KONSO	9	19	3.84
KONTA	4	7	1.36
S OMO	52	82	2.90
SEGEN	36	37	2.80

SHEKA	15	43	4.41
SIDAMA	265	362	2.52
SILTI	73	131	3.56
WOLAYTA	134	209	2.83
YEM	4	6	1.53
SNNPR	1195	2108	2.80

AFP rate by Woreda:

Bench-Maji zone woredas: Bero district reported 13.9/100,000 <15 population, which was the highest rate in the zone, Mizan-Aman reported 13.1/100,000, Sheko district reported 6.9/100,000, majia District reported 5.5/100,000, She-Bench town reported 4.4/100,000, South-Bench District reported 3.2/100,000, Surma district reported 2.2/100,000, Semen-Bench district reported 1.3/100,000, and Gurafereda district reported 0.8/100,000.

Dewuro zone woredas: Loma Distract reported 3.5/100,000 <15 populations Essare Distrect Reported 3.2/100,000, Genabosa district reported 2.5/100,000 Tocha district reported 1.8/100,000 and Maraka districts reported each non-AFP rate of 1.7/100,000 under 15 year's population. Tercha city reported the non-AFP rate below 1/100,000 population.

Gamo-Gofa zone Woredas: Merab-Abaya district reported 7.8, Kucha reported 3.8, Arbaminich-Zuria Woreda reported 3.6, Chencha reported 3.4, Oyida reported 3.2, Uba-Dedretsehay reported 2.7, and Kamba, Deramala, and Melokoza districts reported the non-AFP rate of 1.9, 1.7, and 0.9 per 100,000 populations respectively.

Gedeo zone Woredas: The highest non-AFP rate is reported from Bulle district, which is 4.3/100,000. Wonago woreda reported 3.6/100,000, Kochore woreda reported 2.7/100,000, and Dilla zuria reported 2.6 Dilla town reported 2.4/100,000, Yirga cheffe woreda reported 1.3/100,000, and Gedeb woreda reported 1.2/100,000.

Gurage zone Woredas.

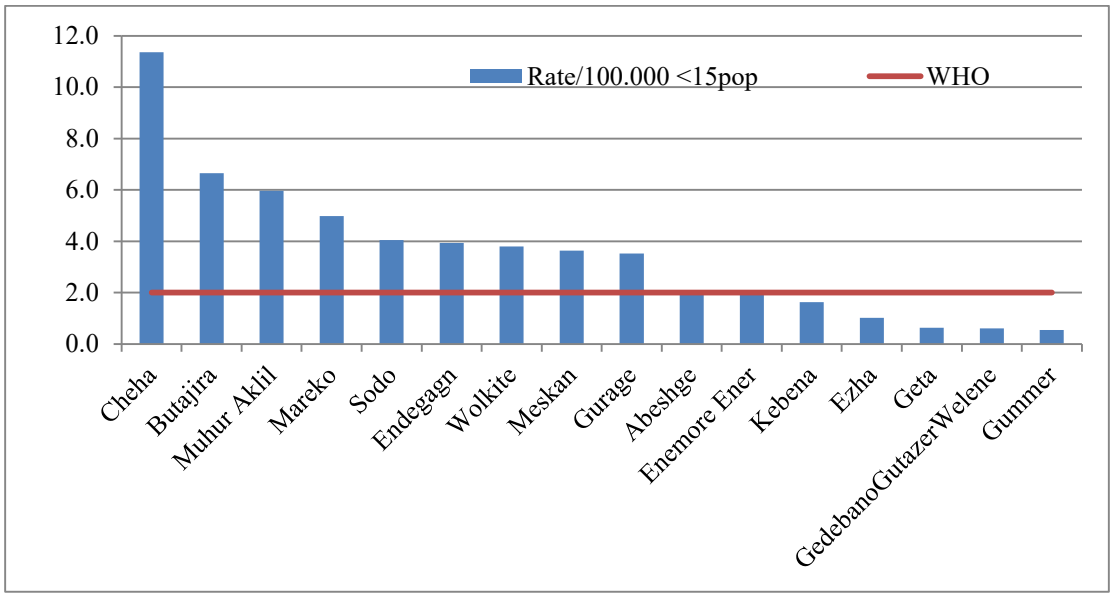

Figure 50: AFP cases by woreda, Gurage SNNPR, 2007-2015

Sheka zone Woredas. Masha woreda reported 6.95/100,000, Yeki woreda reported 4.5/100,000, Andracha woreda reported 2.9/100,000, and Tepi Town reported 1.8/100,000.

Kembata-Tembaro zone Woredas: The highest non-AFP rate is reported from Tembaro district, which is 6.15/100,000. Kedida-Gamela district reported 3.75/100,000, Hadero-Tuntozuria district reported 2.75/100,000, Damboya district reported 2.2, Kacha-Bira district reported 2.15, Dura me Town reported 2.05/100,000, Angacha district reported 1.3/100,000, and Doyogena district reported 0.85/100,000, under 15 years population.

Hadiya zone Woredas: Misrak-Badewacho woreda reported 5.6/100,000, Anilemo district reporte 4.45/100,000, Merab-Badewacho woreda reported 3.75, Shashogo woredas reported 3.1, Hossana town reported 2.95 Gomboraworeda reported 1.84, Lemo woreda reported 1.8, and Misha, Duna and Soro woredas each reported 1.7/100,000 <15 years population.

Kefa zone Woredas: Adiyo district reported 5.2/100,000, Gesha woreda reported 4.5, Bitta woreda reported 4.2,Chena woreda reported 4.1, Gewata woreda reported 3.9, Gimbo woreda reported 3.3, Cheta woreda reported 2.5, Decha woreda reported 2.3, , Bonga town reported 2.2, and Tello woreda reported 0.5/100,000 under 15 years population.

South-Omo zone Woredas: The highest rate was reported from Jinka Town, which is 14.1/100,000 <15years population.

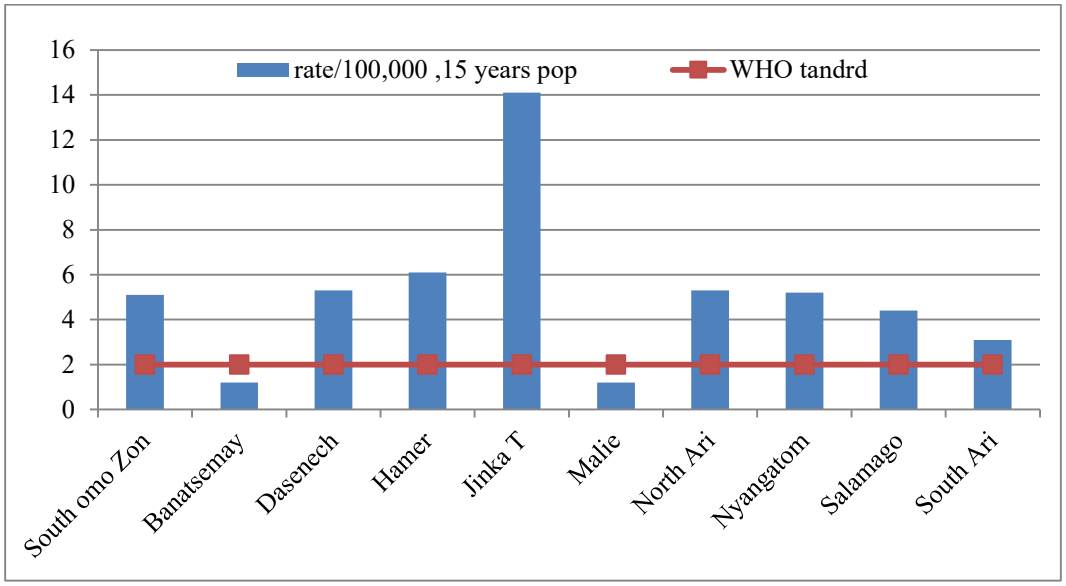

Figure 51: AFP cases by woreda, South-omo, SNNPR, 2007-2015

Silte zone Woredas: The highest rate was reported from Worabe Town, which is 8.3/100,000 <15 years population, followed by, Dalecha woreda, 6.2, Lanfro woreda reported 5.3, Misrak-Azernet woreda reported 3.5, Sankura woreda reported 2.7, Silti woreda reported 2.6, Merab-Azernet woreda reported 2.1, Alechoworero reported, 1.8 and, Hulbareg woreda reported 0.5

Sidama zone Woredas.: The highest rate was reported from loka abya district, which is 7.5/100,000 <15 years population

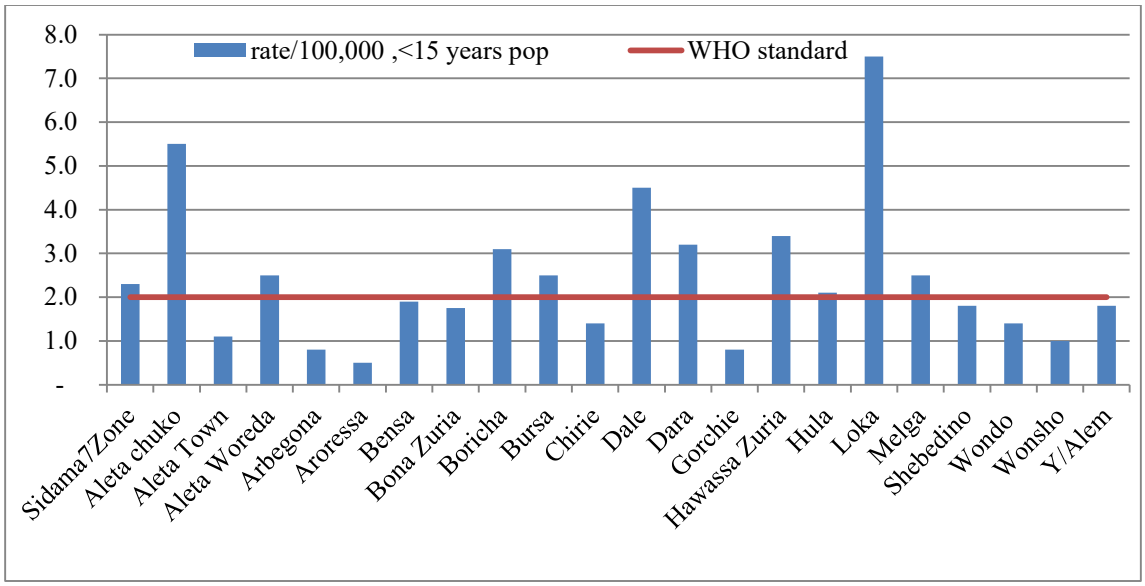

Figure 52AFP cases by woreda, Sidama zone, SNNPR, 2007-2015.

Hawassa Town administration: The AFP rate of Hawassa town administration for the last nine years (2007-2015) was 22.3/100,000, < 15 years population.

Wolayta zone woredas:

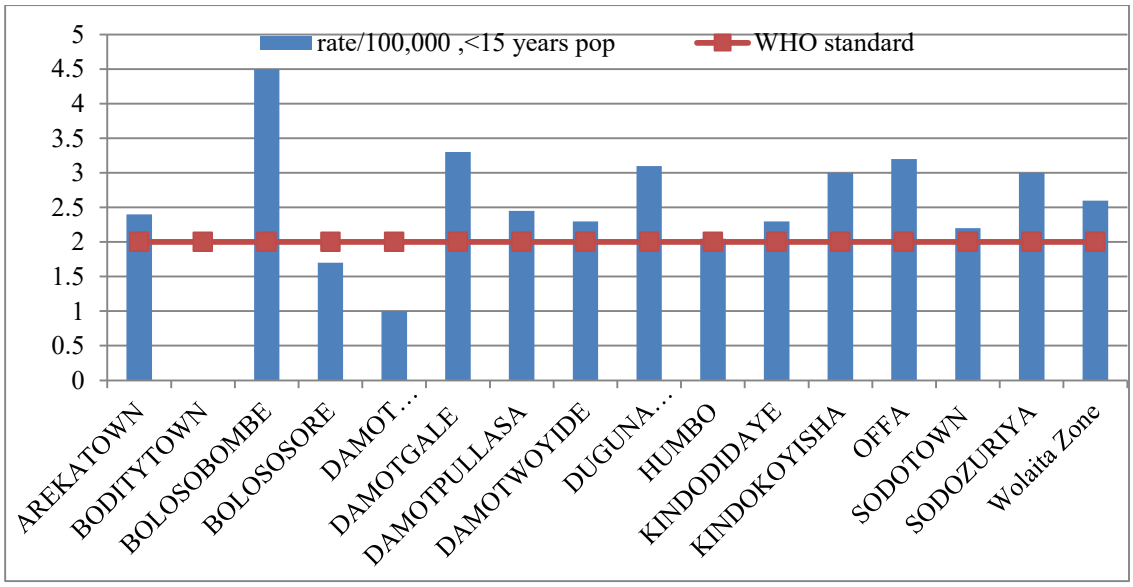

Figure 53AFP cases by woreda, Wolayta zone, SNNPR, 2007-2015.

