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

Ethiopia Field Epidemiology Training Program (EFETP)
Compiled Body of Works in Field Epidemiology

By:
Daniel Teshome Bekele

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, 2014

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Advisors:
Dr. Merawi Aragaw
Dr. Jemal Haider

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I also thank Ethiopian Health and Nutrition Institute (EHNRI) for inviting Field Epidemiology residents on Meningitis post outbreak evaluation panel discussion in Hawassa during our residency time. Eventually, I would like to acknowledge SNNPR Public Health Emergency Management core process staffs for their unreserved support during the residency period

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List of Abbreviations

AAU	Addis Ababa University
AFP	Acute Flaccid Paralysis
AR	Attack Rate
AWD	Acute Watery Diarrhoea
BPR	Business Process Re-engineering
CFR	Case Fatality Rate
CTC	Cholera Treatment Centre
CSA	Central Statistics Agency
CSF	Cerebro Spinal Fluid
E.C	Ethiopian Calendar
E.F.Y	Ethiopian Fiscal Year
EHNRI	Ethiopian Health and Nutrition Research Institute
FP	Family Planning
HC	Health Center
HEP	Health Extension Program
HEW	Health Extension Worker
HMIS	Health Management Information System
HP	Health Post
IDSR	Integrated Disease Surveillance System
IHR	International Health Regulation
IR	Incidence Rate
IRS	Indoor Residual Spray
ITN's	Insecticide Treated Nets
MCV	Measles containing vaccine
LLIN	Long Lasting Insecticide Treated Nets
MIS	Malaria Indicator Survey
MOH	Ministry of Health
NNT	Neonatal Tetanus
OR	Odds Ratio
PHEM	Public Health Emergency Management
PMTCT	Prevention of HIV from Mother to Child Transmission
RDT	Rapid Diagnostic Test
RHB	Regional Health Bureau
RRT	Rapid Response Team
SNNPR	South Southern Nation and Nationalities peoples Region
SRS	Simple Random Sampling
TT	Tetanus Toxoid
UNICEF	United Nations Children's Emergency Fund
WASH	Water Sanitation and Hygiene
WHO	World Health Organization
ZHD	Zonal Health Department

Executive Summary

National health Policy of Ethiopia gives due attention to prevention and control of diseases which are epidemic prone, of international concern and diseases on eradication and elimination programs through surveillance activities. The role of public health practitioners include ensuring effective health promotion, disease prevention and control activities, conducting surveillance on emerging public health threats and providing pertinent information to policy makers and public health officials.

From January, 2013, I have been staying in Field Epidemiology Training Program, School of Public Health-AAU and at Southern Nation and Nationalities' people Regional (SNNPR) Health Bureau field base. I carried out outbreak investigations, surveillance data analysis, and evaluation of surveillance system, health profile description of district, abstract for scientific conference, Belg assessment, research proposal and training as outputs.

Chapter I: Epidemiological investigations of two outbreaks were conducted. Descriptive and Analytic Epidemiology was used during investigations. We identified factors that contributed to measles outbreak in Kucha and Humbo, Gamogofa and Wolayita zones respectively, the highest incidence in age group 5 -14 children, the risk factors include a low vaccine coverage, Overcrowding (living in a house more than six), recent travel to history to area where measles cases were reported and weak case detection system. We recommended supplemental measles vaccination, strengthening of routine immunization and public enlightenment of immunization. Vaccination campaigns should target children above age of five years. Vaccination catch up was held from age 6 month to 14 years, defaulters were traced and supportive treatment. After meticulous intervention activities were initiated the number of cases began to decline rapidly.

.**Chapter II: -** Nine years (2005-2013) Southern Nation and Nationalities Peoples Region Malaria data were utilized for analysis to describe malaria by person, place and time based on malaria indicators. **T**he average estimated annual incidence of reported total malaria for the calendar years (2005-2008) has declined from 37.23 to 29.25 per 1000 persons , while (2010-2012) increased from 75.13 to 86.44 per 1000 persons, the confirmed malaria cases has increased from 9.39 to 24.40 per 1000 person with no clear decline in out-patient cases over the time period. However, the reported malaria in-patient admissions (averaging 29.48 to 12.45 per

1000) and deaths (6 to 2 per 1000 per year) showing reduction between 2005 and 2013. Out of 18 reporting zones, 61 %(11/18) had average annual estimated incidence of confirmed malaria 80-150 per 1,000 persons

Factors hypothesized to be associated with weak surveillance system (early detection and reporting, irregular reporting system.), inconsistent prevention and control measure.

Chapter III: - Evaluation of surveillance system was conducted from December 15 –25, 2013 in Gamogofa Zone. The overall structure of the surveillance data flow from lower to higher was well organized. Absence of timely analysis and utilization of data made the existing surveillance system weak. Therefore, it is necessary to strengthen the surveillance system by capacitating health workers at all levels to analyze and utilize available data. The overall surveillance system currently underway in the zone was not satisfactory. Absence of timely analysis and utilization of data made the existing surveillance system weak. Therefore, it is necessary to strengthen the surveillance system by capacitating health workers at all levels to analyze and utilize available data.

Chapter VI: - Health profile is a system of collecting and summarizing health and other health related events, demographic, socio-economic, political and cultural aspect of a particular district. Health and health related data was collected in Shebedino district during April 14-18, 2013. Malaria, Diarrhoea and intestinal parasitosis Acute Febrile Illness and Lower Respiratory Tract Infections (Pneumonia) were leading causes of adult morbidity in the district. Pneumonia, Malaria and Diarrhoea were the leading causes of morbidity in under-five children.

Chapter V:-Scientific Manuscript for Peer Reviewed Journals was conducted on measles outbreak in Humbo, Gamogofa Zone.

Chapter VI:-Two abstracts for scientific conference submission were prepared during residency time. These were:

- Analysis of Malaria data –SNNP Region, Ethiopia: Nine years (2005-2013)
- Outbreak of measles, Kucha district, Gamogofa zone, SNNPR, Ethipia,2013

Chapter VII:-Narrative summary of disaster situation. Belg assessment was conducted in two zones of SNNPR, from June 16 to 26/2013 in the selected woredas of Gamogofa and Wolayita zones, to identify areas where emergency health and nutrition assistance needed and to determine the gap in the capacity of the health system in addressing anticipated risks so as to develop response plan.. Malaria was a major problem in the two visited zones. In addition, there was a meningitis, measles outbreak in Gamogofa and Wolayita Zones respectively

Chapter VIII: - Protocol/proposal for Epidemiologic Research Project proposals was prepared. The main purpose of this study is to identify sociodemographic and environmental risk factors associated with the transmission dengue virus infection and to identify risk areas to target control measure. Hospital based case control study is designed.

Chapter IX:-Other Additional Output.

In order to achieve effective disease surveillance system and improve surveillance and case management PHEM focal persons should be strengthened through training. Training was given to woreda PHEM focal persons of Gamogofa, Segen people, Wolayita, South Omo, Keffa zones. Training material was comprised of PHEM overview, public health surveillance, epidemiology of malaria, prevention and control of malaria, measles surveillance, and meningitis surveillance was given to woreda PHEM focal persons. A total of 75 trainers were planned and 55 PHEM focal persons (75%) attended training. Mean pre-test score was 60%. Mean post-test score was 73%.There was improvement of knowledge on PHEM among participants even though there is shortage of time

Chapter – I Outbreak Investigations

Abstract:

1.1 Outbreak of Measles in Kucha district, Gamo Gofa zone, Ethiopia, August, 2013
Abstract Text:

Background: Measles is a highly infectious vaccine preventable childhood disease that infects over 20 million people each year. On 14th August, 2013; five suspected cases of measles were reported in Kucha district, Gamo Gofa zone, Ethiopia. We conducted an investigation to confirm the diagnosis, assess factors associated with the outbreak and recommend control measure.

Method: We conducted 1:2 unmatched case-control study, we defined a case as any resident of Kucha district with fever, rash, and either cough, conjunctivitis or coryza, between August 14 to 20th September, 2013.Five blood specimen collected from suspected cases for testing Measles IgM. We reviewed patient's medical records of in the health facilities and active search for additional cases in affected communities. Questionnaires were administered to caregivers of cases and controls to obtain information on Scio-demography and risk factors. Immunization status was assessed using immunization card and/or care givers recall.

Results: We found 148 cases with (AR=8/10,000) with two death (CFR=1.2%). A total of 30 cases and 60 controls recruited Females constitute 53.3% and 51.7% of cases and controls respectively. The median age was 6.5 years (range 8 month to 18 years) and controls 7.5(1-18 years), and 39 (26.4%) under five and 97(65.5%) were 5-14 years old. Measles vaccine coverage 92%. Prior vaccination status (OR=0.21, 95% CI: 0.08-0.54), Knowledge of measles transmission (OR= 0.13, 95%CI: 0.02-0.35). Living in a room with more than six people (OR=4.2, 95%CI: 1.53-11.95). All five samples tested positive for measles IgM.

Conclusion: Low measles immunization, poor knowledge of transmission of measles, and overcrowded living condition and accumulation of susptible groups above 5 years age may be responsible for this epidemic. We recommend supplemental measles vaccination, strengthening of routine immunization and Public advocacy on immunization campaigns, Vaccination campaigns should target children above age of five years.

Keywords: Measles outbreak, Ethiopia, Gamogofa, case control, Kucha

1.1.1 Introduction:

Measles is a highly contagious human disease caused by RNA virus, which belongs to genus Morbillivirus which grows in the cells that line the back of the throat and lungs (1-2). Despite huge efforts to promote widespread safe and cost-effective vaccine, measles remains an important cause of morbidity and mortality worldwide, especially in African children. (3)

Worldwide, 222,318 of measles cases reported in 2009 and there were 164,000 global measles deaths occurred in 2008. More than 95% deaths occurred in low income countries with weak coverage of health infrastructure. Endemic measles transmission has not occurred in the United States since the late 1990s due to high vaccination coverage of measles, despite continued importations. However, large outbreaks occurred in several African countries during 2008, including the Democratic Republic of the Congo (12,461 reported cases), Ethiopia (4,470), Niger (1,317), and Nigeria (2-3)

Ethiopia introduced measles vaccination as part of the Expanded Program on Immunization (EPI) in 1980; one dose of measles vaccine was recommended at 9 months of age and started SIA on 1998 targeting children 6 months - 14 years, and follow up /SIAs have been conducted every year targeting different geographic areas since 2005.(2)

The government of Ethiopia launched a nation-wide "best practices" follow-up measles campaign in two phases: October 2010 (in 7 regions) and February 2011 (in remaining 4 regions), targeting over 8 million Children (1-3). WHO/UNICEF coverage estimates for measles vaccination in Ethiopia indicate 80% in 2010 which remains below the target of measles routine coverage over 90% is needed for achieving a sustainable reduction in measles mortality and too recent to achieve the 2012 pre-elimination and 2020 elimination goals set by WHO/AFRO. (8-9) In 2010 in 93 of 96 administrative zones of the country 8,261 suspected measles cases were reported. (3).

In SNNPR region, measles is the major public health concern of vaccine preventable disease. From August 2013, eight zones of the region and 20 of the 131 woredas were affected by the disease with 3015 suspected cases and 3 deaths.

On August 14, 2013 the Kucha district health office announced to the SNNP regional health bureau PHEM department, 5 suspected measles cases and with two death report from kebeles (Kullo and Dele-Keyse) of the district. The region deployed a team of investigators on August 16, 2013 to undertake possible investigations and intervention measures. The team was prepared to the field by developing questionnaires and equipped with necessary materials.

1.1.1.1 Background:

Gamogofa zone is one of the 14 zones in the Southern Nations, Nationalities and Peoples' Region of Ethiopia (SNNP) regional states. The administrative town of the zone is Arbaminch town. The area is highly and quite wooded, with coffee typically grown under indigenous shade trees. It is a food secure area of SNNPR that produces some of the highest quality organic coffee in Ethiopia and is also productive in terms of Enset.

Kucha woreda is one of the 17 woredas in Gamogofa zone, Southern region of Ethiopia. It is bordered on the south by Dita and Deremalo, on the southwest by Zala, on the west by Demba Gofa, on the northwest by the Dawro Zone, on the north by the Wolayita Zone, on the east by Boreda, and on the southeast by Chencha. The administrative town of the woreda is Selamber town which is located 150 km and 275 km the zonal capital Arbaminch and capital city of Ethiopia, respectively. The woreda has 33 administrative kebeles out of which 32 kebeles are rural kebeles. According to the 2007 national census, the projected population of the woreda is estimated to be 182,360 in 2012/13. Of this, the under-five population is 23,236 and the expected number of pregnant mothers is 5,362. The average size of a household is 4.7. (4)

It has 40 functional health posts; there are 7 health center and 18 private clinics that make the health service coverage of the woreda 96% and 100% respectively. The woreda Conducted Follow-up immunization activities on the month of December,2013 targeting 6 months – 5 years old children and achieved 94% coverage.

There are a total of 284 workers in woreda health sector; 120 health workers, 86 HEWs and 78 supportive staffs. Currently, 682 health development armies deployed in all kebeles of the Woreda. The top ten diseases in the woreda are as follows from the largest to smallest: Malaria, intestinal parasites, Pneumonia, AFI, Diarrheal diseases, typhoid fever, Trachoma, UTI, URTI, and gastritis. The woreda health office has assigned one focal person for EPI and IDSR focal persons in the five HCs.

1.1.2 Objectives:

1.1.2.1 General Objective**:**

- To investigate the measles suspected outbreak of Kucha district, Gamogofa zone SNNP Region

1.1.2.2 Specific Objectives**:**

- To confirm the existence of the outbreak
- To identify the causative agent of the outbreak
- To identify potential risk factors of its transmission.
- To analyze the data in terms of place, person and time variables
- Based on our finding to take possible intervention measures to contain the outbreak and prevent occurrence of further cases.

1.1.3 Material and Methods: We started our study by defining a suspected measles case based on WHO case definition, as any person with fever, maculopapular generalized rash and cough, and either coryza, or conjunctivitis or any person in whom a clinician suspects measles. We collected standard line list that includes variables like name of patient, age, sex, address, date of onset, date seen at health facility, vaccination status and specimen taken and outcome of the patient from the woreda health bureau. We interviewed cases, controls, community leaders and health professionals of the district health office and health facility in detail. We made house to house visit to assess additional cases

1.1.3.1 The study population: was composed of the inhabitants of the Kucha Woreda involved kebeles in the measles outbreaks. Kucha woreda has a total population of 183,029 of which 91074 are females and 91955 are males.

1.1.3.2 Study area: The study was conducted in Kucha Woreda of Gamogofa Zone; Southern Nations, Nationalities and Peoples' Regional State. The woreda has 33 kebeles of which 1 is urban and 32 are rural kebeles. The study was conducted in 8 kebeles of the Kucha woreda. The admission site was Selamber and Morka Health centers.

1.1.3.3 Study design: Descriptive and the Case-control study were conducted from August 14-20/2013. We conducted case - control study to identify potential risk factors to its transmission and complication; two controls per each case (30 cases and 60 controls) in regard to variables house hold size, recent travel history to areas with active measles cases, knowledge of measles transmission, vaccination status, and occupation and literacy level. Vaccination history was obtained from care givers' recall and by observing the immunization cards

1.1.3.4 Study period: Surveillance data were analyzed from all reported cases since the beginning of the first outbreak on August 14, 2013G.C. until the end of September 20, 2013G.C.

1.3.3.5 Data dissemination: Written report (both hard and soft copies) was prepared and shared to Addis Ababa University School of Public Health Resident advisors and coordinators, SNNPR Health Bureau of PHEM.

1.3.3.6 Operational definition

1.3.3.6.1 Suspected measles case

In this investigation suspected measles case is any person in the study area from August 14, 2013 to September 20/2013 G.C with rash, fever and one of the following: Cough, coryza, and conjunctivitis.

1.3.3.6.2 Confirmed case definition

Any ill person from these localities in the same year, with laboratory confirmation of measles specific IgM antibody from the serum.

- **Vaccination status**

Individuals were considered to be vaccinated if vaccination was documented in their vaccination cards or by history.

1. Enrollment of cases and controls

- **Cases:** those that have clinical sign symptom of measles based on WHO case definition those were either laboratory confirmed or epidemiologically linked to the laboratory confirmed cases.
- **Controls**: controls are selected from the same kebele and village cases live. Two controls were selected per each case unmatched by age and sex.

1.1.5 Result

1.1.5.1 Descriptive study

We identified 148 suspected cases with two death report in eight kebeles of the district since 8/14/2013 – 9/20/2013, females comprise 45.95%, 98(66.21%) were farmers. Median age of cases was 6.5 years (ranges from 3 month to 28 years). Of these cases 21.62% and 65.54% were age group 1-5 and 5-14 years respectively. Prior Vaccination history, 78/148(52.30%) were not vaccinated, 53/148(35.2%) taking one dose measles vaccine. the overall attack rate 8 per 10,000 population.

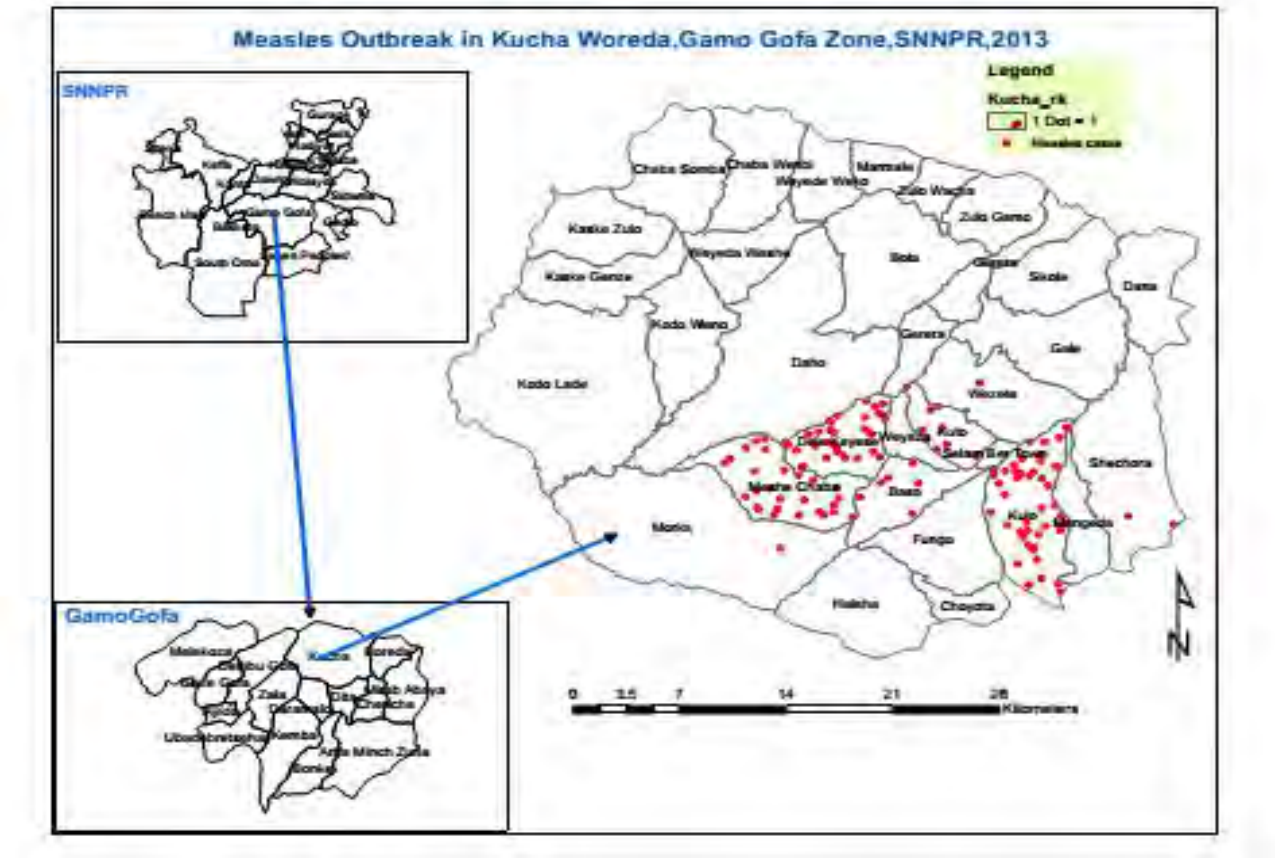

Figure 1.1.1 Distribution of measles cases by kebeles, Kucha, Gamogofa Zone, 2013

Table: 1.1.1 Number of cases by age group, Kucha district, Ethiopia, 2013

Variable		Frequency	Population	AR /1000	Percent
Age Group	<5	40	8117.90	4.92	27.03
	5-14	96	13734.06	6.98	64.86
	15+	12	29204.03	0.41	8.11
	Total	148	51056	2.89	1000
Sex	F	68	26128	2.60	45.95
	M	80	24928	3.20	54.05

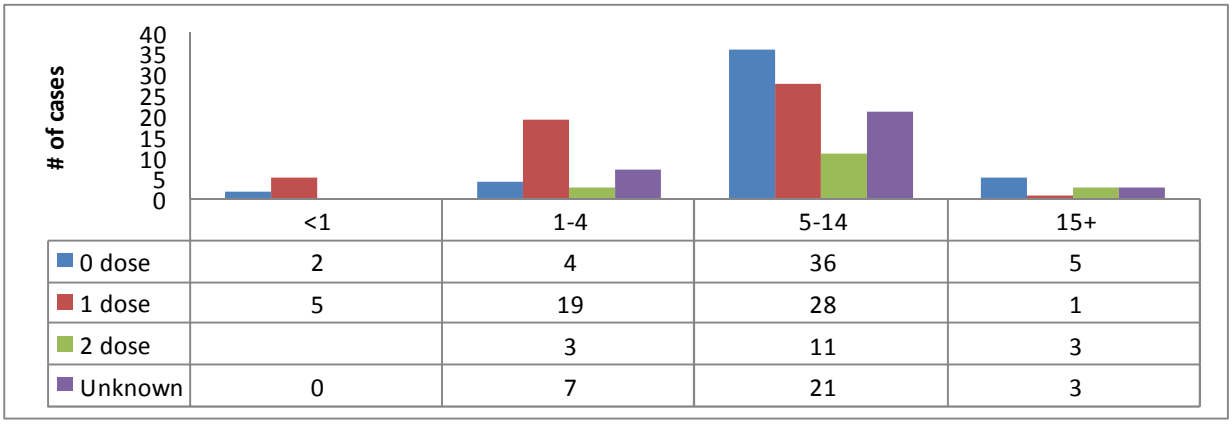

Figure: 1.1.2 Measles cases by age group and vaccination status,Kucha district,Gamogofa, Ethiopia 2013.

Table:1.1.2 Distribution of measles cases by Kebeles, Kucha district, Ethiopia, 2013

Kebeles	Cases	Population	AR/1000	Proportion (%)
Kullo	47	9090	5.2	31.76
Dele kesaye	33	4880	6.8	22.30
M chaba	28	4768	5.81	18.91
Selember	22	6763	3.25	14.86
Kutto	9	3937	2.28	6.08
Basso	6	4644	1.30	4.05
Shochora	2	10881	0.18	0.018
Woyzete	1	6093	0.16	0.68
Total	148	51,056		

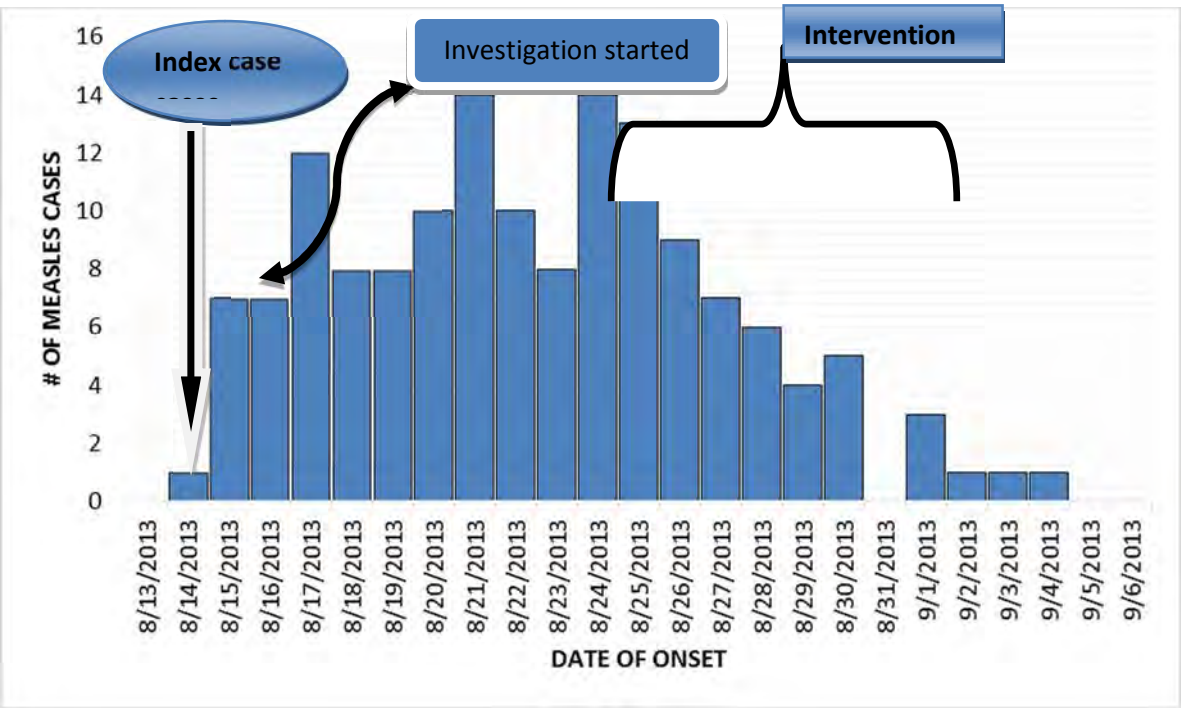

Figure: 1.1.3 Number of measles cases by date of rash onset, Kucha district, Gamogofa zone, Ethiopia/2013

In this investigation we found that two cases were below nine months age group that contracted the disease from their infected sisters. From the total cases 47(31.76 %) of the 148 were from Kullo, 33(22.30%) were from Dele Keyese, 28(18.92 %) from Mesh Cheba and 22(14.86%) from Selember town. There were two deaths reported from Morka health center. Attack rate was highest in Dele Keyese (6.58 per 1000 population), followed by Mesha Chaba (5.71 per 1000 population), and least in Woyzete (0.02 per 1000 population). . The common sign and symptoms were Fever (90%), Rash (98.1%), cough (93%), and coryza (75%), Conjunctivitis (80.8%), Diarrhea (43.33%) and vomiting (26.42.9%).The index case was seen in August 8/14/2013 in Kullo, and followed the next cases in Selamber and Dele Keyese. Peak cases were seen in 8/25/2013.

1.1.5.2 Case Control study: A total of 30 cases were interviewed for the case control study, median age 7 years (0.83-18 year) and that of controls is 7.5 Years ranging from 1 to 18 years. 19/30(63.33%) had unvaccinated history among cases. 9(29.73%) know that measles is vaccine preventable disease.

Table: 1.1.3: Bivariate analysis of measles cases and controls in regard to different variables, Kucha district, Gamo Gofa zone, Ethiopia, 2013

variables		cases	controls	OR(95%CI)
Prior Vaccination status	Yes	11(36.67%)	40(66.67%)	0.28(0.12-0.72)
	No	19(63.33%)	20(33.33%)	
Knowledge of measles transmission	Yes	9(30%)	46(76.3%)	0.13(0.02-0.30)
	No	21(70%)	14(27.7%)	
Living in a room with more than six people	>6 persons	24(80%)	29(48.33%)	4.2(1.53-11.95)
	≤ 6 persons	5(4%)	31(51.67%)	
Recent travel to areas with active measles cases	Yes	16(53.33%)	36(62.07%)	0.69(0.28-15.70)
	No	14(46.67%)	22(37.93%)	
Educational status	Elementary and below	27(100%)	46(85.2%)	__
	Secondary and above	0(0%)	8(14.8%)	
Age	<5	4(14.8%)	13(24%)	0.55(0.16 -1.9)
	>=5	23(85.2%)	41(76%)	
occupation	Farmer	22(81.5%)	32(59.3%)	3(0.9-9)
	Others	5(18.5%)	22(40.7%)	
Marital status	Single	8(14.8%)	13(24%)	0.7(0.3-1.8)
	Married	17(63%)	29(53.7%)	
Sex	Female	16(53.33%)	31(51.67%)	0.93(0.38-2.25)
	Male	14(46.67%)	29(48.33%)	

1.1.6 Prevention and control action:

- .Reactive vaccination campaign: Vaccination catch-up programs campaigns vaccinated all children 6 months to 14 years old, whether or not they have had measles or previous vaccinations and supplementary dose of vitamin A,
- Prompt case management: cases were managed by distributing supportive treatments (Antibiotics, tetracycline ointment, oral rehydrating Salt, and Vitamin A, and anti-pyretic).
- Health promotion: We delivered Health Education in social gathering areas like church, school, to create awareness about measles modes of transmission, control mechanisms and to make them report cases as soon as possible to the nearby health institution or health professional. Two schools in the highly affected area were closed.
- Orientation was given to Woreda Health Office & Health Center Workers on the following topics: The Importance of Home Isolation for uncomplicated cases in reducing the transmission of measles and active surveillance and contact tracing, complicated cases to be managed at Health center. Vitamin A supplementation to all contacts under 15 years of age
- In addition to this we discussed with community leaders, health professionals and administrative office of the district how to create awareness among the community, two Nurse and HEWs made daily house to house visit to search additional cases, trace defaulters of vaccination and to see patient progress. After intervention activities were initiated the number of cases began to reduce rapidly.

1.1.7 Discussion

We identified factors associated with measles outbreak in Kucha district, Gamogofa zone. The finding showed Living in a room with more than six people was significantly associated with higher rates of disease. The OR= 4.2, 95 CI (1.53.-11.95), indicated that those who were live in a house more than six, 4.2 times more likely to contract measles than who were live in less than six. In the rural community it is common to have large Family size composed of extended family, therefore it has proved that, Overcrowding is one of a risk factors found that close contact with an infected person increased measles transmission since measles is a highly infectious communicable disease.(1-3)

In this study Prior vaccinated status was highly protective against disease transmission, (OR=0.28), 95 CI= 0.12-0.54) showed us those who had previous vaccinated were more protected against measles disease, but for those unvaccinated OR 3.4, 95 CI (1.9-12.13) this indicate that those unvaccinated children 3.4 times more likely contracted measles than vaccinated. This is consistent with measles outbreak finding in Meta Robi district, central Ethiopia in 2013, Meaza T et al showed the similar finding that cases were high in unvaccinated and who incompleted vaccination compared to completed vaccination, This led to the presence highly accumulated susceptible and low population immunity as a cause of outbreaks in the woreda.

Majority cases were preschool and older children with age group 5_15 yrs. of the total (n=30) 66.70% unvaccinated. This is Consistent with the study conducted explosive measles outbreak in Nyanza province, Kenya 2012.This showed that there was age shift which might indicate the accumulation of susceptible host. Measles outbreak investigation in Kenya, Paumio, M, Peltola, H, Valle, M, et al revealed that cases were high in unvaccinated older children compared to those who were completely vaccinated. It is possible to prevent them by timely immunization of susceptible individuals in populations at higher risk and also by improving overall levels of vaccine coverage in the population. (3)

1.1.8 Study Limitations

- Data is dependent on recall, Potential misclassification of vaccination status
- Incomplete data- lack of the required identification some of the cases in the line list, for instance, vaccination status, age, sex.
- Shortness time for the investigation available, because the area remote and inaccessible for transport, a paradox scenario that an outbreak occurred in high administrative coverage, it needs in-depth probing

1.1.9 Conclusion

This outbreak was the largest epidemic of measles in Kucha, Gamogofa zone since 2011. The concerned area is regularly affected by measles, In January 2013, other laboratory confirmed cases was reported before the current outbreak, this Underlining the importance of pursuing efforts and extend the SIA to rural area, where children have lived remote area and unreachable. (3).

Low Measles immunity was responsible for this outbreak in which preschool and older children have become an increasing concern in SNNPR, and we have got a confirmed measles outbreak with high morbidity rate in 5-14 age groups in rural community of Gamogofa, Ethiopia. The results support the view that failure to vaccinate rather than vaccine failure contributed to the high infection rate in this outbreak. These finding was supported by other studies conducted in different areas (5-7) showed that accumulation of susceptible children shifted measles cases to older children.

Although measles was once labeled a childhood disease, older children cases with complications of measles become public health concern in developing countries. (1-3). Consideration of local measles epidemiology (Older children cases) is important to strengthening vaccination priorities based on age groups most at risk to attain herd immunity. It is necessary to learn lessons from the past experiences of measles outbreaks with high proportion older children cases in similar studies in Gamogofa zone.

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1.1.12 Recommendation

Based on our finding we recommended enlightenment of immunization campaigns should target children above age of five years by:

1. Strengthening Supplementary immunization of children before starting in school could be effective in preventing measles outbreaks. In addition, implementation of supplementary immunization every 5–14 years in older age groups might be effective in preventing future outbreaks
2. Increase routine immunization coverage (>90%) in the target age group to stop transmission of measles and to achieve the targeted goal set by WHO for African region elimination of measles by 2020.
3. Surveillance standards must also be maintained to ensure rapid detection of measles cases, thus allowing a timely response and containment
4. Provision of health education to the community to create awareness regarding enlightenment the advantage of immunization.

1.1.12 Acknowledgement: We would like to express our deep gratitude and appreciation to Mr. Asfaw/Hilegiorgis. Mr. Eyob Morka for his unreserved guidance and sincere cooperation during our field visit to each household without whom the case- control study was unthinkable. Our deep appreciation go to Getachew Alemu for his invaluable contribution and commitment to share us his experience and our field supervisor Mr. Jemal Hassen for the administrative arrangements he made. We are very grateful to the HEWs of Kullo H/P for their support in indicates us house of cases.

1.1.13 References

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1.1.1 Annex

Annex 1: Questions for Investigation of measles Outbreak in Gamogofa zone

1. **Demographic Information**

- Id number --- Cases Status—A/ Cases B/ Control Date of birth----------Age--------
- Name of the child ---------- Sex A/ Male B/ Female
- Date of interview----------
- Occupation ----------Level of Education ----------
- A/ Zone ----------B/Woreda----------C/Kebele ----------
- Religion A/Orthodox B/Muslim C/ Protestant D/Catholic E/ Others/ Specify/
- Ethnicity ---------- Economical Status/of family----------
- Number of persons in the HH---------- Marital status----------House size--------

2. **Risk Factors and Clinical Features**

1. Did the child has illness of measles A/ yes B/ No
2. If yes, did you take him/her to the health institution? A/ yes B/ No
3. If yes, did he/she admitted A/yes B/no
4. If yes, date of Admission----------Day of stay----------
5. Duration of illness before visiting the health facility ----------in days/hours--------
6. Did the child treated with traditional medicine before health facility? A/ yes B/ No
7. What symptoms does he/she have?
   - Fever A/ yes B/ no Rash A/ yes B/ no
   - Runny nose A/ yes B/ no Red eyes A/ yes B/ no
   - Cough A/ yes B/ no loss of appetite A/ yes B/ no
8. If he/she has a rash, date of rash onset ----------
9. Did the child have contact with someone having rash within 1 wk back? A/ yes B/ no
10. Did the child develop complication? A/ Yes B/ No
11. If yes, is it? A/ diarrhea B/ pneumonia C/ otitis media D/ others/specify/
12. Did the child receive measles vaccine? A/ Yes B/No
13. **If yes, at what age? ----------**
14. If yes, Check card---------- see if A/ by card B/by History
15. If yes, how many times /for measles only? ----------
16. date of last measles vaccination----------
17. Are there other persons with similar symptoms within the household? A/ Yes B/ No
18. Are there other persons with similar symptoms in the neighborhood/? A/ Yes B/ No
19. Have you measles infection in your life? A. Yes B. No
20. Have you any contact with suspected/confirmed measles case? A. yes B. No

3. **Nutritional status**

- Did the child receive Vit A at 6 month? A/ Yes B/ No

- Is the child on OTP A/ Yes B/ No
- Is there bilateral edema? A/ Yes B/ No

4. Knowledge

1. For what reason do somebody vaccinate her/his child with measles vaccine?
   A. To prevent measles disease B. To prevent hunger C. I don't know
2. What is the right age of vaccinating the child with measles vaccine in our country?
   A. 9months B. 6months C. 3months D. other E. I don't know
3. By what mechanism does the healthy child get measles disease from the sick child?
   A/ Droplet B/ body contact C/ Food D/ Water E/Other/specify/

4. Attitude

1. Do you think vaccination can prevent measles disease? A/ Yes B/No
2. Do you think medical treatment helps measles patient? A/ Yes B/No
3. Do you believe that the child with rash should get medication? A/ Yes B/No
4. Do you believe that feeding and extra fluid is important for the child with measles? A/ Yes B/No

5. Practical

1. What can somebody do if the child gets measles?
   A. Taking to HF B. taking to local healer C. keeping in home D. I don't know
2. What care can be given to measles patient at home?
   A. Giving food/fluids B. giving local medication C. leaving alone D. I don't know
3. What can you do to prevent your family from measles disease?
   A. Vaccinating B. keeping at home C. giving local medication D.I don't know
4. Can you isolate the child with measles rash from other children? A/ Yes B/ No

Abstract:

1.2 Title: Outbreak of Measles in Humbo district, Welayita zone, Ethiopia, September, 2013

Abstract Text:

Background: An estimated 10 million cases and 164,000 deaths from measles occur worldwide each year. On 25 September 2013 Welayita Zonal health department reported suspected measles outbreak. We investigated to verify the existence of the outbreak, identify possible risk factors and recommend control measures.

Method: We define a cases as any person with fever and rash (maculopapular) with any cough, coryza or conjunctivitis living in the affected communities from September 25 to October 30, 2013. We reviewed medical records of patient and active cases searched in the affected communities. Questionnaires were administered to care givers of 40 cases and 80 controls to obtain health and immunization status through immunization cards and/or care givers recall.

Results: During the study period we identified 168 suspected cases and without death report. (AR=11.3/10,000), 40% of the cases were under 5, followed by 27% of 5-9 years. The administrative coverage 98%. We compared 40 cases to 80 controls, with median age 6 years (range 3 months to 18 years) cases and controls 5.5 years (range 3 months-24 years), found that prior vaccination (odds ratio (OR) =0.15, 95% (CI): 0.06-0.36) and knowledge of measles transmission (OR= 0.13, 95%CI: 0.05-0.31) were protective of disease and recent travel to areas with active measles cases (OR=3.80, 95%CI: (1.53-9.74) were associated with higher rates of disease. Among five samples tested three positive for measles specific IgM.

Conclusion: Low measles immunization and recent travel to areas with active measles cases and poor knowledge of measles transmission may be responsible for this epidemic. We recommend improve routine and SIAs and public enlightenment on the usefulness of immunization, travelers should be restricted to affected kebeles.

Keywords: Measles outbreak, Ethiopia, Welayita, case control, Humbo

1.2.1 Introduction

Measles is a highly infectious disease that is transferred from one person to another through aerosolized droplets or by direct contact with the nasal and throat secretions of infected persons (5).Measles transmission is prevented by vaccination and in sub-Saharan Africa, it is recommended that the vaccine be given at 9 months of age, by which time the child would have lost passive immunity conferred by maternal antibodies. One dose of measles vaccine confers life-long immunity to approximately 85% of those vaccinated (1-9).

Childhood immunization programs targeted at children less than 59 months have led to a marked decrease in measles infections and outbreaks (1-3). However, in order to interrupt the endemic transmission of measles virus; a population immunity of ≥95% has to be achieved (3-9). Measles case fatality is estimated to be between 3 to 5% in developing countries and may be as high as 10% during epidemics (5). Despite the efforts made at increasing immunization, measles remain a leading cause of under-five mortality in Africa (3).There were 139, 300 measles deaths globally in 2010 which represents nearly 380 deaths every day or 15 deaths every hour (1). Nigeria is one of the 45 countries that together account for 94 percent of the global deaths caused by measles (7)

Measles-case based surveillance is a system put in place to detect cases and outbreaks of measles. It involves reporting and investigating any suspected case of measles and to use the data to evaluate immunization efforts and predict outbreaks through the identification of geographical areas and age groups at risk (7,3). In 2006, measles case based surveillance was established in Ethiopia using the resources and infrastructure of the already established surveillance for Acute Flaccid Paralysis (AFP). It involves both passive and active surveillance (3). In 2008, the WHO African regional office set a regional preelimination goal to be achieved by the end of 2012. The goals include: reducing the incidence of measles to < 5 cases/ 106 population per year in all countries, increasing the first dose of measles containing vaccine (MCV1) to greater than 90% at the national level and greater than 80% in all districts and (3) measles surveillance system performance that reports non-measles febrile rash illness rate of ≥2 cases per 100,000 population per year (9-3)

Ethiopia has committed to the World Health Organization (WHO) to accelerate measles control program by intensifying measles surveillance through case based surveillance system, strengthening routine infant immunization and giving a second opportunity for measles immunization through catch up and follow up measles supplementary immunization activities.(8,9) Ethiopia is progressively improving the routine immunization coverage against measles from 52% in 2000 to 82.4% in 2010. In addition several follow up measles SIAs has been conducted since 2011 to 2013. (7)

Despite the above efforts, the country has experience several outbreaks since 2008. In 2010, a total of 193 outbreaks in 140 woredas were recorded in the year 2010, with over 4,000 confirmed outbreak cases. (7), SNNP regions accounted for 37% of the confirmed cases. Efforts have been made over the years to strengthen capacity at regional and zonal level to effectively investigate suspected outbreaks, however gaps still exist and most outbreaks are not investigated to the level of scientific documentation.

