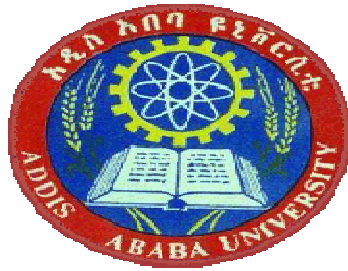


**Addis Ababa University, College of Health Sciences,  
School of Public Health**

**Ethiopian Field Epidemiology Training Program (EFETP)**



**Compiled Body of Works in Field Epidemiology**

**By: Tigabu Hiluf**

**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**

**April, 2014**

**Addis Ababa**

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**Advisors**

**Dr. Getahun Aynalem**

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## **Abbreviations/Acronyms**

AAU	Addis Ababa University
EFETP	Ethiopian Field Epidemiology Training Program
AFNET	African Field epidemiology Network
CDC	Centers for Disease Control and prevention
EPHA	Ethiopian Public Health Association
IRS	Indoor Residual Spray
IRB	Institutional Review Board
OR	Odds Ratio
RDT	Rapid Diagnostic Test
SPH	School of Public Health
LLITNs	Long Lasting Insecticide Nets
WHO	World Health Organization
UNICEF	United Nations
CFR	Case fatality rate
PHEM	Public health emergency management
KM	Kilometer
MS-excel	Micro Soft Excel
MS-Word	Micro Soft word
BMI	Body Mass Index
CI	Confidence Interval
EPHI	Ethiopian Public Health Institute
EU	European Union

GPS	Geographical Positioning System
HIV/AIDs	Human Immune Virus /Acquired Immune Deficiency
IgM	Immunoglobulin” M”
KAP	Knowledge, Attitude, Practice
MCV	Measles Containing Vaccine
MMR	Measles, Mumps, Rubella
OR	Odds Ratio
PHEM	Public Health Emergence Management
SPSS	Statistical Package for Social Science
TRHB	Tigray Regional Health Bureau
UNICEF	United Nations Children and Education Fund
VE	Vaccine Efficacy
CHD	Community Health Days
TFP	Therapeutic Feeding Programme
OTP	Outpatient Therapeutic Feeding Programme
DRMFSS	Disaster Risk Management and Food Security Sector
WASH	Water, Sanitation and Hygiene

## Preface

This body of work is consisting of 9 major outputs and 4 additional outputs in partial fulfillment for the degree of Master of Public Health in Field Epidemiology.

Chapter one includes an outbreak investigation in which there was an outbreak of measles in Tsegedea district, Tigray region from 6-25/2/2014. In addition to this, Suspected outbreak of anthrax has been occurred in Kolatemben woreda, Tigray region from May-July/2014. For both of it, we used a case-control study design to identify the possible risk factors and to describe the magnitude of these diseases.

Chapter two describes a surveillance data analysis on Severe acute malnutrition in Tigray region based upon the secondary data adopted from Tigray regional health bureau, HMIS unit. We described the trend of this public health problem in respect to the 46 woredas, age groups and sex to identify the majority distribution and to whom it affected.

Chapter three is the surveillance system evaluation on malaria and dysentery diseases which was conducted in Raya Alamata woreda, Tigray regional health bureau and regional laboratory in 2013 based upon the surveillance system indicators such as, key attributable of surveillance system, population under surveillance, trends of these diseases and the health facility coverage and availability of logistic and supplies.

The fourth chapter is a health profile assessment done in Endamehoni woreda, Tigray region based upon the secondary data from 2002-2004 E.C. We determined Geography and Climate, Administrative Organization, population structures, Education, Disaster Status in the area, Health Services (Types and numbers of health institutions, Types and numbers of health professionals, health institution to pop ratio, health professional to pop ratio, health service coverage, top and leading causes of OPD visit, admission and death, health budget allocation, ) and 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/etc.), Nutrition, Essential drugs etc.)

We also mentioned the abstracts on measles and a suspected anthrax outbreak investigation for oral and poster presentations in chapter five and we included in chapter six, a finalized draft of a scientific manuscript of measles outbreak investigation for a peer review journal.

In chapter seven we assessed the disaster situation in seven belg beneficiary woredas of Tigray region. A multi-disciplinary expertise was involved to assess the health and health related problem, Nutrition status of the community, WaSH facilities and Education related problem.

A project proposal on the RDT prevalence and possible risk factors of malaria was prepared and described in chapter eight. This will be done in welkayt sugar factory at the mid of 2014. we used a comparative cross sectional study design to identify the magnitude and mainly associated risk factors for the occurrence of malaria disease.

Finally, we include four additional out puts in chapter nine such as , the training proposal on PHEM for health workers which was based upon the finding from surveillance system evaluation done in raya Alamata woreda. The remaining outputs are, bulletin writings on malaria from weekly report of THB, A secondary data analysis of Hepatic-VOD occurred in north western Tigray from 2003-2005E.C. we also analysed the laboratory finding report on measles outbreak which was sent from national laboratory , EPHI for weekly report of February to March/2014.

## **CHAPTER -1 MEASLES OUTBREAK INVESTIGATION IN TSEGEDEA WOREDA, TIGRAY REGION, FROM 6-24/2/2014**

**T, HILUF<sup>1</sup>, M, GOITOM<sup>2</sup>, I ADEM<sup>3</sup>, G AYNALEM<sup>4</sup>**

### **EXCUTIVE SUMMARY**

**Introduction:** Tsegedea district is found in western Tigray region composed of 123,641 populations and 25 kebelles. The health facility coverage is 100 %( 5) for health centers and 93 %( 23) for health posts. Measles is an acute, highly contagious viral disease caused by measles virus.. As more countries immunize more children, measles deaths have been reduced by 71 per cent—from an estimated 548,000 in 2000 to 158,000 in 2011. However, according to the official report, an outbreak of measles is occurring throughout the regions of Ethiopia. Among these regions, Tigray region has reported 6 outbreaks of measles from, 2011-2013. We received 4 clinically suspected measles cases from 2 kebelles of the district from 6-10/2/2014. We investigated this cluster to confirm its etiology, describe its magnitude, identify potential risk factors and make recommendations.

**Methods:** We investigated measles outbreak from 6-24/2/2014 in Tsegedea district by a case-control study. We recruited 20cases and 40controls by simple random sampling having a structured questionnaire. We entered the data to Epi-Info, version 7.6.1 and exported to SPSS, version 16 for analysis. We have computed the BMI, overcrowdings, vaccine efficacy  $(1-OR)*100$  and herd immunity (from 2012-2014).

**Results:** we detected a prevalence of 0.23/1000(29) with 100 %( 7) IgM positive in Tsegedea district. It was higher in males 51.8 %( 15) than females 48.2 %( 14). The median age was 9years (8month-30years) with ASAR of 0.277/1000(1) for <1 years and 0.22/1000(15) in  $\geq 15$  years age. Majority of the cases were in Alemgenet Kebelle( 2.19/1000(10)) compared to the other 6 kebelles that ranges 0.1/1000-1.1/1000. We computed a herd immunity of 73.1% and a vaccine efficacy of 94.1% for one dose vaccinated Vs non-vaccinated .55% of the cases enrolled to the study were underweight .The vaccination of 1 dose and  $\geq 2$  dose were a protective factor for developing measles infection(i.e for 1 dose, AOR =0.059,95%CI(0.008-0.44), P-value=0.0060 ,for  $\geq 2$ ,AOR=.061,95%CI(0.004-0.9) ,P-value=0.045). Overcrowding was also highly associated with the occurrence of measles outbreak (AOR= 8.42, 95%CI (1.76-40.1), P-value= 0.007).

**Conclusion:** compared to the national measles vaccination policy, the herd immunity was low with higher vaccine efficacy. The vaccination status and overcrowding had a strong relationship with measles infection separately. The measles outbreak was a propagative that lied majority of the cases in  $\geq 15$  years age and specific areas of the district. So, that, a selective vaccination campaign, improvements on housing condition and nutritional status of the community should be implemented.

## 1. INTRODUCTION

Tsegedea district is found in western Tigray region composed of 123,641 populations and 25 kebelles in which, 44 %( 11) of them are lowland areas. The health facility coverage is 100 %( 5) for health centers and 93 %( 23) for health posts. We received 4 clinically suspected measles cases from 2 kebelles of the district from 6-10/2/2014.

Measles is an acute, highly contagious viral disease caused by measles virus. This highly contagious virus is transmitted primarily by respiratory droplets or airborne spray to mucous membranes in the upper respiratory tract or the conjunctiva.(1) Measles is one of the most contagious diseases known to man and often occurs in explosive epidemics. It usually does not kill children directly; however, as a result of its associated immune suppression, measles can lead to lethal complications, such as pneumonia, croup, and diarrhea. Measles can also lead to lifelong disabilities, including blindness, brain damage, and deafness. (2)

The risk factors for measles virus infection include: infants who lose passive antibody before the age of routine immunization, children with vitamin A deficiency and immunodeficiency due to HIV or AIDS, leukemia, alkylating agents, or corticosteroid therapy, regardless of immunization status and children who travel to areas where measles is endemic or contact with travelers to endemic areas. Malnourished and young children are at higher risk of developing complications and mortality from measles infection. Malnutrition (including vitamin A deficiency), underlying immunodeficiency and lack of access to medical care are all factors leading to the high case-fatality rates observed in many parts of the world

### Sign and symptoms of measles

Prodrome and general symptoms: measles infection presents with a two to four day prodrome of fever, malaise, cough, and runny nose (coryza) prior to rash onset. Conjunctivitis and bronchitis are commonly present. Although there is no rash at disease onset, the patient is shedding virus and is highly contagious.

The current routine immunization schedules recommend a dose of measles vaccination at 9 months of age.(1)All immunization programme should have a standard of getting an access for all children with two doses of measles containing vaccine (MCV).The second dose may be delivered through routine immunization or periodically mass campaign upon the strategies able to achieve high coverage.(3)

. The only effective preventive measure is vaccination with two doses of measles-containing vaccine, usually administered as a measles-mumps-rubella (MMR) vaccine. National vaccine uptake of at least 95% with two doses of MMR vaccine is considered to be necessary to achieve region-wide.(4) However, a vaccination uptake of below 95% of the population in several EU Member States has resulted in an accumulation of susceptible individuals. Thus measles has re-emerged in the region that resulted an Outbreak in sub-groups of populations with low vaccine uptake and then spread to the general population.(5)

The sero-conversion rate of measles vaccine at 9 month of age is 85%, accordingly, even in regions where routine immunization coverage is high; some children from each birth cohort remain susceptible to measles. When large numbers of susceptible children accumulate over time, periodic outbreaks may occur in well vaccinated woredas.(1) The critical question in evaluation of the vaccine program, an Observational studies, direct (cohort) and indirect(case-control), have played a crucial role in determining whether persisting disease is the result of vaccine failure or failure to vaccinate, . Observational designs are useful when comparing vaccines with very large differences in effectiveness. (6)Eventhough Comparison of attack rates in vaccinated and unvaccinated individuals during outbreaks provides unacceptable alternative for post licensing study of VE, It can be also estimated from cohorts or diseases with least incidence in case control study.(7)

Global progress in the past decade against measles has been stunning. As more countries immunize more children, measles deaths have been reduced by 71 per cent—from an estimated 548,000 in 2000 to 158,000 in 2011.(8)

In addition to this, more than 40,000 laboratory-confirmed cases of measles were reported globally in 2011.(9)According to official reports, the coverage of measles containing vaccine (MCV) throughout Iran was greater than 90% of the population since 2001 and during 2008 and 2009, and it was approximately 99%.(10)

However, Measles Outbreak was occurred in Southeast Iran with a Vaccine effectiveness of approximately 74.2 % ( 95% CI, 10.2–92.6) based on the calculated OR for measles vaccination given twice versus no vaccination. The vaccination status among the study subjects was 8 (16.3%) for one dose and 26 (53.1%) for 2 dose .where as 15 (30.6%) of the total cases were not vaccinated and the persons who had a contact history with a confirmed measles cases was 10.93 times more likely to develop measles infection. In addition to this, a vaccination exposure was statistically significant as a protective factor against measles infection (i.e 1 dose vs. no

vaccination OR=0.74, 95%CI of 0.20–2.71 and for 2 doses vs. no vaccination, OR=0.26 , 95%CI 0.07-0.90). (11)During Measles Outbreak in a Northern Pakistani Village a total of 139 children (25 %) have reported a history of measles prior to the 1990 outbreak.(12)

These outbreaks occurred in the AFRO region challenges to the recent successes against measles-mortality and to the goal of measles elimination ,Eventhough the nationally coverage of MCV1 and MCV2 have increased by 27% and 26% from 68% and 57% in 2001 to 95% and83% in 2010, respectively. Comparatively, SIA coverage has remained at high levels, around 90%, over the years 1996–2010.(13)

A large outbreak of measles involving around 1700 cases occurred in South Africa between 2003 and 2005 following its introduction from Mozambique. And also there were an outbreak of measles from2009-2011, with the highest incidence among infants: 61 per 10 000 (95% CI: 59.3–62.4).But ,he incidence in children aged 10 to 14 years and in those aged 15 to 19 years was higher than in those aged 5 to 9. (14)

Kenya has reported an MCV1 coverage of 107% (5,995,049) in children targeted 9-59 months. Gabon has achieved68% (168,749) in children targeted 6-59 months during 2012.(8) The WHO - UNICEF coverage estimates for measles vaccination for Ethiopia also indicate an increase from 37% in 2000 to around 80% in 2010. (1)However, according to the official report, an outbreak of measles is occurring throughout the regions of Ethiopia. Among these regions, Tigray region has reported 6 outbreaks of measles from, 2011-2013.

After the report of measles outbreak from the nationwide and Tsegedea district, it was shock to the health sector and had the potential to seriously undermine confidence in the immunization program. Thus, the main aim of this outbreak investigation was to confirm its etiology, describe its magnitude, identify potential risk factors, assess vaccine efficacy and make recommendations on the future.

## **2. OBJECTIVES**

### **2.1General objective**

- To investigate an outbreak of measles in Tsegedea district, Tigray region ,from 6-25/2/2014

## **2.2 Specific objectives**

- To confirm the existence of measles outbreak
- To describe the magnitude of the outbreak
- To determine the possible risk factors of the outbreak

## **3. Methods**

### **3.1 Study area and period**

The study population was composed of the inhabitants of the Tsegedea district villages involved in measles outbreak .the district has a total population of 123,645 .it is located in 661 km far from the capital city of Tigray region, Mekelle. The study was conducted from 10-24/2/2014 in 7 villages of the district.

### **3.2 Study design**

We conducted a case-control study design to identify the possible risk factors for the occurrence of measles outbreak .A blood serum has been sent to National Laboratory (EPHI) from 7 clinically suspected measles cases that have been involved in the outbreak of measles before 2 weeks date of onset to confirm the IgM of measles virus.

### **3.3 Sampling method**

The cases and controls were recruited by simple random sampling method that have been matched by their residence irrespective of other variables (age, sex, and vaccination status)

### **3.4 Sample size**

We used unmatched case-control sample size determination from the previous study of measles outbreak conducted in southeast Iran, 2011 by using the most frequent independent variable i.e contact history (OR=10.9, 95%CI, alpha=0.05, proportion of cases exposed=77.6%, proportion of controls exposed=41.8%, power=80).however, we approximated the cases from 23 to 20 and the controls from 43 to 40 (i.e 2 controls for every cases; 1:2).

### **3.5 Data collection tools and Methods**

We used a structured questionnaire to collect the required information composed of the socio-economic demography, clinical status of the cases, the possible risk factors and the KAP of the community .the national measles guide line, national PHEM guide line, GPS and camera were fully available .the data was collected through face to face interview with the respondents ,by

reviewing the line list data in the health facility and properly registering the geographical location of individual households

### 3.6 Variable specification

Sr.no	Dependent variable	Independent variable
1	<ul style="list-style-type: none"> <li>• Measles infection</li> </ul>	<ul style="list-style-type: none"> <li>• Measles vaccination status</li> </ul>
2		<ul style="list-style-type: none"> <li>• Measles infection (previously)</li> </ul>
3		<ul style="list-style-type: none"> <li>• BMI</li> </ul>
4		<ul style="list-style-type: none"> <li>• Over crowding</li> </ul>
5		<ul style="list-style-type: none"> <li>• Family size</li> </ul>
6		<ul style="list-style-type: none"> <li>• Travel history</li> </ul>
7		<ul style="list-style-type: none"> <li>• Contact history</li> </ul>
8		<ul style="list-style-type: none"> <li>• KAP on measles infection</li> </ul>

### 3.7 Data entry and analysis

We used an Epi-Info, version 7.6.1 for data entry that have been exported to SPSS, version 16 for univariate analysis and multivariate analysis with 95% CI and alpha=0.05. we have computed the BMI (weight (kg)/height (m)), overcrowdings, by dividing the standard average sleeping area (10.2m<sup>2</sup>) to number of persons (2)=5.1m<sup>2</sup>/1 person(15) and vaccine efficacy was estimated by subtracting the OR vaccination of one dose for cases and controls (1-OR) (16)

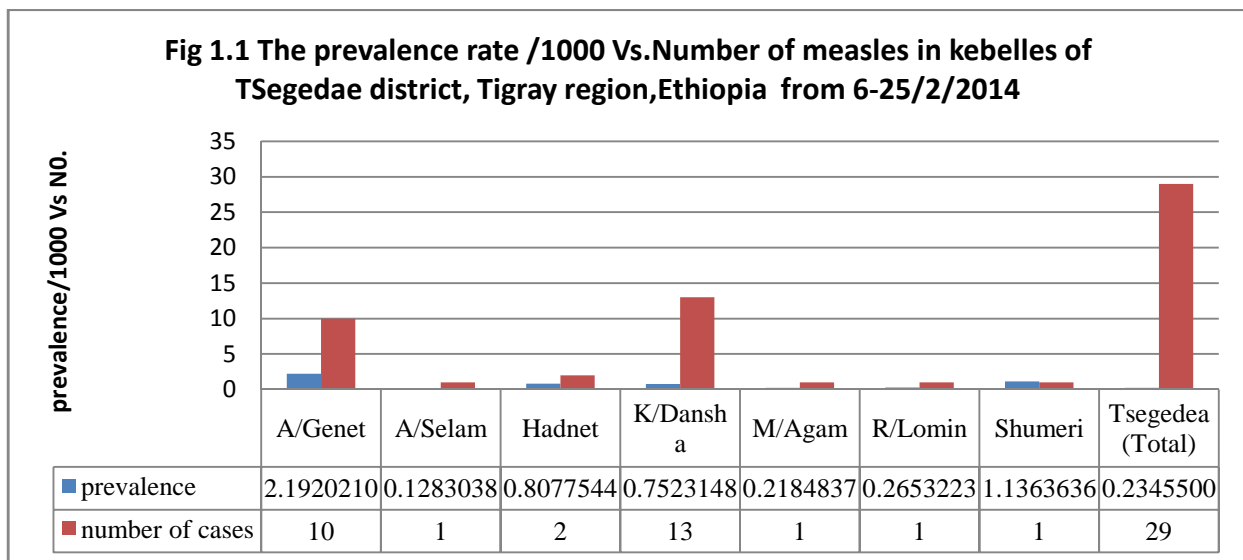
### 3.8 Ethical consideration

The district health office has accepted for the investigation of measles outbreak through the formal letter of TRHB. all the respondents as well as the parents were well informed about the objectives of questionnaire and we got consent from them. And also, some of the respondents were voluntary to get their photographs through our camera after they have been informed fully.

## 4. Result

### 4.1 Descriptive result

We detected a point prevalence of 0.23/1000(29) measles cases with 100%(7) laboratically confirmed in Tsegedea district, Tigray region from 6-25/2/2014. Eventhough, majority of the cases were in Dansha ketema (13) and in Alem genet kebelles (10), the prevalence was higher in Alemgenet 2.19/1000(10) and Shumeri kebelles with 1.1/1000(1). whereas, it ranges from 0.12/1000-0.8/1000 in the other 5 kebelles.



**Table.1.1** The ASAR for measles infection among kebelles and Tsegedea district , Tigray region from 6-25/2/2014.

N O	Kebelle Name	Total population	<1Yrs		1-5Yrs		6-15Yrs		>15Yrs	
			No. case s	ASA R/100 0	No. case s	ASAR/100 0	No. case s	ASAR/100 0	No. case s	ASAR/100 0
1	<b>Alem Genet</b>	4562	1	7.5	2	3.74	1	0.74	6	2.44
2	<b>Adi Selam</b>	7794	0	0	0	0	1	0.43	0	0
3	<b>Hadnet</b>	2476	0	0	0	0	0	0	1	0.24
4	<b>KetemaDansha</b>	17280	0	0	2	0.98	6	1.1	5	0.53
5	<b>May Agam</b>	4577	0	0	0	0	0	0	1	0.4
6	<b>RubaLomin</b>	3769	0	0	0	0	1	0.89	0	0
7	<b>Shumeri</b>	880	0	0	0	0	0	0	1	2.1
8	<b>District(total)</b>	123641	1	0.277	4	0.276	9	0.24	15	0.22

The ASAR was higher in less than 1 years age for Alem genet kebelles 7.5/1000(1) and for the Tsegedea district with 0.277/1000(1).however, there was no less than 1 years age of measles cases in the remaining six kebelles and it was higher in age groups of >15 years that ranges from 0.24/1000(1)-2.44/1000(6).

**Fig 1.2: The herd immunity of <1 years age against to measles infection and Accumulation of susceptible for Routine 1-dose vaccination only in Tsegedea district, Tigray region from mid 2011-2013.**

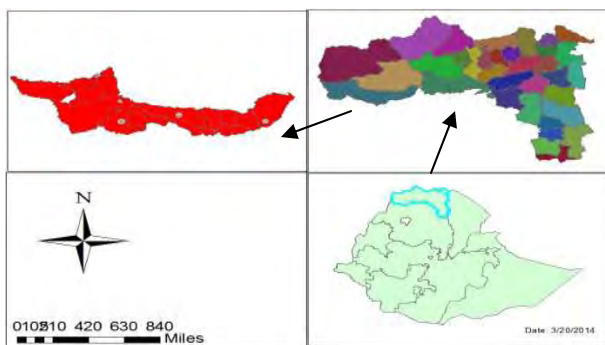
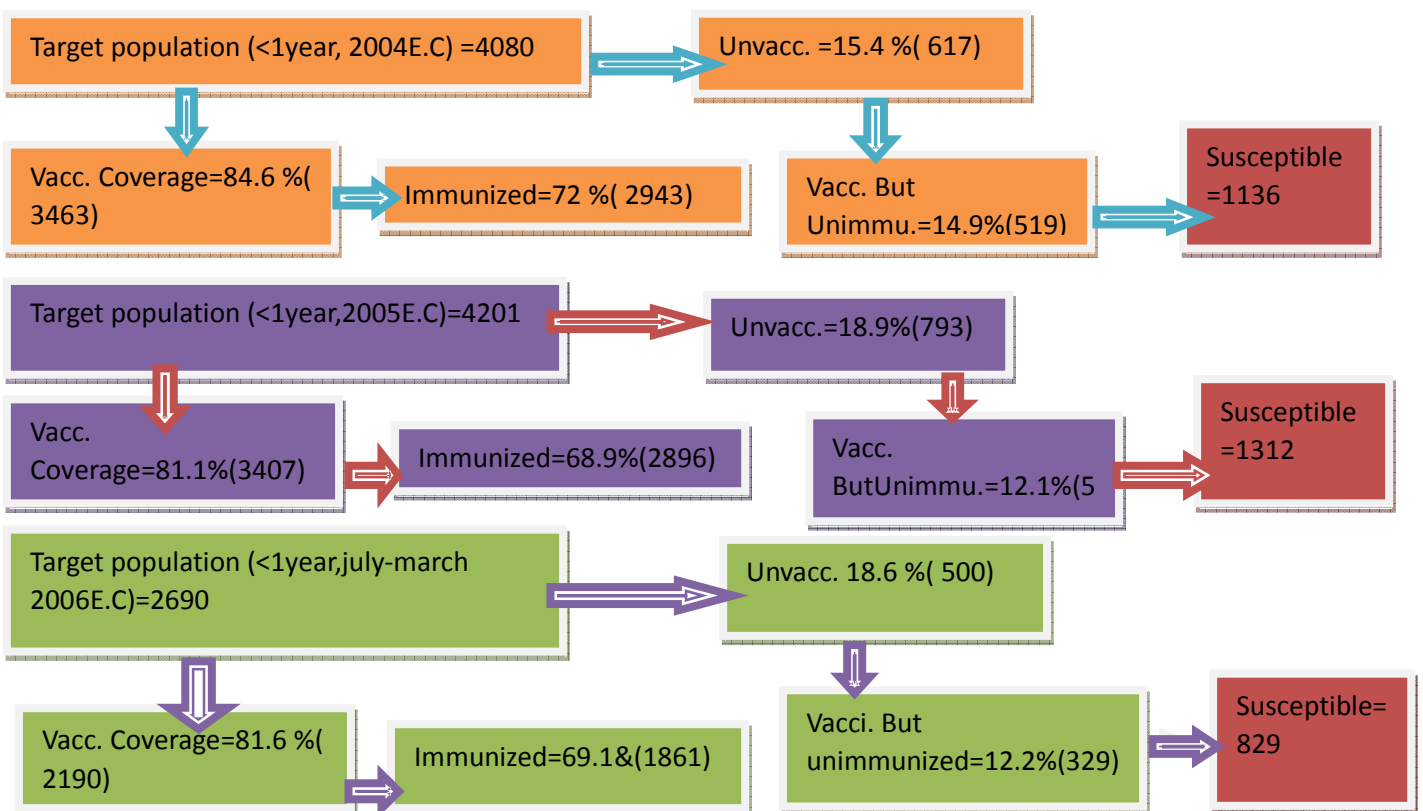
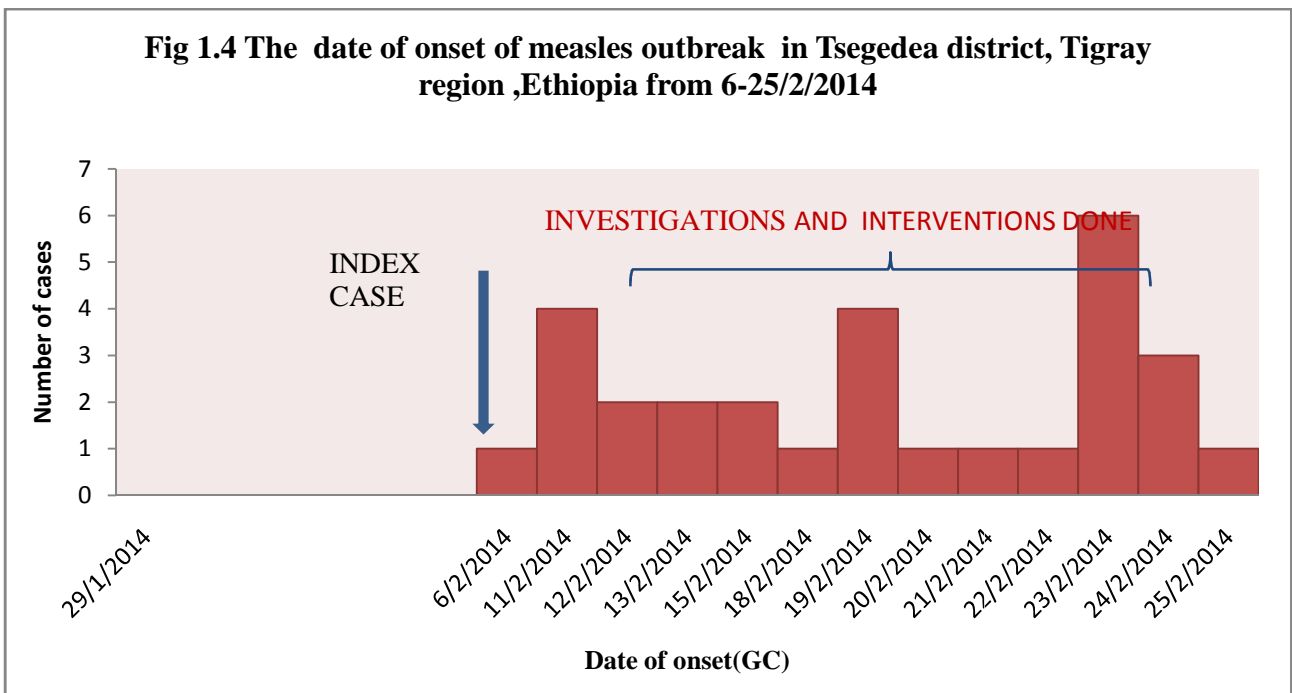
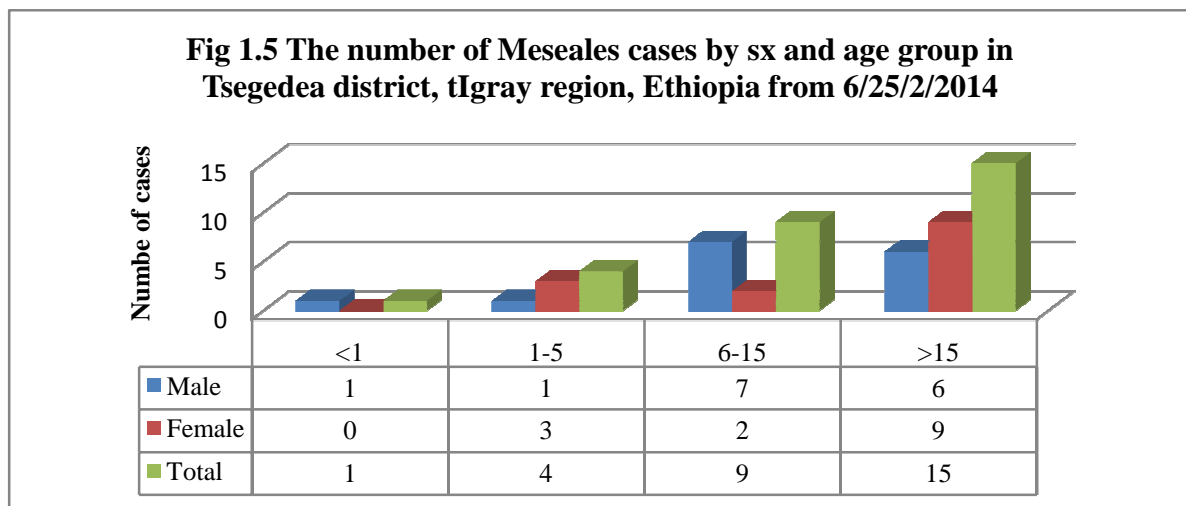


Fig 1.3 the spot map of measles cases in Tsegedea district, Tigray region, Ethiopia from 6-25/2/2014,

The duration of measles outbreak was stayed for three weeks with intermittent interventions across the kebelles where the cases were occurred. The index case was a female with 18 years age who was neither vaccinated nor previously measles infected .she had visited and contacted with the adjacent district of Amhara region where there was an outbreak of measles 23 days before her onset of rash. The epidemic curve was a multi-peak with sharp rise and gradual fall that indicated a propagative type of outbreak.



In age groups of less than 1 and 6-15years, the number of measles cases was higher in females than males with the reverse in the other age groups. However, the aggregate of measles cases were greater in males 51.7 %( 15) than females 48.3 %( 14).



Majority of the cases that have been recruited to the case control study was in age groups of >15years with 45 %(9) and males with 55%(11).from 20 cases, 55%(11) of them was categorized in underweight and sleep in greater than 10.m<sup>2</sup>/2person

Table 1.2 shows the descriptive characteristics of the participants in the case-control part of the study in Tsegedea district from6-25/2/2014

Sr.no	variable		Case No (%)	Control No (%)
1	Age	<1yrs	1(5)	2(5)
		1-5yrs	4(20)	5(12.5)
		6-15yrs	6(30)	13(32.5)
		>15yrs	9(45)	20(50)
2	sex	male	11(55)	25(62.5)
		female	9(45)	15(37.5)
3	BMI	Under weight	11(55)	19(47.5)
		Normal weight	7(35)	20(50)
		Over weight	1(5)	1(2.5)
		obese	1(5)	0(0)
4	Family size	<5 persons/HH	9(45)	24(60)
		>5 persons/HH	11(55)	16(40)

## 4.2 Analytic result

By univariate analysis, the vaccination against measles, those who had a history of measles infection and the knowledge about the mode of transmission for measles infection were a protective factor for developing the disease and statistically significant. In addition to this, the measles cases that slept in area of less than 10.2m<sup>2</sup> for two persons were 5.44 times more likely to get infection of measles. However, they are not statistically significant in multivariate analysis method except to that of vaccination history and over crowdedness.

Table1.3. Adjusted odds ratios, 95%confidence intervals, and P-values of the independent factors on univariate analysis of measles outbreaks of Tsegedea district, Tigre region, Ethiopia from6-25/2/2014

Sr.no	variables		Cases No (%)	Control (%)	OR(95%CI)	P-Value	remarks
1	Vaccination	0 dose	16(80%)	17(42.5)	1		**
		1 dose	3(15)	14(70)	0.228(0.018-0.024)	0.004	**
		>=2dose	1(5)	19	0.118(0.021-0.028)	0.049	**
2	Previously measles infected	yes	1	12	0.12(0.005-0.8)	0.028	**
		no	19	28			
3	Knowledge on Mode of transformation	yes	1	17	0.07(0.008-0.58)	0.003	**
		no	19	23			
4	Over crowdedness	<5.1	14	12	5.44(1.68-17.5)	0.003	**
		>5.1	6	28			
5	Travel history	yes	2	1	4.33(0.36-50.9)	0.25	*
		No	18	39			
6	Contact history	Yes	6	10	1.28(0.38-4.2)	0.68	*
		No	14	30			

N.B, \*\*= statistically significant

,\*=statistically insignificant

. Table1.4. Independent factors found to be associated with measles on univariate analysis Vs multivariate analysis in measles outbreaks of Tsegedea district, Tigray region, from 6-25/2/2014

Sr.no	variables	CrudeOR(95%CI)	Adjusted OR(95%CI)	Adjusted P-Value
1	Vaccination VsNo.Vacc.	0.228(0.018-0.024)	0.059(0.008-0.44)	0.006
		1 dose		
		2 dose	0.118(0.021-0.028)	0.061(0.004-0.9)
2	Overcrowding	5.44(1.68-17.5)	8.42(1.76-40.1)	0.007

As shown in the above table, the exposure to one dose of measles vaccination and sleeping in overcrowding are more likely to be protected and develop measles infection respectively with highly statistically significant. The Vaccine effectiveness, based on the calculated OR for measles vaccination given one dose versus no vaccination, was approximately 94.1% (95% CI, 10.2–92.6).

## **5. Interventions taken**

- 96.5%(28) of the cases were treated by medications (Anti biotic, ORS,TTC, Vitamin A)
- An active surveillance has been conducted in all kebelles of the district
- The measles vaccination coverage within the specific kebelles was reviewed
- We discussed with health workers in Governmental and private health institutions
- The banners has been distributed and health education was disseminated to the areas where the community are mostly assembled like, church, schools, water and soil conservation, and local meetings

## **6. Discussions and conclusion**

According to the measles national guide line that designed 3 or more laboratically confirmed cases to declare an outbreak of measles, we confirmed the existence of measles outbreak with a prevalence of 0.23/ 1000(29) and 100% IgM positive among a total of 7 clinically measles suspected cases in Tsegedea district from 6-25/2/2014.As a district, the prevalence was lower compared to the national health policy of EFMoH that targeted as 1 measles case/1000persons .however , It was beyond the national level in Alemgenet and Shumeri kebelles with 2.13/1000 and 1.13/1000 respectively and lower in relative to the outbreak of measles occurred in South Africa with an incidence of 6.1/1000 for infants from 2009-2011.The distribution of the cases were different among the 7 kebelles of the district in which the ASAR was greater in <1 years aged for Alemgenet kebele and in >15 years aged for the majority of the remaining kebelles. This coincides with the measles outbreak investigated in South Africa that lied majority of the cases in infants and 10-19 years age.

The MCV1 coverage targeted for <1 years age has decreased from 84.6% in the mid 2011 to 81.6% in 2014 which was lower than the MCV1coverage achieved in Kenya (i.e107% (5,995,049)) in 2012, But higher than Gabon, MCV1 coverage of 68% (168,749) in 2012 and the national, Ethiopia around 80% in 2010.From the mid 2011-2014, the primary chance of getting MCV1, There herd immunity coverage was 70.1% with a 94.1% of vaccine efficacy which is

beyond the level of national measles efficacy(85%) and higher than the MCV1 efficacy during the outbreak occurred in Iran(73.4%) during 2011. therefore, the occurrence of this outbreak may be due to the presence of a 3277 susceptible persons for measles infection at the end of 2014.

The duration of measles outbreak was no longer than one month that has covered in a 7 scattered kebelles and resulted a propagative type of outbreak. However, the secondary attack rate was lower considering that measles is a highly contagious disease and one measles case can transmit around 200 persons within two meters. This happened, may be due to an early treatment of the cases that has been achieved in 94.6 % ( 28) of the total cases and an effective interventions on the community.

Among the total cases enrolled to the case-control study, majority of the cases 55 % ( 11) has resulted underweight that coincides as of malnutrition is one of the complication of measles infection. This may be due to the result of low socio-economic status in which majority of the cases had a family size of >5 persons, Eventhough it was not statistically significant.

Coming to the vaccination status, 87.1% of the cases were not vaccinated which is around 1.5 times greater compared to the measles outbreak occurred in Iran, 2011. In multivariate analysis, the vaccination of MCV1 and MCV2 were highly a protective factor for measles infection, in case they are statistically significant similar to the outbreak investigation in Iran. In addition to this, the presence of overcrowdings (sleeping room=5.1m<sup>2</sup>/person) was more likely to develop a secondary attack of measles infection. However, the community awareness towards prevention and control of measles infection was very low which is statistically significant in univariate analysis. This leads the community to believe on traditional practices and not to bother getting of MCV1 and MCV2. consequently; the outbreak was occurred due to less herd immunity of the community.

## 7. Recommendations

- A nonselective vaccination should be planned by Zonal, regional, and/or to improve MCV coverage ,as long as, there are a high risk (susceptible) children and the measles infection is becoming shifted to adults
- social mobilization should be strengthen to improve the community awareness on the prevention and control of measles infection
- A routine visit of households is necessary on achieving a safe housing conditions among the community
- The status of community based nutrition should be assessed and strengthen to prevent malnutrition from measles infection
- Overall, an Evaluation study on MCV1 supplies and health worker skills towards measles vaccination can solve the problems of low coverage in Tsegedea district

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**1.1 Questionnaires for Case- control study on Outbreaks of Measles in Tigray Region, Tsegede District from 6-25/2/2014**

Case status= Case\_\_\_\_\_ Control\_\_\_\_\_

Name\_\_\_\_\_ Date of Data collection\_\_\_\_\_

Region\_\_\_\_\_ Zone\_\_\_\_\_ Woreda\_\_\_\_\_

Kebelle\_\_\_\_\_ Got\_\_\_\_

Respondent Status =

Case\_\_\_\_\_ Mother\_\_\_\_\_ Father\_\_\_\_\_ Other\_\_\_\_\_

Longitude: \_\_\_\_\_

Latitude:\_\_\_\_\_

**I. Socio-demographic Characteristics**

Sr.no	Question	Alternatives	Category
1.1	Sex	1.Male      2.Female	B
1.2	Age	Years____ Month_____	B
1.3	Occupation	1. Farmer      2. House wife 3.Student      4.Unemployed 5. Daily laborer      6.Merchant 7. Government      8. Others(specify)	B
1.4	Educational level	1.Illiterate      2.Read & write 3. Elementary      4.Secondary 5. college and above	B
1.5	Marital status	1.single      2.Maried 3.Diverced      4.Widowed 5. Under age of 18	B
1.6	Family size		B
1.7	What is your house hold income per month?		
1.8	Is there any sick person with rash,Fever,running nose or conjunctivitis in your family	1. Yes      2.No	B

1.9	If Yes , number of sick person	_____	<b>B</b>
2.0	Were the case/ control Sick for Other disease 1 week back this disease	1. yes                      2.No	<b>B</b>

## II .Clinical history of the disease

2.1	What was the symptoms	1.Fever                      2.Rash 3.cough                      4.Coryza(runny nose) 5.Conjunctivities(Red eyes 6.Diarrhea 7.Pneumonia              8.Blurning of vision 9.Ear discharge      10.vomiting 11. croup	<b>C</b>
2.2	Date of onset of fever	_____/____/_____	<b>C</b>
2.3	Date of onset of rash	_____/____/_____	<b>C</b>
2.4	Date seen at health facility	_____/____/_____	<b>C</b>
2.5	Did you/he/she take treatment	1. Yes                      2. No	<b>C</b>
2.6	If Yes, treatment taken	1.ORS                      2.Antibiotics 3.Vitamin A              4.TTC ointment 5. Anti pyretic          6. supplementary food	<b>C</b>
2.7	Did you /he/she recovered after treatment	1.cured                      2.partially improved 3. Deteriorated      4. Death	<b>C</b>

## III. Risk factor

3.1	Did You ever vaccinated for measles?	1.Yes 2.No 3.Unknown 4. Not applicable	<b>B</b>
3.2	If yes last vaccination date	1._____/____/____ by card	<b>B</b>

		2. _____ / _____ / _____ by history	
3.3	Number of vaccine doses received	1. One dose 2. Two dose 3. Three and above	<b>B</b>
3.4	Did you ever have measles infection?	1. Yes 2. No 3. Unknown	<b>B</b>
3.5	Did you have any travel history 7-8 days to areas with active measles cases	1. yes 2. No If yes where	<b>B</b>
3.6	Did you have any contact with confirmed or suspected cases of measles	1. yes 2. No	<b>B</b>
3.7	If yes in Qe.3.6 ,How	1. living together 2. Sleeping together 3. Playing together 4. admitted with suspected measles cases	<b>B</b>
3.7	Do you have any travel history four days before and after rash onset?	1. Yes 2. No 3. If yes, where _____	<b>C</b>
3.8	Do you have any contact history with someone else four days before and after rash	1. Yes 2. No If yes, when?	<b>C</b>
3.9	If yes for Qe.3.8 with whom	1. school friends 2. Neighbours 3. Market 4. other specify	<b>C</b>
4.0	Does the home you live have a window?	1. yes 2. No If yes, how many?	<b>B</b>
4.1	If yes, how often is it opened?	1. every day 2. some times 3. Never Opened	<b>B</b>

4.2	How many rooms have your home?		B
4.3	How many people sleeping together?		B
4.4	What is the average area of your sleeping room?		B
4.5	Do you know modes of transmission for measles?	1.Yes 2.No	B
4.6	Do you know measles is vaccine preventable disease?	1.yes 2.No	B
4.7	Where do you go first if you get ill for measles?	1. health facility 2. Traditional Healer 3. Holy water 4. Stayed at home 5. other specify	B
4.8	If answer for Q 3.13 other than health facility, why?		B
4.9	How do you think people get measles?	1. contact with sick person 2. Wrath of God 3. Curse of other people 4. Other specify	B
5.0	Nutritional status (Currently for both)	Weight                      height MUAC	B
5.1	Nutritional status (Before sick for cases)	Weight                      height MUAC	B
5.2	Who do you think that can be affected by measles?	1.Children of aged less than 5 years 2. Children of aged less than 18 years 3.Women of any age 4. Any age group 5. other _____	B
5.3	Does this household own Radio?	1.yes 2.No	B

5.4	Have you ever heard about measles in Radio?	1.yes 2.No	B
5.5	How do you think measles can be cured?	1. Using modern medicine 2.Using traditional medicine 3. Holy water 4.By feeding nutritious food 5. Keeping the sick person indoor 6. other_____	B
5.6	When do you go to health facility if get ill for measles	1. Immediately 2. After a week	B

## CHAPTER-2 A SUSPECTED ANTHRAX OUTBREAK INVESTIGATION IN KOLATEMBEN WOREDA, TIGRAY .FROM MAY-JULY/2013

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### **Executive summary**

**Background:** Anthrax is an acute disease caused by the bacterium *Bacillus anthracis* in which most forms of the disease are lethal, and it affects both humans and animals. There are three main forms of human anthrax, depending on the route of exposure and named as cutaneous, gastrointestinal and pulmonary or inhalation anthrax. The disease is more common in countries without widespread of veterinary or human public health programs. In the 21st century, anthrax is still a problem in less developed countries. Banlu village, Lianyungang, China, has experienced an outbreak of cutaneous anthrax with an attack rate of 47.1% (8/ 17 suspected cases) in 2012. In Zambia, Chama district, Eastern Province, there were an outbreak of Anthrax which had a total of 233 suspected cases and 6 community death (CFR: 2.6%) reported between August and September 4, 2012 in which all patients have a history of contact (by ingestion or touch) with Hippo meat mysteriously dying in the upstream of the Luangwa River. Where as In Ethiopia, 1219 suspected Anthrax cases with 16 deaths due to Anthrax were reported in 2011. In addition to this ,there has been a report of 47 anthrax cases from Tigray regional health bureau, 36 cases from central zone and 17 cases from kolatemben woreda during 2012 .However, Early detection of sources of anthrax infection can allow preventive measures to be taken in the areas where the diseases has affected the community.