Segen zone Woredas. The highest AFP rate was reported from Burji district reported which is 3.8/100, 000, 15 years. Darashe district reported, 3.7, Konso district reported 3.4, and Amaro district reported 3.1/100,000<15 years population. Ale woreda had zero report.

Special Woredas: Halaba Special woreda reported 2.7, Basketo special woreda reported 1.9, Yem Special woreda reported 1.8, and Konta Special woreda reported 1.1/100,000 <15 years population. Except Halaba all special woredas reported under the WHO standard.

By residence: Out of the total 2108 reported AFP cases, 2014 (95.5%) were reported from rural Kebeles, the rest 94(4.5%) cases reported from urban areas. From the total reported urban AFP cases the highest rate 13 (13.8%) was reported from Gamo Gofa zone, 12 (12.7%) was reported from Wolayta 10(10.6%) was reported from Hadiya 9(9.6%) cases each reported from Gedeo and Hawassa city respectively, and 8 (8.5%) cases reported from South-omo zone.

Private health institution: No one of AFP case was reported from Holly water site. 1376 (65.3%) AFP cases reported by the health center, 310(14.7%) AFP cases reported by Hospitals, 38(1.8%) cases reported by Private clinics, 43(2 %) cases reported by Woreda health office, 67(3.2%) reported cases by health posts and 274(13%) were missed variables.The region reported the highest incidence rate in 2012

Duration of case investigation following notification:Out of the total 2108 AFP cases 1523 (72.3%) cases investigated less than or equal to two days following notification, 48 (2.3%) cases investigated greater than or equal to 3 days, for 100 (4.7%) AFP cases date of investigation preceded date of notification. Between 2007 and 2008 the date of notification for 437 (20.7%) AFP cases had been missed.

Interval between first and second stool collection: Between 2014 and 2015,460 (100 %) cases of stool collected within 24-48 hrs intervals, between 2009 and 2013, 1228 (74.5%) cases of stool collected within 24-48 hrs intervals. In 2007 and 2008 for 420 (25.5%) date of first stool collected is missed.

Stool arrival. Out of the total 2108 AFP cases 1632(77.4%) cases of stool specimen arrived less than or equal to three days duration, 37(1.8%) cases of AFP stool specimen arrived between 4 and 11 days duration, for 439(20.8%) the date received at national lab is not filled (missed variables).

Days between onset of paralysis and second stool collection:

For 1588 (75.3%) of AFP cases the duration is less than or equal to 14 days, for 80 (3.8%) of AFP cases the duration is greater than or equal to 15 days, and for 440 (26.7%) of AFP cases days between date of onset of paralysis is variable was missed.

Discussion: We identified a total of 2108 AFP cases in the region from 2007-2015. The most affected age group was 1_4 followed by the age group of 5_9 and 10_14 respectively. Sheka zone was (4.41/100,000) the most affected area among zones, followed by Gurage 3.55/100,000. Out of regional districts, Bero in Kafa, 13.9/100,000 the most affected district followed by, Chaha district in Gurage 11.4/100,000, Loka abaya districts in Sidama zone, 7.5/100,000, and Masha district in shaka zone 6.95/100,000 ,15 years population.

Among urban reported Jinka Town in south-omo zone was 14.1/100,000, the most affected, followed by Mizan-Aman Town in Bench-Maji, 13.1/100,000, and Worabe Town in silite zone, 8.6/100,000, Loka abaya districts in Sidama zone, 7.5/100,000, and Masha district in shaka zone 6.95/100,000, <15 years population. There were 38-districts and 2-special woredas in the region which have reported the non-AFP rate below the WHO standard, of thes 11(28%) were from sidama zone which is 48% of its districts. (<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 2015 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 numbers 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 numbers 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 populations, it was below the WHO standard.

Conclusion & Recommendations

The most affected age group was 1- 4 years. Regionally the highest AFP rate was reported in 2012. Sheka reported the highest incidence among Zones.Therewas significant number of districts that did not meet the WHO standard. There was low vaccination coverage among children of all age groups. 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. All health unit should Improve data recording, and reporting.

Acknowledgements

The authors would like to acknowledge the SNNP Regional, PHEM bureau and. We also thank Dr Alemayehu Bekele for his meticulous advice and encouragement, and Yeshitila Moges, his continuous support.

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Chapter VI – Abstracts for Scientific Presentation

6.1. Measles Outbreak investigation in East Badewacho Woreda, Hadiya Zone, South, Nations, Nationalities, and Peoples Region, 2015

Tsehay Ayele 1, Alemayehu Bekele 2, Million Tomato 3

Abstract

Background: Measles is vaccine preventable diseases, which cause significant morbidity and mortality among children worldwide especially in developing countries like Ethiopia. In Southern Nation Nationalities and Peoples' Region outbreaks of measles occur every year. The aim was to rapidly investigate the outbreak epidemiologically and guiding response activities in the affected district, from March-April 2015.

Methods: We reviewed a line list and case register logbook of the districts, as the World Health Organization, measles case definition. We interviewed 50 cases and 100 controls, using a structured questionnaire. We applied a checklist to observe case managed health facility. We collected blood samples, transported and examined as per standard. We used epi info 7 to analysis.

Result: We identified 158 (five confirmed and 153 suspected) measles cases, 86(54.4%) were males, with median age of 6 years ranging from 7 months to 28 years. The most affected age was 5-15 years 117(74. %), with the age specific attack rate of 292/100,000. the epidemic was peaked on 2/17/2015. We recruited 50 cases (median age of 5 years ranging from 1 year to 20 years), and 100 controls (median age 5 years ranging from 1 year to 14 years).Not-vaccinated for measles, [AOR=21.6, 95% CI (7.9, 58.7)], Malnourished [AOR=10.0385, 95% CI (4.5, 22.2)], and close Contact with cases, [AOR=52.8, 95% CI (14.6, 190.3)], were showed significantly associated with the outbreak.

Conclusion: We confirmed measles IgM as etiologic agent. Not-vaccinated, malnourished, and close contact with cases, were likely determinants for this outbreak. Improving measles vaccination coverage, avoiding close contact with cases, and Improving nutritional status to control measles outbreak is necessary.

Key words: Measles, Outbreak, Mesrak-Badawacho, SNNPR, Ethiopia.

Correspondence: shayeayele@yahoo.com, alemayehubekele2002@yahoo.com

6.2 Description of Southern Nations Nationality peoples Region /SNNPR Measles Surveillance, 2011− 2015, Ethiopia

Tsehay Ayele 1, Alemayehu Bekele 2, Million Tumato 3

Abstract

Background: Measles is known vaccine preventable disease, which cause significant morbidity and mortality among children worldwide, especially in developing countries like Ethiopia. The aim of this study was, to assess the measles trend, in SouthernNations Nationality peoplesRegion /SNNPR, describe measles epidemiologically, and identify locations where occurrence of cases is high, for providing further investigation of causes.

Methods: We used a cross-sectional Descriptive study, SNNP Regional measles surveillance data, 2011-2015, January 2016. We used the database for analyzing of variables, we used the National measles guideline for case definitions, and the final classification of cases by the laboratory as it was kept in the database. We used Microsoft Excel and Epi info 7 to analysis.

Results: 13,270 cases and 87 deaths (CFR=0.73%) were reported during 2011 -2015. 6,768(51%) were females, and median age was 5 years old. 5-14 years age constitutes, 4612(34.7 %) however 3722 (28%) cases age category was not recorded. The highest attack rate, (210.4/100,000 pop) was Kafa zone. The Regional measles vaccine coverage reached 99%, but 4 zones were <80%. The five years Epi-curve peaks in Jan-2012. 4,454(33.6%) cases get one or more vaccine doses and 8,816 (66.4%), were not vaccinated.

Conclusion: Generally, cases were increased from December to march. The regional vaccination coverage showed progress; however 4 zones were < 80%. 5-14 years age was the most affected; however the line list was incomplete. (66.4%) of the cases were not vaccinated, Not vaccinated were likely determinants for the cases. Seasonally occurrence of outbreaks could indicate when to conduct SIAs. Vaccination coverage, early detection, completeness of variables, and specificity should be improved, and needs further investigation.

Key words: Measles, regional surveillance, vaccination coverage, SNNPR

Word count = 271

6.3Acute Flaccid Paralysis Data Analysis Report ofnine years(2007-2015) in Southern, Nations, Nationalities, and Peoples, Region, Ethiopia, April-2016.

Tsehay Ayele 1, Alemayehu Bekele 2, Million Tomato 3

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 nine 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 2007-2015.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 and excel to calculate rates, frequencies, mean, and median.

Result: We identified 2,108 AFP cases with non AFP rate of 2.8/100,000. 1241(59%) of cases were males. 2074(98.4%) were under 15 years. The median age was 4 with SD of 3.78 ranging from 1 month to 28 years. The incidence rate among 1-4 age groups is 10.5. 54% of AFP cases received less than 4-polio doses. 11% of cases have unknown vaccination history. Sheka is the most affected zone (4.7/100,000) and Jinka town is the most affected district 14/100,000. Ten districts reported the non-AFP rate below 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, SNNPR

Words=267

6.4 Evaluation of Malaria surveillance system in Hadiya zone, SNNPR, 2016

Tsehay Ayele 1, Alemayehu Bekele 2, Million Tomato 3

Abstract

Background: Public health surveillance is ongoing, systematic collection, analysis, interpretation, and dissemination of data, for use in public health action, the evaluation focuses on how the system operates to meet its objectives. We evaluated malaria surveillance system to describe the existing surveillance system for malaria in Hadiya zone.

Methods: We used a cross-sectional descriptive study design using the CDC "updated guideline to assess the core and supportive function, and key attributes of the surveillance system for malaria. We selected 41 surveillance units, one, best, better, and poor performances, based on 2014 annual PHEM report, from each category were assessed. We collected data using structured questionnaire and observation using checklist. The principal investigator collected data. We used Excel and Epi-Info 7 to organize and analyze.

Result: We evaluated a total of 41-surveillance units. The zonal PHEM reported 1,397 clinical, 28,683 confirmed, and 14 admitted malaria cases, and no death. At all evaluated units, standard case definition was used. For case confirmation, all health posts used RDT, health centers used RDT and microscope, and Hospital used microscope. The surveillance data were not analyzed. Communication facilities were accessible at all level. Report completeness was > 95%. The system was helpful to detect cases, on time to permit accurate diagnosis, to estimate the magnitude of morbidity and mortality. The surveillance system did not include all private health facilities in evaluated areas.

Conclusion: The malaria surveillance system in Hadiya was, simple, acceptable, flexible, and stable, but not quality, timely, not representative, and did not analyzed, so, each surveillance unit should be analyze the data, prepare and updated malaria-monitoring chart. All available health units should be included in reporting.

Key words: Malaria, surveillance System, Hadiya -zone, SNNPR

Worde count =269

Chapter VII – Narrative Summary of Disaster Situation Visited

7.1 Belg Needs Assessment on Health and Nutrition in Sidama and GedeoZones, South, Nations, Nationalits and Peoples Region, JULY, 2015

Introduction

The government of Ethiopia has been conducting a multi-agency emergency assessment in the past years with the objective of addressing the emergency need of the country. The assessment has been conducted twice in a year following post harvesting season of *Belg* and *Meher*.

The Federal Disaster Response Management and Food Security Coordination officehave requested a Multi-agency mid- *Belg* Emergency Need Assessment in collaboration with MOH, MOW,NMA,MFA and NGOS (MSF-S,SCI) and UN Agencies (WHO,UNICEF, FAO and WFP), from 23 Jun to 5 Jul 2015.

The health sector and partners working in areas of health took part in the assessment with the purpose of identifying areas where emergency health and nutrition assistance needed for the upcoming six months (July to December 2015) and to determent the gap in the capacity of the health system in addressing anticipated risks so as to develop response plan.

The objectives of the assessment are:

To assess the extent, types, magnitude, severity and likelihood of different risks in the most "vulnerable" woredas in both Zones

To assess the existing capacity of the health system of SNNPR to address those risks

To determine gaps in the capacity of SNNPR health system to address anticipated/impending risks and existing threats

Based on the findings, contribute to the regional/Zonal response plan development

Methodology

The assessment was conducted in 2 zones (6 woredas) (see Table 1) from 23 June to 5 July 2015. From each zone woredas were selected based on emergency health and nutrition problems in consultations with the FMOH, RHB of SNNP and ZHDs.

Nine team members comprised from different sectors of government (regional and federal levels), NGOs (MSF-S, WVI,) and UN Agencies (UNICEF, FAO and WFP) took part in the data collection.

The data was collected by interviewing responsible persons from different units of health sector as well as reviewing secondary health and Nutrition data, using the questionnaire developed by FMOH/EHNRI/PHEM.

Briefing by different sectors of the zones were made to the team members before departing to the selected woredas, and also debriefing by the assessment team was done at last and discussions were under gone about the findings of the assessment

Table 33 Woredas Visited in Sidama &Gedeo Zones

Zones	Woreda	Remark
Sidama	Boricha, Shebadeno and Loko Abaya	
Gedeo	Wonago, Kochera and gedeb	

Assessment findings: The assessment findings were summarized here in such a way compiled the health and nutrition findings for each zone.