In SNNP region there were frequent measles epidemic have occurred in different zones, among these Welayita zone was one of the epidemic affected area with high administrative measles vaccination coverage which was paradox phenomenon. Eleven districts have been affected, these are: Kindodidaya, Humbo Damot gale, Damot sore Damot pulassa Damot woyide Dugna fango, Offa, Sodo town and Sodo zuria .A total of 1966 cases of measles were reported in the last 6 months from Welayita zone.

On September 25, 2013, Humbo district health office reported to the SNNP regional health bureau PHEM department, 25 suspected measles cases without deaths occurred in one kebele (Tebela) of the district. The region deployed a team of investigators on September 27, 2013 to undertake possible investigations and intervention measures. The team was prepared to the field by developing questionnaires and equipped with necessary materials (Supportive treatment get from the Humbo district health office).

1.2.2 Background of Humbo District

Humbo is one of the woreda in Welayita zone in Southern region of Ethiopia. The administrative town of Humbo woreda is Tebela town which is located 18 km and 165 km south of zonal capital Welayita Sodo and the regional capital Hawassa, respectively.

The woreda has 41 administrative kebeles out of which 38 kebeles are rural kebeles. According to the 2007 national census, the projected population of the woreda is estimated to be 148,950 in 2012/13. Of this, the under-five population is 23,236 and the expected number of pregnant mothers is 5,362. The average size of a household is 4.7. There are 6 health centers and 38 health posts in the Woreda. Only 6 HPs and 4 HCs have water access. There are a total of 284 workers in woreda health sector; 120 health workers, 86 HEWs and 78 supportive staffs. Currently, 682 health development armies deployed in all kebeles of the Woreda

1.2.3 Objectives

1.2.3.1 General: -

- To investigate and identify risk factors of suspected measles outbreak in Humbo district, Welayita zone, SNNP Region

1.2.3.2 Specific: -

- To confirm the existence of the outbreak
- Describe the outbreak by person, place and time
- Identify possible risk factors
- Recommend and take control measures

1.2.4 Material and Methods

Based on WHO case definition, as any person with fever, maculopapular generalized rash and cough, and either coryza, or conjunctivitis or any person in whom a clinician suspects measles. We collected standard line list that includes variables like name of patient, age, sex, address, date of onset, date seen at health facility, vaccination status and specimen taken and outcome of the patient from Tebela, Fango Gelchecha health centers and Humbo district health office.

We made house to house visit to assess additional cases and conduct case - control study to identify potential risk factors to its transmission, complication and mortality; with two control per each case (40 cases and 80 controls) in regard to variables house hold size, recent travel history to areas with active measles cases, knowledge of measles transmission, vaccination status, occupation and literacy level. Vaccination history was obtained from Patient recall and by seeing the immunization cards.

1.2.4.1 Study design: Unmatched case-control; we recruited cases from the community through house to house search of cases, Controls were recruited from the neighborhoods of cases .Data source: H/c record review and active case search in the communities. Data collection method: Interviewer administered questionnaire and we collected information regarding demographic characteristics, socio-economic status, education, clinical symptoms and potential risk factors (vaccination status, contact etc.) .Data analysis using Microsoft Excel and Epi Info software 3.5.3 (CDC Atlanta, USA); Bivariate analysis was done to identify risk factors.

1.2.4.2 The study population: was composed of the inhabitants of the Welayita Zone in Humbo Woreda involved kebeles in the measles outbreaks. Humbo woreda has a total population of 98,135 of which 48086 are males and 50049 are females, our study populations from 25 kebeles are 7 Kebeles selected depending on the admitted cases were coming, those populations was approximately 44,430.

1.2.4.3 Study area: The study was conducted in Humbo district of Welayita Zone; Southern Nations, Nationalities and Peoples' Regional State. Humbo woreda has 41 kebeles of which 2 is urban and 39 are rural kebeles. The study was conducted in 7 kebeles and two admission sites were selected based on their access to transportation services. These are Tebela H/C and Fango Gelchecha H/C.

1.2.4.4 Study design

The case-control part of the study was conducted from October 1-10, 2013.The study units were measles cases at household and person admitted with measles case in health facility. For each case, 2 controls were selected from the general population of the same Kebeles. Cases and controls were not matched individually for both age and place of residence.

1.2.4.5 Study period: Surveillance data were analyzed from all reported cases since the beginning of the first outbreak on September 25, 2013G.C. until the end of October 30, 2013G.C. However, the case-control study began on October 1, 2013G.C. and enrollment of the controls continued until October 10, 2013G.C.

1.2.4.6 Data dissemination: Written report (both hard and soft copies) was prepared and shared to Addis Ababa University School of Public Health Resident advisors and coordinators, SNNPR Health Bureau of PHEM.

1.2.4.7 Operational definition

A. **Suspected measles case: In** this investigation suspected measles case is any person in the study area from September 25, 2013 to October 2013 G.C with rash, fever and one of the following: Cough, coryza, and conjunctivitis.
B. **Confirmed case definition** any ill person from these localities in the same year, with laboratory confirmation of measles specific IgM antibody from the serum.
C. **Vaccination status:** Individuals were considered to be vaccinated if vaccination was documented in their vaccination cards or by history.

1.2.4.8 Inclusion and Exclusion Criteria

A. Inclusion criteria

- All measles cases admitted in selected 2 health facility. / For measles cases/
- Persons without measles in the community. / For control/

B. Exclusion criteria

- Persons without measles cases./ for measles cases/

  A history of measles disease since the beginning of Humbo woreda outbreak

  Who was recovered /for control/

1.2.4.9 Sampling Procedures

a. **Cases:** We first select 2 admission sites which are accessible to road. Then took all persons admitted with measles cases and followed by active search. It is representative; at least at the time of the study, since most persons who developed fever, rash, cough, coryza, or conjunctivitis.

b. **Control subjects:** Controls are selected from the same community or the neighbor and Select 2 control per cases. The advantages of selecting controls from the same kebeles as cases are likely to live the same populations as the cases, in effect for socioeconomic status, place of residence, access to care and so on are temporal match & comparable records

1.2.4.10: Data collection: We designed questionnaire to interview the case-control part of the study used to collect information on demographic, clinical signs and symptoms, vaccination history, travel history, knowledge, attitude and related variable on measles. In general we have collected epidemiological information in order to allow descriptive and analytical epidemiology of measles outbreaks. The interview was conducted in the local language. Interviews of each pair of cases and controls were performed mostly on the same day. The investigation team was composed of a regional PHEM officer, and EFELTP residents filled the questionnaire as well as collect line list formats.

1.2.4.11 Data processing and Analysis: First we collect all the necessary data, computerized data was coded on pre-arranged coding sheet. Data entry and analyzed using epi-info, 3.5.1 and excel. Tables and graphs are used to present frequencies of appropriate findings. Association between the risk factor and exposure outcome were measured and tested using OR and 95 % CI.

1.2.4.12 Data Quality Control: During data collection in the field and at the end of each day, the questionnaires were reviewed and checked for completeness, accuracy and consistency and corrective measures were taken.

1.2.5 Result

1.2.5.1 Descriptive study: we investigated 168 suspected cases and without death from seven kebeles of the district since 9/25/2013 – 10/23/2012, (overall attack rate 2.20/1000), Median age of cases was 6 years (ranges 3 month to 25 years). Majority of cases (32.74%) were under five and (58.33%) were 5-14 age of these (57.30%) 29.13%, had unvaccinated history respectively.

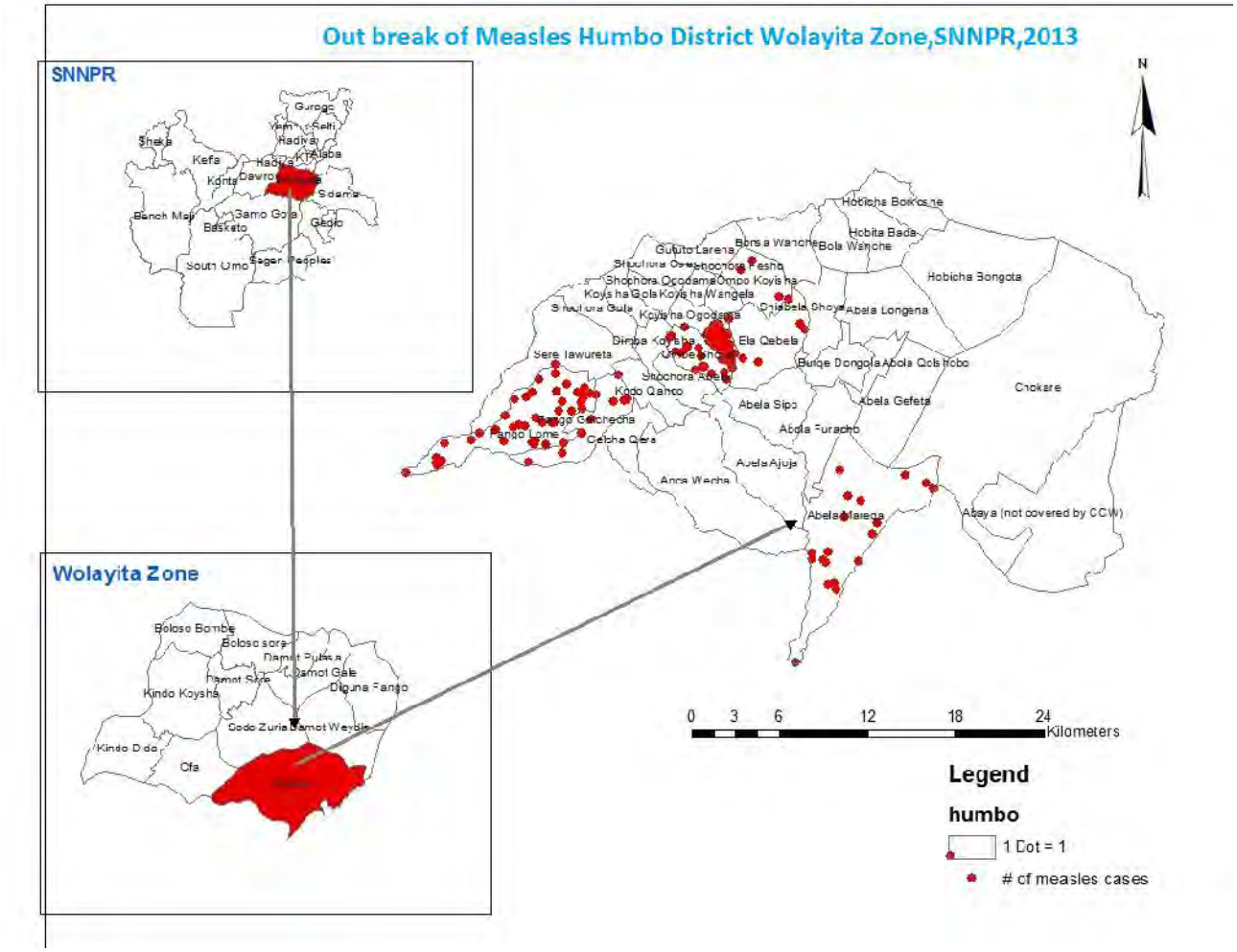

Figure1.2.1: Measles by kebeles-Humbo, Welayita Zone, Ethiopia, 2013

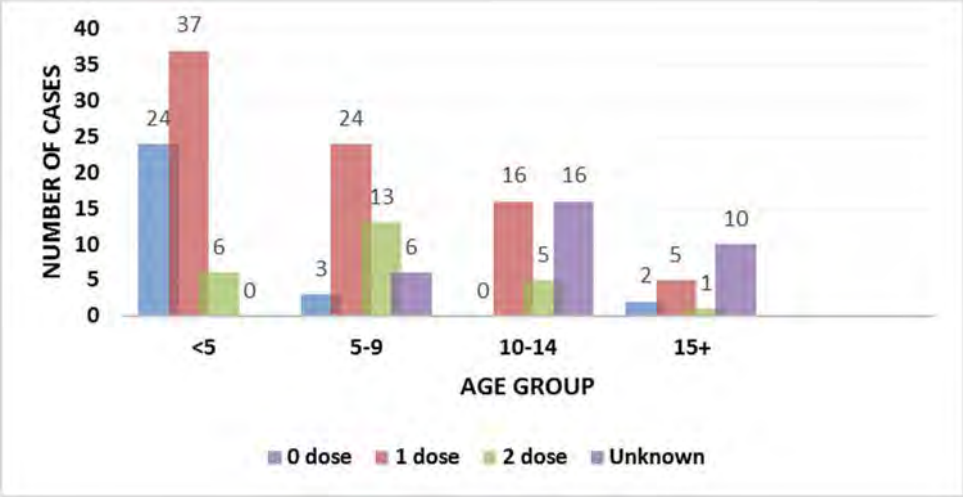

Figure 1.2.2 Measles cases by age and vaccination status, Humbo district, Welayita zone, Ethiopia, 2013

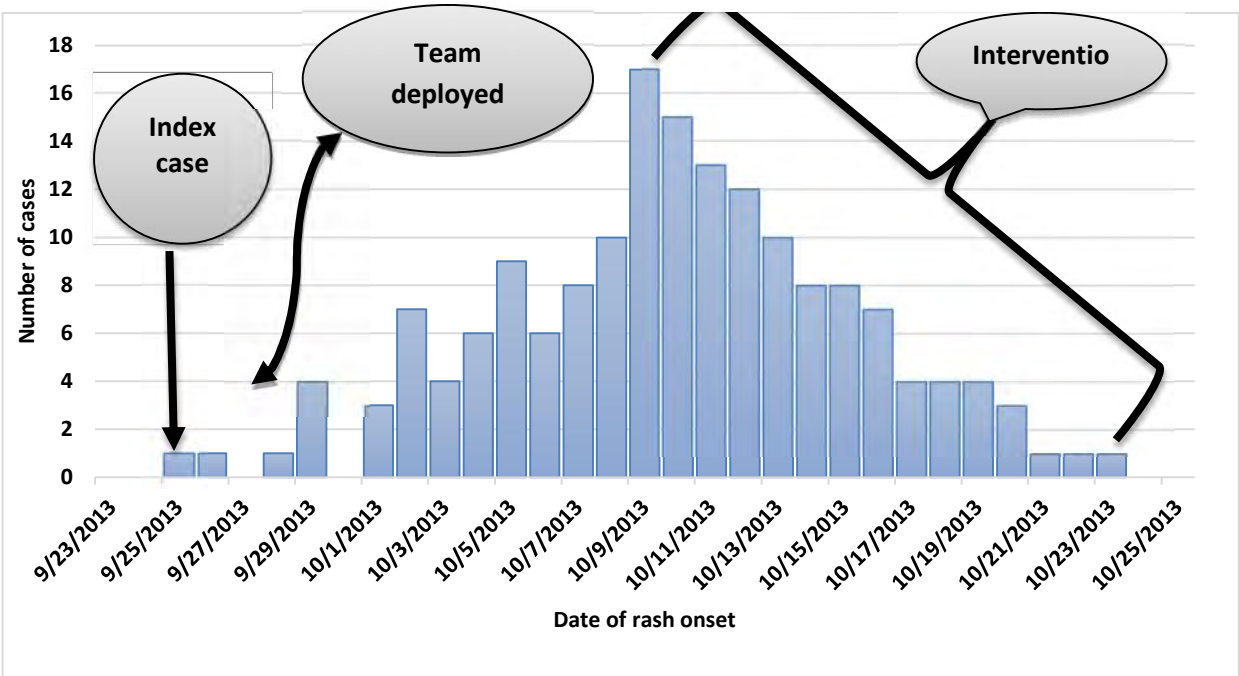

Figure 1.2.3 Number of measles case by date of rash onset, Humbo district, Welayita zone, Ethiopia, 2013

Table :1.2.1 Attack rate by age and sex Measles cases in Humbo district, Ethiopia, 2013

Variable		Frequency	Population	AR /1000	Percent (%)
Age Group	**<5**	67	18,505	3.6	33.93
	5-9	46	26,571	1.7	27.38
	10-14	37	22,538	1.6	22.02
	15+	18	34,756	0.5	10.71
Sex	**F**	87	58,481	3.9	51.78
	M	81	60,141	4.1	48.21
Total		168	148950	1.2	0.11

Table 1.2.2 Number of measles cases by affected kebeles, Humbo district, Ethiopia, 2013

Kebeles affected	Cases	Population	AR/1000	Proportion (%)
Tebela	51	7426	6.86	30.36
Fango Lome	50	4563	10.90	29.76
Abela Mareka	23	3282	7.00	13.69
Ambe shoya	20	3310	6.04	11.90
Fango Gelche	12	3784	3.20	7.14
Ella kabala	7	5676	1.23	4.16
Ampo koyshsha	5	5018	0.99	2.38

As this finding showed three cases were below nine months of age that contracted the disease from their infected sisters. Of the total cases, 51(30.36%) and 50 (61.50%) were saturated in Tebela and Fango Lome, 23(25.30%) were from Abela mareka. Attack rate was highest in Fango Lome (10.90 per 1000 population), followed by Abela mareka (7 per 1000 population), and least in Ampo Koysha (0.99 per 1000 population). The index case was seen in September 25/2013 in Tebela kebele. Peak cases were seen in November 10/2013. All four blood specimens investigated was positive for measles specific IgM and the remaining cases were epidemiologically linked.

1.2.5.2 Case control study, the median age of cases were 4.5 (ranges 5 months-24 year) and controls 6 year (6 months-18 years), from the total 40 cases enrolled under case control study 16(40%) develop diarrhea, and 12.50% experienced vomiting. Through Bivariate analyses we found that had prior vaccination history Odds Ratio (OR= 0.20 (95% Confidence interval (CI=0.09-0.47) and Knowledge of measles transmission OR = 0.13(95%CI (0.06-0.36) preventive factors but Living in a room with more than six people at (OR= 3.90(95%CI 1.5-10.55), recent travel to areas with active measles cases OR= 3.80 (95%CI 1.53 – 9.74) were risk factors. Educational status, occupation and marital status have not statistically significant associations at p- value ≤0.05.

Table: 1.2.3 crude analysis of measles cases and controls in regard to different variables, Humbo district, SNNP region, Ethiopia, 2013

variables		cases	controls	OR(95%CI)
Prior Vaccination status	Yes	11(27.50%)	51(65%)	0.20(0.09-0.47)
	No	29(72.50%)	28(35%)	
Knowledge of measles transmission	Yes	10(25%)	57(71.25%)	0.13(0.0.05-0.32)
	No	25(75%)	24(28.75%)	
Living in a room with more than six people	>6 persons	34(85%)	47(58.75%)	3.9(1.50-10.55)
	≤6 persons	6(15%)	33(41.25%)	
Recent travel to areas with active measles cases	Yes	33(82.50%)	44(55%)	3.8(1.53-9.74)
	No	7(17.50%)	36(45%)	
Educational status	Elementary and below	27(67.5%)	46(57.5%)	0.99(0.45-1.62)
	Secondary and above	13(32.5%)	22(42.5%)	
occupation	Farmer	32(80%)	42(52.5%)	3.6(0.9-9)
	Others	8(20%)	38(47.5%)	
Marital status	Single	7(15.5%)	38(47.5%)	0.21(0.3-1.8)
	Married	33(84.5%)	42(52.5%)	

Prevention and control actions taken

- Catch-up (SIA) campaigns were carried out that vaccinated all children 6 months to 14 years old, whether or not they have had measles or previous vaccinations and supplementary dose of vitamin A in Humbo as well as adjacent district
- Vaccination of measles was given for defaulters from the age of 6month - one year; cases were managed by distributing supportive treatments (Antibiotics, tetracycline ointment, oral rehydrating Salt, and Vitamin A, and anti-pyretic).
- We delivered Health Education to create awareness about measles modes of transmission, control mechanisms and to make them report cases as soon as possible to the nearby health institution or health professional.
- Schools in the highly affected area were closed and In addition to this we discussed with community leaders, health professionals and administrative office of the district how to create awareness among the community, two Nurse and HEWs made daily house to house visit to search additional cases, trace defaulters of vaccination and to see patient progress. After intervention activities were initiated the number of cases began to decline rapidly.

1.2.7 Discussion

We identified factors associated with measles outbreak in Humbo district, Wolayita zone. The finding being unvaccinated was significantly associated with measles illness, suggesting that poor immunization coverage played a crucial role in measles outbreak in Humbo district, (6), this indicated that cause of the outbreak was the presence of many unvaccinated children in the district. The OR of 4.9 showed that the unvaccinated 4.9 times more likely contracted measles than who were vaccinated. Measles immunization was significantly lower in children who had measles compared to those who didn't, this supported by a measles outbreak investigation in Herena and Dawe Serer Districts, Bale, Oromia, Ethiopia, Daba M, W Derresa, et al revealed that the similar finding that cases were high in unvaccinated and incompletely vaccinated children compare to those who were completely vaccinated. (6-7)

In this study, most of the children involved were unvaccinated under 5 children (29/40 i.e. 72.5%), more than half of measles cases in unvaccinated patients eligible for measles vaccine potentially could have been prevented if health care providers had vaccinated them at the time when they either received other antigens, on the other hand, the higher proportion of vaccinated children found in this investigation amongst suspected cases (82/168 i.e. 49%) can be explained by the inaccurate reporting and the presence of over reporting or false reporting of vaccination status reported from Woreda as well as Zonal health offices..

Living in a room with more than six people was significantly associated with higher rates of disease. The OR 3.9, 95 CI (1.50.-10.55), (7) indicated that those who were live in a house more than six, 3.9 times more likely to contract measles than who were live in less than six, therefore it has proved that, Overcrowding is one of a risk factors found that close contact with an infected person increased measles transmission since measles is a highly infectious communicable disease

1.2.8 Study Limitations

- Data is dependent on recall, Potential misclassification of vaccination status
- Incomplete data- lack of the required identification some of the cases in the line list, for instance, vaccination status, age, sex.
- Shortness time for the investigation available, because the source of this outbreak paradox, multifaceted, it needs in-depth probing

1.2.9 Conclusion

Measles outbreak in rural and urban Humbo district was due to low immunization coverage resulting in an accumulation of susceptible children within the community. some of the reasons expressed for the poor uptake included the lack of knowledge of the importance of immunization and the failure to remember to take the child for immunization, which are issues amenable to social bring about through Behavioural Change Communication (BCC) and social mobilization.

In this study, most of the children involved were unvaccinated under 5 children, more than half of measles cases in unvaccinated patients eligible for measles vaccine potentially could have been prevented if health care providers had vaccinated them at the time when they either received other antigens, on the other hand, the higher proportion of vaccinated children found in this investigation amongst suspected cases can be explained by the inaccurate reporting and the presence of over reporting of vaccination status reported from Woreda as well as Zonal health offices..

1.2.10 Recommendation

1. We recommend strengthening routine and second opportunity (catch-up and Follow-up) immunization coverage to children to improve herd immunity: Increase routine immunization coverage (>90%) in the target age group to stop transmission of measles and to achieve the targeted goal set by WHO for African region elimination of measles by 2020.
2. Supplementary immunization of children before starting in school could be effective in preventing measles outbreaks. In addition, implementation of supplementary immunization every 5–10 years in older age groups might be effective in preventing future outbreaks.
3. Improve Surveillance approach for early case detection and reporting for immediate response
4. Delivered health education to the community to create awareness regarding measles mode of transmission and control mechanisms.
5. Issues amenable to social addressed through Behavioral Change Communication (BCC) and social mobilization

1.2.11 Acknowledgements

We would like to thank Mr. Jemal Hassen for the facilitation of the measles outbreak investigation. Dr Merawi, for devoting comment, correcting and shaping the investigation report. Our sincere thanks to the entire health personnel of the Welayita zone, Humbo woreda, HEW of Tebela health post health department staffs and the community for actively participating in the implementation of the strategies defined to control the measles outbreak and record keeping. The same goes to the entire regional EPI team for their relentless supportive supervision during the outbreak.

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Annex 2: Questions for Investigation of measles Outbreak in Welayita zone

1. Demographic Information

- Id number --- Cases Status—A/ Cases B/ Control Date of birth----------Age--------
- Name of the child ---------- Sex A/ Male B/ Female
- Date of interview----------
- Occupation ----------Level of Education ----------
- A/ Zone ----------B/Woreda----------C/Kebele ----------
- Religion A/Orthodox B/Muslim C/ Protestant D/Catholic E/ Others/ Specify/
- Ethnicity ---------- Economical Status/of family----------
- Number of persons in the HH---------- Marital status----------House size--------

2. Risk Factors and Clinical Features

21. Did the child has illness of measles A/ yes B/ No
22. If yes, did you take him/her to the health institution? A/ yes B/ No
23. If yes, did he/she admitted A/yes B/no
24. If yes, date of Admission----------Day of stay----------
25. Duration of illness before visiting the health facility ----------in days/hours--------
26. Did the child treated with traditional medicine before health facility? A/ yes B/ No
27. What symptoms does he/she have?
    - Fever A/ yes B/ no Rash A/ yes B/ no
    - Runny nose A/ yes B/ no Red eyes A/ yes B/ no
    - Cough A/ yes B/ no loss of appetite A/ yes B/ no
28. If he/she has a rash, date of rash onset ----------
29. Did the child have contact with someone having rash within 1 wk back? A/ yes B/ no
30. Did the child develop complication? A/ Yes B/ No
31. If yes, is it? A/ diarrhea B/ pneumonia C/ otitis media D/ others/specify/
32. Did the child receive measles vaccine? A/ Yes B/No
33. **If yes, at what age? ----------**
34. If yes, Check card---------- see if A/ by card B/by History
35. If yes, how many times /for measles only? ----------
36. date of last measles vaccination----------
37. Are there other persons with similar symptoms within the household? A/ Yes B/ No
38. Are there other persons with similar symptoms in the neighborhood/? A/ Yes B/ No
39. Have you measles infection in your life? A. Yes B. No
40. Have you any contact with suspected/confirmed measles case? Ayes B. No

5. Nutritional status

- Did the child receive Vit A at 6 month? A/ Yes B/ No
- Is the child on OTP A/ Yes B/ No
- Is there bilateral edema? A/ Yes B/ No

6. Knowledge

6. For what reason do somebody vaccinate her/his child with measles vaccine?
   B. To prevent measles disease B. To prevent hunger C. I don't know
7. What is the right age of vaccinating the child with measles vaccine in our country?
   B. 9months B. 6months C. 3months D. other E. I don't know
8. By what mechanism does the healthy child get measles disease from the sick child?
   A/ Droplet B/ body contact C/ Food D/ Water E/Other/specify/

9. Attitude

5. Do you think vaccination can prevent measles disease? A/ Yes B/No
6. Do you think medical treatment helps measles patient? A/ Yes B/No
7. Do you believe that the child with rash should get medication? A/ Yes B/No
8. Do you believe that feeding and extra fluid is important for the child with measles? A/ Yes B/No

10. Practical

5. What can somebody do if the child gets measles?
   B. Taking to HF B. taking to local healer C. keeping in home D. I don't know
6. What care can be given to measles patient at home?
   B. Giving food/fluids B. giving local medication C. leaving alone D. I don't know
7. What can you do to prevent your family from measles disease?
   B. Vaccinating B. keeping at home C. giving local medication D.I don't know
8. Can you isolate the child with measles rash from other children? A/ Yes B/ No

Chapter – II Surveillance Data Analysis Report

2.1 Malaria Surveillance Data analysis in South Nation and Nationality people's Region, Ethiopia, 2013

Abstract

Background: Ongoing malaria surveillance data analysis is useful for assessing incidence and monitoring disease trends over time and evaluating the effectiveness of disease control programs. This study examined the magnitude and trends of malaria and communicated the findings for a better intervention in the region.

Methods: A descriptive study was employed for analysis of extract data on malaria indicators from the Integrated Disease Surveillance and Response System database for the years 2005-2010 and 2011-2013. All the relevant data were collected, cleaned and entered into a computer using Microsoft excel and Epi info version 7.1. The surveillance data were analyzed to show incidence trends for malaria indicators, reporting completeness, and.variation in risk by reporting zones.

Result: The average estimated annual incidence of reported total malaria for the calendar years (2005-2008) has declined from 37.23 to 29.25 per 1000 persons , while (2010- 2012) increased from 75.13 to 86.44 per 1000 persons, the confirmed malaria cases has increased from 9.39 to 24.40 per 1000 person with no clear decline in out-patient cases over the time period. However, the reported malaria in-patient admissions (averaging 29.48 to 12.45 per 1000) and deaths (31.30 to 8.10 per 1000 per year) showing reduction between 2005 and 2013. Out of 18 reporting zones, 61 %(11/18) had average annual estimated incidence of confirmed malaria 80-150 per 1,000 persons. The reporting of cases was initially monthly and starting from 2011 it was weekly though irregularly reporting and the reporting was over 80% in 2013.

Conclusion and recommendation: Although the malaria Surveillance system and Response activities were not sufficient in reducing the outpatient cases during the specified study period, it had brought considerable impact on malaria in-patient cases and mortality because of the scaled up of interventions and therefore, it is necessary to reinforce the malaria surveillance system and scale up intervention**.**

Key words: cross sectional, descriptive, malaria, irregular reporting, south Ethiopia

2.1.1. INTRODUCTION

As efforts to control malaria are expanded across the world, the burden of malaria in countries sub-Saharan Africa has declined with scaling up of prevention, diagnosis and treatment, (1-3). Ongoing malaria surveillance data analysis is useful for assessing incidence and monitoring disease trends over time and evaluating the effectiveness of disease control programs (2).

Approximately 75% of Ethiopia's landmass is malaria-endemic; areas of disease are primarily associated with altitude and rainfall (2-3). The peak malaria illness incidence usually follows the main peak rainfall season (June and 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 clearly defined rainfall season (3). Additionally, focal and multifocal epidemics reported between 2003 and 2005 (4). In 2010, the Federal Ministry of Health (FMOH) reported 4,068,768 clinical and confirmed malaria cases to World Health Organization (WHO) as recorded in the 2011 World Malaria Report (3- 4). Since 2005 the Ethiopian National Malaria Control Program has considerably scaled-up (6-9), it had brought considerable impact on malaria in-patient cases and mortality, but Malaria outpatient cases remains continuous in SNNP of Ethiopia.

Malaria is a major public health problem in the SNNP region, and has been reported as one of the leading causes of morbidity and mortality. P.falciparum and P.vivax are the two dominant species causing malaria in SNNPR, in respective order, with relative frequencies of about 60.5% and 39.5%, respectively. P/falciparum is the dominant parasite species in malaria epidemic situations, and this species causes severe and complicated manifestation and almost all malarial death. (3-4).

SNNPR implemented Integrated Disease Surveillance (IDSR) reporting from all hospitals and health centers using a one page form and lately health posts were formally included in the initial phase. Most diseases were reported on the monthly form, after establishment of PHEM became in weekly manner but certain high priority indicators were to be reported immediately. While IDSR data exist on paper at the district level, they were available in electronic form at zone and Regional Health Bureau.) (5). The surveillance data collected through Public Health Emergency Management was analyzed and interpreted to see the trends of malaria morbidity and mortality in the region.

In order to monitor the trends of malaria morbidity and mortality, an unusual increases and decreases of the disease and evaluating the effectiveness of malaria prevention and control programs and policies in the region (7) Ongoing analysis of the surveillance data collected from the health facilities should be analyzed and interpreted accordingly. This information is also needed to determine the most appropriate and efficient allocation of public health resources and personnel (9), in this assessment, the data will be analyzed to show incidence trends for malaria indicators, reporting completeness, and.variation in risk by reporting zones

2.1.1.2. Back ground of Southern Nation and Nationalities people's Region (SNNP)

SNNP is located in the Southern and South western part of Ethiopia, it roughly lies between 4^0.43-8^0.58 North latitude and 34^0.88-14 East longitude. It is bordered by Kenya in the South, South Sudan in South west, Gambella region in the North West and Oromia region in North West .The total area of the region estimated to be 110,931.9 square kms and inhabited by a population size of about 17,723,069 (projected from 2007 census report). The average population density of the region 142 person per square kms. The region comprises 14 zones, one city administration and 5 special districts. Less than 10% of the population resides in urban areas. Total related to the health facilities there are 19 Hospitals, 638 health center and 3777, health post are providing health care services. The potential health service coverage for the region 89%.

Figure 2.1.1 Map of South southern Nation and Nationalities people's Region, 2013

2.1.1.3. Rationale of the study

SNNPR, as one of the region with high burden of malaria experienced and remain as the major diseases of burden with a high rate of outpatient consultation in 2005EFY [2012/13] of the region.

In relation to this, Malaria is one of the epidemic prone diseases tracked by PHEM surveillance system. Hence, this surveillance data analysis will carry out to review the epidemiology of Malaria in SNNPR from 2005-2013 in order to see the trend and seasonality, to assess the burden and distribution, and to make possible recommendation in an attempt to improve the future interventions against the disease.

2.1.2 Objectives

2.1.2.1 General objectives: To know the malaria morbidity and mortality trend of the SNNPR from 2005-2013 G.C

2.1.2.2 Specific objectives:

- To analyze and interpret the surveillance data in terms of time, place (geographical distribution) and person.
- To identify the magnitude of malaria burden in the region.
- To identify the dominant species distribution in the region.
- To provide recommendation based on the findings.

2.1.3 Materials and Method

2.1.3.1 Study area and population: The South and southern Nations, Nationalities and People's Region (SNNPR) is located in the Southern and South-Western part of Ethiopia. It is bordered with Kenya in South, the Sudan in South West, Gambella region in North West and surrounded by Oromia region in North West, North and East directions. The population size about 17,353,928 in 2012/13 G.C, 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.

2.1.3.2 Study design: A descriptive cross sectional design was employed to extract data on malaria indicators from the Integrated Disease Surveillance and Response System database of SNNPR for the years 2005-2009 and 2010-2013. The IDSR reporting form includes malaria related indicators total malaria cases (clinical and confirmed) for out-patients, in-patients and deaths; confirmed out-patient malaria cases by species; and out-patients, in-patients and deaths**.** Regions, Zones and Populations of IDSR reporting units, units and population denominators. While timeliness of reports is vital for detecting and responding to epidemics, it is not evaluated here since it was difficult and cumbersome, we focus on completeness of reporting to observe relative incidence between zones as well as trends over a nine-year period

2.1.3.3 Study period: The study was conducted from Nov 15 to Jan 31st /2014, the period in which the peak of malaria illness incidence usually follows the main peak rainfall season (June to September) each year.

2.1.3.4 Data collection and analysis procedure: nine year Malaria secondary data (2005-2013) was abstracted from SNNPR PHEM surveillance data base, furthermore data cleaning will be done together with PHEM data officers and finally analysis will be carried out using Microsoft Office Excel 2007 and Epi-info version 7.1.

2.1.3.5 Data dissimination: Witten report(hard and soft copies) was prepared and shared to addis ababa university schoolof public health, Regional Health Bureau, and Ethiopia Field Epidemiology Training program resident advisor and coordinator.

2.1.3.6 Expected outcome: the number of case and death will be analyzed descriptively from 2005-2013, disease distribution will be analyzed by region and zones. Conclusion will be made and possible recommendation will be suggested. Finding will be communicated to the responsible body for appropriate action.

2.1.4 Results

2.1.4.1 Regional annual Trends of malaria morbidity and mortality

In the region the average estimated annual incidence of reported total malaria in the overall population was 48.85 per 1000 persons and of confirmed malaria was 16.06 per 1,000 per year over the nine calendar years 2005 to 2013.

The analysis of the annual incidence over the years suggested, the average estimated annual incidence of reported total malaria for the calendar years (2005-2008) has declined from 37.23 to 29.15.30 per 1000 persons, while (2010- 2012) increased, 75.13 to 86.44 per 1000 persons (Table 1)

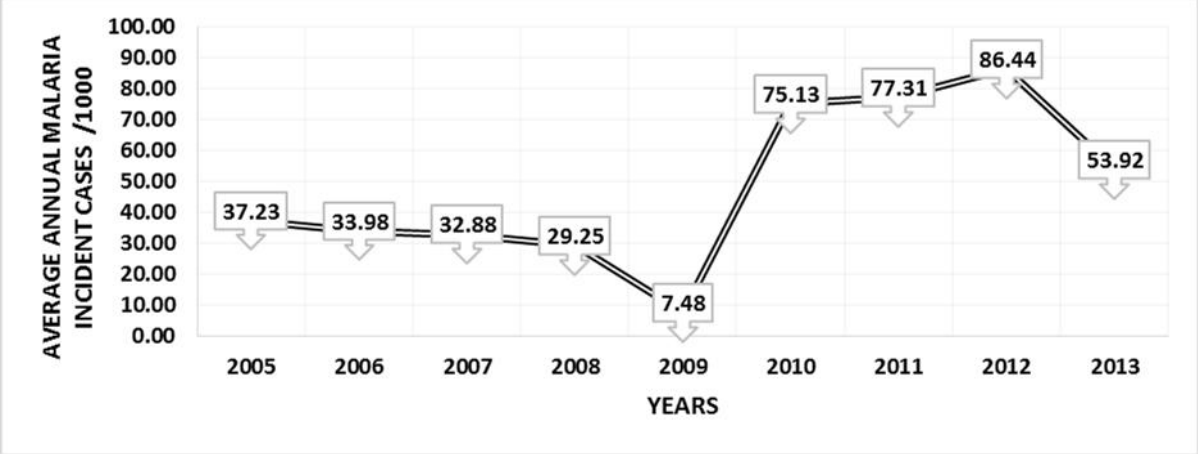

Figure 2.1.2 Average annual incident of clinical plus confirmed malaria cases SNNPR, 2005-2013

The confirmed malaria cases has dropped from 2005 to 2008 12.41 to 9.75 per 1000 person, and 2010 to 2013, increased from 24.04 to 28.81 with no clear decline in out-patient cases over the time period. (Table 2).

Out of 18 reporting zones, 61 %(11/18) had average annual estimated incidence of confirmed malaria 80-150 per 1,000 persons, and the rest were consistently below reported cases per 1,000 persons per year. The reporting of cases was initially monthly and starting from 2011 it was weekly though irregularly reporting and the reporting was over 80% in 2013.

