Addis Ababa University, College of Health Sciences,

School of Public Health

Ethiopian Field Epidemiology and Laboratory Training Program (EFELTP)

Compiled Body of Works in Field Epidemiology

By

Dereje Mamo Kombolcha

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 2015

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Advisors:
Dr. Adamu Addissie
Dr. Million Tumato

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Examiner

Acknowledgments

First of all I would like to forward my gratitude to my mentors Dr. Adamu Addissie (AAU academic coordinator of Field Epidemiology) and Dr. Million Tumato (Field Epidemiologist, SNNPR health bureau) for their guidance and encouragement to finish this program successfully.

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List of abbreviations

AAU: Addis Ababa University

AFENET: African Field Epidemiology Network

ASAR: Age Specific Attack Rate

CDC: Center of Disease Control and Prevention

EDHS: Ethiopian Demography and Health Survey

EFETP: Ethiopia Field Epidemiology Training Program

EPHA: Ethiopian Public Health Association

EPHI: Ethiopia Public Health Institute

EPI: Expanded Program for Immunization

FMOH: Federal Ministry of Health of Ethiopia

IDSR: Integrated Disease Surveillance Report

ITN: Insecticide Treated Nets

LLITN: Long Lasting Insecticide Treated Nets

MCH: Maternal and Child Health

PHEM: Public Health Emergency Management

RHB: Regional Health Bureau

RRT: Rapid Response Team

SNNPR: Southern Nations Nationalities and Peoples Region

WHO: World Health Organization

ZHD: Zonal Health Department

Executive Summary

Field Epidemiology and Laboratory Training Program (FELTP) is an in-service training program in field epidemiology adapted from United States Center for Disease Control and prevention (CDC) Epidemic Intelligence Service (EIS) program. The Ethiopian Field Epidemiology and laboratory training program (EFELTP) started in 2009 G.C. The EFETP grants a Master of Public Health degree (MPH) in Field Epidemiology after residents complete two years of supervised work in applied epidemiology or field epidemiology. The EFETP has two main components, each of which contributes for the award of the Master's degree (a class-room teaching component, 25% of the whole course, and practical attachment or field placement component 75%.

I am one of the Cohort five EFELTP residents from Southern Nations Nationalities and Peoples Region (SNNPR) field base. During the field placement component, I was engaged on outbreak investigation, surveillance data analysis, surveillance system evaluation, district health profile development, Participated in disaster situation analysis, project proposal development, abstract writing for scientific conference, Peer review journal writing, oral presentation in scientific conference, giving refreshment training for Zone and Woreda level PHEM officers, and I produced outputs that compiled in this Body of Work.

Outbreak investigation: Measles outbreak was occurred in Gedeb Woreda, Gedeo Zone from December 2013 to January 2014. In this out break we identified 108 cases and 0 deaths. The highest age specific attack rate was observed among children under five years of age (ASAR 185/100,000). We selected 41 cases and 82 controls for risk identification and identified that being vaccinated is showed significant negative association with contracting measles disease (OR = 0.04; 95% CI, 0.016-0.114).

Outbreak of unknown disease was reported from Konso woreda, Segen Zone, SNNPR on February 27, 2015. A total of 77 cases and 6 deaths (CFR: 7.8%) from 24 different kebeles with sign and symptoms of acute diseases were registered. Six possible causes of disease were hypothesized; Botulism, Diphtheria, Anthrax, brucellosis, Meningitis and poisoning, and outbreak investigation was conducted taking all hypothesized diseases in consideration. The most affected age group was 15-59 years (ASAR: 47/100,000) followed by 5-14 years (ASAR: 33/100,000). On risk identification, 96% of the cases have consistent clinical and

epidemiological suggestive evidences to Diphtheria. However, the laboratory investigation does not supported this all the interventions implemented against Diphtheria were found effective in controlling the outbreak.

Surveillance Data Analysis Report: Five years (2009-2013) SNNPR Measles surveillance data was analyzed. During this period a total of 54,221 measles cases were detected by surveillance system. Both male and female sex was equally affected (50.8%, 49.3%). The most affected age group is under 5 years (ASAR: 10.1/1000) and 5-14years (5.0/1000) followed by above 15 years (0.8/1000). Among all cases 48.8% were never vaccinated while 32.2% were vaccinated with one dose and 6.8% were vaccinated with two doses. The proportion of birth cohort to susceptible population during 2004, 2008 and 2013 was 1:1.03, 1:0.74 and 1:1.67 respectively.

Evaluation of surveillance system; we evaluated malaria surveillance system attributes and core functions of surveillance system in Gambella Region. In consecutive five years malaria cases was the leading cause of morbidity but we identified gaps in malaria surveillance system coordination between government and private health system, documentation, data analysis and use for intervention. Zonal health departments are not active on surveillance and other PHEM activities. Only woreda and regional health bureau is communicating actively by passing zonal department. Data was not analyzed and there was no proper documentation, no feedback for respective units, no monitoring system for malaria, and there is weak utilization of surveillance data for malaria prevention and control.

Health profile description report; Health profile provides a snapshot of the overall health of the local population. However in low income countries like Ethiopia such information especially at district level usually not available. So a study was conducted to provide health profile description of Wonago Woreda, Gedeo Zone, SNNPR. Wonago Woreda is one of the six Woredas in Gedeo Zone with total population of 179,239. There are 6HCs and 20 HPs in the woreda in 20 administrative kebeles. Among the top ten causes of morbidity, malaria is a leading cause of morbidity in outpatient department. Measles and penta 3 vaccination coverage of the woreda by the year 2013 was 94.2% and 87.6 % respectively.

Scientific manuscript journal: Scientific journals are prepared in order to communicate research findings and new ideas that help improve the health, safety and well-being of the

community. So that, we prepared a peer review journal on a disease entitled "Measles surveillance data analysis of Southern Nations, Nationalities and Peoples Region Ethiopia, 2009-2013".

Abstracts for scientific Presentation: Two abstracts were prepared on the title "Measles surveillance data analysis of SNNPR, Ethiopia, 2009-2013" and "Outbreak of Unknown disease in Segen Zone, SNNPR, Ethiopia, 2015".

Disaster situation visited: I was participated in "Belg" assessment of health and nutrition needs during the first two weeks of July 2014 at Gedeo and Sidama Zones. In both zones; measles, malaria and malnutrition were among the identified potential risks of morbidity in subsequent months of the assessment.

Proposal Development for Epidemiologic Research: one project proposal was prepared with a title "Assessment of malaria surveillance and control interventions in Gambella Regional state, Ethiopia, 2015". The objective of the study was to assess malaria control interventions and magnitude of malaria in Gambella Regional State. Gambella regional state is one of the regional states in the country and known with its high burden of malaria, all the year. During the last several years' malaria remain the leading cause of morbidity in all age groups and one of the leading causes of mortality in children under 5 years of age in the region. Low land altitude ranging from 300meter to 2,000meter above sea level, weak surveillance system, low LLITNs coverage (23.9%) (5), large number of immigrants from South Sudan who probably has no/weak immunity, rivers and irrigation of large farms found in the region and movement of the people from high land areas of the country to the region largely contributes for malaria. In this case, epidemiological assessment of malaria surveillance and control interventions at community level in this region is necessary to measure the status of malaria surveillance, prevention and control efforts, and to identify the gaps and intervene accordingly.

Chapter I – Outbreak/Epidemic Investigations

1.1 Outbreak Investigation of Measles Gedeb Woreda, Gedeo Zone, SNNPR, 2014.

Abstract

Background: In Southern Nation Nationalities and Peoples' Region outbreaks of measles occur every year. On December 23/2013 the regional PHEM received a report of suspected outbreak of measles from Gedeb woreda and we conducted to verify the outbreak, identify risk factors and implement control measures to contain the outbreak.

Methods: Unmatched cases-control study was conducted enrolling 41 cases and 82 controls (1:2 ratios).The study was conducted in Gedeb Woreda, Gedeo Zone, SNNPR from December 13/2013 to January 15/2014. Data was collected using structured questionnaire and analyzed using EpiInfo 7.1.4.0 and MS Excel 2013.

Result: We identified a total of 108 cases of measles (5 laboratory confirmed and 48 epi-linked) with median age of 7years, ranging from 6 months to 16 years. The most affected age group was under five years of age (47.2%) followed by 5-9 years of age group (36.1%).The age specific attack rate was also highest in age group of under five year (185/100,000) followed by those 5-9 years of age group (132/100,000) with case fatality of 0% for all. From all measles patients 95 (88%) have no history of vaccination and only the rest 13 (12%) of the cases have history of at least one dose of measles vaccine exposure. The proportion of male 63(58%) was higher than female cases of measles [1:1.4].

Conclusion: The incidence rate of measles in Gedeb woreda was highest among children under 5 years of age (185/100,000) and it is essentially less than measles incidences recorded in different regions of the country. Sub optimal measles vaccination coverage for consecutive years resulted in increased number of susceptible population and triggered the outbreak finally.
Key words: Outbreak investigation**,** Measles, SNNPR

Introduction

Measles is acute, highly contagious, exanthematous respiratory disease of viral origin which has characteristic clinical future of fever, cough, coryza, conjunctivitis, maculopapular rash and a pathogonomic Koplik's spot. [(1)] It is one of the most infectious diseases of the human which can cause serious illness, lifelong complication and death. Measles is spread by breathing-in airborne droplets from the coughs and sneezes of person infected with the disease. [(2)]

Possible risk factors to acquire measles virus infection includes immunodeficiency regardless of immunization status, traveling to areas where measles is endemic or contact with travelers to endemic areas and infants who lose their passive antibody before the age of routine immunization are risk factors for infection. In addition to these, risk factors for severe measles and complications are malnutrition, underlying immunodeficiency, pregnancy, and vitamin A deficiency. [(2)]

After the introduction of measles vaccination program, incidence of measles decreased substantially in all age groups with approximately 22,000-75,000 cases per year annually during late 1960s and early 1970s. Despite effective measles vaccine implementation, measles still causes 164,000 deaths per year worldwide.

In Africa before the introduction of measles vaccination the distribution of the disease was primarily affected young children, annually more than one million cases were reported.

Ethiopia, one of the African countries with large measles epidemic, is still has reporting 10 thousands of cases each year, SNNPR share the large portion of cases reported.

Background

Southern Nation Nationalities and Peoples Region (SNNPR) is one of the nine regions in the country located in Southern and South-western part of Ethiopia with estimated 18,375,050 total population and 110,931 km^2 of total area giving population density of 166 person per km^2.

The region is bordered by Gambella Region in the west, Sudan in the south west, Kenya in south, and surrounded by Oromia Region in east, north and north –west directions. It roughly lies between 4.43^0 – 8.58^0 North latitude and 34.88^0 – 39.14^0 East longitudes. The region has 15

zones (136 Woredas) and 4 special woredas, these are also further divided in to 3678 rural kebeles, 238 urban kebeles in 22 town administrations and 114 certified towns with municipal city status. The region has 56 ethnic groups with their own distinct geographical location, cultures and social identities.

Hawassa is the capital city of the region. Besides Hawassa, the region's major cities and towns include Arba Minch town in Gamogofa Zone, Bonga and Mizan-Teferi towns in Kefa Zone, Chencha and Sodo towns in Wolaita Zone, Dilla town in Gedeo Zone , Yirgalem and Wendo towns in Sidama Zone, and Worabe town in Silti Zone. The total population of the region is 18,375,050. This accounts 20% of the country's population and the area contributes 10% of the country's land with 118,000 km2, giving population density of 157 people per km2. Among the total population 9,242,650 (50.3%) are women while 9,132,400 (49.7 %) are men.

Gedeo Zone is one of the fifteen zones in the region located southern part of the region at 86km distance away from Hawassa, capital city of the region. There are six woreda and two city administrations in Gedeo Zone. Dilla Town is the capital of Gedeo Zone. Gedeb Woreda is one of the woreda located to southern direction and 76km far from Dilla town.

Measles outbreak is one of the priority potential epidemics prone disease identified and documented in Gedeo zone for more than four years. (Source: Gedeo Zone PHEM unit, 2014)

LITERATURE REVIEW

Measles is acute, highly contagious and exanthematous respiratory disease of viral origin which has characteristic clinical future of fever, cough, coryza, conjunctivitis, maculopapular rash and a pathogonomic Koplik's spot [(1)]. It is caused by measles virus of the genus *Morbillivirus* of the *Paramyxoviridae* family, the genus which infects humans. Measles virus is a single-stranded RNA virus with only one antigenic type and about 23 identified genetic variability (genotypes) of wild-type virus. Its genetic variability permits strain identification in measles endemic locations and determining possible origin of infection with specific strain. [(3)]

It is one of the most infectious diseases of the human which can cause serious illness, lifelong complication and death. Measles is spread by breathing-in airborne droplets from the coughs and sneezes of person infected with the disease.[2]

Measles is naturally a disease of childhood, however, any people who are not immune either by vaccination or previous infection are at risk of measles infection [2]. Usually measles is a mild or moderately severe illness, though, can result in complications of respiratory, gastrointestinal and central nervous system which may possibly end up with death of the patient unless otherwise treated early[3]. Complications of measles disease are more common among children under 5 years of age and adults of 20 years of age and older.

Possible risk factors to acquire measles virus infection includes children with immunodeficiency regardless of their immunization status, traveling to areas where measles is endemic or contact with travelers to endemic areas and infants who lose their passive antibody before the age of routine immunization are at risk for infection. There are also risk factors for severe measles and complications. These are malnutrition, underlying immunodeficiency, pregnancy, and vitamin A deficiency. [2]

Patients infected with measles virus will transmits the virus to a susceptible hosts from one to two days before the onset of fever up to four days after the onset of rash (four days before and four days after onset of rash). Infectivity peaks during the time between the days, one to two days before the onset of fever up to the day of onset of rash (prodromal period). [3]

The clinical manifestation of measles disease begins after the incubation period of 7 to 18 days (average; 14 days) following one to two days of fever. General symptoms like malaise, runny nose or coryza, conjunctivitis, cough and fever usually begin after 7 to 18 days of the exposure and will followed by maculopapular rash that appear first around hair line of the face and head. Photophobia and arthralgia may also be seen in older children. In more than 80% of the cases, immediately before the onset of rash, 1 to 2mm size of blue-white spots in the buccal mucosa, koplik's spot appears. [1]

The non-pruritic, erythematous maculopapular rash of measles is begins from the hair line and behind the ears, which then spreads down the trunk and limbs. This time is the most severe point of illness for the patient. Usually, after the fourth day of the onset, the rash will begins to fade in the order it appeared. But, fever resolves four to five days after the onset of rash.

Lymphadenopathy, diarrhea, vomiting and splenomegaly are the immediate complications usually observed while occurrence prolonged fever is suggestive for the presence of the complications. [1]

In some individuals with partial immunity they developed passively or actively after vaccination, the presentation of the disease is usually milder with less intense symptoms and a milder rash. And, this form of mild illness is termed as Modified Measles.

Measles disease in an individual with compromised immunity may occur without typical rash, but the disease can be severe and of prolonged course. [5]

Complication of measles usually involves the respiratory tract (bronchitis, laryngitis, croups), the gastrointestinal tract (gastroenteritis, hepatitis, appendicitis, ileocolitis, and mesenteric adenitis) and the central nervous system. The most common complication responsible for death in children is pneumonia while acute encephalitis is in adult. However, secondary bacterial infection with streptococci, pneumococci or staphylococci is common, majority of pneumonia cases are viral origin. [3, 5]

Approximately 30% of cases develop one or more complication. Complications are more common in children under five years of age and adults of 20 years age and older. From all cases about 8% develops diarrhea, 7% develops otitis media which can lead permanent hearing loss, 6% develops pneumonia and 0.1% develops encephalitis. [6]

Vaccination is the most important prevention of measles disease. The WHO recommended strategy to prevent measles morbidity and mortality is; strengthening routine immunization (>90%) of children 9 to 11 months, providing second opportunity of measles vaccination for those unvaccinated as well as not developed immunity after vaccination, strengthening case-based measles surveillance and improving case management including provision of vitamin A[2].

The disease has worldwide distribution while humans are the only natural hosts of the infection. It is a vaccine preventable most contagious viral disease. The epidemiology of measles has different future before and after the implementation of measles vaccine. Before the implementation of measles vaccine during 1960s, 3 to 4 million cases were reported annually worldwide, almost every person were acquired measles before adult hood and the disease occurred in epidemic cycles.

After the introduction of measles vaccination program, incidence of measles decreased substantially in all age groups with approximately 22,000-75,000 cases per year annually during

late 1960s and early 1970s. Despite effective measles vaccine implementation, measles still causes 164,000 deaths per year worldwide.

In Africa before the introduction of measles vaccination the distribution of the disease was primarily affected young children, annually more than one million cases were reported.[8]

Ethiopia, one of the African countries with large measles epidemic, is still has reporting 10 thousands of cases each year, SNNPR share the large portion of cases reported.

Although the introduction of measles in the 1960s helped to reduce the scope of the disease on a global level, measles is still continued to be a public health problem in countries especially low vaccination coverage allowed the disease to persist. [7]

In the year 2000, as the World Health Organization (WHO) reports, an estimated 535,000 children died of measles while the majority of deaths were in developing countries. In 2010 there were 375,305 measles cases and an estimated 139,300 deaths registered globally. This is about 380 deaths per day.

According to the 2012 annual report of global measles and rubella initiative, global effort against measles has brought magnificent progress by decreasing measles death by 71 percent from 2000 to 2011. But yet, measles remain challenge for many countries in the world including developed ones.

The problem in those developed countries is due to importation of cases from measles-endemic countries or through in-migration of susceptible people. But, challenges of the disease in developing countries are of multiple factors contributed. Although the developed countries has achieved measles mortality reduction strategy and they able to control the disease, because of increasing cases in most countries and large number of susceptible children worldwide, they are not able to maintain measles elimination goal on the time table sat. But, measles death reduction is achieved by decreasing by more than seventy percent within 10 years duration.

By the year 2011 there were 158,000 measles deaths globally. When this is compared to the 2000s measles death of 548,000 the world has able to decrease measles death by more than 70 percent. [4]

Countries which succeeded decreasing measles death by such large percent is deserved their strong effort on routine immunization coverage plus with introduction of second dose in routine immunization and high quality nationwide campaigns.

The world health organization (WHO) member state of eastern African countries, Ethiopia and Kenya, have set goals for elimination of measles by 2020 while Somalia, member state of WHO eastern Mediterranean (EMR) region set goal to eliminate measles by 2015. Meanwhile in all these three countries, despite their effort towards the elimination goal, measles remain endemic with periodic outbreaks.

In Ethiopia during 2010-2011, a total of 9,756 measles cases were reported, while 2,566 cases in Kenya and 16,135 cases in Somalia. From all reported cases 78% were occurring among children under 5 years of age, of which majority are unvaccinated.[3]

Southern nation's nationalities and peoples region (SNNPR) is one of the regional states in the country where large number of measles cases reported every year. In this region measles outbreak is continued to be the challenge in the last couple of years. During the year 2013 only, a total of 7,586 measles cases were registered in the region. [Annual report of SNNPR, 2014]

Statement of the problem

Despite the high vaccination coverage of measles in the region, outbreaks are being increasingly reported from zones and special woredas every year.

According to the surveillance data analysis report of SNNPR, all zones in the region reported outbreak of measles in the year 2013 and Gedeo zone is among zones reported the outbreak. During early December of 2013, suspected outbreak of measles in Gedeb woreda -Gedeo zone was reported to regional PHEM. Verifying the outbreak, characterizing the outbreak, identifying the risk factors and controlling the outbreak raise a need to prompt response and investigation.

Objectives

General objective:

- To verify the existence of measles outbreak and determine the possible risk factors in Gedeb Woreda, Gedeo Zone, SNNPR.

Specific objectives

- To confirm the existence of measles outbreak in Gedeb Woreda, Gedeo Zone, 2014
- To describe the outbreak interns of person, place and time in Gedeb Woreda, Gedeo Zone, 2014
- To determine possible risk factors for the outbreak in Gedeb Woreda, Gedeo Zone, 2014

Methods and Materials

Study area: - The study was conducted during December 2013 to January 2014 in Gedeb Woreda, Gedeo Zone, SNNPR. Gedeb Woreda is one of the six Woredas in Gedeo Zone and located 150km south to Hawassa, capital of SNNPR and 76Km south to Dilla Town.

Study Period: The study was conducted during the time period of January 1st to January 15/2014 in Gedeb Woreda, Gedeo zone, SNNPR.

Study design: - Unmatched cases-control study was conducted enrolling 41 cases from line list of outbreak report registered in the Woreda and 82 controls neighboring the respective case. Case to control ratio was 1:2. Systematic random sampling technique was used, using line list as sampling frame.

Study population: - All children less than 15 years of age reside in Gedeb woreda are source population of this study while those children of same age reside in Kebeles affected by measles are study population. Those cases of measles with active signs and symptom were enrolled as "cases" while those without sign and symptom, living in the same house hold or neighboring are enrolled as "controls".

1. Case definition

Suspected case

A Suspected case of measles defined as any person in Gedeb woreda with fever and maculopapular (non-vesicular) rash and cough, coryza or conjunctivitis (red eyes) OR any person in whom a clinician suspects measles during December 2013 to January 2014.

Confirmed case

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

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 a month OR the occurrence of 5 or more reported suspected cases of measles in a health facility/district in a month.

Inclusion criteria

Cases*:* Any residents of Gedeb Woreda who had symptoms of measles or tested positive for IgM from December 2013 to January 2014.

Controls*:* Any residents of Gedeb Woreda who is a family member or neighbor to a case and who did not develop signs and symptoms of measles.

Exclusion criteria

Cases*:* Those who have no any sign and symptom of measles were excluded.

Controls*:* Those who have or have had signs and symptoms of measles or tested IgM positive for measles were excluded.

Data collection and analysis:

Cases and controls were interviewed using a structured questionnaire. For each case two controls were enrolled. During interview for child cases, we interviewed the parents or care takers. For descriptive part of the study the line list which was reported to the zonal health department PHEM between December 1st 2013 and January 28th of 2014 were reviewed and analyzed. Data was analyzed using EpiInfo version 7.1.4.0 and Microsoft Excel 2013.

Data quality control:

Before the data collection proceeds questionnaires were tested by interviewing five parents of children in kebeles near to study area but in the same woreda. Then with few modifications on

some of the questions data collection was carried out by the principal investigator. The health workers working in the health center near to the affected kebeles were participated in assisting to get information about vaccination status of study subjects. The language used to prepare questionnaire was English but the investigator fluently speaks and writes the local language of source population, therefore preparing the questionnaire in local language was found unnecessary.

Ethical considerations:

Official letter from SNNPR regional health bureau to Gedeo Zone health department as well as Gedeb woreda was obtained prior to attempt the investigation. Verbal consent of each study subject parents or care takers was obtained before interviewing.

Result dissemination Plan:

The study result was planned to disseminate to the respective woreda, Gedeo zone and SNNPR health bureau and to AAU school of public health. According to plan the result is disseminated to all.

Result

Demography:

According to the Ethiopian demography and health survey (EDHS) the total population of Gedeb woreda in 2014 is 179,239 where children under one year of age are 4,338(2.42%), children under five years of age are 27,961(15.6%), those under 15 years of age are 85, 802 (47.87%) and women in child bearing age are 41,763(48.33%). There are 16 rural and one urban kebele administrations in the woreda. Five kebeles, Kedida Gubeta, Bisha Mora, Geshe, Dibandibe and Abel are affected by the outbreak where Kedida Gubeta is the most affected one.

Descriptive

We identified a total of 108 cases of measles (5 laboratory confirmed and 48 epi-linked) with median age of 7years, ranging from 6 months to 16 years. The most affected age group was under five years of age (47.2%) followed by 5-9 years of age group (36.1%).The age specific

attack rate was also highest in age group of under five year (185/100,000) followed by those 5-9 years of age group (132/100,000) with case fatality of 0% for all. From all measles patients 88% (95) have no history of vaccination and only the rest 12% (13) of the cases have history of at least one dose of measles vaccine exposure. The proportion of male (58%) was higher than female cases of measles.

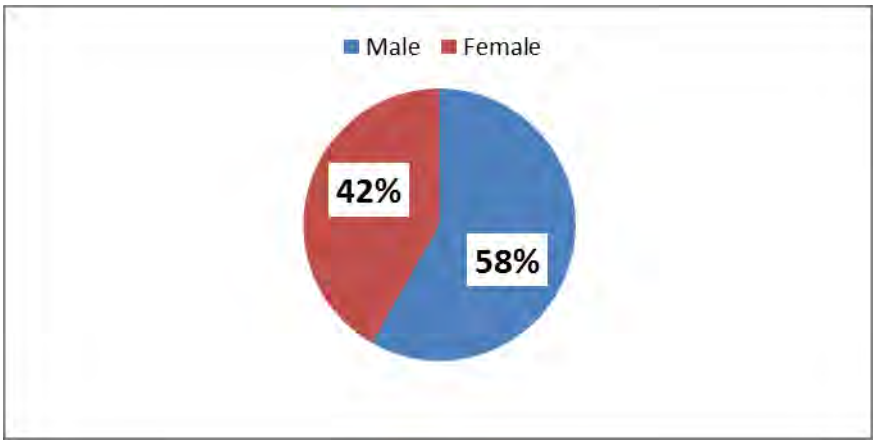

Figure 1: Proportion of measles cases by sex in Gedeb Woreda, Gedeo Zone, SNNPR, 2014.

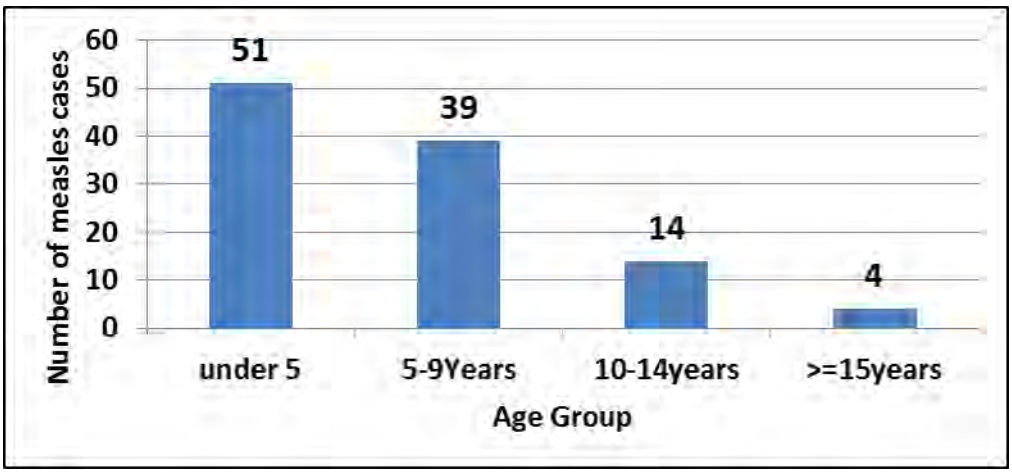

Figure 2: Number of measles cases by age group, Gedeb woreda, Gedeo Zone, SNNPR, 2014.

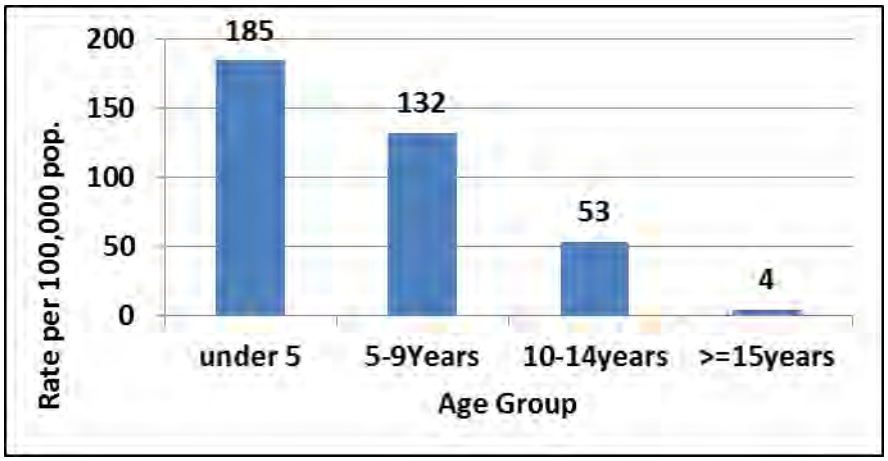

Figure 3: Age Specific Attack Rate of measles per 100,000 populations by group, Gedeb woreda, Gedeo zone, SNNPR, 2014.

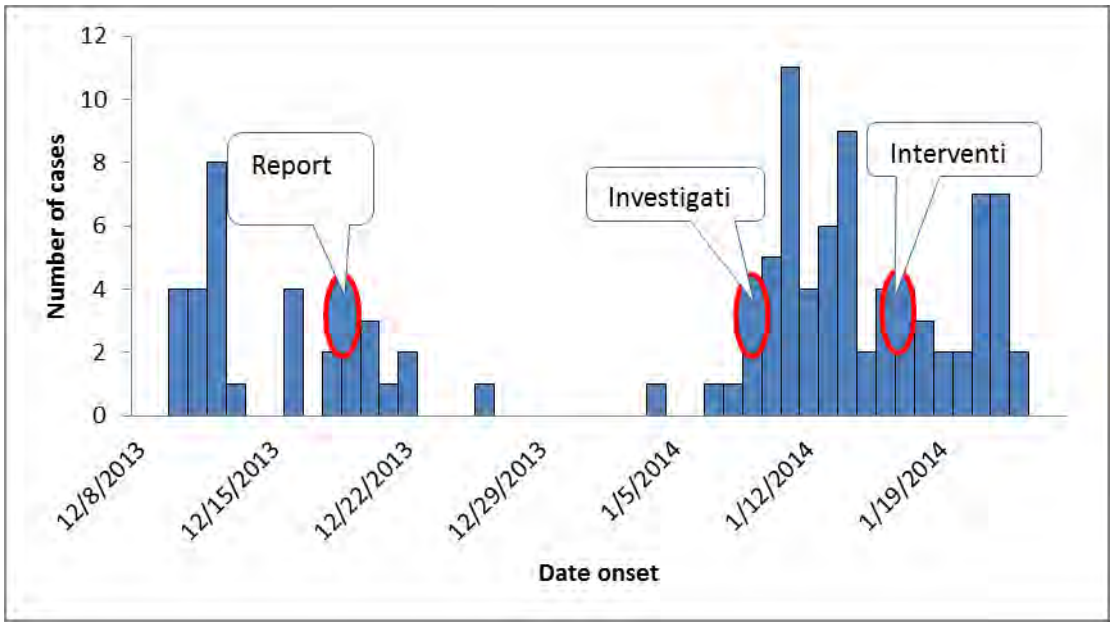

Figure 4: Epidemic curve of measles cases by date of onset, Gedeb Woreda, Gedeo Zone, SNNPR, 2014.