Gedeo Zone

Health and Nutrition

Socio-Demographic Profile: Gedeo Zone found in SNNPR, administratively classified in to 8 Woredas with the total population 1,061,048 of the total population 528,402(49.2%) were male and 153,321(14.45%) were children under five. In the Zone there were no special population such as pastoralist, refugees, internal displacement population and migrant workers.

Coordination: There was not well functional multi-sectoral coordination forum for the health sector in which all relevant government, NGOs and UN agencies were represented. The frequency of the meeting was not regular. The meeting of the forum was not frequent as well as not regular. It is taking place only during epidemics. The Zone Health Department has public health emergency preparedness plan prepared by the zone, but it lacks budget for emergency situations

Outbreak: There was measles outbreak during assessment period in Gedeb woreda from 15/9/2007 to 21/10/2007 EC. A total of 72 cases and 4 dathes, 41[54%] were females. The most affected age was one to four years with the Age Specific Attack rate of(172/100.000 population, Haloberiti kebele was the most affected with 33(43%) of a total case followed by Halohartume kebele with 18(24%).Of total cases ,61(80%) was not received measles vaccine.

The index case of measles was observed in March 2007, which shows a delay in alert response by the woreda health office/facility. Later on they sent a request to regional health bureau and other partners for technical support. A team from RHB was sent to the affected woredas to do assessment and simultaneously to control the outbreak. According to the outbreak report sent from Gedeb and Bulle to the RHB, the minimum age of children affected with measles was 6 months and maximum age was above 15 years. Currently RHB team along with zonal PHEM team are managing measles cases and trying to control the outbreak. Supply- shortage of vitamin A and drugs in the zone and request of drugs and vaccine has been sent to RHB, .than the RHP supplied the requested logistic for outbreak control as requested by the zone'

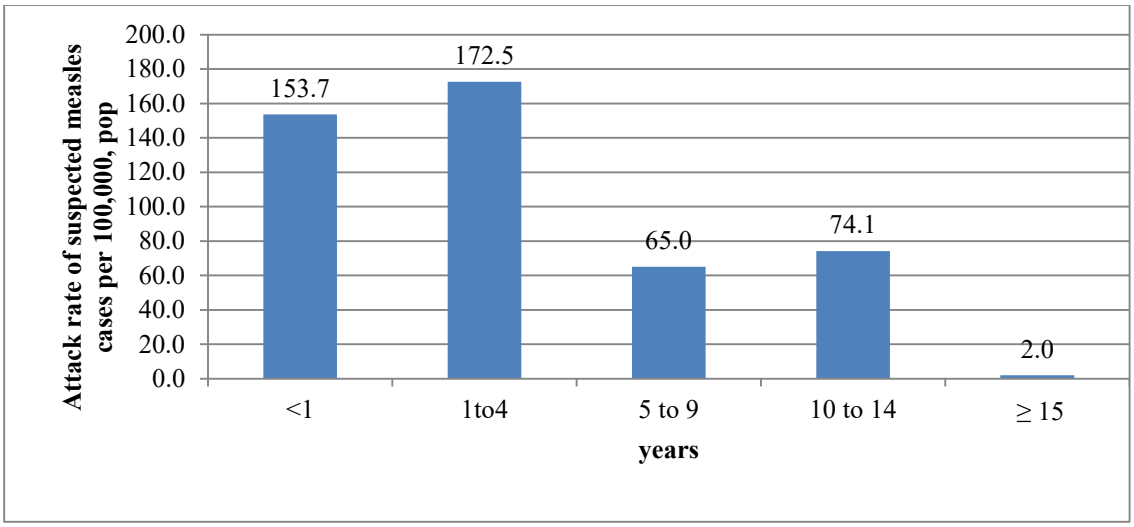

Figure 54Showing attack rate of Measles Cases by Age group in years, Gedebe Woreda, Gedeo Zone, SNNPR, July, 2015,

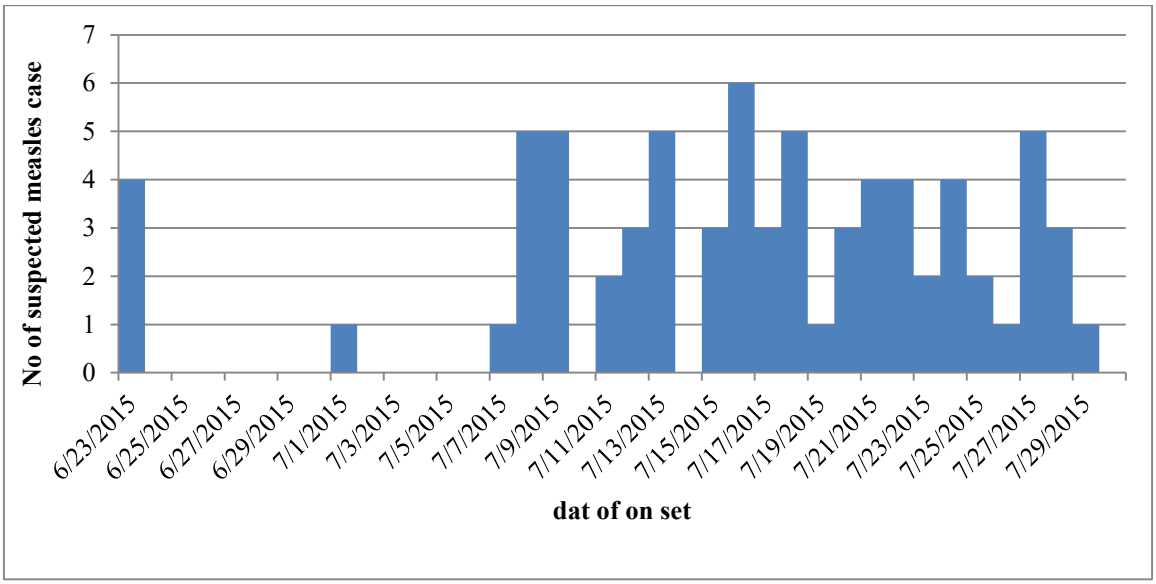

Figure 55: Showing Epi- curve of measles cases by date of on set, Gedeb Woreda, Gedeo Zone July, 2015.

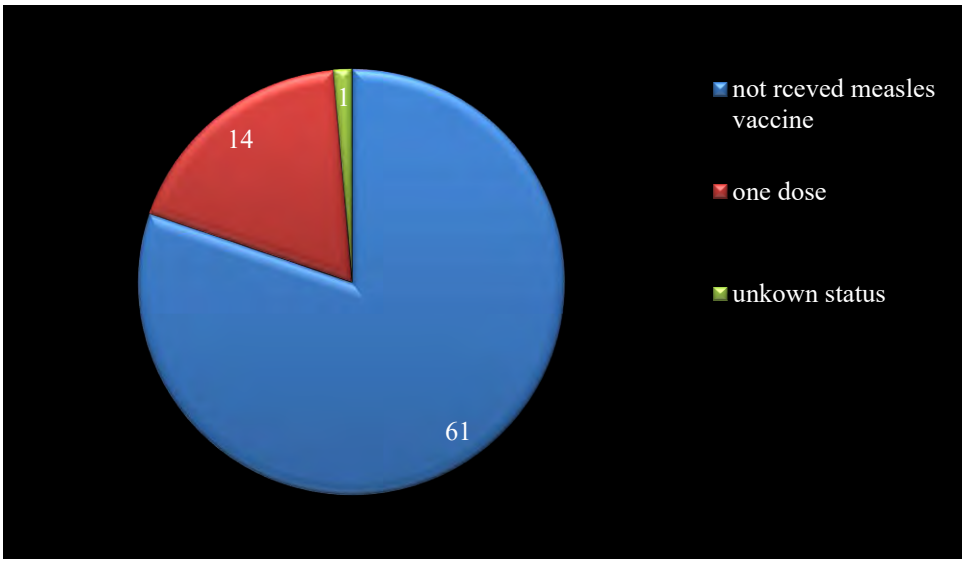

Figure 56: Showing vaccination statues of measles cases, Gedeb Woreda, Gedeo Zone July, 2015

Anticipated epidemics: Woredas at risk for different health hazard were identified by the zonal PHEM core process. Meningitis, malaria, measles, Sevior Acut Malnutrtion (SAM) and AWD were reported as anticipated epidemics in the zone.

Table 34anticipated identified risk for outbreak occurrence by woredas in Gedeo zone July, 2015

Woreda at risk	Type of risk	At risk population
Dilla zuria	Measles, malnutrition, malaria	40,014
Wonago	Measles, malnutrition, malaria	53,165
Yirgacheffe	Measles, malnutrition, malaria	66,755
Kochore	Measles, malnutrition, malaria	55,282
Gedeb	Measles & malnutrition	35,172
Bule	Measles	20,783
Y/cheffe town	Malaria	10,767

Morbidity: The top five causes of morbidity of children under five year and above five year in the visited district were summarized in table below. As seen in the table the most common type of diseases for under five year's children were Malaria, Pneumonia, Diarrhea (non-bloody), Acute Febrile Illness,

and All type of Respiratory Diseases. In adult the top five morbidity causes were Malaria, Acute Febrile Illness, Trauma, Pneumonia and All type of Respiratory Diseases.

Diseases trend in the last five months: In the last five month (Jan – May 2015) in Gedeb woreda there were 72 cases and 4 deaths of Measles, and 290 cases, and no death of Sevior Acut Malnutrition [SAM] and death of meningitis, and AWD ,290 cases of Acut Sevior Malnutrtion and 112 cases and Zero death of malaria reported, see summarized data in table below.

Table 35: Top Five Morbidity by Age, Gedeb woreda in Gedeo zone, SNNPR, Ethiopia, 2014

Zone	Woreda	Top 5 Morbidity Under 5	Top 5 Morbidity above 5
Gedeo	Gedeb	1. Malaria	1. Malaria
		2. Pneumonia	2.Acute febrile illness
		3. Diarrhea	3. Trauma
		4.Acute febrile illness	4. Pneumonia
		5.Respiratory infection	5.Respiratory infection

Table 36: Numbers of Cases and Deaths, by Diseases, Gedeo Zone, SNNP, Ethiopia, 2015.

Zone	Month	AWD		Malaria		Measles		Meningitis	
		Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Gedeo	January	0	0	238	0	16	0	0	0
	Februarys	0	0	280	0	1	0	0	0
	March	0	0	214	0	1	0	0	0
	April	0	0	531	0	0	0	0	0
	May.	0	0	521	0	14	0	0	0
	Total	0	0	1784	0	32	0	0	0

AWD: AS seen summarized table above from January to May 2015 there was no AWD case reported from the District.

Measles: In the last five month (January - May 2015) a total of 32 measles cases were reported these cases were reported from Wonago, Bulle and Kochore woredas.

Meningitis: There wasno case and death of meningitis reported in the Zone in the last five consecutive months (January to May 2015).

Malaria: According to the Zone health department surveillance report, number of malaria cases are increasing in the last five month but did not passed the threshold level to fulfill the outbreak/epidemic criteria and these numbers highly decrease comparing to the last year data.

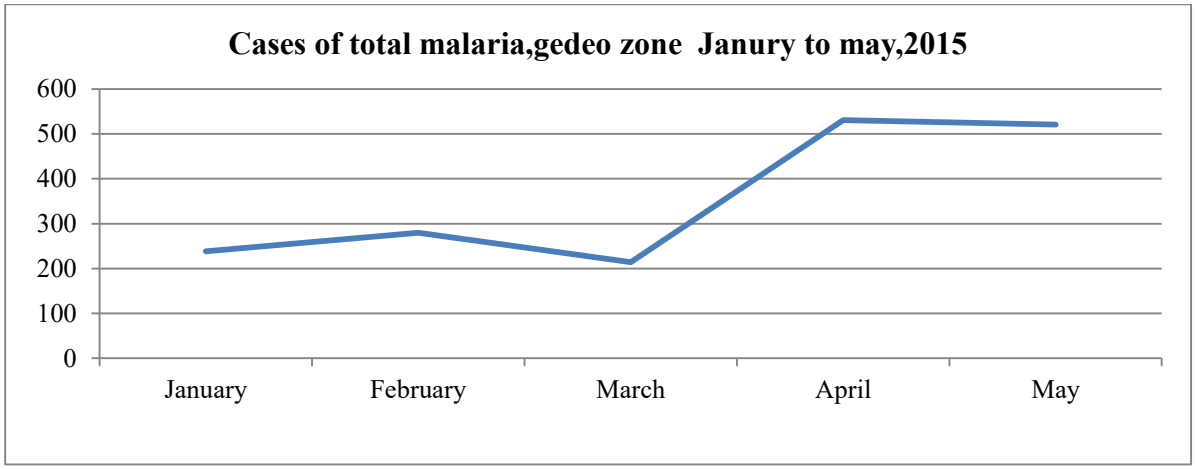

Figure 57: Showing treads' of malaria cases from Jan to May 2015, Gedeo Zone, SNNP, Ethiopia,

As seen the figure above high numbers of malaria cases were reported from March to May, 2015.