**Methods:** we conducted unmatched case-control study for an outbreak of anthrax disease in kolatemben woreda, Tigray region, Ethiopia from May-June, 2013. We enrolled three purposively selected health facilities and 30 controls to 15 cases that met the case definition of PHEM guideline, selected by convenient sampling method. We also used a structured questionnaire consisting of a demographic information, clinical status and risk factors of the disease and line listing of the cases to collect the overall data.

**Results:** We detected an outbreak of anthrax cases with an incidence rate of 4.7/10,000 ( 85 cases ) , and case fatality rate of 4.7%(4) in Kolatemben woreda from may –first week of July, 2013. Majority of the cases were cutaneous with 4.2/10000(75) next to gastro intestinal 0.3/10,000 (6) and mixed type of anthrax cases 0.22/10,000 (4). The distribution of the cases were higher in dernetseb kebele with an incidence rate of 2.3/1000 (16 cases) and the number of Anthrax cases were higher in females 52.3%(45) than males 47.7%(40) in which age groups of 15-49 years were more affected with an incidence rate of 1.74/10,000 (31 cases). The annual coverage of animal vaccination against to anthrax disease was 8.5%. The epidemic curve has

indicated a propagated pattern with the peak on the first June 2013. The exposure of direct contact with dead animals (OR=5.2; 95% CI: 1.36-20, P-Value=0.007) and the persons who had a meal of uncooked meat (OR=6.1; 95% CI: 1.52-24, P-Value=0.02) were associated with more likely to develop the disease of Anthrax. In addition to this, the knowledge of the community towards this disease and its mode of transmission (OR=0.2195% CI: 0.05-0.93) were protective measures on contracting the diseases.

**Conclusion;** we investigated an anthrax outbreak occurred in hot season of the woreda with high fatality rate that affected more females, age groups of 15 -45 years and the areas where many dead animals have been slaughtered. Majority of the cases were cutaneous anthrax cases with less gastro intestinal and mixed type of anthrax due to high rate of exposure of the community on direct contact of uncooked meat and the dead animals. Overall, the less awareness of the community on mode of transmission of anthrax disease was the main factor to the occurrence of the outbreak. So as, we recommend to implement coordinated effort on awareness creation, routine immunization of animals and certification of a premortum inspection for licensed slaughter houses.

## **1. Introduction**

### **I. Notification of the outbreak**

Five clinically suspected anthrax cases seen in werkamba health center were reported immediately to the woreda health office and then to the regional health bureau (early warning, surveillance and advocacy case team) on the first June of 2013. However, the situation was continued from other scattered kebelles and 4 deaths were reported one week later on different areas of the woreda. Most of the cases visited the health facilities were admitted to take treatment. Overall, we have designed a questionnaire to collect the required data's after we gathered a literature review from different sources and prepared transport facilities with collaboration of the regional health bureau, woreda health office staffs and health workers in the health facilities.

## **II. Back ground information**

**Anthrax** is an acute disease caused by the bacterium *Bacillus anthracis*. Most forms of the disease are lethal, and it affects both humans and animals. There are effective vaccines against anthrax, and some forms of the disease respond well to antibiotic treatment.

Like many other members of the genus *Bacillus*, *Bacillus anthracis* can form dormant end spores (often referred to as "spores" for short, but not to be confused with fungal spores) that are able to survive in harsh conditions for decades or even centuries (1). Such spores can be found on all continents, even Antarctica (2). When spores are inhaled, ingested, or come into contact with a skin lesion on a host, they may become reactivated and multiply rapidly

There are three main forms of human anthrax, depending on the route of exposure: cutaneous, gastrointestinal and pulmonary or inhalational. Cutaneous forms account for 95% of anthrax worldwide and is characterized by rapidly developing necrotizing painless Escher (malignant pustule) with suppurative regional adenitis. Cutaneous infection starts as one or more painless, itchy papules or vesicles on the skin, typically on exposed areas such as the face, neck, forearms or hands. Within 7-10 days of the initial lesion, the papule forms an ulcer. In addition, localized swelling, painful swollen regional lymph nodes and systemic symptoms can occur.

The second form of anthrax case is gastrointestinal infection which is most often caused by consuming anthrax-infected meat and is characterized by serious gastrointestinal difficulty, vomiting of blood, severe diarrhea, acute inflammation of the intestinal tract, and loss of appetite. Lesions have been found in the intestines and in the mouth and throat. After the bacterium invades the bowel system, it spreads through the bloodstream throughout the body, while also continuing to make toxins. Gastrointestinal infections can be treated but usually result in fatality rates of 25% to 60%, depending upon how soon treatment commences.

The pulmonary anthrax is the more serious form and rarely occur, which may be a Systemic infection resulting from inhalation of *Bacillus anthracis* that has a CFR approaching to 100%. Respiratory infection in humans initially presents with cold or flu-like symptoms for several days, followed by severe (and often fatal) respiratory collapse (3) (4) (5).

The disease is more common in countries without widespread veterinary or human public health programs. In the 21st century, anthrax is still a problem in less developed countries. An outbreak of anthrax in humans who had eaten meat from a dead carabao was reported in Cagayan province

in the Philippines in early 2010, with over 400 cases of illness and at least two fatalities (6). During an Investigation of an outbreak of cutaneous anthrax in Banlu village, Lianyungang, China, 2012, from a total of 17 suspected cases (seven butchers, five temporary assistants who washed the meat and organs of the sick cow, four vendors and one person who purchased the hides), eight met the outbreak case definitions (five confirmed and three probable cases) and the attack rate was 47.1% (8/17). There were six male and two female cases aged between 21 and 48 years old, with a median age of 28 years (7).

In Bangladesh, Dermatology Outpatient Department of Rajshahi Medical College Hospital, has reported 15 cutaneous anthrax from April -August, 2011 where the mean age in years of the patients was 21.4 with ages ranging from 3 to 46 years. Out of 15 patients, 7 (46.7%) were male and 8 (53.3%) were female with a male to female ratio of 1:1.14. Regarding modes of acquisition of anthrax, contact with raw meat was the highest (46.7%), followed by contact with live animal (33.3%) and butchering (20%) (8).

Zambia has experienced an outbreak of Anthrax which had a total of 233 suspected cases and 6 community death (CFR: 2.6%) reported from Chama district, Eastern Province between August and September 4, 2012. All patients have a history of contact (by ingestion or touch) with Hippo meat mysteriously dying in the upstream of the Luangwa River. The majority of cases have been presenting with skin lesions compatible with cutaneous Anthrax (9).

In Ethiopia, 1219 suspected Anthrax cases with 16 deaths due to Anthrax were reported in 2011. according to the case based report from Tigray regional health bureau, there had been a total anthrax cases of 47(22 female and 25 male) in the region, 36 (18 female and 18 male) in central zone and 17(8 female and 9 male) cases in kolatemben woreda during 2012 (). however Early detection of sources of anthrax infection can allow preventive measures to be taken in the areas where the diseases has affected the community.

## 2. Objectives

### 2.1 General objective

- To describe and identify possible risk factors of anthrax in Kolatemben woreda, Tigray region, Ethiopia

### 2.2. Specific objectives

- To confirm the existence of an outbreak
- To describe the outbreak in respect to different parameters
- To identify the possible risk factors of Anthrax

## 3. Methods

### 3.1 case definition;

**Suspected case definition:** Eventhough we have not taken a specimen for laboratory confirmation, the suspected case of anthrax was any person with acute onset characterized by several clinical forms which are:

#### 1) localized form:

Cutaneous: skin lesion evolving over 1 to 6 days from a papular through a vesicular stage, to a depressed black Escher invariably accompanied by edema that may be mild to extensive

#### 2) Systemic forms:

Gastro- intestinal: abdominal distress characterized by nausea, vomiting, anorexia and followed by fever

Pulmonary (inhalation): brief prodrome resembling acute viral respiratory illness, followed by rapid onset of hypoxia, dyspnea and high temperature, with x-ray evidence of mediastinal widening

Meningeal: acute onset of high fever possibly with convulsions, loss of consciousness,

Meningeal signs and symptoms; commonly noted in all systemic infections and has an epidemiological link to confirmed or suspected animal cases or contaminated animal products.

**Confirmed case definition;** a suspected case that is laboratory-confirmed with ELISA or Western blot, toxin detection, chromatography assay, fluorescent antibody test

### 3.2 Enrollment of cases and controls

- A) Cases; the persons that were supposed as developing a clinically suspected anthrax diseases with sign and symptoms of acute onset characterized by localized and systemic clinical forms which are listed in PHEM guide line
- B) Controls; the persons that were free of an anthrax diseases and selected from the same kebelles , residency of the cases who were voluntary to participate on giving information that we need.

**3.3 Study area and period** ; we conducted an anthrax outbreak investigation from 01/06/-17/06/2013 in Kolatemben woreda consisting a total population of 177,249 and located in central zone of Tigray region which is 90 km far from the capital city of the region, Mekelle.

**3.4 Sampling size and sampling method;** after we completed a discussion regarding to the overview of the anthrax outbreak occurrence with the head of the health office and surveillance focal person, 3 health facilities with higher number of cases were purposively selected .however, we used a convenient sampling method for a total of 15 cases from inpatient and outpatient (residence area) with 2 controls for each case (1: 2 ratio).

**3.5 Study design:** unmatched case -control study design were carried out for the determination of the risk factors and the overall cases of the woreda has been described according to the line listed data's.

**3.6 Data collection tools and methods:** We have collected the data through face to face interviewing using structured questionnaire and reviewing a line list of all cases in the woreda. In addition to this, additional information has been collected from the veterinary office found in the selected kebelles and through discussions carried out with woreda epidemic committee.

### 3.7 Variable specifications:

Sr.no	Dependent variable	Independent variable
1	<ul style="list-style-type: none"><li>• Anthrax disease</li></ul>	<ul style="list-style-type: none"><li>• Ingestion of Row meat</li></ul>
	-Cutaneous anthrax	<ul style="list-style-type: none"><li>• Direct Contact with animals</li></ul>
	-respiratory anthrax	<ul style="list-style-type: none"><li>• Direct contact with dead animals</li></ul>
	-gastro-intestinal anthrax	<ul style="list-style-type: none"><li>• Exposure of Exposure to Hides, Wool, Furs,</li></ul>

		Bone Meal
	-mixed anthrax	<ul style="list-style-type: none"> <li>• Animal vaccination against anthrax</li> </ul>
		<ul style="list-style-type: none"> <li>• Knowledge of the community</li> </ul>

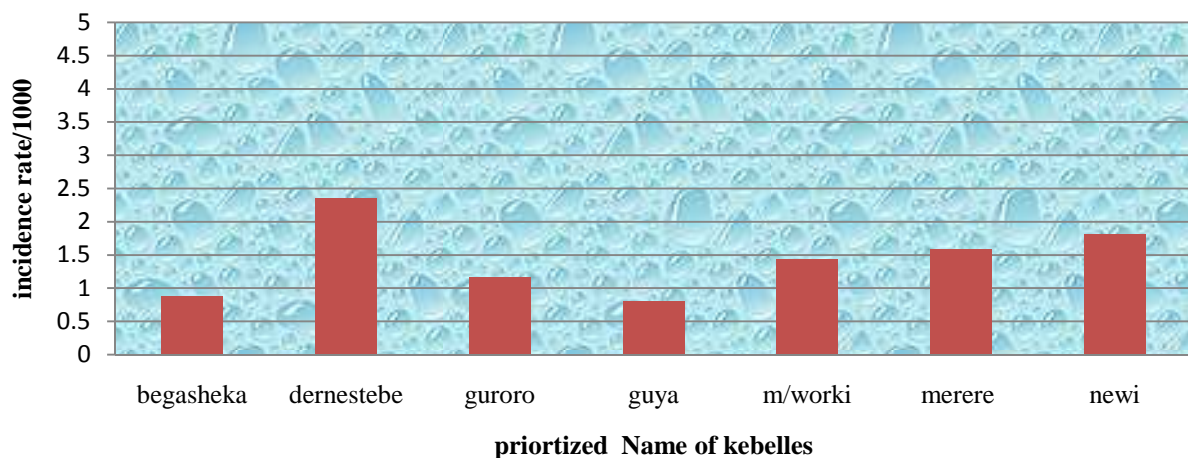
**3.8 Data Analysis:** we used epi-info software to analyze for those data gathered by structured questionnaire (closed questions) with 95%CI and P-value of 0.05. But the remaining data collected by unstructured questionnaire were entered to MS-excel and MS-word for write up.

#### 4. Result

##### 4.1 Descriptive result

we detected a suspected outbreak of anthrax cases with an incidence rate of 4.2/10,000(75) for cutaneous, 0.3/10,000 (6), Gastro intestinal and 0.22/10,000 (4) mixed type of anthrax cases in Kolatemben woreda from may –July, 2013. The distribution of the diseases in relative to the total cases of the woreda were higher in dernetseb kebele with an incidence rate of 2.3/1000 (16 cases), newi kebele 1.8/1000 (12cases) and merere kebele 1.58/1000 (11cases) in which they were enrolled for treatment and care to their catchment areas of Guroro health center, Deder health center and Guya health center respectively.

**Fig 2.1 The incidence rate/1000 of Anthrax cases during an outbreak in kebelles of Kolatemben woreda, from may-july/2013**



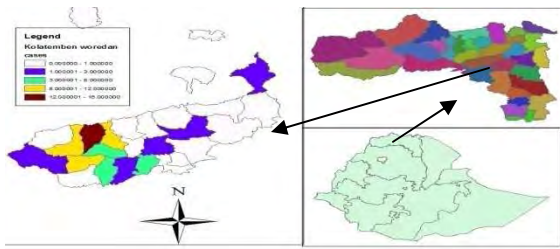
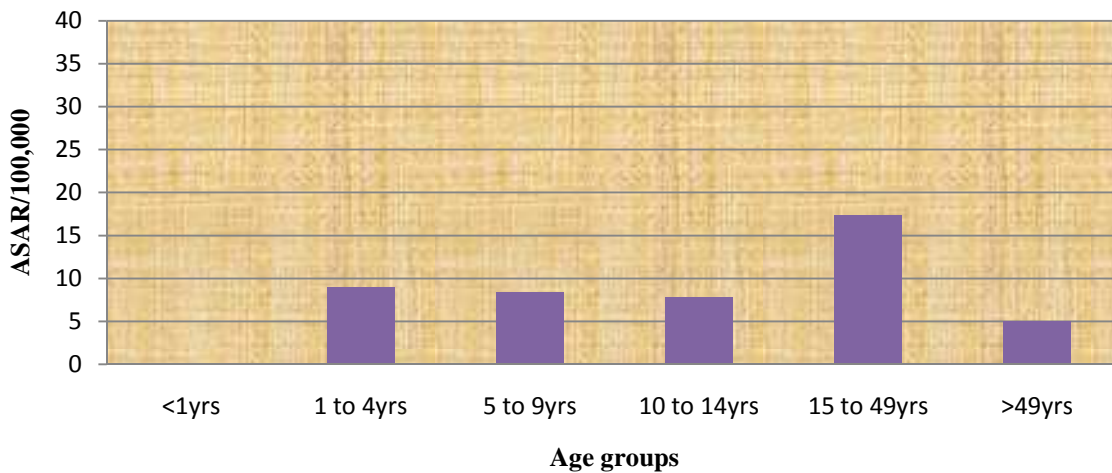


Fig 2.2 the spot map of Anthrax cases in Kolatemben woreda, Tigray region, from may-July/2013

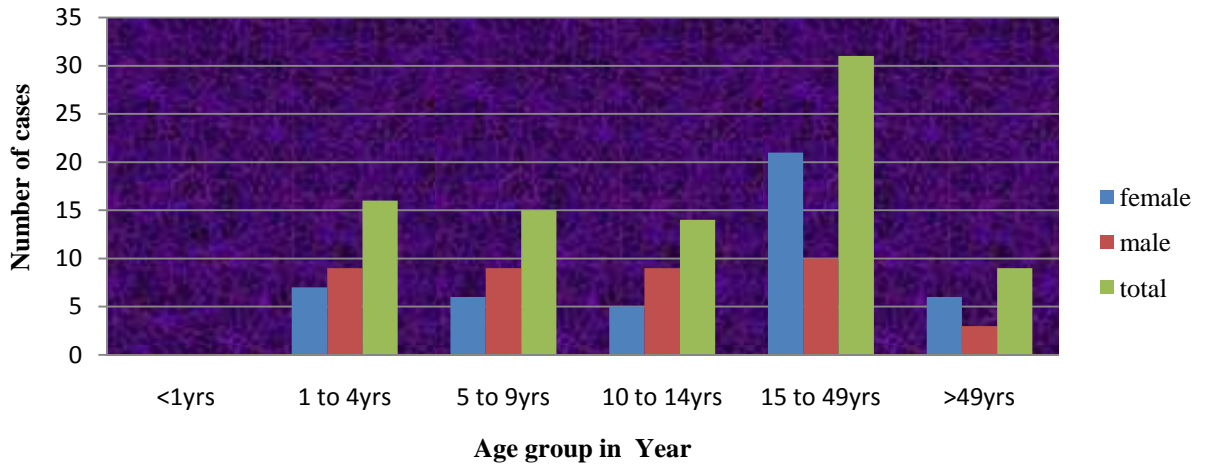
The mid-range of the anthrax cases that ranges from 1 -65years was 33yrs whereas the median age for this age group was 14 years. however, the incidence rate of the cases were higher in age groups of 15-49 years that indicated as 17.4/100,000 (31 cases) .whereas , it was similar among the other age groups that ranges from 7.8-9/100,000 cases and exceeding to the age groups of the elders .but there were no anthrax cases in infants

**Fig 2.3 The ASAR/100,000 for outbreak of Anthrax case in Kolatemben woreda , from may-july/2013**



Among all, the total number of Anthrax cases were higher in females 52.3%(45) than males 47.7%(40).In addition to this, females were highly affected by Anthrax disease in age groups of 15-49 yrs compared to that of males. However, it was higher in males than females in the remaining age groups with none Anthrax cases in infants.

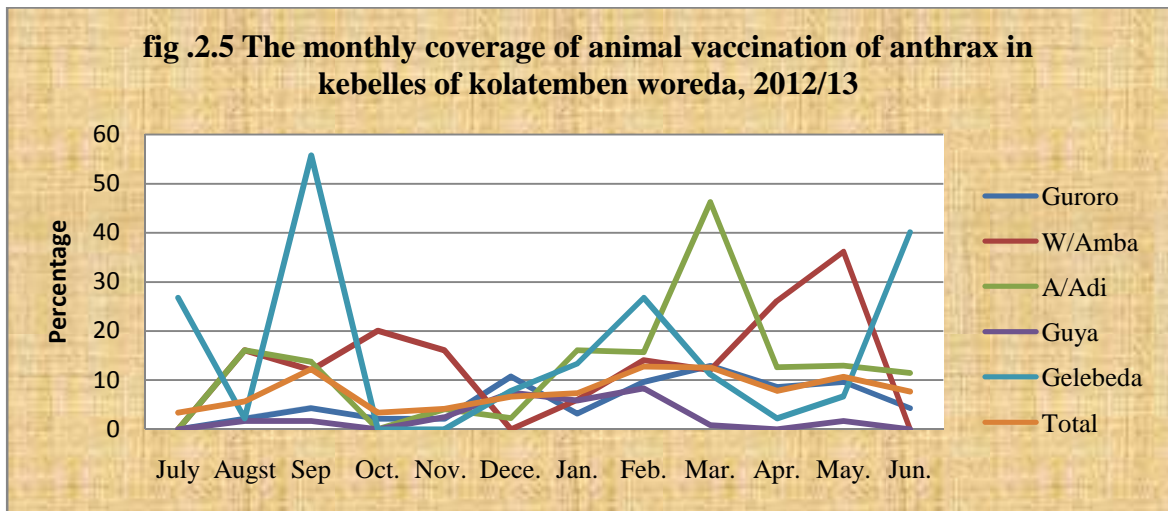
**Fig 2.4 The Number of Anthrax cases by Age group and Sex in Kolatemben woreda ,Tigray region from may-july/2013**



**Table2.1. The annual coverage of animal vaccination against to Anthrax disease in veterinary clinics of kolatemben woreda, 2012**

Name of veterinary clinics	Name of kebelles	Annual plan	Annual coverage	percentage
ABYI ADI	-Meni, Begasheka Dr. Ataklti, Debretsehay, LimatDebregenet	52282	9200	17.5
WERKA-AMBA	Werka-amba, getskimlesley, dabano, selam, t/georg's	59737	7900	13.2
GURORO	Guroro, merere, dernetseb, newi, dedere, chamo	111498	6595	5.9
GUYA	Guya, smret, shulumemni, Mitsawerki, zelakima, arena	144428	3600	2.4
GELEBED A	Gelebeda, a/bkalsi, wuhdet, adiha	53801	8650	16
TOTAL		421746	35945	8.5

**N.B-** The second column is the name of kebelles which are clustered by their distance to get an animal vaccination service on their corresponding veterinary clinics.



As shown in the above figure, the monthly vaccination coverage was lower throughout the year, especially in Guya kebele, 15 days before the occurrence of outbreak.

The index case developed a lesion (1 male with 6 yrs old and 1 female with 20yrs old ) was seen in Merere kebele on 31 May 2013 who have visited to Guroro health center 3 and 4 days later for each case. According to the report of the health workers, both of the index case had an exposure of raw meat with unknown condition of the premortum inspection that was slaughtered in their neighborhood.

AS shown in the figure below, the epidemic curve has indicated a propagated pattern with the peak on 31-1/05/ 2013.and fluctuated throughout the year. The duration of a suspected outbreak of cutaneous Anthrax was from May27, to July 13, 2013.

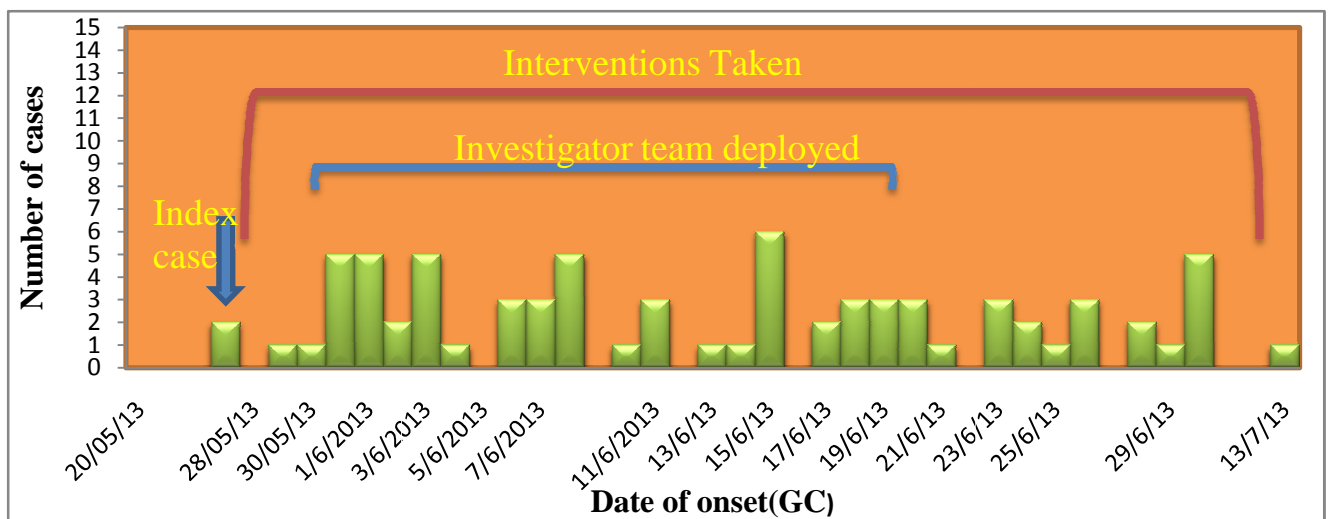


Figure-2.6: Number of Cutaneous Anthrax cases by date of onset, Kolatemben worda, Tigray Region, Ethiopia, May-July, 2013

## 4.2 Case –control study results

From the total variables considered as risk factors for developing anthrax cases , the direct contact with dead animals ( OR=5.2; 95% CI:1.36-20, P-Value=0.007) and the persons who had a meal of uncooked meat (OR=6.1; 95% CI:1.52-24, P-Value=0.02) were associated with more likely to develop the disease of Anthrax. In addition to this, the knowledge of the community towards this disease and its mode of transmission were protective measures on contracting the diseases. However, the Exposure towards animal products (hides and others) and the occupational related to animals or agricultures were not statistically significant factors with the occurrence of the disease.

Among the total 18 persons (cases and controls enrolled to the study) who had eaten uncooked meat ,10 of them had developed either of the clinical forms of the Anthrax disease with an attack rate of 55.5% and the attack rate of peoples who were exposed to the direct contact of dead animals was 35%(7 cases from 20 exposed).

**Table 1.2: Crude analysis of Anthrax cases and controls in regard to different variables, Kolatemben woreda, Tigray Region, Ethiopia, may-July/2013**

Sr.no	variables	cases	controls	OR(95% CI)	P-value	Remarks
1	Direct contact with dead animals	<b>10</b> R=55.56 % C=66.67 %	<b>8</b> R=44.44 % C=26.67 %	5.5(1.43-21)	0.009	Statistically significant
		<b>5</b> R=18.52 % C=33.33 %	<b>22</b> R=81.48 % C=73.33 %			
2	Occupation associated with Animals/Agricultures	<b>13</b> R=37.14 % C=86.67 %	<b>22</b> R=62.86 % C=73.33 %	2.36(0.43-12.8)	0.31	Statistically insignificant
		<b>2</b> R=20.00 % C=13.33 %	<b>8</b> R=80.00 % C=26.67 %			

3	Exposure to hides	<b>6</b> R=42.86 % C=40.00 %	<b>8</b> R=57.14 % C=26.67 %	1.83(0.4 9-6.8)	0.36	Statistically insignificant
		<b>9</b> R=29.03 % C=60.00 %	<b>22</b> R=70.97 % C=73.33 %			
4	Eaten uncooked meat	<b>11</b> R=55.00 % C=73.33 %	<b>9</b> R=45.00 % C=30.00 %	6.4(1.6- 25.6)	0.005	Statistically significant
		<b>4</b> R=16.00 % C=26.67 %	<b>21</b> R=84.00 % C=70.00 %			
5	Knowledge of the diseases transmit ion	<b>3</b> R=15.79 % C=20.00 %	<b>16</b> R=84.21 % C=53.33 %	0.21(0.0 5-0.93)	0.03	Statistically significant
		<b>12</b> 46.15 % 80.00 %	<b>14</b> 53.85 % 46.67 %			

**N.B,** R= the percentage of row cells, C=the percentage of column cells

### 4.3 Environmental investigation

We have interviewed some of the households, slaughter houses and veterinary clinics. Most of the peoples were unaware of the mode of transmission of anthrax disease rather they believe on the hot season as the only cause of the disease. The veterinarians didn't use personal protection equipment on treating the anthrax animal cases and they were practicing improper disposal of wastes due to resource scarcity in the clinic. There were one slaughter house and one hide room which were unhygienic and that can pose a potentially hazardous to the community in Guroro kebele.

## 5. Limitation of the study

- Since, most of anthrax cases were seen in a scattered 19 kebelles with unknown of their specific residency area, the investigator team was unable to get enough sample size.
- None of the anthrax cases were laboratory confirmed due to the absence of an access in regional as well as in national laboratory.
- The prevalence of anthrax disease in animals was unknown apart their vaccination status

## 6. Discussion

In kolatemben woreda, the incidence rate of anthrax case has increased in 2013 (0.47/1000(85 cases)) cases) from the previous year, 2012 (0.09/100(17 cases)).In addition to this, the fatality of the cases was higher (CFR=4.7%) compared to the outbreak of anthrax in Zambia, 2011 with CFR of 2.6%.

Majority of the cases (18% of the total cases) were occurred in Dernetseb kebelles in relative to the other kebelles of this woreda. This is the place where a dead animal has been slaughtered and distributed the meat to most of the peoples in the same neighborhood.

The age range (1-65years) of the cases with median age of 14 years has indicated as highly extended than the age range of the Anthrax cases(21-48) with median age of 28 years occurred in Banlu village, Lianyungang, China, 2012 .However, the majority of the cases were peoples aged 15 years or older with 36.4%(31) of the total 85 cases (skewed to the right).Because , this age groups are more responsible on caring and treatment of diseased animals and to go animal market areas that increases their direct contact of exposure to these animals.

Females were more affected than males that has shown a ratio of 1male: 1.2 female in which it was consistent with the report of cutaneous anthrax in Bangladesh, Dermatology Outpatient Department of Rajshahi Medical College Hospital, between April and August, 2011 with a male to female ratio of 1:1.14.This is due to the adult females are more likely to be engaged in cooking foods who have a direct contact with raw meat.

Eventhough the odds ratio for the risk factor of peoples who have eaten uncooked meat (OR=6.4) was higher than that of peoples who had a direct contact to the dead animals (OR=5.5), majority of the cases were cutaneous anthrax cases. This is due to low awareness of the community on direct contact of raw meat and dead animals. The study has also indicated the knowledge of the community towards the disease was a protective measure.

The attack rate of the disease due to the exposure of uncooked meat (55. %) in this study was higher than to that of the cases who were butchers, washed the meat and organs of the sick cow, purchased the hides in Banlu village, Lianyungang, China, 2012 with attack rate of 47.1% (8/17).

## **7. Conclusion**

Anthrax outbreak was occurred in hot season of the woreda with high fatality rate. It has more affected females and age groups of 15 -45 years. In addition to this it was higher in areas where many dead animals have been slaughtered. Majority of the cases were cutaneous anthrax cases with less gastro intestinal and mixed type of anthrax due to high rate of exposure of the community on direct contact of uncooked meat and the dead animals... Overall, the less awareness of the community on mode of transmission of anthrax disease was the main factor to the occurrence of the outbreak.

## **8. Control measures taken**

- Majority of the cases has been treated by antibiotics( PPF and Doxycycline)
- The health worker has disseminated health education to the community at their neighborhood as well as health facilities and banners were distributed by the kebele administration to report if any cases are occurred.
- The health worker has conducted an active surveillance with the collaboration of the women development army.
- The regulatory case team of the woreda health office has suspended for two slaughter houses.
- The dead animal has been buried according to the regulation in most of the areas.
- The veterinary office has carried out a mass vaccination for animals in three prioritized areas.

## 9. Recommendations

- Coordinated effort is needed on changing the community behavior towards the mode of transmission of the Anthrax disease.
- There should be routine immunization of animals in areas with high incidence of the disease.
- The meat seller should have a premortum inspection certificate from a veterinarian for every animal to be slaughtered.
- As long as the anthrax *Bacillus anthracis* is spore forming bacteria, infection prevention and waste handling materials should be available in veterinary clinics to prevent contamination of animals.
- The woreda health office should develop an emergency preparedness and response through integration of the agriculture office and administration office.

## 10. Photographs of Cutaneous Anthrax cases



## 11. References

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**2.1 data collection tools for a suspected outbreak of anthrax in kolatemben woreda,  
Tigray region from may-July/2013**

**1. Demographic information**

Today's date: ____/____/____		ID :
Patient name		First _____ Last _____ _____
Sex: <input type="checkbox"/> Male <input type="checkbox"/> Female	Date of birth: ____/____/____	Age: _____
<b>Home address:</b>	<b>Zip:</b>	Phone 1:
<b>City/Borough:</b>	<b>County::</b>	Phone 2:
<b>Employer:</b>	Occupation:	Work location:
Work address:	Zip:	Phone:
City/Borough	County:	
Any recent travel outside of MO?	Y N Unknown	If yes, where and when:

<b>2.MEDICAL HISTORY:</b>	Dr.'s name and contact info:	
Has patient experienced any of the following symptoms for the first time since _____?		
<i>(Circle one answer for each symptom)</i>		
New onset skin lesions (i.e., rash, papule, ulcer, vesicle, blister)?		
Y N Unknown	Onset date: ____/____/____	
<b>Location of lesion(s):</b>	Initial description:	Progression:
	Date Notes	Date Notes

<b>Itchy</b>	<b>Y N Unk</b>		
<b>Swollen</b>	<b>Y N Unk</b>		
<b>Painful</b>	<b>Y N Unk</b>		
<b>Oozing</b>	<b>Y N Unk</b>		
<b>Satellite blisters</b>	<b>Y N Unk</b>		
<b>Eschar</b>	<b>Y N Unk</b>		
<b>Lymphadenopathy</b>		<b>Y N Unknown</b>	
<b>If yes, where?</b> _____			<b>Onset date:</b> ____/____/____
<b>Edema</b>			
<b>If yes, where?</b> _____		<b>Y N Unknown</b>	
<b>Severe?</b>		<b>Y N Unknown</b>	<b>Onset date:</b> ____/____/____
<b>Fever</b>		<b>Y N Unknown</b>	
		<b>If yes, max temp:</b> _____ F	<b>Onset date:</b> ____/____/____
<b>Nausea/vomiting</b>		<b>Y N Unknown</b>	<b>Onset date:</b> ____/____/____
<b>Diaphoresis</b>		<b>Y N Unknown</b>	<b>Onset date:</b> ____/____/____
<b>Cough</b>			
<input type="checkbox"/> <b>Productive</b> <input type="checkbox"/> <b>Bloody</b>		<b>Y N Unknown</b>	<b>Onset date:</b> ____/____/____
<b>Chills</b>		<b>Y N Unknown</b>	<b>Onset date:</b> ____/____/____
<b>Muscle aches</b>		<b>Y N Unknown</b>	<b>Onset date:</b> ____/____/____
<b>Joint pain</b>		<b>Y N Unknown</b>	<b>Onset date:</b> ____/____/____
<b>Chest pain when taking a deep breath:</b>		<b>Y N Unknown</b>	<b>Onset date:</b> ____/____/____
<b>Shortness of breath</b>		<b>Y N Unknown</b>	<b>Onset date:</b> ____/____/____
<b>Abdominal pain</b>		<b>Y N Unknown</b>	<b>Onset date:</b> ____/____/____
<b>Bloody diarrhea</b>		<b>Y N Unknown</b>	<b>Onset date:</b> ____/____/____
<b>Headache</b>		<b>Y N Unknown</b>	
<b>Severe</b>		<b>Y N Unknown</b>	<b>Onset date:</b> ____/____/____

<b>Light sensitivity</b>	Y   N   Unknown	Onset date: ____/____/____
<b>Other symptoms:</b>		
<b>Care:</b>	<b>Name and</b>	<b>Date of visit/consult:</b>
<b>Location</b>		<b>Comments</b>
<input type="checkbox"/> <b>Admitted to hospital:</b> _____		
<input type="checkbox"/> <b>treatments given; yes /No,</b> <b>if yes what</b> _____		
<b>Current clinical status</b> <input type="checkbox"/>		
Improved	<input type="checkbox"/> No change	<input type="checkbox"/> Worsened
<input type="checkbox"/> <b>Back to baseline</b>		

**3. OTHER POTENTIAL RISK FACTORS IN THE SIX WEEKS PRIOR TO ONSET OF SIGNS/SYMPTOMS**

Occupation Associated With Animals or Agriculture

If yes, describe

\_\_\_\_\_

Occupational or Other Exposure to Hides, Wool, Furs, Bone Meal or

Other Animal Products

If yes, describe

\_\_\_\_\_

Contact with a Dead Animal

If yes, type of  
contact \_\_\_\_\_

Contact with Unusual Powders, Dusts or Aerosols

If yes, describe  
\_\_\_\_\_

Eaten Undercooked Meat

If yes, describe  
\_\_\_\_\_

Any Unusual Occurrences

If yes, describe  
\_\_\_\_\_

#### **4. Knowledge of the community towards the disease Anthrax**

4.1 have you ever heard about Anthrax disease? Yes / No

4.2 Do you know the mode of transmission for the disease anthrax? Yes/ No

4.3 If yes how?

- A) Through Direct contact to the animals
- B) Through consuming uncooked meat
- C) Through inhalation of powders, dusts, or
- D) All

## CHAPTER-3 SURVEILLANCE DATA ANALYSIS ON SEVER ACUTE MALNUTRITION IN TIGRAY REGION, FROM JULY/2011-JUNE/2012

T.HILUF (Bsc.)<sup>1</sup>, G.AYNALEM (MD, MPH)<sup>2</sup>

### **Executive summary**

**Introduction:** Tigray region is found in northern part of Ethiopia which is 762 km far from the capital city of the nation, Addis Ababa. It is composed of 34 rural woredas and 12 town woredas with a total population of 4,881,411. There are 12 general hospitals, 224 health centers and 544 health posts. Acute Malnutrition is classified into severe acute malnutrition (SAM) and moderate acute malnutrition (MAM) according to the degree of wasting and the presence of oedema. It is severe acute malnutrition if the wasting is severe (W/H < 70% NCHS median or a low MUAC) or there is oedema. Acute Malnutrition is defined as moderate acute malnutrition if the wasting is less severe (W/H between 70% and 80% NCHS median). It is estimated that the world over, 26 million children suffer from SAM. In India, over 8 million children are afflicted by SAM in which those children have mortality rates that are nine times higher than well-nourished children. SAM contributes to approximately 1 million child deaths annually. The progress of severe acute malnutrition in different areas of Ethiopian regions were not detected on the regular time basis. Therefore, it needs a special attention on how to detect and monitor the trends by time, person and place for the purpose of an early warning and effective intervention.

**Methods:** This surveillance data analysis on severe acute malnutrition was conducted in Tigray region on January, 2013. It was based up on the secondary data reported from all health facilities (health posts, health centers and hospitals) from July/2011-June/2012. The data was collected from HMIS case team of the regional health bureau consisting a quarterly report of SAM with respect to their sex, age groups and health facility reporting's. We used a Microsoft office excel 2007 to analyze the frequency of severe acute malnutrition.

**Results:** In Tigray region 2011/12, the prevalence of SAM was 7/10,000(3647) in which majority of the cases were occurred in the first quarter of the year and decreased throughout the year. It was higher in western zone of the region with 12/10000(510), whereas it ranges from 3/10000-9/10000 in the remaining 6 zones. Of the total cases, 76 %( 2764) were detected in rural areas. Children= $\leq$ 4years were highly affected with a prevalence of 8/100(3345). from the total number of cases among the top ten woredas of the region , males 818(55.8%) were higher than females 646(44.2%). The relative frequency and the prevalence rate of severe acute

malnutrition in both sex of all age group were higher in kafta humera Woredas 305(20.8%) and axum Woredas 175(0.34%) respectively.

**Conclusion:** Generally, the prevalence of SAM was higher among children's, rural resident areas, dry season and during summer and winter seasons which are mainly associated with nutritional status of the community. The participation rate on screening program for mothers was very low as long as they are enrolled in the program. So, we recommend strengthening community based nutrition and providing a capacity building for health workers .And also a further study needs to assess the possible factors associated with SAM.

## 1. Introduction

Acute Malnutrition is classified into severe acute malnutrition<sup>1</sup> (SAM) and moderate acute Malnutrition (MAM) according to the degree of wasting and the presence of oedema. It is severe Acute malnutrition if the wasting is severe ( $W/H < 70\%$  NCHS median or a low MUAC) or there is Oedema. Acute Malnutrition is defined as moderate acute malnutrition if the wasting is less severe ( $W/H$  between 70% and 80% NCHS median); Children who have very low weight-for-height (over 3 z scores below the median) or have a mid-upper arm circumference (MUAC) of less than 115 mm or have nutritional edema are labeled as having severe acute malnutrition .(1)

It is estimated that the world over, 26 million children suffer from SAM. In India, over 8 million children are afflicted by SAM in which those children have mortality rates that are nine times higher than well-nourished children. SAM contributes to approximately 1 million child deaths annually. India has a large number of children with SAM and they require urgent attention. Pilot studies have shown that it is feasible to implement the WHO-UNICEF protocol for treating children with SAM in healthcare facilities and that RUTF is acceptable to these children (2).

United Nations Children's Fund (UNICEF) 2011 projected figures suggest that 1.1 million children will suffer from severe acute malnutrition in 2012 in eight countries in the Sahelian including northern Nigeria(3). The 2005 Ethiopian Demographic and Health Survey (EDHS) showed that there has been improvement in the nutritional status of children in the past five years. In Ethiopia, the percentage of stunting fell from 52% in 2000 to 47% in 2005.

Similarly the percentage of underweight children declined from 47% to 38%. However, there is no change in the prevalence of wasting, as it remained 11% (4).

The extended dry season in the pastoral areas of Afar, Somali and part of Oromia regions and below normal rainfall in Amhara, Tigray, part of Oromia and Southern Nations, Nationalities, and Peoples (SNNP) regions have led to the most severe humanitarian crisis since 2003. A significant number of people continue to face humanitarian challenges, including malnutrition, acute watery diarrhea, floods, poor access to health-care services and critical water and sanitation shortage, thereby compromising the well-being of children. Currently more than 200 *woredas* in Somali, SNNP, Oromia, Amhara, Afar and Tigray regions are identified as being 'hotspots' because of a combination of high food insecurity, moderate to high malnutrition rates and rapid onset emergencies like epidemic outbreaks, floods or conflicts. The current nutrition situation is graded as serious and critical with global acute malnutrition (GAM) and severe acute malnutrition (SAM) prevalence ranging from 7.7 to 23.4 and 2.0 to 4.5 percent respectively, based on recent standard nutrition surveys conducted in vulnerable *woredas* in SNNP, Oromia and Afar regions. It is estimated that more than 84,200 children under age five will be in need of treatment for severe acute malnutrition each month. New admissions to therapeutic feeding programme have increased significantly from the onset of the emergency to October 2008 with a total of 164,400 new admissions registered from January to October 2008. The number of therapeutic feeding sites has increased in 2008 from less than 200 to more than 1,200 with 500 at health post level. However, the programme coverage in the six regions is still low trailing at 56 per cent. Children in the remaining 44 per cent vulnerable areas have currently no access to lifesaving treatment for severe acute malnutrition (5).

These statistics make it amply clear that SAM is a major health problem and should be a top priority for any country. The good news is that most of the deaths due to SAM can be prevented. (5). Children with SAM who has poor appetite or those who have an acute medical complication needs to be managed in a facility; while those without these indications can be managed at the community level. Community-based or home-based management is a crucial component of management of children with SAM. Not all children with SAM require inpatient care and in any case no country has enough hospital beds to house every child with SAM. Community-based care ensures that the family is disturbed to only a minimal extent. This is of vital importance, as admission of the child to a healthcare facility exacerbates economic and social stresses in the poverty-stricken families. For restoration of nutritional status, F-75 and F-100 formulae are sequentially used during admission, if necessary through a nasogastric tube.