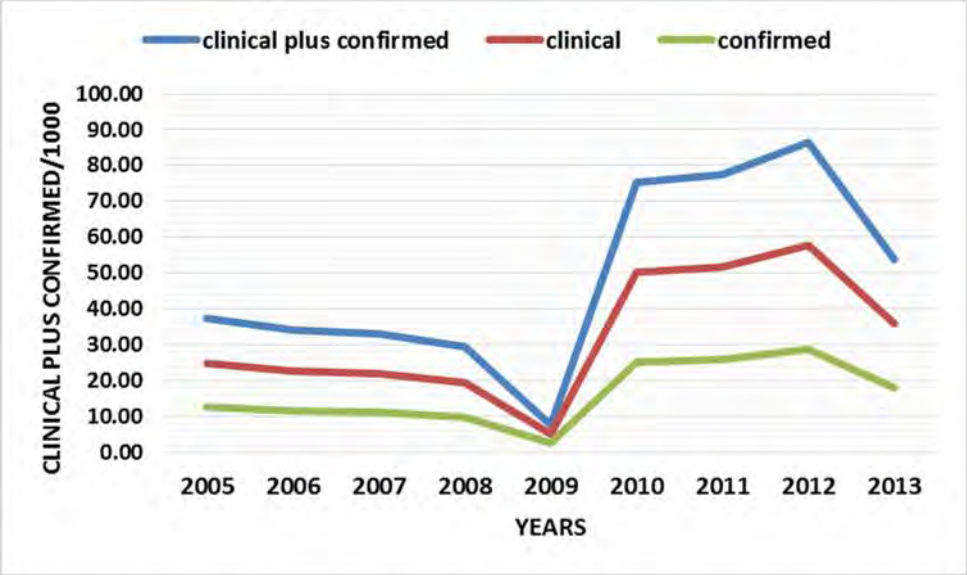

Figure 2.1.3 Average annual malaria clinical + confirmed/10000, SNNPR, Ethiopa.2005-2013

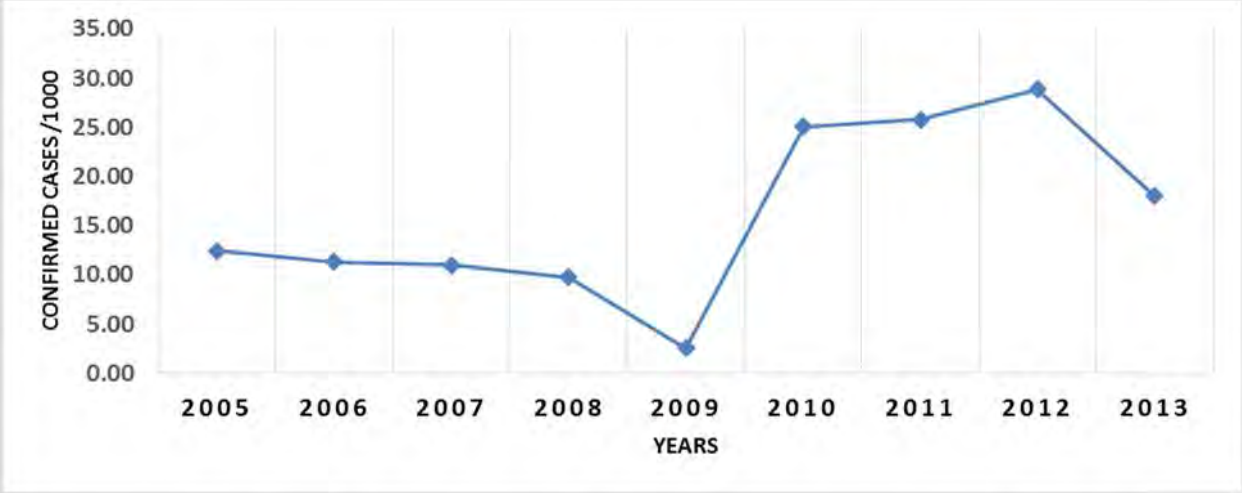

Figure: 2.1.6 Average malaria confirmed cases/10000, SNNPR, 2005-2013

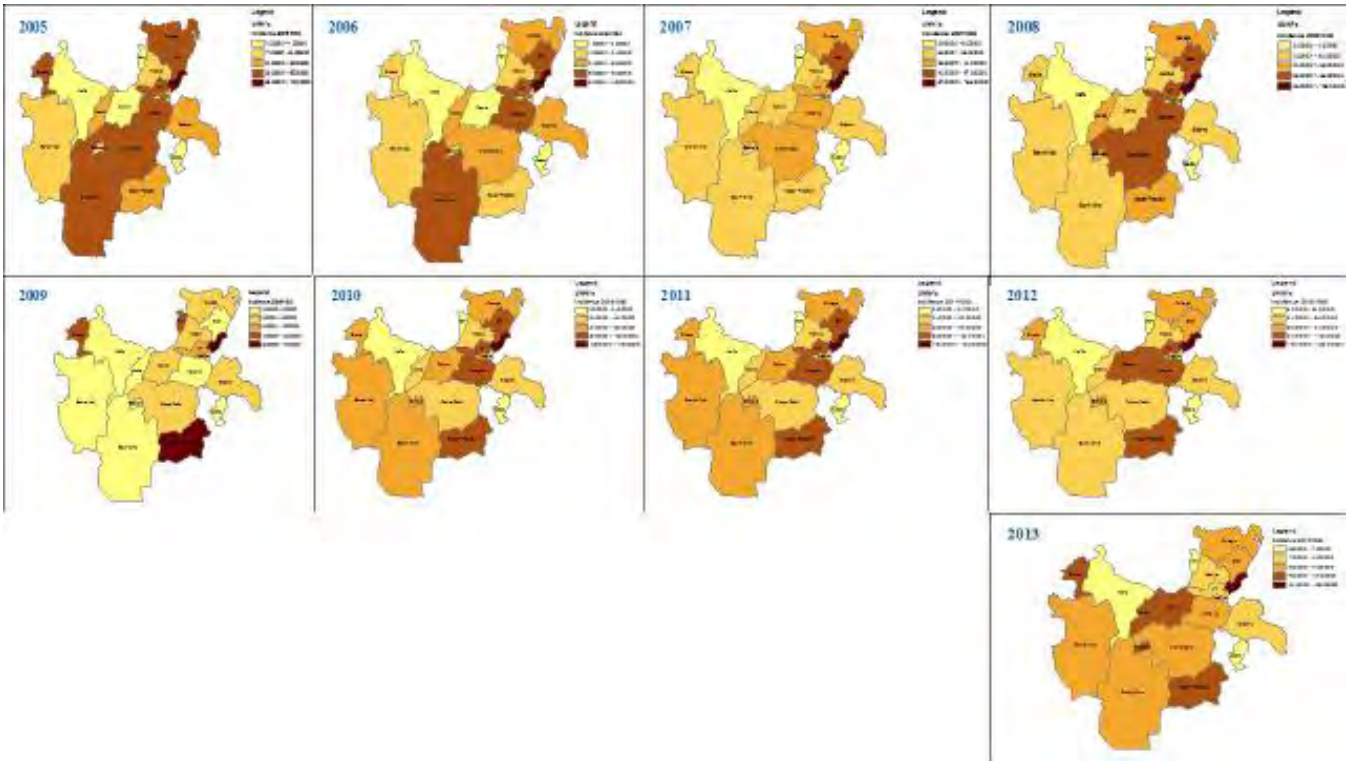

Figure 2.1.3 Distribution of Average incidence/1000 of malaria by zone, 2005-2013

The distribution of the incidence of malaria in the zones indicated that Halaba was the highly affected special woreda with average annual incidence 65-120/1000 per persons. Followed by Wolayita, Gamogofa, Segen people (Figure: 2.1.3).

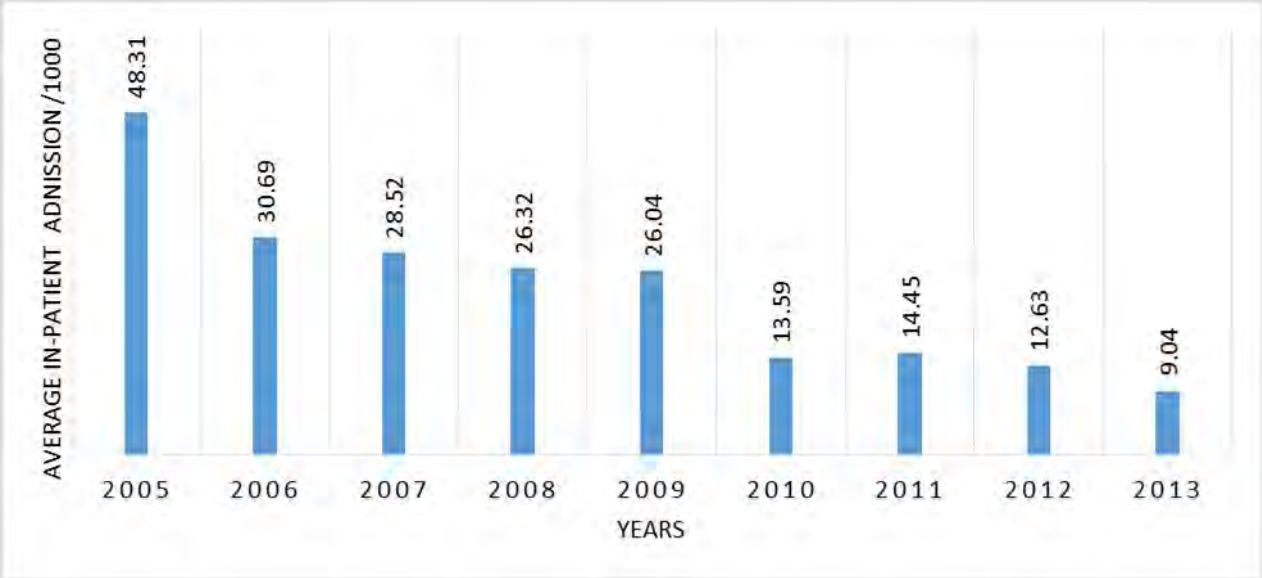

Figure 2.1.4 Total annual malaria cases admission/1000, SNNPR, 2005-2013

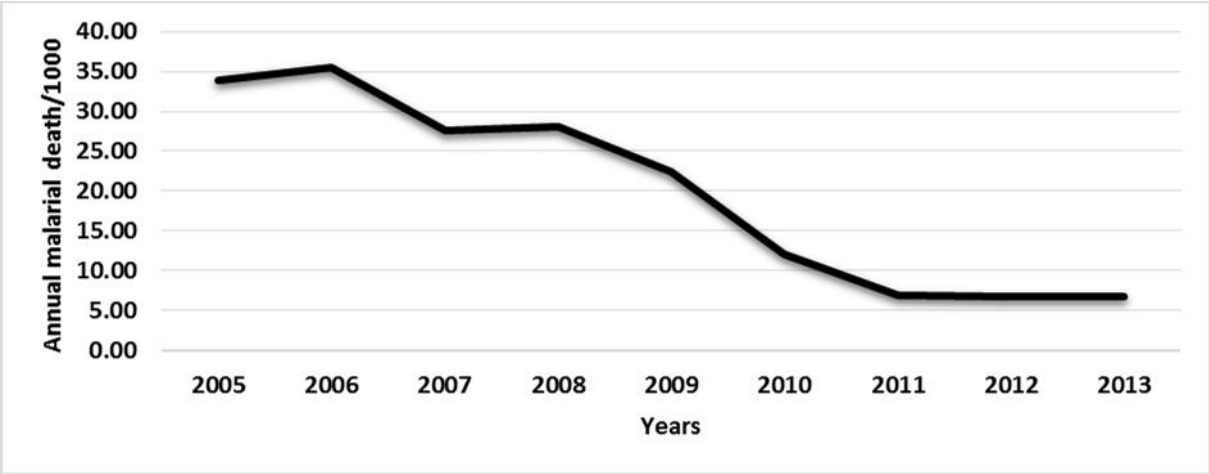

Figure: 2.1.5 Average annual malarial death rate/100000, SNNPR, Ethiopia, 2005-2013

The reported malaria in-patient admissions (averaging 29.48 to 12.45 per 1000) and deaths (6 to 2 per 1000 per year) showing reduction between 2005 and 2013. (Table 2.1.4 and 2.1.5)

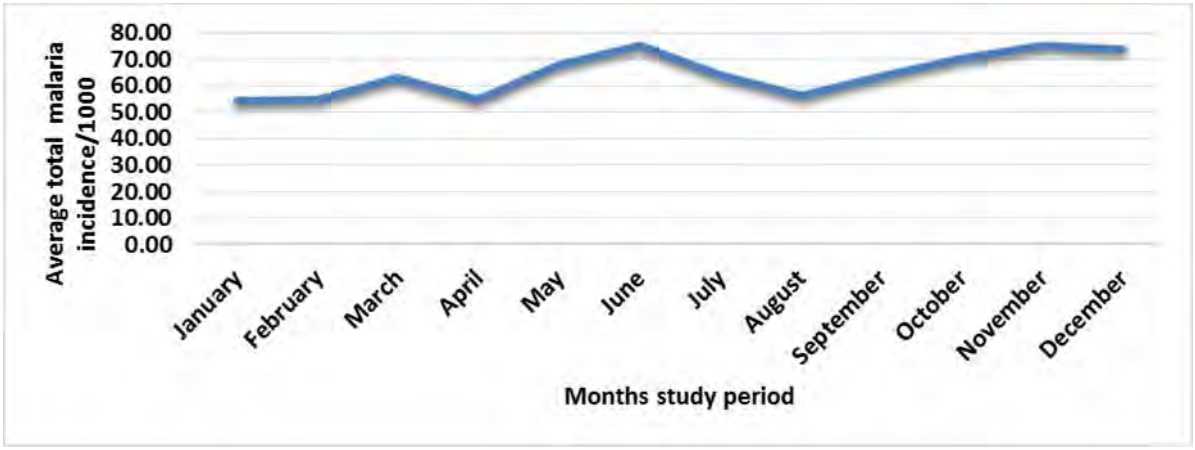

Figure 2.1.8 Malaria cases pattern by months, SNNPR, 2005-2013

As Figure: 2.1.8 depicts malaria incidence increased from 63.48 to 73.83/1000 persons from September-December, this indicated, the peak of malaria illness incidence usually follows the main peak rainfall season (June to September), major planting and harvesting season.

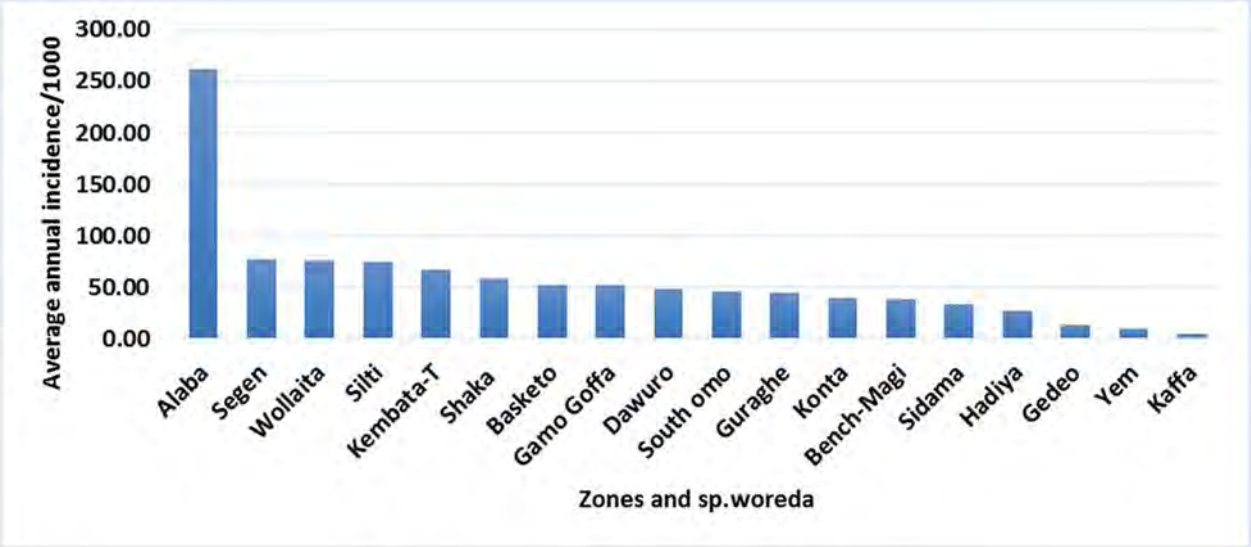

Figure 2.1.9 Average annual incidence/1000, Zones/Sp woreda, SNNPR/ 2005-2013

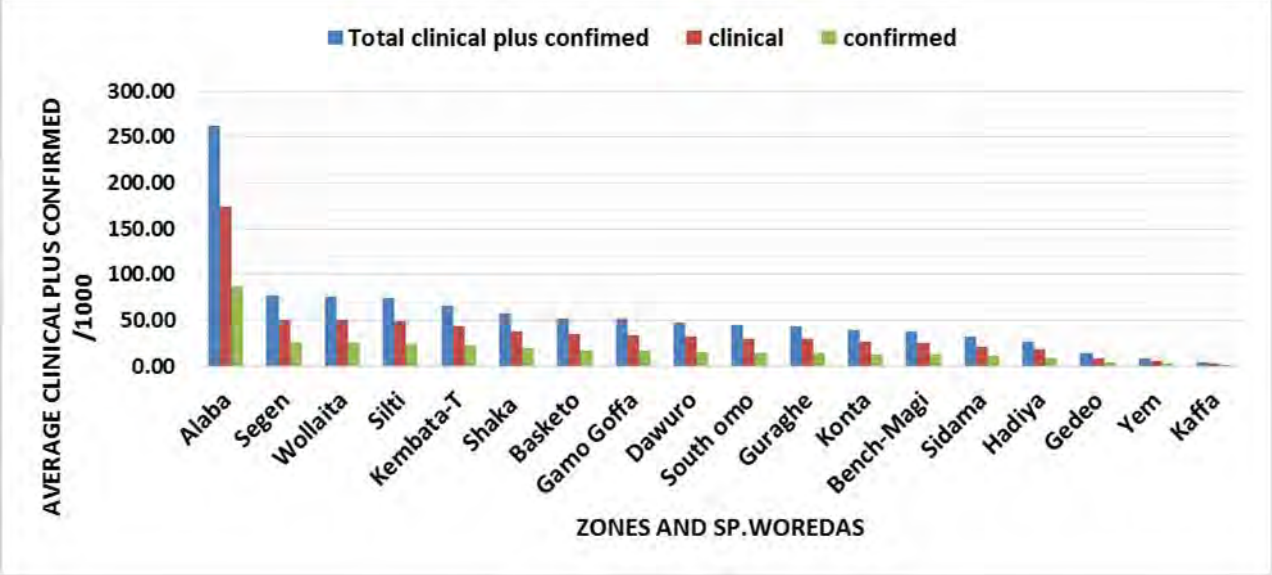

Figure 2.1.9 Distribution of malaria clinical- confirmed cases by Zone, SNNPR, 2013

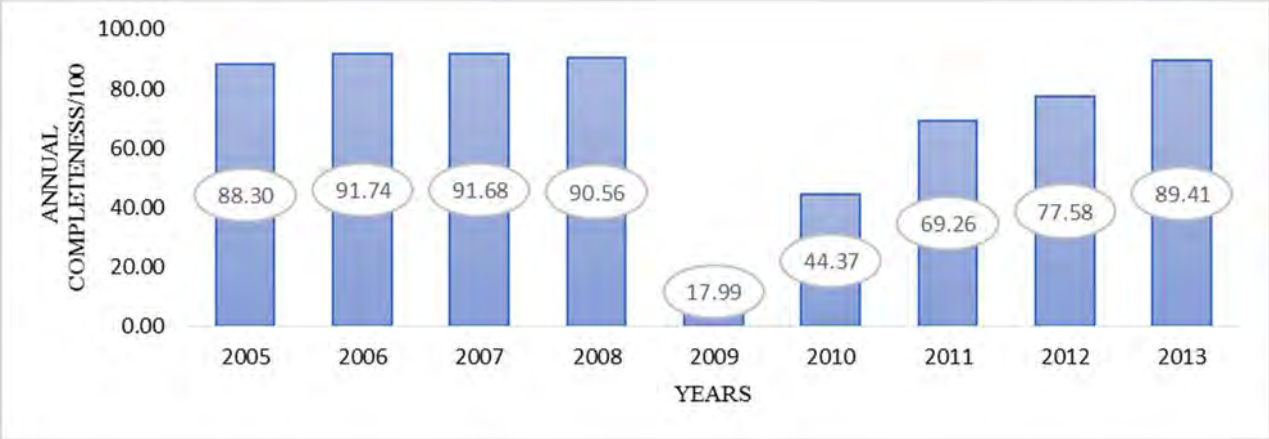

Figure 2.1.10 Reporting completeness by year, SNNPR, 2013

Completeness calculated according to the period, from 2005-2008, we used monthly health facilities expected and reported, and from 2010 -2013, weekly reported utilized to calculate reporting completeness. As the completeness before 2008 was above the normal standard, but from 2010- 2013, majority of the reporting completeness below the standard

2.1.4 Discussion

Since 2005, Ethiopia has scaled up one of the largest and most ambitious malaria control programs in Africa. This have enabled an unprecedented scale-up of malaria control interventions: prompt and effective treatment, case management through rolling-out of the highly efficacious anti-malarial drugs (ACTs), selective vector control with special emphasis on increasing coverage and use of ITNs and currently shifting from the SUFI phase to consolidating and refining malaria reduction intervention has brought significant impact on malaria prevention and control throughout the countries.(1,6-7)

The finding of this analysis showed that the regional average annual incidence of reported total malaria over the nine calendar years 2005 to 2013, from the overall population was 48.85/1000, and of confirmed malaria was 16.06 per 1000. Reported malaria in-patient admissions and deaths averaged 12.06/1000 and 9.00 per 100,000 per year respectively. The total number of malaria cases were about three times higher than confirmed cases. Except malaria in-patient admissions and deaths, there was no clear declining trend in the number of malaria out-patients. Plasmodium falciparum the dominant hemoparasite species among confirmed malaria cases. (4)

As of the calendar years 2005-2008/2009, the annual incidence of total malaria report dropped from 37.23/1000 to 29.25/1000 and reported malaria in-patient admissions and deaths dropped from 12.41/1000 to 9.75 per 1,000 per year and 164/100,000 to 58/100,000 respectively over the period, perhaps as a result of scaled up of interventions in 2007, although little drop in out-patient case numbers was observed. But confirmed malaria cases increased 34/100 to 44/100, (5-6), this might be associated with many new reporting units were added in 2007 and a period of expansion in access to care as well as variation in diagnostic capacity.

Since 2010-2013, a new weekly system has been instituted, in which the malaria indicators have been condensed, all health facilities down to health posts are now required to report. The number of persons tested for malaria confirmation (by slide or rapid test) has been included. From 2010-2013, the annual incidence of reported total malaria increased from 25.04/1000 to 28.36/1000, followed by declined to 17.37/1000, this perhaps related with the unstable nature of malaria transmission in SNNPR () and the large year-to year fluctuations in health facility reporting completeness. The reported malaria in-patient admissions and deaths averaged dropped 29.48 to

12.48 and 6 to 2 per 100,000 per year respectively, this is due to improved health system delivery, better malaria prevention (LLIN and IRS coverage) and use of effective drugs. Given that Ethiopia is considering malaria elimination (9, 10).

This study considered the completeness of reporting of malaria indicators for the IDSR system in SNNPR between 2005 and 2009, and concluded that over 80% it was of sufficient quality to provide estimates of malaria incidence by reporting zone and month until the end of 2008. The results suggest marked decline in numbers of malaria and malaria-related in-patients and deaths over the period, perhaps as a result of scale up of interventions in 2007, although little drop in out-patient case numbers were observed. There was a progressive drop off in reporting starting in January 2009 during Ministry of Health reorganization and planning for conversion to a weekly system. From 2010-2013, the main problem was irregular weekly report and a lower reporting completeness, the late in detection and reporting resulted in an increased malaria case in the region. (7, 8)

The data suggest that some areas of the zones such as Halaba, Gamogofa, Welayita, Sidama and Guraghe and Kenbata Tembaro had average annual estimated incidence of confirmed malaria above 20 per 1,000 persons, this may be due to the higher number of reporting sites, arid areas and presence of irrigation projects may be influencing malaria transmission where incidence is higher than expected and the rest of zones were consistently below five reported cases per 1,000 persons per year, In general, the use of incidence when comparing between zones will improve the ability of Regional Health Bureaus and the zone to plan resources appropriately, improve targeting of malaria control efforts, and allow better evaluation of the programme (9).

2.1.6 Conclusions

The Integrated Disease Surveillance and Response System functioned well over the time period from 2005 to the end of 2008. The data suggested that the scale up of interventions has had considerable impact on malaria in-patient cases and mortality, as reported from health centers and hospitals. While in 2009, there was a progressive drop off in reporting starting in January 2009 during Ministry of Health reorganization and planning for conversion to a weekly system. (4, 5).

From the time period 2010-2013, the annual incidence of reported total malaria increased from 27.50/1000 to 40.36/1000, followed by decreasing to 25.22/1000, this may be related with the unstable nature of malaria transmission in SNNPR, and the large year-to year fluctuations in health facility reporting and completeness. The reported malaria in-patient admissions and deaths averaged dropped 13.59 to 9.04 and 16.45 to 6.02 per 100,000 per year respectively, this is due to improved health system delivery, better malaria prevention (LLIN and IRS coverage) and use of effective drugs. Given that Ethiopia is considering malaria elimination

Although the Integrated Disease Surveillance and Response Systems were not effective in reducing the outpatient cases during the specified study period, it had brought considerable impact on malaria in-patient cases and mortality because of the scale up of interventions and therefore, it is necessary to reinforce the scale up intervention. (6, 7)

2.1.7 Limitations

- There was no data segregated by sex and the age was limited only to two categories.
- The data were not completed.
- The variables were not the same before and after 2011. The number of variables which can give more information about the diseases was reduced or modified since 2008

2.1.8 Recommendations

- Close follow up and technical assistance is needed when no reports are coming from the region.
- Having complete report helps the analysis and interpretation to be more meaningful and acceptable.
- The recent reporting format lacks some important variables such as different age category (other than having two age groups) which helps to allocate logistics and supplies.
- Sustaining the malaria interventions so as to keeping the current achievements and roll back the disease.
- Mobilize resources to strengthen the malaria control programme, particularly in the geographical areas of highest incidence

2.1.9. Acknowledgement

I would like to acknowledge EHNRI and the staffs (Abiot, Nurayine) for their dedicated support in providing me this valuable data that had helped me in easily entering the data without suffering a lot. Next I would like to give many thanks for my mentor Dr Jemal Haider for his constructive comments.

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Chapter – III Evaluation of Public Health Surveillance System

3.1. Evaluation of Public Health Surveillance System- Gamo Gofa zone, South Southern Nation and Nationalities, Ethiopia, 2013

Executive summary

Public health surveillance is an ongoing systematic collection analysis, interpretation and dissemination of data regarding a health related event for use in public health action to reduce morbidity and mortality and to improve health, yet people in Gamogofa zone have experienced a heavy burden, growing prevalence and more frequent epidemic of malaria and measles, moreover, SSE never been conducted, therefore the aim of this study is to assess the performance of core activities and attributes of surveillance system of malaria, Measles in Gamogofa zone, December, 2013.

Methods A cross-sectional descriptive study was conducted from Sept 15–25, 2013 in Gamogofa zone, Southern Nation and Nationality People (SNNP) Regional State. A total of 9 study sites were included in the study, (Zonal Health Department, 2 District Health Offices, 2 Health Centers and 2 Health Posts). Selection of the Zone and Woreda Health Offices was on convenience whereas Health Centers and Health Posts were selected by Simple Random Sampling (SRS) method. Two priority diseases (malaria and measles) were used as a proxy for the evaluation of the surveillance system.

Result The completeness of the data from September to October was 57.68% and the timeliness was 46% at zonal level in the same period. The timeliness was difficult to know at health facility level due to absence of time of report. All the respondents were accepted and engaged in the surveillance system in their particular area. Confirmation of immediately reportable diseases took long time almost greater than 15 days for samples sent to the national laboratory at Ethiopian Health and Nutrition Research Institute (EHNRI). Written epidemic preparedness and response plan was seen only at zonal level. Clinical register and reporting format were seen in all of Health Posts visited.

The overall structure of the surveillance data flow from lower to higher was well organized. Absence of timely analysis and utilization of data made the existing surveillance system weak. Therefore, it is necessary to strengthen the surveillance system by capacitating health workers at all levels to analyze and utilize available data.

3.1.1 Introduction

Public Health Surveillance System

In many communities especially developing countries infectious diseases continue to be substantial causes of mortality, morbidity, and rising health-care costs, and must be carefully monitored and controlled (1). In Ethiopia many studies and reports indicated that communicable diseases account for more than 85% of the diseases seen in the health institutions. Over 13 million people die each year from infectious and parasitic diseases (1)

There is a growing international awareness that coping with infectious diseases threat relies on effective and efficient epidemiological surveillance and response system that promote better coordination and integration of surveillance function. Epidemiological surveillance provides data about incidence of disease in the community; that can help raise or lower the threshold of clinical suspicion for a particular infectious disease, encouraging early detection and appropriate treatment. (4-5)

Ethiopia carried out different strategies to build functional and effective surveillance system. However, surveillance data for communicable diseases are neither reported nor analyzed on time (6). As a result, the opportunity to take action with an appropriate public health response and save lives is insignificant. However, in cases where adequate information was collected; it is often not available for use at the local level (6)By recognizing this, the initiative to strengthen the disease surveillance system that promotes the integration of surveillance activities in Ethiopia was started in 1996. In 1998, Ethiopia along with other member nations at the Regional committee meeting in Harare, endorsed the Integrated Disease Surveillance and Response strategy as a means of strengthening communicable disease surveillance and response with a view to making it more sensitive at all level (4-6)

Public health surveillance is an ongoing systematic collection analysis, interpretation and dissemination of data regarding a health related event for use in public health action to reduce morbidity and mortality and to improve health (4-6). This will be effective through meticulous monitoring of trends of disease burdens and guiding immediate action to be taken, the health policy, planning, evaluation of health programs, formulating research hypotheses and so on.

A functional disease surveillance system is essential for defining problems and taking action. Proper understanding and use of this essential epidemiological tool (public health surveillance) helps health workers at woredas and health units to set priorities, plan interventions, mobilize and allocate resources, detect epidemics early, initiate prompt response to epidemics, and evaluate and monitor health interventions.

Public health surveillance activities are generally authorized by legislators and carried out by public health officials. Public health surveillance systems have been developed to address a range of public health needs. In addition, public health information systems have been defined to include a variety of data sources essential to public health action and are often used for surveillance (6-7). The important surveillance levels are central, intermediate (province /region, district), peripheral (sub-district, health facility) and community level. Other stakeholders and implementers include the disease-specific programs, public health laboratories, and public health training institutions. (2-7)

The roles and responsibilities of the implementers and stakeholders, and how they relate to each Other should be clearly articulated. The flow of surveillance data through the system, and the dissemination and utilization of information needs to be clear and known to implementers and stakeholders, and the mechanism for response should be well coordinated across the different levels of surveillance. (4-6) It is clear that surveillance could not be carried out for all diseases and condition because it is too expensive for effective and useful surveillance in view of the limited human and financial resources; therefore, priority should be given to those diseases that are of interest at national and international concern and diseases on eradication and elimination programs for surveillance activities. (5-8)

Currently the FMoH/ PHEM of Ethiopia identified 20 top priority diseases which are epidemic prone, of international concern and diseases on eradication and elimination programs for surveillance activities (4) , which are included in the IDSR system. The 20 priority diseases are further classified into ‘immediately’ or ‘weekly’ reportable diseases. Some of the priority diseases, such as avian influenza, pandemic influenza A, cholera, measles, meningitis and relapsing fever are likely to spread quickly and to affect a large number of people.

Malaria and measles are of the 20 priority diseases reported as weekly and immediately respectively (5-8). They are significant disease burdens to the public. Diseases like malaria is one of the ten top diseases throughout the zones for more than a decade. In 2005 EFY, 1,639,518 suspected malaria cases were examined by RDT or Microscopy, and 906,642 were positive with positivity rate of 55.3%. In SNNPR Region. 353,825(39.1%) was found to be P.vivax and 552,817(60.9%) was P.falciparum. In the same year Gamogofa zone reported 128,173 clinical plus confirmed of this 90,630 confirmed, 1327 inpatient admission and 12 deaths.

Measles epidemic is becoming more frequent and dispersed to different corners of the Woredas and Kebeles. In 2005 EFY, 2407 suspected measles cases with no death were reported from three of the 15 districts throughout the zone (7). A total of 533 suspected cases sent to central laboratory, 47(41.6%) measles IgM positive and 37(59.7%) positive for rubella. Proportion of woredas reported at least one suspected measles cases was 14/17 (82%). (Report from central laboratories 2013).

The main purpose of surveillance of these diseases are to monitor the trend against the Region conventional threshold limits, as early warning and early response system, and pick any deviation from the limit at the earliest point in time for prompt response. Furthermore as early warning system, it guides risk mapping and preparedness; and prevention and risk aversion actions like immunization, vector control and so on. For these purposes, each of these diseases has case definition(s) and integrated diseases reporting formats defined by the ministry of health and the WHO; and reporting is institutionalized into the health facilities and health offices. (7-9)

The data and information flows routinely from the peripheral (community) up to the higher and central level FMOH/EHNRI. This starts from health post (community) to health facilities then to woreda health office and followed by Zonal health department; to Regional health bureau PHEM core process, sends the compiled data and information to the EHNRI/PHEM.

Diagram illustrating the formal flow surveillance data and information throughout a health system is shown in the figure (1)

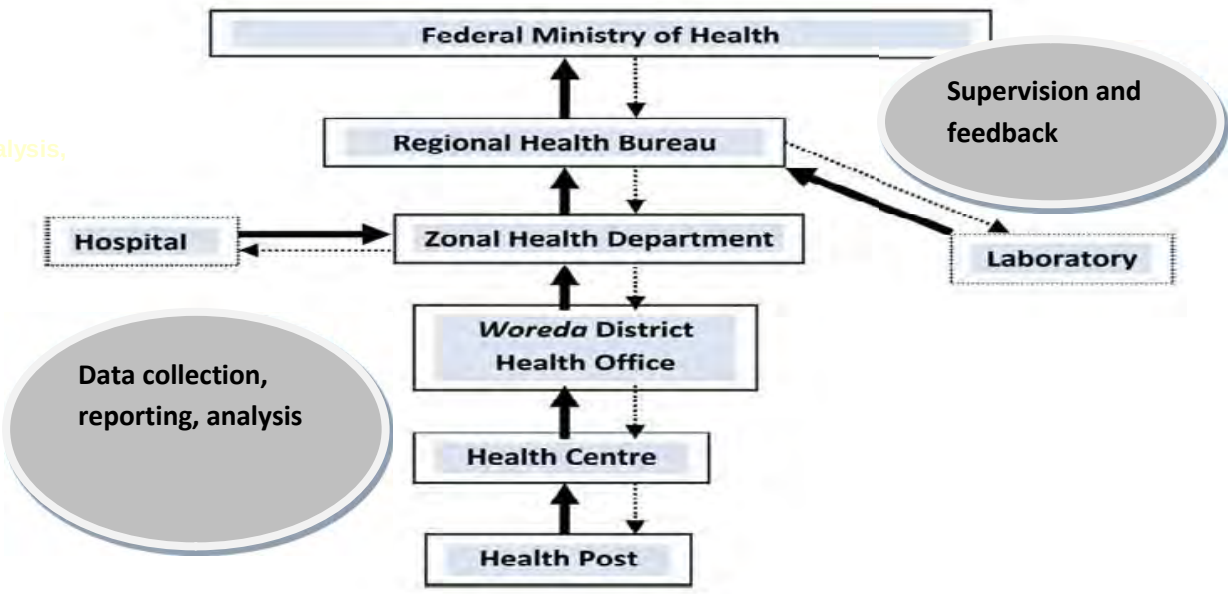

Figure 3.1.1 Routine data and information flows for public health surveillance activities. Ministry of Health, Ethiopia.

Assessing the effectiveness and efficiency of this system in achieving the stated objectives will improve the change in the quality of information need to be assessed particularly for diseases which exert high public health stress. Malaria and measles are of such diseases which can be impacted for the better or worse by the change in the structure.

3.1.2 Rationale of the Study

3.1.2.1 Gamogofa Zone is one of the high risk area for several public emergencies including malaria and measles. Malaria and measles are the major and highly burden of public health importance of the GamoGofa zone with high frequency of epidemic and public health concern. Recent delayed in detection and reporting brought about- for example, a huge measles outbreak in Kucha, Chencha Woredas, Gamogofa zone 2013 was reported late after several people were affected, We make due consideration to these two diseases could be used as proxy indicators of the surveillance system of the region.

3.1.2.2 Surveillance system evaluation has not yet been done in the area; and it is difficult to know the effectiveness and efficiency of the system without evaluation. Use of the collected data at the local level as evidence for public health decision making has not been well established and functional till now. An evaluation of the zone based on surveillance system for malaria and measles improve the information provided evidence based information that help decision maker to ensure that the diseases are being monitored effectively and efficiently.

Therefore an evaluation of malaria and measles surveillance system was conducted to make recommendation that may use to improve the current surveillance system of the diseases and preparedness and response against the possible outbreaks in the future.

3.1.3 Objectives:

3.13.1 General Objectives:-To assess the performance of measles and malaria surveillance system and whether objectives have been achieved.

3.1.3.2 Specific Objectives:-

- To assess the core activities such as case detection, analysis reporting and response of the surveillance system in the study area
- To assess the usefulness of surveillance system in early detection of diseases and outbreaks and response
- To evaluate the attributes of the surveillance system of the selected diseases in the study area.
- To assess major challenge of quality of malaria and measles surveillance system.

3.1.4 Materials and Methods:

3.1.4.1 Study area: This is a surveillance system evaluation study conducted in Gamogofa zone, SNNPR State. This zone was selected for it's far distant from Regional Health Bureau and for its relative high burden and recurrent epidemics results in significant magnitude of morbidity and mortality of the above selected diseases for evaluation. Gamogofa zone is located 325 km south of the capital city of Addis Ababa. Administratively the zone is divided into 15 districts and two city administrations; the general elevation ranges from 600 to 3,300 meters above sea level. The topography of the land characterizes an undulating feature that favors for the existence of different climatic zones in the area, the total population of the zone in 2005 EFY is estimated to be **1,837,896** according to the projection from 2007 census conducted by Central statistics Agency (CSA). There are 3 Hospital, 68 H/C and 471 H/P that make health care service coverage of the zone was 92% in 2005 EFY, (2013).

3.1.4.2. Study Subjects: The study subjects are the health facilities (Hospital, Health Centers, and Health Posts, Regional public health laboratories) and health offices (woreda health offices and zonal health department).

3.1.4.3 Study design: A Cross Sectional descriptive study conducted. The system was evaluated using Center for disease control and prevention (CDC) updated guidelines for evaluating surveillance system. we assessed the structure and the core activities of the surveillance system in the region and in the study facilities, usefulness of the system and attributes of the surveillance system involved assessment of the usefulness of the surveillance system, simplicity of the system, flexibility, quality of the data, acceptability, representativeness, timeliness and stability of the surveillance system.

3.1.4.4 Study Period: The evaluation was conducted from December 15-25/2013, Gamogofa zone, SNNPR regional state.

3.1.4.5 Study Units: The study subjects were the health facilities, health offices and the Regional Health Research Laboratory. A total of 13 study sites were included in the study. These were the Regional State Health Bureau, the Regional Health Research Laboratory, Gamogofa Zonal health department, two district health offices, three health centers and five health posts.

3.1.4.5 Sample size and strategy: Gamogofa zone health department, two woreda health offices, one district hospital (Arbaminch), two health centers and two health posts and one PH Laboratory were included in the sample. Selection of the woredas and health facilities was done as below:

1. From the total woredas in the zone, 2 woredas were selected by Convenient Sampling Method.
2. From A/zuria woreda selected two health center and from M/Abaya woreda one was selected by Simple Random Sampling (SRS) method.
3. From the catchment health posts under each selected health center, two Health Post (HP) was selected by SRS and public health laboratory. Finally a total of 13 sites were assessed during the study period.

3.1.5.6 Data collection methods:

Primary data were collected using semi-structure questionnaire by the principal investigators and observation using check-list. We adapted our questionnaires according to our objectives from the Centers for Disease Control and Prevention updated guideline as reference Guideline, and made interview to the surveillance officers or focal persons in the selected health facilities and health offices for the study as well as reviewed of secondary data such as annual reports of the region Annual reports of the region and The national integrated diseases surveillance and response (IDSR), the Public Health Emergency Management Guidelines.

3.1.5.7 Data Analysis:: The collected data were entered and analyzed using Microsoft Excel and Epi info version 7.1.0.6

3.1.5.8 Ethical and Legal clearance? The ethical approval and clearance obtained from College of School of Public Health of Addis Ababa University ethical committee. Permission also obtained from the concerned bodies of SNNPR Regional Health Bureau, Gamogofa Zonal Health Department.

3.1.5.9 Dissemination of the study result:

The result of the study was submitted to the EFETP- SPH, Gamogofa Zone Health Department and Regional Health Bureau by soft copy.

3.1.5 Results

3.1.5.1 Engage the stakeholder in the evaluation system

Prior to the evaluation of the surveillance system started, discussion and consultation was made with Regional Public Health Emergency Core Process on how to select sites. It is known that stakeholders can provide input to ensure that the evaluation of a public health surveillance system addresses appropriate questions and assesses pertinent attributes and that its findings will be acceptable and useful. In this context, World Health Organization field officer, Gamogofa Zone Health Department Public Health Emergency Management focal person and Woreda Health Office Public Health Emergency Management focal persons were participated in the evaluation of the surveillance system of the zone.

3.1.5.2 Description of the surveillance system to be evaluated

Public Health Emergency Management (PHEM) is defined as the process of anticipating, preventing, preparing for, responding to and recovering from the impact of epidemics and health consequences of natural and manmade disasters. The sub processes identified for the process include preparedness and early warning, response and recovery. The early warning sub-process contains the integrated public health surveillance. This surveillance focuses on diseases which have epidemic potential, diseases under eradication and elimination, diseases of international concern, and severe acute malnutrition.

To describe the surveillance system multiple sources of information might be needed. Thus the description of the system can be improved by describing the public health importance of the health-related event under surveillance, describing the purpose and operation of the system; and describe the resources used to operate the system.

3.1.5.3 Description Public the importance of malaria, measles SNNPR Region; and the related with the Surveillance system*:*

The Federal Ministry of Health of Ethiopia (FMoH) identified 20 top priority diseases which are epidemic prone, of international concern and diseases on eradication and elimination programs for surveillance activities. These diseases are monitored by a designated bodies through available means of communications such as telephone, paper based reporting etc. These

diseases are set to be reported as mandatory notification (which are immediately reportable) diseases and routine surveillance (which are to be reported weekly).

This surveillance evaluation tried to assess diseases targeted for eradication, elimination and epidemic potential in our country especially of priority diseases reported as immediately (measles) and weekly (malaria). They are significant disease burdens to the public. Diseases like malaria is one of the ten top diseases throughout the zone for more than a decade. Measles epidemic is being known become more frequent in different parts of the region and also in the country.

Table 1 3.1.1: List of regional and national notifiable and reportable diseases-Gamogofa, SNNPR, Ethiopia, 2013

Immediately Reportable	Weekly Reportable
1. Acute Flaccid Paralysis	1. Dysentery
2. Anthrax	2. Malaria
3. Avian Human Influenza	3. Meningitis
4. Cholera	4. Malnutrition
5. Dracunculiasis / Guinea worm	5. Relapsing fever
6. Measles	6. Typhoid fever
7. Neonatal Tetanus	7. Typhus
8. Pandemic Influenza A (H1N1)	
9. Rabies	
10. Smallpox	
11. Severe Acute Respiratory Syndrome (SARS)	
12. Viral Hemorrhagic Fever (VHF)	
13. Yellow fever	

3.1.5.2.1 Malaria: In SNNP Regional state due to unstable climatic and environmental condition, 80% of the region is malarious and 75% of the populations are at risk of malaria. A total of 996,205 clinical plus confirmed, 9001 inpatient admission malaria cases and 60 deaths were reported from zones and special woreda to the SNNP Regional Health Bureau/PHEM unit in 2005EFY.The total annual confirmed cases reported PF 406,486 and PV 281,516 with total positivity rate of 55.30%. Concerning malaria species, 59.10% of cases were plasmodium falciparum**.** . (Figure 1)

In Gamogofa Zone, 75.70 %(365/482) kebeles are malarious. From week 24-35(September-October 2013) a total of 35,808 clinical and confirmed malaria and 318 inpatient cases were reported, from 57,625 cases of fever suspected and diagnosed with microscopy and RDT, 16,326 cases positive for Plasmodium falciparum and 9823 positive for plasmodium vivax.