Preparedness: Gedeo Zone has got enough stock of the following items, for the upcoming one month, in case outbreak occurs:Ringer Lactate,ORS,Doxycycline and Consumables: Syringe, Gloves to treat AWD cases,Amoxil Susp, Tetracycline ointmentand Vit. A for measles, Coartem for malaria, and Lab supply: RDT for Malaria

Nutrition Situation:

Table37 Numbers of Cases and Deaths of SAM by Reporting health units, Gedeo Zone, SNNP, 2015

Reporting health unit	Junary			February			March			April			May		
	OTP	SC	Death	OTP	SC	Death	OTP	SC	Death	OTP	SC	Death	OTP	SC	Death
Bule	11	0	0	9	0	0	9	0	0	17	0	0	11	0	0
Dilla Hospital	0	11	0	0	11	0	0	7	0	0	16	0	1	30	0
Dilla Town	0	0	0	0	0	0	4	0	0	4	0	0	5	0	0
Dilla Zuria	1	0	0	3	0	0	3	0	0	6	0	0	13	0	0
Gedeb	62	0	0	55	0	0	48	0	0	65	0	0	70	0	0
Kochere	31	0	0	52	0	0	25	11	0	100	0	0	104	2	0
Wenago	44	0	0	55	3	0	48	0	0	84	4	0	73	0	0
Yergachefe	4	0	0	18	0	0	13	0	0	18	0	0	36	0	0
Yrgachefe Town	1	0	0	0	0	0	4	0	0	0	0	0	1	2	0
Grand Total	154	11	0	192	14	0	154	18	0	294	20	0	314	34	0

Malnutrtion: Number of new admissions to therapeutic feeding programs has been increasing since December of this year. The trend of OTP admissions per month as shown below

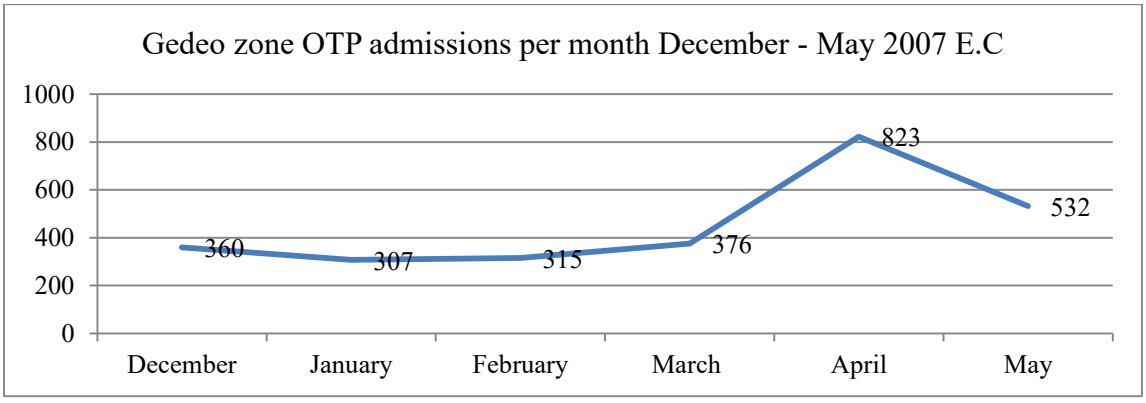

Figure 58: trend of OTP cases per month from December to May 2015, in Gedeo zone, SNNPR

The situation of OTP and SC admission has been increasing in this Zone compare to the last five months (January to May 2015) and the last year the same period of time. The number of OTP and SC cases seems high as seen the figure below.

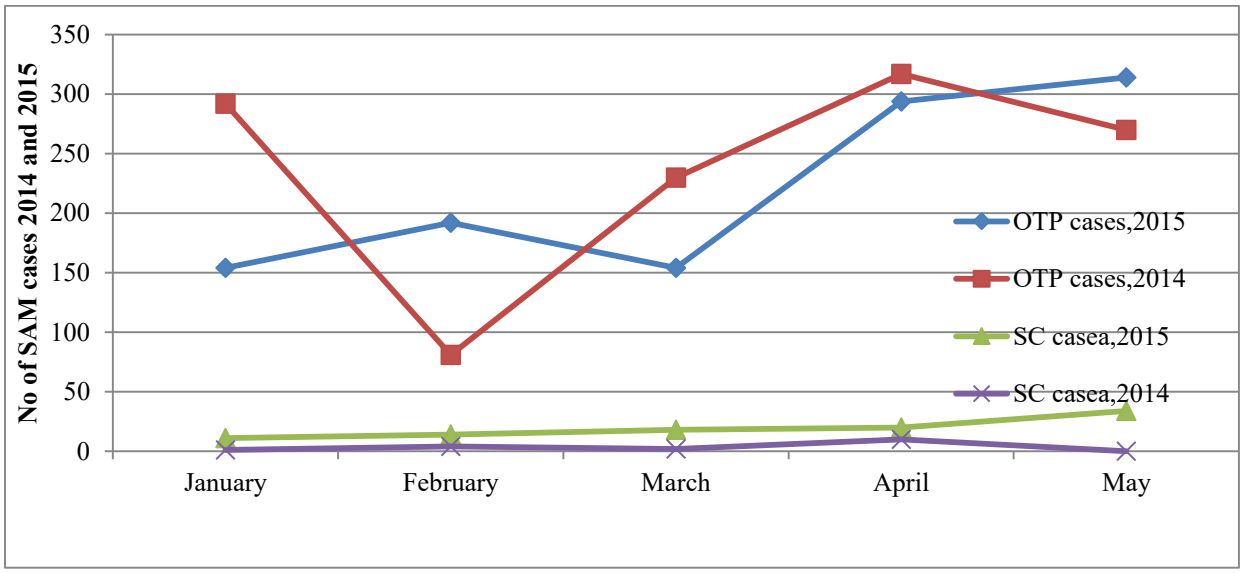

Figure 59: Status of OTP and SC for the last two years, in the same months in Gedeo zone, SNNP.

Additionally 39 children were admitted in stabilization centers to be treated medical complications they have developed due to malnutrition. In general 2288 children were treated in OTP program across the zone since December to May 2007 E.C

No trained man-power shortage was reported by Gedeo zone health department for malnutrition management. But Yirgacheffe woreda health office claims it has limited capacity to expand stabilization centers in the woreda due to inadequacy of experts in malnutrition management. Therefore to strengthen the service, increase access and quality of care, more health professionals should be trained on malnutrition management especially the inpatient care service.

Supply- in regard to Ready to Use Therapeutic Food (RUTF) no shortage has been reported for malnutrition management at zone level. Wonago woreda requests some kind of medical supplies for its emergency preparedness.

Gaps /issues identified: The zone has no budget for Emergency Preparedness Response Plan,and there is no adequate supplies in zone as well as in some woredas.Because of the high staff turnover there is

shortage of trained public health emergency officers at woreda and health facility level. Accessibility to stabilization centers were less in some woredas like Y/cheffe so it needs to be expanded. Delay in notification of outbreak diseases to next level.Free treatment services & feeding the caretakers whose children admitted in stabilization centers.

Sidama Zone

Health and Nutrition

In this *Beleg* season, there was 6332 cases and one death of malaria, 238 measles cases were reported from deferent woredas of the zone and, 108 cases and 6 deaths of Meningitis was reported from three Hospitals in the zone starting from January to May 2015 reported by zonal officials; however the required action undertook and controlled by the concerned bodies. Even though, farther investigation and confirmation of the etiology of meningitis, need attentions from concerned bodes.

Table 38: Numbers of Cases and Deaths, by Diseases, Sidama Zone, SNNP, Ethiopia, 2015.

Zone	Month	AWD		Malaria		Measles		Meningitis	
		Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Sidama	January	0	0	1069	0	43	0	11	0
	Februarys	0	0	1380	0	71	0	28	0
	March	0	0	1407	0	46	0	12	2
	April	0	0	1186	0	54	0	18	1
	May.	0	0	1290	1	24	0	40	3
	Total	0	0	6332	1	238	0	108	6

Nutrition

Almost all woredas are implementing community based nutrition program. Despite all the efforts paid to identify and manage cases of malnutrition, number of new admissions to TFP is increasing. As shown in the figure below, number of Sever Acute Malnutrition cases with medical complications has been increasing in monthly basis.

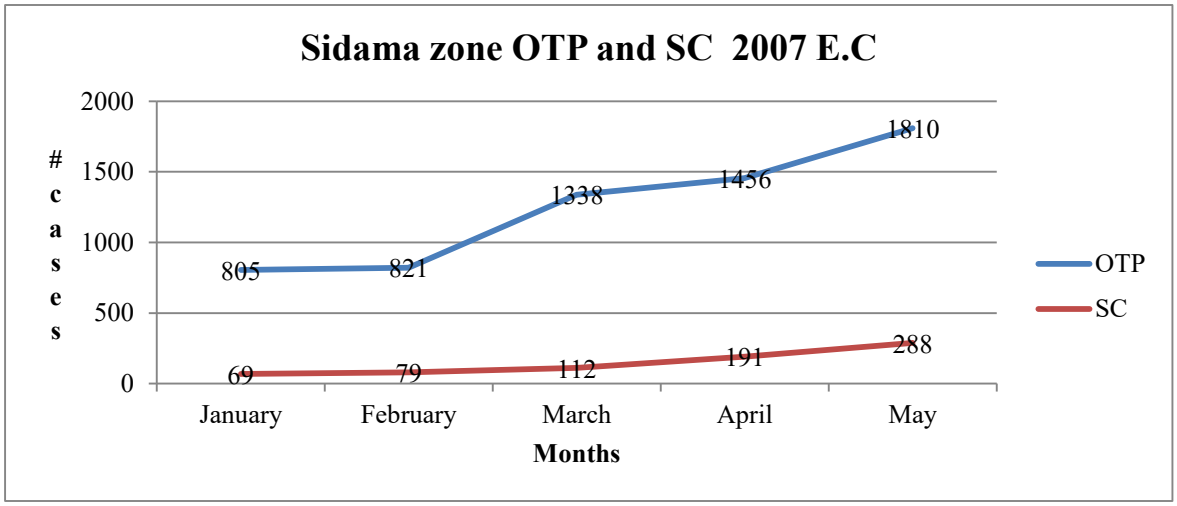

Figure 60: trend of OTP andSC in Sidama zone from Junary to May,2015

Supply: Ther was no shortage of supplies reported for the management of severe acute malnutrition in Sidama zone at all level.

Trained manpower –Sidama zone health department provided training on severe acute malnutrition for health professionals who are working in > 5 years clinics, OTPs and SCs units.

In some visited woredas like Loka abaya, Boricha and Shebedino, the woreda administrations allocated budget to purchase and provides food for care takers as well as to distribute to families of malnourished children. For instance Loka Abaya claims more than 200,000 birr allocation for the purchase of food.

Boricha woreda is one of the most under malnutrition affected area in Sidama zone, factors which contribute to aggravates the malnutrition occurrence are low water coverage in the woreda (28.9%),less land holding size for agricultural production at house hold level and presence of highly populated kebeles at the woreda. Also in this blge Season the under malnutrition problem is increased compared with 2014.

For the reporting *Belge* season, a total of 200,804 children were screened for malnutrition and 3666 OTP cases, and 645 SC case children have been found malnourished (2.1%) that indicates raising in malnutrition situation of children in the zone from the previous periods and years. This malnutrition data is not only associated with chronically food insecurity situation but the majority of the cases are due to other non food insecurity cases like feeding practices and the like. With an established committee to monitor the food security situation of the community, there is a monthly screening process by Health

Extension Workers (HEW) s in each respective sites to refer to OTP/SC sites, helps to reduction in cases for this year, .however the station need additional support from all partners concerned.

The table below shows that there is an increased number, both in OTP and SC cases in the zone due to cumulative impact of chronically food insecurity situation, other non food insecurity cases like feeding practices and the like, in different woredas of the zone.