Number of measles cases peaked on January 11th of 2014 and gradually decreased then after. No cases were reported after January 23rd of 2014 for the consecutive several months.

Case-control

We interviewed 41 cases with median age of 5 years ranging from (6months to 15 years) and 82 controls with median age of 4 years ranging from (9 month to 21 years). Regarding sex distribution, 23(56%) of cases and 51(62%) of controls were males.

Table 1.Results of Bivariate Analysis of Risk for measles, Gedeb woreda, Gedeo Zone, SNNPR, Ethiopia, 2014.

Variables	Response	Case	Control	OR	95%CI
Ever vaccinated for measles?	No	34	41	4.9	(1.08,8.82)
	Yes	7	41		
Family size person per HH	> 6	30	32	4.3	(1.9,9.7)
	≤ 6	11	50		
Do you Know how measles transmitted?	No	23	62	2.4	(1.1,5.4)
	Yes	18	20		
Do you Know measles is vaccine preventable?	No	23	22	3.4	(1.6,7.6)
	Yes	18	60		

Results of Multivariate analysis for Risk Factors, Gedeb woreda, 2014

Table 2. Results of Multivariate analysis for Risk Factors, Gedeb woreda, Gedeo Zone, SNNPR, Ethiopia, 2014.

Term	Odds Ratio	95%	C.I.	Coefficient	S. E.	Z-Statistic	P-Value
Family member >6 /HH	4.2074	1.2328	14.3592	1.4369	0.6263	2.2942	0.0218
Vaccination status = No)	3.7165	1.0331	13.3698	1.3128	0.6532	2.0098	0.0444
Do you know mode of transmission of measles =No)	1.5508	0.4233	5.6811	0.4388	0.6624	0.6623	0.5077
Do you know measles is Vaccine preventable = No)	1.9721	0.5295	7.3457	0.6791	0.6709	1.0122	0.3114

Public health interventions

Measles mass vaccination for all under 5 years children in the affected kebele and all kebeles bordering with this affected kebele. Active case management in the health center level was given to control the outbreak. Community mobilization to create awareness on mode of transmission and prevention measures including mechanisms to reduce contact with active cases. Vaccination was given to 8,649 under 5 year children of 4 kebeles (6month to 59 months).

Discussion

The incidence rate of measles in Gedeb woreda was highest among children under 5 years of age (185/100,000) and it is essentially less than measles incidences recorded in different regions of the country, even in the same region. The incidence rate recorded during measles outbreak of Wolayta Zone, SNNPR in 2013 was 200/100,000.[SNNPR, outbreak investigation report, Measles outbreak in Wolaita Zone, 2013] Similar study conducted in Oromia Region, Bale Zone during November 2010 through February 2011 was also documented incidence rate of 200/100,000. [EPHI, Investigation of Measles Outbreak, 2011]

Children not vaccinated for measles were 4.9 [95% CI: 1.9-12.2] times more likely to acquire measles than vaccinated one. This significant association between being unvaccinated and measles disease indicates the most possible factor for the outbreak is low vaccination coverage. The probability acquiring measles among children living in the households with more than six family members was 4.3[95% CI: 1.9-9.7] times higher than that of children living in the households with less than six family members. Crowded living condition contributed for spread of the outbreak in the community.

Regarding the factors associated with measles outbreak in Gedeb woreda, routine vaccination in the affected and surrounding kebeles was not strong in the last 3 years (Source: Woreda health office EPI unit). Beside the dropout rate above the accepted level of WHO recommendation (<10%), the average vaccination coverage for measles in these kebeles was 71%, 76% and 69% in 2010, 2011 and 2012 respectively. No SIA was conducted in these years. This indicates low vaccination coverage (high number of unvaccinated children) and high dropout rate are the most possible cause of the outbreak which is also concise with the finding that showed being unvaccinated is significantly associated with the disease (OR= 4.9, 95%CI:1.08-8.82).

Limitations

Limited time permitted to investigate the outbreak and lack of transportation (we used public transport) was largely affected our study in terms of areas that need to be visited. We used the line list recorded in the health facility but there would be a possibility of getting more cases from

the community residing in remote villages. The vaccination history was also obtained from line list and no written evidence was found in almost all visited households.

Conclusion

Sub optimal measles vaccination coverage for consecutive years resulted in increased number of susceptible population and triggered the outbreak finally. Although children under five years age affected more compared to others, increased age specific attack rate(ASAR) in 5-9years age group next to under-fives can be warning sign for age shift in the coming years unless complete mass vaccination with high coverage is conducted in the whole Worda.

Recommendation

Strong routine vaccination should be ensured with regular defaulter tracing mechanisms. Any possible challenges for routine EPI should be assessed and solved at the woreda as well as zonal level. Those 5-9years age groups should considered in mass vaccination in future plans of SIAs.

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1.2. Outbreak Investigation of Suspected diphtheria cases in Alle and Konso woreda, Segen Zone, SNNPR, Ethiopia, January 2015.

Abstract

Background: On February 27/2015 Ethiopia Public Health Institute (EPHI) received a report on outbreak of undiagnosed illness and death in Segen Zone, SNNPR which resulted in 13 cases and three deaths. We deployed to the area on February 28/2015, in order to investigate the outbreak. To confirm the outbreak, identify the etiology of the disease, identify the potential source of the disease and produce recommendation for prevention and control measures.

Method: Unmatched cases control study was conducted taking all symptomatic cases as "cases" and family members and/or close contacts and/or neighbors in Segen Zone as "controls" in 1:3 ratios for cases to control. Laboratory investigation of different samples (Whole blood, serum, nasal and throat swab, food items) from cases as well as controls was conducted. Data was analyzed using EpiInfo version 7.1.4.0 and MS Excel 2013.

Result: A total of 77 cases with six deaths (CFR: 7.8%) identified. Out of all cases 99% have sore-throat, 94% have dysphagia, 53% have change in voice, 49% have blurred vision and headache while 4% have aphonia and diplopia. 22.6% had history of direct contact with person who has symptom before one to two days of their illness. Although all cases (100%) had shared same meal with their family members in times/days before the onset only 2% of cases were from same household. The most affected age group is 15-59 years (ASAR:47/100,000). No laboratory result found supportive for any of the differential diagnosis made.

Conclusion: The clinical presentations, disease distribution sparing family members and affecting adults and older children compared to children below five years of age is more compatible with diphtheria than other diseases.

Key words: Outbreak, Diphtheria, SNNPR

Background

Southern Nation Nationalities and Peoples Region (SNNPR) is one of the nine regions in Ethiopia, located in Southern and South-western part of the country with estimated 18,375,050 total population and 110,931 km^2 of total area giving population density of 166 person per km^2.

The region is bordered by Gambela Region in the West, Sudan in the south west, Kenya in South, and surrounded by Oromia Region in East, North and North –west directions. It roughly lies between $4.43^0 – 8.58^0$ North latitude and $34.88^0 – 39.14^0$ East longitudes. The region has 15 zones (136 Woredas) and 4 special woredas, these are also further divided in to 3678 rural kebeles, 238 urban kebeles.

Segen Zone is one of the 15 zones of SNNPR bordering with Gamogofa Zone in the North, South Omo Zone in the South and surrounded by Oromia region in all the rest of all directions. There are five woredas in Segen Zone, namely Alle, Amaro, Burji, Derashe and Konso woredas with the total population of 804, 771.

On February 27, 2015 Ethiopian Public Health Institute (EPHI) received phone report of three deaths and 9 cases from unknown cause occurred in Konso Woreda, Segen Zone and deployed a team on February 28, 2105. A team of one EFETP resident and two medical practitioners deployed by EPHI to investigate this outbreak of unknown.

In addition to the deployed by EPHI, SNNPR PHEM head and officer, Segen Zone health department, Segen Zone Administration officials, partners working in the region (WHO, MSF, Save the Children) were involved in the outbreak response.

Literature review

Diphtheria is an acute, toxin-mediated disease which caused by the bacterium Corynebacterium diphtheriae. C. diphtheriae is anaerobic gram-positive toxin producing bacillus. Toxin production or toxigenicity is occurs only when the bacillus is itself infected or lysogenized by a specific virus which feed bacteria and known as bacteriophage carrying the genetic information for the toxin called toxgene. [1]

C. diphtheriae has three biotypes; C. diphtheriae gravis, C. diphtheriae intermedius, and C. diphtheriae mitis. The most severe disease is associated with the gravis biotype, but any strain may produce toxin. [1]

Susceptible persons may acquire toxigenic diphtheria bacilli in the nasopharynx. The organism produces a toxin that inhibits cellular protein synthesis and is responsible for local tissue destruction and membrane formation (pseudo membrane).[2] The toxin produced at the site of the membrane is absorbed into the bloodstream and then distributed to the tissues of the body. The toxin is responsible for the major complications of myocarditis and neuritis and can also cause low platelet counts (thrombocytopenia) and protein in the urine (proteinuria). [1]

Human carriers are the reservoir for C. diphtheriae and are usually asymptomatic. In outbreaks, high percentages of children are found to be transient carriers. Transmission of the disease is most often person to person through respiratory tract.[2] Rarely, transmission may occur from skin lesions or articles soiled with discharges from lesions of infected persons. Transmission may occur as long as virulent bacilli are present in discharges and lesions. The time is variable, but organisms usually persist two weeks or less, and rarely more than 4 weeks, without antibiotics. Chronic carriers may shed organisms for 6 months or more. However effective antibiotic therapy quickly terminates shedding the bacillus. [3]

The incubation period of diphtheria is two to five days (range, one to ten days) and the disease can involve almost any mucous membrane. The clinical purpose, diphtheria is classified into a number of manifestations depending on the site of disease.

1. Anterior Nasal Diphtheria

The onset of anterior nasal diphtheria is indistinguishable from that of the common cold and is usually characterized by a mucopurulent nasal discharge (containing both mucus and pus) which may become blood-tinged. A white membrane usually forms on the nasal septum. The disease is usually fairly mild because of apparent poor systemic absorption of toxin in this location, and it can be terminated rapidly by antitoxin and antibiotic therapy. [1,2]

2. Pharyngeal and Tonsillar Diphtheria

The most common sites of diphtheria infection are the pharynx and the tonsils. Infection at these sites is usually associated with significant systemic absorption of toxin. The onset of pharyngitis is insidious. Early symptoms include malaise, sore throat, anorexia, and low-grade fever. Within 2–3 days, a bluish-white membrane forms and extends, varying in size from covering a small patch on the tonsils to covering most of the soft palate. Often by the time a physician is contacted, the membrane is greyish-green, or black if bleeding has occurred. There is a minimal amount of mucosal erythema surrounding the membrane. The membrane is adherent to the tissue, and forcible attempts to remove it cause bleeding. Extensive membrane formation may result in respiratory obstruction. [2]

The patient may recover at this point; or if enough toxins are absorbed, develop severe prostration, striking pallor, rapid pulse, stupor, and coma, and may even die within 6 to 10 days. Fever is usually not high, even though the patient may appear quite toxic. Patients with severe disease may develop marked edema of the submandibular areas and the anterior neck along with lymphadenopathy, giving a characteristic “bull neck” appearance.[4]

3. Laryngeal Diphtheria

Laryngeal diphtheria can be either an extension of the pharyngeal form or can only involve this site. Symptoms include fever, hoarseness, and a barking cough. The membrane can lead to airway obstruction, coma, and death. [3]

4. Cutaneous Diphtheria

Skin infections are quite common in the tropics and are probably responsible for the high levels of natural immunity found in these populations. Skin infections may be manifested by a scaling rash or by ulcers with clearly demarcated edges and membrane, but any chronic skin lesion may

harbor C. diphtheriae along with other organisms. The severity of the skin disease with toxigenic strains appears to be less than in other forms of infection with toxigenic strains. Other sites of involvement include the mucous membranes of the conjunctiva and vulvo vaginal area, as well as the external auditory canal.[1]

The differential diagnosis of pharyngitis includes infectious mononucleosis, Group-A streptococcal tonsillo pharyngitis and epiglottitis, pharyngitis due to viruses, Vincent's angina, Corynebacterium ulcerans, Corynebacterium hemolyticum, and severe oral candidiasis can also be confused with diphtheria [4].

Most complications of diphtheria, including death, are attributable to effects of the toxin. The severity of the disease and complications are generally related to the extent of local disease. The toxin, when absorbed, affects organs and tissues distant from the site of invasion. The most frequent complications of diphtheria are myocarditis and neuritis. Myocarditis may present as abnormal cardiac rhythms and can occur early in the course of the illness or weeks later, and can lead to heart failure. If myocarditis occurs early, it is often fatal. [5]

Neuritis most often affects motor nerves and usually resolves completely. Paralysis of the soft palate is most frequent during the third week of illness. Paralysis of eye muscles, limbs, and diaphragm can occur after the fifth week. Secondary pneumonia and respiratory failure may result from diaphragmatic paralysis.[3] Other complications include otitis media and respiratory insufficiency due to airway obstruction, especially in infants. The overall case-fatality rate for diphtheria is 5%-10%, with higher death rates (up to 20%) among persons younger than five years and older than 40 years of age. [1,5]

Diagnosis of diphtheria is usually made on the basis of clinical presentation since it is imperative to begin presumptive therapy quickly. In the event that prior antibiotic therapy may have impeded a positive culture in a suspect diphtheria case, two sources of evidence can aid in presumptive diagnosis: 1) isolation of C. diphtheriae from cultures of specimens from close contacts, or 2) a low non-protective diphtheria antibody titer (less than 0.1 IU) in serum obtained prior to antitoxin administration. A culture medium containing tellurite needed for effective laboratory diagnosis of c. diphtheriae. [1]

Persons with suspected diphtheria should be given antibiotics and antitoxin in adequate dosage and placed in isolation after the temporary clinical diagnosis is made and appropriate cultures are obtained. But, antitoxin will not neutralize toxin that is already fixed to tissues, but it will neutralize circulating or unbound toxin and will prevent progression of disease. However, the patient must be tested for sensitivity before antitoxin is given.

Antibiotic treatment with erythromycin orally or by injection for 14 days, or procaine penicillin daily for 14 days is recommended. The disease is usually not contagious 48 hours after antibiotics are instituted. Elimination of the organism should be documented by two consecutive negative cultures after therapy is completed.

Close contacts, especially household contacts will be given a diphtheria booster, appropriate for age. Contacts should also receive antibiotics like benzathine penicillin stat dose or a seven to ten day course of oral erythromycin. Identified carriers in the community should also receive antibiotics. [3]

Diphtheria and tetanus toxoids and acellular pertussis vaccine (DTaP) is the vaccine of choice for children six weeks through six years of age. The usual schedule is a primary series of four doses at 2, 4, 6, and 15 to 18 months of age. The first, second, and third doses of DTaP should be separated by a minimum of 4 weeks. The fourth dose should follow the third dose by no less than 6 months, and should not be administered before 12 months of age. [1]

Botulism

Botulism is potentially life threatening neuro-paralytic syndrome resulting from the action of a neurotoxin elaborated by the bacterium *Clostridium botulinum*. This disease has a long history and the first investigation of botulism occurred in the 1820s among hundreds of patients with "sausage poisoning" in a southern Germany. The organism was named Bacillus botulinus after the Latin word for sausage, botulus.[1]

C. botulinum is a heterogeneous group of gram-positive, rod-shaped, spore-forming, obligate anaerobic bacteria. Eight strains of C. botulinum have been distinguished based upon the antigenic specificities of their toxins; a single strain almost always produces only one toxin type. [3] The spores of C. botulinum are heat-resistant, easily surviving 100ºC at one atmosphere for five or more hours. However, spores can be destroyed by heating to 120ºC for five minutes.

When appropriate environmental conditions like restricted oxygen exposure which is either an anaerobic or semi-anaerobic environment, low acidity (pH >4.6) water, a temperature of 25 to 37ºC for ideal growth however some strains may grow in temperatures as low as 4ºC are present, the spores will germinate and grow into toxin-producing bacilli.[4]

Among an average of 110 botulism cases reported each year in the United States, approximately 72 % of cases are infant botulism, 25% are foodborne botulism, and the remaining 3% are wound botulism. Adult infectious botulism is only occasionally reported.

Foodborne cases of botulism are most commonly recognized as small outbreaks, usually involving home canned foods such as fruits, vegetables, and fish whereas commercial products and restaurants are occasionally sources of infection [21].

The onset of symptoms in foodborne botulism usually begins within 12 to 36 hours after ingestion of the preformed toxin, but the incubation period may range from several hours to one week. Prodromal symptoms often include nausea, vomiting, abdominal pain, diarrhea, and dry mouth with sore throat, but these symptoms can occur at any time throughout the course of the illness [3].

Clinical manifestation of botulism is classically described as acute onset of bilateral cranial neuropathies associated with symmetric descending weakness [4]. However there are key futures of botulism considered; absence of fever, symmetric neurologic deficits, patient remains responsive, normal or slow heart rate and normal blood pressure, and no sensory deficits with the exception of blurred vision. Nonspecific gastrointestinal symptoms also may be seen [3] and are occasionally the predominant manifestations [2].

Cranial nerve association most commonly marks the onset of symptomatic illness and can include blurred vision (secondary to fixed pupillary dilation and palsies of cranial nerves III, IV, and VI), diplopia, nystagmus, ptosis, dysphagia, dysarthria, and facial weakness. Descending muscle weakness usually progresses to the trunk and upper extremities, followed by the lower extremities. Urinary retention and constipation are common resulting from smooth muscle paralysis. Occasionally paresthesias and asymmetric limb weakness are seen [34]. Respiratory difficulties requiring intubation and mechanical ventilation are common, caused by

diaphragmatic paralysis, upper airway compromise, or both. Despite the evidence of neurologic involvement, cerebrospinal fluid analysis is normal [3].

Objectives

General Objective

To determine and characterize the outbreak in terms of cause and risk factors.

Specific Objective

- To confirm the existence of the outbreak in Alle and Konso woreda, Segen Zone, SNNPR
- To identify possible risk factors for the outbreak in Alle and Konso woreda, Segen Zone, SNNPR
- To identify the etiologic agent causing the disease in Alle and Konso woreda, Segen Zone, SNNPR
- To recommend appropriate prevention and control measures

Methods and Materials

Study area and population

This outbreak investigation was conducted in Alle and Konso woreda, Segen Zone, SNNPR during March of 2015. Segen Zone is one of the 15 zones in SNNPR. There are five woredas in Segen Zone, namely Alle, Amaro, Burji, Derashe and Konso.

Study period

The study was conducted from March 2nd to 21, 2015.

Study design

Unmatched cases control study conducted taking all symptomatic cases as “cases” and family members and/or close contacts and/or neighbors as “controls” in 1:3 ratios for cases to control.

Sample size

As the suspected outbreak of diphtheria is a rare outbreak condition, the investigation will enroll few available cases with relatively higher proportion of controls. Taking 95% confidence level, 80% statistical power, ratio of controls to cases to be 3, with the assumption of 50% controls exposure (prevalence) and 0.05 margin of error the sample size calculated was 50 (13 cases and 37 controls).

Data quality control

Before proceeding data collection on real study subjects, questionnaires were tested by interviewing seven individuals living in the same village but they were neither control nor cases. Then with few modifications on some of the questions data collection was carried out by the principal investigator. The health workers working in the health center near to the affected kebeles were participated in translating the interview questions to local language. The language used to prepare questionnaire was English but the need for translator was found mandatory at every steps of the study and this was arranged earlier.

The collected data was rechecked for any missing information every day before it was entered into the database.

Operational definition

Cases: Any person living in Segen zone presented with sudden onset of sore throat and pain on swallowing, change in voice or blurring of vision (hoarseness) or double vision since February 2015.

Controls: Any person lining in the same house hold or village with "cases" and has no sign and symptom of sore throat or pain on swallowing or change in voice (hoarseness) or double vision since February 2015.

Data collection

Comprehensive questionnaire for interview was developed targeting all possible causes of the disease based on differential diagnosis made by the physicians. Botulism, Diphtheria, GI anthrax, Brucellosis, Meningitis and Poisoning (Chemical, plant, insects, snake) were considered. Data

was obtained from Hospital registration, interview and observation. Data was analyzed using EpiInfo version 7.1.4.0 and MS Excel 2013. Laboratory investigation of different samples (Whole blood, serum, nasal and throat swab, food items) from cases as well as controls was conducted.

Inclusion criteria

Cases: Any person living in Segen zone presented with sudden onset of sore throat and pain on swallowing, change in voice or blurring of vision (hoarseness) or double vision since February 2015.

Controls: Any person lining in the same house-hold, or village with "cases" and has no sign symptom of sore throat or pain on swallowing or change in voice (hoarseness) or double vision since February 2015.

Exclusion criteria

Cases: Any person residing in Segen Zone, and has no sign symptom of sore throat or pain on swallowing or change in voice (hoarseness) or double vision since February 2015 was not included as a "case" in this study.

Controls: Any person living in Segen zone with sign and symptom of sore throat and pain on swallowing, change in voice or blurring of vision (hoarseness) or double vision since February 2015 not included as "control" in the study.

Result dissemination plan

The study result was planned to disseminate to the respective woreda, Segen zone and SNNPR health bureau and to AAU school of public health. According to plan the result (prelminary) is disseminated to all mentioned.

Ethical considerations

Official support letter from Ethiopian public health institute (EPHI) was obtained before our departure to Segen Zone and communicated to the respective health departments at every level of

the health system. Interview of the study subjects was done after obtaining verbal consent from each individual to be interviewed and parents in case of young children.

Result

The index case, a 45 years old male patient whose name is Kamayta Tutisha Bargayle (date of onset Jan 19/2015) from Alle Woreda, Goroze kebele, Gone village was seen in private health facility on Jan 20/2015 and died on January 21/2015 in his home. As the history taken from his family, he was attended ceremony of Ethiopian "Epiphany" with rest of his family and neighbors a day before onset of disease. They consumed cow meat shared with more than twenty households living in the same village. He ate raw as well as cooked meat as his friends and family did. But, he had diarrhea the night they ate meat. No one had similar complain. Next day he complained sudden onset of sore throat and difficulty of swallowing followed by low voice which ended up with complete loss of voice after one day of the initial complain. He taken to private health facility and treated but no improvement was seen, thus the private health facility sent him back to his home telling his relatives that the case is beyond his capability to treat. Then, he died on Jan 21st 2015.

More than 200 people attended the funeral, including his family, neighbors and relatives. They shared everything they have to eat and drink. After burial, they continue life as usual. The index case had no history of travel to other areas in recent months; no one from other areas visited them in the weeks or months before the illness.

After one month of this event, on Feb. 25/ 2015, number of patients with similar signs and symptoms from similar kebele and village visited Arfayde Health center in Konso Woreda. They were complaining sore throat, difficulty of swallowing, low voice with hoarseness.

Out of 10 patients visited the health center at same day, seven were referred to Arbaminch Hospital on February 26, 2015 and the rest three remain at the health center. The reason these seven patients were referred to Arbaminch Hospital was their severe condition of illness and inability to swallow oral medication. The rest three were able to swallow (with pain) the oral

medication given. The treatment given was erythromycin for 14 days and procaine penicillin twice a day for three days.

Among the referred seven patients, three were died at Arbaminch Hospital and the rest four were again referred to Hawassa Hospital on Mach 1st 2015.

After these clusters of cases, patients with similar symptom begin to flow to the Arfayde Health center and distribution of the cases increased from day to day.

A total of 77 cases with six deaths (CFR: 6.8%) identified from Alle woreda (7kebeles) and Konso woreda (14 kebeles). Although all cases (100%) had shared same meal with their family members in times/days before the onset only 2% of cases were from same household. 22.6% had history of direct contact with person who has symptom before one to two days of their illness. The most affected age group is 15-59 years (ASAR:47/100,000). No lab result found supportive for any of the differential diagnosis made.

Although the distribution of cases is in all age group, the most affected age group is 15-59 years followed by under 15 years.

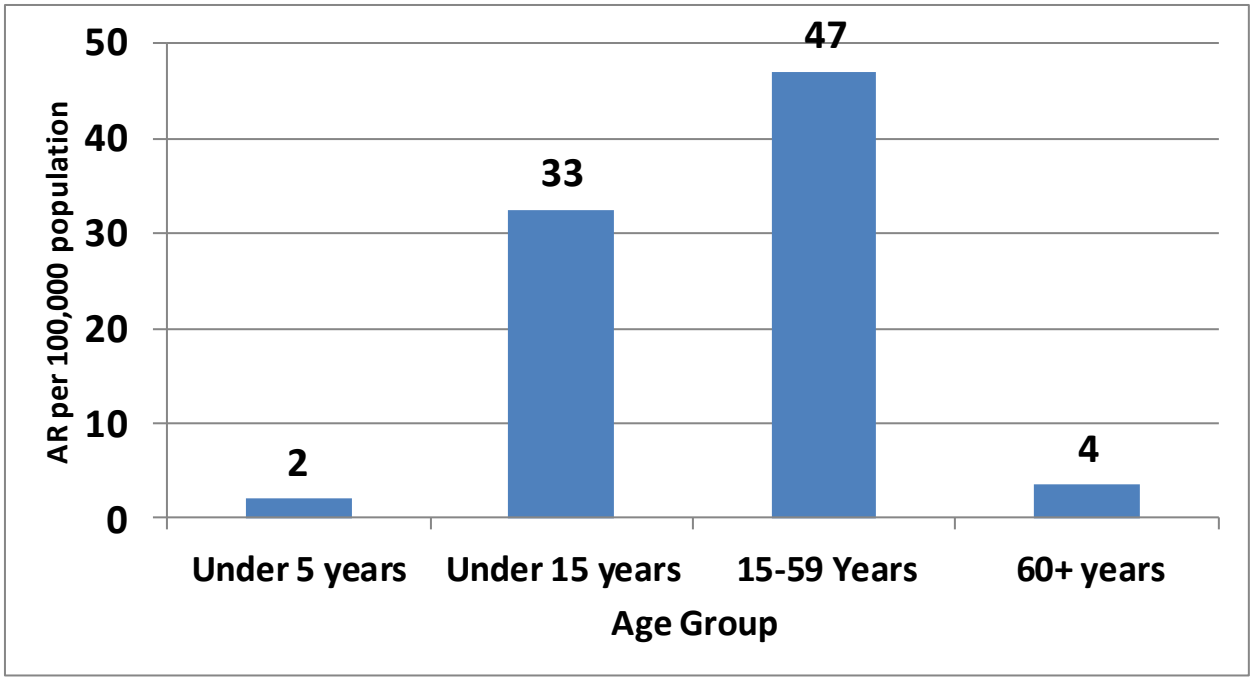

Figure 5: Age specific attack rate of the outbreak by age group, Alle and Konso woreda, SNNPR, March 2015.

The distributions of cases were observed higher among female.

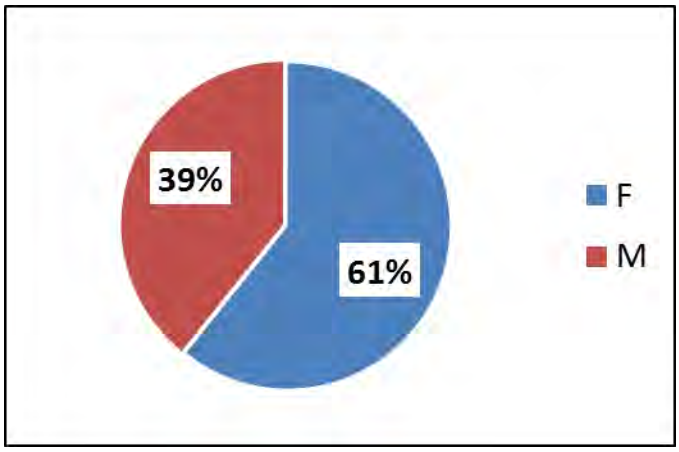

Figure 6: Distribution of Suspected Diphtheria Cases By Sex, Segen Zone, SNNPR, 2015.

Regarding the distribution of cases by kebele, 17 kebeles out of 43 in Konso woreda is affected while 7 kebeles out of 17 in Alle woreda. Goroze is the initially affected kebele of Alle woreda.