Gamogofa Zone in 2005(EFY) a total of 95,015 confirmed malaria cases were reported to the Region. Of total malaria confirmed cases, 59,017(62.11%) were P.falciparum and 35,997(37.88%) were P.vivax. Among total cases, 1418 cases were managed in-patient department and 15 deaths was reported.

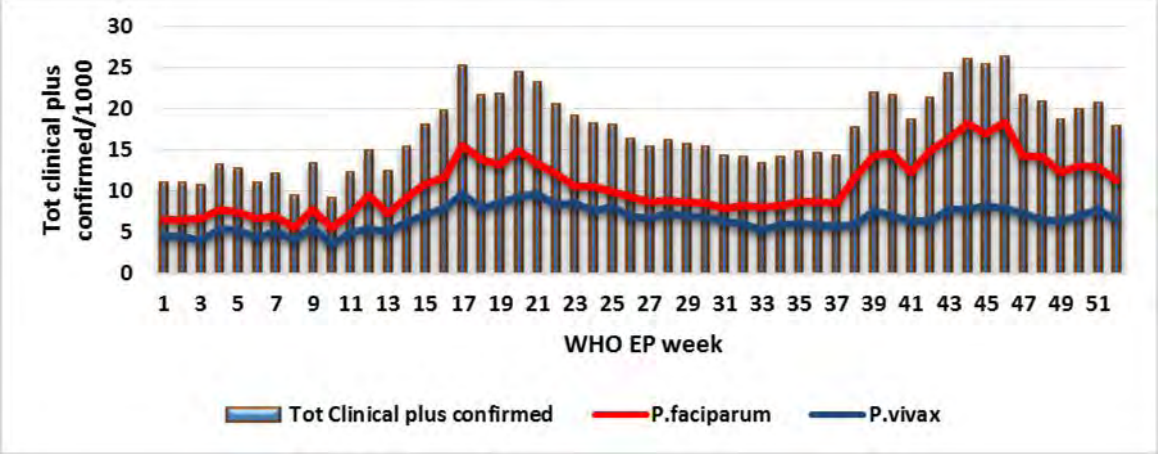

Figure 3.1.2 Total malaria Clinical plus confirmed cases, SNNPR/2013

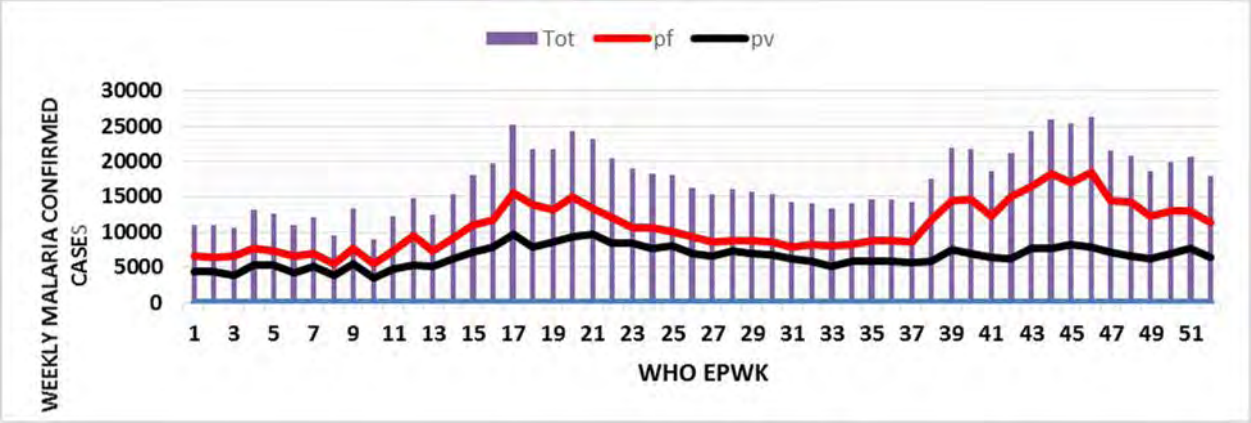

Figure 3.1.3 Number of confirmed malaria cases, SNNPR, Ethiopia/2013

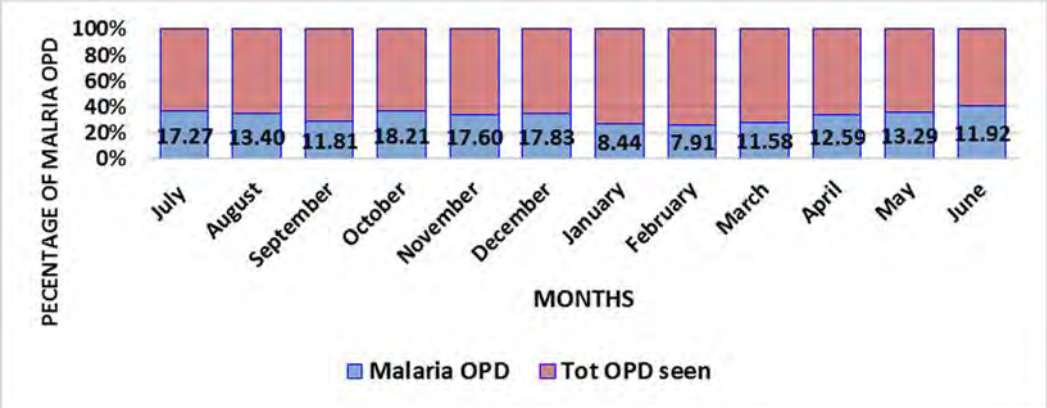

Figure 3.1.4 Percent of malaria cases consulted at OPD, Gamogofa/2013

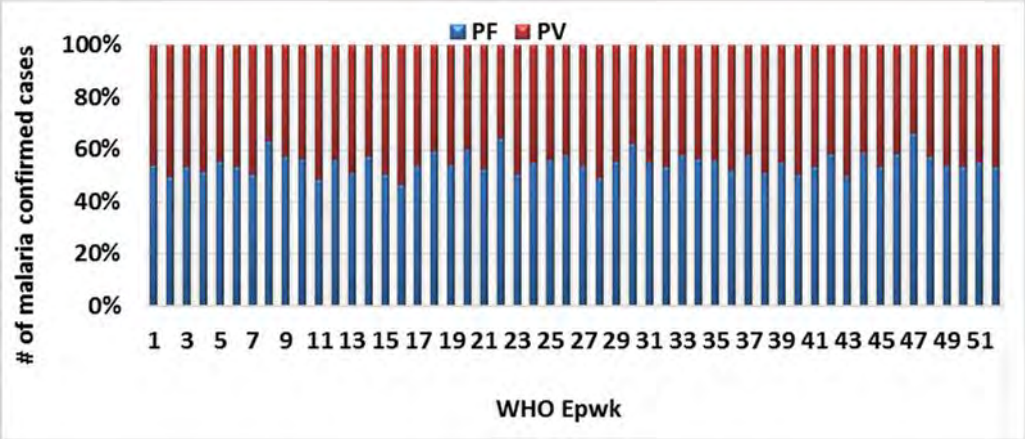

Figure 3.1.5 Percent of confirmed malaria cases by WHO epwk/Gamogofa, 2013

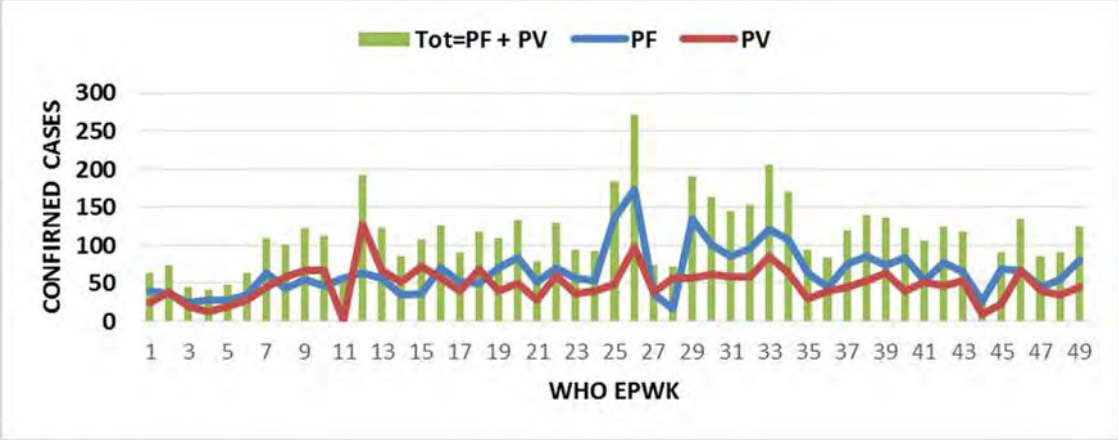

Figure 3.1.6 Malaria confirmed cases reported by week, Arbaminch zuria, Gamogofa, 2013

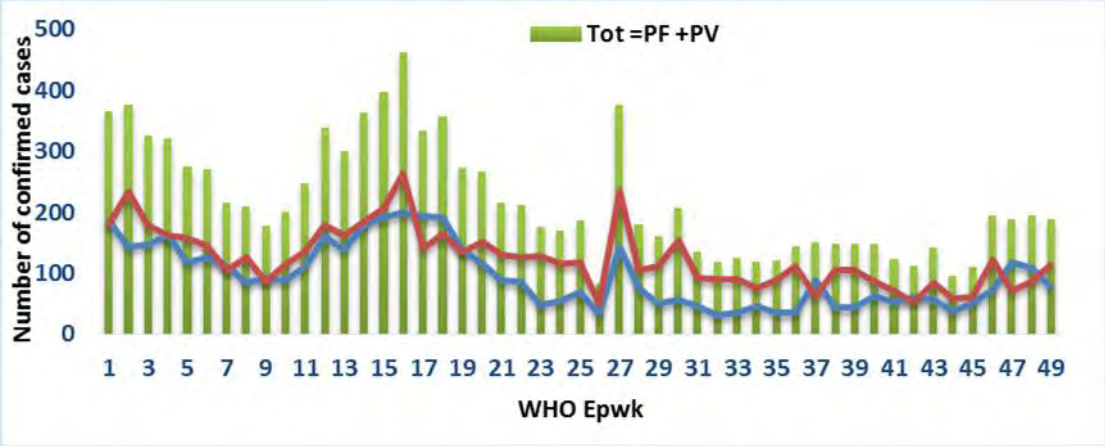

Figure 3.1.7 Malaria confirmed cases reported by week, Mirab Abaya, Gamogofa

3.1.5.2.2 Measles

In 2012/2013, (2005 EFY), a total of 7586 suspected cases and 11 deaths were reported to the region from different zones and special woredas, the detection rate of measles in SNNPR and Gamogofa zone more than 100% relative to the expected number of cases. The proportion of the woredas reported at least 1 suspected Measles cases (out of 17 woredas expected, 11 woredas reported) 86.70%.

In Gamogofa zone, in the year 2013, all districts reported measles cases with a total of 135 cases, which raised from **the** expected annual rash illness detection rate of 2 per100,000 to 6.8 per 100,000 population. A total of 2407 cases of measles were reported to FMOH & WHO from zone in which Chencha account the highest number of cases; 1715(71.30%) followed by Arbam/ zuria 615(25.60%) and Kucha (3.20%).

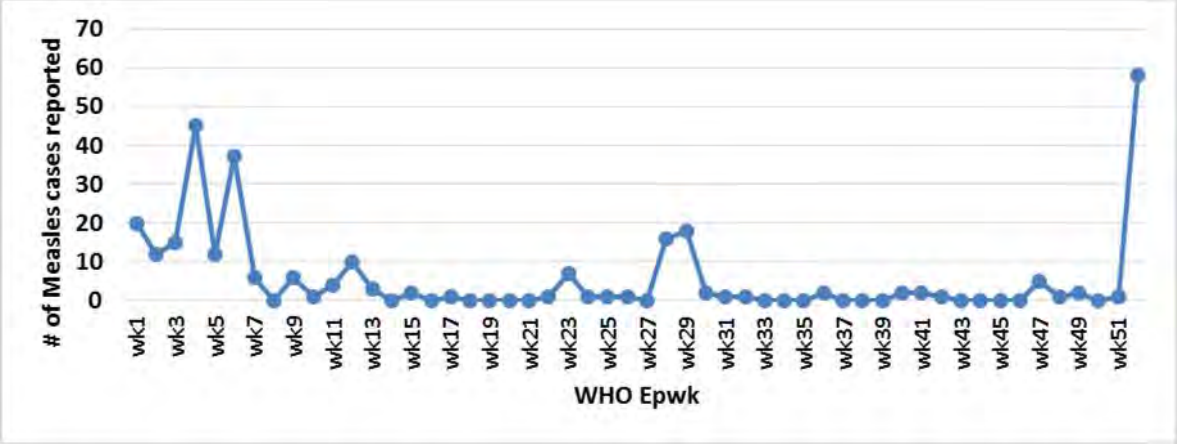

Figure 3.1.9 Trends of weekly malaria reported from SNNPR/2013

Case confirmation

No of site reported	Expected NMFR cases	Reported cases	Measles detection Rate	Total confirmed
AMZ	4	16	8	1
Mirab Abaya	2	10	10	2
Gamogofa	42	533	5.4	47
SNNPR	370	2883	5	302

Table 3.1.10 Gamogofa annual suspected measles cases reported 2012/2013

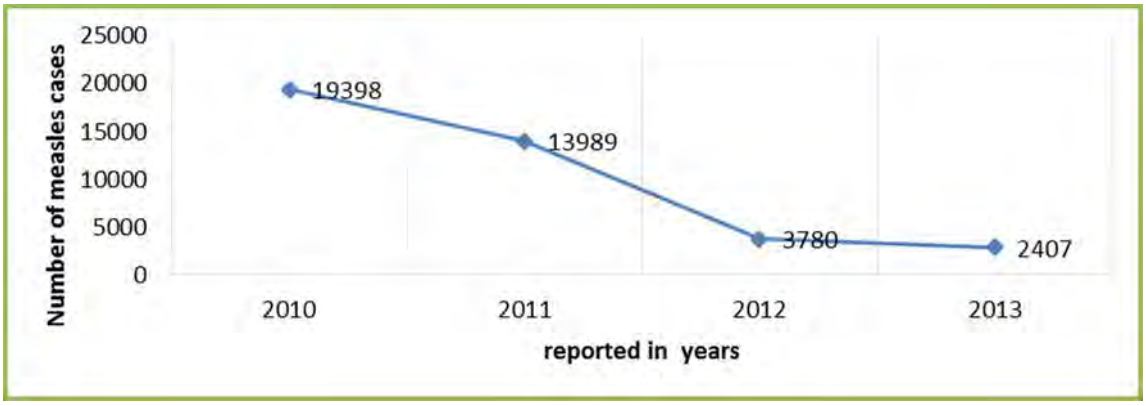

Figure 3.1.11 Trends of annual Measles cases reported from Gamogofa zone, Ethiopia, 2010/13

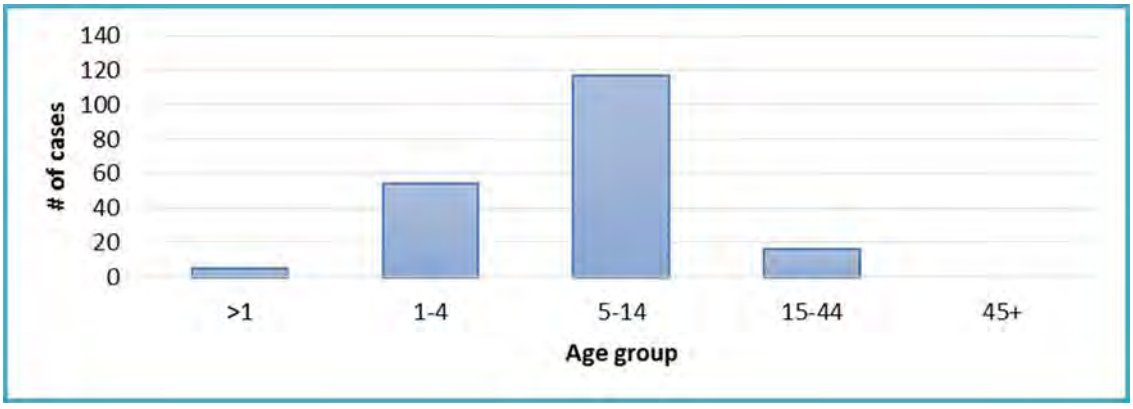

Figure 3.1.12 Measles cases detected by age group Gamogofa zone. SNNPR 2012/2013

3.1.6 Describing the purpose and operation of the surveillance system

Overview of the surveillance system

Purpose of Integrated Disease Surveillance Report (IDSR*)* is an approach adapted to strengthen national surveillance system by coordinating and streamlining all surveillance activities and ensuring timely provision of surveillance data to all disease prevention and control programs (3, 6). Integration encourages best use of scarce resources, and activities can be combined taking advantage of similar surveillance functions, skills, resources, and target population. The reason of integration is therefore described as following (3, 6)

- Strengthen the capacity of district to conduct effective surveillance activities, and increase the involvement of clinicians,
- Integrate multiple surveillance activities so that resources can be used more efficiently and effectively,
- Improve the use of information for decision making,
- Improve laboratory capacity in case detection,
- Emphasize community participation in detection and response to public health problems

Currently, since 2008 the FMoH launched a reform and restructuring of the health sector in to different core processes, and in particular the disease surveillance and response with the concept of BPR. This helps the surveillance of priority diseases to be a dependable system as Public Health Emergency management (PHEM) center. This new structure is extended down to the district level in their capacities. This is designed as a cutting edge for better tracking and monitoring of diseases of public health concerns (4). Moreover, as member state of the WHO, Ethiopia is on preparatory phase to implement the International Health Regulation (IHR) which was declared by member states in 2005. These all are good opportunities to strengthen surveillance.

The overall purpose of surveillance of priority diseases is to monitor the trend against the seated tolerance limits, and pick any deviation from the limit at the earliest point in time and have prompt response (2, 4). Furthermore as early warning system, it guides prevention and risk aversion actions like immunization, vector control and so on (4).For these purposes, each of these diseases has case definitions and integrated diseases reporting formats and reporting is institutionalized into the health facilities and health offices. It is also helpful to prepare, prevent,

detect, verify, respond and contain epidemics/other public health emergencies at the local level and recover quickly from their impacts.

3.1.6.1 The objectives of the Malaria and Measles surveillance:

- To detect cases and respond quickly when their alert threshold is observed.
- To strengthen the report of cases and diseases whenever outbreaks of these diseases are occurred.

Case Definitions:

According to the PHEM guideline there are two case definitions i.e. standard case definitions and community case definitions:

3.1.6.2 Standard case definition of selected diseases

The use of a standard case definition increases the specificity of reporting and improves the comparability of the health-related events reported from different sources of data, including geographic areas (4). Case definitions of the selected diseases for evaluation of the system are:

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

Measles: - Any person with fever and maculopapular (non-vesicular) generalized rash and cough, coryza or conjunctivitis (red eyes) or any person in whom a clinician suspects measles.

Community case definitions;

Malaria:-Any person with fever or fever with headache, back pain, chills, rigor, sweating, muscle pain, nausea and vomiting.

Measles: - Any person with fever and rash starts from post auricular and radiate to face, trunk.

3.1.6.3 Describe the resources used to operate the surveillance system

The methods for assessing resources to operate the surveillance system includes only material resources directly required to operate the surveillance and excludes a broader definition of costs that might be considered in a more comprehensive evaluation.

In the assessed areas: Zonal Health Department and all Woredas Health Offices have regular budget for the surveillance activity from the SNNPR Region or partner support, but the budget allocated is not sufficient to carry out the whole surveillance activities. The logistic and budget constraints were complained by all the health units' assessed, which is the main reason that brought about absence frequent supervision.

At the time of the survey, except the region, none of these woredas health facilities has other communication technologies as E-mail, fax or radio call for urgent notification. These resources were used to support all surveillance systems of infectious diseases.

The availability of critical resources is important for the undertakings of surveillance activities and epidemic preparedness. As indicated in the following table essential material resources available to undertake surveillance activities at all levels were as follow:

Table 3.1.11 Percent availability of resource for surveillance-Gamogofa, SNNPR, Ethiopia, 2013

Type of resources	Zone Health Department	Districts	Hospital	Health Centers	Health Posts
Electricity	100	100	100	100	60
Motorcycle	100	100	100	100	0
Vehicle	0	0	0	0	0
Computers	100	0	0	0	0
Printers	100	0	0	0	0
Fax	100	0	0	0	0
Telephone	100	100	100	100	0
Calculator	100	100	100	100	0
Stationery	100	100	100	100	50

3.1.6.4 Population under surveillance

South Nation and Nationalities Regional Health Bureau Public Health Emergency Management (PHEM) core process targets all the population in the region to be under surveillance for all the twenty priority diseases. During the assessment, Gamogofa zone health department, 2 districts (Arbaminch zuria woreda and Mirab Abaya woreda), 2 health centers (22.22%) and 2 health posts (22.22%) from each district and 1 Hospital (11.11%) were assessed to evaluate the surveillance system

S.No	Name of district	Population	Number of Hospital	Number of HC	Number of Health Post
1	**Arbaminch zuria**	195,000	0	1	1
2	**Mirab Abaya**	88,994	0	1	1

3.1.7 Laboratory activity to confirm priority diseases

The region has public health research laboratories, which is free-standing building, equipped with electricity, running water, back-up power (emergency generator), refrigerator and computers. All communication systems- post, Telephone and Fax, E-mail, Internet are available.Relared to medical Laboratory professional and other staffs, there are (2 MSc 4 BSc), 2 assistants (not doing test), and 2 cleaner. 95% of the lab staff know what diseases should be reported.

These laboratories play roles in the outbreak investigation and confirmation at their capacities. They are able to do basic tests like blood film, gram stains, cultures and sensitivity, and quality assurance of facility level laboratories. They refer virology samples and samples for further analysis to the Ethiopian Health and Nutrition Research Institute (EHNRI). Records were kept of the numbers and type of tests performed and results, reports are submitted districts health offices, national/MOH level in weekly

In Gamogofa zone the capacity of the laboratory to collect, test, transport, and role in the surveillance of malaria and measles were assessed at health facility level.

100% of laboratories at health center level were able to test malaria by microscopy and 100% of health posts test by Rapid Diagnostic Test (RDT). HCs were able to collect samples of measles.

3.1.6.5 Description of core and support functions of the integrated diseases surveillance and response (IDSR) systems

3.16.5 Usefulness

Although the respondents realized the main use of the surveillance system in early detection of epidemics of diseases under surveillance, but the surveillance system has so many challenges in the area of case detection, reporting, and response, therefore Respondents were not satisfied with the system and the utility of the system was low.

3.1.6.5.1 Simplicity of the surveillance system

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 (1). In this assessment all respondents agreed that the case definitions of these diseases for identification of suspected cases are easy to understand and apply by all levels of health professionals. But to confirm cases, it was found usually difficult related to sample collection and delay in laboratory result (up to 1-3 months).

3.1.6.5.2 Flexibility

A flexible public health surveillance system can adapt to changing information needs or operating conditions with little additional time, personnel, or allocated funds. In the absence of practical experience, the design and workings of a system can be examined. Simpler systems might be more flexible (i.e., fewer components will need to be modified when adapting the system for a change in information needs or operating conditions). Public Health Emergency Management (PHEM) made the reporting format flexible to report other new events under immediately reportable case based conditions.

3.1.6.5.3 Data Quality

Data quality reflects the completeness and validity of the data recorded in the public health surveillance system (1). In all selected health offices and health facilities, there was a responsible person for data analysis; however, analysis of the surveillance data was variable for these diseases at the District, Zonal and Regional health offices. For example the Regional Health Bureau analyzes and follows trend for malaria and measles, where as the zone and districts has only for malaria. Moreover data analysis was not done on regular basis.Only 14.30% of the visited health facilities analyzed the data collected for surveillance

Table: 3.1.12 Completeness and timeliness by selected sites-Gamogofa, SNNPR, Ethiopia, 2013
The zone, Arbaminch zuria woreda and Shelle H/C woredas have reported with lower timely manner when compared to others.

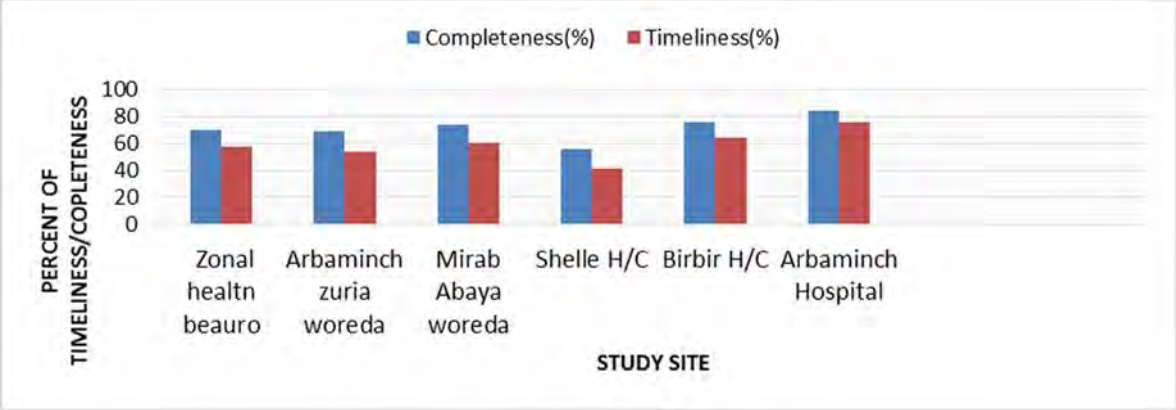

Figure 3.1.13 Completeness and Timeliness by selected site-Gamogofa, SNNPR, 2013

Completeness became irregular because of various reasons like lack of commitment, working over load and lack of continuous feedback, supervision in the government institutions. Example private clinics and Non-Governmental Organizations (NGO's) hadn't reported to all assessed districts

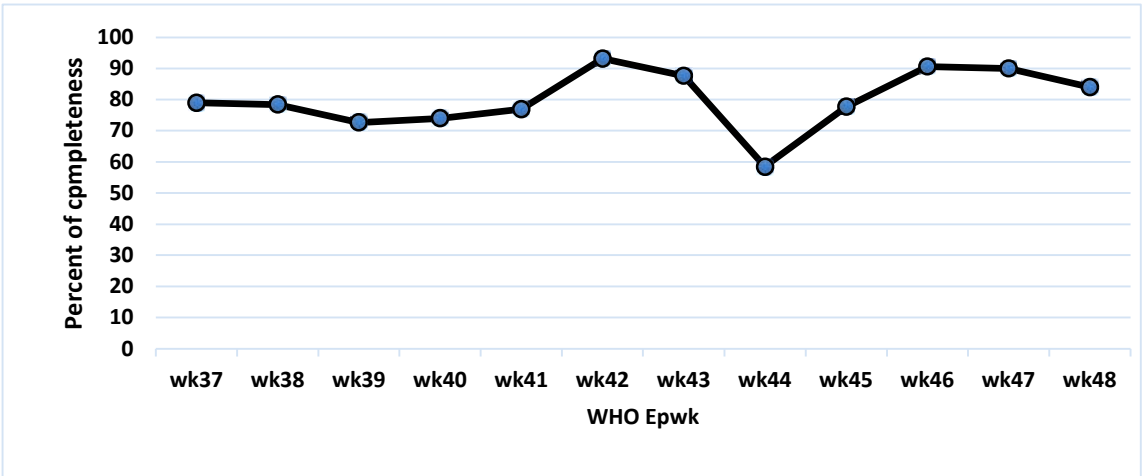

Figure 3.1.14 Trends of report completeness-Gamogofa, SNNPR, Ethiopia, 2013

3.1.6.5.4 Acceptability

In the selected health facilities and offices 85% of the respondants have the willing and participate in the surveillance system.

3.1.6.5.5 Sensitivity

The sensitivity of a surveillance system in detection of cases and outbreaks can be considered at different levels: Based on our study we could not manage to calculate sensitivity of the surveillance system because the following reason:

- **First Surveillance system to capture cases in the community**

  One of the main factor which unable to determine sensitivity in this assessment was absence resource, for instance, HEWs when they lacked antimalarial drugs, cases were mot recorded and reported, yet the number of cases reported from the health post will be high when they had antimalarial drugs. The technical and logistics capacities crucial in detection and laboratory confirmation of cases, these factors undermine the burden of cases in the communities and hence it resulted the sensitivity of the surveillance to pick the case to be low.

- **Multiple responsibilities of HEWs**

  The community perception towards measles that modern medication aggravated the rash, therefore they did not bring their children to health facilities, in addition to this, due to the multiple responsibility imposed on HEWs and the limited Health development armies participation at community, as there were no incentives, or other means of encouragement. This did not allow the HEWs to perform the routine activities like house to house visit to address cases stayed at home. In this situation cases were not reported, hence it weaken the sensitivity of the surveillance to pick the case.

- **surveillance system to detect outbreak malaria and measles**

The capacity of the surveillance system to detect an outbreak is influenced by the definition of the outbreak. In case of malaria and measles, the sensitivity of the surveillance system is depend on different reasons, for instance, regular analysis of the data, definition of threshold, Monitoring chart, reporting rate of the health facilities were much lower than expected, there was no regular analysis of collected data, appropriate application monitoring chart, therefore the sensitivity of case detection and outbreak detection of the surveillance system very low: however, the sensitivity of the system increase once the number of cases has become high or death started to

occur that is the surveillance system would be sensitive for high epidemic,however,positive predictive value and sensitivity are inversely related.

3.1.6.6.7 Predictive value positive

In general the case definitions are broad for the malaria especially at the health post and community level, the PVP is expected to be (PVP=37.84%), especially for malaria. Moreover, the national guide line state to have only limited laboratory tests; for example, laboratory sample of the first five cases is enough to declare measles epidemics.

3.1.6.6.8 Data reporting

Reporting is a must to the higher level and the zone, woreda health offices health facilities did not encountered shortage of reporting formats in the past 6 months. Out of 5933 reports expected in the last 3 months 4919(82.90%) were reported to the zone from all the districts in the zone. To collect and report surveillance data they used telephone.

Table: 3.1.14 Reporting units by visited sites-Gamogofa, SNNPR, Ethiopia, 2013

Name of woreda/zone health office	Government reporting unit	Private reporting unit	NGO reporting unit	Total
Gamogofa zone	542	98	1	641
AZW	42	22	0	64
Mirab Abaya	28	5	0	56

3.1.6.6.9 Data analysis

Surveillance data collection through immediately and weekly reporting system is not an end by itself. The collected data should be analyzed, interpreted and used for decision making starting from local to the central level in order for the values of the data to be realized.

Ongoing analysis of surveillance data is important for detecting outbreaks and unexpected increases or decreases in disease occurrence. Analyses should be performed at regular intervals to identify changes in disease reporting. At zonal level the data was analyzed weekly and monthly by person, time and place regularly for action. Trend monitoring (line graph) was also seen at zone level on priority disease such as measles. Analysis of data at the local level to detect any irregularity in the reports was nonexistent at district and health facility level.

The responsible person for the analysis was PHEM focal person. All reporting sites including zonal health department have epidemic threshold based on national MoH estimate for the malaria and measles diseases.

Table 3.1.15 Analysis of surveillance data from visited sites-Gamogofa, SNNPR, Ethiopia, 2013

Variables	Zone (n =1)	Number of districts out of 2	Number of HFs out of 3	Total(n=7)	Percentage (%)
Described data by person, place and time	1	0	0	1	14.28
Observed plotted line graph	1	0	0	1	14.28
Observed presence of demographic data	1	1	0	2	28.57

3.1.6.7.0 Outbreak investigation

Investigation and management of suspected outbreak is essential in minimizing morbidity and mortality. In the zone there was measles outbreak in the 2013. A total of 7 suspected cases were reported. Outbreaks were traditionally investigated and there were no findings of risk factors during investigation. All health post has case definition manuals for malaria and measles cases, but during this assessment the posters for case definition of malaria and measles were not posted at working area to address the community. Registries were present in all of Health post and health facilities, but in all of health facilities the cases registered of log book which is quite different from cased-based and weekly reporting formats.

Table 3.2.16 Outbreak suspected and conducted by in the zone/2013

Variables	Districts
Number of suspected outbreaks last year	3
Number of suspected outbreaks investigated	3
Looked for risk factor during investigation	0
Used data for action %	0

3.1.6.7.1 Epidemic preparedness and response

In the zone there were malaria outbreaks in 2012 in 1 Arbaminch zuria district and also measles outbreak in 3 districts (including one of the assessed districts). Only Gamogofa Zone Health Department (ZHD) has a written emergency preparedness plan and none of the districts have written emergency preparedness plan. In the zone, 100 % of the visited districts and zonal health department had emergency stocks of drugs and supplies. The standard case management protocol for malaria and measles was only seen at zonal health department.

Budget line for epidemic preparedness and response was existed in any one of the district. 100% of the visited areas have Rapid Response Team (RRT). These committees are formally established based on the guideline. In the contrary, none of them have minute of meeting for epidemic management and they had not evaluated their preparedness as per the guideline of the national and regional recommendation.

Table 3.2.17 Preparedness for epidemics-Gamogofa, SNNPR, Ethiopia, 2013

Variables	Number of districts	Gamogofa ZHD
Written emergency preparedness plan for an outbreak	2	Yes
Availability of emergency stocks of drugs and supplies	1	Yes
Experienced shortage of drugs during recent epidemic	2	Yes
Presence of budget line for epidemic response	0	0
Observed epidemic management meetings minutes	0	0
District has rapid response team	2	Yes

3.1.6.7.2 Representativeness

A public health surveillance system that is representative accurately describes the occurrence of a health-related event over time and its distribution in the population by place and person (1).

However due to lack of time, representativeness in this assessment is only seen in terms of reporting rate of the Health Facilities (HF's), health seeking behavior of the community and technical capacity of the health care provider. Representativeness is related to health coverage of the area. The health service coverage of the zone is 86% and the health seeking behavior of the population is good according to the PHEM focal people's response. The assessment showed that health delivery was given through 639 health facilities (3 hospital, 68 health centers, 1NGOs, 98 private clinics and 471 health posts) which are functional in 2013 and except the private clinics and NGO, 100% of the government health facilities reported in the last 3 months (June to August 2013) from all districts of the zone. Thus, the surveillance system of the zone has been representative.

3.1.6.7.3 Stability

Stability refers to the reliability (i.e., the ability to collect, manage, and provide data properly without failure) and availability (the ability to be operational when it is needed) of the public health surveillance system (1). A lack of dedicated resources might affect the stability of a public health surveillance system. For example, workforce shortages can threaten reliability and availability. Yet, regardless of the health-related event being monitored, a stable performance is crucial to the viability of the surveillance system.

Unreliable and unavailable surveillance systems can delay or prevent necessary public health action. A more formal assessment of the system's stability could be made through modeling procedures. However, a more useful approach might involve assessing stability based on the purpose and objectives of the system.

3.1.6.7.3 Availability of national surveillance manual

The use of a standard case definition increases the specificity of reporting and improves the comparability of the health-related event reported from different sources of data.

In the assessed areas all had surveillance manual covering all notifiable diseases.

Table 1.2.4 Presence of standard case definition and inclusion of PHEM in the annual plan-Gamogofa, SNNPR, Ethiopia, 2013

Parameters	ZHD	Woredas	Hospital	HC's	HP's
Standard case definition material available (%)	100	70	100	66.7	40
Knowledge about standard case definition of selected disease (%)	100	100	100	66.70	40
Availability of PHEM manual or IDSR manual (%)	100	100	100	100	0
Inclusion of PHEM in the annual health plan (EFY 2005) of the zone (%)	100	100	100	100	-

3.1.6.7.4 Feedback, supervision and training

Gamogofa ZHD had given feedback on integrated activities performed by districts, but none of the health posts and health centers received frequent feedback in the last 6 months. The feedbacks and supervisions made were integrated and in the feedback there was no PHEM specific comments seen during the visit. Program specific supervision is not common as told by the PHEM focal people. The reasons addressed for not making all the required supervisory visits were shortage of budget for surveillance. All health centers and 33.3% of health posts were supervised by WHO surveillance officer.

During the assessment, the proportion of trained respondents (focal persons) and HEWs 12/13 (92.30%), for short term training on PHEM for 5 days by the Regional Health Bureau and partner was conducted. At the health facilities, only the focal person assigned for surveillance was trained, but the health care providers did not get the privilege any training related with surveillance.

3.1.7.1 Discussion

The structure of surveillance data reporting flow from the periphery to the higher level was well organized in simple and defined role and responsibility of each reporting entities, there were problems with reporting means due to lack of transport, telephone, fax and computer for data management and analysis, this affected the overall generation of reports (1-2). The findings showed that the average reporting rate of the zone was 70.52% which was lower than expected.

Effective detection of cases requires use of the correct case definition properly and adequate training on clinical diagnosis. Even though measles and malaria surveillance system found and functional at all level, in some of the visited area the quality information needs improvement, Measles and malaria data were not being analyzed and reported on time. The response to an outbreak always focused on case management (put off fire) only. An investigation for risk factors were not more common. This all hindered and undermined the proper investigation and response expected for epidemic prone diseases. (4-6)

The standard and community cases definition were supposed to be available and posted at all health facilities and health offices for detection of suspected cases using the case definition, the cases definition was not available in the health post visited this may lead to low detection of malaria measles from the community. All the visited areas did not set-aside stocks (drugs and supplies for emergency purpose and there was no budget allocated for this purpose though in principle stocks were expected to be available for emergency purpose. (2-3)

The overall completeness of reporting sites in the zone was 70.36% and timeliness of reporting sites was 58%. Effective detection of malaria and measles cases require adequate training on clinical diagnosis and use of the correct case definition properly. Both the above reportable diseases were collected, but not analyzed and reported on time. Coordination and supervision of the surveillance activities were not frequent. Such weak performance could be due to poor monitoring, supportive supervision, incentive mechanism and feedback system at lower level in the surveillance activities. (8-10). This may undermine the attention given to surveillance and response of epidemic prone diseases- like malaria and measles.

3.1.7.2 Conclusions

According to the finding of this assessment, in order to strengthen malaria and measles surveillance and response in the zone, surveillance core activities-case detection, analysis and reporting of surveillance data for action is very crucial. The current weekly based reporting system was very important and be retained, but quality of the data should be verified through regular supportive supervision and training of the staffs.

Malaria and measles were a major public health problems of the Zone in which both were reported from all districts and remain the main threats of epidemic to community, Both measles and malaria outbreak result in recurrent, holocaust epidemics with a high burden social and economic problems. Therefore, an effective and well-functioning surveillance system is crucial for timely detection of cases of the outbreak and will help in the timely response which reduce the expansion and impact of the outbreak; this will improve the satisfaction of the activities involved in the surveillance system

Epidemic management committee was formally established in all districts and zones based on the guideline. None of visited site have minute for meeting epidemic management committee and did not evaluate their preparedness and experience as per the guideline of the national and regional recommendation. The response to an outbreak always focuses on case management only. An investigation for risk factors is not more common. This all hinder and undermines the proper investigation and response expected for epidemic prone diseases. Reports sent by zonal PHEM case team and malaria control program didn't coincided in 2013.

Sustainability of IDSR requires strengthening the coordination and integration mechanism, establishing continuous staff training mechanism, developing simplified guidelines and engage the lower level health system, strengthen multi-sectorial response team at all levels. Strengthen emergency preparedness at all levels with the necessary resources including minimum stocks of drugs and vaccines; strengthening data processing capacity at all levels by providing necessary computing facilities where needed; strengthening feedback system at lower levels; strengthening laboratories facilities and network system , strengthening documentation and document retrieval system at all levels; and creating mechanism for retaining trained staff with appropriate incentives/motives

3.1.7.3 Limitation of the study

- duration time was Shortage
- Data were not available to trace trends at health facilities
- Absence of transportation from woreda to woreda, and health facilities.

3.1.7.4 Recommendations

The goal of strengthening Malaria and Measles diseases reporting at each level of the health facilities and offices is to produce a system that values information for the role in guiding decision making. We recommend the following actions for surveillance system to be improved:

- Malaria and Measles surveillance data should be analyzed, interpreted and used for decision making. All the peripheral staff should be able to manually organize, summarize and display data in table and graphs as appropriate
- Completeness and timeliness of the surveillance data by regular monitoring, program specific supportive supervision, incentive mechanisms and feedback system should be improved.
- In order to increase Malaria and Measles cases detection of diseases, reporting and data analysis on regular basis should be required to build the capacity of health care providers both by governmental and non-governmental organization through Conducting training on disease surveillance and response at district and health facilities level, surveillance manual and standard case definition, case management protocol.
- Strengthen supervision at all levels to ensure that workers acquire and retain the necessary skills, Training health personnel on data management at the health facilities and district focal personnel using the appropriate software.
- Registration book should be checked at regular basis at all levels. Strengthen appropriate documentation
- Budgets should be mobilized by governmental and non-governmental organization and line budget should be there especially at district level.
- Total malaria suspected fever cases examined by RDT or microscopy should come first before total malaria (confirmed and clinical malaria cases)

3.1.7.5 References

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Annex 3-Questionnaires for evaluation of surveillance system, Gamogofa, SNNPR, Ethiopia, 2013

Data collection tools

Regional /Zonal level questionnaires

Background Information of woreda

1. Name of Region/zone_____
2. Number of Zones/Woredas_____
3. Is there a national manual for surveillance?
   1. Yes 2. No 3. Not applicable 4. Unknown
4. **If yes**, describe (last update, diseases included, case definitions, surveillance and control, integrated or different for each disease): for which disease?