Table 39 trend of OTP and SC from 2013 to 2015 at the same months

Months	2013		2014		2015	
	OTP	SC	OTP	SC	OTP	SC
January	319	43	549	62	367	37
February	118	14	266	43	579	91
March	589	50	621	73	743	127
April	246	28	812	115	705	140
May	315	45	956	157	1272	250
Total	1587	180	3204	450	3666	645

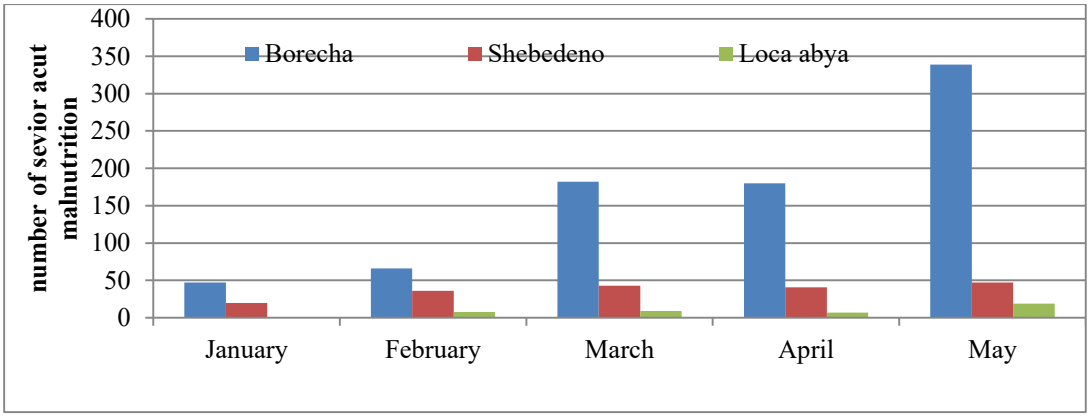

Figure 61: Status of Sevior Acut Malnutrition, from January to May 2015, in visited woredas

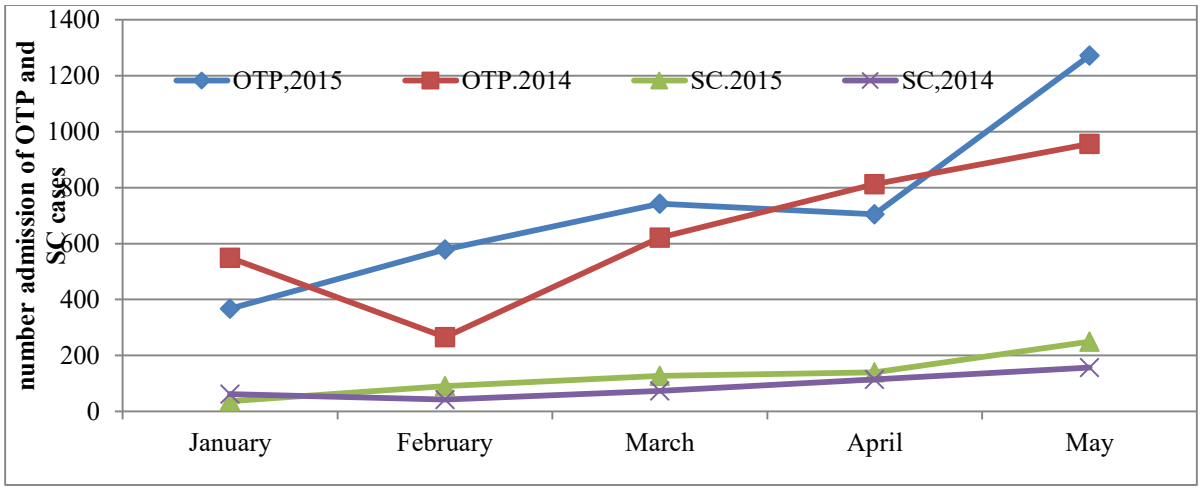

Figure 62 Status of OTP and SC for the last two years from in the same months in Sidama zone, SNNP.

Conclusions

There was a functional multi-sectoral coordination forum with no regular frequency of meeting in almost both zones and all woredas

Malaria, meningitis, measles, AWD, and malnutrition were anticipated risks at zonal level, and at risk population groups were identified, and summary of requirements or needs estimated

There was emergency preparedness and response plan at all levels, but not supported by budget at visited zones and woredas There was a good preparedness regarding emergency drugs and supplies for malaria, measles, AWD (except CTC kits).No shortage of therapeutic food supplies

Recommendations

Strengthening the prevention and control of communicable diseases at all health care units,and the risk assessment, early warning/ surveillance, preparedness and response of Public Health Emergency Management (PHEM) coordination forum, and Zonal and woredas EPRP should be supported by budget.

Chapter VIII – Proposal for Epidemiologic Research Project

8.1 Assessment of prevalence and associated risk factors for malaria in Shashogo Woreda, Hadiya, SNNPR, Ethiopia, 2016

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RESEARCH PROJECT SUBMISSION FORM

	Cell: +251 911760012
	Mail: shayeayele@yahoo.com
Applicant prefix	**Resident**
FETP name	**Ethiopian Field Epidemiology Training program**
Title of study project	**Prevalence and associated risk factors for malaria**
Duration of the project	**April 1 to October 30, 2016**
Study area	**Hadiya zone Shashogo woreda, SNNPR**
Total cost of the project in dollar	**11,730, USA ,Dollar**
Name and address of mentors	**Alemayehu Bekele. (MPH, PhD)** **Cellophane : +251 911179205** **Mail: almayehubekele2002@gmail.com** **Million Tumato. (MD,MPH)**

	Cell: +251 913921997 **Mail:mekkto@yahoo.com**
Address of the supervisor	**Name: Endashawu Shibiru** **Cell : +251 911362760** **Email: endashawu_s@gmail.com** **South, Nations, Nationalities, and peoples Regional Health Bureau (SNNP RHB)**

Introduction

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 Plasmodium falciparum(PF), with the remainder caused by Plasmodium vivax (PV). Anopheles (An) 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%) *Plasmodium falciparum (PF)* and 732,590 (40.8%)*Plasmodium* vivax (PV). 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].South 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. Hadiya zone is one of the 15-zones and 4-special Woreda in the region and the zone has 11- Woredas, (Annalemo, Duna, Gibe, Gombora, Hossana town, Lemo, Mierab Badawacho, Misha, Misrak Badawacho, Shashogo, and Soro). All woredas including Hossana town administrationare malaria endemic, Out of these, 6 (Gibe, Mierab Badawacho, Misha, Misrak Badawacho, Shashogo, and Soro) woredas are known endemic malaria and hotspot woreda in the region as well as in the country. Shashogo woreda is one of the 11 woredas the zone and the Woreda's Capital is Bonosha town, which is located at a distance of 224 kilometers southwest of Addis Ababa, 117kilometers far from the regional town, Hawassa and 54 kilometers far from zonal town Hosanna, bordered by Halaba Special Woreda to the south and east Lemo Woreda and Kembata-Tambaro Zone to the west, and Silete zone to the north. The woreda administratively organized in 34 rural, and 2 urban kebeles. The altitude ranges from 1800 to 2000 mails with a predominantly dry *kola* (hot lowlands), Its total area is estimated to be 32,320 hectares, 26,827 hectares (83%) of flatland, 226 hectares (7%) of slopes, and 3232 hectares (10%) covered by Lake Boyo. Demography of the woreda, Total population 126,277, Male 62,467(49.47%), uunder 1 year of age group (3.06 %) 3864, less than 5 years of age group 19,194(15.2%),Women in reproductive age group 29,410 (23.29%),Total number of estimated pregnancy 4357 (3.45%), Non- pregnant women in fertile age 25,053 (19.84%),less than15 age group 62745(47.8%),15 – 59 years age group 60992 (48.3%), Population growth rate 2.98% and House hold 4.9 (21,403).

The mean annual temperature is about 23 _ 25 ^{O}c and the mean annual rainfall reaches 857 – 1085 mm. The area receives a bimodal rainfall where the small rains are between March and April while the main rains are from July to September [9].

In 2015 Halaba SP woreda reported a total of 5,401 clinical and confirmed malaria cases with zero death, of which 1,693(31.0%) was (PF), 3,706(68.6%) (PV.), and 2(0.04%) clinically treated cases were reported to the South Nations Nationalities Peoples Region (SNNPR), Public Health Emergency Management /PHEM.

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 (< 200 m) 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 (<1500 m, with rainfall >1000 mm).Shashogo woreda one of 6- malaria hot spot Woredas in Hadiya zone. During Nutritonal emergency assessment The woreda health profile indicates, despite the presence of high ITNs and IRS coverage, there was an increase of malaria morbidity in the Woreda[2] (2003-2007,EFY). Moreover, malaria is the first top morbidity cause among adults and under five children's of top ten causes of morbidity in the woreda for the last 5 years. In addition to these, there was high malaria positivity rate, 2015. The cause for the increase of the malaria in the district is unknown and no study has conducted in the area until today regarding malaria.

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

Purpose of the study: During health profile description (2015) in the district, the coverage for ITNs, and IRS for the last three years (2013, 2014, and 2015) 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 2014/205 in the district. There was high *plasmodium falciparum* rate and high positivity rate reported were RDT or microscopically confirmed in 2014/2015 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.

Objective

General objective: To assess malaria prevalence and risk factors in Shashogo woreda, Hadiya zone, SNNPR, 2016

Specific objectives:

To determine malaria prevalence by species in Shashogo woreda

To determine factors associated with high malaria morbidity in Shashogo woreda

Methods and materials

Study area and population: The will be conducted in Shashogo woreda, Hadiya zone .The population of the woreda will be considered as the study population.

Study design and period: We will use cross-sectional community and health facility based study in Shashogo woreda from July to November, 2016.

Sampling technique and sample size: There are 36- Kebeles and 720 gott (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 18(50%) of the Kebeles, 360 (50%) villages of each Kebele and 12,885(50%) households in selected villages will be included in the study. From Each cluster nine with high and nine 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.

$N= z^2pq/d^2= (1.96)^2*0.5(1-0.5)/ (0.5)^2 = 383.$ Because of cluster sampling in the study we used 2 as a design effect and it will be 766 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 dividing 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.

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 malarias 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 2 x 2 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. Four supervisors will be assigned for each twelve 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. Bi-variety analysis will be conducted using Epi Info version 7.1.3.0. Categorical variables will be coded and categorized, and then multivariate analysis will be conducted by using SPSS static version 20.0.

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), Hadiya zone, Shashogo woreda, and other concerned body's.

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 testing 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 surfacesLong Lasting Insecticide: protecting people from being bitten by infected mosquitoes

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

Work plan

Table 40 .Work plan for malaria prevalence and risk factor assessment, Shashogo woreda, Hadiya zone, SNNPR, 2016

Activities	Month/2016					
	March	April	May	June	July to August	September to October
Literature review						
Proposal writing & submission						
Supervisors and data collector training						
Data collection and entry						
Data analysis						
Draft report preparation						
Final report submission						

Budget breakdown

Table 41 Budget breakdown for malaria prevalence and risk factor assessment, Shashogo woreda, Hadiya zone, SNNPR, 2016

S.N	Activity	Quantity	Unit	days	Unit cost	Total cost in $
1	Data collectors training	12	Dollar	3	15	540
2	Perdium for data collection	12	Dollar	15	15	2700
3	Supervisors training	4	Dollar	2	30	240
4	Perdium for supervision	4	Dollar	15	30	1800
5	For investigator training	1	Dollar	2	40	80
6	For investigator supervision	1	Dollar	15	40	600
7	For investigator data analysis	1	Dollar	24	40	960
8	For data entry	1	page	12	15	180
9	Fuel cost of	1	liter	900	1.5	1350
10	Car rent	1	Dollar	15	200	3000
11	A4 Paper 1390 x 4 pack	1	pack	5	10	50
12	Clerk for writing	1	Dollar	12	15	180
13	Printing and padding of	1	pc	10	5	50
	Grand total		Dollar			11,730

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Chapter IX – Other Additional Outputs Report

9.1 Health and Nutrition emergency prevention and Response, summary report, Hadiya and Kambata Tambaro Zones, and Halaba Special Woreda, /August-October 2015

Introduction

Identified Priority Hazards for Ethiopia

The following are hazards identified as priority public health threats:

- Epidemics of communicable disease
- Drought with malnutrition
- Food contamination
- Flood
- Pandemic Influenza
- Conflict and displaced populations
- Accidents incl. Chemical spills
- Earthquake, volcano
- Bioterrorism – release of anthrax

Brief overview of El Niño:

El Niño is a periodic appearance of unusually warm sea-surface temperatures (SSTs) in the central and eastern Pacific Ocean. It is the most prominent known driver of inter-annual variability in weather and climate around the world. El Niño events are associated with increased probability of drought in some areas and excess rainfall in others, together with regional warming across the tropics

Why do we care?El Niño events are notable for their wide geographic influence and the long duration of their extremes. The fact that they are extended climate events with large-scale effects makes them extremely important to the public health sector. To have a general idea of where and when extreme meteorological conditions will occur as a result of El Niño and to determine which regions are more vulnerable and at higher risk of epidemics and begin to take climate changes into account in the planning of health programs. Addressing the health impacts of El Niño can thus lead to reduced vulnerability to the potential health impacts of climate change.

Effects of El Nino: The main threat is drought and disruption of agricultural activities and damaging crops. El Niño could result in flash floods or intense hurricanes that could influence the crop season. Waterborne Diseases-Heavy rains Cause Rivers and lakes to overflow, leading to flooding and the contamination of drinking water- cause'sdiarrhea. Acut Watery Diarrhea /AWD, outbreaks have been

associated with precipitation extremes—both droughts and Floods Infectious Disease Transmission Increase in the disease associated with increases in temperature, humidity, and rainfall- Vector borne Diseases- e.g. Malaria. Drought can also lead to increased concentrations of pathogens in surface water and to hygiene-related diseases. Malnutrition Effects of drought on human health are those caused by water shortages and concomitant food shortages, and those caused by contaminated water. School Dropout

Preparedness activities done so far at FMOH

- Command post
- Preparedness and response plan
- Logistics and Supply mapping and gap analysis
- Preparation of different documents (coordination manual, social mob guideline, reporting templates, logistic monitoring formats, preparedness assessment tool etc)
- Training and deployment of Field Epi residents
- 72 residents
- 29 vehicles
- TOR prepared and given to them

Nutrition

Nutrition is;the study of foods, diets and food-related behaviors, and how nutrients are used in the body. People also use the term to describe the food intake of a person, so nutrition is a balanced diet in terms of quantity, quality & diversity of foods.