After recovery, when the child shows weight gain of over 5 gm/kg/d, the child is discharged and followed up in the community-based phase. To ensure continued weight gain, WHO and UNICEF employ a peanut butter-based ready-to-use therapeutic food (RUTF) for feeding children. Experience from studies has shown that it is possible to implement the WHO-UNICEF protocol in facilities and this has resulted in a decline in the mortality rates (6). Inadequate food intake, large Family size, low monthly, income Parental illiteracy is found to be associated with a higher risk of SAM. This is observed in studies done in North Wollo, Ethiopia (2)

WHO has approved a high-protein and high-energy peanut-based paste for use as a ready-to-use therapeutic food (RUTF). The spread is a mixture of milk powder, sugar, vegetable oil, peanut butter, vitamins and minerals. Several scientists and activists have expressed reservations regarding using an imported RUTF for the program (7).

As always, prevention is better than cure! What we need is promotion of low-cost sustainable solutions like optimal infant and young child feeding so that SAM does not occur. This can be achieved through promotion of breastfeeding, education of mothers regarding proper infant feeding practices, transferring the skills in preparation of low-cost high-energy foodstuffs to mothers, training of doctors and healthcare workers in nutrition and dietetics and motivating them to provide appropriate nutritional advice at every health contact.

## **2. Rational of the study**

SAM causes an economical and health impact in the community. In many health facilities the mortality rate from this case is at present over 20% which is unacceptable. If a proper management and health promotion are carefully followed the mortality rate should be less than 5% even in areas with high prevalence of HIV/AIDS.

The progress of sever acute malnutrition in different areas of the region were not detected on the regular time basis. Even, the logistics and supplies required for screening programme was not distributed according to their previous prevalence rather based on the total population size. Therefore, it needs a special attention on how to detect and monitor the trends by time, person and place for the purpose of an early warning and effective intervention.

### **3. OBJECTIVES**

#### **3.1 General objectives**

- To describe and analyze the distribution of severe acute malnutrition among the community in Tigray region, Ethiopia

#### **3.2 Specific objectives**

- To describe the situation of severe acute malnutrition by time, place and person
- To detect the changes of severe acute malnutrition in different periods of time
- To monitor the trends of severe acute malnutrition in different areas of the region

### **4. Methods and materials**

#### **4.1 Study area and period**

This surveillance data analysis on severe acute malnutrition was conducted in Tigray region on January, 2013. Tigray region is located in northern part which is 783 km far away from Addis Ababa, the capital city of Ethiopia. It consists of 46 woredas with 34 rural woredas and 12 town woredas. The surveillance data analysis was comprised of all woredas based up on the secondary data reported from all health facilities (health posts, health centers and hospitals) from July/2011-June/2012.

#### **4.2 Instruments and procedures**

Every available data were collected from the regional health bureau, HMIS case team that provided quarterly report and other partners concerning to the secondary data. We used materials like, National SAM guidelines and other published studies regarding to severe acute malnutrition.

#### **4.3 Variables specification**

The quarterly annual report consists of, the number of severe acute malnutrition by sex (male and female) and age ( $\leq 4$ , 5-14, and  $\geq 15$  years age group). This report was specified in to woredas health office and hospitals with respect to their total populations.

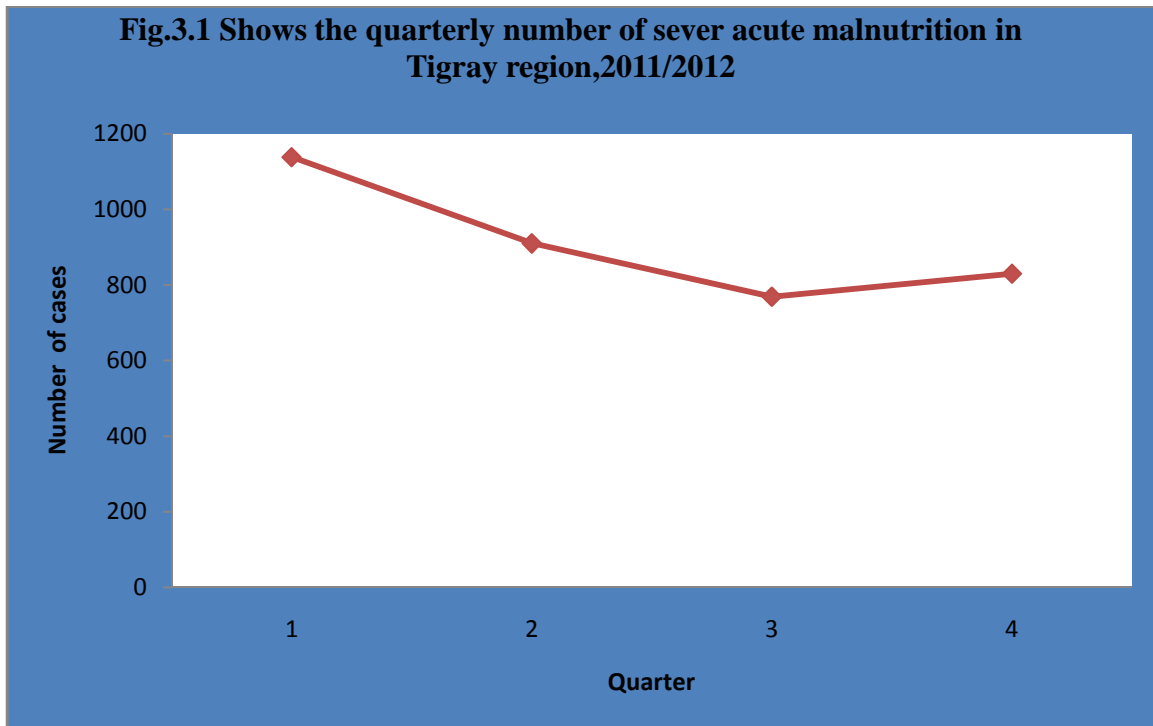
#### **4.4 Data analysis**

Data were entered in to Microsoft office excel 2007. The trend and the frequency of severe acute malnutrition was depicted in different types of graphs and tables by using pivot table function. The proportion and the 95% confidence interval were calculated by open epi curve to determine the status of severe acute malnutrition among the woredas, zones and the region.

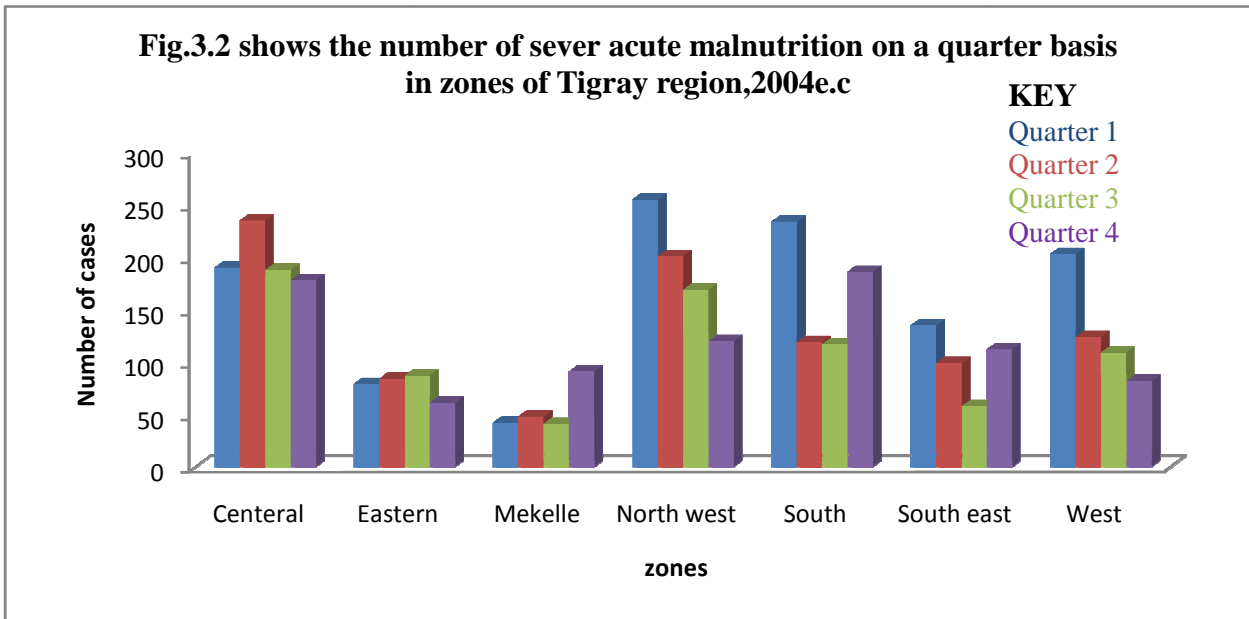
## 5. RESULT

### 1. The frequency distribution of sever acute malnutrition by time and place

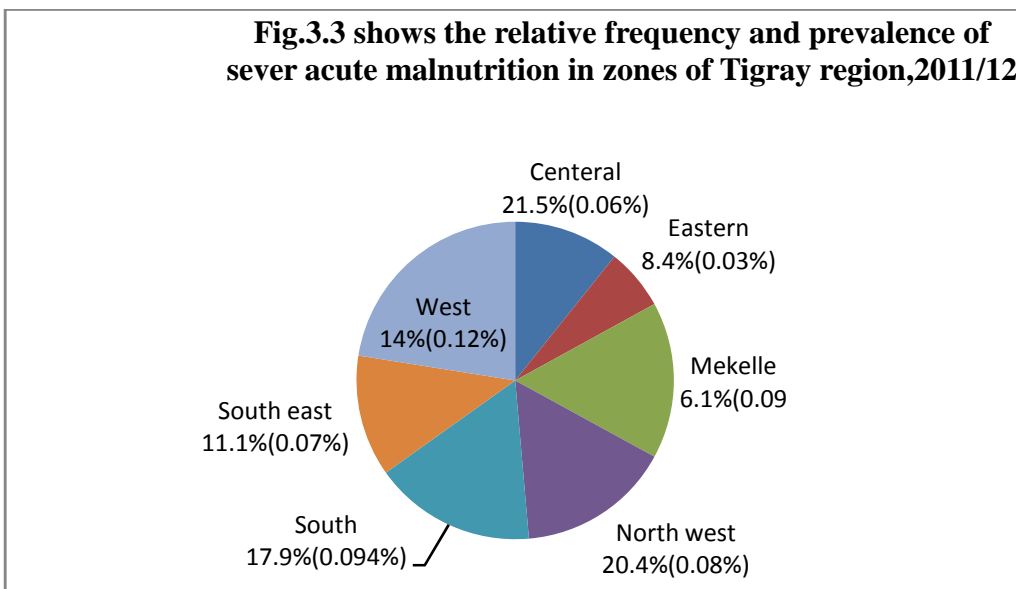
As shown from the graph, the total number of sever acute malnutrition were decreased in the first three consecutive quarters of the year .but as It approaches to the fourth quarter, it became slightly increased. In Tigray region, the prevalence of sever acute malnutrition was 3647(.07%) in 2011/12.



In the central zone of Tigray region , the peak for SAM was in the second quarter where as in mekelle zone, the highest number of sever acute malnutrition was seen in the fourth quarter. except in eastern zone which didn't show an increase ,the rest zones of the region indicated their peak at the first quarter of the year and among those north west and west zones were decreased with significant number of cases throughout the year. similarly the trend of the cases in the south and south east indicated as that of the aggregated number of sever acute malnutrition cases in a quarter basis of Tigray region.



Among the different zones of Tigray region ,the relative frequency and the prevalence rate of sever acute malnutrition was higher in central zone ( 21.5% )and western (0.12%) respectively. however ,the remaining zones were also had a significant value when they are compared in relative to each other which lies their prevalence rate in the rang 6%(0.03%)-20.4%(0.094%).



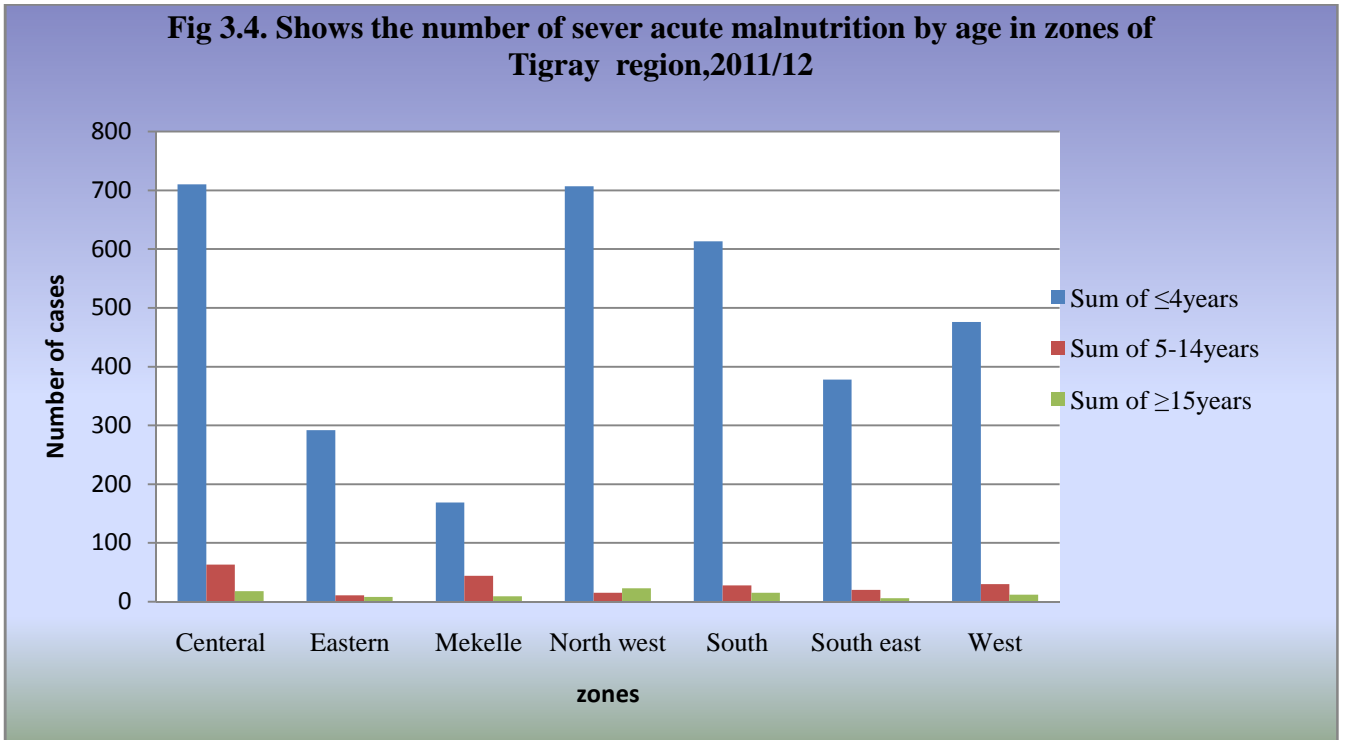
## 2. The ditrubtion of sever acute malnutrition by person and place

The number of sever acute malnutrition were 3 times higher in rural resident area than that of town woredas in which 2764(76%) of the total cases were in rural and the rest 883(24%) found to be on town health facilities (health centers and hospitals).

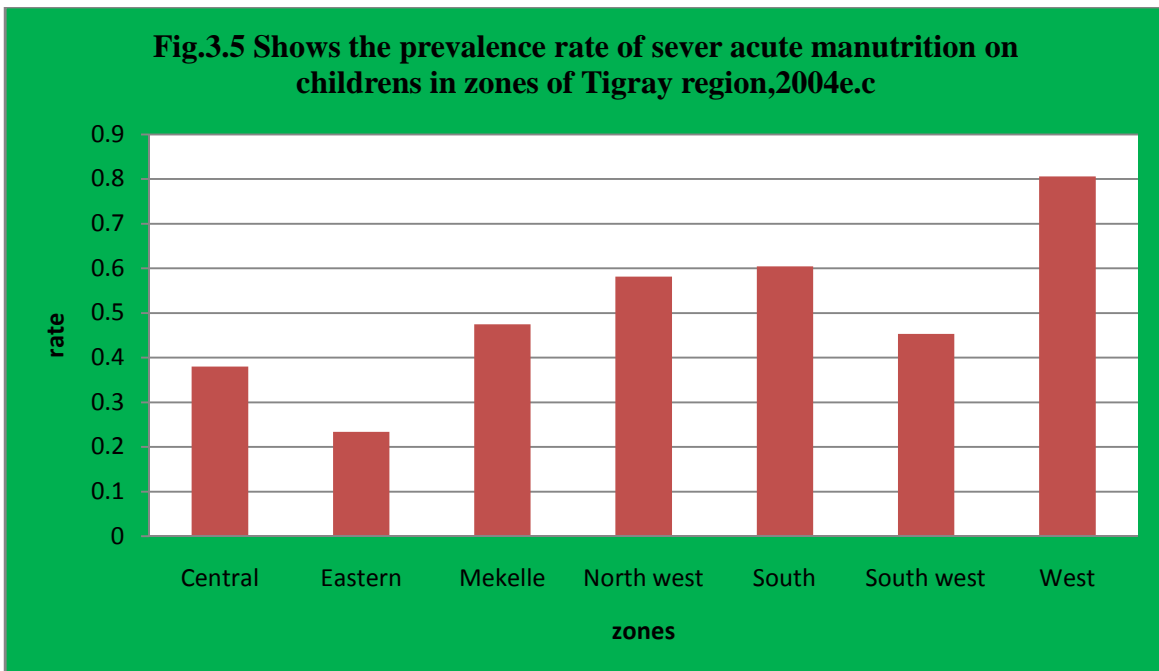
**Table 3.1.Shows the number of sever acute malnutrition among the zones of Tigray region, 2011/12**

<b>no</b>	<b>Name of zones</b>	<b>rural</b>	<b>Percentage (%)</b>	<b>town</b>	<b>Percentage (%)</b>
<b>1</b>	<b>Central</b>	<b>540</b>	<b>68</b>	<b>251</b>	<b>31.7</b>
<b>2</b>	<b>Eastern</b>	<b>263</b>	<b>84</b>	<b>48</b>	<b>15</b>
<b>3</b>	<b>Mekelle</b>	<b>0</b>	<b>0</b>	<b>222</b>	<b>100</b>
<b>4</b>	<b>North west</b>	<b>703</b>	<b>94</b>	<b>42</b>	<b>5.6</b>
<b>5</b>	<b>South</b>	<b>388</b>	<b>59</b>	<b>268</b>	<b>40.8</b>
<b>6</b>	<b>South east</b>	<b>407</b>	<b>99</b>	<b>3</b>	<b>0.7</b>
<b>7</b>	<b>West</b>	<b>469</b>	<b>90</b>	<b>49</b>	<b>9</b>
<b>8</b>		<b>2764</b>	<b>76</b>	<b>883</b>	<b>24</b>

As the figure depicted ,the number of cases in all zones were higher in children  $\leq 4$  age group .where as in adults  $\geq 15$ age group ,a very small number of cases as having sever acute malnutrition were screened in relative to the other age groups except in north west in which the smallest number of cases were in 5-14years of age.

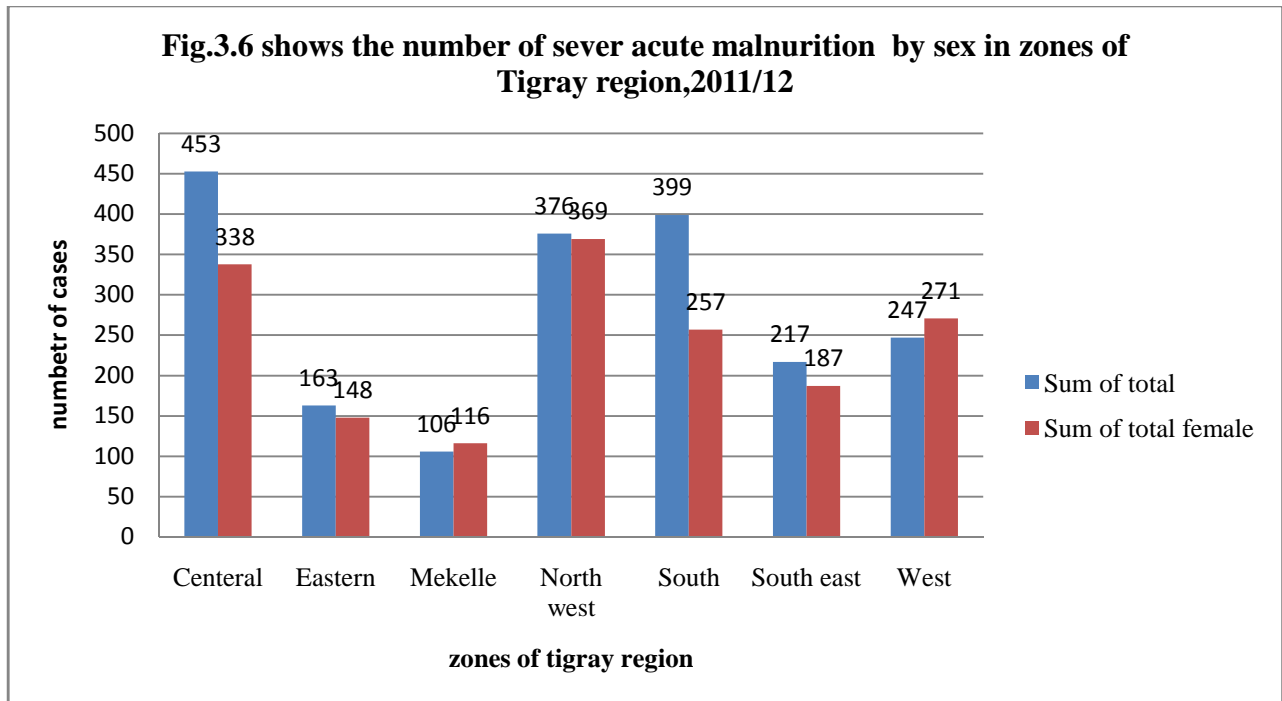


Apart from all age groups, the prevalence rate among children's in zones of Tigray region were 0.8%, 0.6% and 0.58% in western, southern and North West zones respectively. But the other four zones had below 0.5%.



The number of sever acute malnutrition were higher in males than in females for all zones except in mekelle and western zone where the females were higher than that of males .Accordingly, the range or the difference between the numbers of cases in males and females

was very higher in central and southern zones when they are compared to the other zones of Tigray region.



**Table 3.2. Shows the number (by sex), relative frequency and prevalence of sever acute malnutrition among the top ten woredas of Tigray region, 2011/12**

no	Name of woredas	males	females	total	Total population	Relative frequency (%)	Rate (%)
1	Axum Woredas Health Office	117	58	175	50493	11.9	0.34
2	Alamata Town Woredas Health Office	105	19	124	37560	8.4	0.33
3	Kafta Humera Woredas Health Office	132	173	305	104252	20.8	0.29
4	Maychew Woredas Health Office	41	23	64	26569	4.3	0.24

5	Humera Woredas Health Office	31	13	44	24197	3	0.18
6	Tselemt Woredas Health Office	115	101	216	157072	14.7	0.13
7	Asgede Tsimbla Woredas Health Office	94	114	208	153374	14.2	0.13
8	Adwa Town Woredas Health Office	29	29	58	45824	3.9	0.12
9	Enderta Woredas Health Office	97	56	153	129293	10.4	0.11
10	Thatay Maychew Woredas Health Office	57	60	117	05044	9	0.11
	total	<b>818</b>	<b>646</b>	<b>1464</b>	33683	00	0.17

As shown in the above table, from the total number of cases among the top ten woredas of the region, males 818(55.8%) were higher than females 646(44.2%). The relative frequency and the prevalence rate of severe acute malnutrition in both sexes of all age groups were higher in kafta humera Woredas 305(20.8%) and axum Woredas 175(0.34%) respectively.

## 6. Limitation of the study

- The data of SAM was not available in HMIS unit of the region since 2011
- The independent variables were not complete apart from sex, age and health facility

## 7. Discussion

From this surveillance data analysis, the number of severe acute malnutrition were higher in between the first and second quarter which consists of 1127 and 911 respectively. For this situation, the hypothesis indicated that those times with higher number of cases were during summer and winter seasons in which that will be supposed to be the food supply becomes decreased among the community, even the price for different food items is increased.

The prevalence of severe acute malnutrition among woredas and zones of Tigray region were higher in areas where they have dry seasons, thereby this is the main factor for low harvesting food plants. And those are western zone (kafta humera 305(0.29%), setit humera 44(0.18%)) and southern zone (Alamata woredas 124(0.33%)) where they had a prevalence of 0.12% and 0.094% respectively. When this is compared to the survey conducted in vulnerable woredas in SNNP, Oromia and Afar regions where it ranges from 2-4.5%, it was very low. But this may be due to under reporting or low participation rate on the screening program me.

The distribution of severe acute malnutrition in rural residents were 3 times greater than town woredas in which it was 76% in rural and 24% in town areas. This is because of the higher population size, low awareness towards nutrition, large family size and parental illiteracy. This situation is similar to the study done in north Wollo, Ethiopia and in other African countries where those factors are found to be associated with a higher risk of severe acute malnutrition.

In Tigray region, Majority of the cases were children's less than  $\leq 4$  years of age group with 3345(91.7%). This can be correlated with that of children's are unable to prepare their food intake by themselves, low immunity and high participation rate on SAM screening due to the FMOH policy focused in these age group.

The number of SAM cases in children was undermined that might contribute to high child mortality in relative to Indian, sub-Saharan Africa and Ethiopia, where there had been 26 million, 8 million, 1.1 million and 84,200 of severe acute malnutrition in children's respectively.

Overall, the prevalence rate of severe acute malnutrition in all age groups and in children's were 0.07% with CI (0.072-0.077) and 0.46% with CI(0.45-0.48) respectively which is very low compared to the current nutrition situation of Global acute malnutrition (GAM) and severe acute malnutrition (SAM) with a prevalence ranging from 7.7 to 23.4 and 2.0 to 4.5 percent respectively

## **8. Conclusion**

Generally, the prevalence of severe acute malnutrition in all areas of the region were different in relative to their vulnerability and it was higher among children's, rural residents areas, dry season and during summer and winter seasons which are mainly associated with nutritional status of the community. The achievements of participation rate on screening program me for mothers was very low as long as they are enrolled in the program me.

## **9. Recommendation**

- The regional health bureau with collaboration of other partners should Strengthen community based nutrition
- A capacity building is required for health workers to increase the participation rate of SAM screening for mothers
- A further study should be conducted in these prioritized areas with high prevalence of SAM

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## CHAPTER-4 SURVEILLANCE SYSTEM EVALUATION IN RAYA ALAMATA WOREDA AND TIGRAY REGION, 2013

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### **Executive summary**

**Back ground;** Tigray region is found in northern part of Ethiopia which consists of 12 town woredas and 34 rural woredas with a total population of 4,929,999 in which Raya Alamata woreda is one of among the rural woredas located in southern part, 180km far away from the capital city of the region, Mekelle.

**Statement of the problem;** The public health system is continually challenged by recurrent and unexpected disease outbreaks and is facing the challenge of managing health consequences of natural and human made disasters, emergencies, crisis, and conflicts. These problems continue to disrupt the health care system, while successful detection and response to these challenges is becoming increasingly complicated in which malaria and dysentery diseases are among these natural and human made disasters that are affecting the community due to the existence of poor surveillance system. Thus, Public health surveillance systems should be evaluated periodically, and the evaluation should include recommendations for improving quality, efficiency, and usefulness. Dysentery and malaria disease are among the national diseases under the surveillance in which the performance of the surveillance system towards these diseases didn't fit to the standard public health surveillance system in Tigray region and raya Alamata woreda. In addition to this, surveillance system evaluation was not done in the woreda as well as in the region before.

**Methods and materials;** the surveillance system was conducted from 14/5/-19/6/2004e.c in raya Alamata woreda, Tigray region. The study unit were 2 health center, 2 health post, 1 woreda health office ,1 regional health bureau and1 regional laboratory in which the health facilities were selected by simple random sampling method where as the others were purposively included to the study. We collected the data by using a structured and semi structured questionnaire and analyzed in MS-Exell and MS-word for write up. Finally, the first draft of the report was disseminated to the EFETP, field supervisors, mentors, academic coordinator and resident advisors.

## **Results and discussion**

### **I. Description of the diseases under surveillance system evaluation**

We have conducted a surveillance system evaluation on these two weekly reportable diseases such as, malaria and dysentery diseases. According to the report of Tigray regional health bureau, the prevalence of malaria and dysentery diseases was 67.7/1000(333,764) and 6.8/1000(34,149) in 2004e.c respectively. Where as in raya Alamata woreda, the prevalence of these diseases was 29/1000(2,924) and 2.3/1000(226) respectively but they did not experience an outbreak throughout the year.

**Population under surveillance;** all the community of Tigray region and Alamata woreda consisting a total population of 4,929,999 and 98,980 respectively were under the existing surveillance system.

**Case detection and registration ;**The standard case definitions, community case definitions and reporting tools were available in all the study areas in which most of them had poor performance of active surveillance.

All health facilities had a clear and specific clinical registration for malaria disease but 50 % of the health facilities have registered for dysentery disease in the OPD visit.

### **II. Key attributes of the surveillance system**

- **Usefulness;** the magnitude of these specific diseases was clearly labeled in 50% of the health facilities and all have been implemented a prevention and control method.
- **Simplicity;** the way for detection of cases, data management and integration of the surveillance system were easily understandable by all health workers.
- **Data quality;** the completeness and validity of the surveillance data were poor.
- **Acceptability;** all the health workers had a responsibility to collect, report and analyze the surveillance data .but the other concerned body (organizations) had less willingness to participate on these issues.
- **Sensitivity;** the ability of the health workers for detection of cases was relatively effective. But most of the health facilities did not monitor the changes of cases.

- **PVP;** the performance of the laboratory test used to detect the true cases was different among the health facilities and it was higher in health centers than health posts.
- **Representativeness;** According to the national standard of health service coverage, the population under surveillance had an access to the health service which indicated the surveillance system was available at all.
- **Timeliness;** the timely reporting rate of the health center was 83.3% , for health posts 50% and 100 % for woreda health office, regional laboratory and regional health bureau in the last three months of 2004e.c.
- **Flexibility;** there were no any changes in the surveillance system at all.
- **Stability;** the performance of the surveillance activities was affected by the existence of high staff turnover.

**Conclusion;** All the visited health institutions have indicated a non flexibility, a usefulness, simplicity and representativeness of the surveillance system that can meet its objectives. However, the data quality, the timelines of the report, the acceptability, stability, sensitivity and the PVP of the surveillance system did not meet its objective in most of the health facilities visited.

**Recommendations;** the regional health bureau as well as other partners should strengthen by providing building capacity, allocating budget line, conducting a regular supportive supervision specific to surveillance activities and effective monitoring and evaluation of the surveillance system.

## **1. Introduction**

**Back ground:** Tigray region is found in northern part of Ethiopia which consists of 12 town woredas and 34 rural woredas with a total population of 4,929,999 in which Raya Alamata woreda is one of among the rural woredas located in southern part, 180km far away from the capital city of the region, Mekelle.(1)

### **Statement of the problem**

Malaria is a life-threatening parasitic infection that still considered as the most important public health problem in low land as well as high land fringe areas in which 10 million clinical cases reported annually. Approximately 52 million people (68%) live in malaria risk areas in Ethiopia (2)including most of the woredas of Tigray region and raya Alamata woreda.

Public health surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health. Data disseminated by a public health surveillance system can be used for immediate public health action, program planning and evaluation, and formulating research hypotheses.

The public health system is continually challenged by recurrent and unexpected disease outbreaks and is facing the challenge of managing health consequences of natural and human made disasters, emergencies, crisis, and conflicts. These problems continue to disrupt the health care system, while successful detection and response to these challenges is becoming increasingly complicated (3).

An important indicator of a quality reporting system is the timeliness and completeness at each level. When reports are sent and received on time, the possibility of detecting a problem and conducting a prompt and effective response is greater. Completeness of reporting describes whether all the reporting units have reported as expected. If reports are late, or are not submitted, the aggregated information for the woreda (or other administrative area) will not be accurate. Outbreaks can go undetected and other opportunities to respond to public health problems will be missed.

The evaluation of public health surveillance systems should involve an assessment of system attributes, including simplicity, flexibility, data quality, acceptability, sensitivity, predictive value positive, representativeness, timeliness, and stability. With the continuing advancement of technology and the importance of information architecture and related concerns, inherent in these attributes are certain public health informatics concerns for public

health surveillance systems. These concerns include comparable hardware and software, standard user interface, standard data format and coding, appropriate quality checks, and adherence to confidentiality and security standards. Because public health surveillance systems vary in methods, scope, purpose, and objectives, attributes that are important to one system might be less important to another. A public health surveillance system should emphasize those attributes that are most important for the objectives of the system. Efforts to improve certain attributes (e.g., the ability of a public health surveillance system to detect a health-related event [sensitivity]) might detract from other attributes (e.g., simplicity or timeliness). An evaluation of the public health surveillance system must therefore consider those attributes that are of the highest priority for a given system and its objectives.

The purpose of evaluating public health surveillance systems is to ensure that problems of public health importance are being monitored efficiently and effectively. Public health surveillance systems should be evaluated periodically, and the evaluation should include recommendations for improving quality, efficiency, and usefulness. Evaluation of a public health surveillance system focuses on how well the system operates to meet its purpose and objectives. (4).

## **2. Rational of the Evaluation**

Dysentery and malaria disease are among the national diseases under the surveillance due to that they are the major public health concern .according to the report of the regional health bureau, these diseases was ranked among the top ten causes of the diseases in the region. In addition to this, the regional health bureau, early warning and surveillance case team has prioritized the woredas with high prevalence of these diseases and raya Alamata woreda was one of these prioritized woredas with high prevalence of malaria and dysentery diseases. And also the timeliness and data quality of the surveillance data of the region and raya Alamata woreda health office did not meet the objective of the system. In addition to this, surveillance system evaluation was not done in the woreda as well as in the region before. Therefore, the scope of this study is to evaluate the surveillance system and identify the trends to this specific disease.

### **3. Objective**

#### **3.1 General objectives**

- To evaluate the surveillance system on specific diseases (, dysentery and malaria diseases) in raya Alamata, southern zone of Tigray region

#### **3.2 Specific objective**

- To identify the Performance of the system in line with set objectives
- To assess the main attributes of surveillance system
- To assess the availability of the resources in a surveillance activities
- To evaluate the trends of cases of those specific diseases

### **4. Methods and materials**

#### **4.1 Standard case definition;**

##### **Standard Case Definition:**

The Standard Case Definition for these diseases under the surveillance system evaluation that was used at the regional health bureau and raya Alamata woreda was According to the PHEM guideline.

##### **Malaria;**

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

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

##### **Dysentery;**

Suspected; A person with diarrhea with visible blood in stool.

Confirmed; Suspected case with stool culture positive for *Shigella dysenteriae* 1.

**4.2 Study area and period:** this surveillance evaluation system was conducted in Tigray regional health bureau, early warning and Surveillance case team, regional laboratory and raya Alamata woreda, southern zone of Tigray region from 14/5/--19/6/2004e.c

**4.4 Study unit:** The study subjects were the health facilities (, Health Centers, and Health Posts), health offices (Woreda Health Offices, and the Regional Health Bureau) and the regional laboratory.

**4.5 Sample Size and Sampling:** We enrolled the Regional Health Bureau, regional laboratory, one woreda health office, two health centers and two health posts. As long as, the regional health bureau has prioritized this woreda that indicated a high prevalence of this specific disease, we have selected the woreda health office according to the non probability, purposive sampling method. However, the health centers and the health posts were selected by simple random sampling method.

#### **4.6 Data collection tools and methods**

We have collected the data through interview using structured questionnaire with face to face interviewing. The questionnaire was adopted from WHO standard questioner for surveillance evaluation. We also used a Secondary data source like; Annual regional performance report, Stakeholders and other publications.

**4.7 Data Analysis:** The collected data was entered in to computer and analyzed in MS-excel and MS-word for write up.

**4.8 Dissemination/advocacy of the Study:** The project finding was disseminated to the regional program managers for possible Interventions, and also was disseminated to (EFELTP).

## **5. Result**

### **5.1 Description of the diseases under surveillance system evaluation.**

#### **5.1.1 Categories of the diseases**

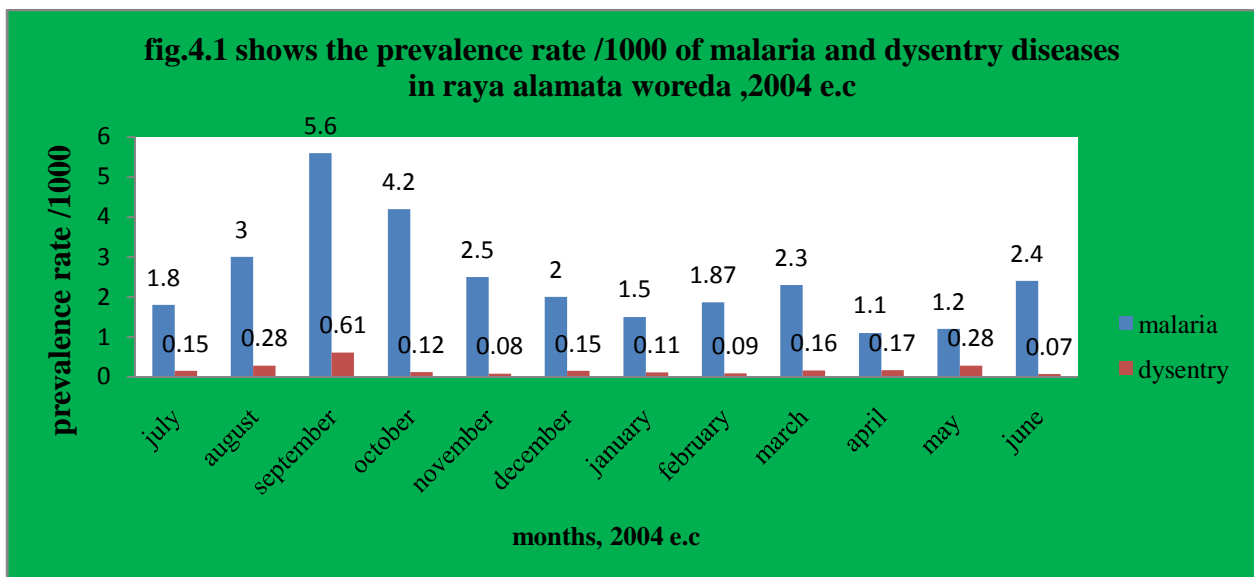
In Ethiopia , there is a PHEM core process in all hierarchies of ministry of health that targets on 20 selected diseases under routine surveillance which were selected based up on the criteria's of the Diseases which have high epidemic potential , Required internationally under IHR2005 ,Diseases targeted for eradication or elimination ,Diseases which have a significant public health importance and Diseases that have available effective control and prevention measures for addressing the public health problem they pose. These diseases were classified as immediately reportable diseases ( AFP/Polio, Avian Human Influenza, Cholera, Guinea Worm, NNT, measles, pandemic influenza , SARS, Small Pox, Plague, Yellow fever, Anthrax, Viral Hemorrhagic Fever ,Rabies ) and weekly reportable diseases (Meningitis, Malaria, Typhoid fever, Typhus, Relapsing fever, and dysentery) in which they were to be reported in an integrated disease surveillance report form.

We have conducted a surveillance system evaluation on these two weekly reportable diseases such as, malaria and dysentery diseases.

### 5.1.2 Epidemiology of the diseases under surveillance system evaluation

In the region, malaria is the major disease burdens of all the 20 priority diseases under Surveillance in the nation. In Tigray Regional state, because of the climatic and environmental changes, 75% of the region is Malaria's and 75% of the populations are at risk of malaria. In addition to this, dysentery disease was also affecting all age groups of the community in areas where there is a low access to safe water supply and low latrine utilization.

According to the report of Tigray regional health bureau, the prevalence of malaria and dysentery diseases was 67.7/1000(333,764) and 6.8/1000(34,149) in 2004e.c respectively. However, in raya Alamata woreda, it was 29/1000(2,924) and 2.3/1000(226) for malaria and dysentery respectively. In 2004 e.c, there were no an outbreak of malaria and dysentery diseases in raya Alamata even the whole Tigray region. As shown below the figure1. , the pick prevalence of malaria and dysentery diseases was in September and they fluctuated throughout the year.



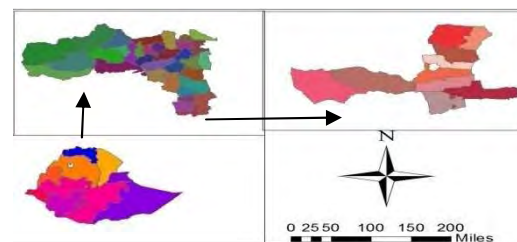
### 5.1.3 Population under Surveillance:

The national PHEM targets all the population in the country to be under surveillance for all the twenty priority diseases. The Tigray Regional state follows the same structure, with a total population of more than (projected from the 2011 national census) and also all the surveillance focal person of raya Alamata district health office has responded that all the community of their respective health facilities were under the surveillance system for these prioritized diseases.

**Table 5.1** The Population under Surveillance in the assessed Region and districts, by Place Of Residence (Population Projected from the 2007 National Census)

Sr.no	place	Total population(	Health center	Health post
1	Tigray region	4,929,999	224	541
2	Raya Alamata woreda	98,980	4	18
3	Tumuga kebele	10,519	1	-
4	Selen wuha kebele	8,563	1	-
5	Limat kebele	8,146	-	1
6	Tao kebele	8,285	-	1

Fig5.2 The Map of surveillance system conducted in Raya Alamata Woreda, Tigray region, Ethiopia, 2004E.C



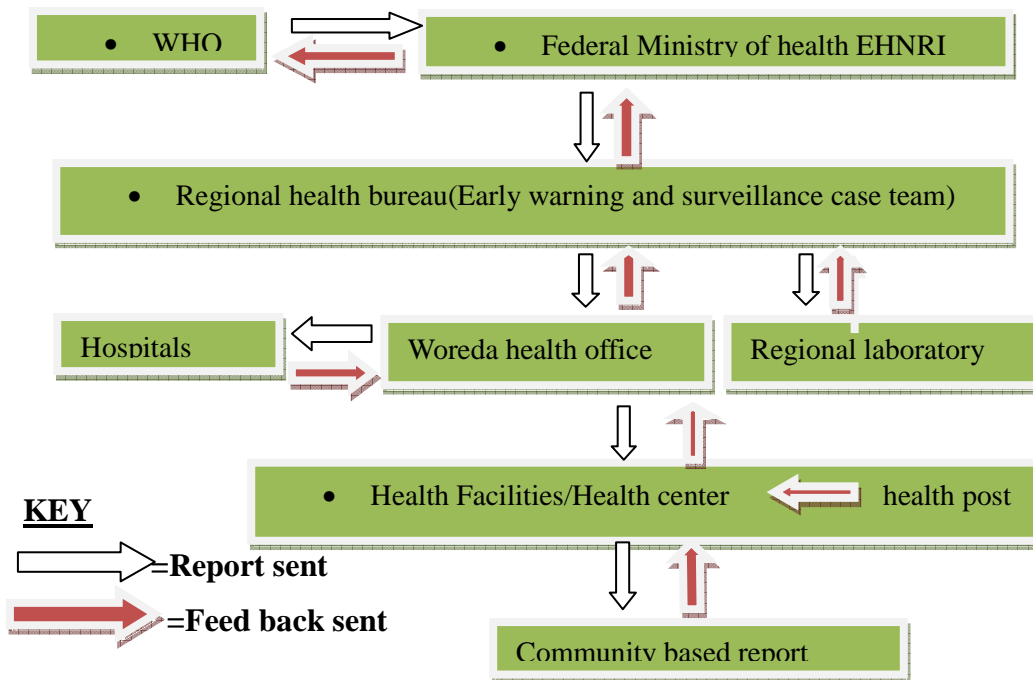
#### 5.1.4 Case detection and registration

The standard case definitions were available in the regional health bureau and in all visited health facilities of raya Alamata wereda. In addition to this, the community case definitions for immediately and weekly reportable disease was distributed in all kebelles of the health facilities visited through the women development army. However there was no a written active surveillance management tool and the prioritized surveillance sites in all health facilities. In the regional health bureau, all the different types of report forms were available throughout the year. They had a responsibility on providing the surveillance forms and to receive the weekly report from all health facilities of the region. And also there were a complete data of weekly report and a registration book log for outbreaks. However; they had not a computerized surveillance network at regional level. All health facilities had a clear and specific clinical

registration for malaria disease but 50 % of the health facilities have registered according to the PHEM guide line for dysentery disease in the OPD visit.