_____

_____

_____

5. Is surveillance/IDSR included in the annual health plan (EFY 2004) of the region/zone?
   1. Yes 2. No
6. Do you have standard case definitions for the Country's priority diseases like malaria and measles? **(**Observed the standard case definition for each priority disease)

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

7. Is the center/region responsible for providing surveillance forms to the health facilities?
   1. Yes 2. No 3. Unknown 4. Not applicable
8. **If yes**, is there shortage of appropriate surveillance forms at any time during the last 6 months?

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

9. What are the reporting units for the surveillance system?
   a. Public health facilities
   b. NGO health facilities
   c. Military health facilities
   d. Private health facilities
   e. Others_____

10. Number of Zones/district reports received at the regional/zonal level during the past 3 months:
11. 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
12. Number of weekly reports received on time (in this 3 months): /12 times the number of districts On time (use national deadlines)
13. Was there any report of the immediately reportable diseases in the past 1 month?

1. Yes 2. No

14. 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
15. Means of reporting to next level by:

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

16. Did the region/zone 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

17. Did the region/zone describe data by place? Observed description of data by zone/district (tables, maps)

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

18. Did the region/zone describe data by time? Observed description of data by time:

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

19. Did the region/zone Perform trend analysis? Observed line graph of cases by time

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

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

_____

_____

_____

21. Did the region have an action threshold defined for each priority disease? (AWD, Measles, AFP/polio, malaria)

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

22. Who is responsible for the analysis of the collected data? _____
23. How often do you analyze the collected data?
    1. Daily
    2. Weekly
    3. Every 2 weeks
    4. Monthly
    5. Quarterly
    6. As needed……..
24. 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

25. Number of outbreaks suspected in the past year:_____
26. List the diseases: _____

_____

_____

_____

27. Number of investigated outbreak: (Observe reports & take copies) _____
28. Number of outbreaks in which risk factors were looked for:_____

29. Number of outbreaks in which findings were used for action: [Observe report] _____
30. Number of districts that looked for risk factors [observe in reports] _____
31. Number of districts that used the data for action [observe in final report] _____
32. 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

33. Does the Region/Zone have emergency stocks of drugs, vaccines, and supplies at all times in past 1 year?

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

34. Does 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

35. Do you have a standard case management protocol for AWD, 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

36. **If yes**, list:_____

37. Is there a budget line for epidemic response?

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

38. 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

39. Does the region/zone have a rapid response team for epidemic?

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

40. Does the region/zone respond within 48 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

41. 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

42. 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

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

Obtained required number of visits from regional/zonal level _____

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

_____
_____
_____

45. What percent of your subordinate personnel have been trained in surveillance? _____
46. Have you been trained in disease surveillance?

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

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

_____
_____
_____

Total reporting sites----------
Number of sites that have:
48. **Data management**
Computer and Printer----------
Photocopier----------
Data manager ----------
Statistical package----------
49. **Communications**
Telephone service----------
Fax----------
Radio call----------
Satellite phone----------
50. Do you have a computerized surveillance network at this level?
1. Yes 2. No 3. Unknown 4. Not applicable
51. Is there a budget line for surveillance in the Regional/zonal level?
1. Yes 2. No 3. Unknown 4. Not applicable
52. **If yes**, what is the proportion: % _____
53. How could surveillance be improved? (Opportunities for strengthening surveillance**)**

_____
_____

54. 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
55. What opportunities are there for integration of surveillance activities and functions (core activities, training, supervision, guidelines, resources etc.)?

_____
_____
_____

Questionnaire for Attributes and level of Usefulness:
56. What is the incidence / Prevalence of priority disease in your area
1. Malaria _____cases _____Deaths _____
57. Does the surveillance system help for this selected priority disease to detect outbreaks of these selected priority disease early?
1. Yes 2. No
58. Does the surveillance system help for this selected priority disease to estimate the magnitude of morbidity and mortality related to this disease, including identification of factors associated with this disease?
1. Yes 2. No
59. Does the surveillance system help for this selected priority disease permit assessment of the effect of prevention and control programs?

1. Yes 2. No

60. Does the surveillance system help for this selected priority disease allow interventions and disease trends analyzed?
    1. Yes 2. No
61. Is the case definition of malaria easy for case detection by all level health professionals?
    1. Yes 2. No
62. What are the organizations which need to receive reports of the surveillance data?

---

63. Do you feel that additional data collected on a case is time consuming?
    1. Yes 2.No
64. How long it takes to fill the format? 1. <5 minute 2. 10-15minuts 3. >15 minutes
65. How long does it take to have laboratory confirmation of
    1. Malaria _____
66. Can the current reporting formats be used for other newly occurring health event (disease) without much difficulty? 1. Yes 2. No
67. 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:_____

_____

_____

68. 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
69. Are the reporting site / data collectors trained/ supervised regularly?
    1. Yes 2. No
70. Review the last month's report of this disease.

i. Average number of unknown or blank responses to variables in each of the reported forms

_____

_____

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

71. Do you think all the reporting agents accept and well engaged to the surveillance activities?
    1. Yes 2. No
72. If yes, how many are active participants (from the expected)? _____

73. 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 _____

_____

74. What is the health service coverage of the district/ zone/ region? _____%
75. Do you think, the populations under surveillance have good health seeking behavior for diseases under surveillance? 1. Yes 2. No
76. Do you think diseases under surveillance are well represented by the surveillance system? 1. Yes 2. No
77. Was the new BPR restructuring affect the procedures and activities of the surveillance of diseases under surveillance? 1. Yes 2. No
78. Was there lack of resources that interrupt the surveillance system? 1. Yes 2. No

District level questionnaires

1. Name of the district _____
2. Number of kebeles: 1. Total_____ 2. Urban_____ 3. Rural_____
3. Is there a national manual for surveillance?

   1. Yes 2. No 3. Not applicable 4. Unknown
4. **If yes**, describe (last update, diseases included, case definitions, surveillance and control, integrated or different for each disease):

   _____

   _____

   _____
5. Is surveillance/IDSR included in your annual health plan (EFY 2004)?

   1. Yes 2. No
6. Is there any written community-based IDSR/surveillance plan of action for the current fiscal year for the district? Check the plan

   1. Yes 2. No

Case Detection and Registration

7. Do you have standard case definitions for the Country's priority disease like malaria? **(**Observed the standard case definition for each priority disease)

   1. Yes 2. No 3. Unknown 4. Not applicable
8. Does the district have the capacity to transport specimens to a higher level lab?

   1. Yes 2. No 3. Unknown 4. Not applicable
9. Does the district have guidelines for specimen collection, handling and transportation to the next level?

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

Data reporting

10. Have you lacked forms recommended for the country at any time during the last 6 months?

1. Yes 2. No

11. No. of health facilities (HP&HC) that sent the reports on time by each Weeks as indicated below. Put 'T' if sent timely or 'L' if sent late (use epidemiologic week of 2012)

Sno	Name of health facility	January				February				March				April				may				June				July				August			
		W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4
1																																	
2																																	
3																																	
4																																	
5																																	
6																																	
7																																	
8																																	

1. Number of weekly reports submitted on time: _____/12 times the number of health facilities
2. Number of immediately reports submitted on time: _____/3 times the number of health facilities
3. What are the diseases selected for your woreda to be reported by:

1. Expected number of cases in the woreda in 2011 _____2012:_____
2. No. of cases reported from the woreda in 2011 _____2012:_____
3. No. of cases in your woreda notified by health extension workers in 2010 & 2011:

1. Expected number of cases in the woreda in 2011 _____2012:_____
2. No. of cases reported from the woreda in 2011 _____2012:_____

3. No. of cases in your woreda notified by health extension workers in 2010 & 2011:

Cases	2011	2012
Malaria		
Measles		

4. No. of epidemics detected through the Case Based Surveillance(CBS) in previous 12 months that were notified to the next higher level within two days _____

5. Total No. of epidemics detected through the CBS in the last 12 months _____

6. No. of health facilities that sent at least one routine IDSR report in 2013 (Meskerem 2005-Nehase 2005 E.C) _____

7. How do you report to the next level?

1. Mail
2. Fax
3. Telephone
4. Radio
5. Electronic
6. Other

8. How can reporting be improved?

_____

_____

Data analysis Percent of sites:

9. Does the district describe data by person (case based, outbreaks) Observe

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

10. Describe data by place **(**Observe)

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

11. Describe data by time (Observe)

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

12. Perform trend analysis (Observe line graph of cases by time)

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

13. List diseases for which line graph is observed:

_____

_____

_____

_____

_____

14. Do you have an action threshold defined for any of the priority diseases?

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

15. Have appropriate denominators, Observed presence of demographic data at site E.g. population <5 yr., population by village, total population)

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

16. Who is responsible for data analysis? _____

17. How often do you analyze the collected data?

1. Daily
2. Weekly
3. Every 2 weeks
4. Monthly

Outbreak investigation

1. Number of malaria outbreaks suspected in the past 6 months:_____
2. List the disease _____

_____

_____

3. Have your district ever investigated malaria outbreak?

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

Epidemic preparedness

4. Does the district have a written Emergency preparedness and response plan for any of the outbreak prone diseases relevant to the area? (Observe the document)

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

5. If yes to Q 35, does this plan include community-based surveillance activities?

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

6. Has the district had emergency stocks of drugs and supplies at all times in past 1 year? (Observed the stocks of drugs and supplies at time of assessment)

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

7. Has the district experienced shortage of drugs, vaccines or supplies during the most recent epidemic (or outbreak)?

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

8. Is there a budget line or access to funds for epidemic response?

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

9. Does the districts have an epidemic management committee (Observed minutes or report of meetings of epidemic management committee)

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

10. Does the district have a rapid response team for malaria epidemic?

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

Responses

11. Has the district implemented prevention and control measures based on local data for Malaria disease or syndrome?

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

12. Has the district responded within 48 hours of notification of most recently reported outbreak (from written reports)

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

13. Has epidemic management committee evaluated their preparedness and response activities during the past year? (observe written report to confirm)

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

14. Is / are there CBS strategies to capture information from the community / or other informal sources? 1. Yes 2.No 3. Unknown 4.Not applicable

Feedback

15. How many feedback reports has the district received from higher level in the last year? (Observed at least 1 report at district from a higher level during the past year on the data they have provided)

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

Supervision

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

(Observed supervision report or any evidence of supervision in last 6 months)

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

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

(Obtain required number of visits from central level)_____

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

Reason 1_____
Reason 2_____
Reason 3_____

Training

19. Have you been trained in Malaria surveillance?

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

20. **If yes,** specify when, where, how long, by whom? _____ _____ __

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

Resources

22. **What resources/Logistics do you have in the district:**

i. Logistics:

1. Electricity 1. Yes 2. No
2. Bicycles 1. Yes 2. No
3. Motor cycles 1. Yes 2. No
4. Vehicles 1. Yes 2. No

ii. Data management

1. Stationery 1. Yes 2. No
2. Calculator 1. Yes 2. No
3. Computer1. Yes 2. No
4. Printer 1. Yes 2. No

iii. Communication

1. Telephone service 1. Yes 2. No
2. Fax 1. Yes 2. No
3. Radio 1. Yes 2. No

iv. Information education and communication materials

1. Posters 1. Yes 2. No
2. Megaphone 1. Yes 2. No
3. VCR and TV set 1. Yes 2. No
4. Generator 1. Yes 2. No
5. Other: 1. Yes 2. No

v. Hygiene and sanitation materials

1. Spray pump 1. Yes 2. No
2. Disinfectant 1. Yes 2. No

Surveillance co-ordination:

23. Is there a surveillance co-ordination focal point within the district epidemic management committee?

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

Satisfaction with surveillance system

24. Are you satisfied with the surveillance system?

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

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

_____

_____

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

_____

Chapter IV – Health Profile Description Report

4.1 District health profile description-Shebedino, Sidama zone, South and southern people region, 2013

Executive Summary

Background -.Health profile is a system of collecting and summarizing health and other health related events, demographic, socio-economic, political and cultural aspect of a particular district. This summarized and prioritized health and health related information is useful for planning, implementing and evaluating health programs. Therefore, well described health profile can be useful for health program managers and stake holders. The objective of this study is to prepare health profile of Shebedino district by identifying health problem and overall health status of the population in the catchment.

Methods: From May 3-10, 2013 health and health related data was collected in Shebedino district,. Interview and Standard check list were the main tools to collect the district health profile. The data sources were the district health office, district education sector, other district sectors and reports from national census and research articles. Data was compiled and analyzed manually and using Microsoft excel.

Results – Malaria is the top leading cause of morbidity at OPD leading by 40.3%, with incidence of 18.10 per 1000 population per year based on outpatient visit records, followed by Typhoid and diarrhea which account 13.76% and10.63% respectively. the proportion of delivery attended by skilled health personnel 16.2 %(1552/9575) and 15.4 %(1474/9575) attended by HEW in the same year. TB detection rate was low (58.84%) and Six TB cases were reported as defaulters. Absence of ITN's distribution in malaria endemic kebeles Safe drinking water supply coverage in the rural and urban community of the district was 21.4% and 32.6% respectively

Conclusion: Malaria, and Diarrheal dieseases were leading causes of adult morbidity in the district. While Pneumonia and Diarrhea were the leading causes of morbidity in under-five children. Extensive effort and attention should be given skilled delivery. IEC/BCC and strong follow up mechanisms should be established.to reduce morbidity and the potential complication of malaria, diarrhea and PTB.

4.1.1 Introduction

From epidemiologic point of view, it is crucial to prioritizes health and others health related condition occurred within the communities (1) .These summarized and prioritized data is important for public health surveillance officials, as they can uses it as a frontline of planning, implementation and evaluation of public health surveillance program conducted at communities level. The challenges of health profile description is non-existence of data especially in the remote area where there is no technologies implemented. (2)

Health profile is a system of collecting and organizing or summarizing health and other health related events to describe health conditions, demographic, socio-economic, political, cultural and other aspects of a particular population in the geographic area. It is crucial to prioritize health and health related events occurred in the area (1, 6). The summarized and prioritized health and health related information is basic for planning and for appropriate intervention; and is an entry point for operational research. It is very vital for prioritizing prominent health and health related problems of the community at any level. Public health managers and stake holders of health and health related issues will access evidence based information from well compiled health profile. However in countries like Ethiopia where Health Management Information System is not strengthened, such information especially at district level is usually not complete and comprehensive (1, 2, 6).

Ethiopia is a signatory to the Millennium Development Goals (MDGs) whereby the government committed itself to significant improvement of the health of the nation by 2015. The country also signed the Alma Ata Declaration on “Health for All” through universal primary health care (8). In order to translate those commitments into action, an efficient and effective health system is required.

Despite major strides to improve the health of the population in the last one and half decades, Ethiopia's population still face a high rate of morbidity and mortality and the health status remains relatively low (7). Vital health indicators from the DHS 2011 show a life expectancy of 54 years (3.4 years for male and 55.4 for female), and an IMR of 59/1000. Under-five mortality rate has been reduced to 88/1000 in 2010. Although the rates have declined in the past 15 years, these are still very high levels (7).

The major health problems of the country are largely preventable communicable diseases and nutritional disorders (7). More than 90% of child deaths are due to pneumonia, diarrhea, malaria, neonatal problems, malnutrition and HIV/AIDS, and often as a combination of these conditions (7).

In terms of women health, the MMR has declined to 217/100,000, but this is still among the world's highest figure.

The major causes of maternal death are obstructed/prolonged labour (13%), ruptured uterus (12%), severe preeclampsia/eclampsia (11%) and malaria (9%). Significantly, 6% of all maternal deaths were attributable to complications from abortion (7). The major supply side constraints affecting maternal health are shortages of skilled midwives, weak referral system at health centre levels, lack of inadequate availability of BEmONC and CEmONC equipment, and under-financing of the service (7). On the demand side, cultural and societal norms, distances to functioning health centers and financial barriers were the major constraints (7).

4.1.2 Objectives

The aim of this assessment health profile of this district are:

- To assess the health and others health related condition of the district
- To describe district health status, health indicators and to identify problems for priority setting.
- To determine disease burden and communicate health and others health related information accessible, practical in simple way.

4.1.3 Materials and Methods

Health and others health related data was collected in Shebedino district (SNNPR) from April-23-30/2013.

- Interview and discussion with concerned health office heads, experts, health professionals etc. and structure questionnaires were used as tools for data collection.
- Review available data in health offices and health institutions, Data source, Shebedino district health office, Shebedino education sector, district water resource Shebedino Mineral and Energy Office, Disaster Preparedness, Prevention and Control Office
- Review of publications and literature about the area office, and national housing a population census of 2007 G.C. Data was compiled and analyzed using micro-soft excel.

4.1.4 Results

4.1.4.1 Historical background and culture

Shebedino is one of the oldest districts in Sidama zone in SNNPR. It has been ruled by different sidama tribe before the introduction of formal government. According to an oral tale, district name was coined from the combination term of Shebe and dino, 'Shebe' was the name of the an individual involved in mediating when there were conflicts and frequent collision among different tribes, 'dino' in Sidamegna language mean where ? So where was Shebe when there were these conflicts? Then came up with new name of the district called Shebedino _means “to mediate or reconcile’’. There are no written documents about the precise meaning of the term Shebedino.

4.1.4.2 Geography and climate:

Shebedino district is one of the twenty-one districts of Sidama zone, located in the east of 18 km from Hawassa city and 298 from the capital city, Adiss Abeba. It is bordered with Tula town in North, Dale in the South, Gorche in the East and Borcha woreda in the west (1). The total area of the district 276.9 sq.km, of these 62,800 hectare is plow able land, 21,059 hectare is grazing land and 33,074 hectare is forest land. Its topography features range from peaks as high as 3000m above sea level to 1500m below sea level. The ‘weynadega’ and ‘Dega’ or cool temperate suitable for flora and fauna. Temperature of 16C^{o}-25C^{o} centigrade. Average annual rainfall range from 800-1600 millimeters (mm) beginning from April through November.

4.1.4.3 Administrative and political structure:

Shebedino district has thirty two (32) rural and three (3) urban kebeles, the nearest kebeles is Remeda and the remote one Arbegona. It has well organized political and administrative structure working harmonically with zonal as well as regional council. All sectors of the district are found in the town (Leku town). There are others medium and small investments working in the woreda. The district is supported by anti-HIV/AIDS clubs and Plan Ethiopia.

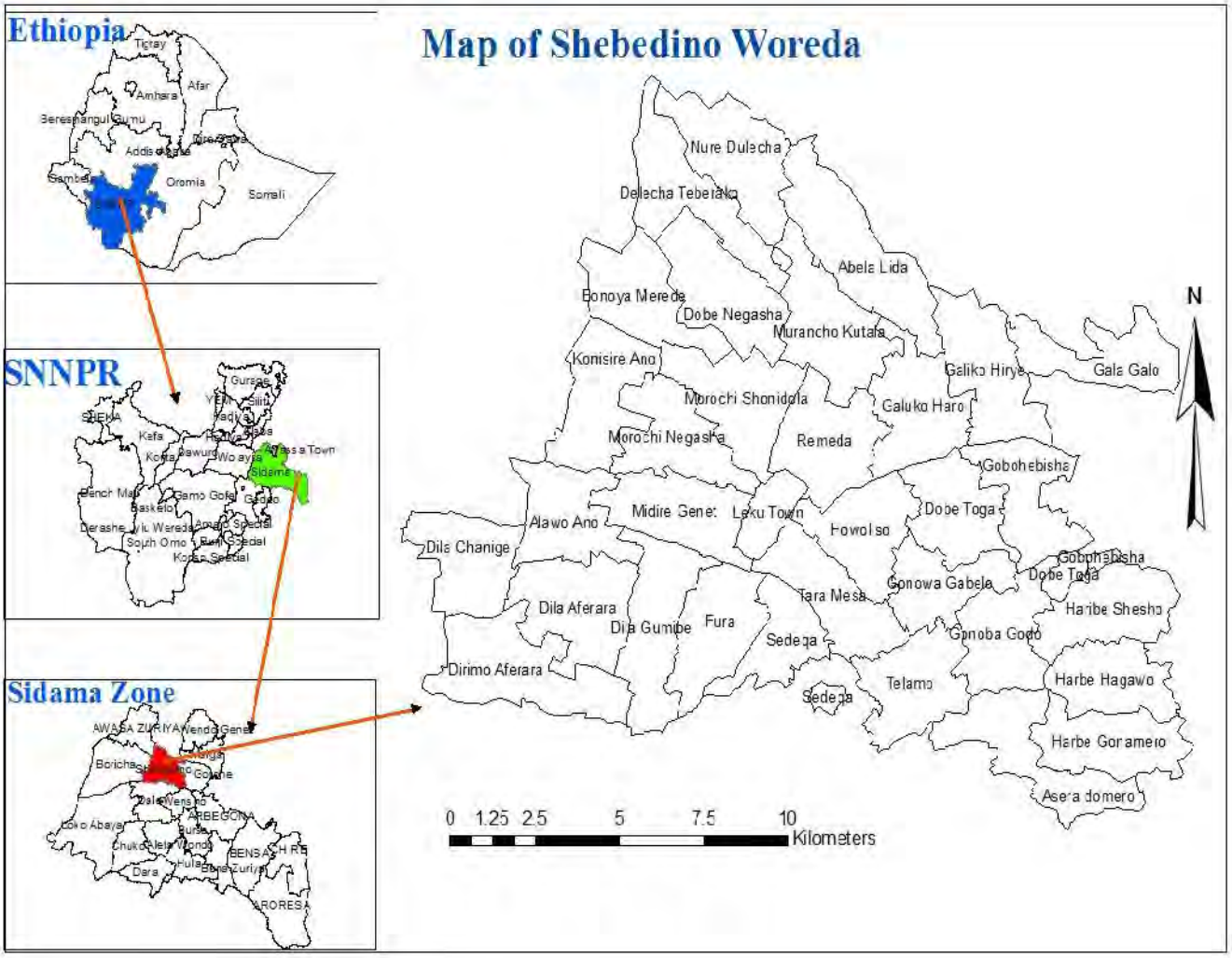

Figure 4.1.1: Map of administrative structure – Shebedino, Sidama, SNNPR, Ethiopia, 2005 (2012/2013)

4.1.4.4 Demographic Information

In 2005 E.C (2012/2013), the district population estimated to be 277,480 from which 49.5 % of the total population was female; with 4.8% (6551/137,353) of them (female) residing in the urban kebeles. Overall, 81 % of the populations both male and female were living in rural kebeles of the district. Out of the total population, 8519 (3.1 %) and 43,286 (15.6 %) were under one years of age and children less than five years of age respectively. Women under reproductive age (women 15-49 years of age) constitute 64,653 (23.3 %) of the population segment, this estimation is based on the projection of census finalized by Central Statistics Agency (CSA) in 2007

About 71 % of populations were protestant followers, Orthodox and Muslim and others formed 29 %.2005(2011/2013) estimated population and others vital statistics of the district shown in tables 1 below. There are different ethnic groups of population in Shebedino woreda.

Sidama is the majority of district residence occupying 76.5 % of the landmass with more than 71 % of total population living within the district. The others 29 % composed, Amhara, Oromo, and others different ethnic groups. Sidamegna language is the dominant speaking language in the woreda but Amharic is the officials language due to it ethnic diversification.

Table 4.1.1 Estimated Population by kebeles in Shebedino, Sidama, SNNPR, Ethiopia.2013

S/N	Kebeles	Total population	Remarks
1	Abela lida	12701	
2	Telamo	10368	
3	Dobe toga	10051	
4	Dobe negash	10035	
5	Kutla	9926	
6	Asrado mero	9869	
7	Genet	9838	
8	Diramo aferara	9334	
9	Dila aferara	9033	
10	Nure dulecha	8806	
11	Morcho shondolo	8699	
12	Dulecha tewarako	8683	
13	Taramesa	8511	
14	Galuko haro	8334	
15	Gunowa Gudo	8134	

16	Dila gunbe	8090	
17	M/Negash	7989	
8	B/**meride**	7936	
19	Gubo hebisha	7866	
20	A/Ano	7645	
21	Hewolso	7464	
22	Kosere Ano	7463	
23	G/Gabalo	7376	
24	G/Hereyo	7241	
25	Harbe Shifo	7189	
26	Dila Chenge	7143	
27	Fura	6747	
28	Remeda	6705	
29	Arbegona Mero	6697	
30	Leku 01	6380	
31	H/Hagawo	6034	
32	Sadek	6031	
33	Garalo	5472	
34	Leku 02	4323	
35	Leku 03	3367	
	Tot	277,480	

Table 4.1.2 Distribution of population groups by kebeles, Shebedino, Sidama, SNNPR, Ethiopia

S/N	Kebeles	Under 1 years	Under 5 years	Pregnant mother	Remarks
1	Abela lida	272	1229	202	
2	Telamo	212	713	108	
3	Dobe toga	229	1016	246	
4	Dobe negash	232	1250	253	
5	Kutla	289	1306	297	
6	Asrado mero	203	763	239	
7	Genet	65	486	67	
8	B/meride	357	1615	268	
9	Diramo aferara	249	1027	157	
10	Dila aferara	189	823	174	

11	Nure dulecha	283	1178	231	
12	Morcho shondolo	262	1085	240	
13	Dulecha tewarako	61	325	73	
14	Taramesa	218	1030	245	
15	Galuko haro	141	456	114	
16	Gunowa Gudo	144	649	117	
17	Dila gunbe	242	1096	219	
18	M/Negash	238	1075	244	
19	Gubo hebisha	124	561	127	
20	A/Ano	282	1276	291	
21	Hewolso	254	1150	261	
22	Kosere Ano	148	668	152	
23	G/Gabalo	127	573	130	
24	G/Hereyo	114	516	118	
25	Harbe Shifo	88	397	90	
26	Dila Chenge	179	807	183	
27	Fura	174	586	179	
28	Remeda	204	623	210	
29	Arbegona Mero	97	438	100	
30	Leku 01	193	770	198	
31	H/Hagawo	246	113	253	
32	Sadek	127	576	131	
33	Garalo	126	571	130	
34	Leku 02	132	598	143	
35	Leku 03	102	575	152	
	Total	6502	27828	6329	

4.1.4.5 Productivity and Income

The district is green and fertile land suitable for agriculture. About 81 % of the district population living in the rural kebeles and they are agriculture dependent. Coffee, Maize, Sorghum, Enset, chat and other roots product crops are the main products cultivated in the district in their descending order. coffee, which was cultivated on 22,772 hectares from which 832,905 quintals was produced, False banana cultivated on 16,940 hectares from which 670,801 quintals was produced, Maize cultivated on 1,306 hectares from which 79,003 quintals was produced, Beans cultivated on 1,669 hectares from which 34,921 quintals were harvested and other crops were the main products cultivated in the district in their descending order.

4.1.4.6 Education

Shebedino woreda/district has 47 primary schools, subdivided into 8 first cycles and 39 second cycles, and 2 secondary schools. In 2005 EY (2012/2013) 66,743 students were enrolled to school in the district. First cycles elementary schools (grade 1-4) have a total pupils of 44529 (67%) with 22617 (50.8%) were female. Second cycle school (grade 5-8) have total students of 17,660; with 9283 (52.6%) of female. There are two secondary schools in the district has total of 4554 students. The majority of students enrolled in secondary school were male (53.1%).

Out of 47 schools (both primary and secondary) in the district 5 (28 %) of them have provision of safe water supply, and 2 (11%) have functional latrines for both male and female. All the woreda schools have anti-HIV/AIDS clubs, the district has 100% provision of anti-HIV/AIDS clubs services in each school.

Table 4.1.3 Number of institution and educational status, Shebedino, Sidama, SNNPR

YEAR,E/C	Number of Institutions/ educational statues											
	1-4			5-8			9-10			11-12		
	M	F	Total	M	F	Total	M	F	Total	M	F	Total
2004	17080	18791	36599	7434	6113	13547	1926	2650	4576	81	23	104
2005	18687	19857	38544	6999	8110	15109	1524	1624	3148	203	49	252

4.1.4.7 Facilities

Electricity is one of the modern sources of energy used as source of power at resident's level. The district town, Leku, has a provision 24 hours of electric power since 1953 EC. There was totally no accessibility of electric power in the 28 health posts, there is a cables based telephone and mobile service 98% and 96% respectively, postal service and Bank (Commercial Bank of Ethiopia). In addition, 70% television and 90% radio users in the woreda.

Regarding transportation, the district is crossed by big road from Addis Ababa to Moyale town which is 17 kilometer asphalt. About 95.8 % (34/35) of health posts is accessible to transportation but only two kebeles which are new incorporated under Shebedino district recently have no transport accessibility. From the district there are four main roads connecting these thirty two kebeles each other's.

4.1.4.8 Shebedino district health system Organ-structure

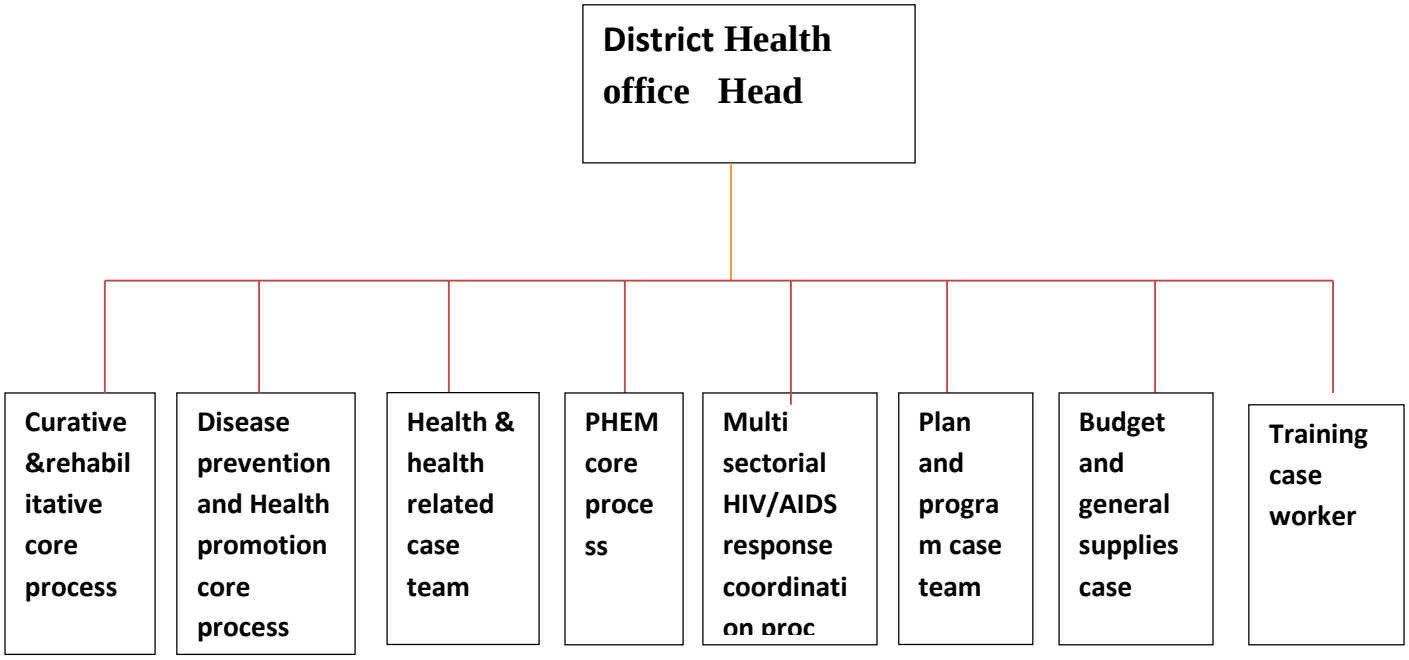

Figure 4.1.2 Health office organizational structure-Shebedino, Sidama zone, SNNP, Ethiopia, 2013

4.1.4.8 Organizational structure of district health office

The district health office structure is well organized and is part of the woreda administrative council cabinet. Despite the district health officials took training on new policy designed by the government Business Processing and Re-engineering (BPR), they did not start to implement the policy.

The district health services coverage was 81 % estimated from ten functional health centers and Health posts. Theses health centers have been giving VCT and ART follow up services. More details on the availability of health facilities of district will be shown (table 3) below:

Table 4.1.4 Availability of health facilities by type in Shebedino district –SNNPR, April.2013

S/N	TYPE	NUMBER	REMARK
1	Hospital	1	
2	Health Center	7	
3	Private HFs (clinics, diagnostic lab, drug stores)	6	Not standard
4	Health posts (HPs)	32	

4.1.4.9 Health indicators and vital statistics

Health indicators and vital statistics are important for estimation of country or district growth. In Shebedino district, there was no data on vital statistics like infant deaths, under five deaths, maternal mortality rate and others crucial data.

Table 4.1.5 Distribution of vital statistics in Shebedino woreda –SNNPR, April.2013

S/N	INDICATORS	Number (%)	REMARKS
1	Total population	277,480 (100)	
2	Male	140,019 (50.5)	
3	Female	137,461(49.5)	
4	Under 1 years old	9450 (3.4)	
5	Under 5 years old	43287 (16)	
6	Women 15- 49 years old	64652.8 (23.3)	
7	Pregnant women	9156.8 (3.3)	
8	Urban	52721 (18.9)	
9	Total live births	9045.8(3.26)	
10	Rural	224,759 (81.1)	
11	IMR/1000	No data	
12	Under 5 MR/1000	No data	

4.1.4.10 Immunization coverage

The district has conducted both static and outreach immunization services in 2005 EFY, (2012/2013.Out of 9450 targeted populations, immunization coverage for children < 1year of age was 95.50% (9028/9450) for BCG, 95.30 %(9007/9450) for Penta1, 93.72% (8857/9450) for penta3, for measles and fully vaccinated 8465/9450 (89.58 %) and 8446/9450(89.38 %) respectively. PCV1 and PCV3 was 84.7%and 81.7%. Dropout rate for Penta1to Penta3 and Penta1 to measles was 1.67% and 6.1% respectively which is acceptable from the standard.

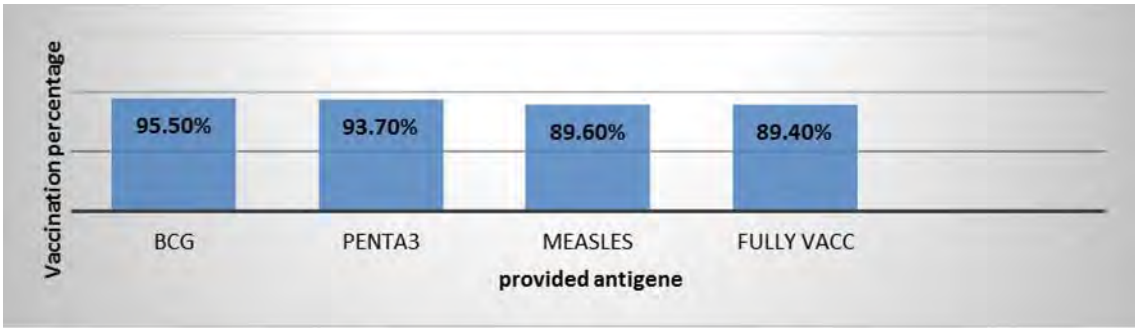

Figure 4.1.3 Children under 1 year vaccination coverage-Shebedino, Sidama, SNNP,2013

4.1.4.11 Mothers Health Services Coverage

Regarding ANC services,), Based on 4 times visit, the ANC achievement was 38.62 %(3698/9575) and the proportion of delivery attended by skilled health personnel 16.2 %(1552/9575) and 15.4 %(1474/9575) attended by HEW in the same year and 24% of targeted women got Post Natal Care (PNC) service.new and repeat family planning acceptance was 80 %(51,874/64,653).TT dose given, 31347/64653(48.48%).

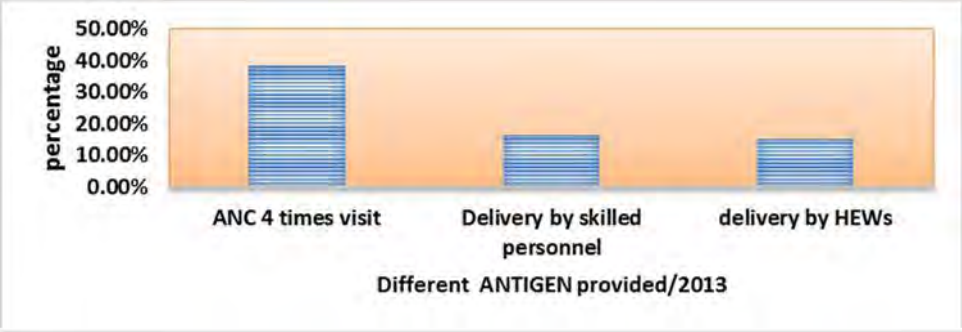

Figure 4.1.4 Percentage mother health services provided Shebedino, Sidama, 2013

4.1.4.12 Water supply and Sanitations

In 2005 EC (2012/2013), the provision of safe water supply coverage was only (19/35)54.4% of Kebeles.This was because of unequal distribution of constructed boreholes among kebeles. Shallow well, deep well and protected spring were not common in the district but communities at the remote areas used ponds, unprotected springs, rivers and other unprotected water sources. The main water sources are borehole (20), unprotected springs (11), Protected springs (6)

The health office disease prevention and health promotion core process in collaboration with HEWs created communities awareness of the district on the important of personal hygiene and environmental sanitation, As a result, the district latrines coverage and utilization was 76.8% and 75.4 % respectively, in addition to this,6834(60%) model families trained by health extension package, This families play a great role by constructing latrines at each households (HHs) level 4176(52%) and constructing communal latrines 92(41%) where peoples gathered area and road sides. From total 35 kebeles (42.86%) 15, were declared as free of open defecation. The district was used newly designed health development army strategy to reach each house hold on hygiene and sanitation as well for other health programs.

Table 4.1.5 Distribution of hand dug well by kebeles, Shebedino Sidama/2013

No.	Type of drinking water source	Number	Functional	Nonfunctional
1	**Borehole(hand pump)**	8	2	6
2	**Protected spring**	19	12	3
3	**Shallow well**	6	1	4
4	**Deep well**	2	1	1
Total		35	17	11

4.1.4.13 Health education

There was no compiled data of health education provided but the services was conducted on family planning, ANC , PMTCT, nutrition Tuberculosis and Diarrheal diseases others public health concerns. 121,710, 5000 and 918 people got health education on Environmental Sanitation and water hygiene, Malaria, HIV/AIDS, respectively.

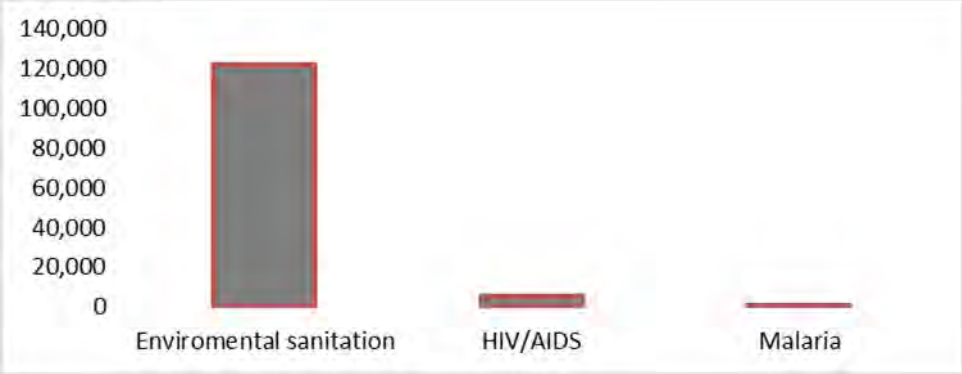

Figure 4.1.5: Health Education given to the community-Shebedino, Sidama, 2013

4.1.4.14 Top leading causes of Morbidity and Mortality:Malaria is a major public health problem presented both at outpatients and inpatients department of health facilities in the Shebedino district. In 2012/13 GC, .A total of 14,927 malaria cases were seen at outpatients and inpatients departments of which 44.96 %(6705) of them were confirmed, form this [*P.falciparum* (66.6%), *P.vivax* (33.4%).The leading causes of OPD & IPD visit in the district are shown in tables 6&7 below:

Table 4.1.6 Top ten causes of Adult outpatients department visit, Shebedino- Sidama, 2013

S/N	Type of Disease	Cases		Remark
		Number	percent	
1	Malaria confirmed	5023	40.28 prev rate	18.10/1000
2	Diarrhea disease non-bloody	1716	13.76	
3	Typhoid fever	1325	10.63	
4	Intestinal parasitosisi	1232	9.88	
5	Gastritis	1029	8.25	
6	Pneumonia	704	5.65	
7	Acute upper resparat infection	414	3.32	
8	UTI	377	3.02	
9	Skin infection	332	2.66	
10	Trauma(injury, fracture)	318	2.55	

Table 4.1.7: Top five causes of inpatients/admissions in pediatrics, Shebedino, Sidama/2013

S/N	Type of Disease	Cases		Remark
		Number	percent	
1	Diarrheal with DHN	872	54.0	
2	Pneumonia	457	27.9	
3	Acute upper resp infection	211	13.1	
4	Severe acute malnutrition	137	5.6	
5	Accidental injury	96	4.7	

Table 4.1.8: Top ten causes of under-five years' outpatients' visit-Shebedino Sidama/ 2013

S/N	Type of Disease	Cases		Remark
		Number	Percent	
1	Mild Pneumonia	872	48.3	
2	Malaria confirmed	457	25.36	
3	Diarrhoea without DHN	211	11.70	
4	Tonsillitis/Sore throat	137	7.6	
5	Ear Infection	96	1.1	
6	Intestinal parasitosis	12	0.7	
7	Conjunctivitis	7	0.6	
8	Skin infection	6	0.5	
9	Taenia captis	3	0.2	
10	Accidental Injury	1	0.1	

4.1.4.15 Endemic diseases

4.1.4.15.1 Malaria

Malaria is endemic in the district throughout the year. 25/35 (71.4%) kebeles in the district throughout the year with 176,925(71%) of population at risks of being infected by malaria. In 2005 EC (2011/12), a total of 14,912 malaria cases were reported at outpatients and inpatient departments in which 6705(44.96%) positive for hemoparasite, 3028(45.16%) cases were plasmodium Vivax and 3577(53.34%) cases were plasmodium falciparum, the rest cases 8207(55.03%) were clinically treated.