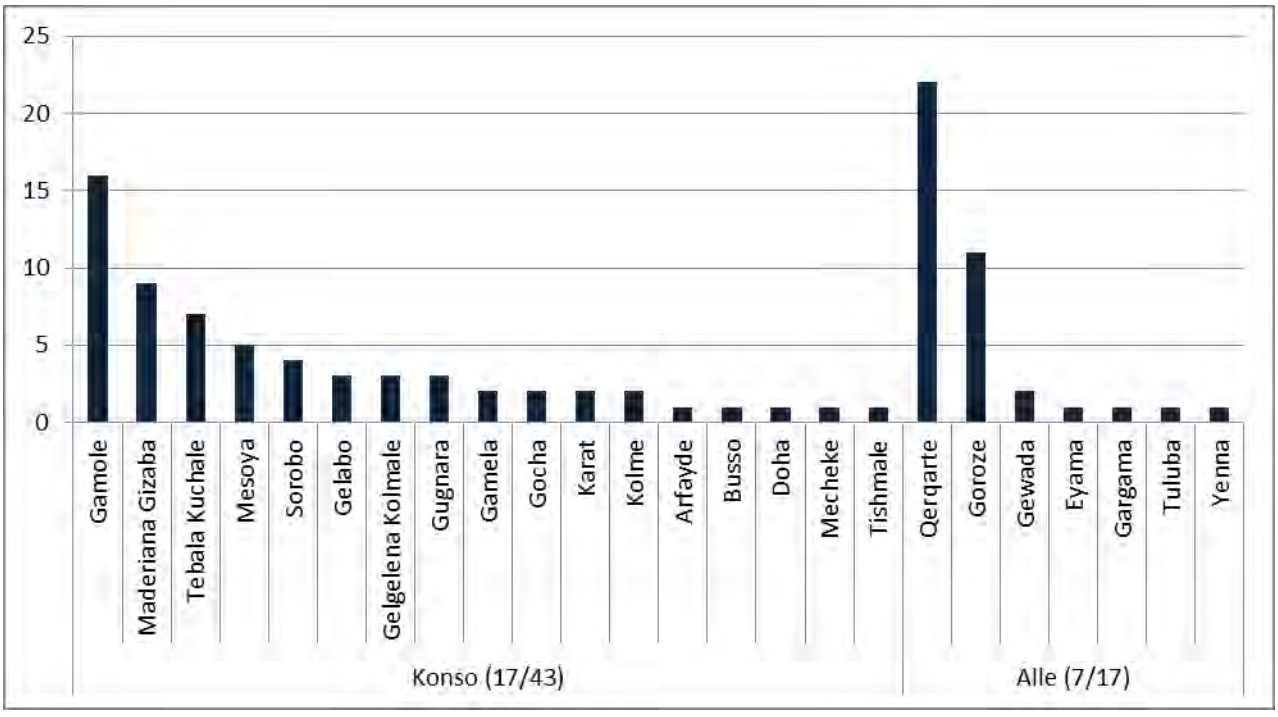

Figure 7: Distribution of Suspected Diphtheria Cases By Kebele, Segen Zone, SNNPR, 2015.

The epidemic pattern of the outbreak shows a propagated type of distribution which might be compatible with a possible person to person transmission of this outbreak.

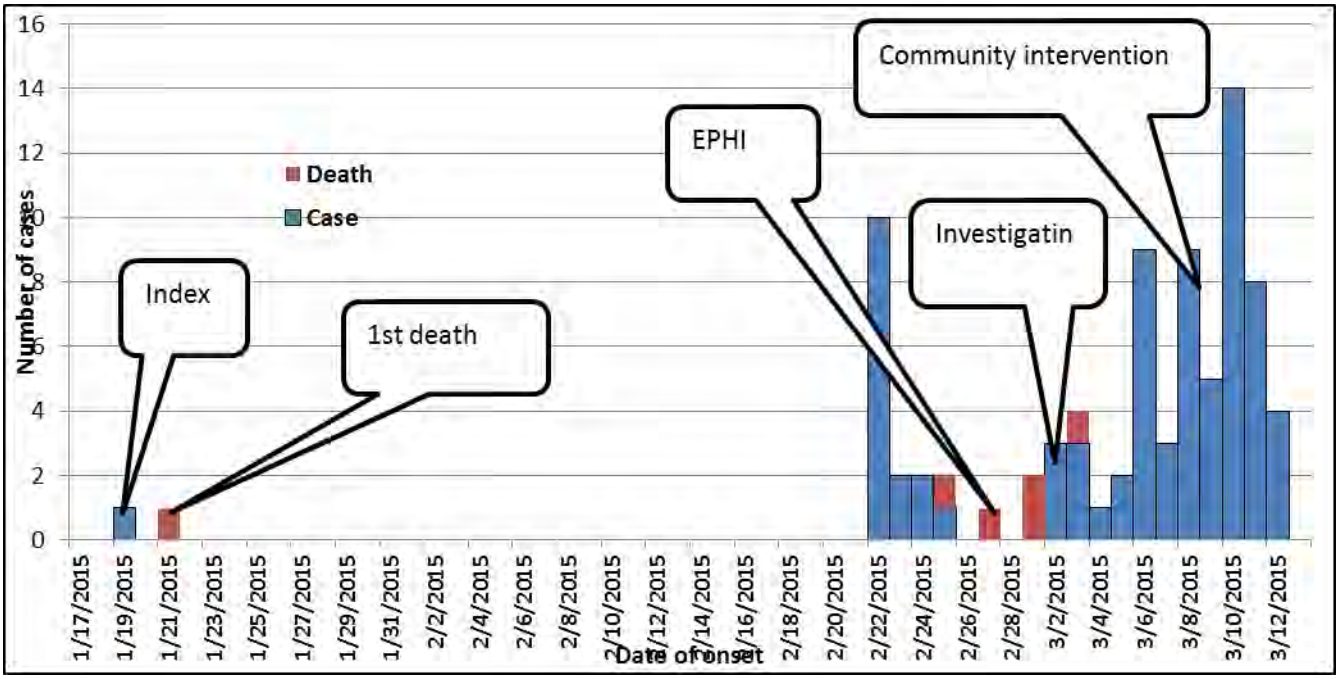

Figure 8: Epidemic curve of suspected outbreak of diphtheria in Segen Zone, SNNPR, 2015.

From observed cases majority of them have sore throat and dysphagia of sudden onset. Out of all cases 99% have sore-throat, 94% have dysphagia, 53% have change in voice, 49% have blurred vision and headache, 34% had low grade fever(<38^{o}C), while 4% have aphonia and diplopia. However, only 1% of all cases had swelling on their anterior-neck.

Table 3: Proportion of symptoms observed in suspected cases of diphtheria, Segen Zone, SNNPR, 2015.

Symptom	Percent
Sore throat	**99%**
Dysphagia	**94%**
Change in voice	**53%**

Headache	**49%**
Bluring of vision	**49%**
Fever (>=38.0 c)	**34%**
Aphonia	**4%**
Diplopia	**4%**
Neck swelling	**1%**

Laboratory findings

Although all suggested samples, whole blood, serum, throat and nasal swab was collected to examine diphtheria as well as other possible causes of outbreak , no feedback was given to the team. The samples were collected at the outbreak site and transported to EPHI as well as Atlanta.

Possible risk factors

All cases have no previous history of similar illness but 29 (37.7%) out of 77 cases has direct contact with person who has symptom before one to two days of their illness. The rest of case has no known direct contact with person with symptom. Therefore, direct contact with symptomatic case has found to increase risk of acquiring the disease. The reason why the rest of the contacts or family members is not developed the disease is remained unanswered.

Seventy five (97.4%) of the cases consumed “Checka”, locally prepared alcoholic drink made of sorghum. Checka is cultural drink with some amount of alcoholic content and consumed by all community members in Konso and Alle.

Fifty two (67.5 %) of the cases drunken “Cheka” sharing cup (locally made or plastic) with someone else one to seven days prior to their illness.

More than 60 % (46) of female are affected (1.5:1). The cultural difference among male and female in the community were tried to assess. Women in Konso and Alle woreda are found more intimate than males with their friends and more likely to share “Cheka” each other than males

do(source: local community leaders and elders). The other point different in women is they tend to kiss each other when they meet each other, mostly lip-to-lip.

Adults and older children are more affected compared to children below five years of age might more support the hypothesis of diphtheria than other diseases as children are vaccinated for DPT/Penta in recent years compared to older children and adults. As more susceptible population found in the community, the probability of disease transmission increases mainly in older ages than under-fives.

When symptoms of the patients analyzed has more similarity to diphtheria and botulism than other differentials (GI anthrax, meningitis and poisoning).

Similarities among clinical presentations, incubation period and epidemiology analyzed and showed that diphtheria is more likely than botulism in the following points;

- In a family consumed the same meal it is unlikely that botulism will affect only one person from all.
- In diphtheria it is possible that the infection may spare some of the members of the family, depending on their susceptibility for the disease.
- Botulism usually results in point source epidemic mainly with in defined geographical distribution.
- The epidemiological pattern observed shows propagated type rather than point source, therefore, person to person transmission is more likely.

Public health interventions

Active Surveillance

Health workers were oriented on the event and methods to conduct active surveillance at the community level. All villages in both Alle and Konso woreda are actively searched for cases using community cases definition. The community case definition used was, “Any person with sudden onset of sore throat and difficulty of swallowing”.

Case definition was distributed to health extension workers (HEWs), health workers working in the health centers as well as community leaders. Contact tracing in each kebele and health facility level were done by health workers and HEWs.

Public Awareness

Meeting at Woreda and kebele level with community leader and private health facilities is conducted. People gatherings, markets and schools were targets area for mass education.

Monitoring and Evaluation

The teams at woreda level monitor and evaluate daily activities of the intervention and updates of the cases in each kebele. Task force and technical working task group were formed in each woreda and led by team leader assigned in each technical working group; Surveillance and field investigation team, Case management team, Social mobilization and communication team and Logistics and supplies team.

Discussion

Although the result of laboratory investigation for both botulism as well as diphtheria is negative, the clinical manifestations of the cases were very consistent with both diseases as literature states. Sore throat (99%), dysphagia (94%), voice change (53%), headache and blurring of vision (49%) while low grade below 38^{o}C (34%) observed among cases is found almost complete manifestation which can be seen in disease conditions, diphtheria and botulism. Manifestations of diphtheria includes malaise, sore throat, anorexia, and low-grade fever, if enough toxins are absorbed, patients usually develop severe prostration, striking pallor, rapid pulse, stupor, and coma, and may even die within 6 to 10 days.(2) In the other hand, clinical manifestations of botulism is usually appear within onset of 12 to 36 hours (range 1hr to one week) after ingestion of the preformed toxin and symptoms include nausea, vomiting, abdominal pain, diarrhea, and dry mouth with sore throat, symmetric descending weakness, absence of fever, symmetric neurologic deficits, patient remains responsive, normal or slow heart rate and normal blood pressure, no sensory deficits, blurred vision, diplopia, nystagmus, ptosis, dysphagia, dysarthria, and facial weakness. Descending muscle weakness usually progresses to the trunk and upper extremities, followed by the lower extremities.(1)

Although the clinical manifestations observed were closely related to the top differentials hypothesized, the epidemiological distribution of the cases was much more consistent to diphtheria than botulism. More than 95% of the observed cases were not from the same family and they have consumed same meal with their family members on the days prior to the onset. This is not possible for botulism but in case of diphtheria it can happen. In a house hold, who is living together consumed the same meal it is unlikely that botulism will affect only one or two person from all family members. But, in diphtheria it is possible that the infection may spare some of the members of the family, depending on their susceptibility for the disease. Botulism usually results in point source epidemic mainly with in defined geographical distribution. The observed case covered more than 20 kebeles in two Woredas within 10 to 80 km distance from the index cases' village. The epidemiological pattern observed shows propagated type of epidemic curve which is not consistent with botulism. Botulism usually resulted in point source epidemic.

Age wise, the most affected age group is 15-59 (ASAR: 47/100,000) years but children below 5 years are less affected (ASAR: 2/100,000) which is more associated with susceptibility issue. In cases of diphtheria, people vaccinated with DTaP or DPT or Pentavalent or any other preparations of diphtheria vaccination are less likely to develop the disease. This does not work for botulism. If anyone ingested a food infected with botulism causing microorganism or its toxin, regardless of his/her age more and more likely to develop the disease.

Conclusion

According to the clinical and epidemiological observations, the cause of the outbreak is not botulism. Even though, laboratory result is not supported the cause of outbreak as "diphtheria", epidemiological findings suggested diphtheria is more likely the cause of the outbreak, irrespective of possible serotypes that might be circulating in the community.

Recommendation

- Feedback of the laboratory investigations in such conditions should be given in time and EPHI should build strong system for this kind of field investigation and ensure the laboratory experts are engaged.

- Active surveillance and investigation in neighboring regions and zones should be conducted by zonal and regional health bureaus.
- As the most possible cause of the outbreak seems diphtheria, further study should be carried out to map risks for diphtheria.

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Chapter II – Surveillance Data Analysis Report

2.1 Measles Surveillance Data Analysis of Southern Nations, Nationality and Peoples Regional State, Ethiopia, 2009-2013.

Abstract

Background: Measles is among a leading cause of childhood morbidity and mortality in Africa. During the year 2013, a total of 10,088 suspected measles cases were reported from South Ethiopia Regional State. Our aim is to assess the magnitude and level of susceptibility for measles in the region.

Methods: Cross-sectional study conducted by reviewing a five years (2009-2013) measles case based surveillance data and ten years (2004-2013) routine and supplementary vaccine coverage data of the region during March 2014.

Result: A total of 54,221 measles cases were registered by surveillance system. The cumulative incidence rate was 8.25%. The most affected age group is under 5 years (ASAR: 10.1/1000) and 5-14years (5.0/1000) followed by above 15 years (0.8/1000). Both male and female sex was equally affected (50.8%, 49.3%). The mean age of cases is six years. Among all cases 48.8% were never vaccinated while 32.2% were vaccination with one dose and 6.8% were vaccinated with two doses. The proportion of birth cohort to susceptible population during 2004, 2008 and 2013 was 1:1.03, 1:0.74 and 1:1.67 respectively.

Conclusion: The most at risk-group is children under five years of age. Throughout the years, number of susceptible is more than two-third of the birth cohort of the corresponding years. Unless all children under 15 years of age are targeted for measles vaccination campaign and strong routine vaccination is maintained in the region, the outbreak will not contained easily and the 2020 measles elimination goal will less likely to be achieved.

Key words: Measles, Data analysis, Surveillance

Introduction

Measles is acute, highly contagious, exanthematous respiratory disease of viral origin which has characteristic clinical future of fever, cough, coryza, conjunctivitis, maculopapular rash and a pathogonomic Koplik's spot. [(1)] It is one of the most infectious diseases of the human which can cause serious illness, lifelong complication and death. Measles is spread by breathing-in airborne droplets from the coughs and sneezes of person infected with the disease. [(2)]

Possible risk factors to acquire measles virus infection includes immunodeficiency regardless of immunization status, traveling to areas where measles is endemic or contact with travelers to endemic areas and infants who lose their passive antibody before the age of routine immunization are risk factors for infection. In addition to these, risk factors for severe measles and complications are malnutrition, underlying immunodeficiency, pregnancy, and vitamin A deficiency. [(2)]

After the introduction of measles vaccination program, incidence of measles decreased substantially in all age groups with approximately 22,000-75,000 cases per year annually during late 1960s and early 1970s. Despite effective measles vaccine implementation, measles still causes 164,000 deaths per year worldwide.

In Africa before the introduction of measles vaccination the distribution of the disease was primarily affected young children, annually more than one million cases were reported.

Ethiopia, one of the African countries with large measles epidemic, is still has reporting 10 thousands of cases each year, SNNPR share the large portion of cases reported.

Background

Southern Nation Nationalities and Peoples Region (SNNPR) is one of the nine regions in the country located in Southern and South-western part of Ethiopia with estimated 18,375,050 total populations and 110,931 km^2 of total area giving population density of 166 people per km^2.

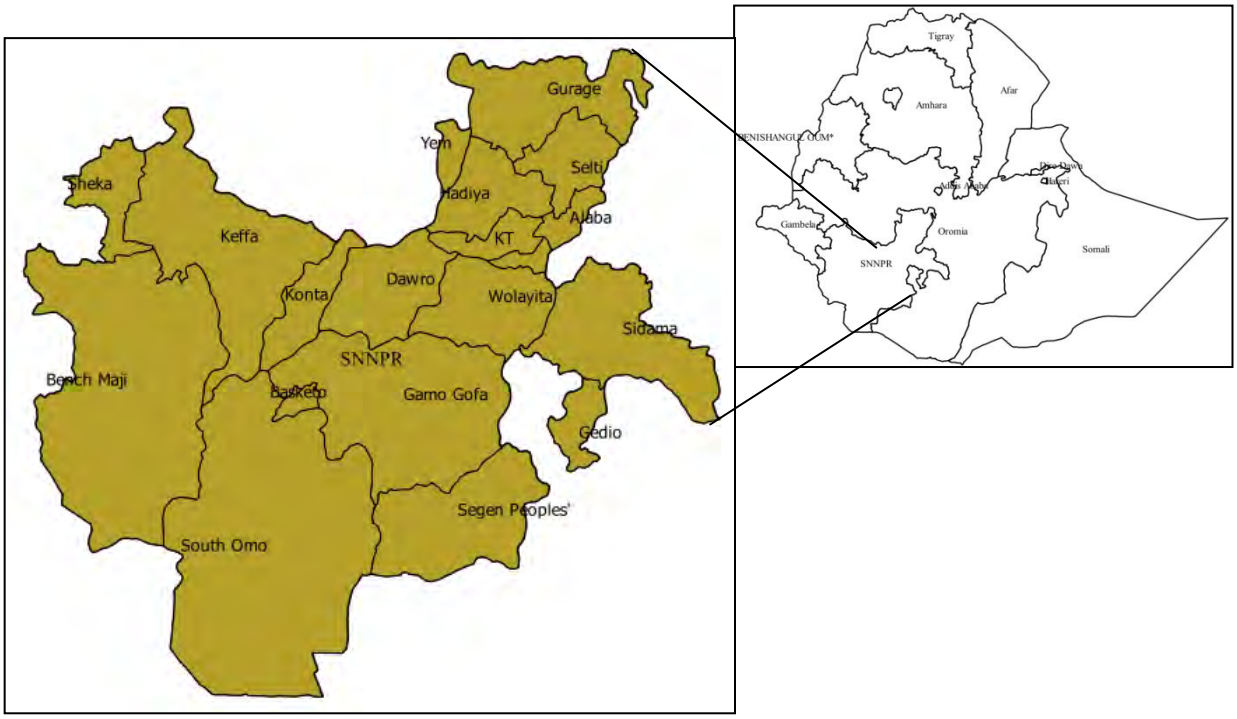

Figure 9: Administrative map of Southern Nations Nationalities and People Region, Ethiopia.

The region is bordered by Gambela Region in the west, Sudan in the south west, Kenya in south, and surrounded by Oromia Region in east, north and north –west directions. It roughly lies between 4.43^0 – 8.58^0 North latitude and 34.88^0 – 39.14^0 East longitudes. The region has 15 zones (136 Woredas) and 4 special woredas, these are also further divided in to 3678 rural kebeles, 238 urban kebeles in 22 town administrations and 114 certified towns with municipal city status. The region has 56 ethnic groups with their own distinct geographical location, cultures and social identities.

There are 4,576 health facilities in the region. Out of which 20 hospitals, 641 health centers 3,762 health posts, 55 NGO clinics and 98 are private health facilities.

At every level of the health system, health departments are technically responsible to protect health of the respective community. However, protecting health of a community needs adequate information about the health status of the community, potential health problems and, means and techniques to overcome the problems as well as improve the health status of the community. [(3)]

In this regard, surveillance data analysis plays important role in understanding the health status of the community and identify potential health problems within the community. Among more than 4,500 health facilities found in the region about 4,000 health facilities are actively reporting IDSR regularly to their immediate higher level health facility or health department according to the national PHEM procedure.

Regular and planned surveillance data analysis is therefore one of the most important public health activity which enables decision makers reasonable and effective in their public health management role.

Taking this in account, five years regional measles cases based surveillance data analysis is conducted and the result will be used by the regional health bureau and other stake holders possibly.

Introduction

Measles is highly infectious viral disease known as a disease of childhood. However, people who are not immune either by vaccination or previous infection are at risk of measles infection.(1) Usually measles is a mild or moderately severe illness but, can result in complications of respiratory, gastrointestinal and central nervous system which may possibly end in death of the patient. (2) Complications from measles are more common among both children under 5 years of age and adults 20 years of age and older.

Although the introduction of the measles vaccine in the 1960s helped to reduce the scope of the disease on a global level, measles continues to be a public health problem in countries with low vaccination coverage and population immunity.

The World Health Organization (WHO) reported that in 2000, an estimated 535,000 children died of measles. The majority of deaths were in developing countries. In 2010 there were 375,305 measles cases and an estimated 139,300 deaths registered globally.

According to the 2012 Annual Report of Global Measles and Rubella Initiative, global effort against measles has brought magnificent progress by decreasing measles death by 71 percent from 2000 to 2011. But yet, measles remain challenge for many countries in the world including developed ones.

The problem in those developed countries is due to importation of cases from measles-endemic countries or through in-migration of susceptible people. Although the developed countries has achieved measles mortality reduction strategy and they able to control the disease, because of increasing cases in most countries and large number of susceptible children worldwide they are not able to maintain measles elimination goal on the time table sat. (2)

By the year 2011 there were 158,000 measles deaths globally. When this is compared to the 2000s measles death of 548,000 the world has able to decrease measles death by more than 70 percent.

Countries which succeeded decreasing measles death by such large percent is deserved their performance on routine immunization coverage plus with introduction of second dose in routine immunization and high quality nationwide campaigns.(5)

The world health organization (WHO) member state of eastern African countries, Ethiopia and Kenya, have set goals for elimination of measles by 2020 while Somalia, member state of WHO eastern Mediterranean (EMR) region set goal to eliminate measles by 2015. Meanwhile in all these three countries, despite their effort towards the elimination goal, measles remain endemic with periodic outbreaks.(3)

In Ethiopia during 2010-2011, a total of 9,756 measles cases were reported, while 2,566 cases in Kenya and 16,135 cases in Somalia. From all reported cases 78% were among children under 5 years of age, of which majority are unvaccinated.

LITERATURE REVIEW

Measles is acute, highly contagious and exanthematous respiratory disease of viral origin which has characteristic clinical future of fever, cough, coryza, conjunctivitis, maculopapular rash and a pathogonomic Koplik's spot [(1)]. It is caused by measles virus of the genus *Morbillivirus* of the *Paramyxoviridae* family, the genus which infects humans. Measles virus is a single-stranded RNA virus with only one antigenic type and about 23 identified genetic variability (genotypes) of wild-type virus. Its genetic variability permits strain identification in measles endemic locations and determining possible origin of infection with specific strain. [(3)]

It is one of the most infectious diseases of the human which can cause serious illness, lifelong complication and death. Measles is spread by breathing-in airborne droplets from the coughs and sneezes of person infected with the disease.[(2)]

Measles is naturally a disease of childhood, however, any people who are not immune either by vaccination or previous infection are at risk of measles infection [(2)]. Usually measles is a mild or moderately severe illness, though, can result in complications of respiratory, gastrointestinal and central nervous system which may possibly end up with death of the patient unless otherwise treated early[(3)]. Complications of measles disease are more common among children under 5 years of age and adults of 20 years of age and older.

Possible risk factors to acquire measles virus infection includes children with immunodeficiency regardless of their immunization status, traveling to areas where measles is endemic or contact with travelers to endemic areas and infants who lose their passive antibody before the age of routine immunization are at risk for infection. There are also risk factors for severe measles and complications. These are malnutrition, underlying immunodeficiency, pregnancy, and vitamin A deficiency. [(2)]

Patients infected with measles virus will transmits the virus to a susceptible hosts from one to two days before the onset of fever up to four days after the onset of rash (four days before and four days after onset of rash). Infectivity peaks during the time between the days, one to two days before the onset of fever up to the day of onset of rash (prodromal period). [(3)]

The clinical manifestation of measles disease begins after the incubation period of 7 to 18 days (average; 14 days) following one to two days of fever. General symptoms like malaise, runny nose or coryza, conjunctivitis, cough and fever usually begin after 7 to 18 days of the exposure

and will followed by maculopapular rash that appear first around hair line of the face and head. Photophobia and arthralgia may also be seen in older children. In more than 80% of the cases, immediately before the onset of rash, 1 to 2mm size of blue-white spots in the buccal mucosa, koplik's spot appears. [1]

The non-pruritic, erythematous maculopapular rash of measles is begins from the hair line and behind the ears, which then spreads down the trunk and limbs. This time is the most severe point of illness for the patient. Usually, after the fourth day of the onset, the rash will begins to fade in the order it appeared. But, fever resolves four to five days after the onset of rash.

Lymphadenopathy, diarrhea, vomiting and splenomegaly are the immediate complications usually observed while occurrence prolonged fever is suggestive for the presence of the complications. [1]

In some individuals with partial immunity they developed passively or actively after vaccination, the presentation of the disease is usually milder with less intense symptoms and a milder rash. And, this form of mild illness is termed as Modified Measles.

Measles disease in an individual with compromised immunity may occur without typical rash, but the disease can be severe and of prolonged course. [5]

Complication of measles usually involves the respiratory tract (bronchitis, laryngitis, croups), the gastrointestinal tract (gastroenteritis, hepatitis, appendicitis, ileocolitis, and mesenteric adenitis) and the central nervous system. The most common complication responsible for death in children is pneumonia while acute encephalitis is in adult. However, secondary bacterial infection with streptococci, pneumococci or staphylococci is common, majority of pneumonia cases are viral origin. [3, 5]

Approximately 30% of cases develop one or more complication. Complications are more common in children under five years of age and adults of 20 years age and older. From all cases about 8% develops diarrhea, 7% develops otitis media which can lead permanent hearing loss, 6% develops pneumonia and 0.1% develops encephalitis. [6]

Vaccination is the most important prevention of measles disease. The WHO recommended strategy to prevent measles morbidity and mortality is; strengthening routine immunization (>90%) of children 9 to 11 months, providing second opportunity of measles vaccination for those unvaccinated as well as not developed immunity after vaccination, strengthening case-based measles surveillance and improving case management including provision of vitamin A[2].

The disease has worldwide distribution while humans are the only natural hosts of the infection. It is a vaccine preventable most contagious viral disease. The epidemiology of measles has different future before and after the implementation of measles vaccine. Before the implementation of measles vaccine during 1960s, 3 to 4 million cases were reported annually worldwide, almost every person were acquired measles before adult hood and the disease occurred in epidemic cycles.

After the introduction of measles vaccination program, incidence of measles decreased substantially in all age groups with approximately 22,000-75,000 cases per year annually during late 1960s and early 1970s. Despite effective measles vaccine implementation, measles still causes 164,000 deaths per year worldwide.

In Africa before the introduction of measles vaccination the distribution of the disease was primarily affected young children, annually more than one million cases were reported.[8]

Ethiopia, one of the African countries with large measles epidemic, is still has reporting 10 thousands of cases each year, SNNPR share the large portion of cases reported.

Although the introduction of measles in the 1960s helped to reduce the scope of the disease on a global level, measles is still continued to be a public health problem in countries especially low vaccination coverage allowed the disease to persist. [7]

In the year 2000, as the World Health Organization (WHO) reports, an estimated 535,000 children died of measles while the majority of deaths were in developing countries. In 2010 there were 375,305 measles cases and an estimated 139,300 deaths registered globally. This is about 380 deaths per day.

According to the 2012 annual report of global measles and rubella initiative, global effort against measles has brought magnificent progress by decreasing measles death by 71 percent from 2000 to 2011. But yet, measles remain challenge for many countries in the world including developed ones.

The problem in those developed countries is due to importation of cases from measles-endemic countries or through in-migration of susceptible people. But, challenges of the disease in developing countries are of multiple factors contributed. Although the developed countries has achieved measles mortality reduction strategy and they able to control the disease, because of

increasing cases in most countries and large number of susceptible children worldwide, they are not able to maintain measles elimination goal on the time table sat. But, measles death reduction is achieved by decreasing by more than seventy percent within 10 years duration.

By the year 2011 there were 158,000 measles deaths globally. When this is compared to the 2000s measles death of 548,000 the world has able to decrease measles death by more than 70 percent. [4]

Countries which succeeded decreasing measles death by such large percent is deserved their strong effort on routine immunization coverage plus with introduction of second dose in routine immunization and high quality nationwide campaigns.

The world health organization (WHO) member state of eastern African countries, Ethiopia and Kenya, have set goals for elimination of measles by 2020 while Somalia, member state of WHO eastern Mediterranean (EMR) region set goal to eliminate measles by 2015. Meanwhile in all these three countries, despite their effort towards the elimination goal, measles remain endemic with periodic outbreaks.

In Ethiopia during 2010-2011, a total of 9,756 measles cases were reported, while 2,566 cases in Kenya and 16,135 cases in Somalia. From all reported cases 78% were occurring among children under 5 years of age, of which majority are unvaccinated.[3]

Southern nation's nationalities and peoples region (SNNPR) is one of the regional states in the country where large number of measles cases reported every year. In this region measles outbreak is continued to be the challenge in the last couple of years. During the year 2013 only, a total of 7,586 measles cases were registered in the region. [Annual report of SNNPR, 2014]

Statement of the problem

Southern nation's nationalities and peoples region (SNNPR) is one of the regional states in the country where thousands of measles cases reported every year. In this region measles outbreak is continued to be the challenge for several years. (2)

During the year 2013, a total of 7,586 measles cases were registered in the region. Every year, number of cases and epidemics are reported from majority of zones and special Woredas, there for determining the magnitude and characterizing the trend of measles in the region will be very crucial. So, this surveillance data analysis will help in describing the distribution and magnitude

which will provide preliminary information for further investigation and decision making against the outbreak of measles.

Objectives

General Objective

- To analyze measles surveillance data of SNNP Region during 2009 to 2013, Ethiopia, 2014.

Specific Objectives

- To describe the distribution of measles in terms of place, person and time from 2009 - 2013.
- To determine the trend of disease from 2009 to 2013.
- To provide base line information for disease prevention and control purpose.

Methods

Study area and population

This surveillance data analysis was conducted in SNNP regional health bureau during June to August 2014 by reviewing measles case based surveillance data of the region from 2009 to 2013. Southern Nation Nationalities and Peoples Region (SNNPR) is one of the nine regions in the country located in Southern and South-western part of Ethiopia with estimated 18,375,050 total population and 110,931 km^2 of total area giving population density of 166 person per km^2. The study population is the total population in the region.

Study Design

Descriptive cross-sectional review of secondary data of measles cases based reports from all zones and districts during Jan 2009 up to Dec 2013.

Data source

Data was obtained from data base of SNNP regional office of WHO and regional PHEM.

Operational definitions

Suspected measles case: any person with fever and maculopapular (non-vesicular) generalized rash and cough, coryza or conjunctivitis OR any person 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.

Laboratory-confirmed case: is a suspected case which has laboratory results indicating infection (measles IgM positive or isolation of a measles virus).

Epidemiologically-linked case: is a suspected case, which has contact with laboratory confirmed case or another epidemiologically-confirmed case.

Compatible case: is a suspected case which has not been adequately investigated.