### 5.1.5 Information flow

The surveillance data was disseminated through the diagram depicted below Eventhough there were no a zonal health office in which the regional health bureau has received directly.



### 5.1.6 Data analysis

According to the respondent, the entire health worker assigned in regional health bureau, early warning and Surveillance case team as well as the regional laboratory had a responsibility to analyze the data collected of these diseases under surveillance in a weekly basis. However, there were no an observed description of the collected data (malaria and dysentery diseases) by person, time and place in 2004 e.c. Except that they used a spot map to describe an outbreak of measles. As that of the region, all the health facilities have responded as having a responsibility to analyze the disease under surveillance. But 25% (1) of the visited facilities has analyzed the trend of malaria disease on weekly aspect for two years by using a line graph.

The action threshold for malaria diseases was different starting from region to health post level. However, the regional health bureau and the woreda health office had defined an action threshold of the second pick among the five year data or doubling the cases for the previous one year data .But all the health facilities has defined the action threshold based up on an

increase of the positivity rate for malaria cases. However, there was no a defined action threshold for dysentery disease at all health facilities and regional health bureau.

### **5.1.7 Epidemic preparedness and response**

Even though, there were an observed written plan of epidemic preparedness and response at regional level, it was not available at woreda health office and health facilities level. In addition to this, there were no a functional epidemic committee and rapid response team that settled for reviewing and monitoring the national notifiable disease under the surveillance system at all levels. The regional health bureau had an annual budget of 4,432,000 birr for epidemic response and had an emergency stocks of drugs, vaccines and supplies at all times in 2004e.c except that they experienced a shortage of vitamin A drug during measles outbreak. However, the woreda health office of raya Alamata had not a specified budget line allocated for epidemic responses, even, the surveillance focal person of the health facilities has sent the weekly report by telephone call without a payment for what they have spent. But, all the required emergency drugs for epidemic response were available throughout the year.

In 2004e.c, the regional health bureau, early warning and surveillance case team has detected an outbreak of three types of diseases in eight districts of the region, such as, measles, persteusis and relapsing fever (RF) after they received a telephone report from the health facilities. They conducted an outbreak investigation for measles cases only in two woredas and identified the risk factors associated with this outbreak. But, they responded an intervention within 48 hours of notification of these out breaks without a written report to all woredas where the outbreak of the above disease occurred.

However, the region, the woreda and the health facilities under this surveillance system evaluation had not experienced an outbreak of malaria and dysentery diseases in 2004e.c

### **5.1.8 Supervision and feed back**

As all the respondents, they had conducted an integrated supportive supervision based up on their hierarchy in a quarterly and annually basis. As a result, the regional health bureau, early warning and surveillance case team had five feedback bulletins of surveillance data disseminated to all woredas of the region. However there were no a regular supportive

supervision specific to surveillance activities except to that of the 50% of the health facilities visited which conducted a supervisory visit in the last six months without a written feedback.

#### **5.1.9 Resources available for surveillance**

**Materials** –the materials used for surveillance activities such as, reporting formats, a functional cold chain, and transport media for collected specimens, RDT, electricity, and motor cycles were available in the regional level as well as in all visited health facilities of the woreda health office. In addition to this, they responded as having the materials used for data management, IEC and hygiene and sanitation but not a budget line and communication facilities- like telephone, fax machines, internet and so on in all health facilities. And also There was no a radio call system in any of the visited woreda as well as the regional level which impacted the timeliness of reports of both immediately and weekly reportable diseases

**Training** –even though there were a health workers assigned to the surveillance activities at all levels, all the surveillance focal person of the visited health facilities has not taken training on malaria and dysentery diseases surveillance. However the woreda health office, early warning and surveillance expert and 20 % Of the regional health and laboratory expert has trained on malaria disease in 2004 e.c.

#### **Laboratory facility**

In 2004 e.c, the RDT facility used to confirm for malaria disease was full time available and accessible in all health facilities that have been visited. But the laboratory facilities applicable for dysentery disease were existed in 50% of the total health facility because of the health policy of the federal ministry of health that did not recommend a laboratory facility in the health posts.

The regional laboratory had full filled a staff of four Master of Science on microbiology and parasitology (but one of them was MPH in field epidemiology), eight medical laboratory professionals and three cleaners. It was free-standing building with sufficient bench space in all the laboratory units. In addition to this, it had a running water services and electricity with a buck up power source in case of power failure.

The PFSA organization was the only source of reagents for this regional laboratory that did not experience a shortage of all required reagents in 2004 e.c. and they used distilled water for preparation of media and carry and Blair for transport of media.

According to the response of the head of the regional laboratory, the regional health bureau has situated this for a laboratory test of three immediately reportable diseases among the

disease under the national surveillance (meningitis, AWD and hepatitis), DBS and others. However, the confirmatory test for malaria and dysentery diseases can be performed in primary health care unit.

## **5.2 Evaluation of the performance and attributes of the surveillance system**

### **5.2.1 Usefulness**

Among the total health facilities, 50% of them have conducted an active surveillance to detect cases of malaria and dysentery. In addition to this, all of the health facilities have used a standard case definition for the diagnosis of those diseases in a passive surveillance manner.

According to the review of weekly report, the magnitude of malaria and dysentery morbidity was clearly registered in a weekly basis throughout the year in 50% of the total health facility visited and in regional health bureau. However, the remaining 50% of the health facilities have sent to the woreda health office by telephone service but there were no a complete hard copy of report kept at their health facility.

The mechanism of detecting changes of cases was not similar among the health facilities that have been visited. However, the woreda health office has decided to have an action threshold of when the positivity rate is 30% and the magnitude of the cases becomes doubled in the successive weeks at specified local areas. Whereas 50% of the total health facilities have responded as having an action threshold of greater than 50 cases per week for malaria and greater than 5 cases per week for dysentery disease that occurred around their kebelles.

All health facilities have implemented a prevention and control measure in routine activities but not based up on their data used to prioritize the health burden of the community. Besides to this, they also conducted a follow up for malarial and dysentery patients to register the number of deaths from those specific disease with the coordination of women development army who are responsible to report to their nearby health facilities. However, all of the health facilities did not measure the case fatality rate which means it was unknown.

### **5.2.2 Simplicity**

#### **Detection of cases**

The standard case definition for disease malaria and dysentery was easily understandable by all health workers .the surveillance focal person of 50% of the health facilities conducted a routine active surveillance but none of the health facilities had not an active surveillance

management tool used for the detection of cases in schools , holy waters , traditional medicine provider and others .the time required for laboratory confirmation of malaria and dysentery disease was not more than 30 minutes for both.

### **Data management**

All the interviewee responded that , the amount of data required for those specific disease and other additional data's was not more than one page for weekly reporting form which can be examined within 10 -15 minutes in those 75% of the health facilities and less than 10 minutes for regional health bureau and regional laboratory. However, there were no a line listing form in all health facilities which is used for data collection during an outbreak. Besides to this, 40 % of the health facilities, regional health bureau and regional laboratory have used a computer for data management of the surveillance data. However, as all respondents, they did not depict the distribution of those specific diseases by time, place and person characteristics.

### **Integration of the surveillance system**

As of the response of the interviewee, the surveillance focal person was responsible on coordinating the health workers for data analysis. The agricultural office, water office , school office , the kebelles and woreda administration were considered to be involved on receiving a report during the occurrence of outbreak as that of the regional health bureau stake holders .But, There was no functional rapid response team as well as the kebelles and woredas epidemic committee in all health facilities because of staff turnover.

### **5.2.3Data quality**

According to the review of the three month documents, 50% of the total health facilities had a complete weekly report that indicated all variables written in the reporting format and clinical registration book. However, all the data's collected was not valid in more of the health facilities visited when compared with the existing data at the woreda health office even when reviewed to the regional health bureau. In addition to this, the space provided in the weekly integrated disease surveillance report used to fill additional information and prevention and control measures taken was not complete in all health facilities. They had not a recorded document that indicated a regular supervision undertaken and the feedback given from the health facilities as well as regional health bureau.

#### **5.2.4 Acceptability**

As mentioned in the above attributes of the surveillance system, all health facilities has responded that the concerned institutions had not a willingness to participate on receiving a report of these epidemic prone disease and to be the member of the rapid response team and epidemic committee. And also, there were no reports that have been sent to other organizations and the minutes that indicate the regular meeting of these teams in these six months in all health facilities.

Not only the surveillance focal person but also the other health workers had a responsibility to report and analyze the surveillance data on those specific diseases. Even though, all the health workers were engaged by the survey of family folder , the leader of the woreda health office as well as the health workers assigned as surveillance focal person were voluntary to avail the required data's and to participate on the interview in all health facilities.

#### **5.2.5 Sensitivity**

The sensitivity of the surveillance system can be evaluated by the existing ability of the health workers to detect these specific diseases among the community. All health facilities had a standard case definition used by the health workers as well as the community to detect the cases of malaria and dysentery.

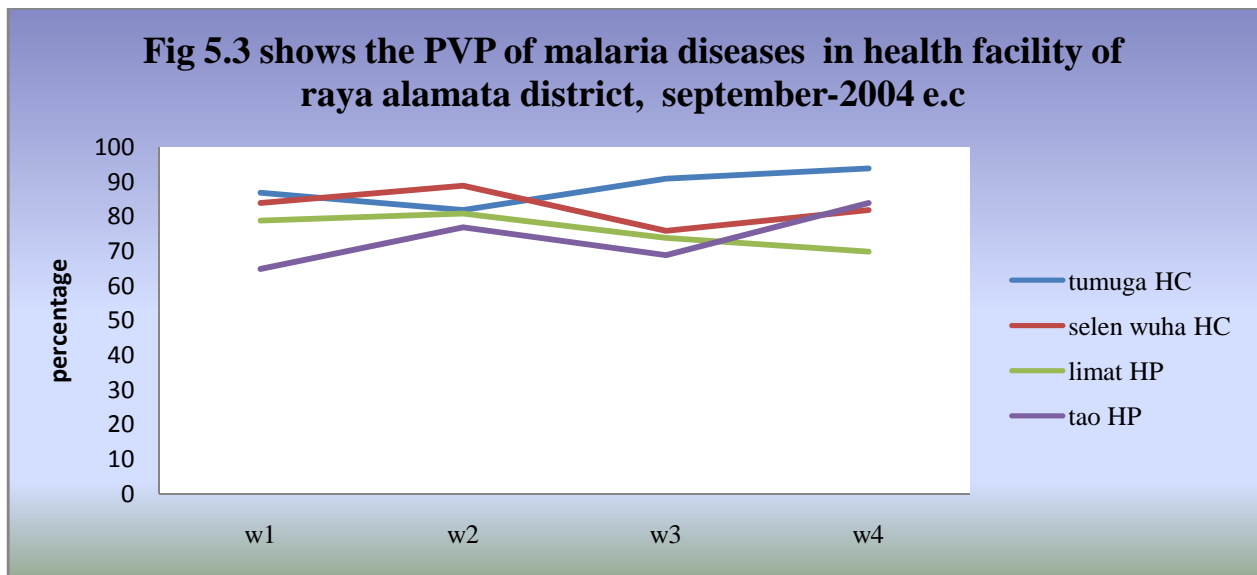
According to the response of the health workers, they conducted an active surveillance 12 times in three months. However, there were no a written active surveillance management tool and a specified surveillance sites to be visited in all health facilities. In addition to this, there were no a functional rapid response team that facilities a regular case detections. 50% of the total visited health facilities had monitored the changes of the malaria cases by using a line graph .but there were no mechanisms for monitoring the changes in dysentery cases in all health facilities.

All the malaria and dysentery cases detected by the surveillance system had got a laboratory test in all health facilities and in 50% of the health facilities respectively. The remaining 50% of the health facilities among visited had not a laboratory facilities to confirm the dysentery cases rather they used a referral system to the nearby health centers.

#### **5.2.6 PVP**

Even though both the health centers and health posts have used the same standard case definition for clinical detection of malaria disease, the PVP for this case was higher in health centers than those health posts in all weeks of the selected month. And also there were no a

constant proportion of PVP for malaria disease by using RDT in all health facilities. However it was impossible to measure the PVP for dysentery disease .Because there was no available data's on false positive result for dysentery disease in all health facilities.



### 5.2.7 Representativeness

All of the kebelles of the health facility were lowlands which were considered to be as malaria's area that affects the general population. even though ,The availability of RDT, intervention methods ,case detection methods , registering and report systems regarding to malaria disease were similar in all health facilities , the detection method for dysentery diseases in health posts was different to that of health centers in which they used the same standard case definition but there were no a laboratory confirmatory in health posts. According to the national standard of health service coverage, the population under surveillanc had an access to the health service as shown in the above table 1.

### 5.2.8 Timeliness

The regional health bureau had received a weekly reports on time 100 %( 12 times) from a total of 46 woredas in the region and the regional laboratory and reported to FMOH/EHNRI on time in the last three months. In addition to this, there was one immediately reportable diseases reported on time after they detected the cases with in less than one hour. However, the timely reporting rate of the health center was 83.3%, for health posts 50% and 100 % for woreda health office, regional laboratory and regional health bureau in the last three months of 2004e.c.

### **5.2.9 Flexibility**

According to all respondents, there were no changes on case definitions of malaria and dysentery diseases, reporting periods, reporting formats designed and the organization of the surveillance activities in 2004 e.c in which they performed according to the national PHEM guide line.

### **5.2.10 stability**

There were a high staff turnover and budget constraints for surveillance activities in all health facilities but not in regional health bureau and regional laboratory in 2004 e.c. consequently, the weekly active surveillance and data collection was not regular in 50% of the total health facilities visited in the last three months. And they responded that the system was not being used as efficiently and consistently as it could have been.

## **6. Discussion / conclusion**

All the visited health institutions were using a national PHEM guide line to perform the surveillance activities of these disease which indicated that the non flexibility of the system.

Even though, the data analysis to detect the changes and the active surveillance performed on malaria and dysentery diseases was not complete, the magnitude of these specific diseases was clearly labeled based up on the appropriate denominator in which the whole population was under the surveillance .in addition to this, the standard case definitions, information channel and the reporting forms was easily understandable by all health workers. Therefore, the usefulness, simplicity and representativeness of the surveillance system can meet its objectives.

However, There was no willingness of the health workers and other organizations to participate on surveillance system of these diseases due to the non existence of a functional epidemic committee and rapid response team in all health facilities visited and a written document that indicated a regular supervision conducted and the feedback given to those health facilities as well as other concerned organizations,. The ability of the health workers on detecting cases and the PVP of RDT was poor and different among all health facilities due to the high staff turnover, budget constraints and lack of training on the surveillance system of these diseases.

Generally, the data quality, the timelines of the report, the acceptability, stability, sensitivity and the PVP of the surveillance system did not meet its objective.

## **7) Recommendation**

- The woreda health office/ all concerned organizations should provide training on surveillance system of these specific diseases as well as on general diseases under the national surveillance system to improve the capacity of the health workers on case detection, defining action threshold and surveillance data analysis.
- During the time of staff turnover of the health workers assigned as surveillance focal person, all the surveillance data should be cleared and kept in a safe manner before they leave the health facility to assure data quality.
- All health facilities should conduct a regular active surveillance activities on what they prioritized the surveillance sites like, holy water, schools, traditional medicine provider and so on to increase the detection of cases.
- The woreda health office/ all concerned organizations should allocate a budget line at woreda as well health facility level for public health surveillance activities like, communication facilities to improve timeliness of the report,
- The regional health bureau as well as the woreda health office should strengthen the epidemic committee and rapid response team, a regular supervision, timely dissemination of feedback and integration of the surveillance system with all concerned organizations

## **8) References**

1. Population of Ethiopia regions zones woredas-2011-1
2. NATIONAL MALARIA GUIDELINE Third Edition Addis Ababa January 2012
- 3Public health emergency management, Ethiopia health and nutrition research institute, February, 2012, Addis Ababa, Ethiopia
4. Updating Guidelines for evaluating public health surveillance system, department of health and human services (CDC), July 27, 2001

4. Data collection tools for surveillance system evaluation in raya Alamata woreda, Tigray regional health bureau and regional laboratory in 2004e.c

**REGIONAL /ZONAL LEVEL QUESTIONNAIRE**

**Identifiers:**

Interviewer \_\_\_\_\_ Respondent \_\_\_\_\_

Date \_\_\_\_\_ Surveillance System \_\_\_\_\_

Interviewer name \_\_\_\_\_ Name of health facility \_\_\_\_\_

**General**

**I. Availability of a National Surveillance Manual**

1. Is there a national manual for surveillance?

Yes / No / Not applicable / Unknown

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

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**II. Case Detection and Registration**

3. Do you have standard case definitions for the Country's priority disease like malaria ?

Yes / No / Unknown / Not applicable

4. **Obs [1 to n priority diseases] Observed** the standard case definition for 1. malaria, 2,AFP, 3, Dysentery

5. Did you conduct an active surveillance in the last six months? Yes/ no

6. If yes, how many times.....?

7. **Obs** Is there an active surveillance management tool that properly filled? Yes/ no

8. Is there a functional RRT at your facilities? Yes/ no

9. What about epidemic committee at administrative level? Yes/ no

10. **Obs** documents of meeting held by RRT or epidemic committee? Yes/ no

11. Did all the cases detected by the surveillance get a laboratory test? Yes/ no

**III. Data reporting.**

Presence of recommended reporting forms in the country at all times over the past 6 months

12. Is the central level responsible for providing surveillance forms to the health facilities?

Yes            No            Unknown            Not applicable

13. **If yes**, have you lacked appropriate surveillance forms at any time during the last 6 months?            Yes            No            Unknown            Not applicable

14. What are the reporting entities for the surveillance system?

- a. Public health facilities
- b. NGO health facilities
- c. Military health facilities
- d. Private health facilities
- e.

Others \_\_\_\_\_

15. **Percent of district reports(either directly or through an intermediate level) received each reporting period at the central level during the past 3 months:**

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

**Weekly:** \_\_\_\_\_ /12 times the number of districts

**Immediately:** \_\_\_\_\_ /----- times the number of districts

16. **On time (use national deadlines)**

Number of weekly reports received on time: \_\_\_\_\_ /12 times the number of districts

17. Was there any report of the immediately reportable diseases in the past 1 month? Yes/  
No

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

- a. Less than 1 hour
- b. 2-24 hour
- c. 1- 2 days
- d. 3- 7 days
- e. After 1 week

19. Percent of districts that have means for reporting to next level by e-mail, telephone, fax or radio

\_\_\_\_\_

20. Capacity to report to next level by e-mail, telephone, fax or radio:

How do you report?

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

#### IV. Data analysis

Does the regional level:

21. Describe data by person (case based, outbreaks, and sentinel)?

(Obs) Observed description of data by age and sex:

Yes                  No                  Unknown                  Not applicable

22. Describe data by place?

(Obs) Observed description of data by district (tables, maps)

Yes                  No                  Unknown                  Not applicable

23. Describe data by time?

(Obs) Observed description of data by time:

Yes                  No                  Unknown                  Not applicable

24. Perform trend analysis?

Obs Observed line graph of cases by time

Yes                  No                  Unknown                  Not applicable

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

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26. Have an action threshold defined for each priority disease?

Do you have an action threshold defined for malaria, Measles, and typhoid fever?

Yes                  No                  Unknown                  Not applicable

27. Who is responsible for the analysis of the collected data? \_\_\_\_\_

28. How often do you analyze the collected data?

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

29. Have appropriate denominators?

Obs Observed presence of demographic data (E.g. population by district and hard to reach groups)

Yes No Unknown Not Applicable

V. Outbreak Investigation

Percent of suspected outbreaks that were investigated in the past 6 months

30. Number of outbreaks suspected in the past year: \_\_\_\_\_

31. List the diseases: \_\_\_\_\_

32. Of those, number investigated: \_\_\_\_\_

(Observe reports and take copies if possible)

Of the investigated outbreaks in the past 1 year, percent in which risk factors were looked for:

33. Number of outbreaks in which risk factors were looked for: \_\_\_\_\_

Of the investigated outbreaks in the past 1 year, percent in which findings were used for action

34. Number of outbreaks in which findings were used for action: \_\_\_\_\_

[Observe report]

35. Of districts that investigated an outbreak, percent that looked for risk factors

Number of districts that looked for risk factors [observe in reports]

\_\_\_\_\_

36. Of districts that investigated an outbreak, percent that used the data for action (action include containing outbreak, improving surveillance, community actions)

Number of districts that used the data for action [observe in final report]

\_\_\_\_\_

VI. Epidemic preparedness(relevant for epidemic prone diseases)

37. Existence of a Regional/Zonal plan for epidemic preparedness and response

Obs Observed a written plan of epidemic preparedness and response

Yes No Unknown Not applicable

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

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

Yes No Unknown Not applicable

39. Experience of a shortage of drugs, vaccines or supplies during the most recent epidemic (or outbreak)

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

Yes                      No                      Unknown                      Not applicable

40. Existence of a standard case management protocol for AWD, Malaria, AFP (polio), measles

Obs Observed the existence of a written case management protocol for at least 1 priority disease

41. *If yes, list:* \_\_\_\_\_

42. Presence of a budget line for epidemic response

Is there a budget line for epidemic response?

Yes                      No                      Unknown                      Not applicable

43. I. Existence of a regional epidemic management committee

Observed minutes (or report) of meetings of epidemic management committee

Yes                      No                      Unknown                      Not applicable

44. Existence of a regional rapid response team for epidemics

Does the country have a rapid response team for epidemic?

Yes                      No                      Unknown                      Not applicable

## VII. Response to epidemics

45. Ability of the regional level to respond within 48 hours of notification of most recently reported outbreak:

Obs Observed that the central level responded within 48 hours of notification of most recently reported outbreak (from written reports with trend and intervention)

Yes                      No                      Unknown                      Not applicable

46. Ability of the regional epidemic management committee to evaluate its preparedness and response activities:

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

Yes                      No                      Unknown                      Not applicable

## VIII. Feedback

Existence of a report or bulletin that is regularly produced to disseminate surveillance data:

47. How many feedback bulletin or reports has the regional level produced in the last year?

\_\_\_\_\_

48. **Obs:** Observed the presence of a report or bulletin that is regularly produced to disseminate surveillance data

Yes            No            Unknown            Not applicable

IX. Supervision

Percent of supervisors that made the required number of supervisory visits in the past 6 months

49. How many supervisory visits have you made in the last 6 months? \_\_\_\_\_

Obtained required number of visits from regional level \_\_\_\_\_

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

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

X. Training

Percent of health personnel trained in disease surveillance

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

\_\_\_\_\_

52. Have you been trained in disease surveillance?

Yes            No            Unknown            Not applicable

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

\_\_\_\_\_  
\_\_\_\_\_

Percent of health personnel that have received post-basic training in epidemic management

54. Have you received any post-basic training in epidemic management?

Yes            No            Unknown            Not applicable

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

\_\_\_\_\_  
\_\_\_\_\_

56. Obtain and analyze the content of the surveillance and epidemic management training

Strengths \_\_\_\_\_  
 Weaknesses \_\_\_\_\_  
 Opportunities \_\_\_\_\_  
 Threats \_\_\_\_\_

XI. Resources

Percent of sites that have:

57. Data management

- a. Computer
- b. Printer
- c. Photocopier
- e. Statistical package
- f. Data manager

58. Communications

- a. Telephone service
- b. Fax
- c. Radio call
- d. Satellite phone
- e. Computers that have modems

59. Budget line \_\_\_\_\_

60. Logistics \_\_\_\_\_

XII. Surveillance

Have a functional computerized surveillance network

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

Yes      No      Unknown      Not applicable

Budget for surveillance

62. Is there a budget line for surveillance in the Regional Health Bureau budget?

Yes      No      Unknown      Not applicable

63. *If yes*, what is the proportion: %

Opportunities for strengthening surveillance

64. How \_\_\_\_\_ could \_\_\_\_\_ surveillance \_\_\_\_\_ be

\_\_\_\_\_

\_\_\_\_\_

XIII. *Surveillance Co-ordination*

Existence of focal unit for surveillance at RHB level

65. **Obs** Is there a focal unit for surveillance at the MOH central level? [Observe organogramme of MoH to confirm]

Yes      No      Unknown      Not applicable

### Opportunities for integration

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

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### Questionnaire for Attributes and level of Usefulness:

1. Total population under surveillance \_\_\_\_\_
2. What is the incidence / Prevalence of -----in your area/region in 2003EFY
  - Measles \_\_\_\_\_ cases \_\_\_\_\_Deaths
  - Malaria \_\_\_\_\_ cases \_\_\_\_\_Deaths
  - Typhoid fever \_\_\_\_\_ cases \_\_\_\_\_Deaths

#### I. Level of Usefulness of the Surveillance System for these selected priority diseases

Does the surveillance system help?

1. To detect outbreaks of these selected priority diseases early? Yes/ No
2. To estimate the magnitude of morbidity and mortality related to this disease, including identification of factors associated with these diseases? Yes/ No
3. Permit assessment of the effect of prevention and control programs? Yes/ No

#### Observe (confirmation):

- interventions and diseases trends analyzed ---Available //Not available

#### II. Describe Each System Attributes:

##### i. Simplicity:

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

C. Typhoid fever

ii. Flexibility:

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

**Comment:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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

1. Are the data collection formats for these priority diseases clear and easy to fill for all the data collectors/ reporting sites? Yes/ No
2. Are the reporting site / data collectors trained/ supervised regularly? Yes/No
3. **Observe:** Review the last months report of these diseases

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

\_\_\_\_\_  
\_\_\_\_\_

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

\_\_\_\_\_  
\_\_\_\_\_

—

iv. Acceptability:

1. Do you think all the reporting agents accept and well engaged to the surveillance activities? Yes/No
2. If yes, how many are active participants (of the expected to)? \_\_\_\_\_
3. If No, what is the reason for their poor participation in the surveillance activity?
  - A. Lack of understanding of the relevance of the data to be collected
  - B. No feedback / or recognition given by the higher bodies for their contribution; i.e. no dissemination of the analysis data back to reporting facilities

C. Reporting formats are difficult to understand

D. Report formats are time consuming

E. Other:

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**v. Representativeness:**

1. What is the health service coverage of the district/ zone/ region? \_\_\_\_\_%
2. Do you think, the populations under surveillance have good health seeking behavior for these diseases? Yes / No
3. Who do you think is well represented by the surveillance data? the urban/ the rural

**vi. Timeliness:**

1. -----
2. -----

**vii. Stability:**

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

**DISTRICT (INTERMEDIATE LEVEL) QUESTIONNAIRE/woreda and Regional lab)**

**Identifiers**

Assessment team \_\_\_\_\_ District name \_\_\_\_\_

Date \_\_\_\_\_ region/province \_\_\_\_\_

Interviewer \_\_\_\_\_ country \_\_\_\_\_

Respondent \_\_\_\_\_ surveillance system \_\_\_\_\_

**Percent of districts with available national surveillance manual**

1. Is there a national manual for surveillance at this site?

**Obs** Observe national surveillance manual:

Yes          No          unknown          Not Applicable

Case detection

1. Did you conduct an active surveillance in the last six months? Yes/ no

2. If yes, how many times.....?

**3. Obs** Is there an active surveillance management tool that properly filled? Yes/ no

4. Is there a functional RRT at your facilities? Yes/ no

5. What about epidemic committee at administrative level? Yes/ no

**6. Obs** documents of meeting held by RRT or epidemic committee? Yes/ no

7. Did all the cases detected by the surveillance get a laboratory test? Yes/ no

**I. Case confirmation**

Percent of districts that have the capacity to transport specimens to a higher level laboratory

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

Percent of districts with guideline for specimen collection, handling and transportation to next level

3. Does the district have guidelines for specimen collection, handling and transportation to the next level?

Yes                    No                    Unknown                    Not applicable

**I. Data reporting**

Percent of sites that have forms recommended for the country for that site at all times over the past 6 months

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

Yes                    No                    Unknown                    Not applicable

Percent of health facilities that reported each reporting period to the district level during the past 3 months:

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

Weekly: \_\_\_\_\_ /12 times the number of health facilities

Immediately: \_\_\_\_\_ /----- times the number of health facilities

On time (use national deadlines)

6. Number of weekly reports submitted on time: \_\_\_\_/12 times the number of health facilities

7. Number of immediately reports submitted on time: \_\_\_\_\_/3 times the number of health facilities

8. Percent of districts that have means for reporting to next level by e-mail,

Telephone, fax or radio

How do you report?

a. Mail

d. Radio

b. Fax

e. Electronic

c. Telephone

f. Others

Strengthening reporting

9. How                    can                    reporting                    be                    improved?

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## II. Data analysis

### 10. I. Percent of sites that:

Describe data by person (case based, outbreaks, and sentinel)

**Obs** Observed description of data by age and sex

Yes No Unknown Not applicable

### 11. Describe data by place

**Obs** Observed description of data by place (locality, village, work site etc)

Yes No Unknown Not applicable

### 12. Describe data by time

**Obs** Observed description of data by time

Yes No Unknown Not applicable

### 13. Perform trend analysis

**Obs** Observed line graph of cases by time

Yes No Unknown Not applicable

14. List \_\_\_\_\_

### 15. Have an action threshold for each priority disease

Do you have an action threshold for any of the country priority diseases?

Yes No Unknown Not applicable

16. *If yes*, what is it? \_\_\_\_\_ cases \_\_\_\_\_% increase \_\_\_\_\_rate

(Ask for 2 priority diseases)\_

### 17. Have appropriate denominators

**Obs** Observed presence of demographic data at site (E.g. population <5 yr, population by village, total population)

Yes No Unknown Not applicable

18. Who is responsible for data analysis? \_\_\_\_\_

19. How often do you analyze the collected data?

a. Daily

d. Monthly

b. Weekly

e. Quarterly

c. Every 2 weeks

f. As needed

## III. Outbreak investigation

### 20. Percent of suspected outbreaks that were investigated in the past 6moths:

Number of outbreaks suspected in the past year6 months: \_\_\_\_\_

List the diseases \_\_\_\_\_

Obs Of those, number investigated (Observe reports and take copies if possible):  
\_\_\_\_\_

21. Percent of districts that have ever conducted an outbreak investigation

[Number of districts assessed that have ever conducted an outbreak investigation, Number of districts assessed to obtain indicator]

22. Has your district ever investigated an outbreak?

Yes No Unknown Not applicable

IV. Epidemic preparedness

23. Percent of districts that have a plan for epidemic preparedness and response

(Obs) Observed a written plan of epidemic preparedness and response

Yes No Unknown Not applicable

24. Percent of districts that have emergency stocks of drugs and supplies at all

times in past 1 year

Has the district had emergency stocks of drugs and supplies at all times in past 1 year?

Obs Observed the stocks of drugs and supplies at time of assessment

Yes No Unknown Not applicable

25. Percent of districts that experienced a shortage of drugs, vaccines or supplies during the most recent epidemic (or outbreak)

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

Yes No Unknown Not applicable

26. Presence of a budget line for epidemic response or access to funds for epidemic response

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

Yes No Unknown Not applicable

27. Percent of districts that have an epidemic management committee

Obs Observed minutes (or report) of meetings of epidemic management committee

Yes No Unknown Not applicable

28. Percent of districts that have rapid response team for epidemics

Does the district have a rapid response team for epidemics?

Yes No Unknown Not applicable

29. Percent of sites that implemented prevention and control measures based on local data for at least one reportable disease or syndrome

Has the district implemented prevention and control measures based on local data for at least one reportable disease or syndrome?

Yes No Unknown Not applicable

30. Percent of districts that responded within 48 hours of notification of most recently reported outbreak

Obs Observed that the district responded within 48 hours of notification of most recently reported outbreak (from written reports)

Yes No Unknown Not applicable

31. Percent of districts that achieved acceptable case fatality rates (e.g. 10% for Meningococcal CSM 1% for Cholera) during the most recent outbreak

Obs Observed that the district achieved an acceptable case fatality rate for most recent outbreak (Observe from outbreak report)

Yes No Unknown Not applicable

32. Percent of epidemic management committees that have evaluated their preparedness and response activities during the past year

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

Yes No Unknown Not applicable

#### V. Feedback

33. Percent of sites that have written report that is regularly produced to disseminate surveillance data

How much feedback written reports has the district produced in the last year?

Obs Observed the presence of a written report that is regularly produced to disseminate surveillance data (district and higher)

Yes No Unknown Not applicable

34. Percent of sites that have received a report or bulletin from a higher level during the past year on the data they have provided

How many feedback bulletin or reports has the district received in the last year?

Obs Observed at least 1 report or bulletin at district from a higher level during the past year on the data they have provided

Yes No Unknown Not applicable

**VI. Supervision**

35. Percent of individuals supervised in the past 6 months

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

Obs Observed supervision report or any evidence of supervision in last 6 months

Yes No Unknown Not applicable

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

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

Yes No Unknown Not applicable

37. Percent of supervisors that made the required number of supervisory visits in the past 6 months

How many supervisory visits have you made in the last 6 months? \_\_\_\_\_

(Obtain required number of visits from central level) \_\_\_\_\_

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

Reason 1 \_\_\_\_\_

Reason 2 \_\_\_\_\_

Reason 3 \_\_\_\_\_

**VII. Training**

39. Percent of health personnel (in position of responsibility) trained in disease surveillance

Have you been trained in disease surveillance?

Yes No Unknown Not applicable

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

\_\_\_\_\_

41. Proportion of districts with staff trained in surveillance and epidemic management

What percent of your personnel in the district have been trained in surveillance and epidemic management? \_\_\_\_\_

**VIII. Resources**

42. I. Percent of sites that have:

Logistics

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

43. Data management

- a. Stationery
- b. Calculator
- c. Computer
- d. printer
- e. statistical package

44. Communication

- a. Telephone service
- b. Fax
- c. radio
- d. Computers that have modems

45. Information education and communication materials

- a. Posters
- b. Megaphone
- c. Flipcharts or Image box
- d. VCR and TV set
- e. generator
- f. screen
- g. projector(movie)
- h. others specify

46. Hygiene and sanitation materials

- a. Spray pump
- b. Disinfectant

IX. Surveillance co-ordination:

47. Existence of a surveillance co-ordination focal unit or person at district level

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

X. Satisfaction with surveillance system

Satisfaction with the surveillance system

Are you satisfied with the surveillance system?

Yes      No      Unknown      Not applicable

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

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49. Opportunities for integration

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

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## HEALTH FACILITY QUESTIONNAIRE

### Identifiers

Assessment team \_\_\_\_\_ Type of health facility \_\_\_\_\_

Date \_\_\_\_\_ District \_\_\_\_\_

Interviewer \_\_\_\_\_ Region/province \_\_\_\_\_

Respondent \_\_\_\_\_ Country \_\_\_\_\_

Name of health facility \_\_\_\_\_ Surveillance system \_\_\_\_\_

#### 1. Percent of health facilities with national surveillance manual

Is there a national manual for surveillance at this site?

Obs Observe national surveillance manual:

Yes No Unknown Not applicable

##### I. Case detection and registration

#### 2. Percent of health facilities that have a clinical register

Obs Observed the existence of a clinical register

Yes No Unknown Not applicable

1. Did you conduct an active surveillance in the last six months? Yes/ no

2. If yes, how many times.....?

3. Obs Is there an active surveillance management tool that properly filled? Yes/ no

4. Is there a functional RRT at your facilities? Yes/ no

5. What about epidemic committee at administrative level? Yes/ no

6. Obs documents of meeting held by RRT or epidemic committee? Yes/ no

7. Did all the cases detected by the surveillance get a laboratory test? Yes/ no

3. Percent of health facilities that correctly register cases

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

Yes No Unknown Not applicable

4. Percent of health facilities that have standardized case definitions for the country's priority diseases

Do you have a standard case definition for: (each priority disease), malaria, TF, measles,?

Yes No Unknown Not applicable

5. Obs Observed the standard case definition for: (each priority disease)

Yes No Unknown Not applicable

6. Percent of health facilities that use standardized case definitions for the country's priority diseases

Obs Observed the respondent correctly diagnosing one of the country's priority diseases using a standard case definition

Yes No Unknown Not applicable

(Select one of the priority diseases in the facility's clinical register and ask how they diagnosed it — interviewer should have the standard case definition from MOH)

II. Case confirmation

7. Percent of health facilities that have the capacity to collect specimens (sputum stool, blood/serum and CSF)

Are you able to collect sputum	Y	N	U	N/A
Stool	Y	N	U	N/A
Blood	Y	N	U	N/A
CSF at this facility?	Y	N	U	N/A

8. Obs Observed the presence of materials required to collect

Stool	Y	N	U	N/A
Blood/serum	Y	N	U	N/A
CSF	Y	N	U	N/A

9. Percent of health facilities that have the capacity to handle specimens until shipment

Do you have the capacity to handle sputum, stool, blood/serum and CSF until shipment at this facility?

Yes No Unknown Not applicable

10. Obs Observed presence of functional cold chain at health facility

Yes No Unknown Not applicable

11. Percent of health facilities that have the capacity to ship specimens to a higher level lab

12. Obs Observed presence of transport media for stool at health facility

Yes No Unknown Not applicable

13. Obs Observed presence of packing materials for shipment of specimens at health facility

Yes No Unknown Not applicable

III. Data reporting

14. Percent of sites that have appropriate surveillance forms for that site at all times over the past 6 months

Have you lacked appropriate surveillance forms at any time during the last 6 months?

Yes No Unknown Not applicable

15. Percent of sites that reported accurately cases from the registry into the summary report to go to higher level

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

a. Obs Measles Y N U N/A

b. Obs Malaria Y N U N/A

c. Obs Typhoid fever Y N U N/A

16. Percent of sites that reported each reporting period to the next higher level during the past 3 months

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

Obs Weekly: /12 times the number of sites

Obs immediately: /-- times the number of sites

17. On time (use national deadlines)

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

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

18. Percent of HF that have means for reporting to next level by e-mail, telephone, fax or radio

How do you report?

a. Mail

d. Radio

b. Fax

e. Electronic

c. Telephone

f. other specify

19. Strengthening reporting

How can reporting be improved?

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#### IV. Data analysis

20. Percent of site that Describe data by person (outbreaks, sentinel)

**Obs** Observed description of data by age and sex

Yes No Unknown Not applicable

21. **Describe data by place:**

**Obs** Observed description of data by place (locality, village, work site etc)

Yes No Unknown Not applicable

22. **Describe data by time**

**Obs** Observed description of data by time

Yes No Unknown Not applicable

23. **Perform trend analysis**

**Obs** Observed line graph of cases by time

Yes No Unknown Not applicable

24. **Have an action threshold for each priority disease**

Do you have an action threshold for any of the Country priority diseases?

Yes No Unknown Not applicable

25. *If yes*, what is it (Ask for 2 priority diseases)? \_\_\_\_\_ cases \_\_\_\_ % increase \_\_\_\_\_ rate

26. Who is responsible for data analysis? \_\_\_\_\_

27. How often do you analyze the collected data?

- |                  |              |
|------------------|--------------|
| a. Daily         | d. monthly   |
| b. Weekly        | e. quarterly |
| c. Every 2 weeks | f. as needed |

28. **Have appropriate denominators**

**Obs** Observed presence of demographic data at site (E.g. population <5 yr., population by village, total population)

Yes No Unknown Not applicable

#### V. Epidemic preparedness

29. **Percent of health facilities that have a standard case management protocol for epidemic prone diseases**

**Obs** Observed the existence of a written case management protocol for 1 epidemic prone disease

Yes No Unknown Not applicable

**VI. Epidemic response** \_\_\_\_\_

**30. Percent of sites that implemented prevention and control measures based on local data for at least one epidemic prone disease**

Has the health facility implemented prevention and control measures based on local data for at least one epidemic prone disease?

Yes                      No                      Unknown                      Not applicable

**31. Percent of sites that achieved acceptable case fatality rates (e.g. 10% for Meningococcal CSM 1% for Cholera) during the most recent outbreak**

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

Yes                      No                      Unknown                      Not applicable

**VII. Feedback**

**32. Percent of sites that have received a report or bulletin from a higher level during the past year on the data they have provided**

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

\_\_\_\_\_

**Obs** Observed at least 1 report or bulletin at the health facility from a higher level during the past year on the data they have provided

Yes                      No                      Unknown                      Not applicable

**33. Percent of health facilities that conducted at least semi-annual meetings with community members to discuss results of surveillance or investigation data**

How many meetings has this health facility conducted with the community members in the past six months? \_\_\_\_\_

**Obs** Observed the minutes or report of at least 1 meeting between the health facility team and the community members within the six months

Yes                      No                      Unknown                      Not applicable

**VIII. Supervision:**

**34. Percent of individuals supervised in the past 6 months**

How many times have you been supervised in the last 6 months? \_\_\_\_\_

**Obs** Observed supervision report or any evidence of supervision in last 6 months

Yes                      No                      Unknown                      Not applicable

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

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

Yes No Unknown Not applicable

**IX. Training**

**36. Percent of health personnel trained in disease surveillance and epidemic management**

Have you been trained in disease surveillance and epidemic management?

Yes No Unknown Not applicable

37. *If yes*, specify when, where, how long, by whom? \_\_\_\_\_

**X. Resources**

**38. Percent of sites that have Logistics**

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

**39. Data management**

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

**40. Communications**

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

**41. Information education and communication materials**

- a. Posters
- b. Megaphone
- c. Flipcharts or Image box
- d. VCR and TV set
- e. Generator
- f. Screen
- g. Projector (Movie)
- h. Others

**42. Hygiene and sanitation materials**

- a. Spray pump
- b. Disinfectant

43. **Protection materials (list)** \_\_\_\_\_

**XI. Satisfaction with surveillance system**

44. Satisfaction with the surveillance system

Are you satisfied with the surveillance system?