The ITNs coverage is 44.96 % and Utilization rate were 32% in the district for the year of 2005EFY 2012/13. In (2012/2013) IRS in kebeles was conducted, from planned 27,108 households 9353(34.50%) households were covered, and 87,225 populations protected from malaria. The district had no shortage of coartem, RDT but there were shortage on budget Chemicals for IRS.

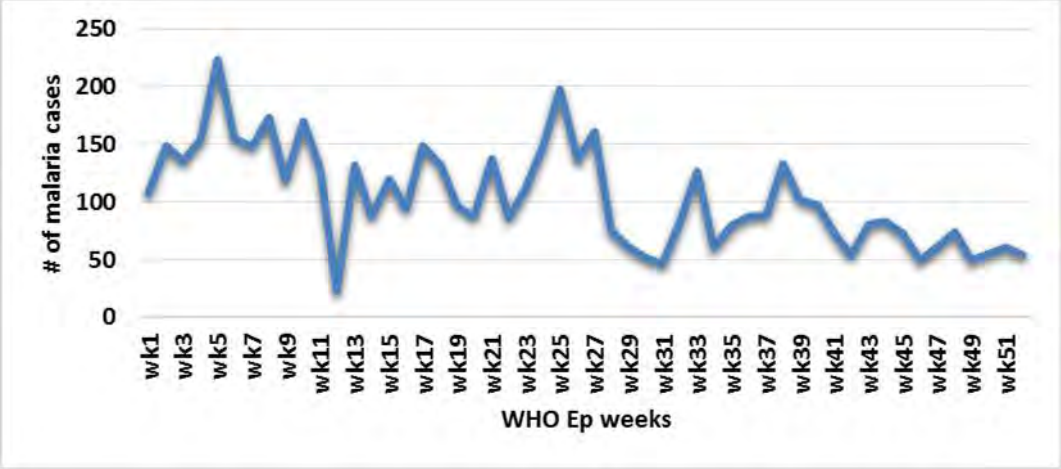

Figure 4.1.6 Trends of malaria cases, Shebedino, Sidama, SNNPR/2013

4.1.4.15.2 Tuberculosis and Leprosy

The general objectives of the TLCP is to reduce the incidence and prevalence of TB and leprosy as well as the occurrence of disability and psychological suffering related to both disease and the morality resulting from TB to such an extent that both diseases are no longer public health problems.

In 2005 EC, Expected number of new smear positive TB case was 503, of this 363 all forms of new smear positive TB cases detected by TB DOTS program was reported from health facilities, from this the total new smear positive (PTB+) 296, smear negative cases (PTB-) was 176 and extra pulmonary TB+ were 31. Case detection rate 58.8 %(296/503), which was below the standard (70%).There was 2 new cases of leprosy (MB+PB), zero case for Grade II disability new cases (MB+PB).

Table: 8 distribution of tuberculosis cases by health facilities, Shebedino, Sidama zone, 2013.

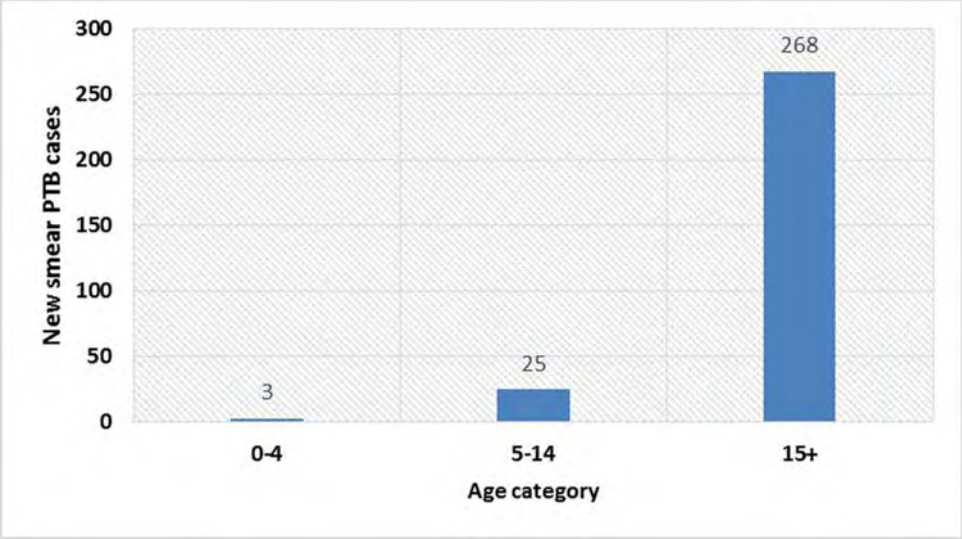

Figure 4.1.8 Distribution of new PTB cases, Shebedino, Sidama, SNNPR/2013

Table 4.1.8 PTB status in Shebedino, Sidama /2013

DOTS clinic	H/Center	Hospital	Total
Smear positive TB cases enrolled in cohort	223	0	223
Treatment completed PTB+	118	5	123
Cured PTB+	166	13	179
Defaulted PTB+	4	2	6
Deaths PTB+	12	0	12

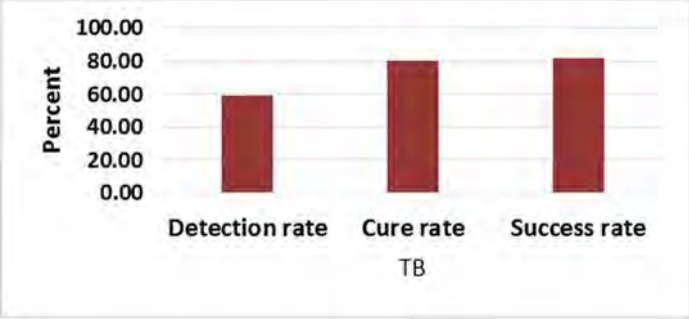

Figure 4.1.9: TB cases detection rate, success rate and cure Shebedino, Sidama, 2013

4.1.4.15.3 Immediately Reportable Diseases

There was a public health emergency preparedness and response plan which was funded or budgeted, PHEM trained focal person one at woreda level and 18 (5 female and 13 males) at health facilities level and trained Rapid Response team (RRT).There was well defined structure of reporting system, surveillance core activities, case detection and reporting completeness more than 85%, but data analysis was not performed and used at woreda level, problem in supportive activities of the surveillance system-lack of budget.

In 2013EFY, of the immediately reportable diseases under Public Health Emergency Management (PHEM), Shebedino district health office reported 119 meningitis cases with attack rate 46/100,000 resulted in 4 community and hospital death, Public health actions conducted Case management, Reactive vaccination campaign to residents for specific, Age group 2-30 years & high risk settings Seven sporadic Measles suspected s cases were reported and blood samples were collected from all cases and sent to EHNRI the outcome was negative.

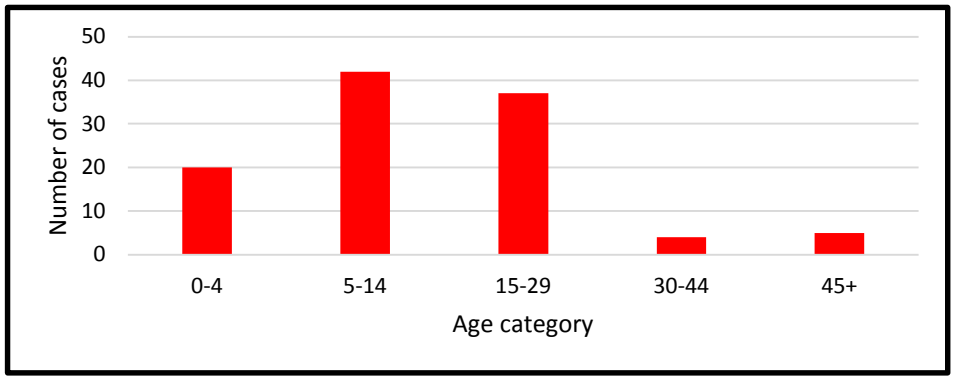

Figure 4.1.10 Number of meningitis cases reported, Shebedino, Sidama/2013

4.1.4.15.4 HIV/AIDS

A total of 4905 persons (clients) were counseled and tested for HIV in 2012/13, of these 1475 were female (Fig 4.1.9). Out of total screened, 121 clients were positive for HIV virus, among this 66/121(54.5%) were females.Number of patient on ART and cases were ever enrolled on ART 159 and 378 respectively in HC as well as Hospital, The district health office in collaboration with DKT Ethiopia supplied condoms in line with health education to prevent youth from HIV virus infection.

Adult HIV/AIDS prevalence the zone is 136/144,290 (0.09%). Persons who were put on Anti retro viral (ART) program service follow up in HC and hospital 159.

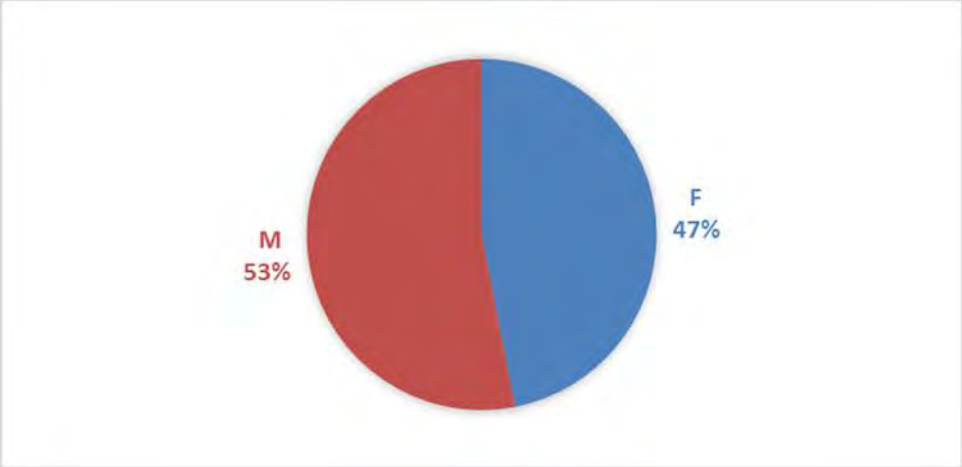

Figure 4.1.11 Total clients screened for HIV by sex- Shebedino, Sidama/ 2013

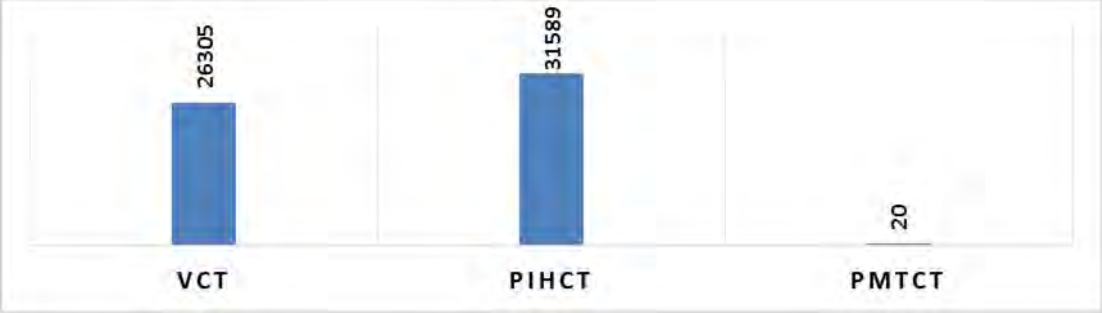

Figure 4.1.12 Total clients screened for HIV-Shebedino, Sidama, Ethiopia, 2013

4.1.4.16 Nutritional status and disasters

In 2005 EY (2013), there was 603 malnourished children less than five years from different OTP sites reported. There was no TSF programs working toward improving nutritional status especially in under 5 children, pregnancy and lactating women. Regarding disaster, the district has not been experienced to any disaster so far.

4.1.4.17 Health budget allocation

In 2012/2013, a total budget allocated for health activities (breakdown for all form of activities) was 10,584,694 ETH Birr. For strengthening Health Care Financing in the woreda a total of 125,180.50 Birr was allocated. There was no external financial source that supports the district health office.

4.1.4.18 Human resource for health office (all type)

Shebedino woreda/district has 6 (six) physicians working in Leku Hospital. Table 8 below demonstrates human resource working under health office:

Table 4.1.9 Human resource working under Shebedino health office/2013

Category	Number	Remarks
Physicians	6	
Health officers	16	
Nurses(all type)	116	Only 8 BSC nurse available
Laboratory technicians	18	
Pharmacy	21	
Environmental health	4	
HEWs	74	

4.1.5 Limitations.

1. Health facilities were not recorded and reported full data of specific diseases.
2. There was no relevant information regarding district background from culture and tourism office in the district and also there was no compiled deaths report at health facilities as well as at district level due to HMIS reporting formats.
3. Some of sectors responsible bodies did not found at the woreda

8.1.6 Discussion

Accessibility of the district very good road even inside the city and also there is transportation facility in every direction. Availability of communication facility like Telephone, mobile and internet etc. The health service coverage of the zone was around 94%.The health performances like maternal and child health activities' are in a good condition.

According to data collected from public health facilities in the district, malaria was the leading cause of morbidity in adult outpatient visit due to malaria is endemic in the district (71.4%) kebeles and (71%) of population at risks of being infected by malaria and early detection, inconsistent prevention and control measure, lower ITN (45 %) and IRS (35%) coverage.

The overall provision of safe water supply was 47.6 %, which majority of the this shared by spring water which may not have good quality and this may have contributed to the higher rate of diarrhea and intestinal parasitosis in the district, which was 14.77%(7675/51,948) of the outpatient visit.

The HIV prevalence of the district based on the health facility data such as from VCT, PMTCT, and PITC was 0.09% which gave a total of 209 PLWHA in 2013. There was low awareness on female clients' because female clients have negative attitude towards HIV testing services according to Health Centers staff response and also only a few women came for ANC were screened for HIV. Therefore, minimizing missed opportunity by initiating all pregnant women when they are given ANC will be improved.

The smear positive pulmonary tuberculosis detection rate (44.33%) was very low compared to the minimum required standard of WHO (i.e.70%), as different studies proved these could be due to delay in detection of Active case search and taking early management.There was absence of measles outbreak, food shortage/malnutrition cases and drought in the district and the status of measles immunization (89.58%) in under 1 years,. There was shortage of IDSR format, Fax, computer, fuel. According to the district health officials, the main problems of the district was very limited regular budget, shortage of medical supplies

4.1.7 Conclusion

Malaria is the major public health problem in the district and it is the leading causes of morbidity. Insecticide treated bed nets and indoor residual spraying coverage should be enhanced and conducted as an interventions activity and preventive measures. Diarrhea and intestinal parasitosis was also found to be the major health problem of the region next to malaria.

Family planning acceptance was good, but Proportion of delivery attended by skill health personnel low, 16.2 %(1552/9575). TB detection rate was low, No vital statistics records like, mortality records, birth records, and shortage of medical supplies. The proportions of pregnancies received ANC services and delivery attended by skilled health personnel coverage low. There were lower latrine and utilization coverage.

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4.1.8 Recommendation

- Sustaining the malaria interventions so as to increase the current achievements and roll back the disease as figure (4.1.6.)
- Close follow up and technical assistance is needed when no reports are coming from the region. Having complete report helps the analysis and interpretation to be more meaningful and acceptable.
- The recent reporting format lacks some important variables such as different age category (other than having two age groups) which helps to allocate logistics and supplies.
- The proportions of pregnancies received ANC services and delivery attended by skilled health personnel, Extensive effort and attention to skilled delivery should be improved.
- Presence of treatment failure and defaulter may facilitate Multi-Drug Resistant (MDR) TB which is dangerous and very difficult to treat in nearby health facilities. Therefore, special attention should be given on defaulter tracing mechanism and DOT strategy should be fully implemented in the area
- Therefore prevention and control measures should be strengthened to reduce the morbidity of malaria, diarrhea, and other priority diseases. The district should also be supported by the higher level government entities and NGOS for emergency preparedness and response, vital statistics recording should be present

4.1.9 Acknowledgement

I would like to express my gratitude to head of Shebedino health office, experts of educational programs and water resource office for their contribution during profile data collection period. Next my deep cheerful will be to some elder of the district for telling me the historical background of the district and SNNPR/PHEM staffs.

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Annex 4 Data collection tools for health profile-Shebedino, Sidama, South Southern Nation and Nationality, Ethiopia, 2013

Shebedino district health profile, (2013/2005 E.C)

Historical Aspects of the area (only if relevant)

_____Geography and Climate (including map, altitudes, agro ecological zones etc…)

Location _____ _____ _____

Altitude _____

Annual rain fall_____

Climatic zones_____ _____ _____ _____

Political and Administrative Organization

No of kebeles_____

List their names _____

District boundary_____ _____ _____ ____

Population and population structures

Total_____

Male _____

Female_____

Under 1yrs_____

Under five yrs_____

Sex ratios_____

urban_____

rural_____,

Ethnic composition _____ _____

Literacy status_____

< 15 years_____

>64 years_____

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

Average income/year_____

Education ----------

Facilities (Transport, Telecommunication, Power supply, …)

How many of the health centers have access to

Transportation_____(%)

Telecommunication_____(%)

Electric power_____(%)

Disaster Status in the area

Was there any disaster in the district in the last one year?

_____

Vital Statistics and Health Indicators

Infant Mortality Rate_____

Child Mortality Rate_____

Crude Birth Rate_____

Crude Death Rate_____

Maternal Mortality Rate_____

Contraceptive Prevalence rate_____

ANC rate_____

Immunization Coverage;

Measles_____

Penta-valent_____

Health staff to population ratio:

Health officers_____

Nurses_____

Medical lab_____ Pharmacy_____, Environmental health _____

Health extension workers_____

Others`_____

Health Services

Hospital_____ Health center_____ health post_____

Private facilities;_____, _____, _____

Health institution to pop ratio_____

Health service coverage

Top and leading causes of OPD visit:

_____

Admission_____

Health budget allocation_____

Community Health Services;

Status of services provided by community health workers namely:

TBAs_____

CHWs_____

HEWs_____

Other_____

Status of Primary Health Care Components – with focus on the eight PHC elements MCH/FP
_____
_____
EPI _____
_____
_____

Environmental Health
_____
_____
Health Education_____
_____
Endemic diseases:_____

Malaria_____
TB/Leprosy
Total TB cases_____ PTB negative_____ PTB positive____ Extra PTB _____
TB detection rate _____
TB treatment success rate_____
TB cure rate_____
TB defaulter_____
Death on Treatment_____
Total Leprosy cases_____

HIV/AIDS;
HIV positive screened for HIV_____
HIV prevalence_____

HIV Incidence_____
PLWHA_____
VCT_____
PMTCT_____
ON ART_____
PITC_____

Nutrition_____
_____
_____

Essential drugs:
_____

(What do you think on) the main problems of the district are?
_____

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

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

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Chapter – V Scientific Manuscript for peer reviewed Journals

Abstract:

1.2 Title: Outbreak of Measles in Humbo district, Welayita zone, Ethiopia, September, 2013

Abstract Text:

Background: An estimated 10 million cases and 164,000 deaths from measles occur worldwide each year. On 25 September 2013 Welayita Zonal health department reported suspected measles outbreak. We investigated to verify the existence of the outbreak, identifypossible risk factors and recommend control measures.

Method: We define a cases as any person with fever and rash (maculopapular) with any cough, coryza or conjunctivitis living in the affected communities from September 25 to October 30, 2013. We reviewed medical records of patient and active cases searched in the affected communities. Questionnaires were administered to care givers of 40 cases and 80 controls to obtain health and immunization status through immunization cards and/or care givers recall.

Results: During the study period we identified 168 suspected cases and without death report. (AR=2.21/1000). The median age was 6 years (range 3 months to 18 years). 40% of the cases were under 5, followed by 27% of 5-9 years. The administrative coverage 98%. We compared 40 cases to 80 controls with median age 5.5 years(3 months-24 years) and found that prior vaccination (odds ratio (OR) =0.15, 95% confidence interval (CI): 0.06-0.36) and knowledge of measles transmission (OR= 0.13, 95%CI: 0.05-0.31) were protective of disease and recent travel to areas with active measles cases (OR=3.80, 95%CI: (1.53-9.74) were associated with higher rates of disease. Among five samples tested three positive for measles specific IgM.

Conclusion: Low measles immunization, poor knowledge of transmission of measles, and recent travel to areas with active measles cases and accumulation of susptible groups in under 5 years age may be responsible for this epidemic. We recommend to improve routine and SIAs immunization to highly affected communities.

Keywords**:** Measles outbreak, Ethiopia, Welayita, case control, Humbo.

1.2.1 Introduction

Measles is a highly infectious disease that is transferred from one person to another through aerosolized droplets or by direct contact with the nasal and throat secretions of infected persons ().Measles transmission is prevented by vaccination and in sub-Saharan Africa, it is recommended that the vaccine be given at 9 months of age, by which time the child would have lost passive immunity conferred by maternal antibodies. One dose of measles vaccine confers life-long immunity to approximately 85% of those vaccinated (1).

Childhood immunization programs targeted at children less than 59 months have led to a marked decrease in measles infections and outbreaks (2). However, in order to interrupt the endemic transmission of measles virus; a population immunity of ≥95% has to be achieved (2). Measles case fatality is estimated to be between 3 to 5% in developing countries and may be as high as 10% during epidemics (1). Despite the efforts made at increasing immunization, measles remain a leading cause of under-five mortality in Africa (3).There were 139, 300 measles deaths globally in 2010 which represents nearly 380 deaths every day or 15 deaths every hour (4). Nigeria is one of the 45 countries that together account for 94 percent of the global deaths caused by measles (5)

Measles-case based surveillance is a system put in place to detect cases and outbreaks of measles. It involves reporting and investigating any suspected case of measles and to use the data to evaluate immunization efforts and predict outbreaks through the identification of geographical areas and age groups at risk (1). In 2006, measles case based surveillance was established in Ethiopia using the resources and infrastructure of the already established surveillance for Acute Flaccid Paralysis (AFP). It involves both passive and active surveillance (2, 3).

In 2008, the WHO African regional office set a regional pre-elimination goal to be achieved by the end of 2012. The goals include (1) reducing the incidence of measles to < 5 cases/ 106 population per year in all countries, (2) increasing the first dose of measles containing vaccine (MCV1) to greater than 90% at the national level and greater than 80% in all districts and (3) measles surveillance system performance that reports non-measles febrile rash illness rate of ≥2 cases per 100,000 population per year (6)

Ethiopia has committed to the World Health Organization (WHO) to accelerate measles control program by intensifying measles surveillance through case based surveillance system, strengthening routine infant immunization and giving a second opportunity for measles immunization through catch up and follow up measles supplementary immunization activities. Ethiopia is progressively improving the routine immunization coverage against measles from 52% in 2000 to 82.4% in 2010. In addition several follow up measles SIAs has been conducted since 2011 to 2013.

Despite the above efforts, the country has experience several outbreaks since 2008. In 2010, a total of 193 outbreaks in 140 woredas were recorded in the year 2010, with over 4,000 confirmed outbreak cases. SNNP regions accounted for 37% of the confirmed cases. Efforts have been made over the years to strengthen capacity at regional and zonal level to effectively investigate suspected outbreaks, however gaps still exist and most outbreaks are not investigated to the level of scientific documentation.

In SNNP region there were frequent measles epidemic have occurred in different zones, among these Welayita zone was one of the epidemic affected area in with high administrative measles vaccination coverage which was paradox phenomenon. Eleven districts have been affected, these are: Kindodidaya, Humbo Damot gale, Damot sore Damot pulassa Damot woyide Dugna fango, Offa, Sodo town and Sodo zuria .A total of 1966 cases of measles were reported in the last 6 months from Welayita zone.

On September 25, 2013, Humbo district health office reported to the SNNP regional health bureau PHEM department, 25 suspected measles cases without deaths occurred in one kebele (Tebela) of the district. The region deployed a team of investigators on September 27, 2013 to undertake possible investigations and intervention measures. The team was prepared to the field by developing questionnaires and equipped with necessary materials (Supportive treatment get from the Humbo district health office).

1.2.2 Background of Humbo District

Humbo is one of the woreda in Welayita zone in Southern region of Ethiopia. The administrative town of Humbo woreda is Tebela town which is located 18 km and 165 km south of zonal capital Welayita Sodo and the regional capital Hawassa, respectively. The woreda has 41 administrative kebeles out of which 38 kebeles are rural kebeles. According to the 2007 national census, the projected population of the woreda is estimated to be 148,950 in 2012/13. Of this, the under-five population is 23,236 and the expected number of pregnant mothers is 5,362. The average size of a household is 4.7. There are 6 health centers and 38 health posts in the Woreda. Only 6 HPs and 4 HCs have water access. There are a total of 284 workers in woreda health sector; 120 health workers, 86 HEWs and 78 supportive staffs. Currently, 682 health development armies deployed in all kebeles of the Woreda

1.2.3 Objectives

1.2.3.1 General: -

- To investigate and identify risk factors of suspected measles outbreak in Humbo district, Welayita zone, SNNP Region

1.2.3.2 Specific: -

- To confirm the existence of the outbreak
- Describe the outbreak by person, place and time
- Identify possible risk factors
- Recommend and take control measures

1.2.4 Material and Methods

Based on WHO case definition, as any person with fever, maculopapular generalized rash and cough, and either coryza, or conjunctivitis or any person in whom a clinician suspects measles. We collected standard line list that includes variables like name of patient, age, sex, address, date of onset, date seen at health facility, vaccination status and specimen taken and outcome of the patient from Tebela, Fango Gelchecha health centers and Humbo district health office.

We made house to house visit to assess additional cases and conduct case - control study to identify potential risk factors to its transmission, complication and mortality; with two control per each case (40 cases and 80 controls) in regard to variables house hold size, recent travel history to areas with active measles cases, knowledge of measles transmission, vaccination status, occupation and literacy level. Vaccination history was obtained from Patient recall and by seeing the immunization cards.

We interviewed cases, controls, community leaders and health professionals of the district health office and health facility in detail, to ask if there were any drought that occurred recently that lead the population to high rate of malnutrition and from where the source could be. Data of malnutrition Prevalence of the district also collected from SNNP regional health bureau nutrition department.

1.2.4.1 Study design: Unmatched case-control; we recruited cases from the community through house to house search of cases, Controls were recruited from the neighborhoods of cases .Data source: H/c record review and active case search in the communities. Data collection method: Interviewer administered questionnaire and we collected information regarding demographic characteristics, socio-economic status, education, clinical symptoms and potential risk factors (vaccination status, contact etc.) .Data analysis using Microsoft Excel and Epi Info software 3.5.3 (CDC Atlanta, USA); Bivariate analysis was done to identify risk factors.

1.2.4.2 The study population: was composed of the inhabitants of the Welayita Zone in Humbo Woreda involved kebeles in the measles outbreaks. Humbo woreda has a total population of 98,135 of which 48086 are males and 50049 are females, our study populations from 25 kebeles are 7 Kebeles selected depending on the admitted cases were coming, those populations was approximately 44,430.

1.2.4.3 Study area: The study was conducted in Humbo district of Welayita Zone; Southern Nations, Nationalities and Peoples' Regional State. Humbo woreda has 41 kebeles of which 2 is urban and 39 are rural kebeles. The study was conducted in 7 kebeles and two admission sites were selected based on their access to transportation services. These are Tebela H/C and Fango Gelchecha H/C.

1.2.4.5 Study design

The case-control part of the study was conducted from October 1-10, 2013.The study units were measles cases at household and person admitted with measles case in health facility. For each case, 2 controls were selected from the general population of the same Kebeles. Cases and controls were not matched individually for both age and place of residence.

1.2.4.5 Study period: Surveillance data were analyzed from all reported cases since the beginning of the first outbreak on September 25, 2013G.C. until the end of October 30, 2013G.C. However, the case-control study began on October 1, 2013G.C. and enrollment of the controls continued until October 10, 2013G.C.

1.2.4.6 Data dissemination: Written report (both hard and soft copies) was prepared and shared to Addis Ababa University School of Public Health Resident advisors and coordinators, SNNPR Health Bureau of PHEM.

1.2.7.1 Operational definition

D. **Suspected measles case: In** this investigation suspected measles case is any person in the study area from September 25, 2013 to October 2013 G.C with rash, fever and one of the following: Cough, coryza, and conjunctivitis.
E. **Confirmed case definition** any ill person from these localities in the same year, with laboratory confirmation of measles specific IgM antibody from the serum.
F. **Vaccination status:** Individuals were considered to be vaccinated if vaccination was documented in their vaccination cards or by history.

1.2.7.2 Inclusion and Exclusion Criteria

A. Inclusion criteria: All measles cases admitted in selected 2 health facility. / For measles cases/

Persons without measles in the community. / For control/

B. Exclusion criteria

- Persons without measles cases./ for measles cases/

A history of measles disease since the beginning of Humbo woreda outbreak

Who was recovered /for control/

1.2.4.9 Sampling Procedures

c. **Cases:** We first select 2 admission sites which are accessible to road. Then took all persons admitted with measles cases and followed by active search. It is representative; at least at the time of the study, since most persons who developed fever, rash, cough, coryza, or conjunctivitis.

d. **Control subjects:** Controls are selected from the same community or the neighbor and Select 2 control per cases. The advantages of selecting controls from the same kebeles as cases are likely to live the same populations as the cases, in effect for socioeconomic status, place of residence, access to care and so on are temporal match & comparable records 1.2.4.10 Data collection

We designed questionnaire to interview the case-control part of the study used to collect information on demographic, clinical signs and symptoms, vaccination history, travel history, knowledge, attitude and related variable on measles. In general we have collected epidemiological information in order to allow descriptive and analytical epidemiology of measles outbreaks. The interview was conducted in the local language. Interviews of each pair of cases and controls were performed mostly on the same day. The investigation team was composed of a regional PHEM officer, and EFELTP residents filled the questionnaire as well as collect line list formats**.**

1.2.4.11 Data processing and Analysis

First we collect all the necessary data, computerized data was coded on pre-arranged coding sheet. Data entry and analyzed using epi-info, 3.5.1 and excel. Tables and graphs are used to present frequencies of appropriate findings. Association between the risk factor and exposure outcome were measured and tested using OR and 95 % CI.

1.2.4.12 Data Quality Control: During data collection in the field and at the end of each day, the questionnaires were reviewed and checked for completeness, accuracy and consistency and corrective measures were taken.

1.2.5 Result

1.2.5.1 Descriptive study: we investigated 168 suspected cases and without death from seven kebeles of the district since 9/25/2013 – 10/23/2012, females comprise 54.3%. Median age of cases was 7 years (ranges from three month to 18 years), 97/148(65.54%) of the patients were 5-14 years, of this 58/97(59.80%) had unvaccinated history and (13/39) under two cases from <5 age group, 18/39(14.30%) cases did not have Prior vaccinated history.

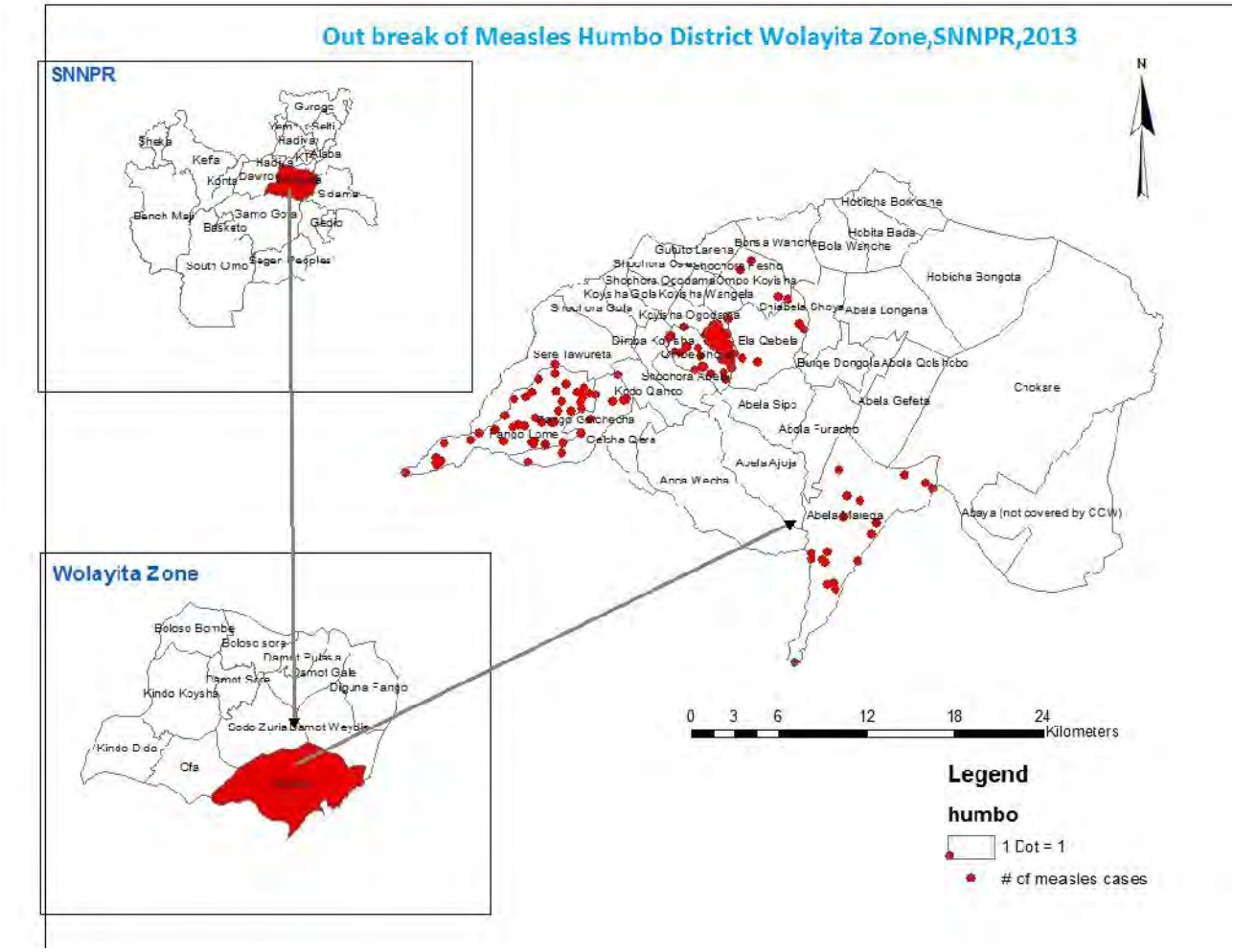

Figure 1.2.1: Measles by kebeles-Humbo, Welayita Zone, Ethiopia, 2013

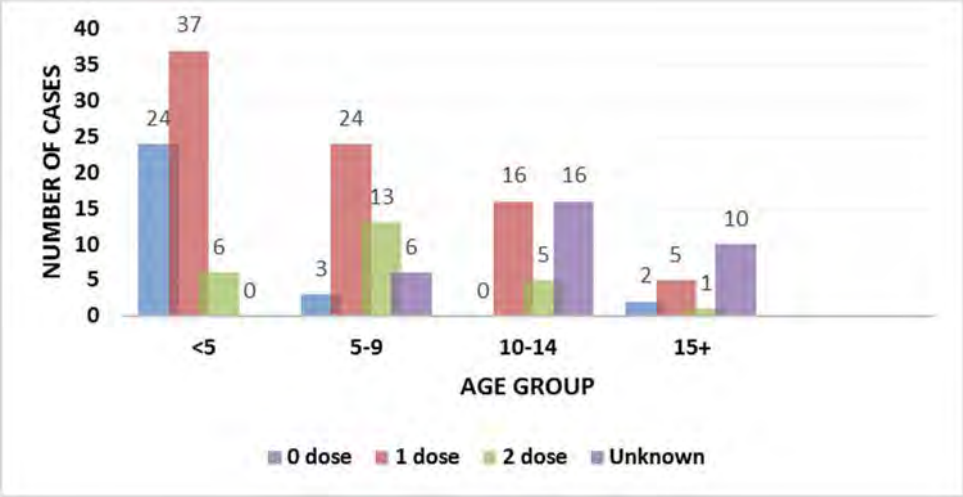

Figure 1.2.2 Measles cases by age and vaccination status, Humbo district, Welayita zone, 2013

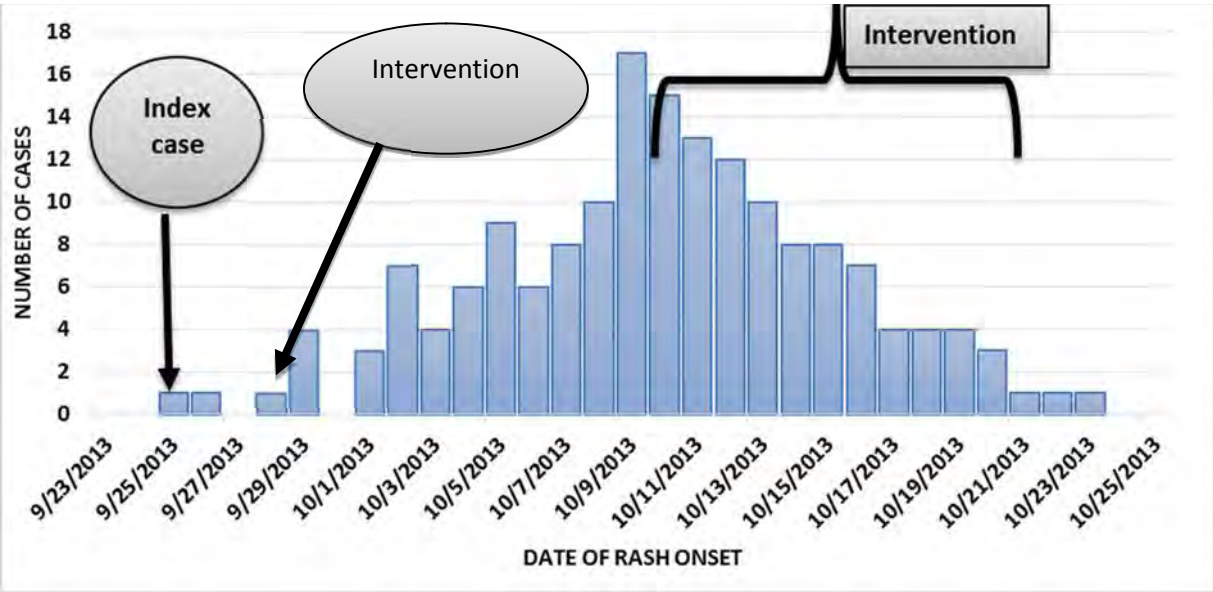

Figure 1.2.3 Number of measles case by date of rash onset, Humbo district, Welayita zone, 2013

Table:1.2.1 Attack rate by age and sex Measles cases in Humbo district, Ethiopia, 2013

Variable		Frequency	Population	AR /1000	Percent (%)
Age Group	**<5**	67	18,505	3.6	33.93
	5-9	46	26,571	1.7	27.38
	10-14	37	22,538	1.6	22.02
	15+	18	34,756	0.5	10.71
Sex	**F**	87	58,481	3.9	51.78
	M	81	60,141	4.1	48.21
Total		168	148950	4.0	0.11

Table 1.2.2 Number of measles cases by affected kebeles, Humbo district, Ethiopia, 2013

Kebeles affected	Cases	Population	AR/1000	Proportion (%)
Tebela	51	7426	6.86	30.36
Fango Lome	50	4563	10.90	29.76
Abela Mareka	23	3282	7.00	13.69
Ambe shoya	20	3310	6.04	11.90
Fango Gelche	12	3784	3.20	7.14
Ella kabala	7	5676	1.23	4.16
Ampo koyshsha	5	5018	0.99	2.38

As this result showed four cases were below nine months age group that contract the disease from their infected sisters. Incidence rate among vaccinated was 0.96 per 1000 population. Of the total cases, 51(30.36%) and 50 (61.50%) were saturated in Tebela and Fango Lome, 23(25.30%) were from Abela mareka. Attack rate was highest in Fango Lome (10.90 per 1000 population), followed by Abela mareka (7 per 1000 population), and least in Ampo Koysha (0.99 per 1000 population). The index case was seen in September 25/2013 in Tebela kebele. Peak cases were seen in November 10/2013.