Balance diet:

QUANTITY	QUALITY	DIVERSITY
• **Enough food to cover the needs of the body.** • **Food gives us energy. Our bodies use energy, even when we are sleeping.** • **Sometimes our bodies use more energy.**	• Hygiene • Cooking • Storage • Preparation of food	• Diversity means eating the food having different types of nutrients. • A mix of each nutrient is needed.

A balanced diet provides the correct amounts of food energy and nutrients needed during the day to cover the dietary requirements of the person. A balanced diet must be composed of a variety of different

foods from different food groups so that it contains all macronutrients and micronutrients the person needs

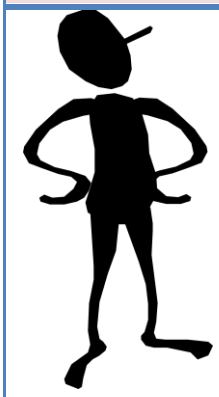
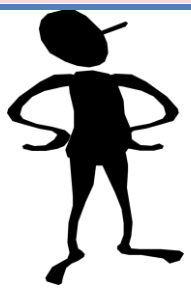
Food and nutrients :A food is something that provides nutrients. Nutrients are essential substances, contained in food that is needed for the body to function properly. Nutrients are divided into twoMacro (big) nutrients that are needed in large amounts. These are: carbohydrates, fats and proteins,Micro (small) nutrientsthat we need in small amounts. These are minerals – iron, iodine and zinc vitamins - vitamin 'A, B-group vitamins and vitamin C.

Basically nutrients are classified into six groups; Carbohydrates, Fats Protein, Vitamins, Minerals and Water. What we are made of; Minerals, 6%, Fat, 14%, Protein, 18% and Water, 62%

Malnutrition: An abnormal physiological condition caused by deficiencies, excesses or imbalance of energy and nutrients. People who have poor diets and do not eat the right amounts of energy-rich foods andnutrients are often sick and become **Malnourished**. Therefore, Malnutrition is the biggest health problem in the world, especially in developing countries like ……

So Malnutrition: is a nutritional disorder including under-nutrition, micro & macronutrient deficiencies and over-nutrition

Common consequence of malnutrition:Growthfailure, Decrease resistance to disease, Reduce ability to work and the likes,

Types of Malnutrition and their Criteria		
		
Normal	Acute malnutrition Short term Current status Wasting Reversible Measured by the nutritional index WFH and MUAC	Chronic malnutrition Longer to develop Past history Stunting Irreversible Measured by the nutritional index HFA

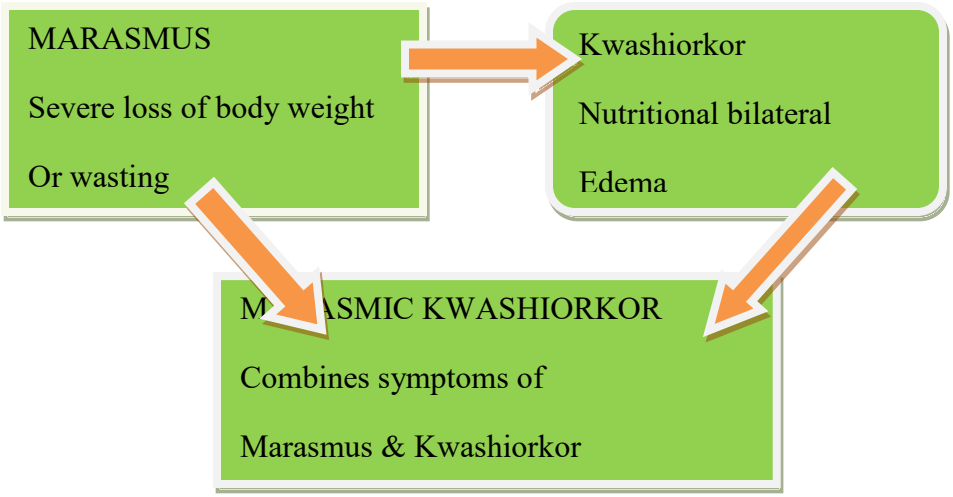
Acute Malnutrition

It is Short term duration phenomena, It can happen within short period of time , **Current status** Individual can tells us something about the current nutrition and health situation of the area It is reversible, the person can be rehabilitated when situation getting normal, Weight for height & MUAC

The best indicators for acute malnutrition

Wasting: A condition that results from the loss of body tissue and fat

THE THREE TYPES OF ACUTE MALNUTRTION

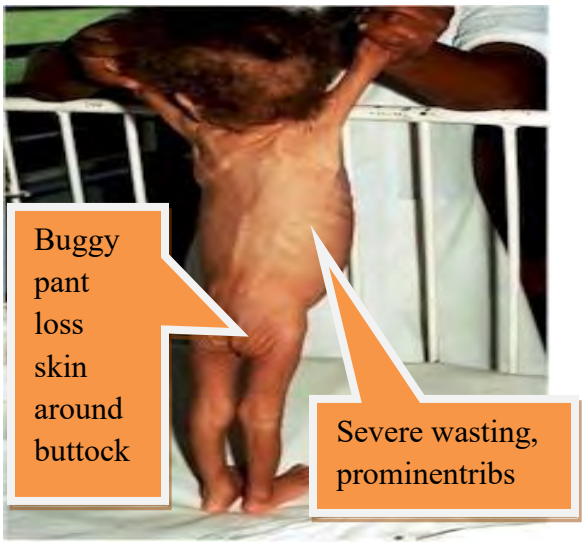


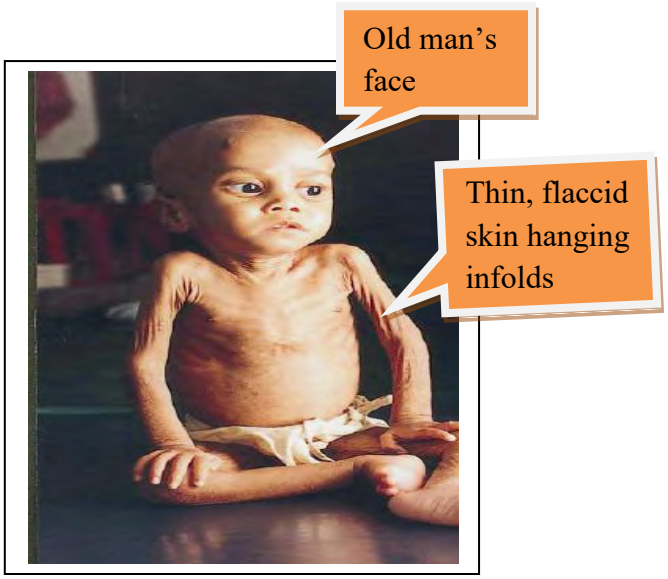
Clinical sign and symptoms of Marasmus

- A thin old man face
- Buggy pant, loss skin around the buttocks
- No nutritional edema
- Prominent rips

The children are usually active and may appear to be alert in their condition

Severe wasting [Marasmus]



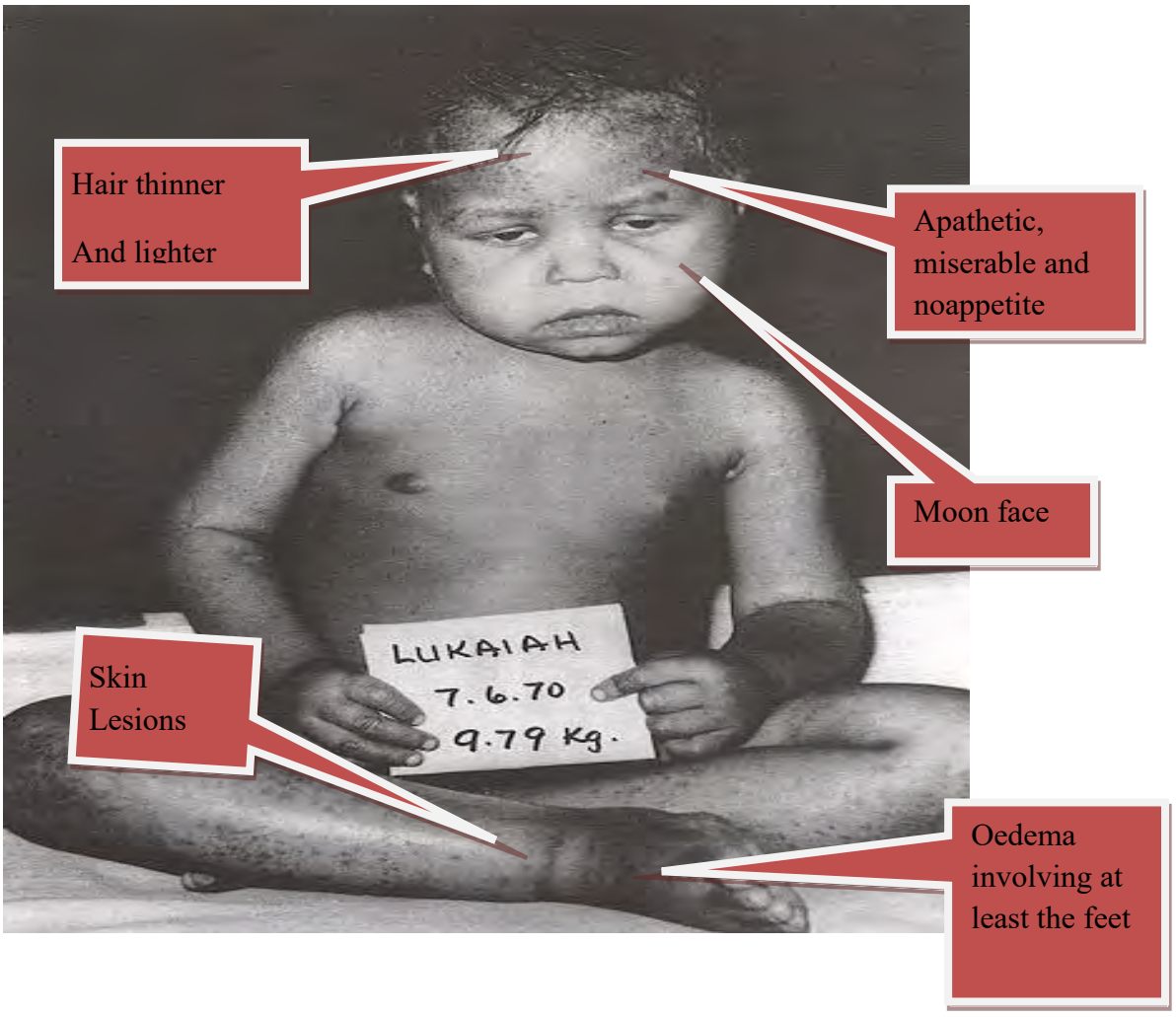


KWASHIORKOR/NUTRITIONAL BILATERAL OEDEMA

Kwashiorkor is always severe form of malnutrition. Children with bilateral pitting edema are at high risk of mortality and need to be urgently treated.

Clinical sign and symptoms

- Weight loss is masked by fluid retention (edema),
- looks 'swollen',
- Thin orangey hair ,
- a moon shaped face but often
- A thin upper body.
- lack an appetite
- apathetic [lack of interest] and
- Irritable [bad- tempered].
- at high risk of death



CHIRONIC MALNUTRITION (STUNTING)

Long term or Long period to develop, Stunting associated with CHRONIC or prolonged inadequate diet (quality and quantity) and/or disease it is Passed history in balanced diet. Stunted children tells us something about the past nutrition and health situation of the area

Height for age is the indicator for stunting relatively stunting is irreversible, permanent after about 5 years of age. Stunted children have normal body proportions and may look younger than their actual age. Growth failure in a child that occurs over a slow cumulative process as a result of inadequate nutrition and/or repeated infections

Back Ground

South Nations Nationalits People Region:

South Nations Nationalits People Region (SNNPR) is administratively sub-divided into forteen Zones, four special woredas and one city administration, and according to the 2007 Population and Housing Census projection, with a total population of 18,276,000, with average annual growth rate of 2.5%. 50.2% (9,174,552) were females, 15.61% (2,852,884) of the population was under age 5 years old , (47.48% was under age 15 years old, 19.27%(3.521,785) was between 15 and 25 years old ,and 33.25%(6,076,770) was in the age group of ≥ 25 years ,and the proportion of aged ≥ 65 years was 3.2 %(584,832)

Hadiya, Kambata Tambaro zones and Halaba special (Sp) l woreda are among the SNNPR zones and Sp woredas.