Data collection and analysis

The consecutive five years data of measles case based repots were collected from regional WHO office and PHEM and analyzed using EpiInfo version 7.1.4.0 and Microsoft Excel 2013.

Inclusion criteria: Complete line lists and case based reports of measles recorded in the data base of SNNPR PHEM and regional office of WHO from January 2009 to December 2013, measles vaccination coverage of the region from 2004 to 2013 and same years birth cohort of the region included.

Exclusion criteria: Line lists and case based reports registered prior to January 2009 and after December 2013 as well as the line lists with incomplete data elements (variables) and measles vaccination coverage and birth cohorts of the region before 2004 and after 2013 excluded.

Result dissemination

The result of this study was planned to disseminate for regional PHEM and AAU school of public health. After completion of the study, the result was disseminated to the respective SNNPR PHEM and AAU school of public health.

Ethical consideration

Official permission to access surveillance data from SNNP regional PHEM and WHO office was obtained from department officials prior to collection of data.

Result

During the data collection, we noticed that- the quality and completeness of variables required for data analysis and appropriate epidemiological explanation of the disease were not well

documented in the data base. However, using relatively complete data of the past 5 consecutive years the following result is obtained.

During the period of 2009 to 2013 a total of 54,189 measles cases were reported, out of which 7,261 (13.4%) were under 1year; 17,991 (33.2%) were 1-4 years; 16,365 (30.2%) were 5-9years while 12,572 (23.2%) were those in age group of older than 10years of age. The median age of cases was six years while the youngest and the oldest suspected measles cases investigated were a three month old infant and a 98 years old man. The youngest lab confirmed case of measles was a 3months infant while the oldest is a 37 years old man. The most affected age group is 1-4years (33.2%) followed by 5-9 years (30.2%). Of all investigated suspected measles cases 898 (1.6%) were positive for measles IgM.

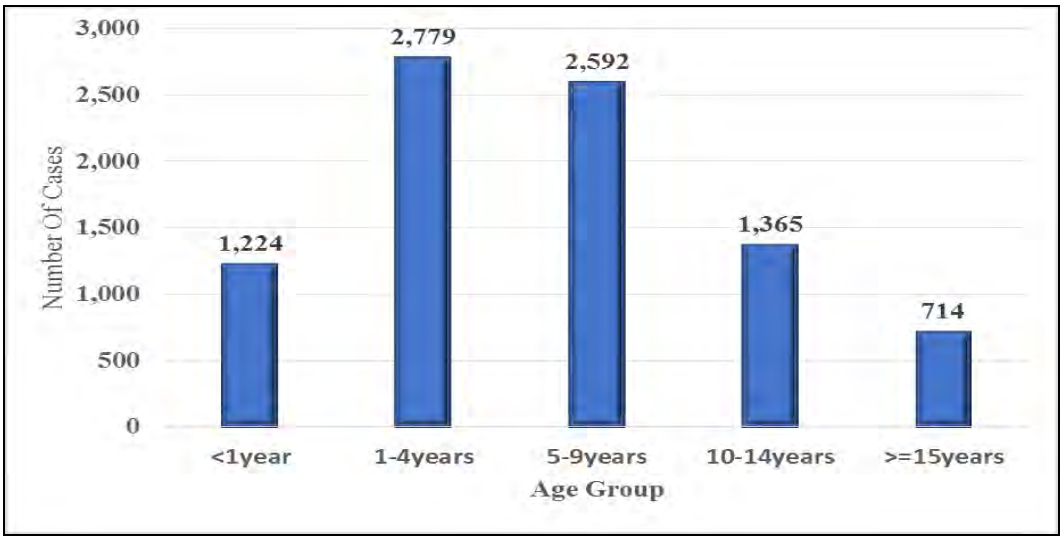

Figure 10: Total number of suspected measles cases by age group, SNNPR, 2009-2013.

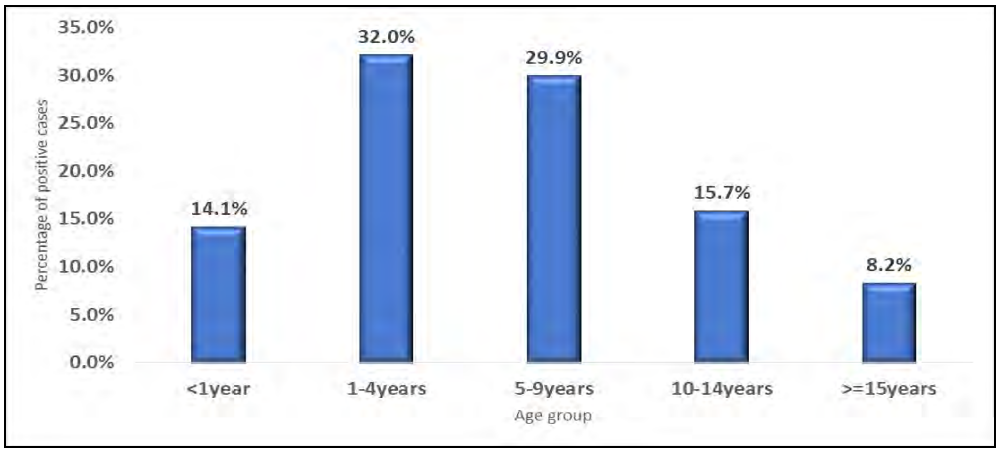

Figure 11: Suspected measles cases by age group, SNNPR, 2009-2013.

The three highest number of lab confirmed measles cases were registered in Kefa, Sidama and Wolayta Zones, however, almost all parts of the region reported lab confirmed measles cases. The leading zone with large number of measles confirmed cases throughout the study period, 2009 to 2013, was Kefa Zone.

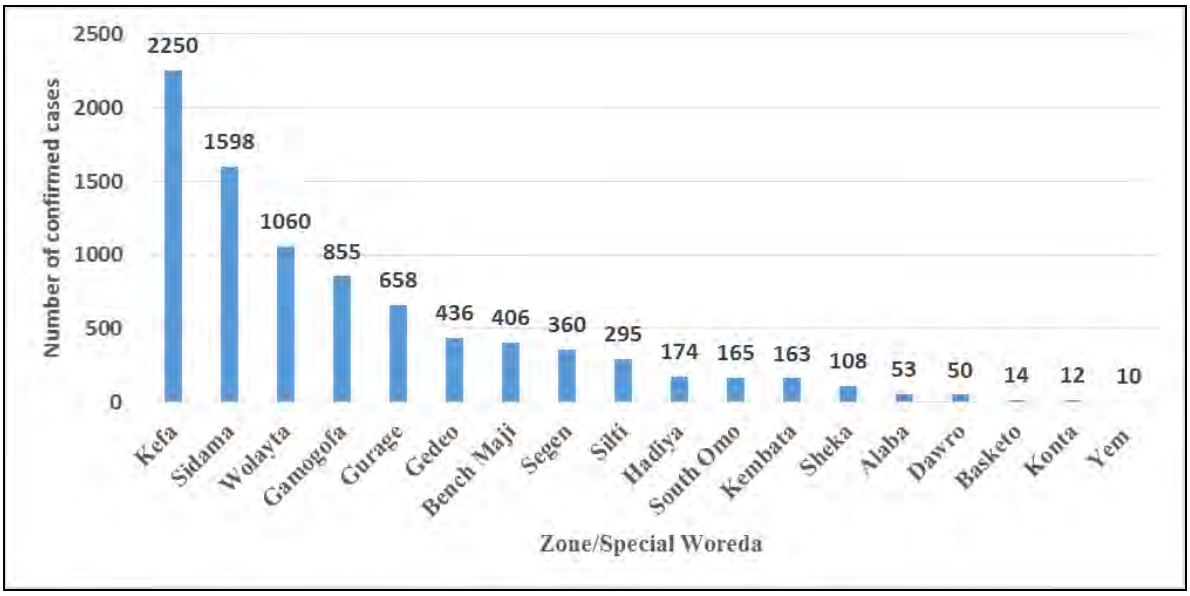

Figure 12: Confirmed cases of measles by zone and special woreda, SNNPR, 2009-2013.

During the five years, the total number of suspected measles cases were seen to be progressively increasing from year to year, and the largest peak was in 2012.

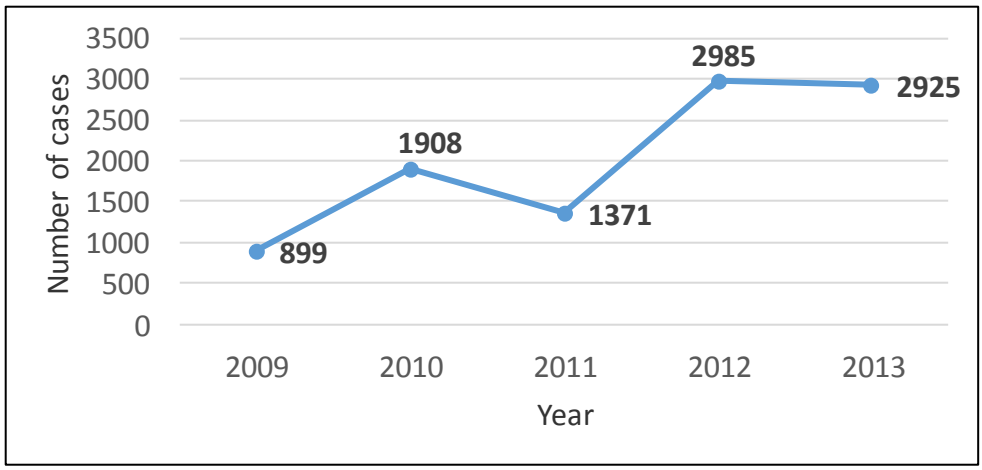

Figure 13. Trend of suspected measles cases, SNNPR, 2009-2013.

Out of 8,674 suspected measles cases 82% (7,111) cases were confirmed for measles. Out of 7,111 confirmed cases, 898 (12.6%) were classified as lab confirmed cases for measles virus while 6,213 (71.6%) cases classified as measles confirmed by epidemiological linkage to the areas with confirmed outbreak during a time samples were obtained. Of the rest, 705 (8%) cases were classified as clinically compatible measles cases. Whereas 858(10%) investigated cases are finally classified as discarded cases.

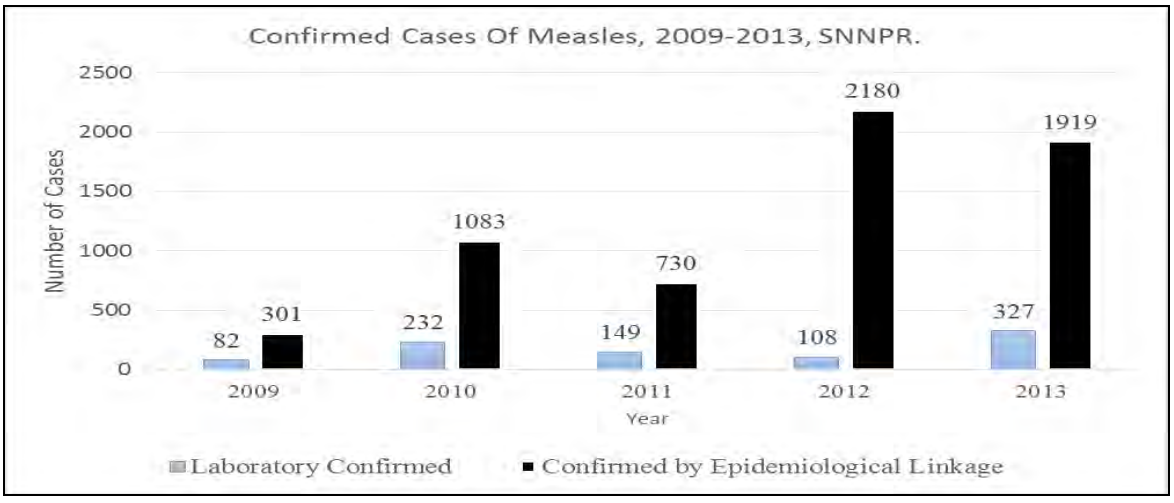

Figure 14. Confirmed measles cases by year during 2009-2013, SNNPR.

Among 898 lab confirmed measles cases, the highest number was recorded in the age group of 1-4 years (33.5%) followed by 5-9 years and 10-14 years which accounts for 27.9% and 19.4% respectively.

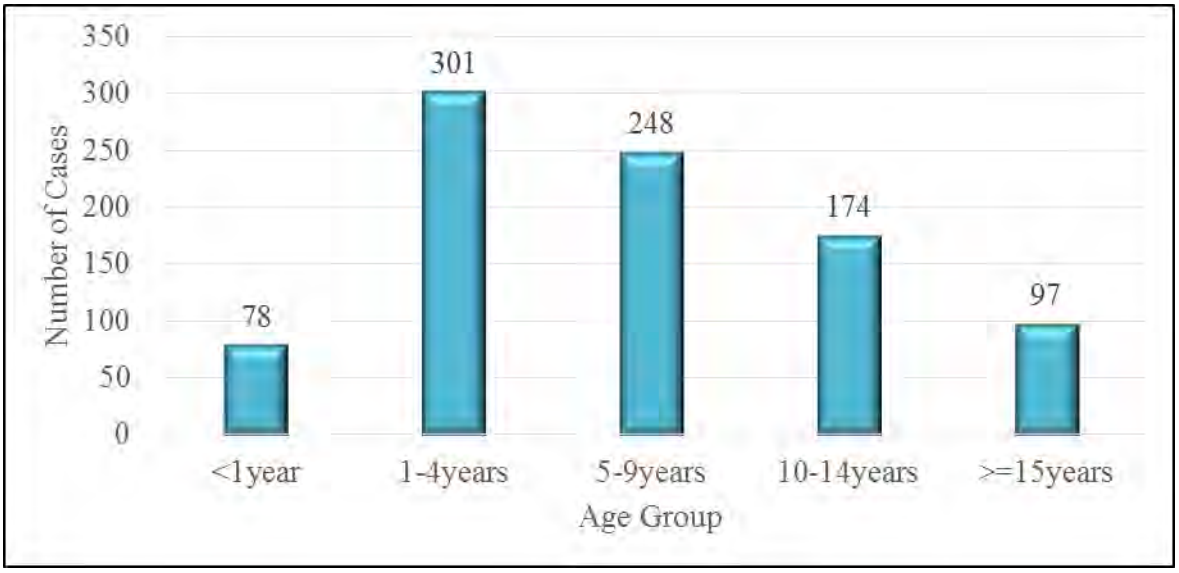

Figure 15. Lab confirmed measles cases by age group during 2009-2013, SNNPR.

The highest number of confirmed measles cases during the 5 years period of time were reported from Sidama, Wolayta, Gamogofa and Silte Zones reporting 189 (21%), 139(15.5%), 113 (12.6%) and 102 (11.4%) cases respectively.

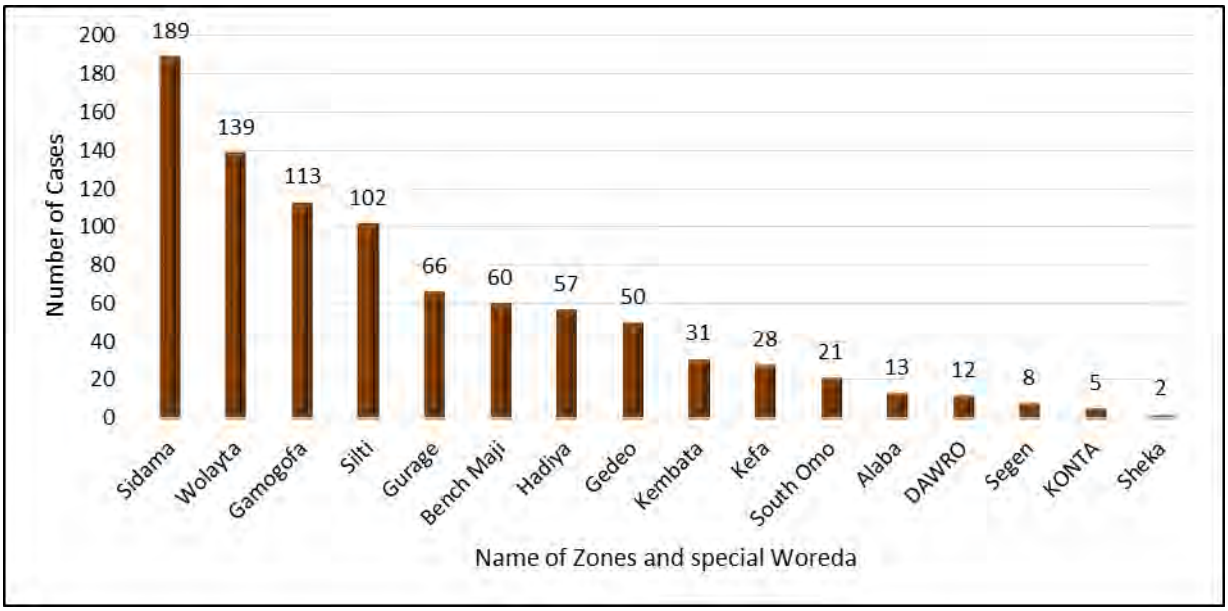

Figure 16. Confirmed measles cases by zones and special woredas during 2009 to 2013, SNNPR.

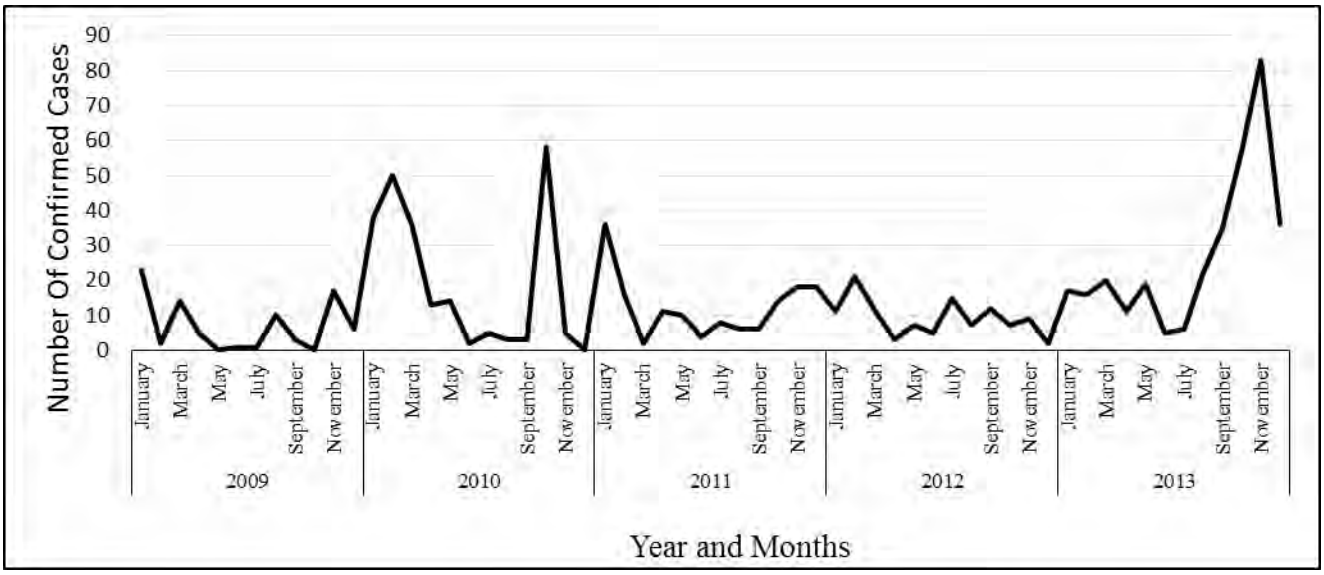

Figure 17. Trend of lab confirmed measles cases by months during 2009 - 2013, SNNPR.

During the 5 years period, confirmed measles cases were reported in almost all months of the years and seasonal variation were existed with peaks of infection during the first quarter(January to March), late third(September) and last quarter (October to December).

Regarding the vaccination status of the cases 4,388(49.4%) of them were not vaccinated, 2,894(33.4%) of them were vaccination with one dose, 615 (7.1%) of them vaccinated with two doses while the vaccination status of the rest 10.1% of the cases is unknown. (See Fig. 18)

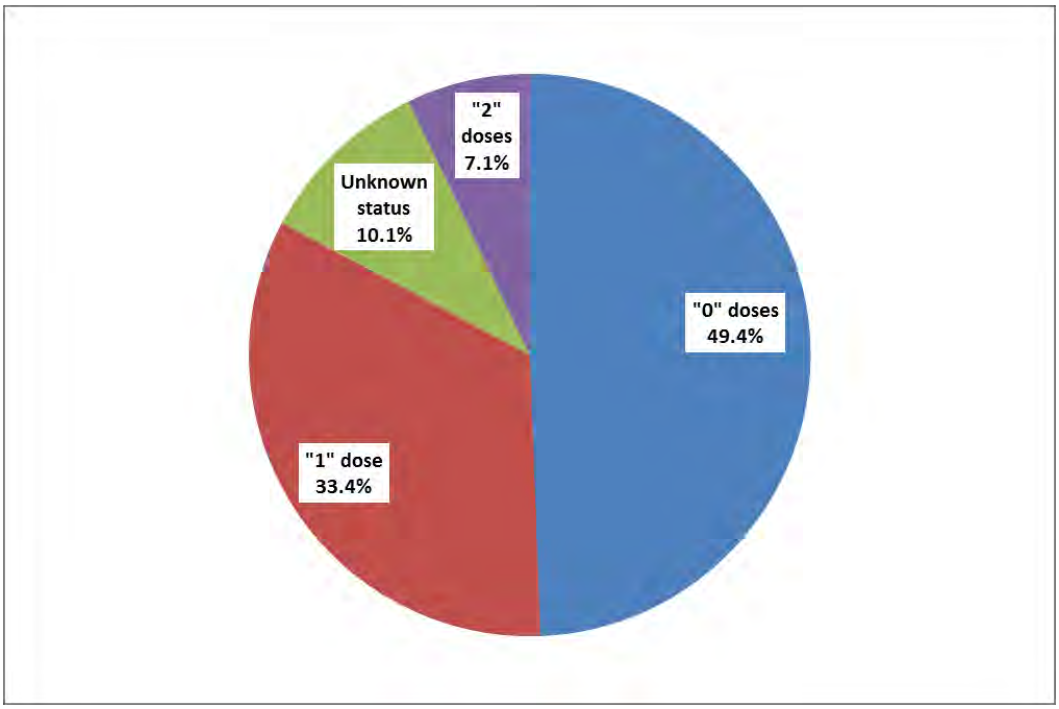

Figure 18. Confirmed measles cases by vaccination status, SNNPR, 2009-2013

Discussion

The most affected age groups are those 1-4years and 5-9years. Almost half of the cases were not vaccinated which is a possible indicator for the existence of an increased number of susceptible people in the region. Although the "period study" of this study is limited to 2009-2013 and describing the cases reported during this period of time, there are number of cases before as well as after the study period. In the five years period, highest number of cases were reported from Kefa, Sidama and Wolaita Zones respectively from the most to the least order. Primary vaccine failure and failure to vaccinate are the already known causes for accumulation of susceptible children and low herd immunity, might be the possible causes for increased number of cases recorded in the region year to year. The age shift from younger to older might be a possible indicator for accumulation of susceptible people in the community and lower herd immunity achievement in the region and need further study to determine the factors.

Conclusion

Measles cases are increasing year to year covering almost all zones and special woredas of the region. There is high number of susceptible people in the region. Failure to achieve optimum herd immunity is the possible reason for sustained outbreak in the region.

Recommendation

All children under 15 years of age should be targeted for mass vaccination. Those zones and districts with high dropouts of measles vaccination should be identified and prioritized for appropriate measures. The regional health bureau should strengthen routine EPI programs and SIAs in order to reach unvaccinated children and susceptible. In addition to this EPI performance quality assessment should be conducted at zone, woreda and kebele level in order to determine area specific challenges and gaps.

Measles surveillance system should be monitored and strengthened from regional PHEM to the community level. Capacity building for health workers on measles surveillance, especially on laboratory surveillance, should be emphasized by regional health bureau and all stakeholders. [out of 10,089 measles samples sent to central lab within five years, 2009-2013, 858 (8.5%) samples were disqualified due to its poor sample quality; source: SNNPR regional office of WHO EPI surveillance].

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Chapter III – Evaluation of Surveillance System

3.1 Malaria Surveillance System Evaluation of Gambella Regional State, Ethiopia, 2014.

Abstract

Back ground: Public health surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding health and health-related event for use in public health action to reduce morbidity and mortality and to improve health. The public health surveillance system is therefore evaluated to ensure that problem of public health importance are being monitored efficiently and effectively. Consequently the public health surveillance system evaluated intermittently and the evaluation comprises recommendation aimed at improving quality, efficiency, and usefulness. Thus, this study was designed to evaluate malaria surveillance system; core function and attributes of surveillance system in Gambella regional state of Ethiopia.

Methods: A cross sectional study design was used to evaluate the core, supportive and attributable elements of the surveillance system for malaria. The regional health bureau, regional hospital, zonal health department, two woreda heath offices, two health centers and two health posts were conveniently included in the study. Data was obtained from nine surveillance units from December 10 to 25, 2014 through observation, document review and interviewing surveillance officers and focal persons using semi structured questionnaire.

Result: In the year 2013, a total of 51,233 cases and 21 deaths attributed to malaria were reported to regional PHEM. Out of seven surveillance units evaluated (n=7) the national malaria guideline were available for three (33.3%) of surveillance units. From all health facilities (n=5), all of them have clinical register but none of them have either malaria guideline or malaria monitoring chart. Surveillance data was not analyzed and used for action at all level of the surveillance unit. Outbreaks were not investigated based on outbreak guide line and there was no analyzed and documented report.

Conclusion: The surveillance system for malaria in Gambella regional state is sub optimal and not supported with the requirements of updated guidelines. Absence of malaria monitoring chart and weak surveillance data utilization is hindered the actual estimate about the magnitude of the disease at regional as well as national level.

Key words: Malaria, surveillance evaluation, Gambella

Background

An estimated 198 million cases and 584, 000 deaths of malaria were occurred in 2013 worldwide. Out of all deaths of malaria worldwide 90% is occur in Africa. In Africa, malaria constitutes 10% of the continent's overall disease burden and it is a leading cause of under-five mortality. Approximately 52 million people (68%) live in malaria-endemic areas in Ethiopia, chiefly at altitudes below 2,000 meters[4]. It is a major public health problem and is one of the three leading causes of morbidity and mortality in the country.

Gambella region is one of the malaria endemic areas in the country and known by its year round stable malaria transmission. According to the national malaria prevention and control guideline, effective malaria surveillance system enables decision makers to identify the areas most affected by malaria, trends of morbidity and mortality that require additional intervention, and to assess the impact of control measures. Therefore the gaps and challenges of the surveillance system need to be evaluated. The objective of the evaluation is to assess the performance of the system in line with set objectives and surveillance system's key attributes in the region.

Updated guideline for evaluating public health surveillance systems, published by the center for disease control and prevention (CDC) was used for the evaluation of the surveillance system.

Introduction

Public health surveillance is the ongoing systematic collection, analysis, interpretation, and dissemination of health data to guide public health decision making and actions.[1] Reasons for conducting public health surveillance can include the need to assess the health status of a population, establish public health priorities, and reduce the burden of disease in a population by appropriately targeting effective disease prevention and control activities**.** Before data is used for public health action, health related data must be collected by the public health surveillance system, analyzed, and disseminated to those responsible for taking action. The purpose of evaluating public health surveillance systems is to ensure that problems of public health importance are being monitored effectively and efficiently[2].

An effective health system is characterized by services that meet the health care needs of the population it serves. In order to measure the population's needs and to monitor the system

performance, sound health information systems are critical. Notifiable disease surveillance plays an important role in health care service delivery as it involves ongoing data collection, collation and analysis of data on priority diseases within a geographic area and in so doing guide public health planning and intervention[3].

The Ethiopian Federal Ministry of Health (FMoH) has designed a fully integrated and adaptable surveillance system to ensure rapid detection of any public health threats, ensure preparedness related to logistic and fund administration and prompt response to and recovery from various public health emergencies[3]. The system comprised of four major components which are: public health emergency preparedness, early warning, response, and recovery. The major component of the early warning is surveillance of diseases.[4]

Malaria is one of the 20 nationally notifiable diseases. The Objectives of the surveillance system in Ethiopia are:

- To detect epidemics/outbreaks so that they can be controlled in a timely manner,
- To predict epidemics so that health services can plan to respond, prevent where possible, treat and control priority diseases,
- To monitor trends of priority diseases in order that changing trends inform policy decision,
- To evaluate an intervention so that effective and efficient actions/policies are identified and supported.