Yes No Unknown Not applicable

45. *If no*, how can the surveillance system be improved? \_\_\_\_\_

\_\_\_\_\_

46. Opportunities for integration

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

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**LABORATORY ASSESSMENT TOOL**

<b>General information</b>		
<b>Name of the laboratory</b>		
<b>Address of the laboratory:</b>	Telephone_____	
	Fax_____	
	e-mail_____	
<b>Level of the Laboratory :</b>	Community	
	Health Facility District	
	Regional	
	National	
<b>Affiliation of the Laboratory :</b>	<b>Public/Private</b> /Academic	
	/Religious Institution / NGO	
<b>Name of head of Laboratory</b>		
<b>Building Facilities and utility services</b>		
Is the laboratory in a free-standing building or part of larger structure?		
How many rooms with bench space are there in the laboratory		

How many rooms with bench space are there in the laboratory		
Does the Laboratory have the following services available? Electricity/Running water		
Is there a back-up power source in case of power failure (e.g. emergency generator)?	Yes / No	
<i>If yes, what systems are protected?</i>		
Refrigerators/freezers	Yes No	
Computers	Yes No	
Other(specify)	Yes NO	
What types of communications systems are available?		
Post	Yes No	
Telephone	Yes No	
Fax	Yes No	
Satellite phone	Yes No	
E-mail (no. computers)	Yes No	
Internet (no. computer)	Yes No	
Laboratory staff		
1. Medical Laboratory Professionals <b>Number</b> a. MSc, b. Bsc c. Diploma		
2. Assistants (not doing tests)		
3. Clerical/Cleaner		

Has training been conducted for the laboratory staff on		
AWD		
Malaria		
Other epidemic prone diseases (briefly describe)		
If yes when was the last training been conducted for your laboratory staff?		
Does the Laboratory have the following services available? Electricity/Running water		

### Reagents

Where you are getting your reagents?	From a commercial supplier
	From another laboratory
	Supplied by Regional/Zonal/District/health office
Was there shortage of reagents in the last six month which are used for identifying diseases	Yes/No
If Yes What Are the most important reasons?	Lack of funds  Lack of information  Un prioritizing  others(specify)
What type of water is used for preparation of media and reagents?	
Demonized Distilled	Yes No
Distilled	Yes No
Tap water	Yes No

### Tests performed at the laboratory

Disease	Specimen type	Assay Performed	Yes	No	Number/ Month
<b>Meningitis</b>	CSF	a. Cell count b. Latex agglutination c. Gram stain d. Culture e. Identification tests f. A-M susceptibility			
<b>Watery diarrhea (cholera)</b>	Stool	Microscopy of wet preparation Culture-TCBS Culture-Alk. Peptone Sero typing			
<b>Malaria</b>	Blood	Thick/Thin film ,RDT			
<b>Measles</b>	Serum, Throat swab,conjunctiva lswab	IgM by, EIAOther serological test,Virus isolation			
<b>Yellow fever</b>	Blood, postmortem/live	IgM/Virus isolation			
<b>suspect typhoid or</b>	Blood, serum	Culture Identification tests			

<b>brucellosis</b>		A-M susceptibility  Serological tests(WWF)			
<b>Hepatitis</b>	Serum	Anti-HAV IgM  Anti-HbsAg  Anti-HCV IgM			
<b>VHF</b>	Serum/tissue specimen	IgM/Virus detection			
<b>AFP</b>	Stool	Virus detection			

### Specimen collection, labeling and handling

Do request forms contain <b>ALL</b> of the following patient information:  Specimen source, date and time of collection, type of test requested?	Yes	No
Are specimens that are received labeled with the patient's name and unique identifiers?	Yes	No
Does the laboratory have a logbook/electronic record of all specimens Sent for diagnostic testing?	Yes	No
Are specimens discarded after testing, or are they stored?	Discarded	Stored
Does you laboratory refer bacteriology isolates or serum samples to a reference laboratory?	Yes	No
<i>If yes, reason for referral (<input type="checkbox"/><input type="checkbox"/>all)</i>		
Confirmation	Yes	No
Identification of unknown organism	Yes	No
Test not performed on site	Yes	No
Number of sample referred in the last six month?		
Types of transport media used ( <input type="checkbox"/> <input type="checkbox"/> all that apply)		
Trans-isolate	Yes	No

Cary and Blair	Yes	No
Viral transport medium	Yes	No
Other (describe):		

### Reporting procedures

Are records kept of the number and type of tests performed and results?	Yes	No
Does the laboratory have a list of diseases that are supposed to be reported to the Ministry of Health?	Yes	No
Does the lab staff know what diseases should be reported?	Yes	No
Does the lab provide regular reports of patients with notifiable diseases to any of the following Ministry of Health offices/institutions?		
District Health Office	Yes	No / NA
State Health Office	Yes	No/ NA
National / MOH level	Yes	No/ NA
	Yes	No /NA
If reports are submitted, how frequently?		
Weekly	Yes	No
Monthly	Yes	No
Quarterly	Yes	No
Other	Yes	No
<b>Quality control procedures and programs</b>		
Does the laboratory use any system for internal quality control?	Yes	No
Does the laboratory participate in any external	Yes	No

quality assurance or proficiency schemes?	
Was there any general laboratory supervision conducted to this laboratory?	Yes                  NO
If yes, how often in for the last one year?	one times/two times/ three and more
Does your laboratory have a system for regularly monitoring of quantities of reagents and materials so that there is warning if stocks become low?	Yes                  No

## **CHAPTER-5 HEALTH PROFILE ASSESSMENT IN ENDAMEHONI WOREDA, TIGRAY REGION FROM 2002E.C-2004E.C**

T.HILUF (Bsc.)<sup>1</sup>, Z.BEYENE (Bsc. MPH)<sup>2</sup>, T.ZEGEYE (Bsc.MPH)<sup>3</sup>, G.AYNALEM (MD,  
MPH)<sup>4</sup>

### **Executive summary**

**Background:** A community health profile assessment is a collection of information about the characteristics of the community, the health resources within the community data describing the community and the community's perceptions of health. Globally a health profile addresses the health of the people which includes not only infectious diseases but also chronic and non-infectious as well as age related illness and the health related conditions. Currently the population of Rwanda is estimated at 9.31 million inhabitants, with annual growth rate of 2.6%, Total fertility of 5.5, child mortality rate 37/1000 live birth for newborn babies, 86/1000 live births for infant mortality and 152/1000 for children fewer than 5 years. whereas ,The total population of Ethiopia counted in the survey was 76,296, with females slightly outnumbering males (39,219 compared with 37,077) in which the results indicate an overall sex ratio of 95 males per 100 females and the sex ratio is higher in rural areas (97 males per 100 females) than in urban areas (86 males per 100 females). The health profile assessment provides a direction on how to measure the health of a given population over time, rather than as a snapshot of the current health in a population in order to set a priority and solve health problems of the community.

**Methods:** The health profile assessment was conducted in Endamehoni woreda, Tigray region on March, 2005E.C.The overall data was collected based on the profile data's of from 200E.C-2004E.C. The health expertise in the woreda health office has got an orientation on how to avail the overall required health profile data and how to fill the questionnaire. We collected the data by interviewing, using semi structured questionnaire and by observational check list to assess the existing health documents and wall charts. We compared all the existing health indicators through the consecutive three years by applying a computer skill used to draw tables and graphs.

**Result :**Endamehoni woreda has a total area of 621.84 km<sup>2</sup> ,which covered by forest (169.1km<sup>2</sup>), farming land (174.34km<sup>2</sup> ), grazing land(144.63km<sup>2</sup>),residence and neighbors (31.5km<sup>2</sup>) and the rest 7,884.5 hectares were used for other purposes .Among this The average capacity of the overall area per human ranges from 0.25-0.5 km<sup>2</sup>. The climate of this woreda

consists of 65% cool (humid) high lands, 30% temperate intermediate elevations and 5% hot low land area with an aggregate annual average temperature of 12<sup>0</sup>c-18<sup>0</sup>c and rain fall of 600-800mm. the population growth rate was 2.12% in all years in which the population of females were higher than males. According to the regional conversion factor used to compute age groups, the total population of under one years of age were 3167(3.5%), 3234 (3.5%) ,3302 (3.5%) and the pregnant mothers were 3438 (3.8%), 3511(3.8%), 3586(3.8%) in 2002 EC ,2003 EC and 2004 EC respectively. Endamehoni woreda has 16 rural kebelles and 2 urban kebelles. there were , 42,44, and 45 primary schools in which the functional latrine coverage were 29(69%),38(84%) and 44(97.7%) and also the water supply coverage were 14(33.3%),21(47.7%) and 23 (51.1%) in 2002 EC ,2003 EC and 2004 EC respectively. the most common hazards were flood, snow, drought and shortage of rain that affected 17,420 peoples, 6,872 peoples and 8,528 peoples and the prevalence of HIV/AIDS has decreased which indicated 157(17/10000), 110(11/10000), and 50(5/10000) in 2002E.C, 2003E.C and 2004E.C receptively. except the TT2+ coverage for pregnant mothers that indicated an increase through the consecutive three years, the rest activities of maternal and child health (ANC,PNC, and BCG) has fluctuated as down and up. But, the measles and penta-3 vaccination coverage has decreased throughout the year.

**Discussion:** the coverage of forest ,farming land and grazing land that consists of 27%,28% and 23% of the total area respectively had a suitable contribution for animal breeding and a variety of crop productions .The annual population growth rate of the this woreda( 2.12%) was lower than to that of the national (2.5%) and Ruwanda (2.6%).According to the national standard for health facility coverage (1HC:25,000 population, 1 HP:5,000 population and 1HEW:2,500 population), in Endamehoni woreda , the health center coverage was increasing from 2(50%) in 2002E.C to 4(100%) in 2003 and 2004 E.C. Even though , the ratio of the health facilities or health workers to population was increasing from 2002E.C-2004E.C which approached to the minimum requirements' of the standard, most of the primary health component activities like, measles vaccination ,penta-3 vaccination ,TT2+ for non pregnant mothers and others has decreased. The community did not create a herd immunity against to diarrheal disease, URTI, skin diseases and eye disease which were the top ten diseases of the woreda, even though there were a high coverage of latrine and water supply. The woreda health office, agricultural office, water office and education office should strengthen the capacity on the reduction of the main health problems of the community mentioned in the above and on the prevention of hazards before the occurrence of the disaster.

## 1. Introduction

A community health profile is a collection of information about the characteristics of the community, the health resources within the community data describing the community and the community's perceptions of health (1). Community health assessment is a process of gathering and interpreting information from multiple and diverse sources in order to develop a deep understanding of the health of a community and it is a product, such as a community health profile and a community health improvement plan(2).

Globally a health profile addresses the health of the people which includes not only infectious diseases but also chronic and non- infectious as well as age related illness and the health related conditions .one area that global health professionals place a high priority is maternal and child health. This is because of much avoidable morbidity or mortality in the developing world is attributable to a lack of access to good prenatal and obstetric care, and /or to preventable child hood illness .another key focus in global health is the organization , financing and management of health service system(3).

Currently the population of Rwanda is estimated at 9.31 million inhabitants, with annual growth rate of 2.6% and Total fertility of 5.5. . Women are estimated to represent 52.2% of the population, with a life expectancy at birth of 53.3 years, compared to 49.4 years for men. Total average life expectancy at birth is 52.7 years<sup>3</sup> and the populations aged below 15 years represent about 41.9%. Whereas child mortality rate was 37/1000 live birth for newborn babies, 86/1000 live births for infant mortality and 152/1000 for children less than 5 years. Intermediate Demographic and Health Survey indicators show a net reduction in neonatal, infant and infant-child mortality rates, which are respectively 28/1000 live births, 62/1000 live births and 103/1000 live births. Maternal mortality is estimated at 690/100, 000 live births and, 52% of births were assisted by a health staff (4).

Ethiopia has great geographical diversity; the climate varies with the topography, from as high as 47 degrees Celsius in the Afar Depression to as low as 10 degrees Celsius in the highlands. Ethiopia's total surface area is about 1.1 million square kilometers. Djibouti, Eritrea, the Republic of the Sudan, the Republic of the Southern Sudan, Kenya, and Somalia border the country. There are three principal climates in Ethiopia: tropical rainy, dry, and warm temperate. Maximum and minimum average temperatures vary across regions of the country and seasons of the year. Generally, the mean maximum temperature is highest from March to May and the mean minimum temperature is lowest from November to December.

The total population counted in the survey was 76,296,000 with females slightly outnumbering males (39,219 compared with 37,077). The results indicate an overall sex ratio of 95 males per 100 females. The sex ratio is higher in rural areas (97 males per 100 females) than in urban areas (86 males per 100 females). The crude birth rate in Ethiopia is 34.5 births per 1,000 populations. As is the case with other fertility measures, there is a substantial differential in the CBR by urban-rural residence. The CBR is 37 percent higher in rural areas (36 per 1,000 populations) than in urban areas (26 per 1,000 populations). The GFR in Ethiopia is 161 live births per 1,000 women of reproductive ageing. Ethiopia have (54 percent) access to an improved source of drinking water, with a much higher proportion among urban households(95%) than among rural households (42%) ,(5).

The Community Health Profile provides an assessment of the health of an entire population within a specific geographic area, from the youngest to the oldest. This assessment provides direction on how to measure the health of a given population over time, rather than as a snapshot of the current health in a population (2).

## **2. Rational of the study**

The health profile assessment provides a guidance on how healthy community can address the local health problems they face. Profiles can include a wide range of information, including population characteristics, health service data, environmental and social information. A community health assessment often yields a long list of public health needs, issues and problems .this can help to set priorities which are used to develop consensus on a shorter list of goals that a community can realistically tackle. The interpretation and analysis of health trends and patterns in the data can be included throughout the profile, with summaries' at the end of each profile section. Thus a community's interpretation analysis of health data in a profile is critically important,

### **3. Objective**

#### **3.1 General objectives**

- To assess the health and health related issues and indicators in Endamehoni district

#### **3.2 Specific objectives**

- To assess health status of the community
- To identify health problems for priority setting
- To summarize, present and interpret the health and health related data's
- To identify the strengths and resources of the community

### **4. Methods and materials**

#### **4.1 Study period and area**

We conducted the health profile assessment in Endamehoni woreda on the three year data of the woreda health office which had a total population of 90,486, 92,406 and 94,367 in 2002, 2003 and 2004E.C respectively. This woreda is found in southern part of Tigray region which is 121 km far away from Mekelle, the capital city of the region.

#### **4.2 procedures and Instruments**

First and foremost, after we submitted a proposal of the health profile assessment to our mentors and field supervisors, we incorporated the comments what they provided us. Then, the regional health bureau has decided to write a formal written letter to get permission for administrative and health office the place where we designed for data collection. The health expertise's in the woreda health office have got an orientation on how to avail the overall required health profile data and how to fill the questionnaire. We conducted an interview to those concerned body by using semi structured questionnaire as well as we used an observational check list to assess the existing health and health related documents and the wall charts that displayed the required health statistics.

### 4.3 Variable specification

Dependent variables	Independent variables
<ul style="list-style-type: none"><li>• top ten diseases</li><li>• Occurred disasters</li><li>• Health service delivery</li><li>• Maternal and child health</li></ul>	<ul style="list-style-type: none"><li>• health professionals</li><li>• health facilities</li><li>• Geographic area</li><li>• EPI coverage</li><li>• Sanitation facilities</li></ul>

### 4.4 Data analysis

We compared all the existing health indicators through the consecutive three years by applying a computer skill used to draw tables and graphs. In addition to this, we explained in statement for the data collected by using unstructured questionnaire.

## 5. Result

### 5.1 Geography and climate

Endamehoni woreda is one of the 8 woredas of the southern zone of Tigray region which located at 121 km and 762 km far from mekelle and Addis Ababa which are the capital city of the region and the country of Ethiopia respectively. The borders of this woreda are Raya Azebo to the east, Offal to the south, Alaje to the north and Amhara region (sekota district) to the west. it has a total area of 621.84 km<sup>2</sup>, which covered by forest (169.1km<sup>2</sup>), farming land (174.34km<sup>2</sup>), grazing land(144.63km<sup>2</sup>), residence and neighbors (31.5km<sup>2</sup>) and the rest 7,884.5 hectares is for other purposes. Among this The average capacity of the overall area per human ranges from 0.25-0.5 km<sup>2</sup>.

Endamehoni woreda has many plateaus that rose to an average of 2,850 meter above sea level. For instance, the place Tsibet is mentioned as having 3,935 meter above sea level which is the first plateau from Tigray region. The climate of this woreda consists of 65% cold region, 30%

temperate region and 5% hot region with an annual average temperature of 12<sup>0</sup>c-18<sup>0</sup>c and rain fall of 600-800mm.

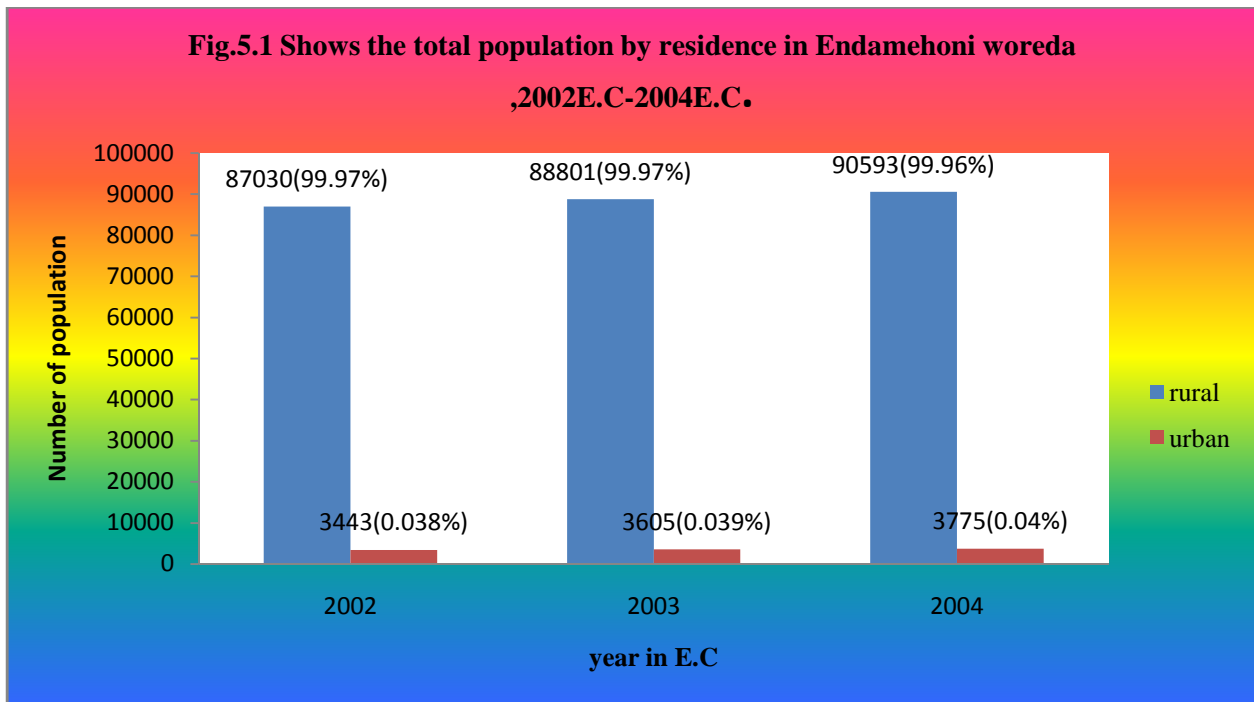
## **5.2 Administrative and political issues**

Endamehoni woreda has 16 rural kebelles and 2 urban kebelles in which the central administrative office for all sectors is found in Maychew town .the government has assigned a political leaders and technical staffs for each sector which are responsible to their duties. They experienced an intersect oral collaboration to achieve the strategic plan .according to the observational check list, the health sector experts conducted a supportive supervision in a quarter basis every year which was designed to strengthen the capacity of health workers and to achieve high coverage of all activities .besides to this ,they created a women development army at all kebelles who are organized based up on five women in one group starting from 2002-2004 e.c.Those five leader women have responsible to lead another five women's each to facilitate the overall health activities and other administrative issues to solve the problems that faced to their neighbor's community especially the maternal and child health .

Generally, the Administrative and political issues in Endamehoni woreda in the time of 2002-2004 E.C had a strong and well organized stretched objectives to create a healthy and productive community.

## **5.3 Population and population structure**

In Endamehoni woreda, the population growth rate was 2.12% in all years. The total population of females were higher than males which indicated a sex ratio of (male: female) 1: 1.015, 1: 1.015 and 1: 1.003 in 2002 EC, 2003 EC and 2004 EC respectively. However, the total populations of males were higher than females in all age groups except that of women of child bearing age group (15-49) in those three consecutive years. According to the regional conversion factor used to compute age groups, the total population of under one years of age were 3167(3.5%), 3234 (3.5%) ,3302 (3.5%) and the pregnant mothers were 3438 (3.8%), 3511(3.8%), 3586(3.8%) in 2002 EC ,2003 EC and 2004 EC respectively. As shown from the figure 1.1, most of the population lives in rural kebelles in relative to urban kebelles.



**Table 5.1 Shows the population size by age group and sex in Endamehoni woreda, 2002E.C-2004E.C.**

Sr.no	Year(E.C)	sex	Age group					total
			<5	5-15	15-49	49-65	>65	
1	2002	male	6671	14,243	18477	3473	2041	44904
		female	6418	13,048	21072	3326	1721	45582
		total	13089	27291	39549	6799	3762	90,486
2	2003	male	6812	14546	18869	3546	2084	45,857
		female	6554	13324	21518	3395	1758	46549
		total	13366	27870	40387	6941	3842	92,406
3	2004	male	6957	14855	19268	3622	2128	45,215
		female	6693	13608	21974	3468	1796	45,378
		total	13650	28463	41242	7090	3924	94,367

#### 5.4 Economical status

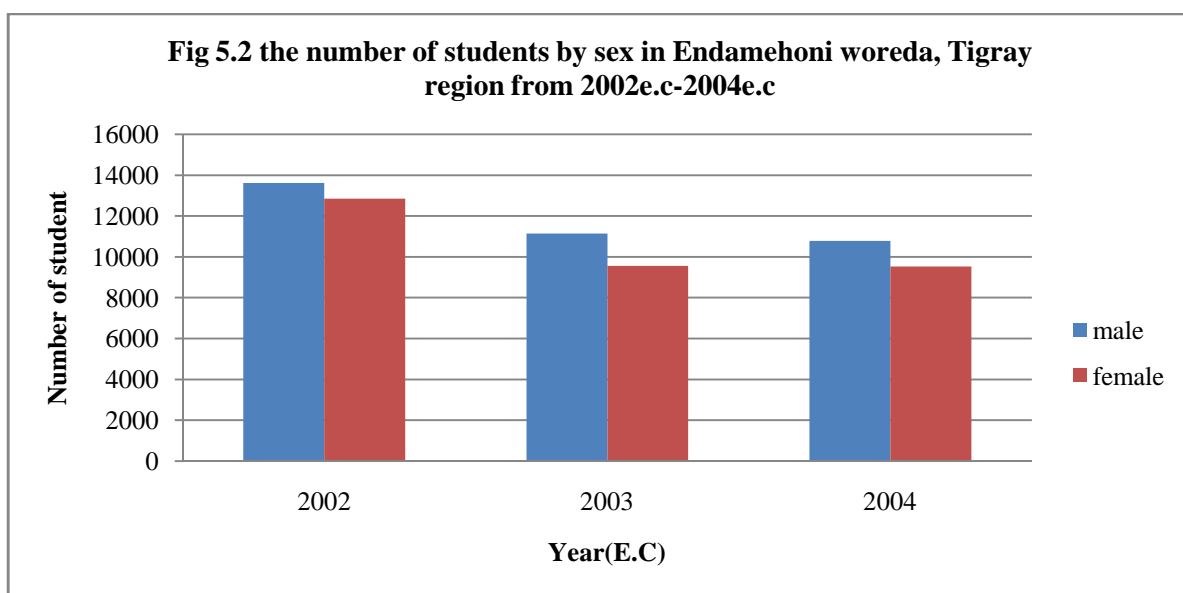
The community of Endamehoni woreda is mostly dependent on agriculture which means harvesting a variety of crops like, cereals, sorghum, 'teff' and fruits. Since ,this woreda is 65%

consisting of high land areas which is suitable for animal and bee breeding , they provide animal food for sealing every weekend to the neighborhood urban like Maychew, korem , mehoni ,sekota and others.

Regarding to the dependency ratio, for every 100 working peoples there were another 87, 95 and 97 other dependent peoples in 2002, 2003, 2004 EC respectively. In addition to this, the population density were 142 persons per kilometer square, 148 persons per kilometer square and 152 persons per kilometer square for the above three consecutive years.

### 5.5 Education

In this woreda, there were 42(2002EC), 44(2003EC) and 45(2004EC) primary schools in which the functional latrine coverage were 29(69%), 38(84%) and 44(97.7%) and also the water supply coverage were 14(33.3%), 21(47.7%) and 23 (51.1%) respectively. But there were only one secondary school which had total students of 123, 223 and 297 in respect to the above three consecutive years. In primary and secondary schools, the numbers of students were higher in males than females in every year. In addition to this, the number of students has decreased throughout the year.



### 5.6 Basic development facilities

Among the total 18 kebelles of the woreda, 7(38.8%) of them have an electric power supply which gives a 24 hours service during the period of 2002-2004EC. In addition to this, the numbers of kebelles that have a permanent and temporary transportation access to their central

administrative office were 6 kebelles and 6 kebelles respectively. However, the rest 6 kebelles are the place where difficult to construct a road because of their challenging geographical location. Apart from this, there were 25 wireless and 2 connected official telephones throughout the three consecutive years.

## 5.7 Disaster situation

In 2002, there were a heavy rain fall with snow that resulted on damaging the property of the community and disruption of farming lands during a summer season. As a result, the government has provided a supplementary food for 17,420 peoples.

In 2003, a drought has occurred in three kebelles due to shortage of rain .however; the food security organization supplied a food relief for 6,872 peoples at their residence.

In 2004, there had been a shortage of rain that resulted absence of crops in 4 kebelles during winter season .consequently, the government has provided a food supply for about 8,528 peoples. Besides to this, in summer season of this year, a heavy rain with snow has damaged their residency in the other 3 localized areas in which that community was displaced to other neighbors for the sake of survival .as a result, the concerned body also supported for 7,466 peoples to have shelters.

Generally, in Endamehoni woreda, the most common hazards were flood, snow, drought and shortage of rain that affected many peoples. Due to this, the Agricultural office with collaboration of other partners supplied a relief and has taken an environmental intervention like, soil conservation and forestation in those vulnerable areas for each year.

## 5.8 primary Health services

### 5.8.1 Health service and financing

**Table5.2 Budget allocation of Endamehoni woreda, Tigray region, 2002- 2004EFY**

Source	Amount in 2002	Amount in 2003	Amount in 2004
Total district budget	26,094,380	29,876,402	35,328,065
Allocated to health sector	2,002,607	2,634,947	2,9542,046
For Salary of health worker	1,377,431	1,6452,854	1,827,632

### 5.8.2 Health facilities

Endamehoni woreda has expanded a health posts and health centers throughout the year. Even, the different level of health workers was increasing to fulfill the minimum requirement of the health facility standard. However, the community had not an access to use hospital service, rather, and they have been going to the area where their central office is found, i.e Maychew town to get a hospital service.

**Table 5.3 shows the number of health facilities and health workers in Endamehoni woreda, 2002E.C-2004E.C**

Sr.no	Name of health workers & health facilities	Years(E.C)		
		2002	2003	2004
1	Health center	2	4	4
2	Health post	12	17	18
3	Health officer	2	4	5
4	Laboratory technician	2	4	4
5	Pharmacy technician	4	6	5
6	Nurses	23	27	31
7	Midwife	2	2	4
8	ENHS	1	1	4
9	HEW	32	30	34
10	TBA/WDA	764	764	1014

Even though, as the health facilities and health workers have increased their ratios to population also increased, this was below the standard when it is compared to Service provision structure of national standard health facility to population ratio.

**Table 5.4 shows the the health facilities to population ratio in Endamehoni woreda, 2002E.C-2004E.**

Sr.no	Description	Ratio		
		2002E.C	2003E.C	2004E.C
1	Health center: population	1:45,243	1:23,101	1:23,591
2	Health post: population	1:7,540	1:5,435	1:5,242
3	Health officer: population	1:45,243	1:23,101	1:18,873
4	Clinical Nurse : population	1:3,934	1:3,422	1:3044
5	Mid wife: population	1:45,243	1:45,243	1:23,591
6	ENHS	1:90,486	1:92,406	1:23,591
7	Pharmacy technician	1:22,621	1:15,401	1:18,873
8	Laboratory technician	1:45,243	1:23,101	1:23,591
9	HEW: population	1:2,827	1:3080	1:2,775
10	TBA/WDA: population	1:118	1:118	1:93

### 5.8.3 Top ten causes of morbidity

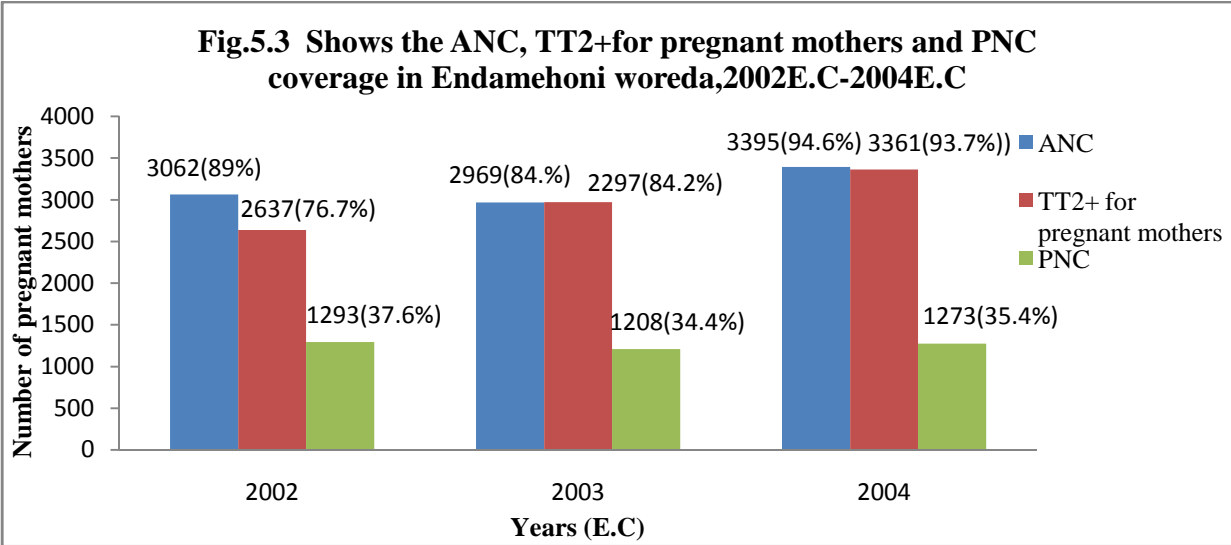
**Table 5.5 shows the numbers and relative frequency of top ten causes of disease in Endamehoni woreda, 2002E.C-2004E.C.**

Sr.no	2002E.C		2003E.C		2004E.C	
	Disease classification	Number (relative frequency)	Disease classification	Number (relative frequency)	Disease classification	Number (relative frequency)
1	URTI	3076(23.4%)	LRTI	1132(22.9%)	AURI	1704(28.9%)
2	Helments	2603(19.8%)	Intestinal parasite	728(14.7%)	Diarrheal disease	692(11.7%)
3	LRTI	2244(17%)	Eye disease	627(12.7%)	Parasitic infection	669(11.3%)
4	Skin infection	2141(16.3%)	Diarrheal disease	611(12.3%)	pneumonia	555(9.4%)
5	Eye disease	997(7.6%)	URTI	579(11.7%)	Eye diseases	470(7.9%)
6	Dental carries	631(4.8%)	Skin infection	561(11.3%)	Skin infection	397(6.7%)
7	Gastritis	484(3.6%)	malaria	483(9.7%)	Acute febrile	389(6.6%)

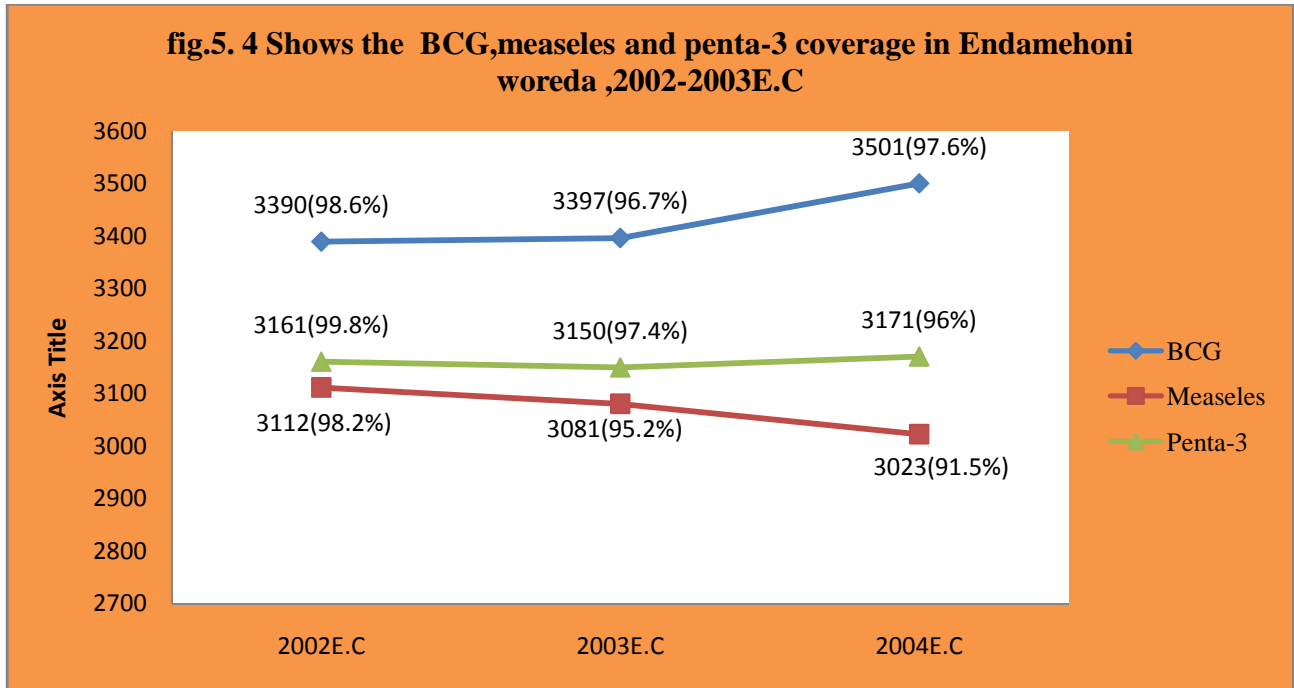
					illness	
8	malaria	442(3.3%)	Dental carries	320(6.4%)	trauma	374(6.3%)
9	arthritis	400(3%)	injuries	272(5.5%)	MAM	369(6.2%)
10	STD	95(0.7%)	UTI	223(4.5%)	UTI	268(4.5%)
11	Total	13113(100%)	Total	4936(100%)	Total	5887(100%)

**5.8.4 MCH and EPI**

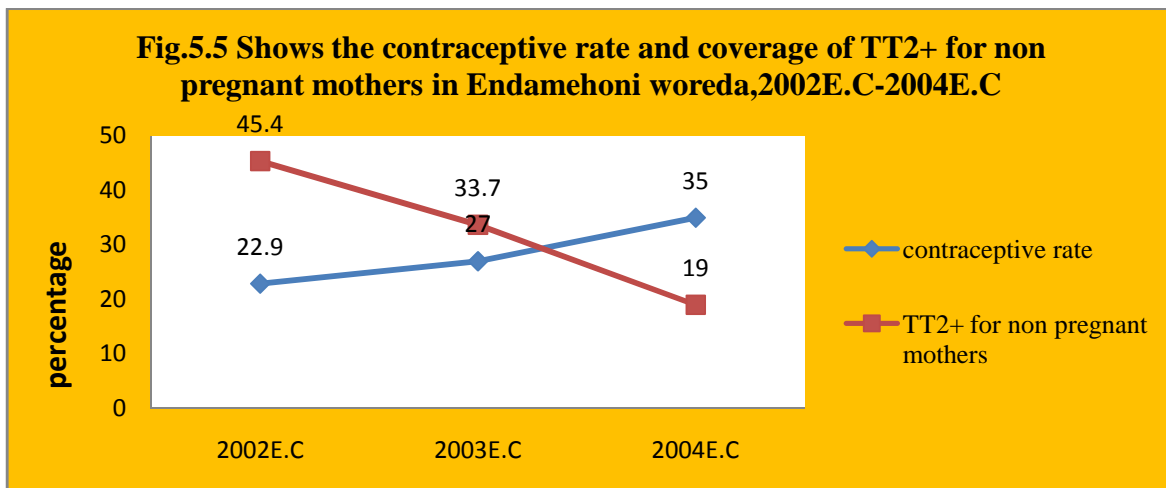
The target population for ANC,PNAC,BCG and TT2+ for pregnant mothers is the same which indicated that, the BCG coverage were higher than ANC coverage .however the ANC coverage were higher than TT2+ for pregnant mothers and PNC coverage. As shown from the figure1. ,except the TT2+ coverage for pregnant mothers that indicated an increase through the consecutive three years, the rest activities of coverage mentioned in the above has fluctuated as down and up.



Even though the measles vaccination coverage was beyond the measles vaccination efficacy level (85%), some of the under one years of children has remained unvaccinated for measles who had taken penta-3 vaccination before in all years. In addition to this, as we go from 2002E.C-2004E.C, the penta-3 and measles vaccination coverage has decreased.



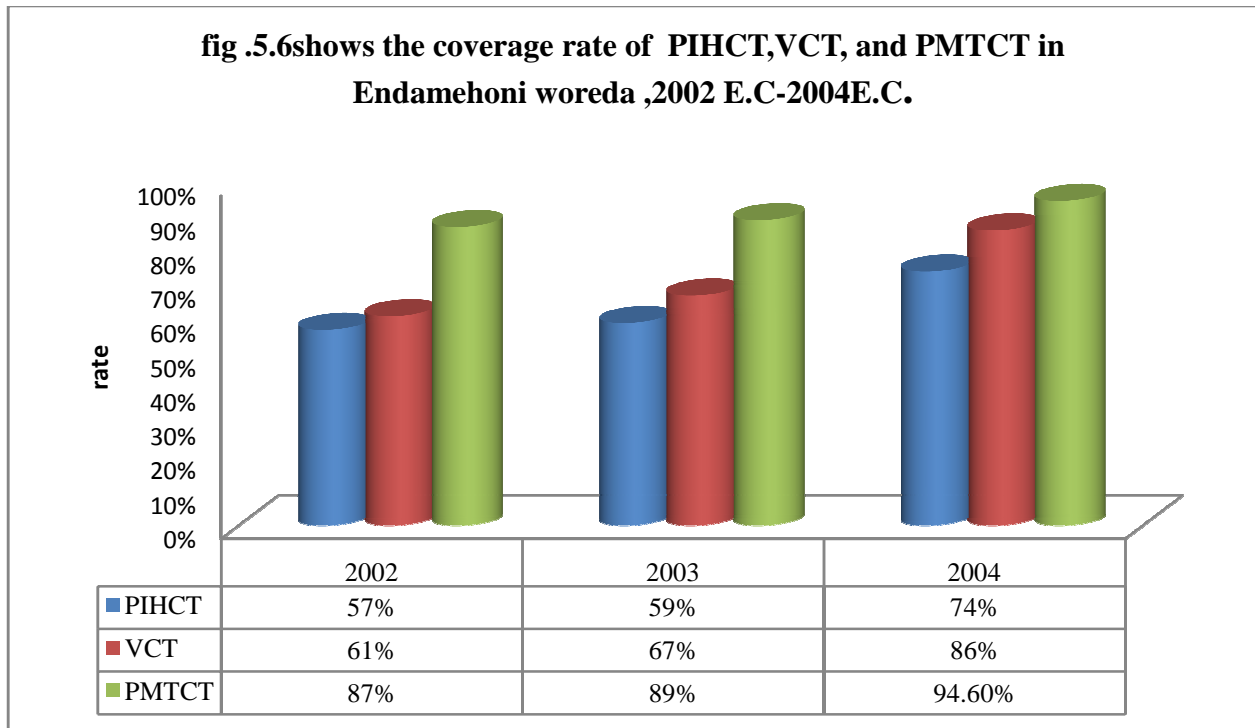
All the reproductive ages (15-49) who are non pregnant mothers (19.7%) and who have taken a family planning method were considered to be vaccinated for TT2+.however, the coverage of TT2+ for non pregnant mothers was higher than that of the contraceptive prevalence rate throughout the consecutive three years. as shown in the figure below, the contraceptive rate has increased but the coverage of TT2+ for non pregnant mothers was vice versa.



### 5.8.5 HIV/AIDS

In Endamehoni woreda, there was a main stream committee that facilitates the prevention and control of HIV/AIDS.the prevalence of HIV/AIDS has decreased that indicated 157(17/10000), 110(11/10000), and 50(5/10000) in 2002E.C, 2003E.C and 2004E.C receptively. Starting to

2002E.C, two health centers were giving ART services. The coverage of HIV/AIDS screening test in all services was increasing in respect to the above three consecutive years.



### 5.8.6 Public health nutrition

The CBN program, TSF program and OTP sites were available in all health posts and health centers found in Endamehoni woreda since 2002E.C. But there were no TFU in those facilities; rather, they have been using a referral system to the other nearby health facilities. The prevalence of sever acute malnutrition in children (under five years of age) was 461 (3.5), 1024(7.6%) and 674 (4.9%) in 2002E.C, 2003E.C and 2004E.C respectively.

### 5.8.7 Hygiene and Environmental sanitation

The latrine coverage that fulfilled solid and liquid waste disposal at house hold level was 16,420(79.8%), 15,777 (75%) and 20164(94%) in 2002E.C. 2003E.C and2004E.C respectively. However, there was no a tangible data of the latrine utilization rate on the woreda health office at all. According to the water supply office report, the total number of water hand dug well and pipe well was 174, 208 and 235 that addressed in addition to the other water sources a safe water supply coverage of 13,649(64.35%), 16,217 (77.2%) and 18,412(85.8%) in 2002E.C. 2003E.C and2004E.C respectively.

### 5.8.8 Endemic disease

The upper respiratory tract infection, other unspecified diseases of eye and skin disease are the most common disease in Endamehoni woreda. Even, malaria disease was among the top ten causes of morbidity in the first two years. But, they haven't experienced an outbreak of diseases during the time interval of 2002E.C -2004E.C.

### 6. Limitations

- ✓ There was no culture and tourism office in this woreda .as a result, the data's regarding to the historical aspect of the area was not available.
- ✓ The vital statistics data was not available .consequently, the measure of mortality (CDR, IMR, MMR, and CMR) for the woreda was not known.
- ✓ The health worker assigned to TB/Leprosy expert in the woreda health office was not present due to being he was engaged to other jobs during the time of data collection.

### 7. Discussion

Endamehoni woreda has a total area of 621.84km<sup>2</sup> which is 0.05% of the total area of country Ethiopia (1.1million km<sup>2</sup>).the coverage of forest, farming land and grazing land that consists of 27%, 28% and 23% of the total area respectively had a suitable contribution for animal breeding and a variety of crop productions.

The annual population growth rate of the this woreda( 2.12%) was lower than to that of the national (2.5%) and Ruwanda (2.6%).but the sex ratio of male to female had a slight difference when compared to the national in which females were higher than males in both. The rural to urban population ratio was similar through 2002E.C-2004E.C with rural <99/100 and urban >1 /100 which was the proportion of rural resident higher than the national (i.e 80/100 in rural and 20/100 in urban).

According to the national standard for health facility (1HC:25,000 population, 1 HP: 5,000 population and 1HEW:2,500 population), in Endamehoni woreda, the health center coverage was increasing from 50% in 2002E.C to 100% in 2003 and 2004 E.C. whereas the health post the health post coverage was 66.3%, 92%, 95% and the HEW coverage was 88%, 81% and 90% in 2002E.C, 2003E.C and 2004E.C respectively. Even though , the ratio of the health facilities or health workers to population was increasing from 2002E.C-2004E.C which approached to the minimum requirements' of the standard, most of the primary health component activities like, measles vaccination ,penta-3 vaccination ,TT2+ for non pregnant

mothers and others has decreased. Even, there were substantial differences on the achievement of the coverage among the different maternal and child health activities which have the same target population. The water supply and latrine coverage was increasing in parallel manner in the last 2004E.C. in Endamehoni woreda; the most common hazards were flood, snow, drought and shortage of rain that affected many peoples. Due to this, the Agricultural office with collaboration of other partners supplied a relief and has taken an environmental intervention like, soil conservation and forestation in those vulnerable areas for each year.

The annual top ten causes of morbidity were not consistent in each year in which some of the disease classification resembled as unusual occurrence. The woreda health area that global health professionals place a high priority is maternal and child health.

## **8. Conclusion**

Accordingly, most of the total area and weather condition was suitable for agriculture .however, as long as 65% of the total population lives in cold temperature (high land), the URTI was the leading causes of morbidity in all years which is mostly common in high land areas .and also due to the presence of many plateaus, the most common hazards were flood and heavy rain falls that affected many peoples who live in the low land area.

The high coverage of latrine and safe water supply has not contributed to create herd immunity among the community. Because, diarrheal diseases was occurred as the top ten causes of morbidity in each year. In relative to the population size, the school coverage and was insufficient from 2002E.C-2004E.C which can cause to low awareness towards the performance of the primary health activities.

## **9. Recommendation**

- ✓ As long as, the main health problems of the community were URTI, skin diseases and eye disease, the woreda health office should strengthen the community awareness towards nutrition and safe hygienic practice.
- ✓ The health worker should conduct a survey on latrine utilization rate and should facilitate on creating open defecation free areas to decrease diarrheal disease among the community which was the top ten causes of morbidity from 2002-2004E.C.
- ✓ The coverage of ANC, delivery at health institution, PNC, and TT2+ for pregnant mothers was not similar in each other at all years which have the same target population .so that, the woreda health office should provide a training on capacity building to

women development army at their residency area who have a great role on solving this problem and should fulfill the infrastructures required for maternal and child health activities.