Hadiya Zone:

Hadiya zone administratively sub-divided in two 10-rural Woreda and 1-town administration. Hossana town administration and all woredas are known malaria endemic areas, and six rural woredas are malnutrition hot-spot [East badawacho, Shashogo, Soro Gibe Mesha and West badawacho]. The total population of the zone was 1,594,908 with 781,505 (49%) male and 773.052 (47.48%) <15 years age group, (projection from the 2007 census. Regarding to health facility distribution in the zone, there was 2-Hospital, 61-governmental health centers, 3-NGOs health centers, 309- health posts and 64 private clinics

Kambata-Tembaro Zone:

Kambata-Tembaro Zone administratively sub-divided in 7-rural Woreda and 1-town administration. Dura me town administration and 6- rural woredas are known malaria endemic areas. The total population of the zone was 843,168 with 135,786 (16.1%) urban and 707,376 (83.9%) rural. Out of these areas, 4-rural woredas are malnutrtion 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.

Halaba special woreda

Halaba is one of the Special Woredas of the Southern Nations, Nationalities and Peoples Regional State (SNNPRS). The special Woredas Capital is Halaba Kulito town, which is located at a distance of 315 kilometers south west of Addis Ababa, along the Addis – Arbaminch highway road and 89 kilometers far from the regional town, Hawassa. The Woreda is bounded by Silte zone (Sankura & Lanfuro Woredas) of SNNPR in the North, Hadiya Zone (East Badawacho Woreda) in the South, Kambata Tembaro zone (Kedida Gamela & Damboya Woredas) and Hadiya Zone (Shashogo Woreda) of SNNPR in the West, Oromiya Region to the East (Adami Tulu Jido Kombolcha & Arsi Negele Woredas in the North East and Siraro & Shala Woredas in the South East).

The Woreda is administratively organized into 84 Kebeles, from which 79 are rural and the remaining 5 (five) are Urban Kebeles of Kulito town i.e. one of the 22 reform town of SNNP Region. Currently, the Town Administrative Council governs the urban Kebeles whereas the rural Kebeles are administered by the woreda administrative council. There are also 2 developing town (Guba and Besheno) in the Woreda. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), as of July, 2015 Halaba Sp. Woreda has a projected total population of 303,337, of whom 152,275(50.2%) are Females' According to the census result, about 266,936 (88%)of the Woredas population is living in rural areas (CSA 2007) while the remaining 12% are urban dwellers

79- Rural kebeles and the five urban kebeles are known malaria endemic and above half of the kebeles are malaria and malnutrition hot spots. Regarding to health facility distribution in the Sp woreda, there are 2-Hospital, 10-governmental health centers, and 79- health posts.

Purpose of the assignment

On August 12 2015, the Federal Democratic Republic Ethiopia Ministry of Health (FDREMOH) assembled 72 field epidemiology residents from five universities, and give training on **Health and Nutrition Emergency: Preparedness and Response ofEl Niño effect**. After five days training the MOH, dispatch the residents, team by team, throughout the country in all regions and all hotspot zones and woredas. As a team We were assigned in Hadiya, KambataTamaro Zones, and Halaba special woreda to coordinate and establish task force committee, to support technically on screening and management of Sevior acute malnutrition, to strengthen surveillance system at zonal and woreda level, and to communicate and report Dayly base with the MOH at current situations .

Objective of the assignment

- 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 of Zones and woredas to address those risks
- To determine gaps in the capacity ofZones and woredas health system to address anticipated/impending risks and existing threats
- To contributein all activities in the regional, Zonal and woreda response plan development and intervention, based on the findings.

Methodology

The assessment was conducted in 2 zones and (10 woredas) (see Table 1) from 15 August to 30 October 2015. From each zone woredas were selected based on emergency health and nutrition problems in consultations with the FMOH, RHB of SNNP and ZHDs, special malnutrition hotspot woredas.

The data was collected by interviewing responsible persons from different units of health sector as well as reviewing secondary health and Nutrition data, using the questionnaire developed by FMOH/EHNRI/PHEM**.**

Table 42 Hotspot Woredas Visited in Hadiya &Kambata Tambaro Zones

Zones	Woreda	Remark
Hadiya	East Badawacho, Shashogo, Soro and west Badawacho	
Kambata Tambaro	Danboya, Hadero-Tunto, Kacha-bera, Kadida –gamela and Tambaro	

Halaba Sp woreda	All Rural and urban kebeles were included

Findings:

Hadiya zone Total woredas = 11, Hotspot woreda = 4

Table 43 :Hotspot woredas with kebeles and population Hadiya zone October 2015

Hotspot woredas (Name)	Total Kebeles (#)	Hotspot kebeles (#)	Hotspot kebeles (#)	population
East Badawacho	39	39	208,785	
Shashogo	36	20	70,154	
Soro	49	16	75,203	
West badawacho	36	12	33,576	

Table 44Health Facilities in Hadiya zone

Woreda	Hospital	Health Center	Health Post	Other/clinic/
Anne Lemo	0	5	28	0
Duna	0	4	32	1
East Badawacho	0	8	42	6
Gibe	0	4	21	7
Gombora	0	6	23	6
Lemo	0	7	34	4
Misha	0	7	35	2
Shashago	0	5	36	0
Soro	0	10	49	1
West badawacho	0	4	22	2
Hossana Twon	0	3	0	36

Coordination:

Zonal level, Health & Nutrition Emergency prevention Coordination Committee team members should be:

- Zonal Admen, Chair person

- Zonal Health Department head , Secretary
- Zonal Agricultural Head , Team member
- Zonal Early warning Head , Team member
- Zonal Educational head , Team member
- Zonal Women's& Children Head , Team member
- Zonal Water Resource head , Team member
- Zonal Public Communication, Team member

Responsibility, Accountability and activities of, Zonal Level Coordination committee

Frequency of Coordination Committee meeting is conducting weekly;there should be available records of Minutes

Common agendas of the committee meeting

- Timely reporting
- Evaluating daily and weekly report
- Logistic allocation and distribution
- Evaluating implemented responses, quality and coverage
- Coordinating community mobilization
- Coordinating caretaker food provision at SC level

Zonal Level Technical committee team members

- Zonal Health Department head , Chair person
- Zonal PHEM Head, Secretary
- From deferent health department process, Team member
- Zonal Agricultural Expert , Team member
- Zonal Early warning Expert , Team member
- Zonal Educational Expert , Team member
- Zonal Women's& Children Expert , Team member
- Zonal Water Resource Expert , Team member
- Zonal Logistic team, Team member

Woreda Level Coordination committee team members

- Woreda Admen, Chair person
- Woreda Health Department head , Secretary

- Woreda Agricultural Head , Team member
- Woreda Early warning Head , Team member
- Woreda Educational head , Team member
- Woreda Women's& Children Head , Team member
- Woreda Water Resource head , Team member
- Woreda Public Communication, Team member

Table 45Woreda Level Coordination committee availability description;

Hotspot woreda	Woredas with Coordination yes/no	Regular Meeting yes/no	Minutes documented Yes/no
East Badawacho	Yes	no	no
Shashogo	no	no	no
Soro	Yes	no	no
West badawacho	No	no	no

Table 46Woreda Level Technical Committees availability description:

Hotspot woreda	Woredas with Technical Committee yes/no)	Regular Meeting , yes/no	Minutes, yes/no
East Badawacho	yes	no	no
Shashogo	yes	no	no
Soro	yes	no	no
West badawacho	yes	no	no

Table 47Availability of Malnutrition Management and surveillance, trained human power

Hotspot woreda	# of trained	Clinician (Physician, HO, Nurse)	Surveillance officer
East Badawacho	30	25	5
Shashogo	13	10	3
Soro	18	15	3
West badawacho	16	13	3

Social mobilization

Table 48Availability of social mobilization committee in Hadiya woredas:

Hot spot woredas	# of HDA	# of Eder	# of Ekub	Other
East Badawacho	4162	40		-
Shashogo	2528	38	-	-
Soro	5241	56	-	-
West badawacho	3254	42	-	-

WASH

Table 49Total number and types of woreda water sources

Hot spot woredas	# Spring	# Hand dag well	# Shallow well	# Deep well	# Total	# Protected (%)	Functional (%)
East Badawacho	0	5	10	12	27	51%	63%
Shashogo	2	4	6	10	22	81%	77%
Soro	4	7	11	8	30	77%	83.3%
West badawacho	4	2	11	5	21	80.1%	85.7%

Table 50Availability of Water Treatment Chemicals, in Hadiya zone, October 2015

	Total			Distributed			Available at stock		
Hot spot woredas	Water pour	Wuhu agar	Bishn gari	Water pour	Wuhu agar	Bishan gari	Water pour	Wuhu agar	Bishan gari
East badawacho	no	no	no	no	no	no	no	no	no
Shashogo	no	no	no	no	no	no	no	no	no
Soro	no	no	no	no	no	no	no	no	no
West badawacho	no	no	no	no	no	no	no	no	no

Case management

Table 51: # of OTP and SC sites and availability of trained personal in hotspot woredas, Hadiya zone October, 2015

Hotspot woredas	# of OTP site	# of SC site	Availability of Trained human power
East badawacho	37	2	30
Shashogo	34	5	13
Soro	40	2	18
West badawacho	32	1	16

Table 52Stabilization Center organization

Hotspot woredas	# of SCs	% of SCs with safe water	% SCs with Critical supplies	% of SCs with food for care takers	% of SCs with anthropometric measurement	% of SCs with SAM Management Protocol
East badawacho	4	50%	50%	0%	100%	50%
Shashogo	3	33%	100%	0	100%	100%
Soro	3	66%	100%	0%	100%	100%
West badawacho	2	50%	50%	0%	100%	100%

Table 53Outreach Treatment program (OTP) organization

Hotspot woredas	# OTPs	% of OTPs with safe water	% OTPs with Critical supplies	% of OTPs with anthropometric measurement
East badawacho	37	13.5%	100%	100%
Shashogo	34	5.8%	100%	100%
Soro	42	23.8%	100%	100%
West badawacho	32	12.5	100%	100%

Surveillance system organization

Table 54Availability of surveillance tools at health facility level (YES/NO) hotspot woredas, Hdiya zone October. 2015

Hotspot woredas	Weekly PHEM reporting formats	Revised OTP reporting Formats	Revised SC reporting formats	SAM Case definition
East badawacho	yes	yes	yes	yes
Shashogo	yes	yes	yes	yes
Soro	yes	yes	yes	yes
West badawacho	yes	yes	yes	yes

Weekly New SAM Reports from Stabilization (SC) center and Outreach Treatment Program (OTP)

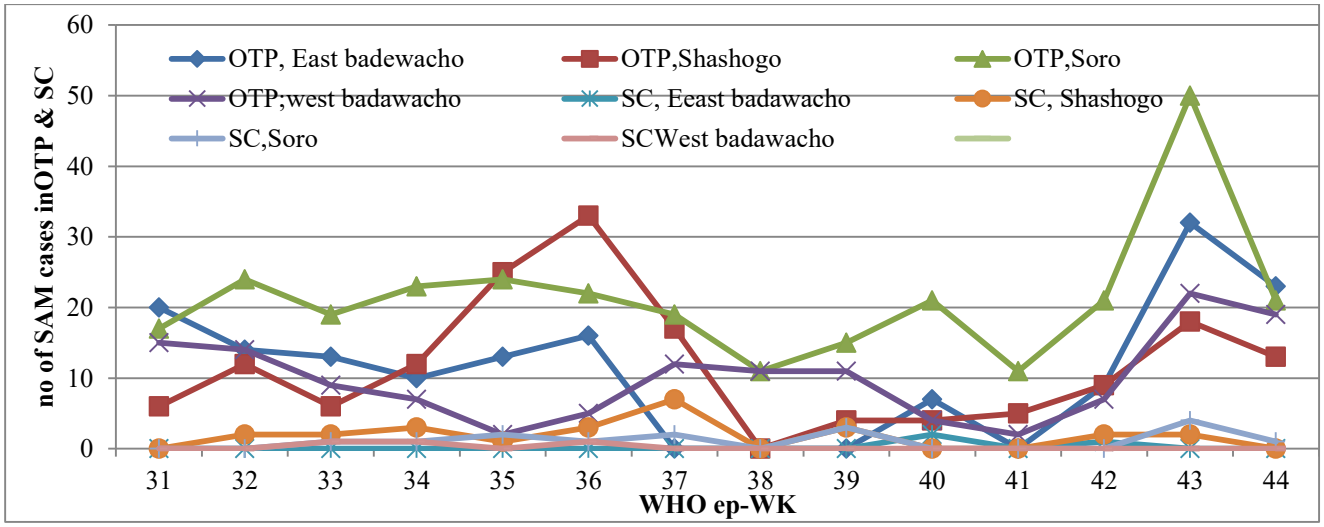


Figure 63 new OTP and SC cases Hadiya zone hotspot woredas from epidemiologic week 31 to 44 2015