Malaria is a major public health problem in Ethiopia and has been constantly reported as one of the three leading causes of morbidity and mortality in most of the regional states of the country. Approximately 52 million people (68%) live in malaria-endemic areas, mainly at altitudes below 2,000 meters. Malaria is generally seasonal in the highland outlying areas and of relatively longer transmission duration in lowland areas, river basins and valleys.[(4)]

Literature review

Malaria is an entirely preventable and treatable mosquito-borne illness. However, it remains a huge public health problem throughout the world. According to the annual global report of 2014, 97 countries and territories had ongoing malaria transmission with an estimated 3.2 billion people at risk of malaria, of whom 1.2 billion are at high risk.[(3)]

Malaria occurs mostly in poor tropical and subtropical areas of the world. In many of the countries affected by malaria, it is a leading cause of illness and death. The most vulnerable people for malaria are persons with no or little immunity against the disease. These are young children who have not yet developed partial immunity to malaria, pregnant women whose immunity is decreased by pregnancy especially during the first and second pregnancies and travelers or migrants coming from areas with little or no malaria transmission who lack immunity.(4)

In 2013, there were an estimated 198 million cases of malaria worldwide (with an uncertainty range of 124 million to 283 million) and an estimated 584 000 deaths (with an uncertainty range of 367,000 to 755,000). Out of all deaths of malaria worldwide 90% is occur in Africa. An estimated 437 000 (96.5% of global burden) African children died before their fifth birthday due to malaria during the same period.(3)

In Africa, malaria constitutes 10% of the continent's overall disease burden and it is a leading cause of under-five mortality (20%). It accounts for 40% of public health expenditure, 30-50% of inpatient admissions, and up to 50% of outpatient visits in areas with high malaria transmission.[9]

In Ethiopia, malaria transmission is largely determined by altitude and climate as affected by Indian Ocean conditions and global weather patterns. Most of the malaria transmission occurs between September and December, after the main rainy season from June to August. Certain areas, largely in the western and eastern parts of the country, experience a second “minor” malaria transmission period from April to May, following a short rainy season from February to March. There are five main malaria eco-epidemiological strata recognized in the country, these are Stable, year round transmission in the western lowlands and river basin areas of Gambella and Benishangul-Gumuz Regional States; Seasonal transmission in lowland areas <1,500 meters; Epidemic-prone areas in highland fringes between 1,500 – 2,500 meters; Arid areas where malaria is only found near semi-permanent water bodies; and Malaria-free highland areas >2,500 meters.[5]

Malaria surveillance predicts the maintenance of an on-going watch over the status of malaria in a community. The main purpose of surveillance is to detect changes in trends or distribution in

malaria and other vector borne diseases in order to initiate investigation or control measures. It provides a basis for measuring the effectiveness of anti-malaria program. Malaria surveillance includes laboratory confirmation of presumptive diagnosis, finding out the source of infection and identification of all cases and susceptible contacts and still others who are at risk in order to prevent further spread of the disease. The ultimate objective of malaria surveillance is prevention and control of malaria in the community.[6]

A malaria surveillance system consists of the tools, procedures, people and structures that generate information on malaria cases and deaths, which can be used for planning, monitoring and evaluating malaria control programmes. An effective malaria surveillance system enables program managers to identify the areas or population groups most affected by malaria; identify trends in cases and deaths that require additional intervention to assess the impact of control measures.[6]

With this information, programmes can direct resources to the populations most in need and respond to unusual trends, such as outbreaks of cases or the absence of a decrease in the number of cases despite widespread implementation of interventions. As a result, progress in malaria control can be accelerated and wastage of resources avoided.[6]

Malaria surveillance systems have two principal objectives, to provide programme managers with information to identify geographical locations and population groups in which the incidence of malaria cases and deaths are greatest and to track changes in the incidence of malaria cases and deaths over time[6].

Statement of the problem

Gambella region is one of the malaria endemic regions in the country with stable and year round transmission. The low land altitude in the region, below 500mteres above sea level, and river basins favors the mosquito breeding which results in large number of malaria cases throughout the year. Malaria is remained the leading cause morbidity among both adult and children in the region for the last couple years.

In order to predict the outbreak as well as identify the most areas affected by malaria and implement appropriate control measure, effective surveillance system should be there. Therefore, evaluating the existing surveillance system will enable decision makers more efficient on

resource mobilization as well as public health objective achievement. Moreover, it will help the health system to address the health need of the community.

Rationale of the study

The public health system is continuously challenged by recurrent and unexpected disease outbreaks and is facing the challenge of managing health consequences of natural and human made hazards.

Early detection and prompt response to outbreaks need effective and well organized surveillance system in all level, from region to the health facility. In order to ensure the effectiveness of the surveillance system, regular evaluation and assessment of malaria surveillance system is crucial. This study will benefit the people of Gambella who are largely suffering from year out malaria infection.

Therefore it is important to assess the gaps and challenges of the surveillance system as a whole and malaria surveillance in particular in the region that could help to critically identify the gaps.

Objectives

General Objective

To evaluate malaria surveillance system, Gambella regional state, Ethiopia, 2014.

Objective of the evaluation

- To assess the performance of the malaria surveillance system in line with stated objectives in Gambella regional state, Ethiopia, 2014
- To assess the malaria surveillance system key attributes in Gambella regional state, Ethiopia, 2014
- To identify the strength and weakness of the malaria surveillance system in Gambella regional state, Ethiopia, 2014

Methods and materials

Study design:

Cross-sectional study using framework detailed in the updated guidelines for evaluating public health surveillance systems published by the center for disease control and prevention (CDC) was used for the evaluation of the surveillance system. The surveillance system attributes in which data will be collected includes level of usefulness, simplicity, sensitivity, flexibility, acceptability, representativeness, data quality and stability were assessed.

Study area:

The evaluation was conducted in Gambella regional state of Ethiopia. Gambella region is one of the 9 regions in the country with a total population of 385,997 (2012 census) and located in the south western part of the country and covers an area of 25,802km^2. Its capital is Gambella Town and is found at a distance of 777 km from Addis Ababa. The region has five native ethnic groups and administratively it has 14 districts. Regional surveillance unit, one regional hospital, one zonal health department, one woreda health office, two health centers and two health posts were studied.

Data collection and Analysis:

Data was collected using semi structured questionnaire to interview the surveillance officers at each level of the health system. Secondary data from surveillance system records of the previous years was also used to see the disease trend, detection and diagnostic capacity of malaria by the system. Surveillance units were selected conveniently taking their performance evaluation result given by regional PHEM and including the three good performed and the other three poor performing surveillance units irrespective of their location and distance from Gambella town.

On every surveillance unit respondents were PHEM officers at Zone and Woreda level, surveillance focal persons at health center level and health extension workers at health post level. These are health workers in charge of managing surveillance system. Interview was conducted by principal investigator using the standard questionnaire designed for surveillance evaluation. Data was analyzed using EpiInfo version 7.1.4.0 and MS Excel 2013.

Operational definition

Acceptability: Willingness of persons and organizations to participate in the surveillance system. And it will be measured quantitatively through the reviewing completeness of report forms for the past three months and timeliness of information coverage.

Accessibility: - Ease which statistical data can be received from the office. This lets in the ease with which the existence of information can be found out, as good as the suitability of the shape or medium through which the data can be accessed. The monetary value of the information may also be an aspect of accessibility for some users.

Accuracy: - Degree to which a measurement or an appraisal based on measurements represents the genuine value of the attribute that is being evaluated.

Completeness: - Proportion of all expected data reports that were actually submitted to the public health surveillance scheme**.**

Information Quality: - Data quality reflects the completeness and robustness of the data entered into the public health surveillance scheme**.**

Flexibility: - A flexible public health surveillance system can conform to changing data needs or operating conditions with little extra time, staff office, or allocated funds**.** Flexible systems can accommodate, for instance, new health-associated effects, changes in case definitions or technology, and variations in funding or reporting sources. In accession, organizations that utilize standard data formats (e.g., in electronic data interchange) can be well mixed with other arrangements and therefore might be considered flexible.

Positive Predictive Value (PVP): - PVP is the proportion of reported cases that actually have the health-related event under surveillance.

Representatives: - A public health surveillance system that is represented accurately describes the occurrence of a health-related event over time and its distribution in the population by place and person.

Simplicity: - The simplicity of a public health surveillance system refers to both its structure and ease of operation. Surveillance systems should be as simple as possible while still meeting their objectives.

Sensitivity: - The sensitivity of a surveillance system can be considered on two levels. First, at the level of case reporting, sensitivity refers to the proportion of cases of a disease (or other health related event) detected by the surveillance system. Second, sensitivity can refer to the ability to detect outbreaks, including the ability to monitor changes in the number of cases over time.

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

Timeliness: - Interval between the occurrence of an adverse health event and (i) the report of the event to the appropriate health agency, (ii) the identification of that agency of trends or outbreaks, or (iii) the implementation of control measures.

Usefulness:- How helpful the system is to public health staff in taking actions as a result of interpreting and analyzing its data.

Validity:- Degree to which statistical information correctly describes the phenomena it was designed to measure

Data quality control

Data collected by interview at every level was cross-checked with documents available at every level of the surveillance unit and also completeness of the information after every interview were checked and rechecked.

Ethical consideration

Before the start of this study official permission to access regional data and support letter zones, woredas and health facilities and also verbal consent prior to each interview was obtained from every interviewee.

Result dissemination

The result of this study was planned to be disseminated to respective health departments as well as AAU school of public health. The preliminary report of this study is delivered to regional health bureau.

Result

The population under surveillance for malaria was the total population the region. The core functions of the surveillance system (case detection and registration, data reporting, data analysis, outbreak investigation, epidemic preparedness and response; existence and functionality of RRT and the surveillance feedbacks were evaluated. For malaria detection, standard case definitions were available in 54% of the health facilities.

Core functions of the surveillance system

Case detection and registration

Malaria cases were detected based on case definitions and all of the health facilities have clinical registries but there is huge gap of keeping registrations and related documents appropriately. Out of seven surveillance units evaluated (n=7) the national malaria guideline were available for three (33.3%) of surveillance units. From all health facilities (n=5), all of them have clinical register but none of them have either malaria guideline or malaria monitoring chart.

Case confirmation

All visited health facilities use laboratory facility to confirm malaria cases except the health posts (HP), uses only rapid diagnostic test (RDT).

Data reporting

Using the reporting supplied by central level health departments, all health facilities and surveillance units are reporting malaria cases and deaths in weekly base. In the last 6 months, out of all health facilities expected to report weekly surveillance report to their next higher level, only 76 % were reported. The report timeliness of the previous year is only 68%. The timelines of the surveillance system was not monitored at all level as a result immediately reported cases were reported in weekly basis.

Data analysis

In all surveillance units and health facilities evaluated, none of them (0%) were analyzed data in the previous 6 month. Data is only compiled and organized for annual or 6 months activity report in almost all surveillance units. Surveillance data was not analyzed and used for action at all level of the surveillance unit.

Outbreak investigation

There is stable malaria transmission in the region throughout the year a total of 51,233 cases and 21 deaths, irrespective of report completeness issues, of attributed to malaria were reported to the regional PHEM. However, the malaria surveillance system in all level has no standard malaria monitoring tool to detect outbreak in time. The ITNs distribution and utilization coverage data is not documented in woreda, zone and regional health bureau level. There is no documented outbreak investigations conducted in previous years.

Laboratory

Laboratory services for accurate diagnosis especially for diseases need confirming a suspected outbreak, is one of the good features of ideal surveillance system. Although there is laboratory service for malaria diagnosis in Hospital and health center level, there is no regular quality control system to ensure effectiveness and efficiency of malaria case detection and management.

Epidemic preparedness

Plan: except in regional level no written document of preparedness plan was found in any of the surveillance units and health departments assessed.

RRT and Epidemic management committee: there is document that showing the RRT as well as epidemic management committee is established but no minute or any evidence for practical actions was in all level.

Budget: no budget is allocated for epidemic response in all level. But in case of emergencies, resources collected from different roots and allocated.

Epidemic response and control

Data was not analyzed and used for action at all level. No document found about the response carried out in response to any emergencies.

Feed back

Until recent time, regional health bureau was preparing bulletin in weekly base but currently it is interrupted. Except this bulletin, no feedback was exercised and documented at all level.

National surveillance manual

Malaria, PHEM, measles, meningitis AWD and malnutrition guidelines were available in regional PHEM and in the hospital. In all evaluated health posts there was no surveillance guideline. At zonal level there is only malaria & measles case management protocol.

Training

Training as one of the mechanism to build the capacity of health workers and strengthening the surveillance system. Regional, Zonal and Woreda level majority of PHEM officer have training at least once a year through workshops and review meetings but health center and HP IDSR focal have no training about PHEM.

Resources

Logistics

For surveillance system we use technologies that facilitate documentation, analysis, reporting and communication which need electric power. Electric power available from zonal to HC level but not regularly supplied because repeated interruptions. At HP level there was no electric power supply at all. Transport vehicles also very important for supportive supervision, active case search and in case of outbreak investigation. There is no independently assigned vehicle for surveillance system in all visited, Zone, Woredas and HC level. Even there is no vehicle for regional PHEM independently.

Data management

Only regional PHEM unit have complete tools for data management like computer accessories and statistical packages. At Zone, Woreda and HC levels there is no statistical packages even computers are not only independent to the surveillance system. At all level there is no electronic data base and no assigned data manager. Priority diseases are not registered electronically with required variables that help to analysis whenever required.

Communications

Regional and zonal level surveillance system use Telephone, Email fax, and eIDSR for communication. At Woreda and HC level the only available communication tool is land phone and personal mobile phones. Health extension workers expected to conduct community IDSR but there was no communication tool at HP level. They use their mobile phone to communicate emergency and other health activities.

Attributes and level of usefulness

Usefulness: The surveillance serves for a total population of Gambella regional state. From this population a total of 51,233 cases and 21 deaths of malaria were reported. All gaps on reporting timeliness and completeness as well as documentation, malaria surveillance system found useful to measure burden of the disease in some level.

Simplicity: Reporting formats used were simple and can take, on average, only 10-15 minute to fill the format but it takes not more than 30 min for lab confirmation in most of the health facilities.

Flexibility: The current report format is flexible and not difficult to add additional information required by a surveillance system especially if new disease emerged. But there is limitation of the format in lacking some variables which most required for analysis like age, sex, address and clinical symptoms.

Satisfaction on the surveillance system (Acceptability)

Except lack of refreshment trainings and logistic supply, all surveillance officers believe that surveillance system is helpful and important for public health.

Representativeness: The surveillance system is structurally representative because there is HP in each kebele but have limitations due to operational and accessing the whole communities in the required time and place.

Timeliness: In all level of surveillance system we assessed, there were no tool prepared to monitor completeness and timeliness of the reports. Every notifiable disease has time to report to the next level but immediately reportable diseases reported weekly. The report timeliness of the previous year was 68%.

Stability: The surveillance system ensured to function in proper way and according to the standard guideline. It is not stable. Reports were collected and aggregated by Woredas and

reported to directly to the regional PHEM, zonal health departments are not active in surveillance system of the region as a whole.

Sensitivity: Although limitation of documentation is obvious, using the available data sensitivity was analyzed. According to the 2013 malaria surveillance report, positive predictive value for malaria 74% while sensitivity which is synonymous to completeness was 79%.

Discussion

At the health facility level data was collected and recorded in registry books and were not entered to electronic data base. As a result surveillance data was not analyzed, interpreted and used for action even it is difficult to analyze in the future because registers were old and destroyed. The main reason identified for report dalliance is high turnover of trained staff and lack of communication means to those very far from woreda level. There were no feedback and supportive supervision given to the lower levels. The core functions of the surveillance system recording, reporting analysis and feedback have gap which have negative implication on the quality of surveillance data. Surveillance data should have good quality because without quality public health data, interventions may mislead decision makers. [4]

Operational budget is one of the supportive functions of the surveillance system. There was budget line at zonal and region level but there was no budget for surveillance at woreda and health facility level. Study suggest that failure of surveillance systems in developing countries is often due to limited available resources, lack of knowledgeable staff, disorganization, and poor infrastructure for finding and reporting cases.[3] We investigated that the time lines of all notifiable disease was not monitored and therefore, it was difficult to get when the disease was detected and reported to the next level. Timeliness is one of quality measure of any surveillance system and should be monitored regularly. It is a key element of the surveillance system that indicates the system's ability to take appropriate action on public health problems, based on the urgency and the type of responses needed.[5]

Strength of the study

This malaria surveillance system evaluation is conducted in the region for the first time and will provide base line information for further studies.

Limitation

Incomplete data was a big problem to calculate most of the indicators which help to measure basic indicators for malaria surveillance system.

Conclusion

The surveillance system for malaria in Gambella regional state is sub optimal and not supported with the requirements of updated guidelines. Absence of malaria monitoring chart and weak surveillance data utilization is hindered the actual estimate about the magnitude of the disease at regional as well as national level.

Recommendation

National surveillance guidelines should be avail to all level of the surveillance structure. The database should have all relevant variables (age, sex, address, clinical symptoms and other additional variables based on the type of disease (e.g. vaccination status for measles). There should be periodic supportive supervision and refreshment training to strengthening the surveillance system especially at HP and HF level where cases initially detected. Training should be given to surveillance officers and focal persons that help them how to organize and analyze surveillance data.

Further studies should be conducted to identify other factors related malaria disease prevalence as well as ways to improve surveillance system.

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Chapter IV – Health Profile Description Report

4.1 Assessment of District Health Profile, Wonago Woreda, Gedeo Zone, SNNPR, Ethiopia, 2014

Abstract

Background- Wonago Woreda is known with its high population density in the country. Study was conducted to describe the health status of the community and determine potential health problems.

Methods- Cross-sectional descriptive study of record review and interview conducted using structured checklist from March 12-19/2014 on five surveillance units in the woreda. Data was collected by interviewing surveillance officers in each units and review of documents in the same units. Microsoft Excel was used to analyze data.

Result- Total population of 143,215 are residing in 17 rural and 2 urban Kebeles. Population under 1years is 4,296 (3%), under 5years is 22,342 (15.6%), under 15years is 68,744 (48%) and women of childbearing age (15-49years) 69,172 (48.3%). Estimated pregnant women is 5,730 (4%). Potential health service coverage is 87% while 80% of HCs have access for transportation and electricity. Only 20% of HCs and 10% of HPs have water facility. Coverage of ANC is 95.4%, skilled delivery service is 10.5%, $Penta_3$ is 103.6%, PCV_3 is 98.9% and MCV_1 is 106.6%. Among adult OPD cases seen in the year, malaria (17.53%) and typhoid fever (12.17%) is the leading cause of morbidity while diarrheal disease (27.66%) and pneumonia (16.9%) is the leading causes of morbidity in under 5 years. Malaria (87.5%) followed by severe acute malnutrition (12.5%) is the leading causes of death in under 5years.

Conclusion- Low coverage of water access and skilled delivery service, below the expected plan which should be the main area of health service improvement plan. Malaria, typhoid fever and sever acute malnutrition are the leading causes of morbidity and mortality in part, which need prompt prevention and control measure.

Key words- Health profile, District Health Assessment, Wonago Wereda, Gedeo Zone, SNNPR

Introduction

Health profile assessment is a systematic collection, organization and interpretation of data of health and health related events, demography, political, social, economic and cultural aspects of a particular territory in order to describe the health status of the community and determine disease burden so as to improve community health.

Wonago Woreda is one the six Woredas found in Gedeo Zone and known by its high population density in the region as well as in the country and recurrent outbreaks. Wonago Woreda is located 12km south of Dilla town bordering its northern part with Dilla Zuria, Bule Woreda to the East, Oromia region to the west and Yirga cheffe Woreda to the south direction. The altitude of the district ranges from 1400-2400 meters above sea level and the highest annual rainfall is 1,449mm while the lowest is 875mm. The mean annual temperature of Wonago Woreda ranges from 11^0c to 29^0c, lowest and highest temperature respectively.

More than half of the land (57.5%) of the district is sloppy while 39.5% is mountainous and only 2.8% is flat land surface. Coffee is the major cash crop production in the area with "Enset" plant as main food source. Therefore "Enset" is the main crop of the area used as source of food. Small farms of vegetables like cabbage and some types of fruits like avocado, mango and banana are common in the area.

Study is conducted to describe the health status of the community and determine magnitude of health problems.

Any intervention intended to improve health of the community has to rely on evidences collected from the respective community and available data sources that describes about that community. Having reliable data dictating the health status of the community will be strong baseline for setting health planning and evaluating programs and strategies. One of the important aspect of health profile assessment is to avail important and relevant information for public health officials to have evidence based decision making practice.

Rationale of the study

District health profile provides a snapshot of the overall health status of the local community and highlights potential health problems through comparison of basic indicators with other areas as well as with the national average. However, in developing countries like Ethiopia such information especially at district level is usually not complete and comprehensive. (X, Xx) Therefore this study was conducted to generate Wonago woreda health information which helps the woreda and other stakeholders such as local and international NGOs working in the woreda as well, to improve the public health.

Objective

General Objective:

- To describe health profile of Wonago Woreda, Gedeo Zone, SNNPR, Ethiopia, 2014.

Specific Objectives:

- To describe the demographic and socio-economic status of Wonago Woreda
- To describe burden of community health problems in Wonago woreda.
- To identify priority health problems in the woreda
- To describe primary health care service coverage of Wonago woreda.

Methods and Materials

Study area

The study was conducted in Wonago Woreda from March 12-19/2014. Wonago Woreda is one of six woredas in Gedeo Zone and located 11 km south to Dilla town, capital of Gedeo Zone. The Woreda has a population of 143,215 within 17 rural and 2 urban administrative Kebeles.

Source population

The source population for this study is the population of Wonago woreda residing in 17 rural and 2 urban kebeles.

Study design

We used descriptive cross-sectional study using data obtained from review of available secondary sources and interview of individuals in charge on health and other health related conditions was conducted. Data were collected using standard structured questionnaire and analyzed by using EpiInfo version 7.1.4.0 and Microsoft Excel 2013. The study was conducted in Wonago Woreda from March 12-18/2014.

Data collection

Data was obtained from health, agriculture, culture and tourism, water resource management, finance and economy and education offices.

Both qualitative and quantitative data were collected through interview and document review using health profile data collection checklists.

Data analysis and organization: - We used Excel sheet for the analysis of frequencies and figures. We also used Arc Map to describe the administrative area Woreda.

Ethical consideration: A signed written letter of permission was obtained from RHB and respective administrative organizations. Also verbal consent was obtained before interviewing the respondents at every unit of surveillance.

Results

Back Ground and Geographical Location

Wonago is one of the oldest Woreda, among four former Woredas namely Yirgacheffe, Chelelektu (currently named as Kochore) and Bule Woredas in Gedeo Zone Wonago Woreda is one of the six Woredas found in Gedeo zone located on 12 km southern to Dilla town, capital of Gedeo zone and 102 km away from Hawasa, capital of SNNPR. Wonago Woreda is bordered with Yirgacheffe Woreda in the south and south-east, with Dilla Zuria town in north-east and eastern direction.

Wonago Woreda is located 1,400-2400 meters above sea level with 54.5% woinadega, 39.5% dega, and 6% kola climatic zone. The annual rain fall range from 875mm to 1,449mm and the

mean annual temperature is 11 ^{0}c (Lowest) and 29^{0}c (Highest). From the total land of the Woreda, 39.5% is mountainous and 57.5% sloppy area.

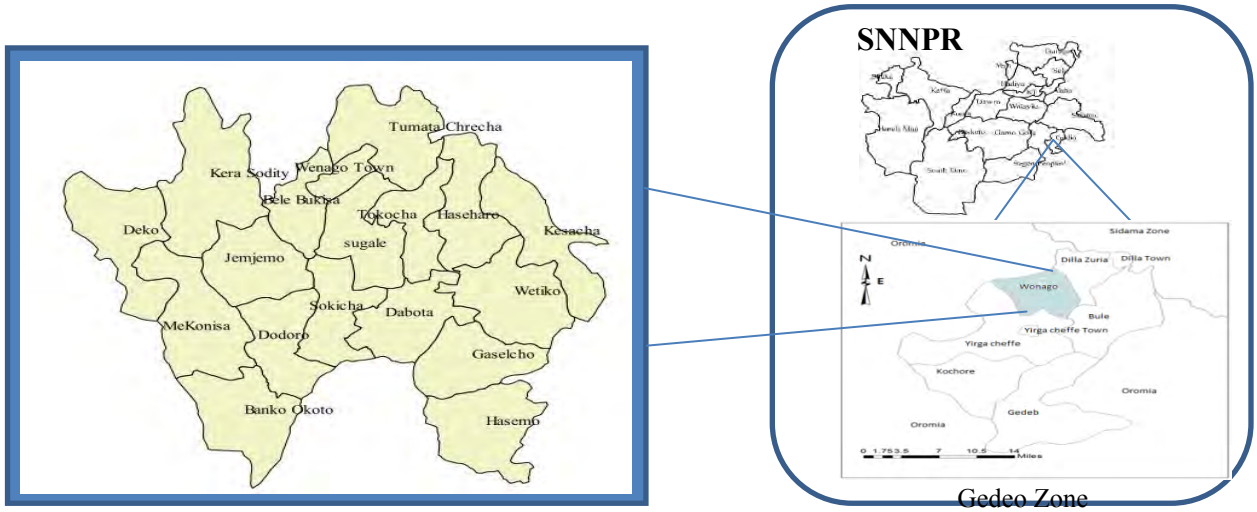

Figure 19: Administrative Map of Wonago Wereda, Gedeo Zone, SNNPR.

Coffee is the major cash crop production in the Woreda with "Enset" plant as main food source. Small farms of vegetables like cabbage and some other types of fruits like avocado, mango and banana are common in the area.

Administrative and Political structure

There are 19 kebeles in the Woreda, two of them are Urban. The nearest kebele to the Woreda town is Balebukissa kebele (One far km from the Woreda center) and the remote kebele is Halemo kebele (16 km far from the Woreda center). Regarding the ethnic composition in the Woreda, multiple ethnic groups are residing with majority of them is Gedeo ethnic group (87%), followed by Amhara, Gurage, Oromo, Silte, Wolaita, Sidama, Tigre, Kambata, and others together comprising the rest 13%.

Protestant (Christian) religion followers are majority of all other religion followers (80%) followed by Orthodox (15%), Muslim (4%) and others (1%).

There are 26 schools in the Woreda of which 22 are government schools while 4 are private. A total of 24,975 students, (M; 13,693[54.8%] & F; 11,282[45.2%]) in four kinder garden (private) 21 primary school and one secondary schools.

Table 4: List of kebeles and their population in Wonago Woreda, Gedeo Zone, SNNPR.

No	Name of Kebele	population	School
1	Wonago-buo	4,784	**
2	Wonago-tutufela	4,784	*
3	Balebukissa	4,607	*
4	Tumata chiracha	6,047	**
5	Sugale	11,044	*
6	Tokicha	4,650	*
7	Hase haro	9,274	*
8	Jemjemo	8,214	X
9	Karasodity	6,743	*
10	Mekonisa	13,050	*
11	Deko	5,641	**
12	Dodoro	7,401	*
13	Banko okoto	8,461	*
14	Sokicha	7,295	*
15	Debota	8,475	*
16	Gelelcho	7,544	**
17	Kelecha	9,296	*
18	Wotiqo	10,652	*
19	Halemo	5,253	*
		143,215	

*One primary school; ** one secondary school; X No school

Demographic information

The Woreda population is estimated to be 143,215 people residing in 17 rural and 2 urban kebeles, of which 51 percent are female. From the total population 6.7% (9,568) percent is residing in urban kebeles. An average of 1,014 people is residing in one square kilometer and the most densely populated kebele in the district is Mekonisa Kebele in which 1,284 people in one square is residing. Population under 1years is 4,296 (3%) under 3years is 11,457 (8%), under 5years is 22,342 (15.6%), under 15years is 68,744 (48%) and women of childbearing age (15-49years) 69,172 (48.3%) while estimated pregnant women during the year is 5,730 (4%).

Health Service Coverage

There are 20 health posts and 5 health centers in the Woreda which gives the potential health service coverage to be 87%.

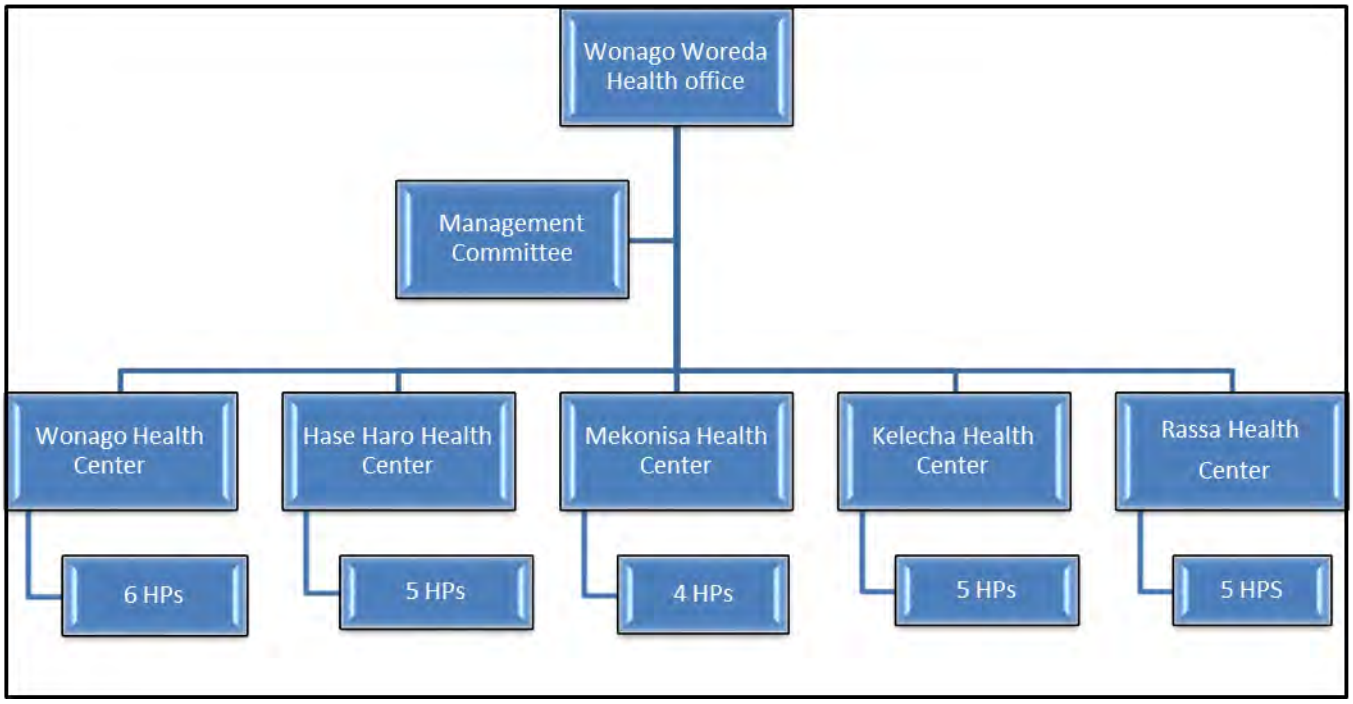

Figure 20: Organogram of Wonago woreda health office, Gedeo Zoe, SNNPR, 2014.

From 5 HCs found in the Woreda, four (80%) of them have transportation access (Road) and electric power supply. Only one health center (20%) has access for telecommunication (fixed line phone) and water facility. Out of 20 health posts in the Woreda, only two health posts (10%) has access of water in the facility.