- ✓ The education office should allocate a budget for water supply construction in schools with collaboration of water office and health office that could lead to apply safe hand washing practice among the students.
- ✓ The agriculture office should prioritize an early warning system that could prevent the hazard rather than focusing on the disaster reduction by providing a relief as well as taking rehabilitation after the hazard is happened.

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**5. data collection tools for health profile assessment in Endamehoni woreda, Tigray region from 2002e.c-2004e.c**

**1. Historical Aspects of the area (if available)**

- The name how and why \_\_\_\_\_
- How was the woreda formed \_\_\_\_\_
- Any other historical aspect \_\_\_\_\_

**2. Geography and Climate**

- Area of the woreda \_\_\_\_\_
- Distance from Addis and Mekelle \_\_\_\_\_
- Altitude \_\_\_\_\_
- Latitude \_\_\_\_\_
- Average Annual rain fall \_\_\_\_\_
- Average Annual temp \_\_\_\_\_
- Land bodies \_\_\_\_\_
- Water bodies \_\_\_\_\_

**3. Demographic information**

- Total Population size \_\_\_\_\_
- male \_\_\_\_\_
- female \_\_\_\_\_
- urban \_\_\_\_\_
- rural \_\_\_\_\_
- Sex ratio \_\_\_\_\_
- Age structure: - percentage of children < 1yrs \_\_\_\_\_ . <5yrs \_\_\_\_\_ < 15 yrs.
- Percentage of old people >65 years \_\_\_\_\_
- Women child bearing age \_\_\_\_\_
- Percentage of pregnant women \_\_\_\_\_
- Dependency ratio \_\_\_\_\_

❖ Population size by religion

- Orthodox \_\_\_\_\_
- Catholic \_\_\_\_\_

- Protestant\_\_\_\_\_
- Muslim\_\_\_\_\_
- Others\_\_\_\_\_

❖ Estimated Population size by kebele

no	Name of kebelles	Population size											
		2002				2003				2004			
		<5	5-15	>15	total	<5	5-15	>15	total	<5	5-15	>15	total
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
	<b>total</b>												

**4. Administrative setup**

Total no. of kebelles: rural\_\_\_\_\_Urban\_\_\_\_\_

Woreda Boundaries 1. Southern\_\_\_\_\_

2. Northern \_\_\_\_\_

3. Western \_\_\_\_\_

4. Eastern \_\_\_\_\_

**5. Health Facility coverage**

Type of Health facility	year		
	2002	2003	2004
1.Health center			
2.Health posts			

Name of disciplinary	2002		2003		2004	
	standard	Total no	standard	Total no	standard	Total no
Health officers						
Laboratory technician/technologist						
Pharmacy technician/Pharmacist						
Nurses						
Midwife						
ENHS						
HEWs						
TBA						

## 6. Ratio of health facility and professional to population

Description	Ratio		
	2002	2003	2004
Health center: population			
Health post: population			
Health officer: population			
Nurse: population			
Midwife: population			
HEW: population			

## 7. Top causes of morbidity and mortality

no	2002		2003		2004	
	Diseases classification	No(%)	Diseases classification	No(%)	Diseases classification	No(%)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

## 8. MCH and EPI coverage

Description	2002	2003	2004
	No (%)	No (%)	No (%)
ANC coverage			
PNC coverage			
BCG coverage			
Measles vaccine			
OPV			
Penta1			
Penta2			
Penta3			
Contraceptive prevalence			
TT2 for pregnant			
TT2 for no pregnant			
Latrine coverage			
Safe water supply coverage			
Total people screened for HIV			
VCT			
PICT			
PMTCT			
HIV Prevalence			
TB prevalence			

## 9. HIV/AIDS activities

Activities	Male	Female	total	Remark
Total people screened for HIV				
VCT				
PICT				
PMTCT				
HIV Prevalence				

Total PLWHIV				
On ART				
Pre ART				

Level of school	2002			2003			2004					
	No of school	Number of student			No of school	No of student			No of school	Number of student		
		male	fem ale	total		mal e	fe mal e	total		male	fema le	total
Primary												
Secondary												
Total												

Schools with functional latrines			
schools with water supply			
Schools with HIV/other Health clubs			
Literacy ratio			
employed			
unemployed			
Employed; unemployed			
HF access to transportation			
HF access to telecommunication			
HF access to Electric power			
for all woreda sectors			
for health sector			

11. Disaster situation in Endamehoni district from 2002 -2004e.c

Type of hazard	2002		2003		2004	
	disaster	Control measures/solutions	disaster	Control measures/solutions	disaster	Control measures/solutions

**12, Nutrition activities**

Type of food intervention program	2002		2003		2004	
	Health post	Health center	Health post	Health center	Health post	Health center
No of OTP sites						
No of TFU program						
No of TSF program						
No of CBN program						
No of EOS program						
No of SAM						

**13. Summary**

1. What do you think the major Health problem/s of the woreda?

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2. What do you think solutions of the addressed problems?

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## CHAPTER-6 SCIENTIFIC MANUSCRIPT FOR PEER REVIEW JOURNALS

### 6.1 AN OUTBREAK OF MEASLES INVESTIGATION IN TSEGEDEA DISTRICT, TIGRAY REGION FROM 6-25/2014

T. Hiluf<sup>1</sup>, G. Mehari<sup>2</sup>G.AYNALEM (MD, MPH)<sup>3</sup>

#### Abstract

**Background:** Tsegedea district is found in western Tigray region composed of 123,641 populations and 25 kebelles. The health facility coverage is 100 % ( 5) for health centers and 93 % ( 23) for health posts. We received 4 clinically suspected measles cases from 2 kebelles of the district from 6-10/2/2014. We investigated this cluster to confirm its etiology, describe its magnitude, identify potential risk factors and make recommendations.

**Methods:** We investigated measles outbreak from 6-24/2/2014 in Tsegedea district by a case-control study. We recruited 20cases and 40controls by simple random sampling having a structured questionnaire. We entered the data to Epi-Info, version 7.6.1 and exported to SPSS, version 16 for analysis. We have computed the BMI, overcrowdings, vaccine efficacy (1-OR)\*100 and herd immunity (from 2012-2014).

**Results:** we detected a prevalence of 0.23/1000(29) with 100 % ( 7) IgM positive in Tsegedea district. It was higher in males 51.8 % ( 15) than females 48.2 % ( 14).The median age was 9years (8month-30years) with ASAR of 0.277/1000(1) for <1 years and 0.22/1000(15) in >=15 years age. Majority of the cases were in Alemgenet Kebelle( 2.19/1000(10)) compared to the other 6 kebelles that ranges 0.1/1000-1.1/1000.the herd immunity was 73.1% with vaccine efficacy of 94.1% for one dose vaccinated Vs non-vaccinated .55% of the cases enrolled to the study were underweight .The vaccination of 1 dose and >=2 dose were a protective factor for measles infection(i.e for 1 dose, AOR =0.059,95%CI(0.008-0.44), P-value=0.0060 ,for >=2,AOR=.061,95%CI(0.004-0.9) ,P-value=0.045). Overcrowding was also highly associated with the occurrence of measles outbreak (AOR= 8.42, 95%CI (1.76-40.1), P-value= 0.007).

**Conclusion:** The herd immunity was low with higher vaccine efficacy. The vaccination status and overcrowding had a strong relationship with measles infection separately. The measles outbreak was a propagative that lied majority of the cases in >= 15 years age and specific areas of the district. So, that, a selective vaccination campaign, improvements on housing condition and nutritional status of the community should be implemented.

## 1. Introduction

Tsegedea district is found in western Tigray region composed of 123,641 populations and 25 kebelles in which, 44 % ( 11) of them are lowland areas. The health facility coverage is 100 % ( 5) for health centers and 93 % ( 23) for health posts. We received 4 clinically suspected measles cases from 2 kebelles of the district from 6-10/2/2014.

Measles is an acute, highly contagious viral disease caused by measles virus. This highly contagious virus is transmitted primarily by respiratory droplets or airborne spray to mucous membranes in the upper respiratory tract or the conjunctiva. The risk factors for measles virus infection include: infants who lose passive antibody before the age of routine immunization, children with vitamin A deficiency and immunodeficiency due to HIV or AIDS, leukemia, alkylating agents, or corticosteroid therapy, regardless of immunization status and children who travel to areas where measles is endemic or contact with travelers to endemic areas. (1)

Global progress in the past decade against measles has been stunning. As more countries immunize more children, measles deaths have been reduced by 71 per cent—from an estimated 548,000 in 2000 to 158,000 in 2011.(32)

In addition to this, more than 40,000 laboratory-confirmed cases of measles were reported globally in 2011(33). Measles Outbreak was occurred in Southeast Iran with a Vaccine effectiveness of approximately 74.2 % ( 95% CI, 10.2–92.6) based on the calculated OR for measles vaccination given twice versus no vaccination. (34) These outbreaks occurred in the AFRO region challenges to the recent successes against measles-mortality and to the goal of measles elimination ,Eventhough the nationally coverage of MCV1 and MCV2 have increased by 27% and 26% from 68% and 57% in 2001 to 95% and 83% in 2010, respectively. Comparatively, SIA coverage has remained at high levels, around 90%, over the years 1996–2010.(35)

A large outbreak of measles involving around 1700 cases occurred in South Africa between 2003 and 2005 following its introduction from Mozambique in which the incidence in children aged 10 to 14 years and in those aged 15 to 19 years was higher than in those aged 5 to 9. (36)

Kenya has reported an MCV1 coverage of 107% (5,995,049) in children targeted 9-59 months.(32) .However, according to the official report, an outbreak of measles is occurring throughout the regions of Ethiopia. Among these regions, Tigray region has reported 6 outbreaks of measles from, 2011-2013. Thus, the main aim of this outbreak investigation was to

confirm its etiology, describe its magnitude, identify potential risk factors, assess vaccine efficacy and make recommendations on the future.

### **3. Methods**

#### **3.1 Study setting**

The study was conducted from 10-24/2/2014 in 7 villages of Tsegedea district. Composed of 123,645 inhabitants and located in 661 km far from the capital city of Tigray region, Mekelle. Measles can affect all age groups and both sex without any restrictions of residency areas .so that all inhabitants of Tsegedea district had equal chance to participate in cases and controls.

#### **3.2 Study design**

We conducted a case-control study design to identify the possible risk factors for the occurrence of measles outbreak .A blood serum has been sent to National Laboratory (EPHI) from 7 clinically suspected measles cases that have been involved in the outbreak of measles before 2 weeks date of onset to confirm the IgM of measles virus. The cases and controls were recruited by simple random sampling method that have been matched by their residence irrespective of other variables (age, sex, and vaccination status).We used unmatched case-control sample size determination from the previous study of measles outbreak conducted in southeast Iran, 2011 by using the most frequent independent variable i.e contact history (OR=10.9, 95%CI, alpha=0.05, proportion of cases exposed=77.6%, proportion of controls exposed=41.8%, power=80).however, we approximated the cases from 23 to 20 and the controls from 43 to 40 (i.e 2 controls for every cases; 1:2).

#### **3.3 Data collection tools and Methods**

We used a structured questionnaire to collect the required information composed of the socio-economic demography, clinical status of the cases, the possible risk factors and the KAP of the community .the national measles guide line, national PHEM guide line, GPS and camera were fully available .the data was collected through face to face interview with the respondents ,by reviewing the line list data in the health facility and properly registering the geographical location of individual households .

### 3.4 Variable specification

Sr.no	Dependent variable	Independent variable
1	<ul style="list-style-type: none"><li>• Measles infection</li></ul>	<ul style="list-style-type: none"><li>• Measles vaccination status</li></ul>
2		<ul style="list-style-type: none"><li>• Measles infection (previously)</li></ul>
3		<ul style="list-style-type: none"><li>• BMI</li></ul>
4		<ul style="list-style-type: none"><li>• Over crowding</li></ul>
5		<ul style="list-style-type: none"><li>• Family size</li></ul>
6		<ul style="list-style-type: none"><li>• Travel history</li></ul>
7		<ul style="list-style-type: none"><li>• Contact history</li></ul>
8		<ul style="list-style-type: none"><li>• KAP on measles infection</li></ul>

### 3.5 .Data entry and analysis

We used an Epi-Info, version 7.6.1 for data entry that have been exported to SPSS, version 16 for univariate analysis and multivariate analysis with 95% CI and  $\alpha=0.05$ .we have computed the BMI (weight (kg)/height (m)), overcrowdings , by dividing the standard average sleeping area (10.2m<sup>2</sup>) to number of persons (2)=5.1m<sup>2</sup>/1 person **(15)** and vaccine efficacy was estimated by subtracting the OR vaccination of one dose for cases and controls (1-OR) **(16)**

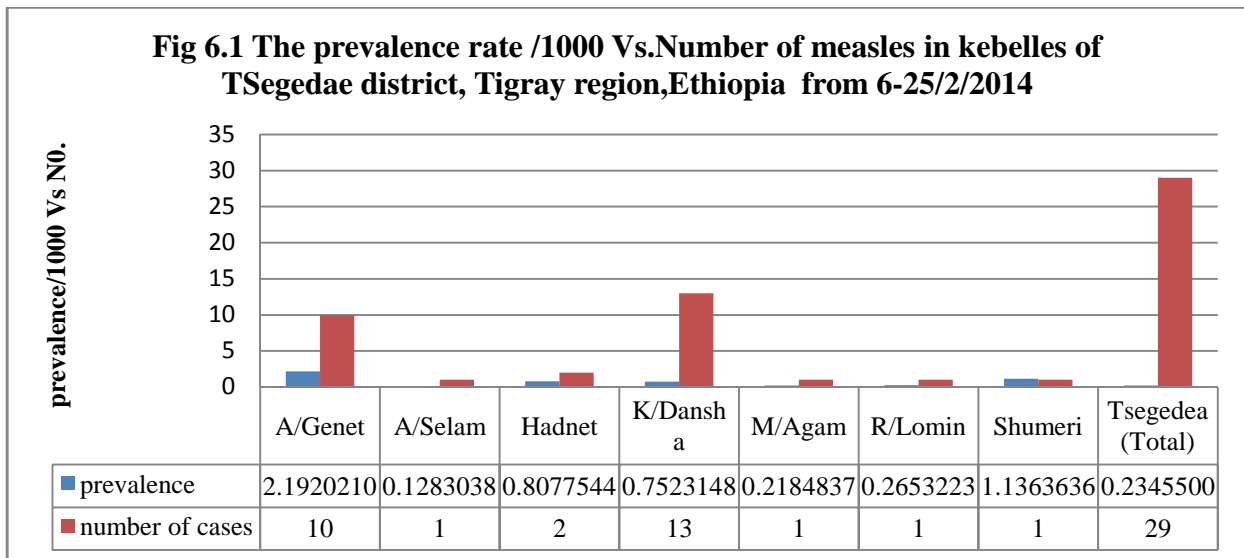
### 3.6 Ethical consideration

The district health office has accepted for the investigation of measles outbreak through the formal letter of TRHB .all the respondents as well as the parents were well informed about the objectives of questionnaire and we got consent from them. And also, some of the respondents were voluntary to get their photographs through our camera after they have been informed

## 4. Result

### 4.1 Descriptive result

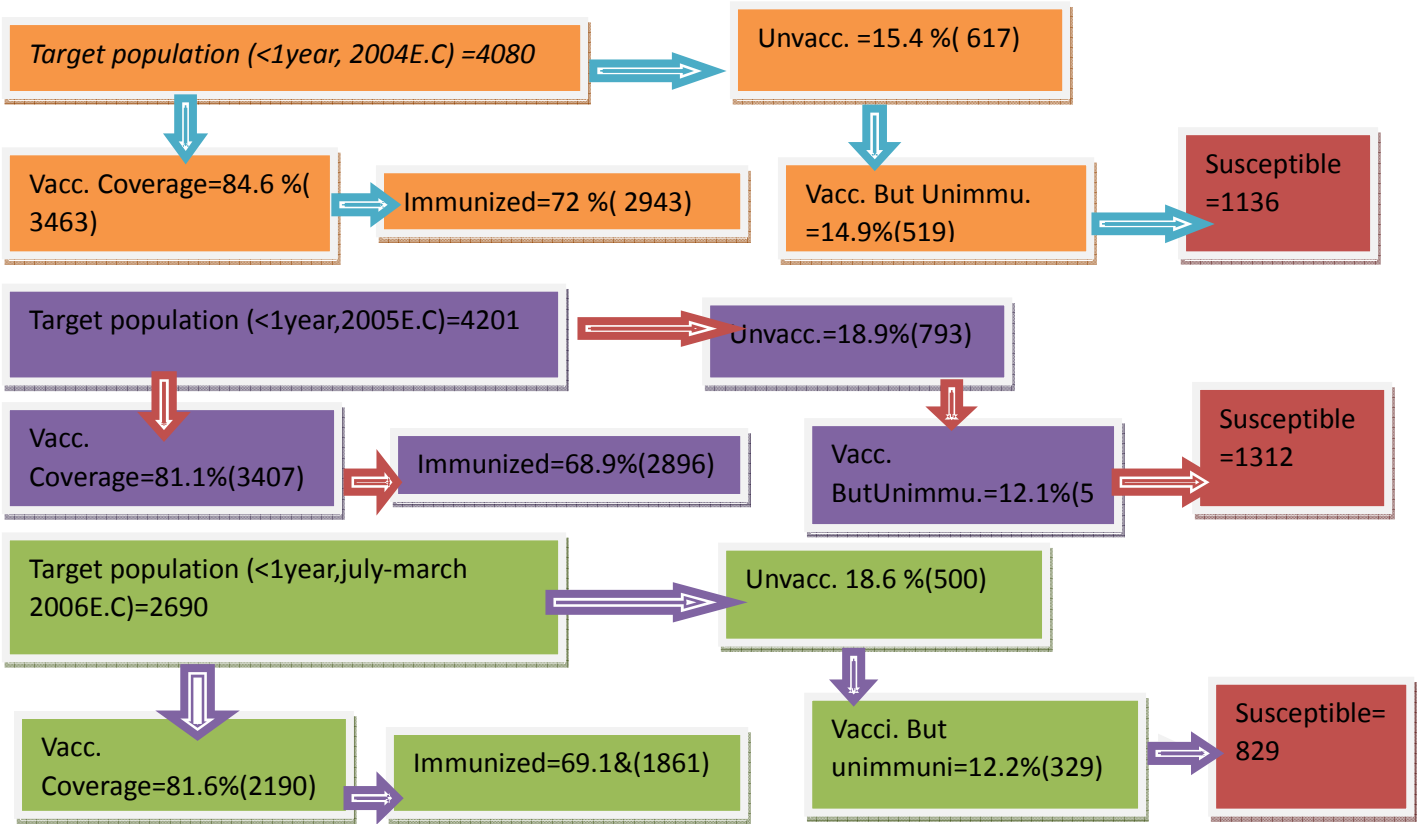
We detected a point prevalence of 0.23/1000(29) measles cases with 100%(7) laboratically confirmed in Tsegedea district, Tigray region from 6-25/2/2014.Eventhough, majority of the cases were in Dansha ketema (13) and in Alem genet kebele (10), the prevalence was higher in Alemgenet 2.19/1000(10) and Shumeri kebele with 1.1/1000(1).whereas, it ranges from 0.12/1000-0.8/1000 in the other 5 kebelles.



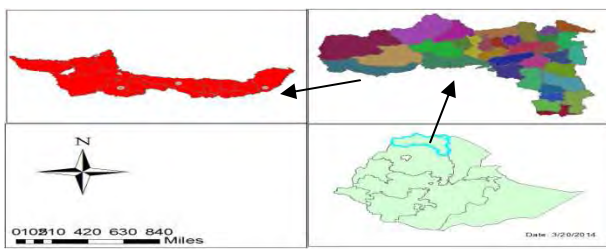
**Table6.1** The ASAR for measles infection among kebelles and Tsegedae district, Tigray region from 6-25/2/2014

N O	Kebelle Name	Total population	<1Yrs		1-5Yrs		6-15Yrs		>15Yrs	
			No. case s	ASA R/100 0	No. case s	ASAR/100 0	No. case s	ASAR/100 0	No. case s	ASAR/100 0
1	Alem Genet	4562	1	7.5	2	3.74	1	0.74	6	2.44
2	Adi Selam	7794	0	0	0	0	1	0.43	0	0
3	Hadnet	2476	0	0	0	0	0	0	1	0.24
4	Ketema Dansha	17280	0	0	2	0.98	6	1.1	5	0.53
5	May Agam	4577	0	0	0	0	0	0	1	0.4
6	Ruba Lomin	3769	0	0	0	0	1	0.89	0	0
7	Shumeri	880	0	0	0	0	0	0	1	2.1
8	District(total)	123641	1	0.277	4	0.276	9	0.24	15	0.22

**Fig 6.2 The herd immunity of <1 years ago against to measles infection and Accumulation of susceptible for Routine 1-dose vaccination in Tsegedea district, Tigray region from mid 2011-2013.**

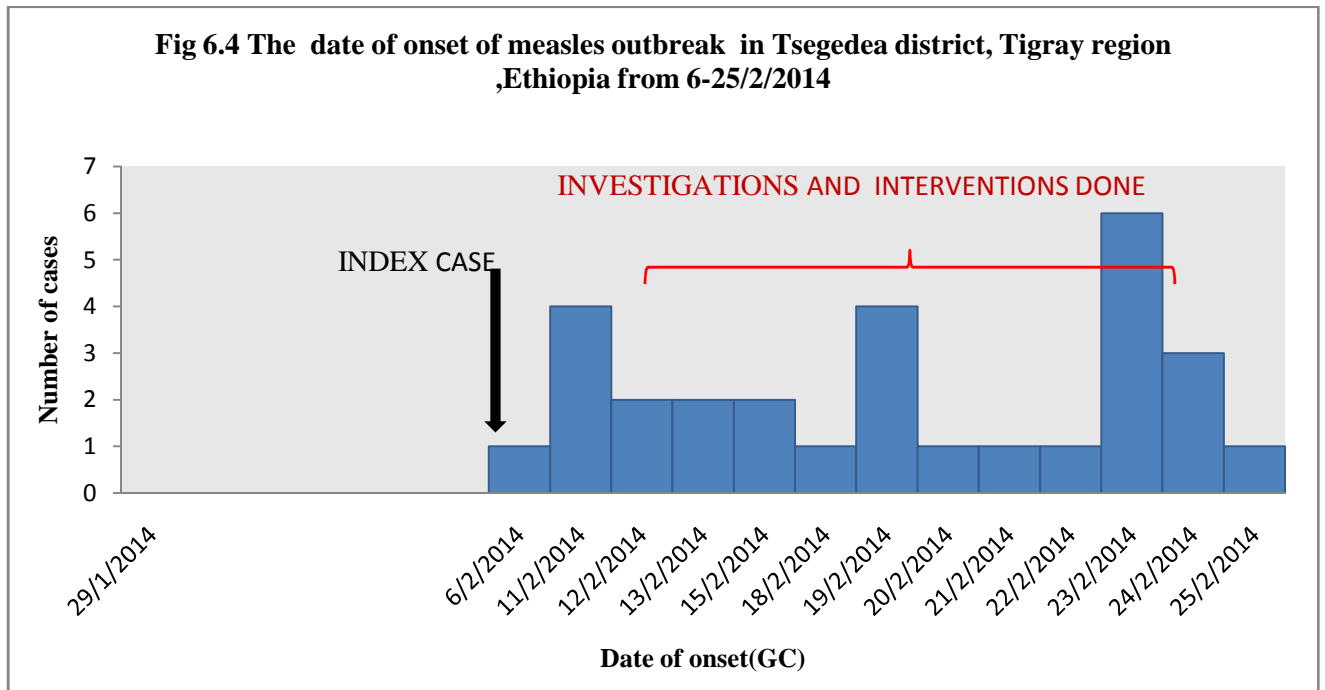


The vaccination coverage for MCV1 has decreased from 84.6% in the mid 2011 to 81.6% in 2014. the herd immunity of the community was 70.1% (3277) at the end of 2013.



**Fig 6.3 the spot map of measles cases in Tsegedea district, Tigray region, Ethiopia from 6-25/2014.**

The duration of measles outbreak was stayed for three weeks with intermittent interventions across the kebelles where the cases were occurred. The index case was a female with 18 years age who was neither vaccinated nor previously measles infected .she had visited and contacted with the adjacent district of Amhara region where there was an outbreak of measles 23 days before her onset of rash. The epidemic curve was a multi-peak with sharp rise and gradual fall that indicated a propagative type of outbreak.



In age groups of less than 1 and 6-15years, the number of measles cases was higher in females than males with the reverse in the other age groups. However, the aggregate of measles cases were greater in males 51.7 %( 15) than females 48.3 %( 14).Majority of the cases that have been recruited to the case control study was in age groups of >15years with 45 %( 9) females and 55 %( 11) males. From 20 cases, 55 %( 11) of them was categorized in under weight and sleep in greater than 10.m<sup>2</sup>/2person

## 4.2 Analytic result

By univariate analysis, the vaccination against measles, those who had a history of measles infection and the knowledge about the mode of transmission for measles infection were a protective factor for developing the disease and statistically significant. In addition to this, the measles cases that slept in area of less than 10.2m<sup>2</sup> for two persons were 5.44 times more likely to get infection of measles. However, they are not statistically significant in multivariate analysis method except to that of vaccination history and over crowding.

Table 6.1 shows the descriptive characteristics of the participants in the case-control part of the study in Tsegede district Tigray region from 6-25/2/2014

Sr.no	variable		Case No (%)	Control No (%)
1	Age	<1yrs	1(5)	2(5)
		1-5yrs	4(20)	5(12.5)
		6-15yrs	6(30)	13(32.5)
		>15yrs	9(45)	20(50)
2	sex	male	11(55)	25(62.5)
		female	9(45)	15(37.5)
3	BMI	Under weight	11(55)	19(47.5)
		Normal weight	7(35)	20(50)
		Over weight	1(5)	1(2.5)
		obese	1(5)	0(0)
4	Family size	<5 persons/HH	9(45)	24(60)
		>5 persons/HH	11(55)	16(40)

Table 6.2. Independent factors found to be associated with measles on univariate analysis Vs multivariate analysis in measles outbreaks of Tsegedea district, Tigray region, from 6-25/2/2014

Sr.no	variables	Crude OR(95%CI)	Adjusted OR(95%CI)	Adjusted P-Value
1	Vaccination VsNo.Vacc.	1 dose 0.228(0.018-0.024)	0.059(0.008-0.44)	0.006
		2 dose 0.118(0.021-0.028)	0.061(0.004-0.9)	0.045
2	Overcrowding	5.44(1.68-17.5)	8.42(1.76-40.1)	0.007

As shown in the above table, the exposure to one dose of measles vaccination and sleeping in overcrowding are more likely to be protected and develop measles infection respectively with highly statistically significant. The Vaccine effectiveness, based on the calculated OR for measles vaccination given one dose versus no vaccination, was approximately 94.1% (95% CI, 10.2–92.6).

### 5. Interventions taken

- 96.5%(28) of the cases were treated by medications (Anti biotic, ORS, TTC, Vitamin A)
- An active surveillance has been conducted in all kebelles of the district
- The measles vaccination coverage within the specific kebelles was reviewed
- We discussed with health workers in Governmental and private health institutions
- The banners has been distributed and health education was disseminated to the areas where the community are mostly assembled like, church, schools, water and soil conservation, and local meetings

### 6. Discussions & Conclusions

According to the measles national guide line that designed 3 or more laboratically confirmed cases to declare an outbreak of measles, we confirmed the existence of measles outbreak with a prevalence of 0.23/ 1000(29) and 100%(7) IgM positive in Tsegedea district from 6-25/2/2014. The prevalence was higher in Alemgenet and Shumeri kebelles with 2.13/1000 and

1.13/1000 respectively but lower in relative to the outbreak of measles occurred in South Africa with an incidence of 6.1/1000 for infants from 2009-2011. The ASAR was greater in <1 years aged for Alemgenet kebele and in >15 years aged for the majority of the remaining kebelles. This coincides with the measles outbreak investigated in South Africa that lied majority of the cases in infants and 10-19 years age.

The MCV1 coverage targeted for <1 years age has decreased from 84.6% in the mid 2011 to 81.6% in herd immunity coverage of 70.1% and 94.1% of vaccine efficacy at the end of 2013. This could be the occurrence of this outbreak may be due to the presence of a 3277 susceptible persons for measles infection at the end of 2014.

The duration of measles outbreak was no longer than one month that has covered in a 7 scattered kebelles and resulted a propagative type of outbreak. However, the secondary attack rate was lower considering that measles is a highly contagious disease and one measles case can transmit around 200 persons with in two meters. This was happened, may be due to an early treatment of the cases that has been achieved in 94.6 % ( 28) of the total cases and an effective interventions on the community.

Among the total cases enrolled to the case-control study, majority of the cases 55 % ( 11) has resulted underweight that coincides as of malnutrition is one of the complication of measles infection. This may be due to the result of low socio-economic status in which majority of the cases had a family size of >5 persons, Eventhough it was not statistically significant. The vaccination of MCV1 and MCV2 were highly a protective factor for measles infection, in case they are statistically significant similar to the outbreak investigation in Iran.

Generally, the herd immunity was low with higher vaccine efficacy. The vaccination status and overcrowding had a strong relationship with measles infection separately. The measles outbreak was a propagative that lied majority of the cases in  $\geq 15$  years age and specific areas of the district. So, that, a selective vaccination campaign, improvements on housing condition and nutritional status of the community should be implemented.

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## CHAPTER-7 ABSTRACTS FOR SCIENTIFIC PRESENTATION

### 7.1 A SUSPECTED ANTHRAX OUTBREAK INVESTIGATION IN KOLATEMBEN WOREDA, TIGRAY REGION FROM MAY-JULY/2013

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#### Abstract

**Background:** Most forms of anthrax diseases are lethal and it affects both humans and animal's .A suspected outbreak of these was reported from Kolatemben woreda, Ethiopia with a total population of 177,249. We investigated this cluster to confirm its etiology, describe its magnitude, identify potential risk factors, and make recommendations for preventing similar outbreaks in the future.

**Method:** Based on Clinical details of anthrax cases, we conducted unmatched case-control study to describe and identify risk factors for acquiring the infection in Kolatemben woreda, from May-June, 2013. We selected three health centers purposively and 2 controls for each 15 cases by convenient sampling method. We -used a structured questionnaire to collect data on demographic information, clinical status and risk factors.

**Results:** We detected a total of 85 suspected anthrax cases with an incidence rate of 4.2/10,000 (75) for cutaneous, 0.3/10,000 (6), Gastro intestinal and 0.22/10,000 (4) mixed type with case fatality rate of 4.7 % (4). Direct contact with dead animals (OR=5.2; 95% CI: 1.36-20, P-Value=0.007) and ingestion of uncooked meat (OR=6.1; 95% CI: 1.52-24, P-Value=0.02) were identified as risk factors; and knowledge of the community towards this disease (OR=0.2195% CI: 0.05-0.93) was identified as protective factor. The annual coverage of animal vaccination in the area was 8.5%.

**Conclusion:** The high rate of exposure to animal meat, the less awareness of the community and low vaccination coverage of animals in the area were the main factors for the occurrence of the outbreak. Vaccination of the livestock in the area and community education on the dangers of handling and slaughtering dead/ill livestock are necessary.

**KEY WORDS:** Suspected anthrax; outbreak; risk factors, animal vaccination, awareness of the community

## 7.2 AN OUTBREAK OF MEASLES INVESTIGATION IN TSEGEDEA DISTRICT, TIGRAY REGION FROM 6-25/2014

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### Abstract

**Background:** Tsegedea district is found in western Tigray region composed of 123,641 populations and 25 kebelles. The health facility coverage is 100 % ( 5) for health centers and 93 % ( 23) for health posts. We received 4 clinically suspected measles cases from 2 kebelles of the district from 6-10/2/2014. We investigated this cluster to confirm its etiology, describe its magnitude, identify potential risk factors and make recommendations.

**Methods:** We investigated measles outbreak from 6-24/2/2014 in Tsegedea district by a case-control study. We recruited 20cases and 40controls by simple random sampling having a structured questionnaire. We entered the data to Epi-Info, version 7.6.1 and exported to SPSS, version 16 for analysis. We have computed the BMI, overcrowdings, vaccine efficacy (1-OR)\*100 and herd immunity (from 2012-2014).

**Results:** we detected a prevalence of 0.23/1000(29) with 100 % ( 7) IgM positive in Tsegedea district. It was higher in males 51.8 % ( 15) than females 48.2 % ( 14).The median age was 9years (8month-30years) with ASAR of 0.277/1000(1) for <1 years and 0.22/1000(15) in >=15 years age. Majority of the cases were in Alemgenet Kebelle( 2.19/1000(10)) compared to the other 6 kebelles that ranges 0.1/1000-1.1/1000.the herd immunity was 73.1% with vaccine efficacy of 94.1% for one dose vaccinated Vs non-vaccinated .55% of the cases enrolled to the study were underweight .The vaccination of 1 dose and >=2 dose were a protective factor for measles infection(i.e for 1 dose, AOR =0.059,95%CI(0.008-0.44), P-value=0.0060 ,for >=2,AOR=.061,95%CI(0.004-0.9) ,P-value=0.045). Overcrowding was also highly associated with the occurrence of measles outbreak (AOR= 8.42, 95%CI (1.76-40.1), P-value= 0.007).

**Conclusion:** The herd immunity was low with higher vaccine efficacy. The vaccination status and overcrowding had a strong relationship with measles infection separately. The measles outbreak was a propagative that lied majority of the cases in >= 15 years age and specific areas of the district. So, that, a selective vaccination campaign, improvements on housing condition and nutritional status of the community should be implemented.

**Keywords:** Vaccination status, Overcrowdings, ASAR, measles outbreak, herd immunity, BMI

### 7.3 A SURVEILLANCE DATA ANALYSIS ON SEVER ACUTE MALNUTRITION - TIGRAY REGION, 2011/12

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#### **Abstract**

**Introduction;** Sever acute malnutrition is children with a middle upper circumference less than 11.5cm and for adults with body mass index of less than 16 .Globally, 26 million children and in Africa 1.1 million children suffer from sever acute malnutrition annually. In Ethiopia, the percentage of stunting fell from 52% in 2000 to 47% in 2005. However, there is no change in the prevalence of wasting, as it remained 11%. Regional health bureau of Tigray intended to understand the trend of Sever acute malnutrition which helps for early warning and intervention.

**Methods;** In this case we conducted a surveillance data analysis based up on the secondary data from July, 2011 to June, 2013 by using an epi-info soft ware.

**Result ;**The prevalence of Sever acute malnutrition was 3647(0.07%) in all age groups and 3345(0.46%) for children's less than five years old in which those were 91% out of the total age group. Among all zones of the region, it was higher in Western and Southern zones which indicated 669(0.12%) and 711(0.09%) respectively.

**Discussion;** The prevalence of Sever acute malnutrition was 3647(0.07%) in all age groups and 3345(0.46%) for children's less than five years old in which those were 91% out of the total age group. Among all zones of the region, it was higher in Western and Southern zones which indicated 669(0.12%) and 711(0.09%) respectively.

**Key words;** sever acute malnutrition, prevalence, seasons, surveillance, Tigray

**Word count;** 252

## CHAPTER-8 DISASTER MANAGEMENT SITUATION REPORT

### 8.1 BELG ASSESSMENT IN SIX SELECTED WOREDAS OF TIGRAY REGION FROM JANUARY –MAY/2013

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#### EXCUTIVE SUMMERY

Belg Emergency Needs Assessment was conducted in Tigray from June 18 to June 27 2013. The assessment was conducted in six belg beneficiary woredas namely: Raya-Azebo, Raya-Alamata, Ofla, E/mekoni, E/alaje and H/wejerat. Health emergency, whether disease outbreaks or other health emergencies including wide spread malnutrition, usually follow emergency events and could lead to increased illness and deaths. During emergency conditions, access to safe water and sanitary facilities are major challenges. If proper measures are not undertaken, the lack of safe water and sanitary facilities could lead to adverse effects in fulfilling daily needs, and could lead to increased morbidity & mortality due to food & water borne diseases.

The assessment was conducted using a nationally standardized non - food emergency needs assessment checklist. Information was collected using the formatted checklists, and observations and discussions made with Zone and Woreda Administrations and Sector Offices officials and concerned experts. Information was collected on existing and or potential emergencies on health, nutrition, water – hygiene and sanitation and education. Experts from Ministry of Water and Energy (MWE), Ethiopian Health and Nutrition Institute (EHNRI), UNICEF, Education Bureau and EFETP resident have participated during the assessment.

The total population of the six woredas is about 796,189 this comprised of 16.1% of the total population of Tigray region. Of the total population, 116,241 are children age of less than five years, 27,986 are pregnant mothers, and 187,435 are reproductive age group women. Among the overall assessed woredas, there were no internally as well as externally displaced peoples.

During this assessment, the health situation in the visited woredas is more or less stable. There was no significant outbreak of diseases or health emergency at present in the visited Woredas. The major outbreak reported in the last four months was Typhoid fever in Raya-Azebo and ofla woreda in which 170 cases were reported. Seven measles cases were reported from raya-Azebo, H/wejerat and E/alaje woredas from February to May 2013. Rabies out brake was

reported from H/wajeratworeda in May 2013. It was reported that there were malaria cases increment in Raya Alamata during April 2013 and in Ofla in May 2013.

Considering the existing factors for diseases outbreaks or health emergencies, the most predicted diseases that could occur as outbreaks are malaria, measles, and Meningitis and AWD.

Based on information obtained from Woredas and existing Therapeutic Feeding Programmes (TFP) and Community Health Days (CHD) data, the nutrition situation in the visited woredas is stable. But close follow up is required to monitor and give response for possible increased malnutrition levels.

During the assessment about 67,240 people from Raya-Azebo, H/wejerat, and Raya-Alamata and E/alaje woredas are seriously affected by shortage of water supply and about 13,517 are at risk. Especially in Raya-Azebo and H/wajeratworeda there has been recurrent drought consecutively for more than 3 years as a result these two woredas are highly affected. Out of the total number of affected population 57% are from Raya-Azebo and 30% are from H/wejerat. In Ofla and E/alaje woredas even though there is chronic type of water shortage relatively the current water supply situation is better from emergency point of view. Out of the 289 schemes found in the affected kebelles 93 (32%) are non-functional mainly due to drought. Similar to the community water supply a number of schools and Health institution in the visited woredas are affected by critical water supply shortage due to different reasons. From the 36 schools with critical water supply problem about 18,076 students are affected and 941 are at risk. During the assessment, the teaching learning activities in the visited woredas was found to be stable, and most schools are regularly functioning.

An effective intervention should be taken in decreasing the top ten leading causes of morbidity (pneumonia, diarrheal and malaria diseases). LLITN and IRS should be available in all malaria endemic areas. An active surveillance should be conducted in areas where clinically suspected measles cases occurred. AWD and Meningitis also requires due attention and close follow up.

Despite of the overall acute malnutrition level of the assessed Woredas is stable; acute malnutrition is transient and can be changed with some aggravating factors. Hence close monitoring and follow up is mandatory, particularly, in Ofla, E/alaje and Raya-Alamata which showed highest OTP admission.

Emergency drugs and medical supplies support for the predicted disease outbreaks are required. In addition, general health services support is required for people in drought affected woredas/pocket areas. Capacity building and operational cost support for Woredas are also required.

To alleviate the identified WASH related emergency different interventions have been proposed: water trucking, rehabilitation of existing non-functional water supply schemes, construction of additional water points and capacity building works.

## **1. INTRODUCTION**

Health emergency, whether disease outbreaks or other health emergencies including wide spread malnutrition, usually follow after emergency events due to natural or manmade disasters. During emergency conditions, access to safe water and sanitary facilities are major challenges. If proper measures are not undertaken, the lack of safe water and sanitary facilities could lead to adverse effects in fulfilling daily needs; and could lead to increased morbidity and mortality due to food and water borne diseases. During emergency, the process of teaching - learning would be difficult due to direct or indirect effects of the situation. If proper measures are not taken, there could be decreased school enrolment, increased school drop outs, and partial functioning or closure of schools. So that the Belg emergency need assessment is crucial to forecast and assess the magnitude of the emergency threats and accordingly to make the necessary plans and preparations to prevent unnecessary human damage and deaths

Hence, this non-food assessment was part of the *Belg* assessment activities conducted between 18 and 27 June 2013 to assess the positive and negative impact of *Belg* rain in six *Belg* benefiting Woredas namely: Raya-Alamata, Raya-Azebo, Ofla, Endamehoni, Alaje and Hintalo-Wejerat.

During this Belg season, even though the rain fall started on time there was interruption throughout the belg seasons and the amount & distribution was very low except in those four kebelles found in ofla woreda that harvested relatively good crop. As a result there has been drought affected wide or pocket areas that consequently would lead to severe consequences on health and welfare of the population among which include malnutrition due shortage of food, communicable disease, and disease outbreaks that subsequently could lead to increased morbidity and mortality.

## **2. OBJECTIVES**

- To identify existing or potential health, nutrition, WASH and education emergencies and assess the magnitude and likelihood of the emergency situations in the six belg beneficiary woredas
- To assess the level of humanitarian crises and the need for emergency aid.
- To plan and prepare for the emergency responses for existing and or predicted emergency conditions.

### 3. Methodology

The assessment was conducted using a nationally standardized non-food Belg assessment questionnaire. Semi-structured interviews/briefings/debriefing with Woreda sector offices head and/or focal persons (Admin, Health, Water, Agriculture and Education) were carried out to obtain the required information. In addition to the formatted checklists, observations were also made based on discussions with officials and concerned experts conducted in the six woredas. Secondary data were collected from sector offices and analysed using computer based programs. Information collected on health include: top five diseases of children and adult, disease outbreaks, epidemic prone diseases and nutritional status (OTP admission cases of children under five). Information collected on WASH include: Water supply situation, Latrine and hand washing situation at community and institutional levels. Information collected on education include: any existing education emergencies and affected children. The belg assessment was conducted by a multi-agency team composed of Federal and Regional government, UN agencies, and NGOs and was led by the DRMFSS.

### 4. Result

#### 4.1 Socio-demographic profile

The six belg beneficiary woredas (Raya-Azebo, Raya-Alamata, Ofla, E/mekoni, E/alaje and H/wejerat) are found in southern and southeaster zone of Tigray. The total population of the six woredas is about 796,189 this comprised of 16.1% of the total population of Tigray region. Among the overall assessed woredas, there were no internally as well as externally displaced peoples and there is no community residing in refuge.

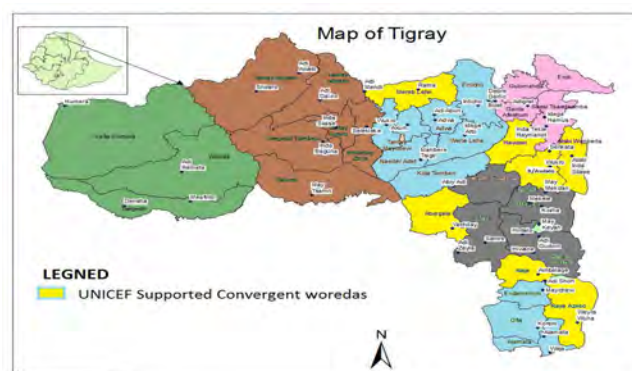
Table 7.1 shows the population distribution by sex and age in six woredas of Tigray region from January- may, 2013

Sr.no	Name of woredas	male	female	total	Under five	Women of reproductive age(15-49yrs.)	Pregnant women
1	E/Alaje	61344	63847	125192	18275	29545	4381
2	Raya Azebo	77620	80144	157764	23034	37232	5364
3	Raya Alamata	48703	50287	98990	14452	23243	3369
4	Ofla	70393	73271	143668	20975	33733	4884
5	E/mehoni	48193	50161	98354	14359	23211	3442

6	H/Wejerat	84388	87833	172221	25143	40471	6546
7	total	392229	403959	796189	116241	187435	27986

Fig 7.1 the belg assessment conducted in six woredas of Tigray region from jan.-

may/2013



## 5.2 public health

### Public health emergency coordination and response

In all of the woredas visited ,they have been conducted a multi sect oral PHEM coordination forum in which it indicated the existence of a functional epidemic committee consisting of all sectors involved in the belg assessment. However, only 4(66.6%) of the total woreda health offices assessed had a written document for PHE 'preparedness' and response plan and 83.3% of them had not a trained rapid response team. In addition to this 2(33.3%) of the total woreda visited has responded as having an access to the emergency response fund from the woreda by itself as well as other partners that notified them. However, none of them did not allocate a budget for preparedness' and response activities except Raya Azebo woreda that they had. In most of the woredas, the timeliness and completeness of weekly reportable diseases was 100%.