1.2.5.2 Case control study, the median age of cases were 4.5 (ranges 5 months-24 year) and controls 6 year (6 months-18 years), from the total 40 cases enrolled under case control study 16(40%) develop diarrhea, and 12.50% experienced vomiting. Through Bivariate analyses we found that had prior vaccination history Odds Ratio (OR= 0.20 (95% Confidence interval (CI=0.09-0.47) and Knowledge of measles transmission OR = 0.13(95%CI (0.06-0.36) preventive factors but Living in a room with more than six people at (OR= 3.90(95%CI 1.5-10.55), recent travel to areas with active measles cases OR= 3.80 (95%CI 1.53 – 9.74) were risk factors. Educational status, occupation and marital status have not statistically significant associations at p- value ≤0.05.

Table 1.2.3 crude analysis of measles cases and controls in regard to different variables, Humbo district, SNNP region, 2013

variables		cases	controls	OR(95%CI)
Prior Vaccination status	Yes	11(27.50%)	51(65%)	0.20(0.09-0.47)
	No	29(72.50%)	28(35%)	
Knowledge of measles transmission	Yes	10(25%)	57(71.25%)	0.13(0.0.05-0.32)
	No	25(75%)	24(28.75%)	
Living in a room with more than six people	>6 persons	34(85%)	47(58.75%)	3.9(1.50-10.55)
	≤6 persons	6(15%)	33(41.25%)	
Recent travel to areas with active measles cases	Yes	33(82.50%)	44(55%)	3.8(1.53-9.74)
	No	7(17.50%)	36(45%)	
Educational status	Elementary and below	27(67.5%)	46(57.5%)	0.99(0.45-1.62)
	Secondary and above	13(32.5%)	22(42.5%)	
occupation	Farmer	32(80%)	42(52.5%)	3.6(0.9-9)
	Others	8(20%)	38(47.5%)	
Marital status	Single	7(15.5%)	38(47.5%)	0.21(0.3-1.8)
	Married	33(84.5%)	42(52.5%)	

1.2.5 Prevention and control actions taken

- Catch-up (SIA) campaigns were carried out that vaccinated all children 6 months to 14 years old, whether or not they have had measles or previous vaccinations and supplementary dose of vitamin A in Humbo as well as adjacent district
- Vaccination of measles was given for defaulters from the age of 6month - one year; cases were managed by distributing supportive treatments (Antibiotics, tetracycline ointment, oral rehydrating Salt, and Vitamin A, and anti-pyretic).
- We delivered Health Education to create awareness about measles modes of transmission, control mechanisms and to make them report cases as soon as possible to the nearby health institution or health professional.
- Schools in the highly affected area were closed and In addition to this we discussed with community leaders, health professionals and administrative office of the district how to create awareness among the community, two Nurse and HEWs made daily house to house visit to search additional cases, trace defaulters of vaccination and to see patient progress. After intervention activities were initiated the number of cases began to decline rapidly.

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1.2.7 Discussion

We identified factors associated with measles outbreak in Humbo district, Wolayita zone. The finding being unvaccinated was significantly associated with illness, suggesting that poor immunization coverage played a crucial role in measles outbreak in Humbo district, this indicated that cause of the outbreak was the presence of many unvaccinated children in the district. The OR of 4.9 showed that the unvaccinated 4.9 times more likely contracted measles than who were vaccinated. Measles immunization was significantly lower in children who had measles compared to those who didn't, however, the higher proportion of unvaccinated children found in this investigation contradicts with the high administrative of RI and SIA coverage reported from Woreda as well as Zonal health offices and this can suggest the presence of over reporting or false reporting.

In a measles outbreak investigation in Herena and Dawe Serer Districts, Bale, Oromia, Ethiopia, Daba M, W Derresa, et al revealed that the same finding that cases were high in unvaccinated and incompletely vaccinated children compare to those who were completely vaccinated.(2)
Living in a room with more than six people was significantly associated with higher rates of disease. The OR 3.9, 95 CI (1.50.-10.55), indicated that those who were live in a house more than six, 3.9 times more likely to contract measles than who were live in less than six, therefore it has proved that, Overcrowding is one of a risk factors found that close contact with an infected person increased measles transmission since measles is a highly infectious communicable disease. (7)

1.2.8 Study Limitations

- Short time available and hard to reach places where cases were living there.
- Recall bias

5.2.9 Conclusion

Measles outbreaks in older children have become an increasing concern in Ethiopia and in the rest of Africa. These findings support other studies conducted in SNNPR that accumulation of susceptible older children shifted measles cases from young children to older children. Although measles was once labeled a childhood disease, older children with cases developed complications of measles become public health concern of SNNP region.

Consideration of local measles epidemiology (Older cases) is important to establish vaccination priorities based on age groups most at risk to attain herd immunity. It is necessary to learn lessons from the past experiences of measles outbreaks with high proportion of older children cases in similar studies in SNNPR region, to develop future strategies to extend age groups and budget allocation.

1.2.11 Recommendation

1. We recommend strengthening routine and second opportunity (catch-up and Follow-up) immunization coverage to children to improve herd immunity.
2. Increase routine immunization coverage (>90%) in the target age group to stop transmission of measles and to achieve the targeted goal set by WHO for African region elimination of measles by 2020.
3. Supplementary immunization of children before starting in school could be effective in preventing measles outbreaks. In addition, implementation of supplementary immunization every 5–10 years in older age groups might be effective in preventing future outbreaks.
4. Improve Surveillance approach for early case detection and reporting for immediate response
5. Delivered health education to the community to create awareness regarding measles mode of transmission and control mechanisms.

1.2.11 Acknowledgements

We would like to thank Mr. Jemal Hassen for the facilitation of the measles outbreak investigation. Dr Merawi, for devoting comment, correcting and shaping the investigation report. Our sincere thanks to the entire health personnel of the Welayita zone, Humbo woreda, HEW of Tebela health post health department staffs and the community for actively participating in the implementation of the strategies defined to control the measles outbreak and record keeping. The same goes to the entire regional EPI team for their relentless supportive supervision during the outbreak.

1.2.12 References

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Annex 1.2.1 Questions for Investigation of measles Outbreak in Welayita zone

1. Demographic Information

- Id number --- Cases Status—A/ Cases B/ Control Date of birth----------Age--------
- Name of the child ---------- Sex A/ Male B/ Female
- Date of interview----------
- Occupation ----------Level of Education ----------
- A/ Zone ----------B/Woreda----------C/Kebele ----------
- Religion A/Orthodox B/Muslim C/ Protestant D/Catholic E/ Others/ Specify/
- Ethnicity ---------- Economical Status/of family----------
- Number of persons in the HH---------- Marital status----------House size--------

2. Risk Factors and Clinical Features

41. Did the child has illness of measles A/ yes B/ No
42. If yes, did you take him/her to the health institution? A/ yes B/ No
43. If yes, did he/she admitted A/yes B/no
44. If yes, date of Admission----------Day of stay----------
45. Duration of illness before visiting the health facility ----------in days/hours--------
46. Did the child treated with traditional medicine before health facility? A/ yes B/ No
47. What symptoms does he/she have?
    - Fever A/ yes B/ no Rash A/ yes B/ no
    - Runny nose A/ yes B/ no Red eyes A/ yes B/ no
    - Cough A/ yes B/ no loss of appetite A/ yes B/ no
48. If he/she has a rash, date of rash onset ----------
49. Did the child have contact with someone having rash within 1 wk back? A/ yes B/ no
50. Did the child develop complication? A/ Yes B/ No
51. If yes, is it? A/ diarrhea B/ pneumonia C/ otitis media D/ others/specify/
52. Did the child receive measles vaccine? A/ Yes B/No
53. **If yes, at what age? ----------**
54. If yes, Check card---------- see if A/ by card B/by History
55. If yes, how many times /for measles only? ----------
56. date of last measles vaccination----------
57. Are there other persons with similar symptoms within the household? A/ Yes B/ No
58. Are there other persons with similar symptoms in the neighborhood/? A/ Yes B/ No
59. Have you measles infection in your life? A. Yes B. No
60. Have you any contact with suspected/confirmed measles case? Ayes B. No

7. Nutritional status

- Did the child receive Vit A at 6 month? A/ Yes B/ No
- Is the child on OTP A/ Yes B/ No
- Is there bilateral edema? A/ Yes B/ No

8. Knowledge

11. For what reason do somebody vaccinate her/his child with measles vaccine?
    C. To prevent measles disease B. To prevent hunger C. I don't know
12. What is the right age of vaccinating the child with measles vaccine in our country?
    C. 9months B. 6months C. 3months D. other E. I don't know
13. By what mechanism does the healthy child get measles disease from the sick child?
    A/ Droplet B/ body contact C/ Food D/ Water E/Other/specify/

14. Attitude

9. Do you think vaccination can prevent measles disease? A/ Yes B/No
10. Do you think medical treatment helps measles patient? A/ Yes B/No
11. Do you believe that the child with rash should get medication? A/ Yes B/No
12. Do you believe that feeding and extra fluid is important for the child with measles? A/ Yes B/No

15. Practical

9. What can somebody do if the child gets measles?
    C. Taking to HF B. taking to local healer C. keeping in home D. I don't know
10. What care can be given to measles patient at home?
    C. Giving food/fluids B. giving local medication C. leaving alone D. I don't know
11. What can you do to prevent your family from measles disease?
    C. Vaccinating B. keeping at home C. giving local medication D.I don't know
12. Can you isolate the child with measles rash from other children? A/ Yes B/ No

Chapter – VI Abstracts for Scientific Presentation

Abstract:

1.1 Outbreak of Measles in Kucha district, Gamo Gofa zone, Ethiopia, August, 2013
Abstract Text:

Background: Measles is a highly infectious vaccine preventable childhood disease that infects over 20 million people each year. On 14th August, 2013; five suspected cases of measles were reported in Kucha district, Gamo Gofa zone, Ethiopia. We conducted an investigation to confirm the diagnosis, assess factors associated with the outbreak and recommend control measure.

Method: We conducted 1:2 unmatched case-control study, we defined a case as any resident of Kucha district with fever, rash, and either cough, conjunctivitis or coryza, between 1st August to 14th October, 2013.Five blood specimen collected from suspected cases for testing Measles IgM. We reviewed patient's medical records of in the health facilities and active search for additional cases in affected communities. Questionnaires were administered to caregivers of cases and controls to obtain information on Scio-demography and risk factors. Immunization status was assessed using immunization card and/or care givers recall.

Results: A total of 30 cases and 60 controls recruited (AR=3.21/1000) with two death (CFR=1.2%). Females constitute 53.3% and 51.7% of cases and controls respectively. The median age was 6.5 years (range 8 month to 18 years) and controls 7.5(1-18 years), and 39 (26.4%) under five and 97(65.5%) were 5-14 years old. Measles vaccine coverage 92%. Prior vaccination status (OR=0.21, 95% CI: 0.08-0.54), Knowledge of measles transmission (OR= 0.13, 95%CI: 0.02-0.35). Living in a room with more than six people (OR=4.2, 95%CI: 1.53-11.95). All five samples tested positive for measles IgM

Conclusion: Low measles immunization, poor knowledge of transmission of measles, and overcrowded living condition and accumulation of susptible groups above 5 years age may be responsible for this epidemic. We recommend supplemental measles vaccination, strengthening of routine immunization and Public advocacy on immunization campaigns should target children above age of five year.

Keywords: Measles outbreak, Ethiopia, Gamogofa, case control, Kucha

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1.2 Malaria Surveillance Data analysis in South Nation and Nationality people's Region, 2013 Ethiopia, 2013

Abstract

Background: Ongoing malaria surveillance data analysis is useful for assessing incidence and monitoring disease trends over time and evaluating the effectiveness of disease control programs. This study examined the magnitude of malaria including the efficiency of the surveillance system in the region.

Methods: A descriptive study design was employed to extract data on malaria indicators from the Integrated Disease Surveillance and Response System database for the years 2005-2010 and 2011-2013. All the relevant data were collected, cleaned and entered into a computer using Microsoft and Epi info version 7.1. The data were then analyzed to show the surveillance data for variation in risk by reporting unit, and incidence trends for malaria indicators.

Result: The average estimated annual incidence of reported total malaria for the calendar years (2005-2008) has declined from 37.23 to 29.25 per 1000 persons , while (2010- 2012) increased from 75.13 to 86.44 per 1000 persons, the confirmed malaria cases has increased from 9.39 to 24.40 per 1000 person with no clear decline in out-patient cases over the time period. However, the reported malaria in-patient admissions (averaging 29.48 to 12.45 per 1000) and deaths (6 to 2 per 1000 per year) showing reduction between 2005 and 2013. Out of 18 reporting zones, 61 %(11/18) had average annual estimated incidence of confirmed malaria 80-150 per 1,000 persons. The reporting of cases was initially monthly and starting from 2011 it was weekly though irregularly reporting and the reporting was over 80% in 2013.

Conclusion and recommendation: Although the Integrated Disease Surveillance and Response Systems were not effective in reducing the outpatient cases during the specified study period, it had brought considerable impact on malaria in-patient cases and mortality. Because of the scale up of interventions and therefore, it is necessary to reinforce the scale up intervention.

Key words: Retrospective, malaria outbreak, irregular reporting, south Ethiopia

Chapter – VII Narrative summary of disaster situation

7.1. Report on Belg emergency needs assessment- South Southern Nation and Nationality People Region, Ethiopia, 2013

Executive summary

The Belg assessment was conducted in two zones of south southern Nation and Nationality people Region (SNNPR), to identify humanitarian needs in drought affected areas of the region. The rapid assessment helped to explore the immediate and future needs of the community in order to make prior identification of the needs. The assessment was conducted from June 16-30, the selected woredas of Damot gale and Humbo of Welayita and Dembagofa and Mirab Abaya from Gamogofa zones.

The main objective of the assessment was to develop emergency requirements and to contribute to ensuring appropriate and effective humanitarian planning that helps to reduce morbidity and mortality related malnutrition and disease outbreaks.

Semi structured questionnaire, review of documents and reports, meetings and discussions with woreda and zonal preparedness and response task forces, officials and program managers was carried out to collect data. This was complemented by field visits in selected woredas and kebeles to discuss with community to triangulate data and information collected from zone and woredas

There was multi-sectoral PHEM coordination forum at all level. Outbreak of Meningitis, measles and yellow fever were reported in the region and New Severe Acute Malnutrition cases were increased from March to May in Dembagofa woreda. Epidemic preparedness and response plan is available in all visited zones and woredas as well as at regional level however; the plan is supported by budget only at regional level. At regional level AWD, Malaria, Meningitis and measles are the anticipated epidemic for the upcoming months and a total of 465,906 people are estimated to be at risk and 8,298,890 required addressing the anticipated health and health related emergencies. Public health emergency drugs and supplies should be available in all woredas with special emphasis to woredas with nutritional problem.

7.1.1. Introduction

Humanitarian need assessment/community risk assessment is a participatory process for assessing hazards, vulnerabilities, risks, ability to cope, preparing coping strategies and finally preparing a risk reduction options implementation plan by the local community (1). Humanitarian need assessment uses scientific information and predictions and participatory debates to identify, analyze and evaluate risk environment of a particular community, reach consensus amongst the community on actions that are needed to manage the risks (1).Good assessment practice is about having enough relevant information on which sound analysis and judgments are made. Formal needs assessments may also aim to force a decision by others, to influence the nature of others' decisions, or to verify or justify decision already taken. Humanitarian need assessment is ways of achieving a more consistent and accurate picture of the scale and nature of the problems people actually face in humanitarian crises, and how to ensure that decisions about response are properly informed by that understanding (2).

Southern Nations, 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 17,353,928 in2012 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 developing 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%. 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. The areas of our assignment for the non-food team (health and nutrition) for group nine was Gamo Gofa and Wolaita Zones of SNNP region. After briefing at regional level, the team Visited zonal health department and selected woreda health offices in these zones.

7.1.2. Objectives

- To assess the extent, types, magnitude, severity and likelihood of different risks in the most “vulnerable” Woredas;
- To assess the existing capacity of the health system to address those risks;
- To determine gaps in the capacity of the health system to address anticipated/impending risks and existing threats.

7.1.3 Methods

The assessment was conducted in 10 zones and on wore special, from each Zone two woredas were selected based on emergency health and nutrition problems in consultations with the FMOH, RHB and ZHDs. From the selected two zones and specifically visited woredas pertinent data and information were collected using different methods. Time constraint was vividly seen from the outset and the team was forced to subdivide itself to achieve its objectives. 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.

Methods used during the assessment were:

- Initial briefing from regional, zonal and Woreda Health Offices and relevant experts at all levels.
- Discussion with zonal and Woreda Health Offices and relevant experts at all levels, using secondary data on health and nutrition
- Administered Semi structured questionnaire was used to collect the required information check list were employed at the region, zones and woreda level
- In-depth interviews of key informants at zonal and woreda levels
- Reviewed secondary data from health facility reports
- Complementary information collected through facility visit and field observation

7.1.4. Results

7.1.4.1. Health profile

7.1.4.1.1. Coordination

Southern Nation and Nationalities People's Region (SNNPR)

1. Coordination

The region has a functional multi - sectorial coordination forum for emergency preparedness and response in which all government, NGO's and UN agencies are represented and it is going on in a monthly basis. Public health emergency preparedness and response plan is available and budget is allocated for it.

2. Disease outbreak

During the last 3 months period, Meningitis, Measles and Yellow fever out breaks occurred in different parts of the region. 367 meningitis cases were treated and 5 deaths reported. Regarding Measles, 284 cases were treated and 2 of them died. Yellow fever was also one of the out breaks occurred with 70 cases and 15 deaths reported.

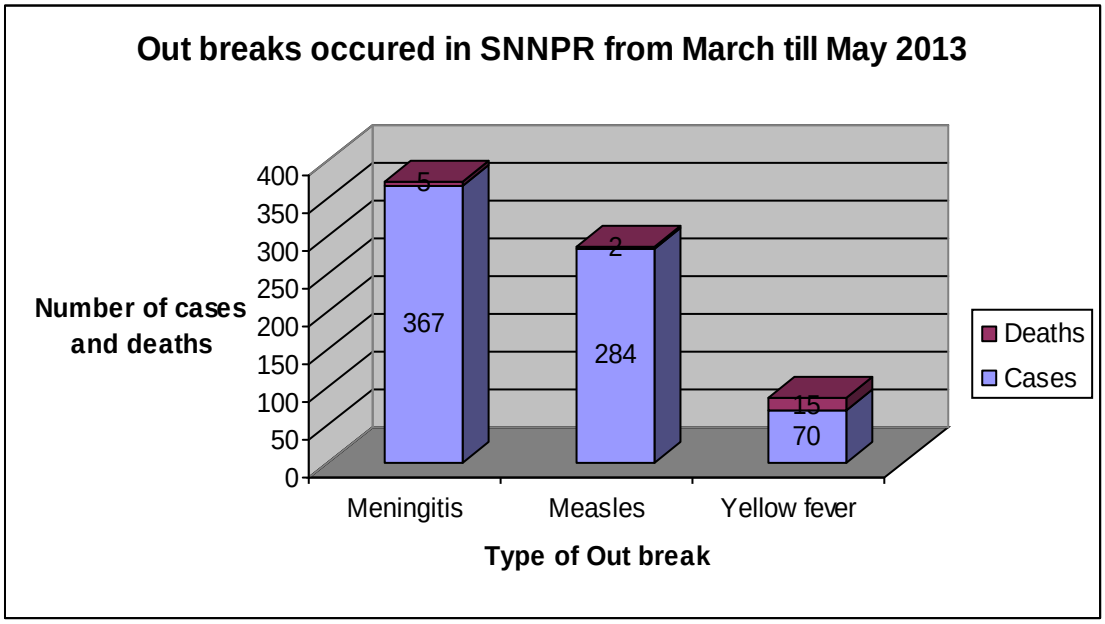


Figure 7.1.1 Outbreak occurred in SNNPR, from March to May /2013

1. Welayita Zone

1.1 Coordination

There was a functional multi-sectorial coordination forum for the health sector in which all relevant government, NGOs and UN agencies were represented. The frequency of the meeting was weekly.

1.2 Outbreak

There was meningitis outbreak in the last three months from Feb to March 2013.A total of 228 cases with three deaths were reported the last six months.

1.3 Anticipated epidemics

Meningitis, measles and AWD were reported as anticipated epidemics in the zone.

1.4 Public health emergency management

There was a public health emergency preparedness and response plan which was funded or budgeted. There were trained staffs on PHEM at zonal and woreda level. The two PHEM staffs at zonal level were trained (four males and one female). The number of trained PHEM staffs at woreda level was (44 males and 18 females). There was a zonal trained Rapid Response team (RRT).There was trained three staffs (one female and two males) on Minimum Initial Service Package for RH at zonal level.

Table 7.1.1: Depicting Drugs and Medical Supplies Required and Gaps for Welayita Zone, June 2013

Drugs and medical supplies		Total requirement	Available	Gap
i. Meningitis vaccine		985937 dose	0	985937 dose
ii. Drugs:	Coartem	12,000 dose	11,000 dose	109,000 dose
	Artesunate (rectal)	2400 suppository	1224 supp	11765 supp
	Artesunate (Inj)	1824 amps	1034 amps	790 amps
	Artemether IM	2000 amps	840 amps	1160
	Quinine (PO)	100 tin	0	100 tin
	Quinine (IV)	1204 amps	104 apms	1100 amps
	Chloroquine	1130 tin	101tin	1029 tin
	Ceftriaxone	9640 vials	300 vials	9340 vials
	Oily CAF	100 vials	0	100 vials
	Doxycycline	150*200caps	90*200caps	60*200caps
	Ringer lactate	300 bags	150 bags	150 bags
	ORS	2004sackets	1200sackets	804sackets
	Vit A.	400tin	240 tin	160 tin
iii. Lab supplies	RDT (Malaria)	25*750 box	10*750 box	
	Pastorex (Meningitis)	100bottles	5bott	25 bott
	LP set	100pcs	20 pcs	80 pcs
	TI bottle	30bott	5 bott	25 bott
CTC Kit (AWD)		100	0	100
Medical Supplies	Gloves,	60box	20box	40box
	Syringe	120 box	24 box	96box
	PPE	10	0	10
Clinical Delivery Assistance kit PART A: Reusable Equipment		69	0	69
Clinical Delivery Assistance kit PART B: Drugs & Disposable Equip.		138	0	138
Mgt. of Complications of Abortion kit (Manual Vacuum Asp. Set)		69	66	3

1.1.1 Humbo Woreda

1. Coordination

There was functional multi sectoral PHEM coordination forum with PHEM preparedness and response plan. Moreover, there was fund allocated for preparedness activities, and accessible emergency response fund. Morbidity data for the top 5 causes of illness

4. Preparedness

Table 25: Depicting the Status of Emergency Drugs and Supplies or easily Accessibility on Need for One Month in Humbo Woreda.

Emergency drugs and supplies enough for one month or easily accessible on need	
Available	**Not available**
Ringer Lactate, ORS, Doxycycline, Consumables : Syringes, Gloves, Amoxil susp, Tetracycline ointment, Vit A, Coartem, Artesunate (rectal and injection), Quinine (PO and IV), Chloroquine, Ceftriaxone, RDT for Malaria, , PHEM guideline distributed to all Health institutions, trained woreda Rapid Response Team,	Artemether IM, quinine (iv), Artesunate (injection) RDT (pastorex) for Meningitis, LP set, CTC kit, Clinical Delivery Assistance kit part A and B, Mgt. of Complications of Abortion kit (Manual Vaccum Asp. Set) ,budget allocated for emergency Rapid response by the woreda Health office, staffs trained on Minimum Initial Service Package for Reproductive Health

5. Risk factors

5.1. Malaria

All the forty one kebeles are identified as malarious with at risk population of 74,118 and 74,813 for females and males. There is a weak malaria control and prevention activity in the Humbo woreda evidenced by LLITN coverage below 80%, and IRS coverage of 30% for the year 2005.

The following risk factors were identified by the Humbo woreda for malaria:

- Malaria endemic area, Presence of malaria breeding site
- Interrupted or potentially interrupting rivers

Unprotected irrigation in the area

The new malaria guideline had been distributed to all health institutions, and health professionals were also trained on it.

5.2. Meningitis

There was meningitis epidemic in the last three years (2005) for which vaccination conducted for 22,530 target groups 27/7/05-7/8/05.There is meningitis outbreak control guideline in the health institutions. Health professionals were trained on it.

5.3. AWD

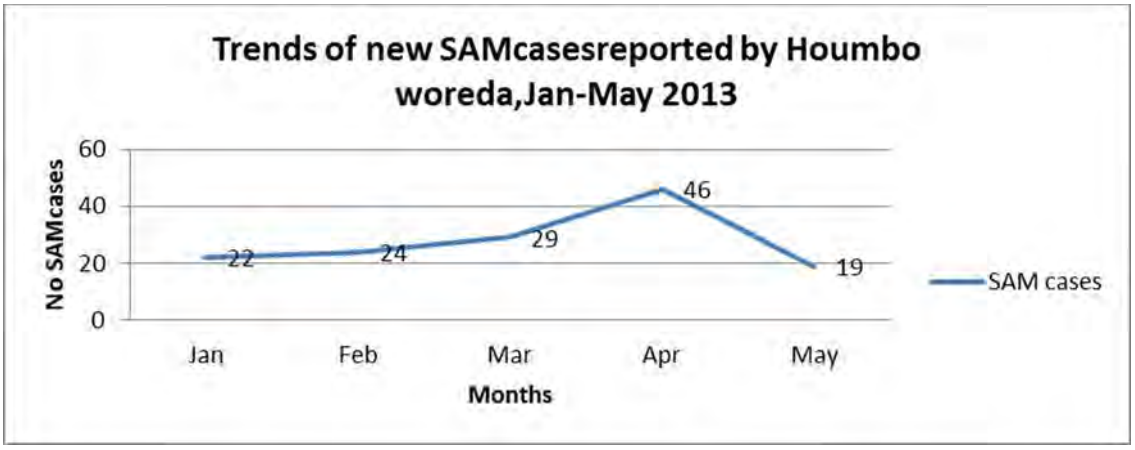
There was no AWD epidemic in the last three years. The latrine coverage and utilization for the Humbo woreda was 75.6%. Cholera outbreak control guideline was distributed to all health institutions.

5.4. Measles

There was no ongoing measles outbreak during the assessment period. The measles vaccination coverage for 2005 was 96%. SIAs were conducted for children in the age groups of 9-59 months in 2005. A total of 41,674 children were vaccinated. The new measles guideline had been distributed to all health institutions, and health professionals were also trained on it.

6. Nutrition

A total of 79 TFP (74 OTP and 5 SC) sites were found in the woreda during January to May 2013. All of them reported new SAM cases during the time period with completeness rate of 100%.There were adequate therapeutic supplies during the reporting period. All children discharged from TFP were referred to SFP. There are adequate therapeutic supplies for the next one month.

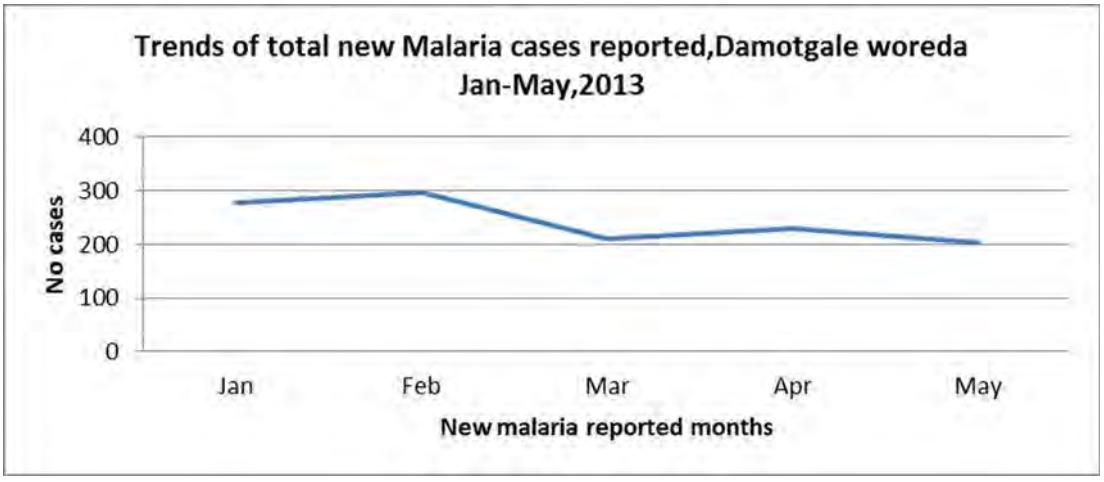


There was an increase in the trends of new admissions of SAM from January to March followed by decline from March to May 2013.There were no challenges identified by the woreda in epidemic response experience.

1.1.2 Damot Gale Woreda

1. Coordination

There was no functional multi sectoral PHEM coordination forum, but PHE preparedness and response plan. However, there was no fund allocated for preparedness activities, and no accessible emergency response fund.



5. Preparedness

Table 28: Depicting the Status of Emergency Drugs and Supplies or easily Accessibility on Need for One Month in Damotgale Woreda

Emergency drugs and supplies enough for one month or easily accessible in need	
Available	**Not available**
ORS, Consumables: Syringes, Gloves, Tetracycline ointment, Coartem, Artesunate (rectal), Chloroquine, CTC kit, Clinical Delivery Assistance kit part A and B, (Manual Vaccum Asp. Set), PHEM guideline distributed to all Health institutions	Amoxil susp, Vit A, Artesunate(injection)Doxycycline, Ringer Lactate, Quinine (PO and IV), Ceftriaxone, Artemether IM, RDT for Malaria, RDT (pastorex) for Meningitis, LP set, Mgt. of Complications of Abortion kit, budget allocated for emergency Rapid response by the woreda Health office, , trained woreda Rapid Response Team, staffs trained on Minimum Initial Service Package for Reproductive Health

6. Risk factors 6.1. Malaria

Twenty five kebeles are identified as malarious with at risk population of 70,409 and 67,648 for females and males. There is a strong malaria control and prevention activities in the woreda evidenced by LLITN coverage above 80%, and IRS coverage of 68.0% for the year 2005. The new malaria guideline had been distributed to all health institutions, and health professionals were also trained on it. The following risk factors were identified by the woreda for malaria:

- Malaria endemic area, Presence of malaria breeding site, Interrupted or potentially interrupting rivers, Unprotected irrigation in the area

.6.2. Meningitis

There was no meningitis epidemic in the last three years (2005), but vaccination conducted for 21,269 target groups in 2005.There was meningitis outbreak control guideline in the health institutions. Health professionals were trained on it.

6.3. AWD

There was no AWD epidemic in the last three years. The latrine and utilization coverage for the woreda was 62% and 98% respectively. The safe water coverage was 43%.Cholera outbreak control guideline was distributed to all health institutions

6.4. Measles

There was no ongoing measles outbreak during the assessment period. The measles vaccination coverage for 2004 was 100%. SIA was not conducted.in 2005. The new measles guideline had been distributed to all health institutions, and health professionals were also trained on it.**7.**

Nutrition

A total of 37 TFP (31 OTP and 6 SC) sites were found in the woreda during January to May 2013. All of them reported new SAM cases during the time period with completeness rate of 100%.There were no adequate therapeutic supplies during the reporting period. All children discharged from TFP were not referred to SFP. There are no adequate therapeutic supplies for the next one month

There was an increase in the trends of new admissions of SAM from January to March followed by decline from March to May 2013.

There were challenges identified by the woreda awareness gap the early warning and preparedness and lack of secured fund for the timely response of outbreaks.

2. Gamogofa Zone

2.1 Coordination

There was a functional multi-sectoral coordination forum for the health sector in which comprises all relevant government, NGOs and UN agencies were represented. The frequency of the meeting usually carried out when epidemic occurred.

2.4 Public health emergency management

There was a public health emergency preparedness and response plan which was not funded or budgeted. There were trained staffs on PHEM at zonal and woreda level. However, the zone identified the high turnover of trained staffs. The two PHEM staffs at zonal level were trained (two males and zero female). The numbers of trained PHEM staffs at woreda level were (one female and fourteen males). There was a zonal trained Rapid Response team (RRT).There was trained three staffs (zero female and one male) on Minimum Initial Service Package for RH at zonal level. The number of trained staffs on the same packages at woreda level was (22 males and 36 females).

Table Depicting Drugs and Medical Supplies Required and Gaps for Gamogofa Zone, June 2013

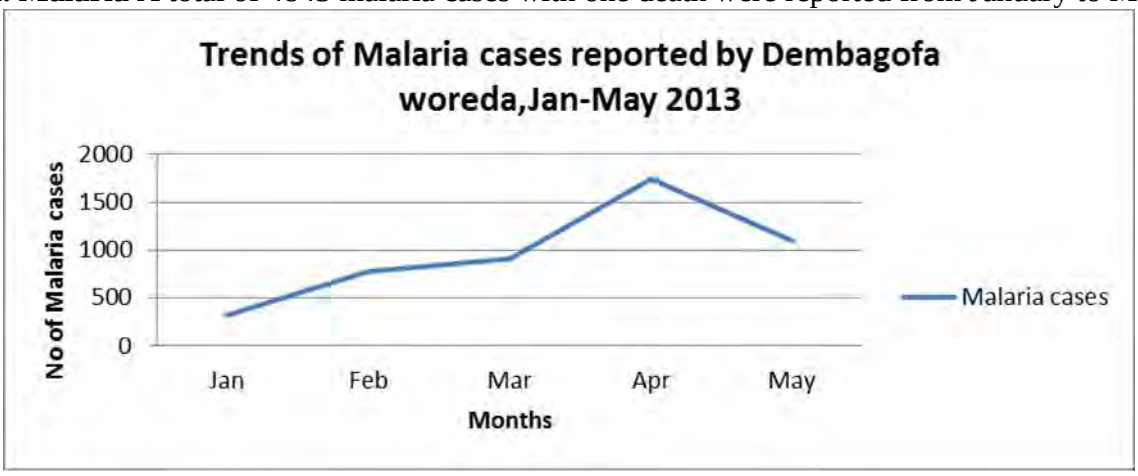
Drugs and medical supplies		Total requirement	Available	Gap
i. Meningitis vaccine		985937	0	985937
ii. Drugs:	Coartem	140,000 dose	12,000 dose)	128,000 dose
	Artesunate (rectal)	4000 tabs	0	4000 tabs
	Artesunate (Inj)	10000 ampls	0	10000ampls
	Artemether IM	3000vial	0	3000vial
	Quinine (PO)	55771	0	55771
	Quinine (IV)	5300	0	5300
	Chloroquine	500tinx1000tablest	11tinx1000	489tin
	Ceftriaxone	1936vials	186 vials	
	Oily CAF	32496	10X50	
	Doxycycline	1041tin	0	104tin
	Ringer lactate	2083 bags	0	2083 bags
	ORS	11,284 sackets	3000sackets	8234sackets
	Vit A.	400tin	520tinx500	
iii. Lab supplies	RDT (Malaria)	400,000pk	60pk	
	Pastorex (Meningitis)	900	0	900
	LP set	30	0	30
	TI bottle	30	0	30
CTC Kit (AWD)		4	2	2
Medical Supplies	Gloves,	200box	0	200box
	Syringe	10carton	0	10 carton
	PPE			
Clinical Delivery Assistance kit PART A: Reusable Equipment		1128	0	1128
Clinical Delivery Assistance kit PART B: Drugs & Disposable Equip.		2000	0	2000
Mgt. of Complications of Abortion kit (Manual Vacuum Asp. Set)		140	12	128

2.2.1 Dembagofa Woreda

1. Coordination

There was functional multi sectoral PHEM coordination forum with PHE preparedness and response plan. However, there was no fund allocated for accessible emergency response and preparedness activities, and no accessible emergency response fund.

2. Malaria A total of 4843 malaria cases with one death were reported from January to May 2013.



5. Preparedness

Table Depicting the Status of Emergency Drugs and Supplies or easily Accessibility on Need for One Month in Dembagofa Woreda.

6. Risk factors

6.1. Malaria

All the thirty five kebeles are identified as malarious with at risk population of 43,254 and 41,558 for females and males. There is a strong malaria control and prevention activities in the woreda evidenced by LLITN coverage above 80%, and IRS coverage of 98.7% for the year 2005. The following risk factors were identified by the Special woreda for malaria: Malaria endemic area, Presence of malaria breeding site, Interrupted or potentially interrupting rivers, Unprotected irrigation in the area the new malaria guideline had been distributed to all health institutions, and health professionals were also trained on it.

6.2. Meningitis

There was no meningitis outbreak in the last three years (2005).There is meningitis outbreak control guideline in the health institutions. Health professionals were trained on it.

6.3. AWD

There was no AWD epidemic in the last three years. The latrine and utilization coverage for the woreda was 97.3 % and 85 respectively. The safe water coverage was 24.2%.Cholera outbreak control guideline was distributed to all health institutions.

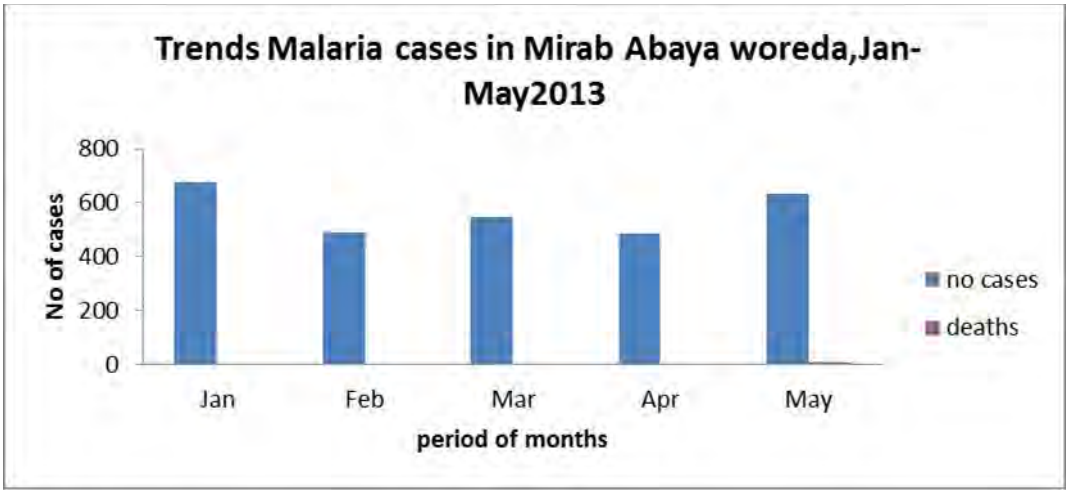
6.4. Measles

There was no ongoing measles outbreak during the assessment period. The measles vaccination coverage for 2004 was 98.5%. SIAs were conducted for children in the age groups of 9-59 months in 2005. A total of 13,970 children were vaccinated. The new measles guideline had been distributed to all health institutions, and health professionals were also trained on it.

Mirab Abaya Woreda

1. Coordination

There Hawasa functional multi sectoral PHEM coordination forum with PHE preparedness and response plan. However, there was fund allocated for preparedness activities, and there was accessible emergency response fund.



4. Preparedness

Table: **Depicting the Status of Emergency Drugs and Supplies or or easily Accessibility on Need for One Month in Mirab Abaya Woreda,**

Emergency drugs and supplies enough for one month or easily accessible on need	
Available	**Not available**
ORS, Doxycycline, Consumables: Syringes, Gloves, Amoxil susp, Tetracyclin ointment, Coartem, Chloroquine, Ceftriaxone, RDT for Malaria, CTC kit, Clinical Delivery Assistance kit part A and B, Mgt. of Complications of Abortion kit (Manual Vaccum Asp. Set), PHEM guideline distributed to all Health institutions, trained woreda Rapid Response Team,	Ringer Lactate it AArtesunate (rectal and injection), Quinine (PO and IV),Artemether IM, RDT (pastorex) for Meningitis, LP set, budget allocated for emergency Rapid response by the woreda Health office, staffs trained on Minimum Initial Service Package for Reproductive Health

7.5 Risk factors

7.5.1. Malaria

All the twenty-four kebeles are identified as malarious with at risk population of 45,387 and 43607 for females and males. There is a strong malaria control and prevention activities in the woreda evidenced by LLITN coverage above 80%, but IRS coverage of 43.8% for the year 2005. The new malaria guideline had been distributed to all health institutions, and health professionals were also trained on it.

7.5.1.1 The following risk factors were identified by the Mirab Abaya woreda for malaria:

- Malaria endemic area, Presence of malaria breeding site, Interrupted or potentially interrupting rivers, Unprotected irrigation in the area

5.2. Meningitis

There was no meningitis epidemic in the last three years (2005). There is meningitis outbreak control guideline in the health institutions. Health professionals were trained upon it.

5.3. AWD

There was no AWD epidemic in the last three years. The latrine coverage and utilization for the woreda was 92% and 92% respectively. The safe water coverage was 46.8%.Cholera outbreak control guideline was distributed to all health institutions.

5.4. Measles

There was no ongoing measles outbreak during the assessment period. The measles vaccination coverage for 2004 was 80%. SIAs were conducted for children in the age groups of 9 months-14 yrs. in 2005. A total of 33/048 /39,371(83.90%) were vaccinated. The new measles guideline had been distributed to all health institutions, and health professionals were also trained on it.