ANC coverage of 2005E.C is 95.4% and that of skilled delivery service is 10.5%. The $Penta_3$ vaccination coverage in the year 2005E.C is 103.6% while PCV_3 coverage is 98.9% and measles vaccine coverage is 106.6%. Regarding the consecutive five years of morbidity data malaria followed by typhoid fever is the leading causes in adult. There were 1890, 1860, 1803, 2310 and 2178 of malaria from 2001 to 2005 EFY respectively. Whereas 1265, 1416, 11291, 1458 and 1752 cases of typhoid fever were registered as the second leading cause of morbidity. Among OPD cases seen in 2005 E.C, malaria(17.53% of all adult cases) followed by typhoid fever (12.17% of all adult cases) is the leading cause of morbidity in adult while diarrheal disease (27.66%) followed by pneumonia (16.9%) is the leading causes of morbidity in children under 5

years of age. Malaria (87.5%) followed by severe acute malnutrition (12.5%) is the leading causes of death in children under 5years of age.

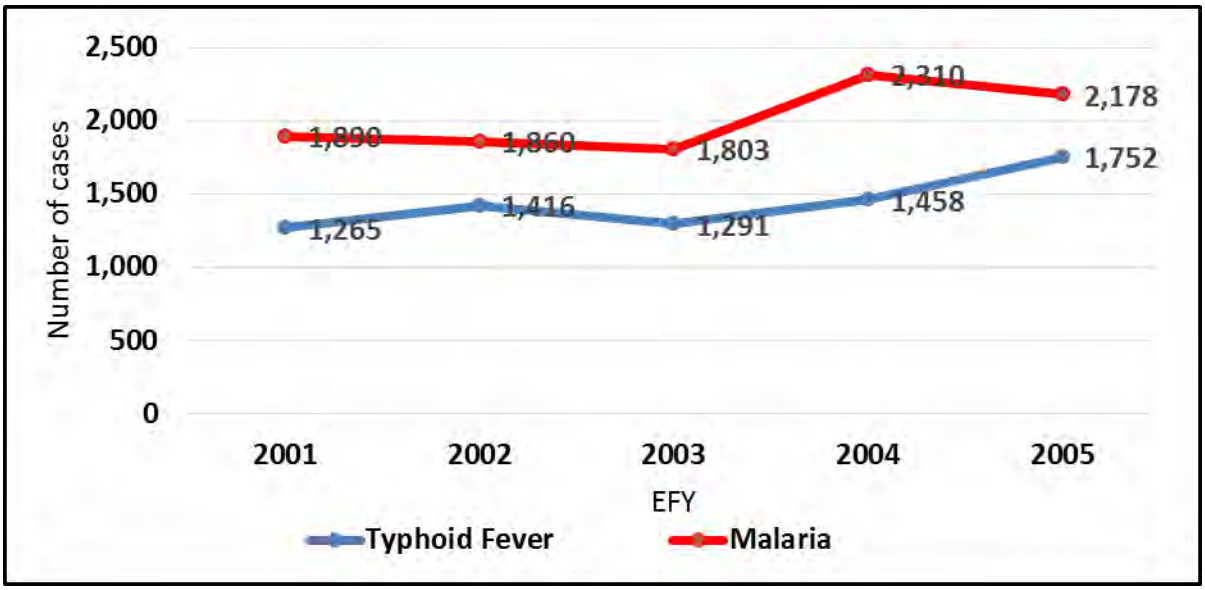

Figure 21: The leading causes of morbidity in adult from 2001 up to 2005 EFY, Wonago Woreda, Gedeo Zone, SNNPR, 2005 E.C.

Economy

As more than 90% of the total population is rural community and depend on farming, the source of their economy is dependent on agriculture mainly on coffee production and other crops in small scale.

More than half (62%) of the total land is covered by coffee tree followed by "Enset" (15%) and annually harvested crops (15%). No data were available about the economic status and the annual average income of the community.

Education

Modern educational system was started in 1968 E.C at Wonago elementary school, Wonago town. In the Woreda junior secondary school (9-10) was started in 1976 E.C... Currently, there are three junior secondary schools (9-10), 21 elementary schools (1-8) and one preparatory school is available in the woreda. School enrolment percentage for the year 2013/14 was 92.7%.

The school dropout was 26% and 24.2% in2012/ 2013 and 2013/2014 mid-semesters respectively. In 2012/2013 the highest dropout rate was recorded among junior secondary school students. Among dropouts, average, in both physical years 46% and 38% were males and female students respectively.

Discussion

Vaccination is one of the strategies used to reduce child hood morbidity and mortality. The vaccination indicators PV3 and measles vaccination coverage was over achieved which is above the optimal standard recommended by WHO as well as national immunization guideline. This vaccination coverage should be encouraged and acknowledged after appropriate assessment survey for vaccination coverage.

Malaria is remaining the leading cause of morbidity for the last five consecutive years (2001-2005 E.C). Although, different activities were implemented to control malaria disease burden but the number of malaria cases become increasing year to year. The ITNS distribution coverage is 98% but the utilization coverage is not assessed in the whole woreda for years. Majority of the health problems in the Woreda were infectious diseases that can be prevented through water and sanitation. But the Woreda drinking water supply coverage is 29.6 % which was below the national coverage (50.8%). Water and sanitation is the basic needs which used in reduction of infectious disease like water borne and fecal oral transmittable diseases. Access to traditional pit latrine was 86% which is better than the national coverage (82%). However those graduated as open defecation free kebeles are only 32%. This shows that sanitation and water supply need to be given due attention by the woreda as well as zonal health department.

Limitation

We could not describe mortality and morbidity for specific indicators (maternal mortality, infant mortality and under five mortality) because data was not available. Limited resource of records at the health departments about health events, disease conditions and economic status was a limitation for further description of the health profile.

Conclusion

Nationally notified diseases burden especially malaria was increased in the last couple of years as the leading and number one health problem in Wonago woreda. Majority of the health problems were infectious diseases that are easily preventable. It is possible to reduce the disease burden through encouraging the community to fully participate in disease prevention and control activities and disease surveillance.

Recommendation

The routine EPI program should be strengthened in addition there should be supplementary immunization to catch up those didn't get vaccination. There should be assessment on ITNs utilization so as to solve the problem in the local contexts which help to solve malaria not to be major health problem. Access to drinking water supply system should be improved which is vital for reduction of majority of infectious diseases.

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Chapter V – Scientific Manuscripts for Peer reviewed Journals

5.1 Surveillance Data Analysis of Measles, SNNPR, Ethiopia, 2009-2013.

Authors: Dereje Mamo[1], A. Addissie, A[2], M. Tucha[3], J. Hassen[3]

Address: [1]Addis Ababa University School of Public Health, Ethiopia Field Epidemiology Training Program (cohort 5 resident); [2]Addis Ababa UNIVERSITY school of public health, Ethiopia field epidemiology training program coordinator, [3]South nations and nationality people region public health emergency management core process owner.

Abstract

Background: Measles is a leading cause of childhood morbidity and mortality in Africa. During the year 2013, a total of 10,088 suspected measles cases were reported from SNNPR, Ethiopia. To assess the magnitude, and trend of measles over five years, 2009-2013.

Methods: Cross-sectional study of a five years (2009-2013) measles case based surveillance data and ten years (2004-2013) routine and supplementary vaccine coverage data of the region were reviewed.

Result: A total of 54,221 measles cases were registered by surveillance system. The cumulative incidence rate was 8.25%. The most affected age group is under 5 years (ASAR: 10.1/1000) and 5-14years (5.0/1000) followed by above 15 years (0.8/1000). Both male and female sex was equally affected (50.8%, 49.3%). The mean age of cases is six years. Among all cases 48.8% were never vaccinated while 32.2% were vaccination with one dose and 6.8% were vaccinated with two doses. The proportion of birth cohort to susceptible population during 2004, 2008 and 2013 was 1:1.03, 1:0.74 and 1:1.67 respectively.

Conclusion: The most at risk-group is children under five years of age. Throughout the years, number of susceptible is more than two-third of the birth cohort of the corresponding years, resulting in huge accumulation of susceptible. Unless all children under 15 years of age are targeted for measles vaccination campaign and strong routine vaccination is maintained in the region, the outbreak will not contained easily.

Key words: Measles, Data analysis, Surveillance

Introduction

Measles is a leading cause of childhood morbidity and mortality. In Ethiopia during 2011, a total of 9,756 measles cases were reported. From all reported cases 78% were children under 5 years of age, of which majority are unvaccinated. In SNNPR, measles outbreak is continued to be a challenge for the last several years. During the year 2013, a total of 7,586 measles cases were registered in the region.

Every year, number of cases and epidemics are reported from majority of zones and special Woredas. But, the magnitude of the disease, its trend and susceptibility of the population for measles is not documented and decision made to control the disease is not evidence supported. There for, determining the magnitude and characterizing the trend of measles as well as assessing susceptibility to measles in the region will be very crucial. So, this surveillance data analysis will help in describing these and provide preliminary information for further investigation, and decision making.

Methods

Study area and population: This surveillance data analysis was conducted in SNNP regional health bureau by reviewing measles case based surveillance data of the region from 2009 to 2013. Southern Nation Nationalities and Peoples Region (SNNPR) is one of the nine regions in the country located in Southern and South-western part of Ethiopia with estimated 18,375,050 total population and 110,931 km^2 of total area giving population density of 166 person per km^2. The study population is the total population in the region.

Study Design: Descriptive cross-sectional review of secondary data of measles cases based reports from all zones and districts during Jan 2009 up to Dec 2013.

Data source: Data was obtained from data base of SNNP regional office of WHO and regional PHEM.

Data collection and analysis: The consecutive five years data of measles case based repots were collected from regional WHO office and PHEM and analyzed using EpiInfo version 7.1.4.0 and Microsoft Excel 2013.

Result

During the data collection, we noticed that- the quality and completeness of variables required for data analysis and appropriate epidemiological explanation of the disease were not well documented in the data base. However, using relatively complete data of the past 5 consecutive years the following result is obtained.

During the period of 2009 to 2013 a total of 54,189 measles cases were reported, out of which 7,261 (13.4%) were under 1year; 17,991 (33.2%) were 1-4 years; 16,365 (30.2%) were 5-9years while 12,572 (23.2%) were those in age group of older than 10years of age. The median age of cases was six years while the youngest and the oldest suspected measles cases investigated were a three month old infant and a 98 years old man. The youngest lab confirmed case of measles was a 3months infant while the oldest is a 37 years old man. The most affected age group is 1-4years (33.2%) followed by 5-9 years (30.2%). Of all investigated suspected measles cases 898 (1.6%) were positive for measles IgM.

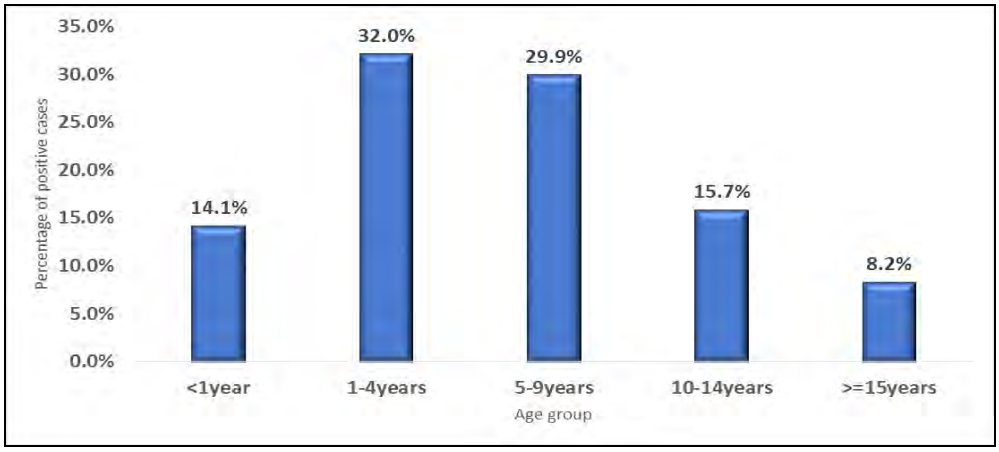

Figure 22: Suspected measles cases by age group, SNNPR, 2009-2013.

The three highest number of lab confirmed measles cases were registered in Kefa, Sidama and Wolayta Zones, however, almost all parts of the region reported lab confirmed measles cases.

The leading zone with large number of measles confirmed cases throughout the study period, 2009 to 2013, was Kefa Zone.

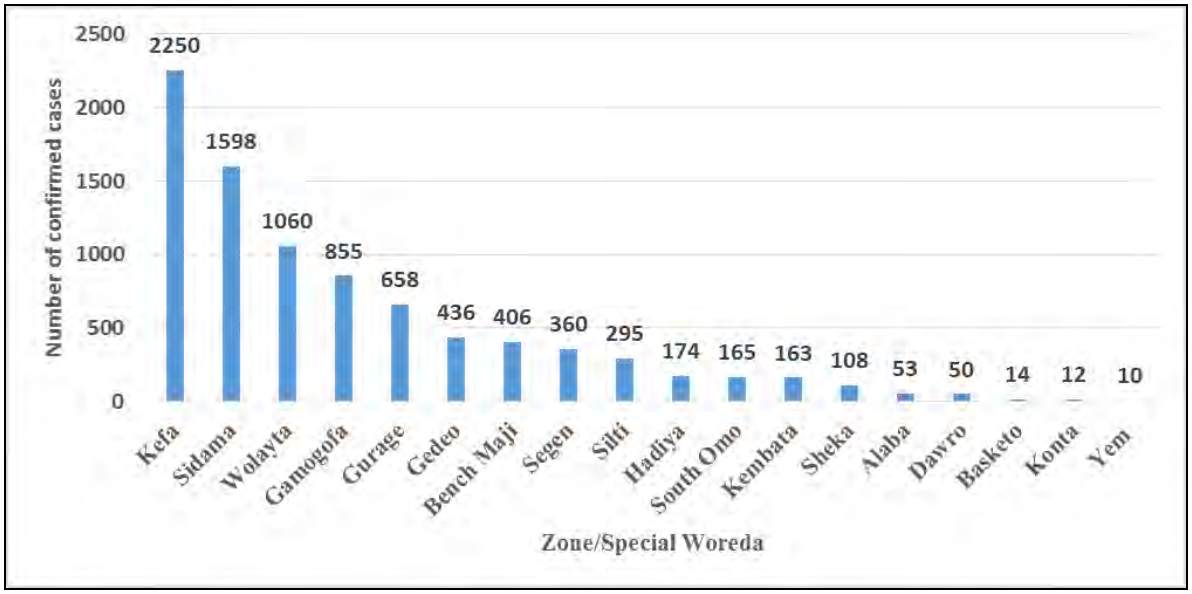

Figure 23: Suspected cases of measles by zone and special woreda, SNNPR, 2009-2013.

During the five years, the total number of suspected measles cases were seen to be progressively increasing from year to year, and the largest peak was in 2012.

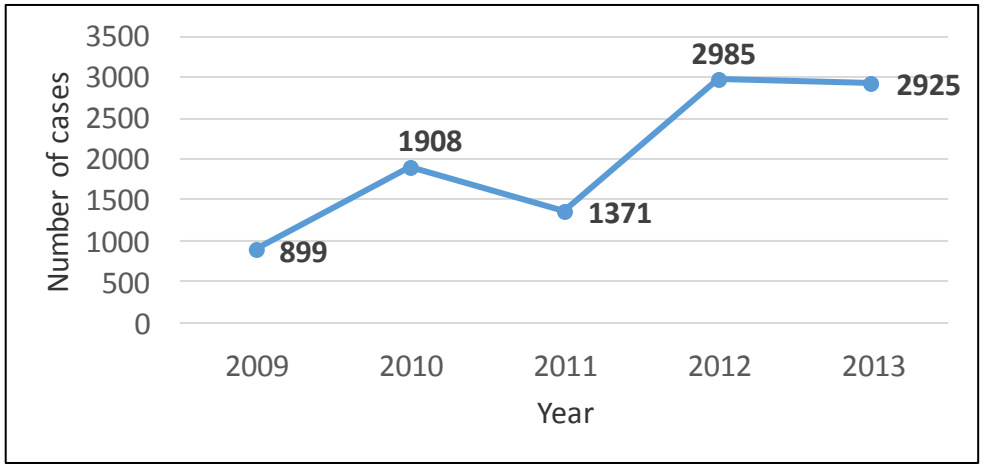

Figure 24. Trend of suspected measles cases, SNNPR, 2009-2013.

Out of 8,674 suspected measles cases 82% (7,111) cases were confirmed for measles. Out of 7,111 confirmed cases, 898 (10.4%) were classified as lab confirmed cases for measles virus

while 6,213 (71.6%) cases classified as measles confirmed by epidemiological linkage to the areas with confirmed outbreak during a time samples were obtained. Of the rest, 705 (8%) cases were classified as clinically compatible measles cases. Whereas 858(10%) investigated cases are finally classified as discarded cases.

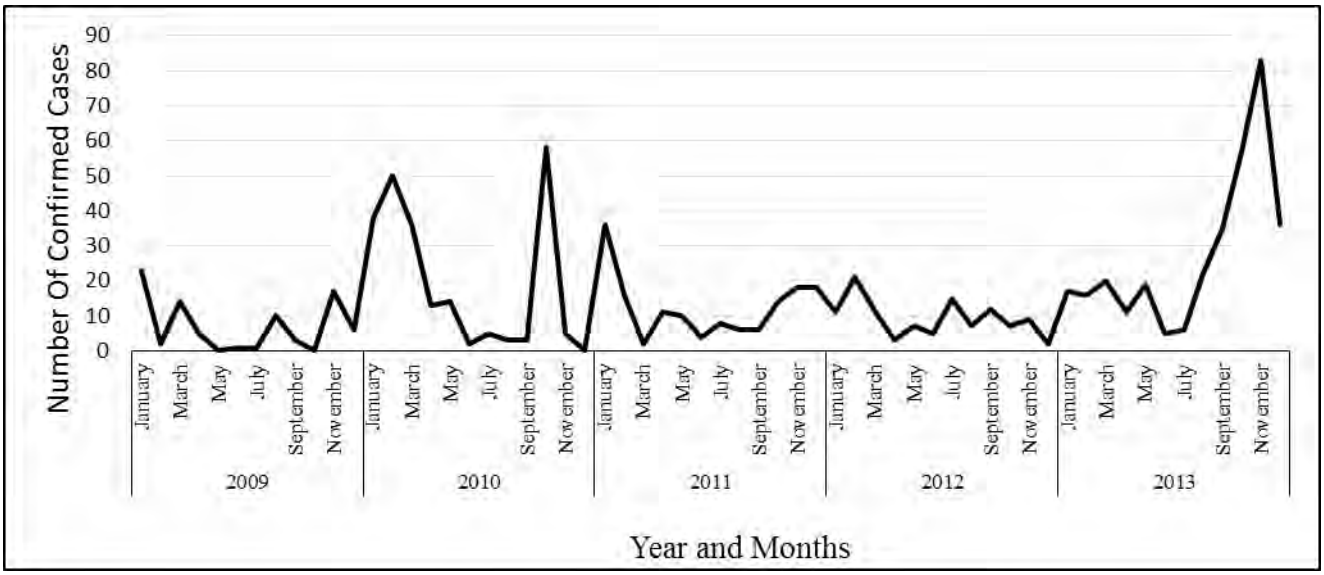

Figure 25. Trend of lab confirmed measles cases by months during 2009 - 2013, SNNPR.

During the 5 years period, confirmed measles cases were reported in almost all months of the years and seasonal variation were existed with peaks of infection during the first quarter(January to March), late third(September) and last quarter (October to December). (See Fig. 9)

Regarding the vaccination status of the cases 4,388(48.8%) of them were not vaccinated, 2,894(32.2%) of them were vaccination with one dose, 615 (6.8%) of them vaccinated with two doses while the vaccination status of the rest 13.3% of the cases is unknown. (See Fig. 10)

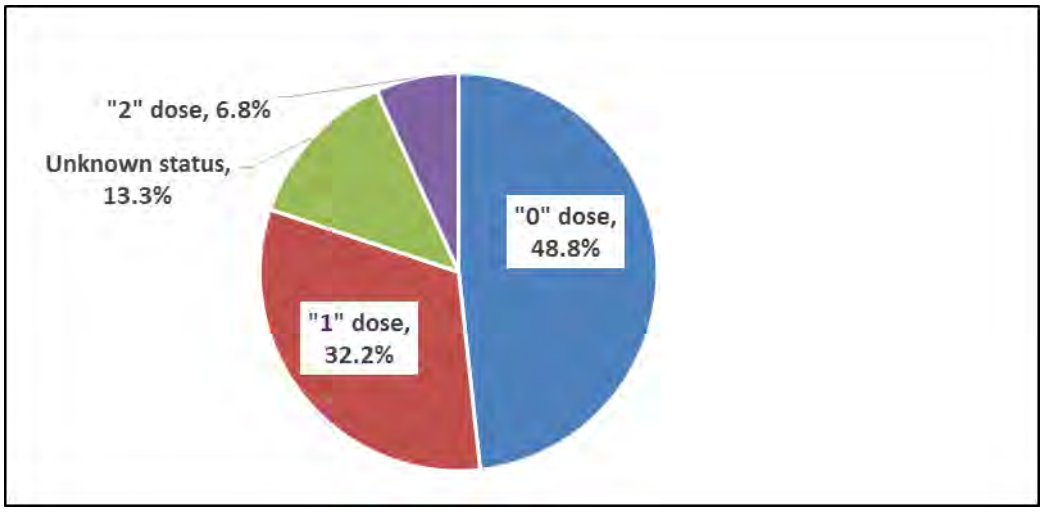

Figure 26. Confirmed measles cases by vaccination status, SNNPR, 2009-2013

Discussion

The most affected age groups are those 1-4years and 5-9years. Almost half of the cases were not vaccinated which is a possible indicator for the existence of an increased number of susceptible people in the region. Although the "period study" of this study is limited to 2009-2013 and describing the cases reported during this period of time, there are number of cases before as well as after the study period. In the five years period, highest number of cases were reported from Kefa, Sidama and Wolaita Zones respectively from the most to the least order. Primary vaccine failure and failure to vaccinate are the already known causes for accumulation of susceptible children and low herd immunity, might be the possible causes for increased number of cases recorded in the region year to year. The age shift from younger to older might be a possible indicator for accumulation of susceptible people in the community and lower herd immunity achievement in the region and need further study to determine the factors.

Conclusion

Measles cases are increasing year to year covering almost all zones and special woredas of the region. There is high number of susceptible people in the region. Failure to achieve optimum herd immunity is the possible reason for sustained outbreak in the region.

Recommendation

All children under 15 years of age should be targeted for mass vaccination. Those zones and districts with high dropouts of measles vaccination should be identified and prioritized for appropriate measures. The regional health bureau should strengthen routine EPI programs and SIAs in order to reach unvaccinated children and susceptible. In addition to this EPI performance quality assessment should be conducted at zone, woreda and kebele level in order to determine area specific challenges and gaps.

Measles surveillance system should be monitored and strengthened from regional PHEM to the community level. Capacity building for health workers on measles surveillance, especially on laboratory surveillance, should be emphasized regional health bureau and all stakeholders.

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Chapter VI – Abstracts for Scientific Presentation

6.1. Measles Surveillance Data Analysis of Southern Nations, Nationality and Peoples Regional State, Ethiopia, 2009-2013.

Authors: Dereje Mamo[1], A. Addissie, A[2], M. Tucha[3], J. Hassen[3]

Address: [1]Addis Ababa University School of Public Health, Ethiopia Field Epidemiology Training Program (cohort 5 resident); [2]Addis Ababa UNIVERSITY school of public health, Ethiopia field epidemiology training program coordinator, [3]South nations and nationality people region public health emergency management core process owner.

Abstract

Background: Measles is among a leading cause of childhood morbidity and mortality in Africa. During the year 2013, a total of 10,088 suspected measles cases were reported from South Ethiopia Regional State. Our aim is to assess the magnitude and level of susceptibility for measles in the region.

Methods: Cross-sectional review of a five years (2009-2013) measles case based surveillance data and ten years (2004-2013) routine and supplementary vaccine coverage data of the region were conducted.

Result: A total of 54,221 measles cases were registered by surveillance system. The cumulative incidence rate was 8.25%. The most affected age group is under 5 years (ASAR: 10.1/1000) and 5-14years (5.0/1000) followed by above 15 years (0.8/1000). Both male and female sex was equally affected (50.8%, 49.3%). The mean age of cases is six years. Among all cases 48.8% were never vaccinated while 32.2% were vaccination with one dose and 6.8% were vaccinated with two doses. The proportion of birth cohort to susceptible population during 2004, 2008 and 2013 was 1:1.03, 1:0.74 and 1:1.67 respectively.

Conclusion: The most at risk-group is children under five years of age. Throughout the years, number of susceptible is more than two-third of the birth cohort of the corresponding years. Unless all children under 15 years of age are targeted for measles vaccination campaign and strong routine vaccination is maintained in the region, the outbreak will not contained easily and the 2020 measles elimination goal will less likely to be achieved.

Key words: Measles, Data analysis, Surveillance

6.2 Outbreak Investigation of Suspected diphtheria cases in Alle and Konso woreda, Segen Zone, SNNPR, 2015.

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Abstract

Background: On February 27/2015 Ethiopia Public Health Institute (EPHI) received a report on outbreak of undiagnosed illness and death in Segen Zone, SNNPR which resulted in 13 cases and three deaths. To confirm the outbreak and identify etiologic agent of the disease.

Method: Segen Zone is one of the 15 zones in Southern Nations Nationalities and Peoples Region State of Ethiopia. Comprehensive questionnaire targeting all possible causes of the disease based on differential diagnosis made by the physicians. Botulism, Diphtheria, GI anthrax, Brucellosis, Meningitis and Poisoning (Chemical, plant, insects, snake) were considered. Unmatched cases control study conducted 1:3 ratios for cases to control. Data was analyzed using EpiInfo version 7.1.4.0 and MS Excel 2013.

Result: A total of 77 cases with six deaths (CFR: 6.8%) identified. Out of all cases 99% have sore-throat, 94% have dysphagia, 53% have change in voice, 49% have blurred vision and headache while 4% have aphonia and diplopia. 22.6% had history of direct contact with person who has symptom before one to two days of their illness. Although all cases (100%) had shared same meal with their family members in times/days before the onset only 2% of cases were from same household. The most affected age group is 15-59 years (ASAR:47/100,000). No lab result found supportive for any of the differential diagnosis made.

Conclusion: The clinical presentations, disease distribution sparing family members and affecting adults and older children compared to children below five years of age is more compatible with diphtheria than other diseases.

Key words: Unknown outbreak, Alle and Konso, Segen

Chapter VII – Narrative Summary of Disaster Situation Visited

7.1 Humanitarian, health and nutrition assessment in Gedeo and Sidama Zone, SNNPR, 2014.

Background

Southern Nation, Nationalities and People Region is one of the big and diversified region of the country with a total of 15 zones and136 Woredas with 4 special Woredas. The region is located Southern and South-Western part of Ethiopia. The total area of the region estimated to be 110,931.9 Sq. Km which is 10% of the country and inhabited by a population size of about 18,375,050 in 2014 G.C, 20% of the total population of the country. The population density of the region became 142 persons per sq.km, which makes the region one of the most populous parts of the country.

In the region there are 8 Zonal Hospitals, 12 District Hospitals, 165 Health Centers, 237 Upgrading health centers, & 2,720 health posts, totally 3,142 health facilities are available in the region. The potential health service coverage of the region reaches 80%.

The Ethiopian Ministry of Health in collaboration with SNNP regional health bureau, Ministry of agriculture, National Metrology Agency and respective bureaus, WHO, UNICEF, OCHA, MSF-S conducted emergency health and nutrition need assessment (Belg assessment) in SNNP region from June 16-30/2013. The main objective of this assessment is to identify areas where emergency health and nutrition assistance needed for the upcoming six months and to determent the gap in the capacity of the health system in addressing anticipated risks so as to develop response plan.

Objectives of the Assessment

- To assess the extent, types, magnitude, severity and likelihood of different risks in the most "vulnerable" Woredas during "Belg" time in Gedeo and Sidama Zones.
- To assess the existing capacity of the health system to address those risks in Gedeo and Sidama Zones.
- To determine gaps in the capacity of the health system to address anticipated/impending risks and existing threats in Gedeo and Sidama Zones.
- Based on the findings, to develop response plans.

Methods

The assessment was conducted in four Woredas of Gedeo and Sidama zones. From each Zone two Woredas were selected based on emergency health and nutrition problems in consultations with the FMOH, RHB and ZHDs. The assessment was done 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/EPHI/PHEM.

Briefing by different sectors of the zone was the initial activity before departing to the selected Woredas and also debriefing by the assessment team was done at last and discussions were under gone about the findings of the assessment.

Result

Gedeo Zone

Coordination: In the Zone there is functional multi-sectorial committee and they meet quarterly however in the committee all relevant government, NGOs and UN Agencies are not well represented. Similarly in Wonago Woreda there is functional multi-sectorial committee and all relevant government and nongovernmental organizations are represented. In both Kochore and Wonago Woreda as well as at zonal level there is emergency preparedness and response plan but budget is not allocated for this plan.

Table 5: Top five causes of morbidity by age group in Kochore Woreda, Gedeo Zone, Jan-May 2014.

No.	Below 5 years	Above 5 years
1	Pneumonia	AFI
2	Diarrheal disease	Other infectious diseases
3	Upper respiratory infection	Typhoid fever
4	Helmenthiasis	Trauma/injury
5	Acute febrile illness (AFI)	UTI

Table 6: Top five causes of morbidity in Wonago Woreda, by age group, Gedeo Zone, Jan-May 2014.

No.	Below 5 years	Above 5 years
1	Diarrhea	AFI
2	Pneumonia	Malaria
3	All respiratory disease	Helmenthiasis
4	Malaria	Typhoid fever
5	AFI	Trauma

Major Epidemic prone diseases

In both assessed Woredas, zero cases and death of AWD was reported, but in Kochore Woreda 11cases of meningitis were reported from Jan – May, 2014. All assessed Woredas are malaria endemic and during three month period malaria cases is decreased in both Woredas during Jan to March but slight increase is observed during April and May 2014.