### Public health burden

The health burden of the community among the overall assessed woredas was similar in which the major causes for the occurrence of those specific diseases were due to low safe water supply, proper sanitation and hygiene practices and shortage of rain fall that can be associated with the prevalence of SAM , pneumonia, dysentery, typhoid fever and so on.

#### A) Top five leading causes of morbidity

In most of the woredas, pneumonia and diarrheal diseases were the leading causes of morbidity that affected the children as well as adults in addition to this; malaria and AURI were the most

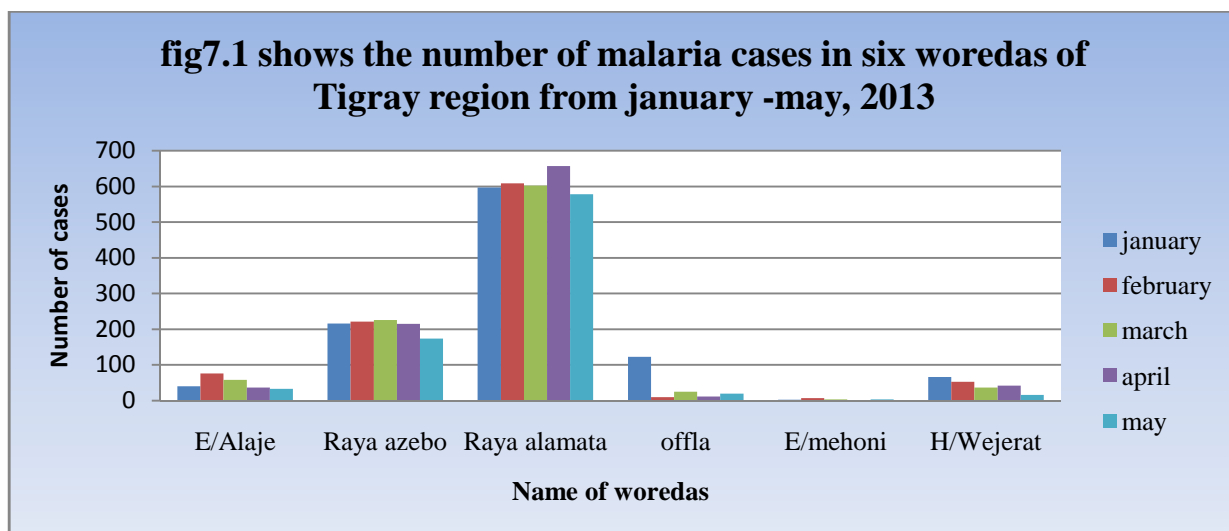
common diseases in low land areas (raya Azebo and raya Alamata woreda) and highland areas (in four woredas) respectively.

Woreda Name	Under 5 Morbidity				
	1	2	3	4	5
E/Alaje	diarhea ( non - bloody ( 1435)	pnuemonia( 1193)	AURI (1018)	Dysentery (470)	skin diseases ( 420)
R/Azebo	Diarhea ( non - bloody ( 1435)	RTI	AFI	malaria	eye diseases
R/Alamata	malaria(2297)	AFI (10860 )	AURI(1071)	diseases ofmosculoskeltal system (902)	trouma (497)
Ofla	pneumonia(541)	diarhea (non- bloody) (251)	diarhea with dhydration(140)	AURI(134)	dysentery(80)
E/mekoni	pneumonia(1090)	diarhea non bloody (975)	AURI(509)	Diarhea with dhydration(474)	unspecified diseases(397)
H/wajerat	pnuemonia(1228)	diarhea non -bloody(979)	AURI(518)	Dysentery(300)	diarhea with dhydration(245)

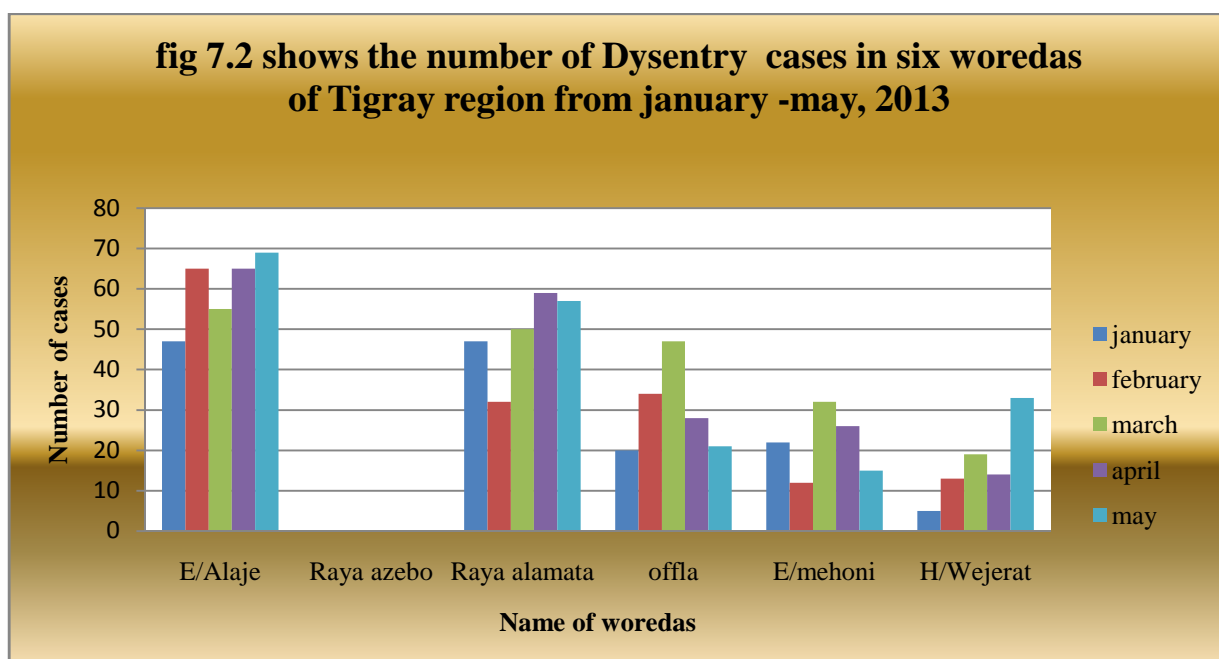
Woreda name	Above 5 Morbidity				
	1	2	3	4	5
E/Alaje	Dyspepsia(1909)	AURI (1767)	unspecified diseases of the eye (1490)	single spontaneous delivery(1227)	trouma (1088)
R/Azebo	RTI (2611)	AFI(1773)	Diarhea(1461)	I/P (1103)	Mlaria (755)
R/Alamata	malaria (3043)	AFI (1487)	AURI (1363)	pneumonia (1014)	diarhea ( non - bloody)925)
Ofla	pneumonia(540)	AURI(496)	Diseases of the musculoskeletal system and connective tissues (331)	AFI (330)	trauma(309)
E/mekoni	AURI(1124)	diseasesof the musuloskeletalssystemes (492)	trauma(458)	Dyspepsia(423)	AFI(374)
H/wajerat	AURI(2727)	unspecified infectious diseases and parasitic diseases	dyspepsia(1184)	urinary tract infection(731)	AFI(721)

## B) Trend of weekly reportable diseases

**Malaria:** the prevalence of malaria was stable in most of the woredas visited during belg season except Raya-Azebo and Ofla woreda which indicated a pick number of cases in April and January respectively; however the trend of malaria cases has decreased compared to the previous years.



**Dysentery**; as shown from the figure, the trend of dysentery cases during belg season was fluctuating from month to month except H/wejerat woreda that showed an increment of cases until April and an inclined upward of the highest number of cases at the end of May.



### C) Suspected Outbreak

**Typhoid fever**; even though it was not among the top five leading causes of morbidity in all woredas, there were an outbreak in raya Azebo(two kebelles) and ofla woreda (three kebelles) during march, 2013 that affected 44 and 126 peoples with no deaths respectively. Raya Azebo woreda has identified the risk factor as being it was due to pollution of water sources but not the

remaining woreda. However both of the woredas has taken an intervention by conducting a sanitation campaign and treating the patients.

**Measles:** In Tigray region including these woredas visited for 'belg 'assessment, a supplementary immunization activity was carried out in May 22-26, 2013, focused on measles vaccination for 6-59 months age group. Consequently, the measles vaccination coverage was achieved greater than 100% in all woredas. However there were clinically suspected measles cases of children in raya Azebo woreda during February 1case and on March 2 cases. Additionally, it was reported 3 cases from E/alaje woreda and 1 case from H/wejerat woreda at the end of May, 2013 but there were no deaths among the patients of these clinically suspected measles cases .as a result, a blood sample taken from all the patients have been sent to EHNRI on time. They have also conducted an active surveillance for searching an additional case and controlled it.

**Rabies:** as the response of H/wejerat woreda health office, rabies was an on-going outbreak in the last three years. Notably, 5 adult males were bitten by clinically suspected dogs as having rabies virus in one kebele (hintalo) during May, 2013. As a result, all of them were admitted to Mekelle hospital for follow up. Furthermore, the woreda public health emergency was coordinated on the assessment of rabies dogs at household level and all health workers were committed to give a health education on different areas where the community could be assembled.

#### **D) Emergency drugs**

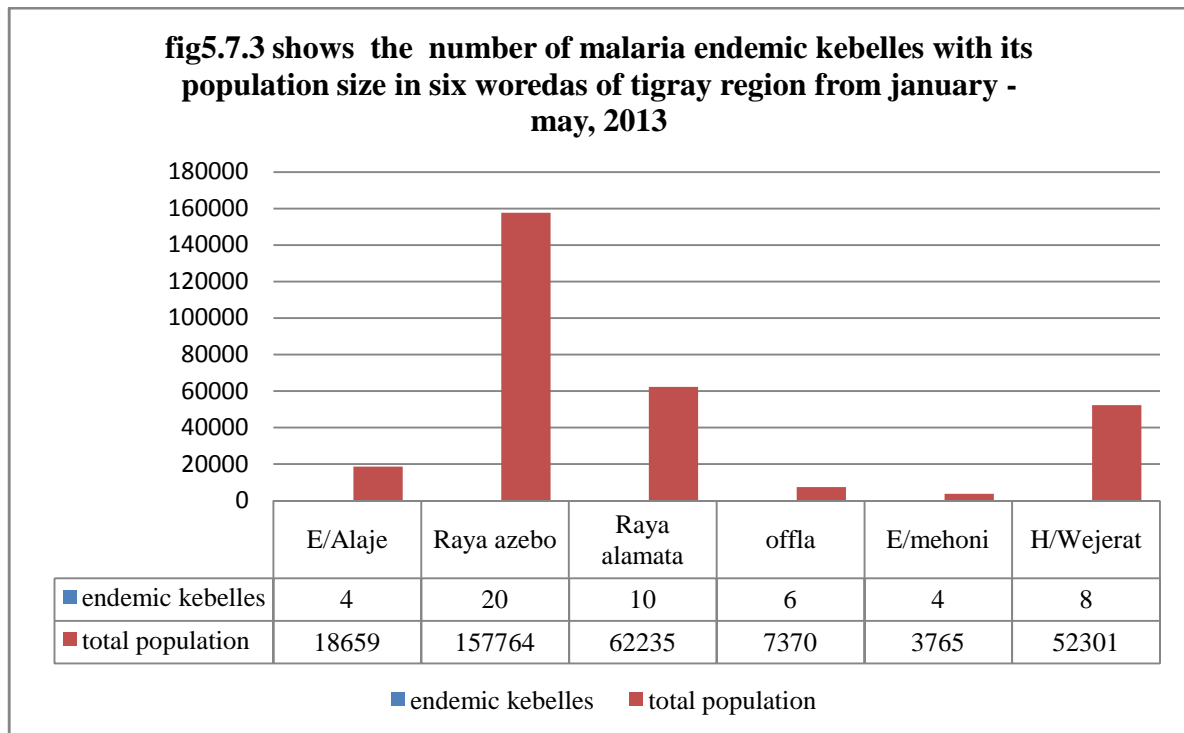
There were no a balanced sheet for the consumption and received tracer drugs in each month. As a result it hindered to use the stock matrix whether the availability of emergency drugs were below or above the standard. However all the list of tracer drugs that could serve for public health emergency were available and easily accessible to all health facilities in the total woredas visited during belg season except to that of CTC kit which is used for AWD in all woredas and amoxicillin in Endamehoni woreda.

#### **E) Public health threats**

Due to the existence shortage of rain fall and low provision of safe water supply in most of the woredas visited for belg assessment, it is supposed an increment of diseases related with hygiene and sanitation, nutrition (balanced diet), water associated diseases and a displacement of peoples (Immigration) to epidemic prone areas, like high prevalent malaria areas.

1) **Malaria:** There are a total of 302,094(37%) populations at risk for malaria .However, the ITNs, IRS and other prevention and control activities were not available in 4 woredas except in raya

Alamata and raya Azebo with a total of 219,999 (72%) populations at risks and > 80% coverage in the distribution of insecticide net and indoor residual spray . The health worker assigned to surveillance focal person has taken training on the new malaria guide line in which it was available in all health facilities of the overall assessed woredas but some of the woreda responded the existence of depleted prevention and control activities due to the engagement of all health workers in other activities like, raya Azebo woreda. Therefore, the prevalence of malaria may be increased throughout the year.



**2) Meningitis:** Eventhough, there were no an outbreak of meningitis in the past three years in all woredas assessed during the belg assessment, the public health emergency department should be motivated on the assessment of meningitis cases on hot areas of the woredas as long as there hadn't been conducted a vaccination till now and there were a shortage of rain fall that leads for an increment of the surrounding temperature in case suitable for the agent. In addition to this, the laboratory supplies (LP set), a trained health worker on meningitis outbreak management and meningitis outbreak control guide line were not available in all health facilities of the total woredas visited which could be difficult for early detection and management of the cases..

**3)AWD:** as long as the latrine coverage, latrine utilization and safe water supply were not achieved in a parallel manner in all kebelles of the overall woredas visited, the community may not create a herd immunity towards cholera outbreak even though all woredas were not

experienced an outbreak of AWD still. Moreover, the unavailability of CTC kit and cholera outbreak control guide line in all woredas can contribute in aggravating the cases to different nearby areas during the occurrence of an outbreak.

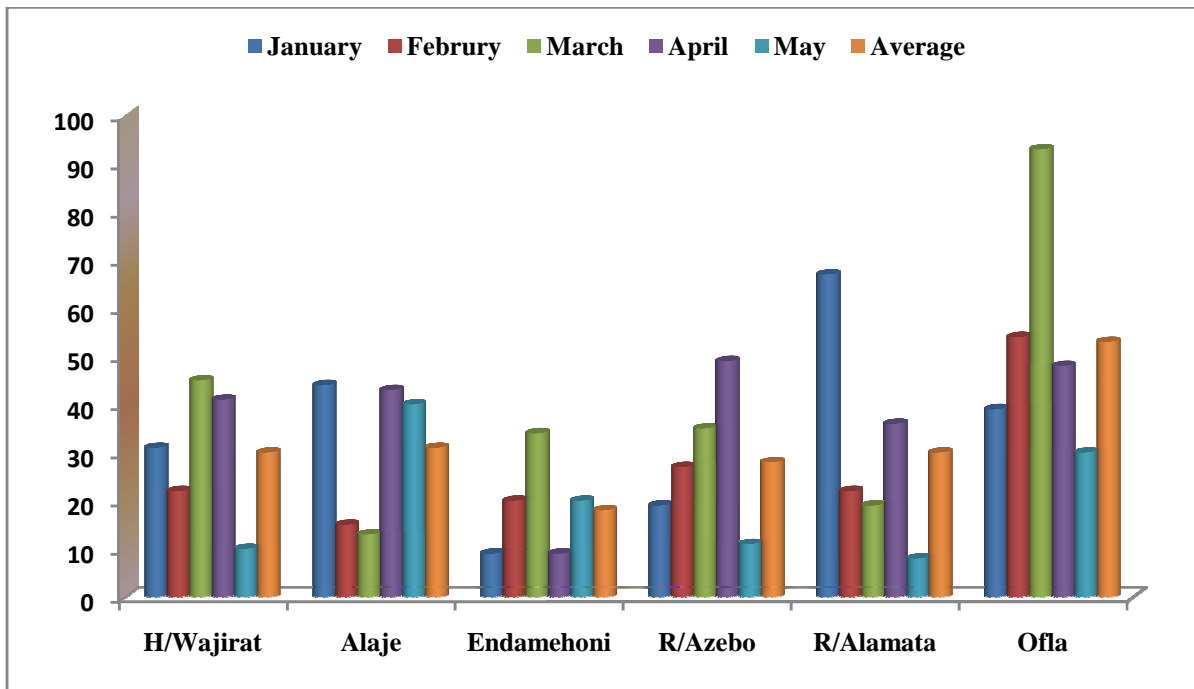
**4) Measles;** due to the shortage of rain fall in most of the woredas there could be a high mobility of community for food searching .so that, the clinically suspected measles cases will aggravate to other areas because measles is a highly contagious disease.

## **5.2. NUTRITION**

The nutrition situation, based on the TFP admission and CHD screening results from January to May 2013, in the six Belg benefiting Woredas was stable. The total number of severe cases admitted in six months in Ofla, Alaje and Raya-Alamata were relatively higher than the rest of three Woredas. Comparing with the TFP admission reports of last year, the total number of severe cases this year has increased in two Woredas (Hintalo-wejerat and E/Alaje) but decreased in the other four Woredas. Standard nutrition survey, as part of the bi-annual nutrition survey activity, was also conducted in Raya-Azebo in May 2013 and prevalence of the acute malnutrition (wasting) was 6.5% (4.7 – 8.8 95% CI) that showed acceptable level.

### **Outpatient Therapeutic Feeding Program (OTP/TFP)**

TFP data were collected from 128 OTP sites (25 from Hintalo-Wejerat, 21 from E/Alaje, 15 form Endamehoni, 20 from Raya-Azebo, 20 from Raya-Alamata and 26 from Ofla) from the month of January through May 2013. A, total of 973(264 from Ofla, 155 from E/Alaje, 152 from Raya Alamata, 149 from Hintalo wejerat, 141 from Raya-Azebo, and 92 form Endamehoni) severe cases of children aged 6 to 59 months were admitted and treated in five months' time. On average, about 191 severe cases from six Woredas and 32 severe cases from each Woreda were admitted on monthly basis. Out of the six assessed Woreda, Ofla, E/Alaje and Raya-Alamata scored the highest with reported severe cases of 264, 155 and 152 respectively. The average monthly admission of severe cases in the three Woredas stipulated above hit 53, 31 and 28 respectively.



**Fig7.4 TFP admission cases &trends of the six Woredas (January – May 2013)**

There had been an expected trend of increment of severe cases in the month of January (in Raya-Azebo) and March and/or April (in all the six assessed Woredas) following community mobilization and active case finding through the quarterly CHD screening exercise carried out in December 2012 and March 2013. The top two monthly admission cases were reported in Ofla (March) and Raya-Alamata (January) with 93 and 67 severe cases respectively.

Comparing the TFP data of this and last year, the TFP admission of this year showed a decline in ten percent (from a total of 1030 to 953 severe cases in five months in all Woredas). As depicted in the table below, TFP admission trend in the two consecutive years showed an increasing trend in Hintalo-Wejerat and E/Alaje by 18.3 and 18 percent respectively while Endamehoni, Raya-Azebo, Raya-Alamata and Ofla showed a decreasing trend by 42, 26, 3 and 1.5 percent respectively.

Table 7.2 the 2004e.c Vs 2005E.C comparison of OTP admission in six selected woredas of Tigray region

Woredas	OTP admission (2004)	OTP admission in 2005	% (- or +)
HintaloWajerat	126	149	+ 18.3%
Alaje	131	155	+18.0%
Endamehoni	158	92	- 42.0%
Raya Azebo	190	141	- 26.0%
Raya Alamata	157	152	- 3.0%
Ofla	268	264	- 1.5%

### CHD Screening Result

Community Health Days (CHD) screening exercise for Children aged 6-59 months and Pregnant & Lactating Mothers (PLM) was carried out in March 2013. Two screening results (March 2004 & 2005) were considered to compare the nutritional status and observe the trends.

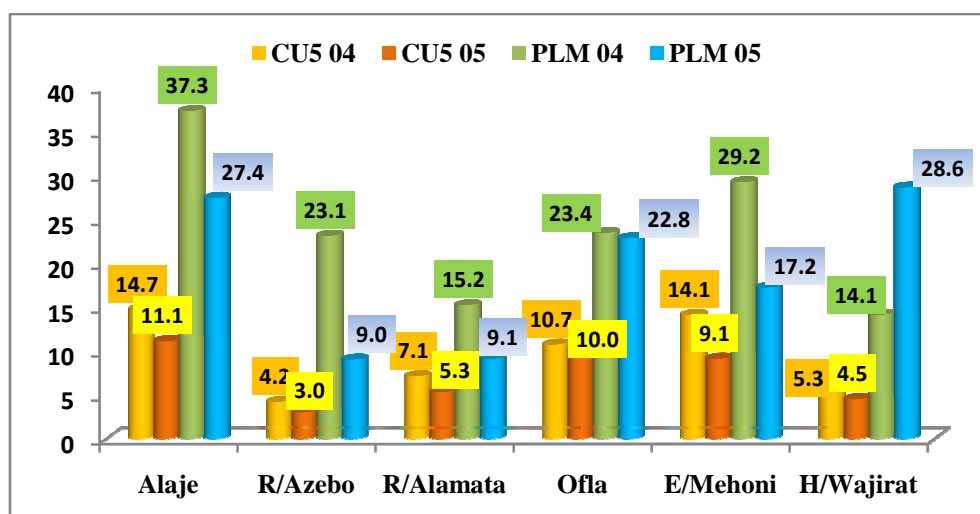


Fig 7.5 CHD screening result of children U5 (CU5) and PLM for March 04 & 05

The reporting coverage for children under five for each Woreda from January to May was good, which is above 80 per cent. On average, the reporting coverage for PLM for the six Woreda for last year and this year were 66.6 and 71.8 per cent respectively. March 2005 CHD screening result showed that the prevalence of malnutrition in children aged 6-59 months in each assessed Woreda ranged from 3.0 to 11.1 per cent with an average value of 7.2 per cent. Compared to the same

month of last year, the malnutrition level of children under five for 2005 showed a slight decline trend in all Woredas. The prevalence of malnutrition for PLM for this year ranged from 9.0 to 28.6 per cent. Compared to the same month of last year, prevalence of malnutrition of PLM in 2005 showed a significant decrease in five Woredas; however, there has been a significant increase in Hintalo-Wejerat Woreda.

### **5.3. WATER, SANITATION and HYGIEN (WaSH)**

During the assessment the following major causes of WASH related emergencies were observed in the six visited woredas:

- Drought (Yield of Borehole, shallow wells, hand dug well and springs decrease or become dry)
- Old life span of schemes (old mono pumps >20 years old) especially in Raya-Azebo and Alamata woredas and Shortage of spare parts
- Over operation due to large number of beneficiaries which leads to non-functionality of schemes
- Poor potential of ground water due to geology, topography and accessibility problem in remote areas
- Low community awareness towards utilization of House hold water treatment chemicals

As in most part of Tigray the water supply source of the six visited woredas depends on ground water in the form of deep wells, shallow wells, hand dug well and springs. However due to recurrent drought a number of schemes decreased their yield and others become dry. During the assessment, about 67,240 people from Raya-Azebo, H/wejerat, Raya-Alamata and E/alaje woredas are seriously affected by shortage of water supply and about 13,517 are at risk. Especially in Raya-Azebo and H/wejerat woredas, there has been recurrent drought consecutively for more than 3 years as a result these two woredas are highly affected. Out of the total number of affected population 57% are from Raya-Azebo and 30% are from H/wejerat. In Ofla and E/alaje woredas even though there is chronic type of water shortage relatively the current water supply situation is better from emergency point of view.

Due to shortage of water, communities are forced to use unprotected water sources, and traveling long distance (3-6km) in search of alternative water sources and there is exposure to water born disease. Mostly women and children are vulnerable to the situation. The most affected kebelles, hazard type and number of affected population in each woreda is depicted in the table below.

**Table 7.4 Hazard Type and number of population affected/At Risk of WASH emergency in six woredas of Tigray region from January-may/2013**

Woreda name	Emergency type and number of population						
	Hazard type	No of affected Kebeles	Affected Population		At risk population		Total
			Male	Female	Male	Female	
Raya Azebo	Drought	8 (Hawelti, Genete, Mechare,tsigea, Erba, Horda,Wargiba,Maru)	20,240	21,066			41,306
Raya Alamata	Drought	4 (Tao, Limat, L/dayu, S/wuha)	1,450	1,673			3,123
E/Alaje	Drought	2 (Atsela, Sesat)	550	470			1,020
H/wejerat	Drought	7 (Tshefti, A/keyih, Senaele, Gonka, Sebera,B/tseba,A/mesn o)	9,403	12,388	6,229	7,288	35,308
Total		21Kebeles	31,643	35,597	6,229	7,288	80,757

**Table 7.5 Status of Water Supply Schemes in six woredas of Tigray region from January-may/2013**

Name of Woreda	# of affected Kebeles	No of functional and non-functional water supply schemes in Affected Kebeles									
		Deep well		Shallow well		Hand dug well		Spring		Total Functional	Total NF
		F	NF	F	NF	F	NF	F	NF		
Raya-Azebo	8	3	2					1		4	2
Raya-Alamata	4	14	2	10	3	3				27	5
E/Alaje	2			12		2	1	18	3	32	4
H/wejerat	7	3	2	38	9	59	52	12	19	112	82
Total	21	20	6	60	12	64	53	31	22	175	93
Total F+NF		268									

Out of the 289 schemes found in the 21 affected kebeles 93 (32%) are non-functional mainly due to drought. Shortage of spare parts to maintain damaged schemes; poor potential of groundwater due to geology & topography and accessibility problem in remote areas have also contributed to the current WaSH emergency situation of the visited woredas.

The household latrine coverage of the visited woredas is much better than the water supply coverage. The latrine coverage for each woreda is 70%, 89%, 92%, 93%, 93.8% & 97% for Ofla, H/wejerat, E/Alaje, Raya-Alamata, Raya-Azebo and E/mekoni woredas respectively; however proper latrine utilization and hand washing practices are limited in all the six woredas.

**Table 7.6 Water Supply status in affected Schools and Health Institutions in six woredas of Tigray region from January-may/2013**

Woreda name	Affected no of Schools	Affected no of Students		No of Students At Risk		Affected no Health Institutions	
		Male	Female	Male	Female	Health center	Health post
Raya-Azebo	5 (Maru, Beru, Ulaga, Dardarba, Late)	1259	1273	-	-	2	6
Raya-Alamata	3 (Gedera, Harle, Chameda)	665	588	-	-	1	5
Ofla	6 (Milleniumofla, Dinka,Guara,Mic hmicha,Tsiglwa, daramariam)	1699	1605	-	-	3	3
E/mekoni	2 (Ashera,Endirka)	-	-	451	490	1	4
E/Alaje	6 (Girakebero,Kola sesat,Dequasesat, Elbat,Mebal,kola habat)	1636	1499	-	-	0	1
H/wejerat	14 (Tsehafti,Atsimba ,waren,Mamat,Zi gadle,A/keyih,she kabeda,gonka,gra nberomkian,daere ta,senaele,genti,h adawdi,hadale)	3861	3991	-	-	2	5
Total	36	9120	8956	451	490	9	24

UNICEF, JICA, World bank, Catholic, Africa Development Bank, REST, Orthodox Church, Action aid and Co-WaSH are the major non-governmental organizations involved in WASH interventions (Construction of new WASH facilities, Rehabilitation and maintenance, Capacity building) activities in the visited woredas. Even if those humanitarian organizations are involved the problem of WASH issues still persists due to its high level magnitude.

#### 5.4. EDUCATION

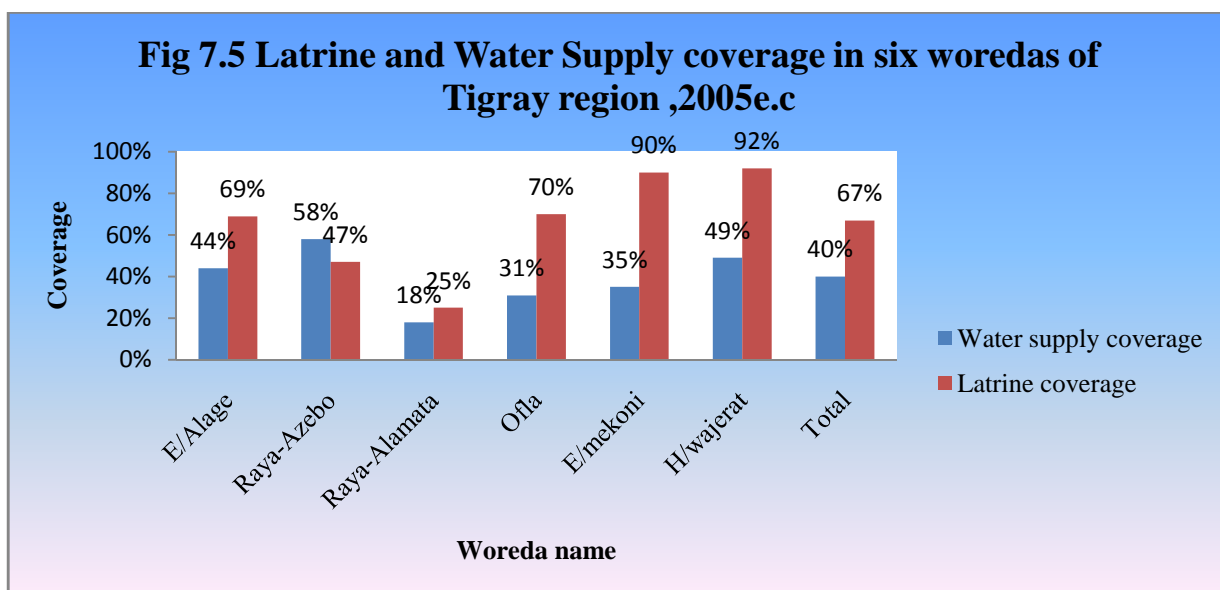
In the assessed six woredas there are 338 elementary schools and 14 secondary schools and all are regularly functioning schools. The total number of students enrolled in grade one through grade eight has decreased compared to the previous year in all the visited woredas except E/alaje woreda in which it showed increment by 835 students in this year.

**Table 7.6 the dropout rate of students in six woredas of Tigray region from January-may/2013**

Woreda name	Enrolment in 2004 E.C	Enrolment in 2005 E.C	Total number of dropout rate in 2005 E.C	Remark	Water supply coverage (%)	Latrine coverage(%)
E/alaje	24464	25297	493 (1.9%)	835	69	44
R/Azebo	30549	28611	831 (2.9%)	-1938	47	58
R/Alamata	20479	19959	544 (2.7%)	-520	18	25
Ofla	28164	26720	1083 (4.1%)	-1444	31	70
E/mekoni	21512	20713	242 (1.2%)	-799	35	90
H/wejerat	38284	37352	359 (.96%)	-932	49	92
<b>Total</b>	<b>163452</b>	<b>158652</b>	<b>3552 (2.2%)</b>	<b>-4800(2.9%)</b>	<b>40</b>	<b>67</b>

#### Status of WaSH facilities in Schools

In general the water supply coverage in schools in the assessed woredas is low which ranges from 18% in Raya-Alamata to 58% in Raya-Azebo woreda. Relatively the latrine coverage exceeds the water supply coverage which ranges from 25% in Raya-Alamata to 92% in H/wajeratworeda.



## 6. Discussions and conclusions

During this Belg season, even though the rain fall started on time there was interruption throughout the belg seasons and the amount & distribution was very low except in those four kebelles found in oflla woreda that harvested relatively good crop. As a result there has been drought affected wide or pocket areas that consequently would lead to severe consequences on health and welfare of the population among which include malnutrition due shortage of food, communicable disease, and disease outbreaks that subsequently could lead to increased morbidity and mortality. In addition to this, the low performance of PHEM activities has influenced to an increase in health and health related problems in majority of these woredas such as, malaria, typhoid fever, diarrhea and others. This public health threats may be aggravated due to the existence of shortage of rain fall. The shortage of supplies for prevention of meningitis and the absence of rain fall in majority of these assessed woredas can result for the occurrence of meningitis cases in these high land areas.

The major sources of safe water supply in the visited woredas is ground water in the form of deep wells, Shallow wells, Hand dug wells and springs. As mentioned in all the visited woredas the Belg season rainfall is low in amount and distribution and was not sufficient for both crop

production and groundwater recharge. AS a result, there were an increase of SAM in hintalo wejerat and Alaje woredas and an outbreak of Typhoid fever in Raya Alamata and ofla woredas.

Similar to the community water supply a number of schools and Health institution in the visited woredas are affected by critical water supply shortage due to different reasons (Drought, poor management & non functionality, budget constraint etc). From the 36 schools with critical water supply problem about 18,076 students are affected and 941 are at risk. Especially the water supply shortage creates problem in schools which have school feeding program example in H/wajeratworeda. Also 33 health institutions (9 health centers& 24 health posts) in the visited woredas have critical water supply problem. Regarding latrine coverage in both institutions most of the institutions have latrine but most of them are single block. However for most of them the latrine condition was poor.

In the assessed woredas about 3552 students have terminated their education. According to the education Bureau standard this is acceptable and normal and as compared to last year the dropout rate is decreased. The reasons for dropout are mainly:

- ✓ The need of parents to engage their children on other works rather than sending them to education due to poor production
- ✓ Increased Students interest to find their own income example migrate to other places to find jobs
- ✓ Low awareness of parents and student towards education

## **7. Recommendations:**

- All woredas should have a budget for PHEM
- The health worker needs a training on specific diseases (malaria, AWD, Meningitis)
- LLITN and IRS should be available in all malaria endemic areas
- Scale up community mobilization activities and active case finding
- 3 water trucks needed for Raya-Azebo woreda to minimize the water supply problem
- New water schemes should be constructed in these affected areas
- Rehabilitation and maintenance should be implemented in non-functional water schemes
- Capacity building is required for water, sanitation and hygiene committee to sustainably manage their schemes
- Institutional WaSH facilities should be fulfilled in low coverage areas

## CHAPTER-9 EPIDEMIOLOGICAL RESEARCH PROJECT PROPOSAL

### 9.1 THE RDT PREVALENCE AND ASSOCIATED FACTORS OF MALARIA DISEASE AMONG WORKERS OF WELKAYT SUGAR FACTORY, TIGRAY REGION MAY-JUNE/2014

T.HILUF (Bsc.)<sup>1</sup>, T.ZEGEYE (Bsc.MPH)<sup>3</sup>, G.AYNALEM (MD, MPH)<sup>4</sup>

#### Executive summary

**Introduction;** Welkayt sugar factory has started working in June, 2013, found in western zone of Tigray region, Ethiopia. There are 7,249 permanent workers including 2,494 women and 4,755 men. It is located at an altitude of 788 meter above sea level. The average annual temperature is 29.9<sup>0</sup>c and there is 16.04mm of annual rainfall. Malaria remains a leading cause of death and ill-health in the developing world. According to the World Health Organization (WHO), there were more than 219 million cases of malaria in 2010, claiming 660,000 lives. At the Welkayt sugar factory, malaria is one of the leading causes of morbidity throughout the year. The monthly prevalence of malaria was dramatically increased from 0.24 % (2) in July/2013, 4.7 % (38) in August/2013, 7.6 % (61) in September/2013 to 30.2 % (241) in October/2013. However, since the coverage of LLITN among the workers of the factory was reportedly nearly 100%, further investigation is needed to understand the unexpectedly high burden of malaria disease. This will be the first special epidemiological investigation study conducted in this area. The target of this study is to identify the incidence of malaria disease for respective parasite species and the risk factors for malaria disease among workers at the Welkayt sugar factory, Tigray region, Ethiopia.

#### Methods

**Study area:** it will be conducted in Welkayt sugar factory from April- June; 2014.

**Study design:** we designed a descriptive cross-sectional for RDT prevalence and an unmatched case-control study will be used to assess the potential risk factors of malaria.

**Sampling procedure:** we will use a multi stage sampling method in which, from a total of 11 sectors, 5 of them and the individuals for cross-sectional study will be selected by systematic random sampling method. Then, for as well as the cases and controls will be recruited by simple random sampling method.

**Sample size:** a total of 476 study subjects will be selected for RDT prevalence study, Then, from these study subjects, 137 cases and 274 controls (1 case: 2 control) a total of 411 subjects will be enrolled to the study.

**Data collection tools and methods;** a trained data collectors and supervisors will be deployed for 8 days in the study area to perform their overall activities. The data will be collected through face to face interviewing using a structured questionnaire and reviewing documents. A blood specimen also collected from individual study subjects for RDT. The supervisors will monitor them in daily basis to check the data quality.

**Data Entry and Analysis:** Data will be entered by principal investigator using Epi Info™ version 7.0.9.7 .to describe and analyze the variables.

**Ethical Considerations:** The study will first require IRB approval, to ensure a proper informed consent process for study participants.

**Result dissemination plan:** it will be presented to AFENET CDC trainee grants program and AAU, SPH, EFETP at the end of July/2014.and disseminated to all health institutions based upon their hierarchy after the permission of EPHA for publishing this material.

**Budget and work plan:** The activities will be started in February, 2014 to perform it by the end of June; 2014.A total of 85,250 ETB with a contingency of 5% of the total is required for the expense of personnel, supplies, transport and training hall.

## **1. Introduction**

### **1.1 Background information**

Welkayt sugar factory has started working in June, 2013, found in western zone of Tigray region, Ethiopia .there are 7,249 permanent workers including 2,494 women and 4, 755 men. It is located at an altitude of 788 meter above sea level .The average annual temperature is 29.9<sup>0</sup>c and there is 16.04mm of annual rain fall. . The factory is divided in to 11 sectors which are 3-5km distant from the health facility (clinic) that serves the entire factory where there are 21 health professionals, adequate water supplies and 24 hours of electric power service.

### **1.2 Statement of the problem and justification/significance of the study**

Malaria is transmitted by the bite of the Anopheles mosquito which carries infective sporozoites stage in its salivary glands which it injects into the human blood stream during a blood meal. (1). There are about 400 different species of Anopheles mosquitoes, but only 30 of these are vectors of major importance (2). Malaria is caused by five species of parasites of the genus Plasmodium that affect humans (P. falciparum, P. vivax, P. ovale, P. malariae and P. Knowles). Malaria due to P. falciparum is the most deadly form and it predominates in Africa; P. vivax is less

dangerous but more widespread, and the other three species are found much less frequently. (3) *P. vivax* has a wider distribution than *P. falciparum* because it is able to develop in the *Anopheles* mosquito vector at lower temperatures, and to survive at higher altitudes and in cooler climates. (2)

Transmission also depends on climatic conditions that may affect the abundance and survival of mosquitoes, such as rainfall patterns, temperature and humidity. In many places in Ethiopia, transmission is seasonal, with the peak during and just after the rainy season. (4)

It is seasonal in most parts of Ethiopia, with unstable transmission that lends itself to the outbreak of epidemics. The transmission patterns and intensity vary greatly due to the large diversity in altitude, rainfall, and population movement; areas below 2,000 meters (m) are considered to be malarious (or potentially malarious). Those areas are home to approximately 68% (52 million) of the Ethiopian population and cover almost 75% of the country's landmass. (5)

At the welkayt sugar factory, malaria is one of the leading causes of morbidity throughout the year. The monthly prevalence of malaria was dramatically increased from 0.24 % ( 2) in July/2013, 4.7 % ( 38) in August/2013, 7.6 % ( 61) in September/2013 to 30.2 % ( 241) in October/2013. However, since the coverage of LLITN among the workers of the factory was reportedly nearly 100%, further investigation is needed to understand the unexpectedly high burden of malaria disease. This will be the first special epidemiological investigation study conducted in this area. The target of this study is to identify the incidence of malaria disease for respective parasite species and the risk factors for malaria disease among workers at the Welkayt sugar factory, Tigray region, Ethiopia.

**Overall**, 68% of households in malaria-endemic areas (Ethiopia) were protected by at least one ITN and/or Indoor residual spraying of households with insecticides. It is believed that the vector control interventions have contributed greatly to a reduction in the burden of the disease. However, there is no a reduction in prevalence of malaria disease with high coverage of ITN among the workers of the factory .In addition to this, this area is mentioned under the malarious part of Ethiopia (<2000m above sea level) which needs a study. Because, there is no study conducted in this area before this. So that, the target of this study is to identify the prevalence of malaria disease with respect to their parasite species and the risk factors simultaneously associated with malaria in welkayt sugar factory, Tigray region, Ethiopia.

## 1.2 Literature review

Globally, an estimated 3.4 billion people are at risk of malaria. WHO estimates that 207 million cases of malaria occurred globally in 2012 (uncertainty range 135–287 million) and 627 000 deaths (uncertainty range 473 000–789 000). Most cases (80%) and deaths (90%) occurred in Africa and most deaths (77%) were in children under 5 years of age. In the Region of the Americas, reductions in incidence of >75% in microscopically confirmed malaria cases were reported in 13 out of 21 countries with ongoing transmission between 2000 and 2012. However, an increase in locally acquired cases, from 35 in 2000 to 59 in 2012, was reported from Algeria. (2) In 2012, 135 million people (4% of the global population at risk of malaria) were protected by IRS worldwide. In the African Region, the proportion of the population at risk that was protected rose from less than 5% in 2005 to 11% in 2010, but fell to 8% in 2012, with 58 million people benefiting from the intervention. The decrease in the number of people protected by IRS in Africa appears to be partly due to increased use of more costly non-pyrethroids insecticides (in response to the threat of insecticide resistance) in a setting of limited IRS budgets. The use of non-pyrethroids for IRS may become increasingly important as a resistance management tool, because all currently approved LLINs are pyrethroids based. According to the global report 2013, the proportion of households in sub-Saharan Africa owning at least one ITN increased steadily, from 3% in 2000 to 56% (range 53%–60%) in 2012, with the most dramatic increase occurring during 2005–2010 (Figure 4.2). The rate of increase in the estimated proportion of households owning at least one ITN has slowed recently; it decreased slightly, to 54% (range 49%–60%), in 2013. The decrease is probably related to the lower number of ITNs delivered to countries during 2011 and 2012, coupled with attrition of ITNs (due to loss and physical degradation), which reduces the supply of available nets. In 2013, the estimated proportion of the population with access to an ITN reached 42% (range 38%–47%) and the proportion sleeping under an ITN reached 36% (range 33%–41%). (3)

Clinical data have suggested an increased risk of malaria caused by proximity to urban agriculture, generally defined as irrigated farmland dedicated to commercial vegetable cultivation. Urban agriculture (UA) irrigation techniques in sub-Saharan Africa have inadvertently created new mosquito breeding grounds, thereby increasing malaria risk in rapidly growing urban centers where anopheline vector densities were lower because of limited availability of suitable breeding sites (6).