7. Nutrition

Due to shortage of therapeutic supplies like F100 and F75, woreda health office stock in Dembagofa and Damotgale was nil and for the next one month therapeutic supply was not enough. There was shortage of plumpy nut in Damotgale even though no shortage was seen in all other assessed woredas. According to Zonal Health Departments report, Community Health Day (CHD) campaign came up with highest Global Acute Malnutrition (GAM) in children in

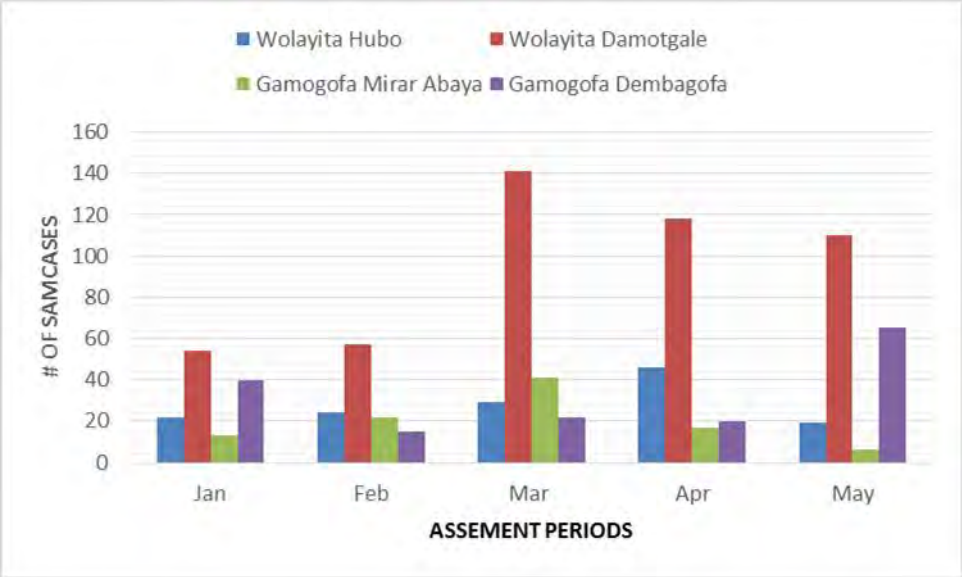


Fig 7.1.4: New SAM cases by woreda-Welayita/Gamogofa, Ethiopia, 2013

Table 7.1.7: Therapeutic feeding program by woreda-Welayita/Gamogofa, Ethiopia, 2013

Woreda	Month	Total new SAM cases	Total number of TFP (OTP/SC) in the woreda	Number of SC sites	Number of OTP sites	Total number of OTP/SC reported	Therapeutic supplies (Y/N)			Children discharged from TFP and referred to SFP(Y/N)
							RUTF	F100	F75	
Humbo	Jan	22	79	5	74	79	Y	Y	Y	Y
	Feb	24	79	5	74	79	Y	Y	Y	Y
	Mar	29	79	5	74	79	Y	Y	Y	Y
	Apr	46	79	5	74	79	Y	Y	Y	Y
	May	19	79	5	74	79	Y	Y	Y	Y
Damot gale	Jan	54	37	6	31	37	Y	N	N	Y
	Feb	57	37	6	31	37	Y	N	N	Y
	Mar	141	37	6	31	37	Y	N	N	Y
	Apr	118	37	6	31	37	Y	N	N	Y
	May	110	37	6	31	37	Y	N	N	Y
Mirab Abaya	Jan	13	32	1	31	32	Y	N	N	Y
	Feb	22	32	1	31	32	Y	N	N	Y
	Mar	41	32	1	31	32	Y	N	N	Y
	Apr	17	32	1	31	32	Y	N	N	Y
	May	6	32	1	31	32	Y	N	Y	Y
Dembag ofa	Jan	40	38	3	35	38	Y	N	N	N
	Feb	15	38	3	35	38	Y	N	N	N
	Mar	22	38	3	35	38	Y	N	N	N
	Apr	20	38	3	35	38	Y	N	N	N
	May	65	38	3	35	38	Y	N	N	N

7.2 Major challenges experienced by the woreda

- .Absence of TFC and Therapeutic supplies (RUTF. F100) .Inadequate stock of drugs and other medical supplies at Zonal as well woredas (F100 and F75 in all woredas, coartem in South Gamogofa Zone -Dembagofa woreda
- Rapid response team were not active.as well as prepared plan and budget to response health emergencies and outbreaks, there was a high turnover of trained health professionals and Shortage of operational cost and logistics (vehicle) to undertake epidemic response
- Problem on data availability, accessibility, and data analysis for action in some Zonal health department and woreda health offices. Poor reporting of immediately and weekly reportable diseases from Health Posts to Health center, the data got from the zone and the Woredas are different
- Shortage of IRS chemicals, shortage of Abet chemical for malaria prevention and control Presence of interrupted or potentially interrupting rivers

7.6 Conclusion

There was a functional multi-sectorial coordination forum with no regular frequency of meeting in all assessed woredas and zones. In the last three months there was report of meningitis, measles and yellow fever outbreak in the region. Malaria, Meningitis, measles, AWD and malnutrition were anticipated risk at regional level and at risk population groups were identified, and summary of requirements or needs estimated. There was emergency preparedness and response plan at all level, supported by budget at regional level only There was a good preparedness regarding emergency drugs and supplies for malaria, measles, AWD, meningitis and emergency reproductive health enough for the next one month or could be easily accessible on need in all. There were no Artemether IM (for malaria), RDT (pastorex) and LP set for meningitis in almost all of the visited woredas.

7.1.5 Recommendations.

- We recommended establishment of TFC and timely provision of therapeutic supplies for effective management of children with the problem of malnutrition, Facilitate transportation of OTP/SC supplies to the facility level duly considered, Children with Moderate Acute Malnutrition screened during Community Health Day should be linked to Supplementary Feeding Program (SFP).
- Availing and equipped stock of drugs, for instance, Artemether IM, Artesunate (injection Artesunate (rectal) for malaria and other medical supplies at Zonal as well woredas,) and IRS chemical and budget should be provided to implement spray as soon as possible, Planning for prepositioning of pastorex test and LP set by the RHB, FMOH and partners. .
- Strengthening ongoing surveillance activities, periodic supportive supervision and intervention measure like- control and prevention of measles, malaria, AWD and meningitis. Measles Supplementary Immunization (SIA's) should be targeted in these areas because malnutrition can be predisposing factor for measles outbreak. Zonal and woredas EPRP should be supported by budget and Capacity building, training on PHEM to cope up with the high turnover of staffs by the RHB/PHEM, Revitalize established rapid response team from Zone to kebeles

7.1.6. Acknowledgement

I would like to acknowledge Ethiopian Health and Nutrition Research Institute (EHNRI) for their trust on us to assess this important humanitarian need. Secondly, many thanks go to CDC-Ethiopia and Ethiopian Public Health Association (EPHA) for their valuable financial support. Lastly I appreciate commitments of zonal health department Public Health Emergency Management (PHEM) focal persons for their active engagement during Belg assessment period.

Table 2.Woredas at risk, type of risk, risk population and estimated budget in visited z ones and woredas

No	Zone	Woreda at Risk	Type of Risk	At Risk Population	Estimated Budget in Birr
1	Gamo Goffa	M.Abaya,Kucha,Dembagofa, Arbaminch Zuria, Deremalo, Kemba, Oida and Uba Debretshay	Malaria	220,000	220,000
		Kemba, Mirab Abaya, Kucha, Uba Debreshay and Arbaminch zuria.	Meningitis	12,000	24,000
		Kamba,M/Abaya,Kucha, Ubadebretshay and Arbaminch Zuria	Malnutrition		
		Kucha,boreda, ,Arbaminch Zuria and Merabe Abeya	AWD		
2	Welayita	Boloso Sore, Boloso Bombe, Damot Pulsa, Damot Gale and Humbo	Malaria	580,510	9,240,000
		Boloso Sore, Damot Pullasa, Boloso Bombee	Malnutrition	180,980	37,968,000
		Humbo(living around Abaya Lake)	AWD	884	

Table Stock estimation for next 6 months (July-Dec.2013) Gamogofa zone

Drugs and Medical supplies		Total Requirement	Available	Gap
Meningitis vaccine				
Drugs	Coartem	6616	0	6616
	Oily CAF	564	0	564
	Doxycycline	174	36	138Box
	Ringer Lactate	3539	180	28372
	ORS	11246	2000	9246
	Amoxicillin Suspension	33078	100	32978
	Cotrimoxazole Suspension	39693	200	39493
	Tetracycline Ointment	794	100	694
	Vitamin A	200 tin	20 tin	180 tin
	F-75	3000 sachet	0	3000 sachet
	F-100	2000 sachet	0	2000 sachet
	Plumy nut	550 box	100 box	450 box
Lab supplies	RDT (malaria)	200000	93750 test	106250
	Pastorex (Meningitis)		0	
	LP set		0	

	TI bottle		0	
CTC Kit (AWD)			0	
Medical Supplies	Glove	200box	100 box	100box
	Syringe	500box	0	500box
	PPE		0	

Table 7. Stock estimation for next 6 months (July-Dec.2012) Wolaita Zone

Drugs and Medical supplies		Total Requirement	Available	Gap
Meningitis vaccine		985,937 dose	0	985,937 dose
Drugs	Coartem	120,000 dose	11,000 dose	109,000 dose
	Artesunate(rectal)	2400 supp	1224 supp	1176 supp
	Artesunate(inj)	1824 ampules	1034 amps	790 amps
	Artemether(IM)	2000 ampules	840 amps	1160amps
	Quinine(po)	100 tin	0	100 tin
	Quinine(iv)	1204 amps	104 amps	1100 amps
	Chloroquine(po)	1130 tin	101 tin	1029 tin
	Ceftriaxone	9640 vials	3000 vails	9340 vails
	Oily CAF	100 vails	0	100 vails
	Doxycycline	150*200 caps	90*200 caps	60*200 caps

	Ringer Lactate	300 bags	150 bags	150 bags
	ORS	2004 sachet	1200 sachet	804 sachet
	Vit A	400 tin	240 tin	160 tin
	Tetracycline ointment	794 tubes	100 tubes	694 tubes
	F-75	3000 sachets	0	3000sachets
	F-100	2000sachets	0	2000sachets
	Plumy nut	500box	100box	400box
Lab supplies	RDT (malaria)	25*750 box	10*750 box	
	Pastorex (Meningitis)	100b bott	5 bott	95 bott
	LP set	100 pcs	20 pcs	80 pcs
	TI bottle	30 bott	05 bott	25 bott
CTC Kit (AWD)		100	0	100
Medical Supplies	Glove	60 box	20 box	40 box
	Syringe	1329box	37	1292box
	PPE	10	0	10

Chapter- VIII Protocol/Proposal for Epidemiologic research project

8.1 Assessment of Socio-demography and environmental factors associated with dengue transmission in Dire Dawa city. Ethiopia.

Summary

Background:

Dengue fever (DF) is a viral mosquito-borne infection caused by four antigenically distinct viruses, designated as dengue serotypes (DENV1–4), and Aedes aegypti mosquitoes is the primary vector for dengue transmission. Socio-demographic and Environmental factors are often keys for effective communicable disease control and underpin successful public health programmers. Despite promising indications in the literature, these factors have remained poorly understood in `the case of dengue. Assessment of socio-demographic and environmental factors in the of Dire Dawa city are important to understand main predictors of dengue transmission

Purpose: The main purpose of this study is to identify sociodemographic and environmental risk factors associated with the transmission dengue virus infection and to identify risk areas to target control measure

Methodology: Hospita based case-control study that will be conducted from September to November, 2014, DD, Ethiopia,during DF major transmission season to identify main socio-demography and environmental determinants. We determine sample size based on previous conducted case control study using an odds ratio that provide largest sample size using Epi info 7.1, Interviews will be carried out with a pre-designed and pre-tested questionnaires. Data will be entered, and analyzed to assess the association with incidence of the disease using EPI-Info version 7.1

Work plan: Data collection will be started September- November, 2014. The study will be completed in December 31, 2014.

Budget: The required cost for the study is estimated 48,684 ETH Birr.

8.1.1 Introduction

The incidence of dengue fever has grown dramatically in the recent decades. According to the WHO report on dengue, 40% of the world's population are now at risk of dengue. Tracing back to 1970, only nine countries experienced severe dengue epidemics but today more countries in Africa, South- East Asia and western pacific regions are seriously affected.(1)

On 5 June 2013, three residents of the Tanzania Field Epidemiology and Laboratory Training Program (TFELTP) participated to investigate complaints of a malaria like illness resulting in three deaths in Dares Salaam Tanzania. The investigation confirmed that out of 90 samples tested, 20 tested for positive for dengue virus and six for malaria, to verify the reported cases and investigate new cases, determine the magnitude of the problem, to identify risk factors, high risk groups and possible sources of the disease.

The emergence and reemergence of DF/DHF have become a significant public health burden in the tropics and subtropics (1-5). Due to the lack of an effective tetravalent dengue vaccine that can secure lifelong immunization, Aedes mosquito control measures have primarily been employed to prevent disease outbreak and interrupt transmission during the outbreak(6). Regarded as intermittent epidemics of DF and DHF have occurred in vulnerable populations. Such outbreaks reflect the failure of current prevention and control efforts. In some cases, an application of appropriate vector control measures along with community participation have proven more effective and sustainable than anti-mosquito approaches alone (7-8).

Several reports have shown a coherent argument that transmission dynamics of dengue viruses result from very complex epidemiology and ecology of the disease. Such dengue transmission dynamics are the interaction among humans, dengue viruses, vectors, and ecosystems, of which biotic and abiotic determinants have both direct and indirect influences on dengue transmission (10-12).

Investigation into such sociodemographic, environmental perspectives can provide foresight into the appropriateness of dengue control efforts, give answers to unexpected vector control responses, and contribute to effective management solutions in an ever-changing environment. Of note, a plausible paradigm of interdisciplinary approach that integrates the environmental and sociodemographic dimensions of dengue (11), has permitted an analysis of dengue transmission

risk to determine what pivotal drivers significantly contribute to dengue transmission in an urban environment.

In this regard, we will apply sociodemographic and environmental factors to determine whether two dengue-related determinants will predict the dengue transmission risk in of Dire Dawa city, An exceptionally high number of dengue fever cases, 9 258, of which 40 were confirmed were reported from September 12 to December31, 2013. Ultimately, the findings of this study would benefit better management of effective dengue prevention and control, especially in resource limited developing countries.

8.1.2 Statement of the problem

Dengue is the most important arthropod-borne viral disease of public health significance. Severe outbreaks of vector-borne diseases (VBDs) and their expansion pose a serious challenge to vulnerable populations. (1). in 2012, Outbreaks exert a huge burden on populations, health systems and economies in most tropical countries of the world. (1-2). The World Health Organization (WHO) currently estimates that there are 50 million cases of dengue infection each year, with approximately 500,000 requiring hospitalization. Of these severe dengue cases, approximately 5% will die. (2)

Reported incidence of dengue has increased worldwide in recent decades, but little is known about its incidence in Africa.(Dengue is likely under recognized and underreported in Africa because of low awareness by health care providers, other prevalent febrile illnesses, and lack of diagnostic testing and systematic surveillance During 1960–2010, a total of 22 countries in Africa reported sporadic cases or outbreaks of dengue; Urbanization and increased travel have contributed to a 30-fold increase in dengue cases between 1960 and 2010. (2-4). However, many outbreaks in Africa are not well characterized, due to the poor surveillance infrastructure and under-recognition of the disease. (4-5)

Factors leading to dengue emergence include environmental and demographic disruptions, increases in human travel resulting in DENV introduction into previously disease-free regions, and an expansion of the range of the principal epidemic mosquito vector Aedes aegypti.5 Recent changes in climatic conditions, greater resistance to insecticides along with other factors, such as population growth, urbanization, lack of sanitation, and ineffective mosquito control are expected to result in a geographical expansion of dengue fever in the coming decades (5).

Investigation into such sociodemographic and environmental perspectives can provide foresight into the appropriateness of dengue control efforts, give answers to unexpected vector control responses, and contribute to effective management solutions in an ever-changing environment. An important option in preventing the spread of dengue fever (DF) is to control and monitor its vector (Aedes aegypti) as well as to locate and destroy suitable mosquito breeding environments.

The aim of the present study is to use a combination of environmental and sociodemographic variables to model areas at risk of DF. These variables include clinically confirmed DF cases, population density in inhabited areas, total populations per district, water access, and neighborhood quality risk of DF. A plausible approach that integrates the environmental and sociodemographic dimensions of dengue will permit an analysis of dengue transmission risk to determine what pivotal drivers significantly contribute to dengue transmission in an urban environment.

As of September 12th to December 31st, the Dire Dawa health bureau reported Some 9,258 suspected cases of dengue fever of which 40 were confirmed. The Government, with support from health partners, are implementing case management and vector control activities. It has known that no cure, vaccine that prevent and control of the outbreak, solely depends on effective vector control measures

In this regard, we apply two sets of environmental and sociodemographic factors to determine whether the two dengue-related determinants will predict the dengue transmission risk area in Dire Dawa city. Ultimately, the findings of this study will benefit better management of effective dengue prevention and control, especially in resource limited developing countries.

8.1.3 Literature Review

Different studies related to the socio demographic and environmental determinants of the DF disease showed that significant risks of incidence of the disease are related to presence of vector breeding sites, the housing and sanitation condition, and individual's behavioral risks are the main factors.

A study in SA showed that showed the presence of stagnant water in indoor drainage holes (OR=4.9), nearby construction site (OR=2.2) and older age (OR=1.2) were independent determinant of dengue (P<0.01) (3), similarly abundance of containers without cover 50.8 %(outdoor) and 20 %(indoor) were reported as main risk factor. (5)

A study in Pakistan also inveterated that water leakage in main supply (OR=2.47), type of housing (OR=2.21), covering of sleeves when going outdoor (OR=0.86), Door mesh (OR=0.31), Mesh in window (OR=0.6) and use of insect killer (OR=0.52) as well as behavior such as lack of personal and home protection (6).

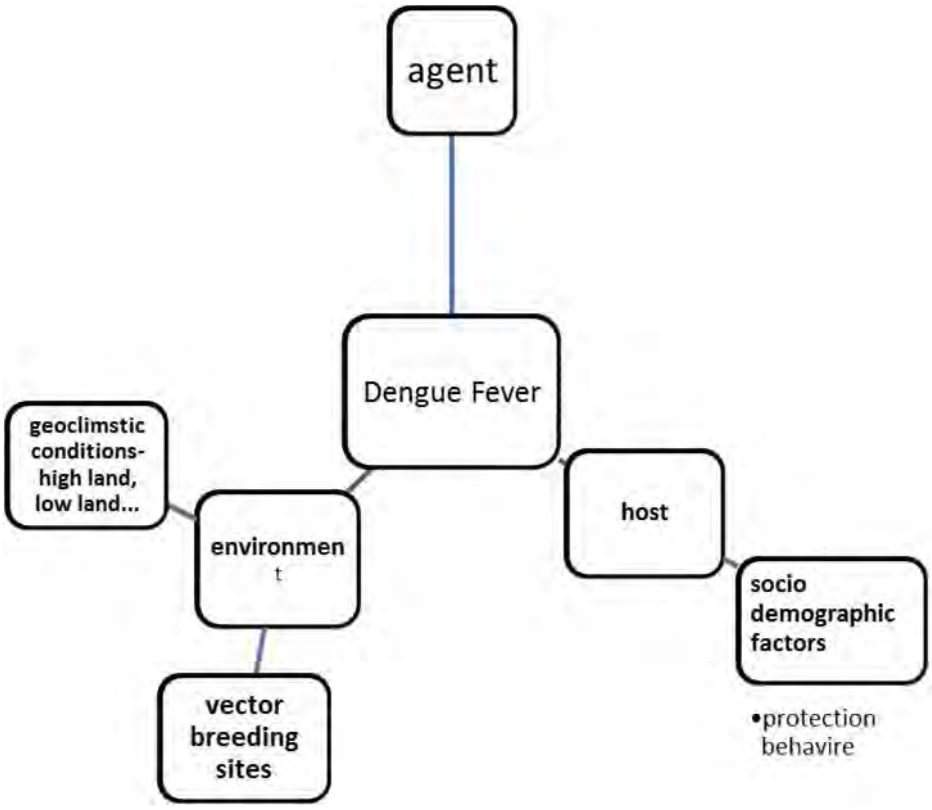
A community based cross sectional study on assessment of environmental factors conducted in urban and rural area of India, the result showed the foremost risk factors for vector breeding was abundance of containers without cover 50.8%(outdoor) and 20%(indoor). The p<0.05 was significant for usage of mosquito coil or repellent, having a protective screen for windows, doors in a living room and use of insecticide spray to reduce mosquito density in urban and rural area (7).

A dengue virus epidemic swept through Charters Towers, North Queensland mining community of 10,000. Dengue in Australia. A female-to-male sex ratio of 1.7:1 was obtained for the 238 cases identified. An age- and sex-matched retrospective case-control study showed that cases were significantly more likely to live in unscreened houses than were controls (McNamara chi 2 = 56.1 DF, P < 0.0001). An association between insect screens and a reduced incidence of mosquito-borne diseases. We speculate that unscreened housing facilitates the initial spread of a dengue epidemic (8).

A study of sociodemographic risk factors of DF patient in territorial care Hospital in Lahore Pakistan, A total of 300 cases and 300 controls were selected, patient were confirmed by ELISA positive were considered as case and ELISA negative as control. The study showed the presence of risk factors ,inside /outside of house, water leakage in main supply (OR=2.47), type of housing (OR=2.21), covering of sleeves when going outdoor (OR=0.86), Door mesh(OR=0.31), Mesh in window (OR=0.6) and use of insect killer (OR=0.52) as well as behavior such as lack of personal and home protection which exposed them to the dengue vector which exposed the resident to dengue infection. (9)

A case–control study with 'cases' being households with entomologically confirmed. Aegypti infestation; personal interviews in Central Havana, Greater risk of infestation was associated with lack of preventive measures, such as no larvicide in the water tanks (OR ¼2.21) and use of flower vases for religious practice (1.93), not being economically active (1.64), vulnerable populations with higher risks in households with older people (1.52) and households with children (1.94) (10).

This case–control study determined factors potentiating the spread of the disease to provide an epidemiological baseline to help dengue control all (650) suspected cases of dengue in Jeddah in 2007.Cases were those confirmed with dengue by laboratory investigations (n = 244) and controls those confirmed negative (n = 406). Of these, 129 cases and 240 controls could be contacted and were included in the study. Variables found significant in the bivariate analysis were included in a logistic regression analysis. The presence of stagnant water in indoor drainage holes (OR = 4.9), indoor larvae (OR = 2.2), nearby construction sites (OR = 2.2), and older age (OR = 1.2) were independent determinants of dengue infection ($P < 0.01$ for all) (12).



Environmental factors

Types of houses- surrounding condition, Distances of houses to open spaces

Containers without covers discarded containers (tin can, bottles, broken jars),, Used tires

-Water leakage in main supply

-Stagnant water in outdoor

Socio-demography factors

-Age, Gender

-Jobs status

-Types of housing

-Door mesh

-Mesh on window

-Income

-Use of insect killer

-Water storage tank

-Bucket/Tubs covering

-Usage of mosquito coil/repellent

-Protective screen

-Travel history

Figure 8.1.4- Conceptual framework for factors affecting Dengue fever transmission In Dire Dawa city, Ethiopia, 2013

8.1.5 Objectives

8.1.5.1 General Objectives

- To identify of Socio-demography and Environmental risk factors and assess potential predictors of locally acquired cases of DF Dire Dawa, Ethiopia.

8.1.5.2 Specific Objectives

- To assess Environmental factors indicator: dengue transmission
- To explore the socio-demographic risk factors associated with Dengue Fever
- To recommend measures that support to benefit better management of effective dengue prevention and control strategies

8.1.6 Materials and Methods

8.1.6.1 Study area: Dire Dawa is located in eastern part of Ethiopia between latitudes 9°36'N and longitudes of 41°52'E; It is bordered on the South by Oromia region, on the west Somali region, on the North Djibouti and on East Somali. It is 515 km from the capital city Addis Ababa. It covers around 1213 km2, Routine registration revealed 90,686 houses with 342,827 residents in 2013 residing in 108 villages. Both urban and semi urban communities are situated in low-lying, the climate is characterized by rainy season (June–August), a winter dry season (November–January), and a hot dry season (February–May).

Given the complexity of its demographic and socioeconomic dispersions, the province is administratively divided into a total of 25 rural and urban kebeles, 90% of kebeles are found inside the city. It has basic infrastructures of connecting roads, electricity, piped water supply system, communication system, and health service system, A total of 48 health facilities which comprises, one government, three private Hospital,19 health center and 25 health post providing healthcare services for the whole population. Recently, a dengue fever outbreak, with an incidence of 36 per 1000 Population has been reported from the Dire Dawa Health bureau

8.1.6.3 Study population: The study subjects will be Any pt. with dengue fever at OPD of Dil Chora Hospital. Inclusion criteria**: Cases** will be individual to Dil Chora referral Hospital with suspected dengue fever and subsequently confirmed by an enzyme-linked immunoassay (EIAs) and **controls** will be persons in the same hospital who are not DF cases by matching for age and gender**.**

8.1.6.1 Working definition

8.1.6.1.1 Suspect: Case: A temperature ≥38^{o}C or history of acute fever in a patient negative for malaria or unresponsive to antimalarial treatment and who reported ≥2 of the following: Headache, retro-orbital pain, myalgia, arthralgia, nausea, vomiting, rash, bleeding tendencies and leucopenia.

8.1.6.1.2 Confirmed Case: A laboratory test positive for anti-dengue IgM by ELISA or detection of DENV by rt-PCR between January to April 2013.

8.1.6.2 Control: is a person diagnosed for other with the case patient for dengue fever has same sex and age with the case patient

8.1.6.1.3 Study design**:** Hospital based case control study will be employed to identify the magnitude, sociodemographic and environmental factors for dengue fever transmission**.**

A. Inclusion and Exclusion Criteria

- **Inclusion criteria**
- All Dengue fever cases who will be diagnosed and confirmed at OPD in the Hospital for Dengue fever cases/
- Persons without dengue fever/Not treated AFI, like malaria. / For control/

B. Exclusion criteria

- Persons without dengue fever cases./ for dengue fever cases/
- A history of Dengue fever disease since the beginning of Dire Dawa city following outbreak who was heal /for control/

8.1.6.4 Sample size and Sampling procedure: the sample size of the study is dependent on the objective of the study. To determine sample size for case control study is computed

1. Using odds ratio of previous conducted case and controls study on Socio-demographic and Environmental Factors associated with Dengue fever transmission, in Phuket, Thailand, 2009.The OR ratio which provide largest sample size will be considered of the risk factors for contracting Dengue fever from this study (12). The odds ratio (case and control=), considering 95% confidence level of certainty and power of 80%, to get adequate sample size, the odds ratio of the factors that will provide largest sample size will be considered. The sample size calculated using **Epi info. Version 7.1**

Unmatched case control study

Percent of controls exposure = 50% **Odds ratio** +3.24

Two sided confidence level 95 CI **percent of cases with exposure**+89

Power 80% n= 45

Ratio controls to cases= 2

2. Information will be collected on demographic characteristics, date of onset of signs, underlying illness, clinical findings, laboratory testing, therapy, and outcome followed by individual household and environment assessment to identify sociodemographic and environmental risk factors which favored dengue transmission,. Cases will be individual suspected dengue fever and subsequently confirmed by an enzyme-linked immunoassay (EIAs) and controls will be any other patients randomly selected from the same Hospital by matching for age and gender. Two controls for each case will be recruited based on the above criteria.

8.1.6.6 Study variables

.8.1.6.6.1 Dependent variable

- Dengue fever cases and death

8.1.6.6.2 Independent variable

- Socio demographic characteristics. Age, sex, place of residence,
- Occupation, Knowledge, Family size , Residence, Family income
- Environmental factors: door mesh, mesh on widow, usage of mosquito coil/repellant
- Water leakage in main supply, water storage tank

8.1.6.6 Data collection instrument

The questionnaires are developed in English and then translated into Amharic and will be translated back to English for accuracy and consistency. Information on socio-demographic characteristics, economic status, sex of the child, family size and knowledge and environmental factors related with dengue fever transmission.

8.1.6.7 Data collection procedure:

The data collection will be held at OPD level from Patients who present at the time of study period at health facilities interviewed by trained nurses using structure checklist designed to capture primary data on age, gender, date of onset, place of residence, occupation, clinical symptoms,riskfactors,information,from clinical history, case management, sociodemographic and environmental factors will be collected.Controls and case patients will be interviewed with structure questionnaire by the same data collector.

8.1.6.8 Training of data collectors and pre-testing

Ten nursing graduated data collectors and one supervisor will be recruited and received two days intensive training before data collection. Training will be given by Amharic on how to ask and fill the question, selection criteria of households and children, and how to approach the mothers/caretakers. Questionnaires will be pretested for completeness and appropriateness to the local context on 20 households in one of the kebeles not selected for the study. Based on the results of the pre-test some questions will be modified.

8.1.6.9 Data analysis procedure: The Data will be entered into the computer and cleaned and completeness and reliability of data will be checked and corrected for incomplete and incorrect data by the principal investigator; then it will be analyzed using Epi info version 7.1.

8.1.7.0 Ethical clearance: the final study proposal will be submitted to institutional review board of Addis Ababa University for approval. Formal letter will be written by the university and the regional health bureau to health facilities and kebeles in the study area and permission will be received from each health facilities to review patient charts and medical records. Verbal consent will be given by each participant and all information as well as the information extracted from medical records will be kept confidential.

8.1.7.1 Outcome of the study: Baseline information on important socio-demography and environmental factors will be identified for possible public health interventions to control and prevent the health and economic impact of the disease in the city, moreover the outcome of this study will be used as reference material on epidemiology of dengue fever in the city.

8.1.7.2 Dissemination of the result: the finding of this study will be shared with the public health mangers of the study area, administrative health bureau officials. The study result will be presented at national or regional scientific conference as well as submitted for publication in peer reviewed journal.

8.1.7.2.3 Budget and implementation time

A total of 48,468.00 birr will be needed to conduct the study. Break down is annexed (Annex 8.1.2). The project will take about one month including preparation of final report, detail is annexed (Annex 2). Study will be started within two weeks after grant released.

Annex 5: Research project implementation period-Dire Dawa, Ethiopia

Activities	Responsible bodies	Time frame					
		Dec	Jan	Feb	Mar	Apr	May
Topic selection, draft proposal writing and consultation of advisor	Principal investigator						
Finalization of proposal and submission	Principal Investigator and advisor						
Review of proposal and approval of project	IRB						
Data collectors training and data collection	Principal Investigator and data collectors						
Data clean up, data entry and analysis	Principal Investigator						
Draft result writing and advisor consultation	Principal investigator and advisor						
Finalizing report writing	Principal investigator						
Final report submission	Principal investigator						
Defense							

Annex 6 Research project budget breakdown-Dire Dawa city, Ethiopia, 2014

No.	Descriptions	Unit	Qty	Unit cost	Total cost
I	**Production of study tools and stationary**				
1	Production of the study tools (1 page x 0.50 Eth Birr x 1320)	Pages	1320	0.50	660
2	Stationeries (5 x 60)	Assorted	60	5	300
	Subtotal				**960**
II	**Training**				**-**
4	Field supervisors (4 days)	person x days	4	150	600
5	Data collectors training (3 days training)	Person x days	30	70	2100
	Subtotal				**2700**
V	**Per diem (Field work)**				
7	Project coordinator	Person x days	25	150	3750
8	Field supervisor	Person x days	25	200	3750
9	Data collectors	Person x days	500	70	35000
	Subtotal				**42,500**
	Total				**46,160**
	Contingency (5%)				**2308**
	Grand total		**Eth Birr**		**48,468**

8.1.2.7.4 References

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Annex 7: Information sheet and consent form, Dire Dawa, Ethiopia, 2014

Introduction:

Hello, my name is..... . I am Field Epidemiology Training research team member. Thank you for taking the time to speak with me today. We are conducting study on sociodemographic and environmental factors which predispose the residents of this kebele the disease-dengue fever, and wanted to speak with you. Our goal is to figure out factors which favor dengue fever transmission in the community. We are very interested in your experiences and your point of view.

We will start by asking your willingness to participate in the study and clearly explain you the objective, benefit and risks of the study to get your consent. And then we will ask you all a multiple of questions for discussion. Questions are simple and what you are clearly known in your daily activities. Please feel free to speak; your name, position, and anything that could identify you personally will not be used in any official reports or presentations. (Feel consent Form).

Annex 8: Questionnaire for assessing Socio-demography and Environmental factors of dengue fever transmission in Dire Dawa city

No.	QUESTION	CATEGORIES	SKIP
1.1	Region	1. Dire Dawa	
1.2	Kebele	_____	
1.3	House Number	_____	
1.4	What is your Ethnicity?	1. Amhara 2.Oromo 3.Somali Other(Specify)_____	
1.5	What is your religion?	1. Orthodox 2. Protestant 3. Islam 4. Other (specify)	
1.6	Age	_____ Year	
1.7	Sex	1.Male 2.Female	
1.8	What is your occupation	1.Farmer 2.House wife 3.Government Employee 5.Merchant 6.Student 7.Daily Laborer 8.Other_____	
1.9	What is your level of Education	1.Illiterate 2.Primary(grade1-8) 4.Secondary 5. Tertiary (College diploma and above)	
1.10	How many years are you residing in this	_____	

No.	QUESTION	CATEGORIES	SKIP
	village?		
1.11	Family monthly income in birr	_____	

No.	QUESTIONS	CATEGORIES
2.1	Main material of the floor RECORD OBSERVATION	NATURAL FLOOR 1. Earth/Sand 2. Dung RUDIMENTARY FLOOR 1. Wood planks 2. Palm/Bamboo FINISHED FLOOR 1. Parquet/Polished wood 2. Vinyl or asphalt strips 3. Ceramic tiles 4. Cement 5. Carpet 6. Other (specify)
2.2	Main material of the wall RECORD OBSERVATION	NATURAL WALL 1. No walls 2. Cane/trucks/bamboo/reed RUDIMENTARY WALL 1. Bamboo/wood with mud 2. Stone with mud 3. Uncovered abode 4. Plywood 5. Carton FINISHED WALL 1. Cement 2. Stone with lime/cement 3. Bricks 4. Cement blocks

		5. Covered Adobe 6. Wood planks/shingles 7. Other (Specify)
2.3	Main material of the Roof RECORD OBSERVATION	NATURAL ROOF 1. Thatch/Leaf 2. Sticks and mud RUDIMENTARY ROOF 1. Rustic mat/plastic sheet 2. Reed/bamboo 3. Wood planks FINISHED WALL 1. Corrugated iron 2. Wood 3. Calamine/cement fiber 4. Cement/concrete 5. Roofing shingles 6. Other (Specify)
2.4	Windows RECORD OBSERVATION	Yes, Total # of windows---- No
2.5	Type of windows RECORD OBSERVATION.	Any window Windows with glass Windows with screens Windows with curtains/mesh
2.6	How many separate rooms are in this household? INCLUDE ALL ROOMS, INCLUDING KITCHEN, TOILET, SLEEPING ROOMS, SALON, etc.	Number of rooms------
2.7	How many rooms in this household are used for sleeping? INCLUDE ONLY ROOMS WHICH ARE USUALLY USED FOR SLEEPING.	Number of sleeping rooms ----------

3.1	At any time in the past 12 months, has anyone sprayed the interior walls of your dwelling against mosquitoes?	Yes No Don't know		
3.2	How many months ago was the house sprayed against mosquitoes? IF LESS THAN ONE MONTH, RECORD # MONTHS AGO.	Months ago.....		
3.3	Do you use mosquito coils/nets/repellent?	Yes No		
3.4	How long ago did your household obtain the mosquito net?	Months ago More than 3 years ago	Months ago More than 3 years ago	Months ago > 3 yrs ago 95
3.5	Where did you obtain the net?	Government -----1 Clinic/Hospital-----2 Health Extension Worker--3	Community Health Worker/ Agent ----4 Retail Shop----7	Pharmacy-----8 Other (specify)
4	Empty containers indoor/outdoor	Yes No		
4.1	Source of water supply	Piped water Water storage vessels Hand dung wel		
4.2	Water pans for animals around the house?	Yes No		

Chapter – IX Additional Outputs

9.1 Narrative summary of training provided to woreda focal persons from different zones and special woredas

9.1.1 Introduction

The burden of disease in our country is mainly due to preventable communicable diseases, which are the common causes of morbidity, mortality & disability. The National health Policy gives due attention to the control & prevention of preventable communicable diseases and epidemic prone diseases as well.

The best strategy for strengthening of prevention & control of communicable diseases is surveillance as it provides evidences on which to base decisions on public health interventions. Importance of disease surveillance in guiding health planning and intervention was recognized long ago; nevertheless, current routine surveillance system is constrained by many factors such as shortage of trained personnel, poor data collection, non-recording, failure to report diseases of epidemic potential in time, incomplete and late reporting of notify able diseases and inadequate data analysis especially at peripheral level. As a result of these constraints IDSR and case management remains weak.

As to the frequent supervisory visits carried out by the health bureau personnel the reports received from zonal health offices are incomplete and observation at health facilities shows that the case management, especially, on measles, meningitis, malaria, malnutrition and AWD are very poor.

In order to achieve effective disease surveillance system and improve case management in our region we have to strengthen PHEM focal persons on general PHEM activities and outbreak investigation of selected epidemic prone diseases.

Training materials comprised of PHEM overview, Public Health surveillance, early warning, preparedness and response, Epidemiology, Prevention and Control of Malaria, , Measles surveillance, Meningitis surveillance.

9.2 Objectives of the Training

General Objective:

- To strengthen PHEM focal persons on surveillance, outbreak investigation of selected epidemic prone diseases case managing abilities and improvement of recording and reporting system.

Specific Objectives:

- To improve the health workers' ability on case management of selected epidemic prone diseases.
- To enable participants to develop the skills on surveillance data analysis.
- To enable participants to develop the skills on outbreak investigation.
- To improve recording and reporting system in the region.

.3. Methodology

1. Place of training was Arbaminch town.

2. Training period was from 18/5/2014-25/5/2014.

3. Participants were from Wolayita, South Omo, Segen people, Keffa.

4. Selection criteria

- Untrained woreda focal persons are selected for training.
- Newly assigned focal persons are being taken in to consideration.
- The methods of conducting the training involved introductory presentation by facilitators, individual reading, working on the exercises, and discussion in small groups with the support of facilitators, group presentation and discussion at plenary sessions with the whole group.

5. Facilitators presented a detail presentation on each topic.

6. Pre and post-tests were given to the participants and seen for improvements.

9.2.1 Results

- A total of 75 trainers were planned and 55 PHEM focal persons (73.33%) attended training.
- Mean pre-test score was 46.12%.
- Mean post-test score was 55.42%.
- Mean difference between post and pre-test was 9.30%.

Table 9.1.1: Descriptive statistics of pre and posttest training results-Gamogofa, Ethiopia, 2014

	Number of participants	Minimum	Maximum	Mean
Pre-test 100%	55	6	88	46.12
Post-test 100%	55	24	100	55.42
Post-Pretest difference	0	18	45	9.30

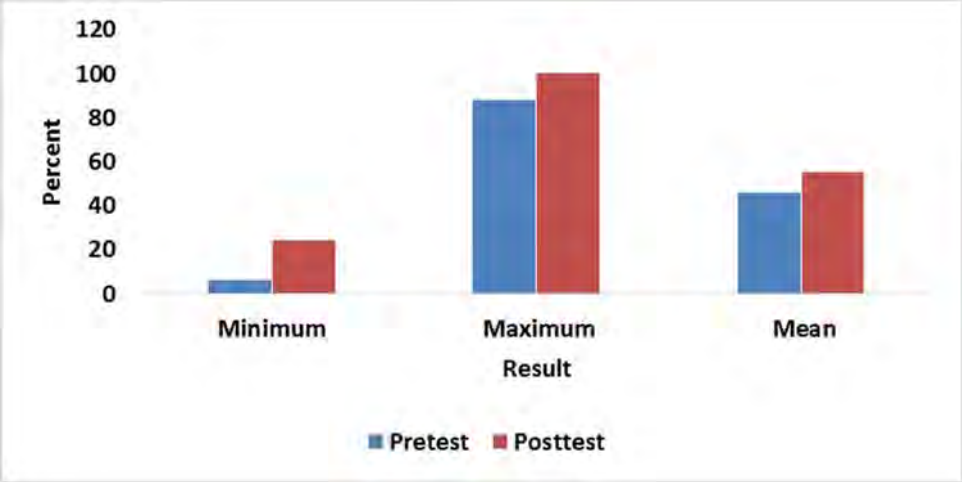

Figure 9.1.1: Comparison of pre and post test result-Gamogofa zone, Ethiopia

9.2.2 Limitations

- Training days were very short and tight.
- Training materials (hard copies) were not given to the trainees.

9.2.3 Discussion

- There is improvement of knowledge on Public Health Emergency Management among participants even though there is shortage of time.

9.2.4 Recommendation

- Training materials should be given in the form of hard copies for PHEM focal persons who came from where computers are unavailable and electricity is not available.
- There should be sufficient time to address important issues to be captured by woreda PHEM officers for the future.

9.2.5 Acknowledgement

I would like to thank Regional bureau for financial support to accomplish the training properly. I also give appreciation to WHO surveillance officers (Dr Meseret) for her technical support. Eventually I thank SNNP regional PHEM staff for their entire involvement throughout the training.

Declaration

I, the undersigned, declare that this is my original work and 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: Daniel Teshome Bekele

Signature: _____

Place: _____

Date of Submission: _____

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

Name of Advisor: Dr Merawi Aragaw

Name of Advisor Dr. Jemal Haider

Signature: _____

Date: _____