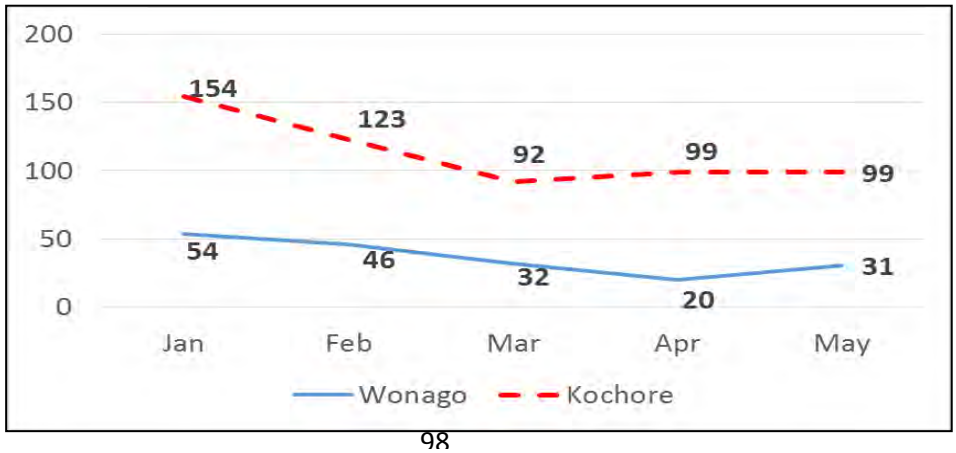

Figure 27: Trend of Malaria cases in Kochore and Wonago Woredas of Gedeo Zone, Jan-May 2014.

A total of 12 measles cases with zero death were reported from Kochore Woreda. Reported cases in January was one (8.3%), February three (25%) and in March 8 (66.7%).

Outbreaks

During the January 2014 meningitis outbreak was occurred in Gedeo Zone and a total of 76 cases and zero deaths were reported. Currently the outbreak is contained. In Wonago Woreda no outbreak was reported.

Preparedness

Reviews of the Woredas drugs and supply stocks have shown that, there is no emergency stock specifically kept for emergency response. Shortage of emergency drugs and medical supplies for measles complication, meningitis, and malaria are common problem in both assessed Woredas as well as zonal level.

Regarding budget allocation for emergency rapid response, in Kochore and Wonago Woredas the budget is not allocated. Availability of skilled /trained professionals in the Woredas play a great role to adequately respond to public health emergencies, there is trained rapid response team.

Table 7: Preparedness; drugs and medical supplies in Gedeo zone, 2014.

Drugs and medical supplies	Total requirement	Available	Gap
Meningitis vaccine			
Drugs			
Coartem	16,568 does	2,400	14,168 does
Artesunate (rectal)	11,205 does	0	11,205 does
Artesunate (Inj)	16,300	0	16,300
Artemether IM	16,300	0	16,300
Quinine (PO)	69 tin	0	69 tin
Quinine (IV)	14 box	0	14 box
Chloroquine	119 box	0	119 box

Ceftriaxione	34,100 vial	0	34,100 vial
Oily CAF	-	0	-
Doxcycline	2,442 Pk	0	2,442 Pk
Ringer lactate	4,000	0	4,000
ORS	8,000 sachet	0	8,000 sachet
Vit A.	500 tin	0	500 tin
Supplies			
RDT (Malaria)	530box	530box	0
Pastorex (Meningitis)	10	0	10
LP set	50	0	50
TI bottle	20	0	20
CTC Kit (AWD)	24	0	24
Medical supplies			
Gloves,	88 carton	22	66 carton
Syringe	90 carton	10	88 carton
PPE			
Clinical Delivery Assistance kit PART A: Reusable Equipment	112	0	112
Clinical Delivery Assistance kit PART A: Reusable Equipment	240	0	240
Mgt. of Complications of Abortion kit (Manual Vacuum Asp. Set)	84	0	84

Timeliness and Completeness

Timeliness and completeness of reports is one of the disease surveillance indicators used for early detection of disease and timely response. In both Wenago and Kochore woreda the completeness is above 85 % while timeliness in both Woreda is below 80%.

Risk factor

In Gedeo zone malaria is the anticipated risk in Dilla Zuria, Wonago, Kochore woredas and Dilla town and a total of 265,238 people are estimated to be at risk. In addition, Malnutrition is the anticipated risk and a total of 118,423 are estimated to be at risk.

Malaria

All assessed Woredas are malaria endemic. 12 kebeles in Wonago Woreda are malarious. A total of 62, 808 and 61,125 populations are identified as risk in and Wonago Woredas respectively.

In both assessed Woredas ITNs coverage is above 80%. IRS coverage is below 40% and below 65% in Kochore and Wonago Woredas respectively. Malaria is the anticipated risk for epidemic to occur due to low IRS coverage, low ITN utilization coverage and depleted prevention and control activity. In Kochore Woreda the previously distributed ITN is expired/out dated need replacement, thus the ITN coverage of the current time will be nil.

Table 8: Anticipated outbreak in the coming July to October and population at risk in Gedeo Zone, 2014.

Woreda	Measles	Malaria	Malnutrition
Bule	18208		
Dilla Twon	11629	80129	
Dilla Zuria	16912	61176	16912
Wonago	20297	61125	20297
Y/cheffe Woreda	33919		33919
Kochore		62808	22680
Total	100965	265238	24615

Meningitis

During Jan a total of 76 cases of meningitis epidemic occurred in Gedeo Zone. There is no meningitis guideline in the assessed Woredas but training on meningitis control guideline was given and PHEM guideline is distributed to all health facilities and health offices.

AWD

Although AWD is the anticipated risk in both assessed woreda, in the last three years no outbreak was occurred. The latrine coverage of the woreda is 94.5% and 85% in Kochore and

Wonago Woredas respectively. Safe water coverage of Kochore Woreda is 43.1% while that of Wonago Woreda is 27.3%. PHEM guideline is distributed to all health facilities.

Measles

There was no ongoing measles outbreak. Measles vaccination campaign was conducted in both assessed Woredas and the coverage both Woredas was more than 95%. In all assessed Woredas measles guideline is distributed to all health facility as well as health workers are trained on measles.

Malnutrition

A total of 20 OTP and 3 SC TFP sites in Wenago woreda and one Sc and 23 OTP sites in Kochore Woreda are available. All sites send report monthly to the immediate higher level. In all assessed Woredas there is shortage of therapeutic supplies like F100 for the last couple of months. During January- May the trend of SAM case increased in both assessed woredas.

Table 9: Malnutrition cases in Kochore and Wonago Woreda by year, Gedeo Zone, 2004-2006 E.C.

	Kochore						Wonago					
	2004		2005		2006		2004		2005		2006	
Months	OTP	SC	OTP	SC	OTP	SC	OTP	SC	OTP	SC	OTP	SC
Jan	21	5	37	1	57	3	76	0	70	2	48	10
Feb	57	4	48	2	96	3	114	0	83	4	65	1
Mar	62	3	113	4	77	5	47	0	90	1	138	5
Apr	69	2	71	6	96	3	68	1	128	2	74	0
May	134	9	190	11	147	5	169	2	174	7	61	1
Total	343	23	459	24	473	19	474	3	545	16	386	17

At zonal level there is 144 OTP and 4 SC site. The trend of malnutrition case is increasing January through May 2014. During Jan there were 267 case while in May 498 OTP cases.

Table 10: Malnutrition cases by year and months in Gedeo Zone, 2004-2006 E.C.

Month	2004		2005		2006	
	OTP	SC	OTP	SC	OTP	SC
Jan	359	12	278	13	267	23
Feb	325	4	273	20	470	26
Mar	386	14	349	15	366	34
Apr	498	26	420	32	298	17
May	801	37	682	39	498	29
Total	2369	93	2002	119	1899	129

Sidama Zone

Coordination

In Sidama Zone there is functional multi-sectorial committee and they meet whenever there is emergency conditions. However, in the committee all relevant government, NGOs and UN agencies are well represented. Similarly in the visited Woredas of Aroresa and Boricha, there is functional multi-sectorial committee, but they are not regularly meeting and not all relevant government and nongovernmental organizations are represented. In both Aroresa and Boricha Woreda as well as at zonal level there is emergency preparedness and response plan but budget is not allocated for this plan in both Woredas but in zonal level.

Table 11: Top five causes of morbidity of Aroresa Woreda by age group, Sidama Zone, Jan-May 2014.

No.	Below 5 years	Above 5 years
1	Diarrheal disease	Typhoid fever
2	Pneumonia	Helmenthiasis
3	Helmenthiasis	UTI
4	Upper respiratory infection	Pneumonia
5	Acute febrile illness (AFI)	AFI

Table 12: Top five causes of morbidity of Borica Woreda by age group, Sidama Zone, Jan-May 2014.

No.	Below 5 years	Above 5 years
1	Diarrhea disease	Typhoid fever
2	All respiratory disease	Helmenthiasis
3	AFI	UTI
4	Pneumonia	Malaria
5	Malaria	Pneumonia

Major Epidemic prone diseases

In assessed Woredas, zero cases and death of AWD as well as measles was reported from Jan – May, 2014.

Outbreaks

No outbreak was reported in both Aroresa and Boricha Woreda during Jan-May 2014.

Preparedness

Reviews of the Woredas drugs and supply stocks have shown that, there is no emergency stock specifically kept for emergency response. Lack of emergency drugs and medical supplies for any possible outbreak that could occur is a problem in both assessed Woredas, but at zonal level the epidemic preparedness plan is budget supported. Unlike Aroresa Woreda, Boricha Woreda has contingency budget at Woreda administration level.

Table 13: Preparedness: drugs and medical supplies of Sidama Zone, 2014.

Drugs and medical supplies	Total requirement	Available	Gap
Meningitis vaccine			
Drugs			
Coartem	46,568 does	5,400	41,168 does
Artesunate (rectal)	36,425 does	0	36,425 does

Artesunate (Inj)	19,230	0	19,230
Artemether IM	27,525	0	27,525
Quinine (PO)	137 tin	0	137 tin
Quinine (IV)	56 box	0	56 box
Chloroquine	231 box	0	231 box
Ceftriaxione	27,216 vial	0	27,216 vial
Oily CAF	-	0	-
Doxcycline	3,500 Pk	250	3,250 Pk
Ringer lactate	8,750	2,300	6,450
ORS	15,700 sachet	3000	13,700 sachet
Vit A.	650 tin	200	450 tin
Supplies			
RDT (Malaria)	1,341box	640box	701box
Pastorex (Meningitis)	30	0	30
LP set	150	0	150
TI bottle	20	0	20
CTC Kit (AWD)	28	0	28
Medical supplies			
Gloves,	135 carton	35	100 carton
Syringe	200 carton	25	175 carton
PPE			
Clinical Delivery Assistance kit PART A: Reusable Equipment	125	0	125
Clinical Delivery Assistance kit PART A: Reusable Equipment	300	0	300
Mgt. of Complications of Abortion kit (Manual Vacuum	76	0	76

Asp. Set)			

Timeliness and Completeness

Timeliness and completeness of reports is one of the disease surveillance indicators used for early detection of disease and timely response. In both Arores and Boricha Woreda the completeness is above the minimum requirement 80%.

Risk factor

In both Aroresa and Boricha Woreda the anticipated risk in the coming July to October 2014 is AWD and approximately 255,000 people are estimated to be at risk. In addition, Malnutrition is the anticipated risk in Boricha Woreda and about 28,423 are estimated to be at risk.

Malaria

Both Aroresa and Boricha are not malaria endemic Woredas but number of kebeles in Boricha and few kebeles in Aroresa Woreda has seasonal malaria cases.

Meningitis

No meningitis case or death was reported during Jan to May 2014 in both Aroresa and Boricha Woredas.

AWD

Although AWD is the anticipated risk in both assessed Woredas, in the last three years no outbreak was occurred.

Measles

There was no ongoing measles outbreak. Measles vaccination campaign was conducted in both assessed Woredas and the coverage in both Woredas was more than 90%. In all assessed Woredas measles guideline is distributed to all health facility as well as health workers are trained on measles.

Malnutrition

All SC and OTP sites send monthly report to the immediate higher level. During January- May 2014 the

Table 14: Malnutrition cases in Sidama Zone by year, 2004-2006 E.C.

	2004		2005		2006	
Jan	1074	82	731	84	971	66
Feb	1927	129	831	72	1049	73
Mar	1661	193	1829	109	1317	157
Apr	2409	264	1402	139	1490	183
May	4249	400	1161	168	1657	169
Total	11920	1068	5954	592	6484	648

trend of SAM case increased in both assessed Woredas as well as at zonal level.

The trend of malnutrition case is increasing January through May 2014 in the same fashion to the previous years. During January there were 971 case while in May 1,657 OTP cases.

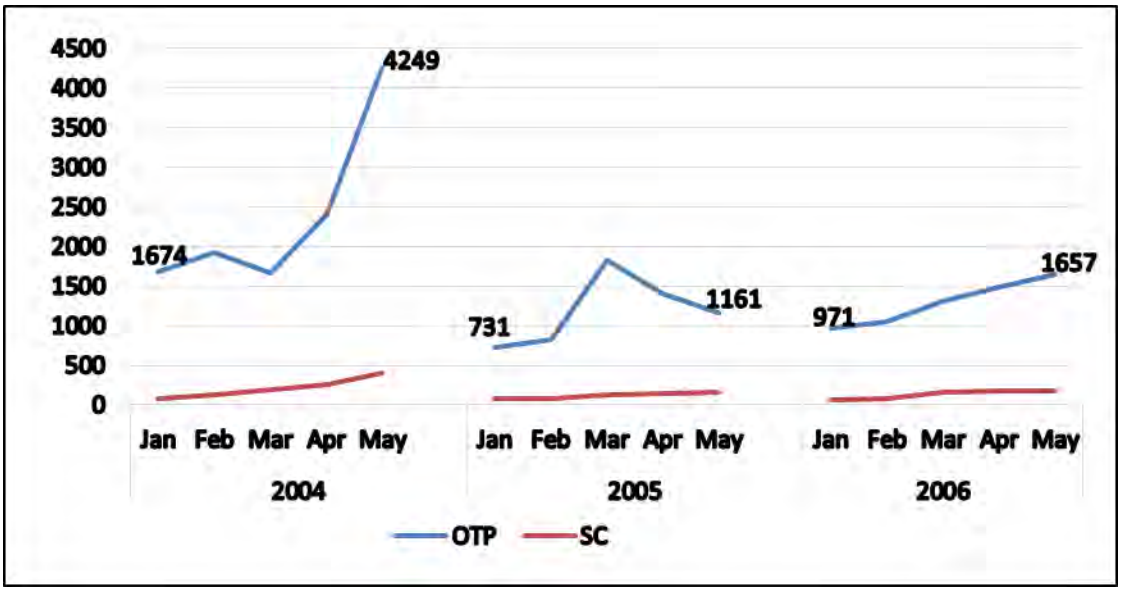

Figure 28: Trend of malnutrition cases by months, Sidama Zone, 2004-2006 E.C.

Compared with the previous two years, the overall number of malnutrition is case is decreasing. During 2006 E.C, OTP cases is decreased by 40% compared to 2004 E.C. Similarly, SC cases are decreased by 45% by 2006 E.C compared to 2004 E.C. (see fig 3)

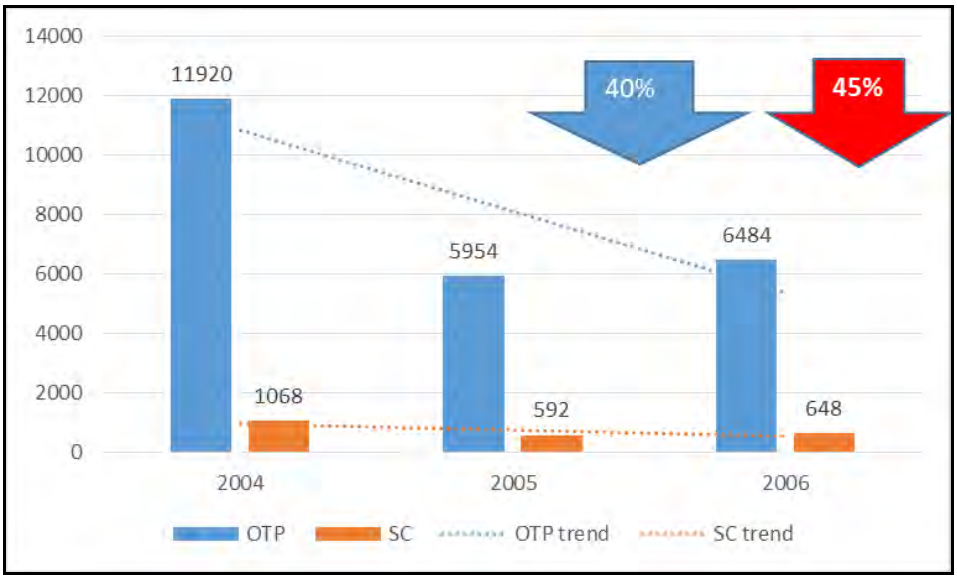

Figure 29: Trend of Malnutrition cases by year, Sidama Zone, 2004-2004 E.C.

Summary

The government of Ethiopia has been conducting multi agency emergency health and nutrition assessment to address the emergency health and nutrition need of the country. The assessment is conducted twice in a year following post harvesting season Belg and Meher. The assessment is leaded by Federal Disaster Response Management and Food Security Coordination office in collaboration with the Ethiopian Ministry of Health, SNNP regional health bureau, SNNP regional early warning, National Metrology Agency and respective bureaus, WHO, UNICEF, OCHA, IRC, Red-cross and World vision.

The assessment was conducted from November 25- December 09/2013. Our team was composed of FDRMFSS, SNNPR health bureau/ PHEM/, WFP, IRC, Red -cross, National Metrology agency and SNNPR EWR. We assessed 3 Zones (Hadiya, Silte and Guraghe) and 8 selected Woredas from each zone in SNNPR.

The objective of this assessment was to identify areas where emergency health and nutrition assistance needed for the upcoming six months and to determine the gap in the capacity of the health system in addressing anticipated risks

From assessed zones (n=3) only 2 have multi-sectoral coordination forum but all governmental and nongovernmental organization were not well represented. The forum has no schedule meeting in all assessed zones. Similarly from 8 Woredas only 5 have multispectral coordination forum. In all assessed Zones and Woredas there were epidemic preparedness plan but only 2 Woredas allocated budget for anticipated emergency plan. There was an ongoing measles outbreak in silite zone 3 Woredas. Measles is contagious disease that has a potential to spread to neighbouring Zones and Woredas. Anticipated diseases that have potential to cause outbreaks were measles, meningococcal meningitis and malaria. The case load for malaria showed increasing from August to September in Silte and Hadiya zone malarious Woredas. In Guraghe zone there were an increased number of malaria cases in September but reduced in October. ITN coverage was very low which is blow 80%. The available ITN was distributed before 3 years which need replacement. The IRS coverage was below 60% because of Chemical shortage. Safe drinking water supply is of the basic need and has a potential for reducing water born outbreaks. From 8 Woredas 7 have drinking water supply coverage below 42% which is very low.

Recommendation

- Appropriate budget should be allocated for identified emergency situations
- Training should be given to all RRT team members and PHEM staffs at all level
- Strengthening the Multi sectorial PHEM coordination forum at all level
- Strengthening routine EPI to prevent measles outbreak
- Improving the water supply coverage and quality especially in areas there is no option to get safe water.

- Chapter VIII – Protocol/Proposal for Epidemiologic Research Project

8.1 Assessment of malaria surveillance and control interventions in Gambella Regional state, Ethiopia.

Background: Malaria is the most highly prevalent tropical disease with high morbidity and mortality as well as high economic and social impact. It is an absolutely preventable and treatable vector-borne illness which is caused by protozoal parasite of the genus *Plasmodium*. Globally, 104 countries and territories are considered malaria endemic. (1)

According to the world health organization report of 2013, an estimated 52.9% of the world population is at risk of malaria and an average of 207 million cases and 627,000 deaths of malaria were occurred by the year 2012 globally. Out of all cases and deaths reported globally, 80% of malaria cases and 90% of deaths attributable to malaria occur in sub-Saharan Africa, while 77% of deaths were in children under 5 years of age. (2)

Malaria constitutes a major public health problem and impediment to socioeconomic development in Ethiopia. Where, about 75% of landmass of the country is malaria-endemic, and 65% (58.5million) of the population is estimated to be at risk of malaria infection. (1) *Plasmodium falciparum* and *Plasmodium vivax* are the two predominant malaria parasites and accounts for 60% and 40% of malaria cases respectively. (3)

Areas of disease are primarily associated with altitude and rainfall while the peak of malaria illness incidence usually follows the main rainy season (June to September) each year. However, certain areas in the south and west of the country have a peak rainfall season beginning earlier in April and May or have no clearly defined rainfall season. Depending on these variable rainfall and altitude patterns, malaria transmission tends to be highly heterogeneous geo-spatially within each year as well as between years.(2)

The socioeconomic burden resulting from malaria is immense resulting high morbidity and mortality rate in the adult population which significantly reduces production activities, the prevalence of malaria in many productive parts of the country prevents the movement and settlement of people in resource-rich low-lying river valleys, the increased school absenteeism

during malaria epidemics significantly reduces learning capacity of students, coping with malaria epidemics overwhelms the capacity of the health services in the country, and thus substantially increases public health expenditures. (4)

The Federal Ministry of Health (FMOH) reported 4,068,764 clinical and confirmed malaria cases to the World Health Organization (WHO) in the year 2010. Malaria parasite prevalence in areas below 2,000 meter above sea level is 1.3% by microscopy blood-slide examination for all ages, while RDTs indicated the prevalence of infection to be 4.5% among all ages. The estimated annual number of malaria-related illnesses, however, may range even higher (seven to eight million per year), considering sub-optimal completeness of the reports by surveillance system. (5)

According to the national strategy for malaria control, areas lower than 2,000 meters in altitude were considered malaria-endemic, and targeted to receive key malaria control interventions including long-lasting insecticidal nets (LLINs), indoor residual spraying (IRS), and prompt diagnosis and effective case management. The strategy outlined an ambitious national goal of 100% household LLIN coverage in malaria-endemic areas, with a mean of two LLINs per household. (Ethiopia MIS 2011) In this regard, malaria surveillance has a central role in providing complete and timely data for appropriate measure to be taken. (4)

The national strategic plan for malaria prevention, control, and elimination (2011–2015) is rooted in the health sector's principal framework, the government of Ethiopia's Health Sector Development Plan Four (HSDP IV). The stated goals of the HSDP-IV are to achieve malaria elimination within specific geographical areas with historically low malaria transmission and to achieve near-zero malaria death in the remaining malaria-endemic areas of the country by the year 2015. (6) Malaria is one of the priority diseases under surveillance in the country in which number of malaria cases and deaths reported to the Federal Ministry of Health through Public Health Emergency Management units (PHEM) in weekly base in usual time and daily in case of outbreaks.

Statement of the problem

Gambella regional state is one of the regional states in the country with high burden of malaria. During the last several years' malaria remain the leading cause of morbidity in all age groups and one of the leading causes of mortality in children under 5 years of age. Low land altitude ranging from 300meter to 2,000meter above sea level, weak surveillance system, low LLITNs coverage (23.9%) (5), large number of immigrants from South Sudan who probably has no/weak immunity, rivers and irrigation of large farms found in the region and movement of the people from high land areas of the country to the region are the main reasons to select the region to conduct this study.

Significance of the study

The main objective of malaria programmes is to stop local transmission of malaria, and surveillance is a principal strategy for achieving this. The capacity of malaria surveillance systems to provide accurate information on the distribution and trends of malaria varies from one regional state to another. Moreover, surveillance is mainly influenced by the extent to which patients seek treatment, whether patients use public sector health facilities, the proportion of patients that receive a diagnostic test, and the completeness of recording and reporting systems.

Assessment of malaria surveillance system and control measures at regional and zonal level, especially in those marginalized regions with high malaria transmission will remain crucial to obtain reliable estimate of national malaria surveillance and control measures status.

In this case, epidemiological assessment of malaria surveillance and control interventions at community level in this region is necessary to measure the status of malaria surveillance, prevention and control efforts, and to identify the gaps and intervene accordingly. Moreover, this will contribute for the improvement of national malaria surveillance and control strategy.

Malaria surveillance is defined as the ongoing and systematic collection, analysis, interpretation, and dissemination of data about cases of malaria and is used as a basis for planning, implementing, and evaluating malaria prevention and control activities.

Objective

General Objective:

To assess malaria control interventions and magnitude of malaria in Gambella Regional State, Ethiopia, 2015.

Specific Objectives:

1. Assess factors for incomplete surveillance system of malaria in Gambella Regional State, Ethiopia.
2. Identify ITNs and distribution and utilization coverage at house hold level in Gambella Regional State, Ethiopia.
3. Assess IRS coverage in Gambella Regional State, Ethiopia.
4. Describe the incidence of malaria cases at community level in Gambella Regional State, Ethiopia.

Methodology

The study will be conducted in Gambella regional state of Ethiopia. Gambella region is one of the nine regional states in the country located in the western part of the country 777 kms away from Addis Ababa (Capital city of Ethiopia) and bordered to Oromia, Southern Nations Nationality and Peoples Region (SNNPR) and South Sudan. The region has an area of 25,800 km^2 with an estimated total population of 423,278 divided into three administrative zones which further divided in to 11 Woredas (Districts) and again these woreda are further divided into 220 kebeles, which are the smallest administrative units. Altitude in the Gambella region ranges from 1,000m to 2,000 m above sea level in the East, to 500m to 900 m in the center, and 300m to 500 m in the West. The annual rainfall ranges from 800mm to 1,200 mm and some falls throughout the year, but with 85% between May and October. The average annual temperature in the region is 27.6^0C. [(7)]

Study design

Prospective cross-sectional study will be conducted using cluster sampling technique.

Sampling technique

List of all kebeles in the region will be used as sampling frame and will be primary sampling units. Households in each kebele will be secondary sampling units. Refugee camps in study area will be listed and taken in the sampling frame as primary sampling units and refugees at household level will be included as secondary sampling units. Both primary and secondary sampling units will be drawn by systematic random sampling method. At house hold level availability and utilization of LLTINs will be assessed, febrile cases in the household will be blood-tested for malaria using Rapid Diagnostic Testing (RDT) kit. Malaria surveillance system will be assessed using WHO standard checklist for surveillance evaluation.

Data collection procedure

Data will be collected using structured questionnaire and pretested. The following findings will be obtained; Proportion of households with pregnant women and/or children under-five will own at least one insecticide treated net (ITN), children under-five will have slept under an ITN the previous night, pregnant women which have slept under an ITN the previous night, dwellings in geographic areas targeted for indoor residual spreading (IRS) which have sprayed, pregnant women and children under five who slept under an ITN the previous night or in a house that has sprayed with IRS in the last 6 months and children under five with suspected malaria which have received treatment with an antimalarial drug in accordance with national malaria treatment policies within 24 hours of onset of their symptoms.

Surveillance report completeness will be defined, and evaluation for surveillance attributes will be based on WHOs standard. Gaps on malaria surveillance and control will be defined.

Data will be analyzed using EpiInfo version 7.1.4.0.

Ethical consideration

Ethical clearance will be obtained from Addis Ababa University, EPHI and Gambella Regional State prior to data collection.

Project outcome

This study will provide important information on the status of malaria surveillance and control interventions in the region. The result will contribute for regional and national malaria surveillance and control strategy improvement. And also, surveillance data recording, report completeness and gaps in the system will be clearly defined after this study.

Result Dissemination Plan

The study result will be communicated and submitted to the corresponding local health department and community leaders, regional health bureau of Gambella, Ethiopia Public Health Institute (EPHI), Ethiopia Public Health Association (EPHA) and Addis Ababa University School of public health. The result of this study will be published, presented on national/international scientific conferences when funds are available.

Work Plan

SN	Particulars	September			October				November	
		Wk 2	Wk 3	Wk 4	Wk 1	Wk 2	Wk 3	Wk 4	Wk 1	Wk 2
1	Proposal writing									
2	Proposal submission									
3	Preparing tools for field work									
4	Field work(Data collection)									
5	Data entry and analysis									
6	Report Writing									
7	Finalization and submission of report									

Budget

S. No	Type of cost	Quantity	Cost	Total
1	Personal	2 health workers	2 x 30 days x 24 USD	$ 1,460
2	Travel	1 car rental	1 x 30 days x 110 USD	$ 3,300
3	Supplies	1 Voice recorder	1 x 125 USD	$ 125
		10 A4 Paper	10 x 11 USD	$ 110
			Total	$ 4,995

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Chapter IX – Other Additional Output Reports

9.1 Ebola Viral Disease screening and community awareness creation in Gog Woreda, Gambella regional state, Ethiopia, 2014.

Introduction

Unaffected Nations with land borders adjoining States with Ebola transmission should urgently establish surveillance for clusters of unexplained fever or deaths due to febrile illness, establish access to a qualified diagnostic laboratory for EVD, ensure that health workers are aware of and trained in appropriate IPC procedures, and establish rapid response teams with the capacity to investigate and manage EVD cases and their contacts deaths due to febrile illness, should treat this as a health emergency, take immediate steps in the first 24 hours to investigate and stop a potential Ebola outbreak by instituting case management, establishing a definitive diagnosis, and undertaking contact tracing and monitoring.

Ethiopia has identified seven land port entry sites for EVD screening, namely Moyale, Metema, Humera, Kumuruk, Togo-Wuchale, Dawale and Gambella. Of this, Gambella is one of the potential areas identified for EVD screening particularly at five land port entry site Metahar (Burbiye), Pagag(Laree), Dima, Akobo and Gog woreda (pugnido).