Supply and logistics

Table 55 : availability of Critical Management supplies in hotspot woredas, Hadiya zone October, 2015

Hotspot woredas	F75	F100	ReSoMal	Antibiotics	Water Treatment Chemicals
East badawacho	yes	yes	No	No for OTP	no
Shashogo	yes	yes	No	No for OTP	no
Soro	yes	yes	No	No for OTP	no
West badawacho	yes	yes	No	No for OTP	no

Kambata Tambaro (KT) Total woredas = 8, Hotspot woreda = 5

Table 56: Hotspot woredas with hotspot kebeles and at risk population, KT zone, October, 2015

Hotspot woredas (Name)	Total Kebeles (#)	Hotspot kebeles (#)	Hotspot kebeles population (#)
Tambaro	21	5	30,548
Hdro/Tuento	18	5	34,002
Kacha-birra	24	3	18,847
Kadida-Gamela	19	4	22,809
Damboya	18	2	10,648

Table 57:Type and # of health facilities in KT zone 2015

Woreda	Hospital	Health Center	Health Post	Other/clinic/
Angacha	0	5	20	7
Danboya	0	4	20	8
Doyo Gana	0	4	17	10
Hadaro Tunto	0	4	20	13
Kacha Birra	0	6	23	4
Kedida Gamela	0	4	20	2

Tambaro	0	4	23	3
Dura me Town	0	4	0	9
Zonal level	1	35	143	56

Coordination

Table 58 availability of Woreda Level Coordination committee in hotspot woredas, KT zone, 2015

Hotspot woreda	Woredas with Coordination (YES/NO)	Regular Meeting (YES/NO)	Minutes(YES/NO)
Tambaro	Yes	Yes	Yes
Hdro/Tuento	Yes	no	yes
Kachbirra	Yes	yes	yes
Kadida-Gamela	Yes	yes	yes
Damboya	Yes	no	yes

Human resource

Table 59Availability of Malnutrition Management and surveillance Trained human power in KT zone, 2015

Hotspot woreda	# of trained	Clinician (Physician, HO, Nurse)	Surveillance officer
Tambaro	25	20	5
Hdro/Tuento	19	15	4
Kach-birra	21	17	4
Kadida-Gamela	23	19	4
Damboya	17	13	4

Social mobilization

Table 60Availability of social mobilization committee: KT zone .2015

Hot spot woredas	# of HDA	# of Eder	# of Ekub	Other
Tambaro	2566	25		-
Hdro/Tuento	2448	21	-	-

Kach-birra	2795	19	-	-
Kadida-Gamela	2167	20	-	-
Damboya	1917	18		

WASH

Table 61Total number and types of woreda water, KT, 2015

Hot spot woredas	#Spring	# Hand dag well	#,Shallow well	#Deep well	# Total	# Protected (%)	Functional (%)
Tambaro	5	6	9	5	25	80%	76%
Hdro-Tuento	6	3	5	6	18	67	77.7%
Kacha-birra	7	5	2	5	19	73.7%	89%
Kadida-Gamela	5	4	6	5	20	75%	70%
Damboya	6	5	4	5	20	70%	80%

Table 62Availability of Water Treatment Chemicals are not available .KT zone, 2015

	Total			Distributed			Available at stock		
Hot spot woredas	Water pour	Wuha agar	Bishn gari	Water pour	Wuha agar	Bisha ngari	Water pour	Wuha agar	Bisha ngari
Tambaro	no	no	no	no	no	no	no	no	no
HdroTuento	no	no	no	no	no	no	no	no	no
Kach-birra	no	no	no	no	no	no	no	no	no
Kadida-Gamela	no	no	no	no	no	no	no	no	no
Damboya	no	no	no	no	no	no	no	no	no

Case management

Table 63: Availability of Trained human power KT zone, 2015

Hotspot woredas	# of OTP site	# of SC site	Availability of Trained human power
Tambaro	21	4	25
Hdro-Tuento	18	3	19
Kach-birra	24	2	21
Kadida-Gamela	19	1	23
Damboya	18	2	17

Table 64Stabilization Centre organization in hotspot woredas KT zone, 2015

Hotspot woredas	# of SCs	% of SCs with safe water	% SCs with Critical supplies	% of SCs with food for care takers	% of SCs with anthropometric measurement	% of SCs with SAM Management Protocol
Tambaro	4	50%	100%	25%	100%	100%
Hdro-Tuento	3	33%	100%	0	100%	100%
Kach-birra	1	100%	100%	0%	100%	100%
Kadida-Gamela	1	100%	100%	0%	100%	100%
Damboya	1	100%	100%	0%	100%	100%

Table 65Outreach Treatment program (OTP) organization in hotspot woredas KT zone, 2015

Hotspot woredas	# OTPs	% of OTPs with safe water	% OTPs with Critical supplies	% of OTPs with anthropometric measurement
Tambaro	21	22%	100%	100%
Hdro-Tuento	18	16.7%	100%	100%
Kach-birra	24	20.8%	100%	100%
Kadida-Gamela	19	21%	100%	100%
Damboya	18	22.2%	100%	100%

Surveillance system organization

Table 66Availability of surveillance tools at health facility level (YES/NO) KT zone, 2015

Hotspot woredas	Weekly PHEM reporting formats	Revised OTP reporting Formats	Revised SC reporting formats	SAM Case definition
Tambaro	yes	yes	yes	yes
Hdro-Tuento	yes	yes	yes	yes
Kach-birra	yes	yes	yes	yes
Kadida-Gamela	yes	yes	yes	yes
Damboya	yes	yes	yes	yes

Weekly New SAM Reports of Stabilization Center (SC) and out rich treatment program (OTP)

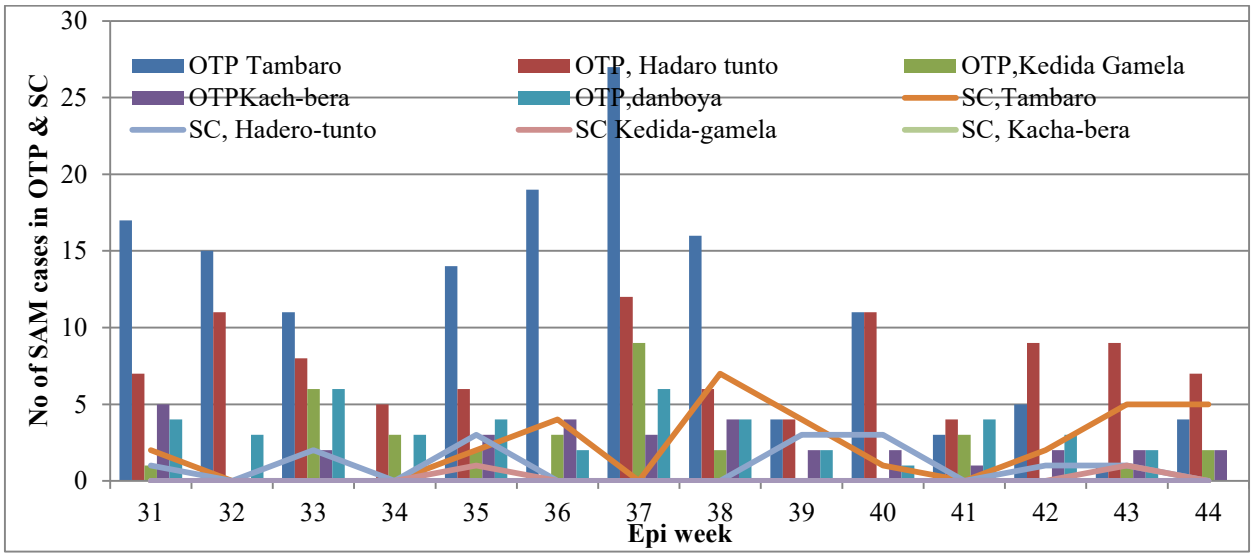


Figure 64: trend of Sevior Acut Malnutrtion in OTP and SC in hotspot woredas, Kambata Tambaro zone from epi week 31 to 44, 2015.

Supply and logistics

Table 67Critical Management supplies, KT zone 2015

Hotspot woredas	F75	F100	ReSoMal	Antibiotics	Water Chemicals	Treatment
Tambaro	yes	yes	No	yes	no	
Hdro-Tuento	yes	yes	No	yes	no	
Kach-birra	yes	yes	No	yes	no	
Kadida-	yes	yes	No	yes	no	

Gamela		
Damboya	yes	no

Halaba special woreda

Well organized Woreda Level Coordination committee run by responsibility of woreda administrator and held regular committee meeting recorded, also technical committee was at place and functional. Ther were multi-sctorial wash committee at woreda level. Surveillance system was functional and have the needed repot format .Ther were 79 OTP sites and 11 Stabilization center sites with critical logistics' protocols and trained personal. But there was shortage of Antibiotics at the health post level and absence of resomal at all level

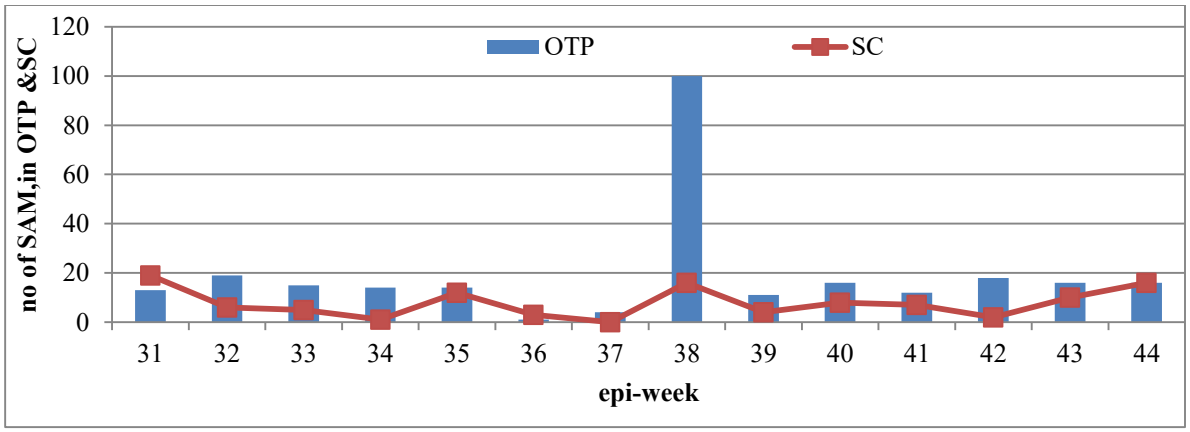


Figure 65:trend of Sevior acute Malnutrtion in OTP &SC Halaba special woreda from epi-week 31 to 44, 2015

Major Challenges and Weakness:

- Hadiya Zone was not cascade timely establishing of coordinating committee at all level
- Shortage of trained health professional
- No appropriate Milk preparation area at stabilization centers
- No appropriate Recording and reporting at both OTP and SC sites and Poor utilization of SAM protocols
- Shortage registration books of SC and OTP
- Shortage of multi charts.
- Shortage of resomal solution & antibiotics
- Absence of food for care givers,
- In appropriate Management of SAM
- Poor and let supervision evaluation act vets

Major Action Taken by Team:

- Discuss with Health Facility managers on identified gaps
- We deal with the SC & OTP focal on appropriate case management
- Strictly follow the protocol guide line of SAM.
- To make ready appropriate milk preparation site
- We call and communicate with Regional technical committee about logistic Shortage
- Coaching on casa management at the OTP and SC sits
- Sensitizing the woreda and health facility staff
- Demonstrating Anthropometrics measurement

Conclusion:

We identified ten malnutrtion hot spot woredas, Halaba special woreda was most affected woreda the case picks from week 36 to week 38. Hadiy zone was late to cascade establishing and organizing coordinating and technical committee, needssupervision and monitoring closely.

Action points:

Table 68 Agreed: Action points on Identified gaps during the attachment

	Findings for Action/ Problems/	Agreed measures for action	By when? (Specific date)	Responsible? (woreda, HO/ ,ZHD or, RHB)
1	Not cascade timely	To cascade at all level	From 13/12/2007	Hadiya zone ad mien + ZHD
2	Shortage of trained HR	coaching & on job training	From 15/12/2007	Technical committee at all level &Field epi residents
3	Shortage of logistic.	Availing identified logistic	17/12/2007	Coordinating & Technical committee at all level and Field epi residents
4	Absence of food for care givers,	Availing food	13/12/2007	Coordinating & Technical committee at all level & Field epi residents

5	Miss management of SAM	Strict supervision, evaluation, coaching , & corrective action	All time and at the spot	Coordinating & Technical committee at all level & Field epi, residents and senior and skilled professionals.
6	Incomplete recording	Strict supervision, evaluation, coaching , & corrective action	All time and at the spot	Coordinating & Technical committee at all level & Field epi, residents and senior and skilled professionals.

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: Tsehay Ayele

Signature: _____

Place: Hawasw field base

Date of Submission: May 30/2016

The thesis has been submitted for examination with my approval as a university advisor.

Name of advisor: _____

Signature: _____

Date: _____