Gambella has the population of 401,920, three zones and one speciall zone and 13 woredas. Gog woreda (Pugnido) is one of the woreda in Agnuwa Zone and found at south west of Gambella city and has the population of 23,201 and 13 Keble's. There are three health centers in the woreda. Gog woreda (Pugnido) bordering with South Sudan puchala district. The woreda has three land port entries namely Johor, Gog and Puchala. Puchala is the land port entry which is active during rainy seasons while the rest two were used during dry season. The entry land port is through river by using boats and land to land on foot. The average number of daily imported refugees to the country is 123.

Gog woreda (Pugnido) Health office and woreda administrative leaders together with FETP Residents should assume a prominent leadership role in coordinating and implementing emergency Ebola response measures at their local site.

The woreda should activate their local role in emergency management mechanisms and establish an emergency operation centre, under the authority of the Head of woreda administration, to coordinate support across all partners, security forces and other relevant sectors, to ensure efficient and effective implementation and monitoring of comprehensive Ebola control measures. These measures must include infection prevention and control, community awareness, surveillance, timely and accurate information among neighboring woredas Puchala Ethiopia and Puchala Sudan. The woreda should ensure that to fully engage the community – through religious leaders and traditional leaders and healer's. So the communities plays a central role in case identification, contact tracing and risk education; the population should be made fully aware of the benefits of timely reporting.

The capacity to manage travelers originating from known Ebola-infected areas who arrive at major land crossing points with unexplained febrile illness should strictly screened and monitored for EVD, AFI and ARI. The general public should be provided with accurate and relevant information on the Ebola viral disease and measures to reduce the risk of exposure.

The established committee of Gog Woreda emphasized the importance of continued support by regional, national and international partners towards the effective implementation and monitoring of EVD screening. Health workers should provide health education on EVD for travelers to Puchala-Sudan or to any at-risk areas with relevant information on risk measures to minimize those risks, and advice for managing a potential exposure.

Activities being implemented

1. Action plan was developed and given to head of woreda administration and head of woreda health office for contentious monitoring and evaluation.
2. ARRA and IRC are partners working at the woreda level and we are communicated with them and discussed to carry out this mission successfully.
3. Woreda task force and technical working group (TWG) was established and actively engaged in a daily planned activities of EVD screening and advocacy.
4. As viral hemorrhagic fever (VHF) is one of the diseases under surveillance in our country, the TWGs are oriented to give due attention on following daily as well as weekly PHEM reports of all health facilities in the woreda.

5. Rapid response team (RRT) of Pugnido health center is revitalized and equipped with up-to-date information of EVD and its response.
6. Beside of EVD screening procedure the TWG was introduced VHF (viral hemorrhagic fever) is one of the identified immediately reportable disease in the country.
7. Potential land port entries are identified and screening site was selected. Shelter for screening is not yet
8. Opening and closing time for screening was decided, as the in-migrants arrives only day time (source: Woreda Officials) the schedule was settled from 6:00 am to 7:00 pm and this is already applied.
9. Orientation was given to 25 health workers and 16 administration staffs of the woreda health sector.
10. Awareness creation about EVD was given to 1,670 (Female 968 and Male 702) attendants who gathered from different sectors and religious institutions, boat drivers, hotel owners and waiters.
11. From September 5 – 15, 2014 a total of 1,230 in-migrants were screened for EVD. Of these females were 922 while 308 were males. No EVD suspected case or high risk individuals were found. Among all screened in-migrants only 27 individuals were screened and examined for AFI and ARI.

Table 15: Summary of screened in-migrants in Gog woreda, Agnuwa zone, Gambella Regional state, Ethiopia, 2014.

S.NO	Date (dd/mm/yy)	Number of screened in-migrants			Level of Risk			Remark
		M	F	Total	High	low	No risk but fever + cough	
1	6/9/2014	28	98	126	0		2	

2	7/9/2014	33	90	123	0		1	
3	8/9/2014	24	96	120	0		4	
4	9/9/2014	42	76	118	0		2	
5	10/9/2014	20	103	123	0		3	
6	11/9/2014	34	86	120	0		2	
7	12/9/2014	31	94	125	0		5	
8	13/9/2014	41	86	127	0		1	
9	14/9/2014	23	101	124	0		3	
10	15/9/2014	32	92	124	0		4	
	Total	308	922	1230	0		27	

Challenges

1. Tent placement for isolation and screening is yet implemented. The problem is communicated to RHB PHEM.
2. Materials for infection prevention and control are not fully supplied.
3. Security forces who have been working with us interrupted their presence on the site of screening due to claiming for per diem.
4. Refugees from south Sudan is very aggressive on arrival because of long distance walk they are very tired and they are not patiently responding to our question.

Gog Woreda is found in Agnuwa Zone of Gambela regional state and has three land port entries. Among these entries only Pugnido-puchala entry site is active during rainy seasons while the rest to be in the summer. Currently we are working on Pugnido-Puchala-Ethiopia land port entry. Puchala land port entry is 192Km far away from Gambella town.

Pugnido-puchala land port entry where a port in which in-migrants and those who travel from Ethiopia to South Sudan for trading are used. The travelers use traditional Boats as means of transportation on the river infront of the screening site. The shelter for screening and isolation will be palced in this area.

Awareness creation to people living near the land port was done while they gathered in Church.

Boat drivers were also our targets for awareness creation, as they are always giving service for travelers and are might be the first to contact in-migrant

Annexes

Annex 1: Questionnaire for outbreak investigation of measles in Gedeb Woreda, Gedeo Zone, SNNPR.

Socio-demographic information

1. Respondent ID**:**_____
2. Respondent category: ☐ case ☐ control
3. Age **:**_____
4. Gender**:** ☐ Male ☐ Female
5. Address**:** Kebele _____village_____
6. Birth place_____
7. Occupation**:** ☐ Farmer ☐ Employed ☐ Unemployed ☐ Student ☐ Pastoralist
8. Total family members: _____
9. Ethnic group _____
10. Religion**:** ☐ Orthodox ☐ Protestant ☐ Muslim ☐ Catholic ☐ other_____
11. Marital status : ☐ Single ☐ Married ☐Widowed ☐ Divorced
12. Educational status: ☐ non-formal ☐ Illiterate ☐ Primary ☐ Secondary ☐ Tertiary
13. Parent's occupation : ☐Farmer ☐ Merchant ☐ Employed ☐ Unemployed ☐ Student ☐ Pastoralist
14. Parents' education : ☐ Illiterate ☐ Primary ☐ Secondary ☐ Tertiary

I. Clinical presentations <u>(ask case ONLY)</u>

15. What were the symptoms?

a) rash: ☐ yes no ☐
b) fever: ☐ yes no ☐
c) runny nose (Coryza): ☐ yes no ☐
d) red eyes: (Conjunctivitis) ☐ yes no ☐
e) cough : ☐ yes no ☐

16. Date of rash onset: ____/_____/

17. Location when rash started?

    District_____Kebele_____

18. Duration of rash _____days

19. Visited health facilities? ☐ yes no ☐, if yes date____/____/____

20. Illness duration before visiting the health facility_____ in days/hours

21. Admitted:☐ yes no ☐, If yes**,** date admitted:___/___ /_____

22. Treatment given? ☐ yes no ☐, if yes specify _____

23. Outcome: ☐Alive ☐ death

- **Ask ONLY if complication**

f) Pneumonia:☐ yes no ☐

g) Diarrhea: ☐ yes no ☐

h) Otitis media: ☐ yes no ☐

i) Convolution ☐ yes no ☐

j) Corneal scar: ☐ yes no ☐

k) Blindness : ☐ yes no ☐

l) Feeding problem☐ yes no ☐

II. Risk factors

24. Vaccinated: ☐ yes, no☐; if yes, number of measles vaccine doses received? ☐One ☐Two

25. Vaccination status is identified; ☐ by history ☐ by card (**check**)

26. Date last measles vaccine dose received? ___/____/_____

27. Age at first vaccination _____

28. If not vaccinated why? ☐lack of knowledge about vaccination campaign, ☐absence during vaccination campaign, ☐ other, specify _____

29. Did you contact with a person with measles symptoms within the last 2-3 weeks? ☐ yes no ☐

30. Travelled to other areas? ☐ Yes, ☐ No if yes, District _____

    Kebele_____

31. Similar person with measles symptoms in your household ☐yes, ☐ no

32. Any symptoms of malnutrition:☐yes, ☐ no

33. On OTP:☐ Yes, ☐ No

34. Distance from house to HC? ☐ greater than 5 km ☐ equal or less than 5 km

35. House condition? ☐ ventilated ☐ not-ventilated

36. What is measles?

_____

37. Mention how measles transmitted:

_____

_____

38. Mention how measles prevented:

_____

_____

39. Why do peoples vaccinate their children with measles vaccine?

_____

_____

40. What is the right age for a child to be vaccinated with measles vaccine? ☐ 9 months ☐ 6 months ☐3 months ☐Other ☐Don't know

41. Do you know vaccination can prevent measles? ☐ yes ☐No ☐Don't know

42. Do you think medical treatment can cure measles? ☐ yes ☐No ☐Don't know

Annex 2: Questionnaire for malaria surveillance system evaluation of Gambella regional state, Ethiopia, 2014.

I. Regional /Zonal Questionnaire

Background Information of Region/Zone

1. Name of Region/Zone_____

2. Number of Zone/District:_____1. Total_____ 2. Urban_____ 3. Rural_____

I. Availability of a National Surveillance Manual

1. Is there a national manual for surveillance?

   1. Yes 2. No 3. Not applicable 4. Unknown

2. If yes, describe (last update, diseases included, case definitions, surveillance and control, integrated or different for each disease):

   _____

3. Is surveillance/IDSR included in the annual health plan (EFY 2005/6) of the zone/Region?

   1. Yes 2. No

II. Case Detection and Registration

4. Do you have standard case definitions for the Country's priority diseases like Meningitis, AFP /polio, malaria, Meningitis Neonatal tetanus and measles? (Observed the standard case definition for each priority disease)

III. 1. Yes 2. No 3. Unknown 4. Not applicable

IV. Data reporting

5. Is the Zone /region responsible for providing surveillance forms to District/Zones? 1. Yes 2. No 3. Unknown 4. Not applicable
6. If yes, is there shortage of appropriate surveillance forms at any time during the last 6 months?
7. 1. Yes 2. No 3. Unknown 4. Not applicable
8. What are the reporting units for the surveillance system?
   1. Public health facilities
   2. NGO health facilities
   3. Military health facilities

4. Private health facilities

5. Others_____

9. Number of Zonal/District reported (either directly or through an intermediate level) received each reporting period at the regional/zonal level during the past 3 months:

Number of reports in the last 3 months compared to expected number

Weekly: _____ /12 times the number of Districts

Immediately:_____ /------ times the number of Districts

10. On time (use national deadlines)

Number of weekly reports received on time: _____ /12 times the number of Districts

11. Was there any report of the immediately reportable diseases in the past 1 month?

1. Yes 2. No

12. If yes, with in what time is the report received after detection of the case/ diseases?

1. Less than 1 hour

2. 2-24 hour

3. 1- 2 days

4. 3- 7 days

5. After 1 week

13. Means of reporting to next level by:

1. E-mail 2. Telephone 3. Fax 4. Radio

V. Data analysis

Does the regional level/Zonal Level

14. Describe data by person (case based, outbreaks, and sentinel)? Observed description of data by age and sex:

1. Yes 2. No 3. Unknown 4. Not applicable

15. Describe data by place? Observed description of data by District (tables, maps)

1. Yes 2. No 3. Unknown 4. Not applicable

16. Describe data by time? Observed description of data by time:

1. Yes 2. No 3. Unknown 4. Not applicable

17. Perform trend analysis? Observed line graph of cases by time

1. Yes 2. No 3. Unknown 4. Not applicable

18. List disease(s) for which line graph is observed

_____

19. Have an action threshold defined for each priority disease? (Meningitis, Measles, malaria)

    1. Yes 2. No 3. Unknown 4. Not applicable

20. Who is responsible for the analysis of the collected data? _____

21. How often do you analyze the collected data?

    1. Daily
    2. Weekly
    3. Every 2 weeks
    4. Monthly
    5. Quarterly
    6. As needed……..

22. Have appropriate denominators? Observed presence of demographic data (E.g. population by District and hard to reach groups)

    1. Yes 2. No 3. Unknown 4. Not Applicable

VI. Outbreak Investigation

23. Number of outbreaks suspected in the past year:_____

24. List the diseases: _____

    _____

25. Of those, number of investigated outbreak: (Observe reports & take copies) _____

26. Number of outbreaks in which risk factors were looked for:_____

27. Number of outbreaks in which findings were used for action: [Observe report] _____

28. Number of Districts that looked for risk factors [observe in reports] _____

29. Number of Districts that used the data for action [observe in final report] _____

VII. Epidemic preparedness(relevant for epidemic prone diseases)

30. Does the Region/Zone have a written emergency preparedness plan for any of the outbreak disease relevant to the area? (Observed a written plan)

    1. Yes ☐ 2. No ☐ 3. Unknown ☐ 4. Not applicable ☐

31. Existence of emergency stocks of drugs, vaccines, and supplies at all times in past 1 year:

    Has the region/Zone had emergency stocks of drugs, vaccines, and supplies at all times in past 1 year?

    1. Yes ☐ 2. No ☐ 3. Unknown ☐ 4. Not applicable ☐

32. Has the Region/zone experienced shortage of drugs, vaccines or supplies during the most recent epidemic (or outbreak)?

1. Yes ☐ 2. No ☐ 3. Unknown ☐ 4. Not applicable ☐

33. Do you have a standard case management protocol for Meningitis, Malaria, AFP (polio), measles (Observed the existence of a written case management protocol for at least 1 priority disease)

1. Yes ☐ 2. No ☐ 3. Unknown ☐ 4. Not applicable ☐

34. If yes, list:_____

35. Is there a budget line for epidemic response?

1. Yes ☐ 2. No ☐ 3. Unknown ☐ 4. Not applicable ☐

36. Is there a regional/Zonal epidemic management committee? Observed minutes (or report) of meetings of epidemic management committee

1. Yes ☐ 2. No ☐ 3. Unknown ☐ 4. Not applicable ☐

37. Does the region/Zone have a rapid response team for epidemic?

1. Yes ☐ 2. No ☐ 3. Unknown ☐ 4. Not applicable ☐

VIII. Response to epidemics

38. Does the region/Zone respond within 48/24 hours of notification of most recently reported outbreak: Observed that the region/zone responded within 48 hours of notification of most recently reported outbreak (from written reports with trend and intervention)

1. Yes ☐ 2. No ☐ 3. Unknown ☐ 4. Not applicable ☐

39. Has epidemic management committee evaluated its preparedness and response activities during the past year (Observe written report to confirm)?

1. Yes ☐ 2. No ☐ 3. Unknown ☐ 4. Not applicable ☐

IX. Feedback

40. How many feedback reports has the regional/zonal level produced in the last year? Observed the presence of a report that is regularly produced to disseminate surveillance data

1. Yes ☐ 2. No ☐ 3. Unknown ☐ 4. Not applicable ☐

X. Supervision

41. How many supervisory visits have you made in the last 6 months? _____

    Obtained required number of visits from regional/zonal level _____

42. The most usual reasons for not making all required supervisory visits. (Text)

    _____

    _____

XI. Training

43. What percent of your subordinate personnel have been trained in surveillance?

    _____

44. Have you been trained in disease surveillance?

    1. Yes ☐ 2. No ☐ 3. Unknown ☐ 4. Not applicable ☐

45. If yes, specify when, where, how long, by whom?

    _____

    _____

XII. Resources

Percent of sites that have:

46. Data management

Computer	1. Yes	2. No	3. Unknown	4. Not applicable
Printer	1. Yes	2. No	3. Unknown	4. Not applicable
Photocopier	1. Yes	2. No	3. Unknown	4. Not applicable
Data manager	1. Yes	2. No	3. Unknown	4. Not applicable
Statistical package	1. Yes	2. No	3. Unknown	4. Not applicable

47. Communications

Telephone service	1. Yes	2. No	3. Unknown	4. Not applicable
Fax	1. Yes	2. No	3. Unknown	4. Not applicable
Radio call	1. Yes	2. No	3. Unknown	4. Not applicable
Satellite phone	1. Yes	2. No	3. Unknown	4. Not applicable
Email	1. Yes	2. No	4. Unknown	5. Not applicable

XIII. Surveillance

48. Do you have a computerized surveillance network at this level?

1. Yes 2. No 3. Unknown 4. Not applicable

49. Is there a budget source for surveillance in the Regional/zonal level?

1. Yes 2. No 3. Unknown 4. Not applicable

50. If yes, what is the proportion: % _____

51. How could surveillance be improved? (Opportunities for strengthening surveillance)

_____

_____

XIV. Surveillance Co-ordination

52. Is there a focal unit for surveillance at the regional/zonal level? [Observe organo-gram to confirm]

1. Yes 2. No 3. Unknown 4. Not applicable

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

_____

_____

XV. Questionnaire for Attributes and level of Usefulness in 2013

54. What is the incidence / Prevalence of priority disease in your area

S/N	Diseases	2009		2010		2011		2012		2013	
		case	Death	Case	Death	case	Death	Case	Death	case	Death
1	Meningitis										
2	Malaria										
4	Measles										

55. Does the surveillance system help for these selected priority diseases?

1. To detect outbreaks of these selected priority diseases early?

1. Yes 2. No

2. To estimate the magnitude of morbidity and mortality related to these diseases, including identification of factors associated with these diseases?

1. Yes 2. No

3. Permit assessment of the effect of prevention and control programs?
   1. Yes 2. No

4. Interventions and diseases trends analyzed
   1. Yes 2. No

XVI. Describe Each System Attributes:

I. Simplicity:

1. Is the case definition of Meningitis, malaria, AFP (polio), neonatal tetanus, Meningitis and measles easy for case detection by all level health professionals?
   1. Yes 2. No
2. What are the organizations which need to receive reports of the surveillance data?
3. Do you feel that additional data collected on a case are time consuming?
   1. Yes 2.No
4. How long it takes to fill the format? 1. <5 minute 2. 10-15minuts 3. >15 minutes
5. How long does it take to have laboratory confirmation of
   A. MENINGITIS _____
   B. Measles _____
   C. Malaria _____

II. Flexibility:

1. Can the current reporting formats be used for other newly occurring health event (disease) without much difficulty?
   1. Yes 2. No
2. Do you think that any change in the existing procedure of case detection, reporting, and formats will be difficult to implement?
   1. Yes 2. No

   Comment:_____

   _____

   _____

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

1. Are the data collection formats for these priority diseases clear and easy to fill for all the data collectors/ reporting sites?
   1. Yes 2. No
2. Review the last months report of these diseases
   A. Average number of unknown or blank responses to variables in each of the reported forms

      _____

      _____

   B. Percent of reports which are complete(i.e. with no blank or unknown responses) from the total reports

      _____

      _____

IV. Acceptability:

1. Do you think all the reporting agents accept and well engaged to the surveillance activities?
   1. Yes 2. No
2. If yes, how many are active participants (from the expected)? _____
3. If No, what is the reason for their poor participation in the surveillance activity?
   1. Lack of understanding of the relevance of the data to be collected
   2. No feedback / or recognition given by the higher bodies for their contribution; i.e. no dissemination of the analysis data back to reporting facilities
   3. Reporting formats are difficult to understand
   4. Report formats are time consuming
   5. Other

      _____

      _____

V. Representativeness:

1. What is the health service coverage of the zone/ region? _____%
2. Do you think, the populations under surveillance have good health seeking behavior for these diseases?

1. Yes 2. No

3. Do you think is well represented by the surveillance data?

1. Yes 2. No

VI. Stability:

1. Was the new BPR restructuring affect the procedures and activities of the surveillance of these diseases? 1. Yes 2. No
2. Was there lack of resources that interrupt the surveillance system? 1. Yes 2. No

II- HEALTH FACILITY [Hospital/Health Center] QUESTIONNAIRE

Background

Assessment team_____ Type of health facility_____

Date_____ District Name_____

Interviewer_____ Region/province_____

Respondent_____ Country_____

Name of health facility_____ Surveillance system _____

---

1. Is there a national manual for surveillance at the Hospital? Health center?

Obs Observe national surveillance manual:

Yes ☐ No ☐ unknown ☐ Not Applicable ☐

I. Case detection and registration

2. Does Hospital/Health Center that have a clinical register?

Obs Observed the existence of a clinical register ?

Yes ☐ No ☐ unknown ☐ Not Applicable ☐

3. Does the Health Center/Hospital correctly register cases?

Obs Observed the correct filling of the clinical register during the previous 30 days

Yes ☐ No ☐ unknown ☐ Not Applicable ☐

4. Does the health center/Hospital has fully employed focal person On PHEM?

5. Yes ☐ No ☐ unknown ☐ Not Applicable ☐

6. Does the Health Center/Hospital have standardized case definitions for priority diseases(Meningitis, AFP (polio), measles, malaria?

Yes____ No ____ unknown ____ Not Applicable_____

II. Case confirmation

7. Does the Hospital/Health center have the capacity to collect specimens (sputum stool, blood/serum and CSF)?

Are you able to collect sputum Y: ☐ N: ☐ U :☐ N/A:☐

Stool Y: ☐ N: ☐ U :☐ N/A:☐

Blood Y: ☐ N: ☐ U :☐ N/A:☐

CSF at this facility? Y: □ N: □ U :□ N/A:□

8. Does the Hospital/Health Center have necessary materials required to collect specimen?

Stool ?	Y: □	N: □	U :□	N/A:□
blood/serum	Y: □	N: □	U :□	N/A:□
CSF	Y: □	N: □	U :□	N/A:□

9. Does The Hospital/Health Center have the capacity to handle specimens like sputum, stool, blood/serum and CSF until shipment?

Y: □ N: □ U :□ N/A:□

10. Does the Hospital/health Center have proper cold chain management during shipment?

Y: □ N: □ U :□ N/A:□

11. Does the Hospital/health Center have the capacity to ship specimens to a higher level lab?

Y: □ N: □ U :□ N/A:□

12. Does the Hospital/health Center have packing materials for shipment of specimens at health facility?

Y: □ N: □ U :□ N/A:□

III. Data reporting

13. Does the Hospital/health Center have appropriate surveillance forms for that site at all times over the past 6 months?

Y: □ N: □ U :□ N/A:□

14. Does the Hospital/health Center have accurately report cases from the registry into the summary report to go to higher level?

Observed that the last monthly report agreed with the register for 4 diseases (1 for each targeted group [eradication; elimination; epidemic prone; major public health importance])

a. Obs Measles	Y: □	N: □	U :□	N/A:□
b. Obs Malaria	Y: □	N: □	U :□	N/A:□
c. Obs AFP (polio)	Y: □	N: □	U :□	N/A:□
a. Obs Meningitis	Y: □	N: □	U :□	N/A:□

15. Does the Hospital/health Center have reported each reporting period to the next higher level during the past 3 months?

Number of reports in the last 3 months compared to expected number

Obs Weekly: /12 times the number of sites

Obs immediately: /-- times the number of sites

16. On time (use national deadlines)

Obs Number of weekly reports submitted on time:-_____ /12 times the number of sites

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

17. Does the Hospital/health Center have have means for reporting to next level by e-mail, telephone, fax or radio

How do you report?

a. Mail
b. Fax
c. Telephone
d. Radio
e. Electronic
f. Other

18. Strengthening reporting
How can reporting be improved?

_____

_____

IV. Data analysis

Percent of sites that:

19. Does the Hospital/health Center have describe data by person (outbreaks, sentinel)?
Obs Observed description of data by age and sex

Y: □ N: □ U :□ N/A:□

20. Does the Hospital/health Center have describe data by place
Obs Observed description of data by place (locality, village, work site etc)

Y: □ N: □ U :□ N/A:□

21. Does the Hospital/health Center have describe data by time ?
Obs Observed description of data by time

Y: □ N: □ U :□ N/A:□

22. Does the Hospital/health Center have Perform trend analysis?
Obs Observed line graph of cases by time

Y: □ N: □U:□ N/A:□

23. Does the Hospital/health Center have an action threshold for each priority disease?
Do you have an action threshold for any of the Country priority diseases?

Y: □ N: □ U :□ N/A:□

24. If yes, what is it (Ask for 2 priority diseases)? _____cases ____ % increase _____rate

25. In the Hospital/health Center Who is responsible for data analysis? _____

26. In the Hospital/health Center have How often do you analyze the collected data?

- ***a.*** Daily
- ***b.*** Weekly
- ***c.*** Every 2 weeks
- ***d.*** Monthly
- ***e.*** Quarterly
- ***f.*** As needed……..

27. Does the Hospital/health Center have appropriate denominators
Obs Observed presence of demographic data at site (E.g. population <5 yr., population by village, total population)

Y: □ N: □ U :□ N/A:□

V. Epidemic preparedness

28. Does the Hospital/health Center have a standard case management protocol for epidemic prone diseases
Obs Observed the existence of a written case management protocol for 1 epidemic prone disease

Y: □ N: □ U :□ N/A:□

VI. Epidemic response

29. Does the health Center/Hospital implemented prevention and control measures based on local data for at least one epidemic prone diseases

Y: □ N: □ U :□ N/A:□

30. Does your Hospital/health center achieved acceptable case fatality rates? (e.g. 10% for Meningococcal CSM 1% for Cholera) during the most recent outbreak

Obs Observed that the health facility achieved an acceptable case fatality rate for most recent outbreak

Y: □ N: □ U :□ N/A:□

VII. Feedback

Does your Hospital/health center have received a report or bulletin from a higher level during the past year on the data they have provided?

Y: □ N: □U:□ N/A:□

31. How many feedback bulletin or reports has the health facility received in the last year? ___

32. Does your Hospital/health center conducted at least semi-annual meetings with community members to discuss results of surveillance or investigation data ?

Y: □ N: □U:□ N/A:□

How many meetings has this the Hospital/health Center conducted with the community members in the past six months? _____

VIII. Supervision:

33. How many times have you been supervised in the last 6 months?_____

34. Of those supervised in the previous 6 months, percent of individuals for which the supervisor from the next higher level reviewed surveillance practices appropriate to their level

Obs Observed supervision report or any evidence for appropriate review of surveillance practices

Y: □ N: □U:□ N/A:□

IX. Training

35. Does health personnel In Hospital/Health center trained in disease surveillance and epidemic management?

Y: □ N: □ U :□ N/A:□

36. Number of Health Personnel trained _____

37. If yes, specify when, where, how long, by whom?_____

_____

X. Resources

38. Number of Hospital/Health center that have Logistics

- ***a.*** Electricity
- ***b.*** Bicycles
- ***c.*** Motor cycles
- ***d.*** Vehicles

39. Data management in Health Center/Hospital

- ***a.*** Stationery
- ***b.*** Calculator
- ***c.*** Computer
- ***d.*** Software
- ***e.*** Printer
- ***f.*** Statistical package

40. Communications in Health Center/Hospital

- ***a.*** Telephone service
- ***b.*** Fax
- ***c.*** Radio call
- ***d.*** Computers that have modems

41. Information education and communication materials in Health Center/Hospital

- ***a.*** Posters
- ***b.*** Megaphone

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

42. Hygiene and sanitation materials in Health Center/Hospital

a. Spray pump
b. Disinfectant

43. Protection materials (list) _____ _____ _____

_____

_____

XI. Satisfaction with surveillance system

44. Satisfaction with the surveillance system in Health Center/Hospital
Are you satisfied with the surveillance system?

45. Y: □ N: □ U :□ N/A:□
If no, how can the surveillance system be improved? _____

_____

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

_____

_____

Annex 3: Data collection questionnaire for health profile description of Wonago woreda, Gedeo Zone, 2014.

Health profile of _____ District .Name of the data collector----------

Date: ----------Respondent (s):----------

1. Historical Aspects of the area (only if relevant)

_____

_____

_____

2. 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----------

3. 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

4. Population and population structures

Total population_____. Total HH ----------

Population by Kebele ----------

Male _____Female _____

Under 1yrs _____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

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

Average income/year_____Source

Economic status?

High----------Low----------Medium---------- other

Productivity----------

6. Education

Total schools----------Gov. ---------- NGOs. ----------Private Schools-----

KG	-----	--------	----------
Primary	------	---------	----------
Secondary	-------	----------	----------
Preparatory	---------	----------	----------

KG M----- F----------total------ Primary M-------- F----------total----------

Secondary M------- F----- ----- total---------- Preparatory M--------- F---------- Total--------

School distribution by Kebele----------

Schools access with water in number----------

Reasons for absence of water for certain parts of schools----------

---

School clubs (activities) other than education and their major and current functionalities.

A, C,

B, D,

Schools access to road----------access to tell----------access to electricity--------

Literacy status (%) ----------Illiterate (%) ----------

7. 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?

8. Disaster Status in the area

Was there any disaster in the district in the last years?

_____

9. 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;

Polio3----------Pentavalent3_____Measles ----------

Health staff to population ratio for each profession.

Health officers ----------Nurses --------Midwifery --------Medical lab_____

Pharmacy_____Env'tal ___ HEWs, rural --------- Urban---------

Others----------

10. 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. _____ ----------

11, others----------

12 Admission causes----------

13 Death cause, ----------

Health budget allocation from last year------

Health budget for emergency condition------

11. Community Health Services;

Status of services provided by community health workers namely:

TBAs ----------

CHWs/ Dep't army----------

HEWs ----------

Other ----------

12. Status of Primary Health Care Components – with focus on the eight PHC elements MCH/FP trend 3 or 5years (recent to last)

EPI

PV1 ----------

Polio3 ----------

Pv3----------

Measles ----------

Environmental Health, ----------

Health Education, ----------

Endemic diseases;

Malaria

Identified malarious 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, ----------

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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----------

Nutritional status in the district.

Malnuritioned cases admitted to OTP trend----------

Sc admission trend----------

Epidemic prone diseases ----------

What do you think the main problems of the district ----------

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Discussion of the highlights and the main findings of the health profile assessment and description

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

Declaration

I, the undersigned, declare that this is my original work and has never been presented by another person in this or any other University and that all the source materials and references used for this thesis have been duly acknowledged.

Name: _____

Signature: _____

Place: _____

Date of Submission: _____

The thesis has been submitted for examination with my approval as a university advisor.

Name of advisor: _____

Signature: _____

Date: _____