According to Berrang-Ford et al. (2012), Health care professionals concurred that the place Batwa face a significantly higher malaria burden despite the application of prevention measures ranging from promotion of long lasting insecticidal nets (LLINS) to indoor residual spraying (IRS)

and integrated vector management (IVM) (7). According to the Government of Uganda, low income households are also more exposed because poor quality housing is prone to mosquito entry and consequently, there are less means for preventive action (8). Further study has illustrated the increasing prevalence of malaria to be associated with warming temperatures and higher frequency of the disease in the local mosquito population (7).

According to MIS in Ethiopia, 2011, the results indicate that 55.2% of households have at least one mosquito net (of any type), and 54.8% of households have at least one long-lasting insecticidal net (LLIN). IRS had been conducted in 46.6% of households in the last 12 months preceding the survey.

Malaria parasite prevalence in areas <2,000m was 1.3% by microscopy blood-slide examination for all ages, with 1% of these being *Plasmodium (P.) falciparum* and 0.3% being *P. vivax*. Similarly, RDTs indicated the prevalence of infection to be 4.5% among all ages (9).

Overall *P. falciparum* prevalence was 14.5% (95% CI 12.7-16.3) in which 43.6% (95% CI 38.5-48.8) of children did not have a mosquito net, 50.6% (95% CI 45.4- 55.7) had an LLIN, 1.1% (95% CI 0.5-2.5) an insecticide-treated net and 4.7% (95% CI 3.1-7.0) an untreated net. Children in the younger age group (6 months-4 years) were more likely to sleep under an insecticide-treated mosquito net than children in the older age group (5-13 years) (10).

In Ethiopia, the overall prevalence of a positive blood slide (any species) was 4.1% (95% CI 3.4-4.9) in which it varied greatly by region, being 4.6% (95% CI 3.8-5.6) in Amhara, 0.9% (95% CI 0.5-1.6) in Oromia and 5.4% (95% CI 3.4-8.5) in SNNPR .

The malaria species seen most frequently was *P. falciparum*: 52.2% of positive slides had *P. falciparum* only and 8.7% were mixed *P. falciparum* and *P. vivax*. *Plasmodium vivax* only was seen on 41.3% of the positive slides. The overall ratio of *P. falciparum* to *P. vivax* was 1.2 with zonal estimates ranging from 0.9 to 2.1. Overall 37.0% (95% CI 31.1-43.3) of households possessed at least one net; the maximum number of nets owned was 5 and the median was 0. Only 19.6% (95% CI 15.5-24.5) owned at least one LLIN. The mean number of nets of any type was 0.6 (95% CI 0.5-0.7) per house and of LLIN 0.3 (95% CI 0.2-0.4) per house (11).

In Afar region, study has shown 82.5% of the surveyed households had at least one LLIN hanging, and 71.9% had tucked the LLIN(s) under a mattress or other sleeping material (12).



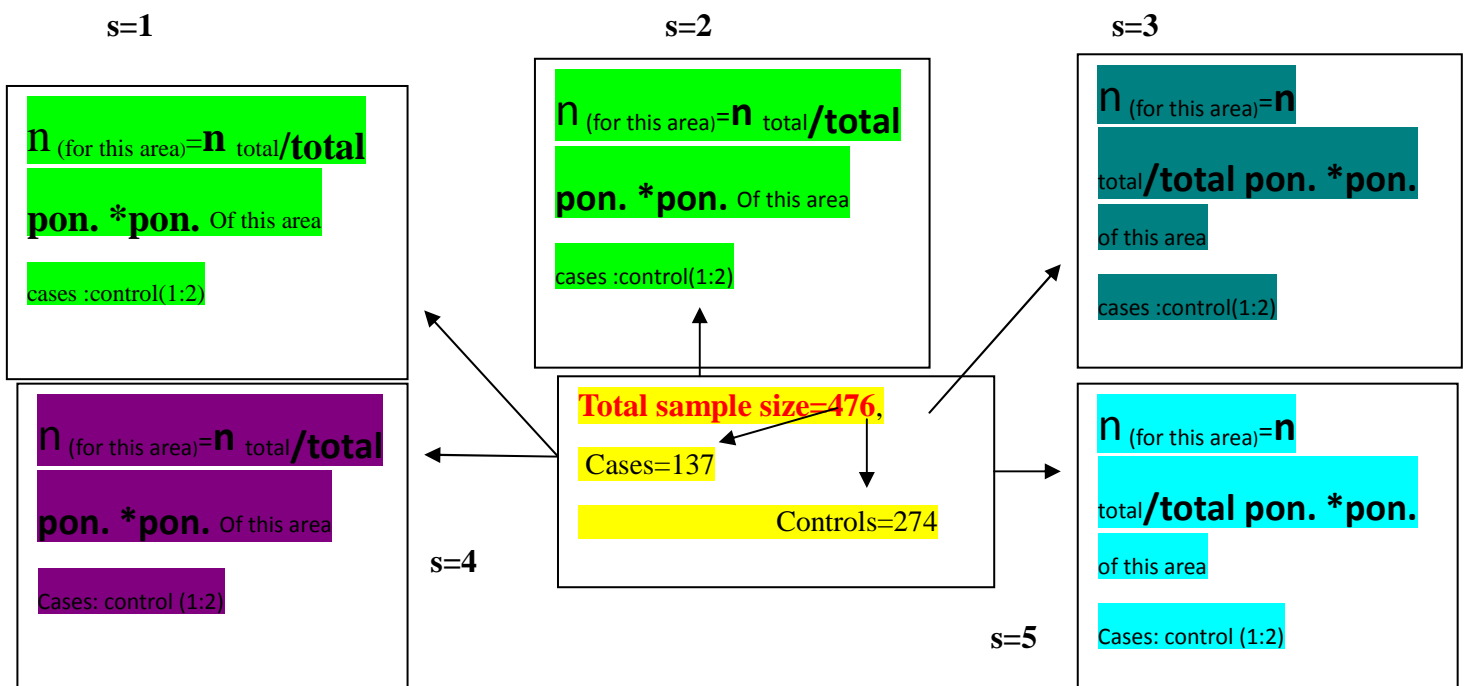
### 3. Methods

**3.1 Study area and period:** The study will be conducted in Welkayt sugar factory from April-June; 2014. This is located in western Tigray region, Ethiopia which consist a total of 7,249 permanent workers. It is 350km far away from Mekelle, capital city of Tigray region.

**3.2 Study design:** We will use a descriptive cross-sectional study to assess the prevalence of malaria using RDT. Consequently, the socio-demographic information, clinical features and risk factors will be collected through a retrospective unmatched case-control study.

**3.3 Sampling procedure:** The study will be conducted using a multi stage sampling method; in which the factory is going to be stratified in to 11 strata according to their sector names and 5 of them will be selected by simple random sampling method. In these selected strata, we will recruit individuals by systematic random sampling method for RDT prevalence. Consequently, the RDT positive(cases) and RDT negative without any febrile illness(controls) will be selected by simple random sampling method to assess the potential risk factors of malaria.

**3.4 Sample size:** A total of 476 study subjects will be selected for the RDT prevalence study by considering a proportion (survey) sample size determination (i.e, population size=7,249, frequency expected (p) =20%, design effect=2 with 95%CI). Then from these study subjects, 137 cases and 274 controls will be recruited which was computed by unmatched case control sample size determination from a previous study in other areas (OR=3, proportion of exposed controls =20%, power=80% with alpha=0.05).



**N.B s= the sectors that have been stratified in to 5 strata.**

**3.5 Data collection tools and methods;** we will assign data collectors and supervisors after having a training on how to fill the data and checking data quality respectively. They will also stay for 8 days in the study area to perform their overall activities. They will have RDT stationary materials, a structured questionnaire that consists of a demographic information, clinical features, KAP and exposure of the risk factors. A blood specimen will be collected from individual study subjects for RDT .The data will be collected by reviewing the line listing data documented in the health facility and through household visits of both the controls and cases. The supervisors will monitor them in daily basis to check the data quality.

**3.6 Data Entry and Analysis:** Data will be entered by principal investigator using Epi Info™ version 7.0.9.7 .Data will be cleaned and then analyzed for descriptive statistics of the variables on interest and comparison of the risk factors. The statistical significance of the variables will be evaluated by computing through one way ANNOVA tests and further analytical tests using p-value of 0.05 which will be further discussed and interpreted. Finally, we will use a computer based MS-word for write up the research report.

**3.7 Ethical Considerations:** All the process will be started after Permissions is obtained from Addis Ababa University, school of public health. Support letter will be requested from the regional, zonal and health facility officials before the data collection. During the data collection, all data collectors will be obliged to get informed consent of the respondent and all precautions will be taken to confidentially maintain patient’s personal information.

**3.8 Variable specification**

Sr.no	Dependent variables	Independent variables
1	Illness due to Malaria	• Sleeping without LLITN
2	Death due to malaria	• Household without IRS
3		• Stagnant water body near residence
4		• Involved in cultivation of sugar cane
5		• Sleeping outdoor
6		• Migrating from malaria endemic areas
7		• Low awareness on modes of malaria transmission
8		• Unprotected water sources
9		• Unsafe latrine utilization

### 3.9 Operational definitions

- Daily laborer: the workers deployed in the sugar cane factory performing different types of activities
- Line-listing data: the list of cases containing place ,time and age variables
- Malaria cases: these cases identified as having plasmodium species parasites in their blood using RDT
- Controls: these persons of RDT negative for malaria without any febrile illness disease who reside in the compound of the factory
- Household with IRS: these residencies sprayed with insecticides before six months
- ITN users: these persons who sleep under ITN every night

**3.10 Result dissemination plan;** upon the completion of the final research, it will be submitted to AFENET CDC trainee grants program and AAU, SPH, EFETP for review process at the end of July/2014. Consequently, a principal investigator will present the reviewed final research report to those organizations separately. As a result, we will request to EPHA for publishing this material. Finally, it will be disseminated to all health institutions according to their hierarchy (Tigray regional health bureau, welkayt woreda health office, health center of welkayt sugar factory) implement the interventions of controlling and preventing malaria disease based upon the findings.

#### 4. Work and Budget plan

Sr.no	Activities	Time period/2014						
		January	February	Marc	Apri	May	June	July
1	Write up a proposal	***						
2	Submission to mentors	***						
3	Incorporate the comments given by mentors	***						
4	Submission of proposal to AFNET		***					
5	Presentation Of the Proposals(defense)			***				
6	Procurement of research materials				***			
7	Trainings to data collectors and supervisors					***		
8	Data collection						***	
9	Data entry and analysis						**	
10	Write up research report							***
11	Submission of the final version research report							***
12	Presentation of the final research report(defense)							***

Sr.no	Budget Category	Unit Cost	Multiplying factor	Total Cost(ETB)
<b>1</b>	<b>1.Personnel</b>	Daily Wage (including per Diem)	Number of staff days (Number of staff x Number of working days)	
	Principal investigator (Subsistence allowance	400	1*20	8000
	Supervisors' per diem	400	2*10	8000
	Data collectors	200	4*10	8000
	Data entry clerk	400	1*5	2000
	Secretarial work	400	1*5	2000
	Sub total		Personnel total	28,000
<b>2</b>	<b>2.Transport</b>	Cost per km	Number of km (no. vehicles x no. days x no. km day)	
	Car rent		1*20*1500	30,000
	Sub total		Transport total	30,000
<b>3</b>	<b>3.Supplies</b>	Cost per Item	Number	
	Questionnaire duplication	5	500	2500
	Clip board	1000	1	1000
	Flip chart paper	100	10	1000
	Pen	50	10	500
	Pencil	50	5	250
	Eraser	50	5	250
	Sharper	50	10	500
	Marker (pack)	100	5	500
	Transparency (pack)	250	1	250
	Printing paper(pack)	1000	5	5000
	Photocopying (pack)	10	500	5000
	Printing and Binding	100	10	1000

	Sub total		Total supplies	17,750
<b>4</b>	<b>4.Training</b>	Cost per item	Number of days	
	Hall rents	1000	5	5000
	Tea/coffee	100 per participatory/day(100*9)	5	4500
	Sub total		Total training	9,500
<b>5</b>	<b>5.Total</b>		(Total 1+2+3+4)	85,250
<b>6</b>	<b>6.Contingency ( 5% x Total)</b>		5%*85,250	4262.5
<b>7</b>	<b>7.Grand Total</b>		Total (5) +Contingency (6)	89,512.5ETB

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7. Data collection tools for a research project proposal on the study of RDT prevalence and associated risk factors of malaria disease among workers of sugar factory, Tigray region from may-June/2013

Name \_\_\_\_\_ Date of Data collection \_\_\_\_\_ project Name\_\_\_\_\_

Case Status; case\_\_\_\_\_ control\_\_\_\_\_ ID\_\_\_\_\_

**1. Socio –demographic**

Sr.no	Question	Alternatives
1.1	Sex	1.Male 2.Female
1.2	Age	Years____ Month_____
1.3	Occupation	1. Office only 2. House 3. supervisor 4.student 5. Farming (in sugar cane) 6. Other
1.4	Educational level	1.Illiterate 2.Read & write 3. Elementary 4.Secondary 5. college and above
1.5	Marital status	1.single 2.Maried 3.Diverced 4.Widowed 5. Under age of 18
1.6	Number of family in house	

**2. Medical history (for cases only)**

2.1	What were the signs and symptoms?	1.fever or fever with headache, 2. Rigor, 3.back pain, 4.chills, 5.sweats, 6. Myalgia, 7. nausea, 8.and vomiting
	RDT for plasmodium parasites	1.posetive 2.negative
	If positive, write the name of parasite	
2.2	For how many days were you ill?	
2.3	Did you take treatment?	1.Yes 2.No

2.4	Did you /he/she recovered after treatment	1.cured                      2.partially improved 3. Deteriorated    4. Death
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### 3. Risk factors

Sr.n	questions	response
3.1	Was your house sprayed in this year?	1.Yes    2.No
3.2	If yes, How many months ago sprayed?	
3.3	Does your household have mosquito nets?	1.Yes    2.No
3.4	If yes, how many?	
3.5	Did you sleep under this mosquito net last night?	1.yes    2.No
3.6	If no, why don't use it?	1.No malaria                      2.No nuisance 3.No space for net              4.Irritation 5.Suffocation                      6.Difficult hanging net 7.Shape                              8.Absence from home 9.Other                                10.Don't know
3.7	How often do you wash your net(s)? (Don't read the response)	1,When it gets dirty                      2.1 time a year 2 3.2 – 3 times a year 3                      4.4 – 5 times a year 5.6 or more times a year
3.8	How long ago did your household obtain mosquito net?	1.whith in 6 months                      2.6months-3 years 3. More than 3 years ago                      4.unknown
3.9	What is Brand of Mosquito net?	1. Permanent                      2. Olyset    3. Safenit 4. Interceptor                      5. Other/Don't Know.....
3.7	Where did you obtain the net	1.Governmental health facility 2.Health extension 3. Community health worker                      4.Retail shop 5.Pharmacy                              6.Work place 7.Other (Specify)_____ 8.Don't know

3.8	What is general condition of the net?	1.Good(no holes)                      2.Fair(no holes that fit a torch battery ) 3.Poor (1-4 holes that fit a torch battery) 4.Unsafe (>5 holes that fit a torch battery) 5.Unused (still in package )                      6.Unknown
3.9	Have you ever used repellent against mosquito?	1.Yes                      2.No
4.0	If yes, When?	1.every day                      2.At night only(sleeping) 3.At work place                      4.At day only(where ever)
4.1	Have you ever used prophylaxis?	1.yes                      2.No
4.2	If yes, what type of drug?	
4.3	If yes, how often?	1.once a year                      2.twice a year
4.4	What is main material of the floor?	1.Nutral floor                      2.Ceramic 3.Cement                      4.Carpet 5 .Dung                      6.Earth/sand 7. Wood planks                      8.others (specify).....
4.5	What is main material of the wall?	1.No walls 2.Cane/trucks/bamboo/reed 3.Bamboo/wood with mud                      4.Stone with mud 5. Carton                      6. Cement 7. Bricks                      8. Wood planks 9. Other
4.6	What is main material of the roof?	1.Thatch/Leaf                      2 Sticks and mud 3. Rustic mat/plastic sheet                      4.Wood 5.Corrugated iron 6.Cement/concrete 7. Other (specify).....
4.7	Does your home have a window?	Yes                      2.no
4.8	If yes, what type?	1.Windows with glass                      2.Windows with screens 3. Windows with curtains 4. Others (specify).....
4.9	If yes, when does it be opened?	1.day only                      2.night only

		3.day and night	4.never opened
5.0	Is there swampy area near to your residency?	1.Yes	2.No
5.1	Is there any stagnant water in your locality?	1.Yes	2.No
5.2	Had you practiced in irrigation?	1.Yes	2.No
5.3	Had you practiced in cultivating sugar cane?	1.Yes	2.No
5.4	Were you here three weeks ago?	1.Yes	2.No
5.5	If not, where have you been?	1.high land area	2.lowland area
5.6	What is the main source of drinking water for members of your household	1.Piped water 3.Unprotected well 5. Rain water 7.Surface water	2.Bore hole 4.unprotected spring 6. Tanker truck 8.Irrigation channel
5.7	What kind of toilet facilities does your household use?	1. Flush/pour 3.Pit latrine Without slab 5.Open pit	2. Pit latrine with slab 4.Ventilated 6.Open field
5.8	What is the monthly house hold income		
5.9	Where do you sleep most of the time?	1.indoor	2.outdoor

#### 4. Assessment of community KAP

Sr.no	Knowledge questions	response
6.0	Do you know mode of transmission of malaria?	1.Yes 2.No
6.1	Have you ever heard about prevention and control of malaria?	1.Yes 2.No
6.2	If yes, where did you hear?	1.health worker 2.TV 3.radio 4.family member

		5.school
6.3	Do you know the most susceptible of malaria ease?	1.Yes 2.No
6.4	If yes, who are they?	1.<1years age 2.<5 years age 3.pregnant mothers 4.lactating mothers 5.all age groups
6.5	Do you know the breeding sites of malaria ctor?	1.Yes 2.No
6.6	If yes, where?	1.swampy areas 2.jungle 3.stagnant water 4.other
	Attitude	Response
6.7	Do you think malaria can be prevented by ntrolling the vector?	1.Yes 2.No
6.8	Do you think malaria can be prevented by pper environmental management?	1.Yes 2.No
6.9	Do you think prophylaxis can prevent malaria?	1.Yes 2.No
7.0	Do you think repellent can prevent malaria? practice	1.Yes 2.No
7.1	Do you sleep under LLITN every night?	1.Yes 2.No
7.2	Do you reside on a house hold sprayed by ecticides?	1.Yes 2.No
7.3	Do you participate on environmental nagement of your locality?	1.Yes 2.No

## CHAPTER-10 OTHER ADDITIONAL OUTPUT REPORT

### 10.1 TRAINING PROPOSAL ON PUBLIC HEALTH EMERGENCY MANAGEMENT

#### 1. INTRODUCTION

**Back ground;** Raya Alamata woreda is one of the rural woreda of Tigray region which is settled in an altitude of < 200m above sea level. It is found in southern part of the region which is located 181 km far away from the capital city of the region, Mekelle. It consist a total population of 98,980 with 4 health centers and 18 health posts.

#### **Statement of the problem**

Public health surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health. Data disseminated by a public health surveillance system can be used for immediate public health action, program planning and evaluation, and formulating research hypotheses.

The public health system is continually challenged by recurrent and unexpected disease outbreaks and is facing the challenge of managing health consequences of natural and human made disasters, emergencies, crisis, and conflicts. These problems continue to disrupt the health care system, while successful detection and response to these challenges is becoming increasingly complicated.

An important indicator of a quality reporting system is the timeliness and completeness at each level. When reports are sent and received on time, the possibility of detecting a problem and conducting a prompt and effective response is greater. Completeness of reporting describes whether all the reporting units have reported as expected. If reports are late, or are not submitted, the aggregated information for the woreda (or other administrative area) will not be accurate. Outbreaks can go undetected and other opportunities to respond to public health problems will be missed.

Arising from this, we have conducted a surveillance system evaluation in Tigray region; raya Alamata woreda in 2013 .This was performed by using a standard questionnaire adopted from WHO. We recruited 2 health posts ,2 health centers and the woreda health office that have been selected based upon simple random sampling method. Finally, the finding of the surveillance system of raya Alamata woreda was as described below.

**Case detection and registration** ;The standard case definitions, community case definitions and reporting tools were available in all the study areas in which most of them had ineffective and inefficient performance of active surveillance.

All health facilities had a clear and specific clinical registration for malaria disease but 50 % of the health facilities have registered for dysentery disease in the OPD visit.

#### **Key attributes of the surveillance system in raya Alamata woreda**

- **Usefulness**; the magnitude of these specific diseases was clearly labeled in 50% of the health facilities and all have been implemented a prevention and control method.
- **Simplicity**; the way for detection of cases, data management and integration of the surveillance system were easily understandable by all health workers.
- **Data quality**; the completeness and validity of the surveillance data were poor.
- **Acceptability**; all the health workers had a responsibility to collect, report and analyze the surveillance data .but the other concerned body (organizations) had less willingness to participate on these issues.
- **Sensitivity**; the ability of the health workers for detection of cases was relatively effective. But most of the health facilities did not monitor the changes of cases.
- **PVP**; the performance of the laboratory test used to detect the true cases was different among the health facilities and it was higher in health centers than health posts.
- **Representativeness**; According to the national standard of health service coverage, the population under surveillance had an access to the health service which indicated the surveillance system was available at all.
- **Timeliness**; the timely reporting rate of the health center was 83.3% , for health posts 50% and 100 % for woreda health office, regional laboratory and regional health bureau in the last three months of 2004e.c.
- **Flexibility**; there were no any changes in the surveillance system at all.
- **Stability**; the performance of the surveillance activities was affected by the existence of high staff turnover.

Generally all the visited health institutions have indicated a non flexibility, a usefulness, simplicity and representativeness of the surveillance system that can meet its objectives. However, the data quality, the timelines of the report, the acceptability, stability, sensitivity

and the PVP of the surveillance system did not meet its objective in most of the health facilities visited. So that the regional health bureau as well as other partners should strengthen by providing building capacity, allocating budget line, conducting a regular supportive supervision specific to surveillance activities and effective monitoring and evaluation of the surveillance system.

## **2. Objectives**

- To strengthen the capacity of the health worker
- To improve the surveillance system of national notifiable disease
- To identify the challenges of the health worker on surveillance system
- To present the current surveillance system of the woreda

## **3. Rational of the training**

- Most of the key attributable of surveillance system were not implemented in raya Alamata woreda
- There were a high staff turnover who has trained a surveillance system previously and they were substituted by the new health workers
- As long as this woreda is located in an altitude of < 200m, it is prone to the outbreak of malaria which is the most life-threatening parasitic infection disease and the prevalence of these diseases was 29/1000(2,924) in 2012
- The detection and monitoring of infectious disease was poor which can influence to the prevention and control activities.

## **4. Implementation of the training**

- After the approval of the training, A formal letter will be addressed to raya Alamata woreda health office from the regional health bureau
- There will be an agreement on the time period and the place of training to be held
- The trainers will present on the findings of the surveillance system and the technical related activities of public health surveillance
- The trainee will have a group discussion on the presentations

- The trainee will practice on data collection (reporting formats) and analysis of surveillance data
- A feedback will be collected from the trainee about the overall training and the threats forward
- The head of the woreda health office will close the programme by conveying a key messages on the national surveillance system

### 5. Expectations from the training

- The trainee will identify the gap of the surveillance system on their locality
- The trainee will develop a capacity on the national surveillance system
- The early detection and monitoring of the national notifiable diseases will be improved
- The trend of morbidity of the disease (malaria) will decrease in raya Alamata woreda
- The woreda health office will prepare an epidemic preparedness and response plan
- The health worker will be able to communicate the public health surveillance to all who need it for action on timely basis
- The health burden of the community will be mitigated which enable them to be productive citizen

### 5. Budget plan

**The budget plan required for Peridium and materials of the training of PHEM in raya Alamata woreda, from April, 17-19/2014**

Sr.no	trainers	number	Perdium/birr	days	Total (Birr)
1	RHB staffs (PHEM unit)	2	400	5	4,000
2	FETP ,4 <sup>th</sup> cohort resident	2	400	5	4,000
3	Trainee				
4	Health center head	4	200	5	4,000
5	Health center surveillance focal	4	200	5	4,000

	person				
6	Health extension worker	18	200	5	18,000
7	Woreda health office	2	200	5	2,000
8	total				<b>36,000</b>

Sr.no	items	Number(each)	Price/individual	Total price(Birr)
1	Exercise book	30	15	450
2	pen	30	5	150
3	Flip chart	10(packed)	50	500
4	Wall plaster	5(roll)	10	50
5	Fuel	400 litter	22	4,400
6	total	-	-	<b>5,550</b>

**Total cost required** =41,500 birr+ 41,500(10%) birr

=41,500 birr+4,150birr

**=45,650 Birr**

## 6. Work plan

	Activities	Time period/ Feb. -April/2014											
		February				March				April			
		W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4
1	Submission of proposal	*											
2	Incorporating comments		*	*									
3	Approval of proposal by WHO				*								
4	Budget allocation					*	*						
5	Agreement of the training time with woreda health office							*					
6	Procurement of materials								*	*			
7	Training time										*		
8	Physical and financial report											*	*

## 7. The contents and schedule of the training

Sr.no	Topic	Subtopic	Time
1	Introduction to IDSR	Introduction <ul style="list-style-type: none"> <li>• Surveillance: (Definition)</li> <li>• IDSR: (Definition)</li> <li>• Objectives of IDSR</li> <li>• Background</li> <li>• IDSR Implementation Process</li> <li>• assignment IDSR</li> </ul>	Day-1 morning
2	Introduction to public health surveillance	<ul style="list-style-type: none"> <li>• types of surveillance</li> <li>• general principles of surveillance</li> <li>• data collection, analysis, interpretation and dissemination of surveillance data</li> <li>• surveillance data flow</li> <li>• surveillance function</li> <li>• Case Detection</li> <li>• data Reporting and Analysis</li> </ul>	Day-2 after noon
3	Outbreak investigation	<ul style="list-style-type: none"> <li>• definitions (terminology) of outbreak</li> <li>• steps of out break</li> <li>• Management of outbreak</li> </ul>	Day -2 morning
4	Overview of EPRP	<ul style="list-style-type: none"> <li>• epidemic preparedness and response</li> </ul>	Day-2 afternoon
5	Surveillance system evaluation	<ul style="list-style-type: none"> <li>• key attributable of surveillance system (specificity, PVP, usefulness, simplicity, data quality, feasibility)</li> </ul>	Day -3 morning
6	Surveillance system evaluation in raya Alamata woreda	<ul style="list-style-type: none"> <li>• general findings of the surveillance system</li> </ul>	Day -3 afternoon

## 10.2 LABORATORY REPORT FOR MEASLES OUTBREAK INVESTIGATION IN TIGRAY REGION FROM 5/1/2014-13/3/2014

### Introduction

Measles is one of the communicable diseases still causing preventable mortality and morbidity in the country. Currently, the outbreak of measles is becoming aggravated throughout nationwide as well in Tigray region.

### Measles case classification

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

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

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

**Discarded case** is a suspected case which, upon adequate investigation that includes a blood specimen collected in the appropriate time frame, lacks serologic evidence of a measles virus infection.

Therefore, Laboratory support is essential for definitive diagnosis, especially during periods of low measles incidence. Many illnesses are accompanied by fever, rash, and a variety of non-specific symptoms. In examining for measles, it is important to consider rubella, scarlet fever, exanthema subitum (roseola), dengue fever, and the early stages of chickenpox in the differential diagnosis. Moreover, there are other conditions that may present in a similar form, including erythema infectiosum (fifth disease), enterovirus or adenovirus infections, toxic shock syndrome, rickettsial diseases, and drug hypersensitivity reactions. Modified forms of measles, with generally mild symptoms, may occur in infants who still have partial protection from.

Internationally there are four recommended techniques for collecting specimens from suspected measles cases. In Ethiopia, currently blood sample (serum specimen) and nasopharyngeal swab samples are the two sample types collected. A blood sample is for measles-specific IgM detection and a nasopharyngeal swab sample is collected for virus isolation in order to identify the genotype of the measles virus in a particular outbreak. WHO recommends the IgM indirect ELISA method for rapid confirmation of measles cases. Filter paper method dried blood sample is another method used to test for the presence of measles-specific IgM; and sample of patient urine is used to do virus isolation for genotyping. This method is not currently used in Ethiopia. A small proportion of samples may give indeterminate results on IgM testing. All measles laboratories are expected to re-test measles

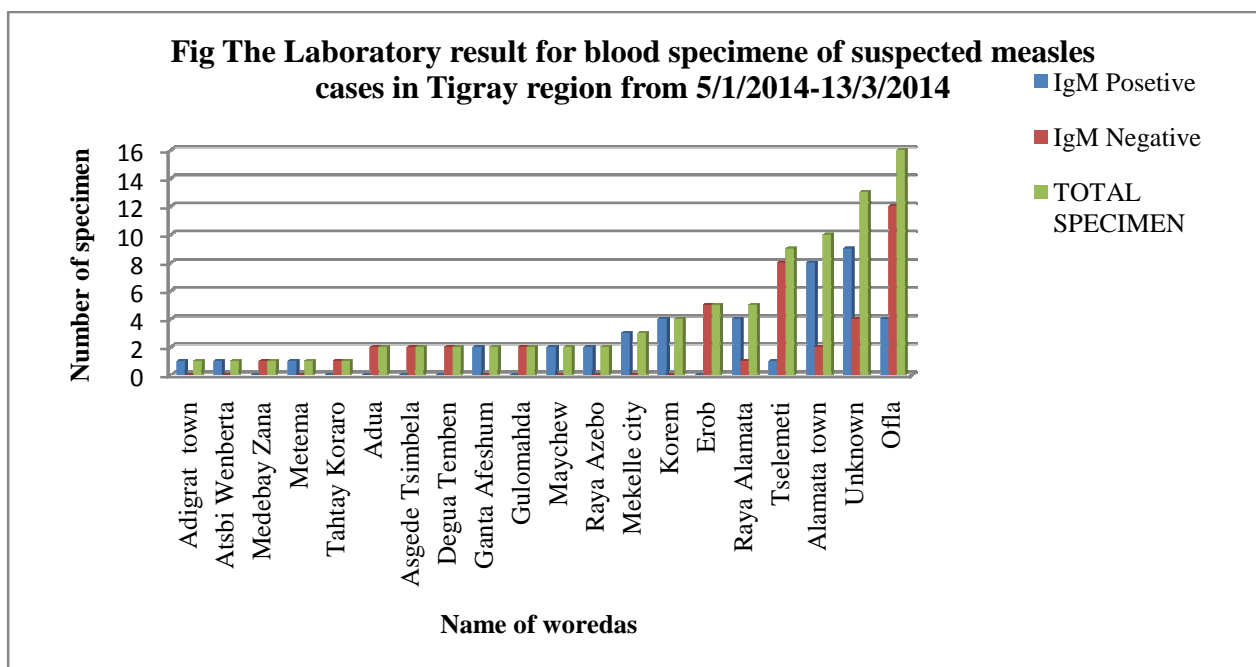
IgM indeterminate samples, and to perform rubella IgM testing on all measles IgM indeterminate and IgM negative specimens.

**Blood sample collection**

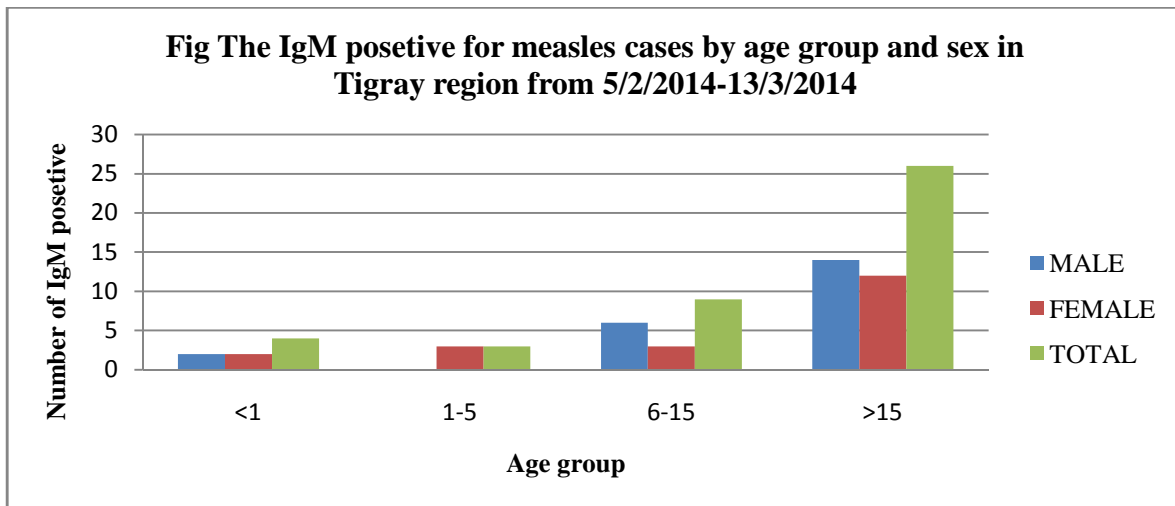
While IgM ELISA tests are more sensitive between days 4 and 28 days after the onset of rash, a single serum sample obtained at the first contact with the health care system within 28 days after onset is considered adequate for measles surveillance. The test can be run in one day so that results can be returned in a timely manner. The laboratory result has to be sent to the users to the maximum within 7 days. So that, we evaluated the magnitude of IgM and time lines of the specimen collected and result sent to the appropriate body.

**Result**

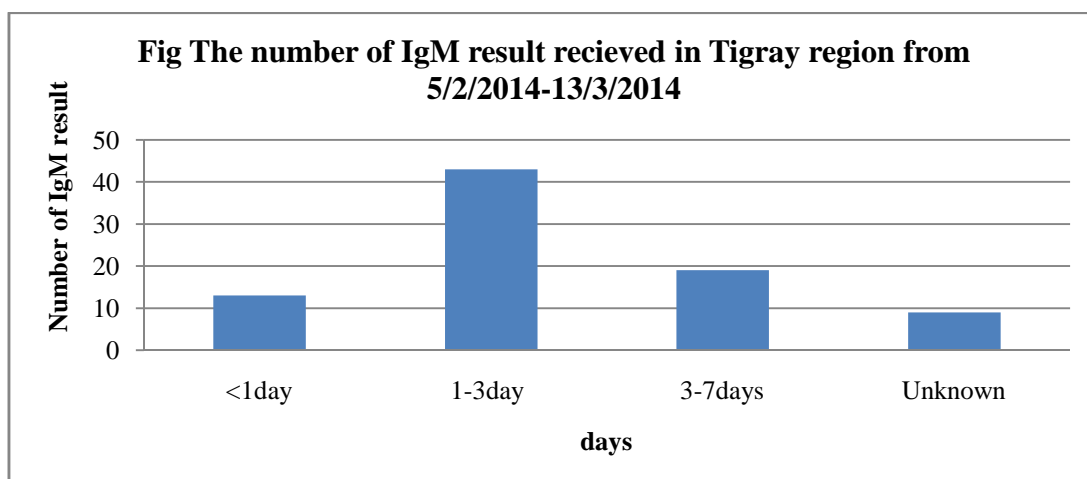
A total of 84 blood specimen of measles suspected cases was sent to national laboratory (EPHI) from a total of 20 woredas of Tigray region during 5/2/2014-13/3/2014. Among these 40%(8) of the total woredas has sent  $\geq 3$  blood specimen and  $<1$  blood specimen for the remaining woredas. However, 50 % ( 42) of the total blood specimen was IgM positive and 75 % (6) of these woredas with  $\geq 3$  blood specimen has declared an outbreak of measles within one month duration.



Majority of the IgM positive for measles cases was among age groups of 6-15 years age and  $>15$  years in which males were higher than females.



Among the total woredas, 100% of them had collected a blood specimen from clinically suspected measles cases with in prior to 28 days of their date of onset. And, all of the blood specimens were determined as good condition that fulfilled adequacy of specimen, sampling procedure and transportation. However, the national laboratory (EPHI) has received 35.7 % (30) of the total specimen within 3 days from date of specimen collection and 64.3 % (54) of the total were later than 3 days. In addition to this, the PHEM unit of EPHI was received 51.1 % (43) of the total IgM results within 1-3 days from the laboratory unit with 10.7 % (9) of the total was unknown date of receiving..However, Tigray regional health bureau (PHEM Unit) has received all results later than 7 days.



## **Conclusions**

The positivity rate for measles IgM was very low but there were no specimens discarded in which all blood specimen was in a good condition. So, that the low detection rate may be influenced due to the health workers unable to identify a typical measles clinically suspected. The laboratory result dissemination from laboratory unit to PHEM unit of EPHI was delayed for majority of the measles IgM result. Consequently, the regional health bureau of Tigray region (PHEM unit) has received all measles IgM result later than 7 days. Therefore, the health worker needs training on measles surveillance and outbreak management to collect blood specimen for clinically suspected measles cases only. And also the reporting system should be improved for early intervention of measles outbreak.

## **References**

1. GUIDELINE ON MEASLES SURVEILLANCE AND OUTBREAK MANAGEMENT  
3RD EDITION, ETHIOPIAN HEALTH AND NUTRITION RESEARCH INSTITUTE  
FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA, January 2012, Addis Ababa, Ethiopia

## 10.3 A SURVEILLANCE DATA ANALYSIS OF HEPATIC-VOD IN NORTHWESTERN PART OF TIGRAY REGION FROM 2003-2005E.C

### Introduction

Hepatic veno-occlusive disease (hepatic-VOD) is first reported in 1996E.C from some woredas of Northwestern zones of Tigray region. More than 15 institutions have been doing a complex multi-facted investigation since 1999 e.c to identify the unknown etiology of ULD in Tigray region. The principle of concerns of the investigation have been alleviating human suffering as well as the adverse effects on the livelihood of the communities using a holistic approach including expertise of both human and animal expertise, Environmental specialists, agriculture expertise, and other disciplines so as to thoroughly examine and consider possible etiologic agents. According to these investigations results are consistent with pyrrolizidine alkaloid (PA) as the etiologic agent .Finally the disease was designated as Hepatic veno-occlusive disease (Hepatic-VOD).

Various interventional schemes were proposed and agreed for implementations following investigational partners and stakeholders review meeting that was held in April 2012 in Gebar Shire Hotel, Shire, in the presence of H. E. Ato Abay Woldu, President of the Regional Government of Tigray, H. E. Dr. Tedros Adhanom, the then Minister of the Federal Ministry of Health of Ethiopia and zonal administrators. The prevention activities were mainly emphasized to reduce morbidity and mortality by preventing exposure to Pyrrolizidine alkaloid (PAs) thereby contains the alleged health problem. The proposed interventions include weeding to zero tolerance, improving soil fertility, use of selected herbicide to control invasive and noxious weeds, environmental rehabilitation, availability of pasture or grazing fields free from *A. conyzoides* and other noxious weeds. In addition to this, maintenance of the effective supportive medical treatment for cases, along with nutritional and psychological support, strengthening the surveillance to monitor disease epidemiology and impact of prevention activities were also strongly recommended as critical points.

### Objectives

- To describe the magnitude of Hepatic -VOD in three woredas of Northwestern Tigray region

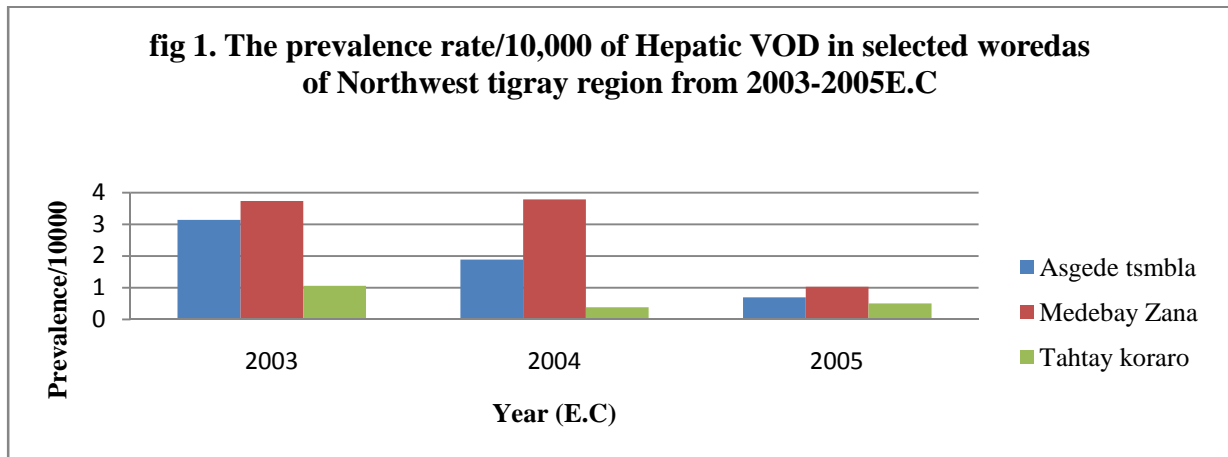
### Methods

The Hepatic-VOD cases was identified through a definition of as prior investigations – An individual with abdominal distention AND either abdominal pain or cramping for 2 weeks OR a family member with abdominal distention or abdominal pain were identified. Majority of the

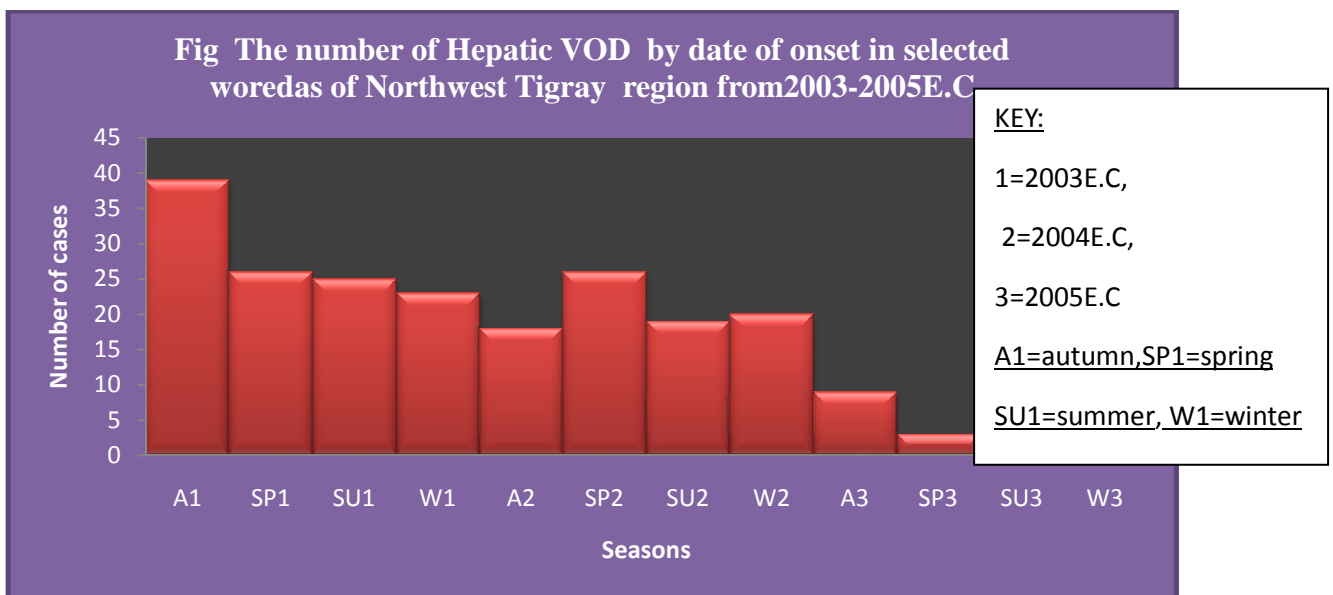
cases were taking a treatment of (furosemide, spironlactone and KCl). Three woredas named as Asgede tsmbila, Medebay zana and Tahtay koraro were selected purposively from Northwestern part of the region. We used a line list of the cases that have been identified through both active and passive surveillance in this selected areas from 2002-2005E.C.

**Results**

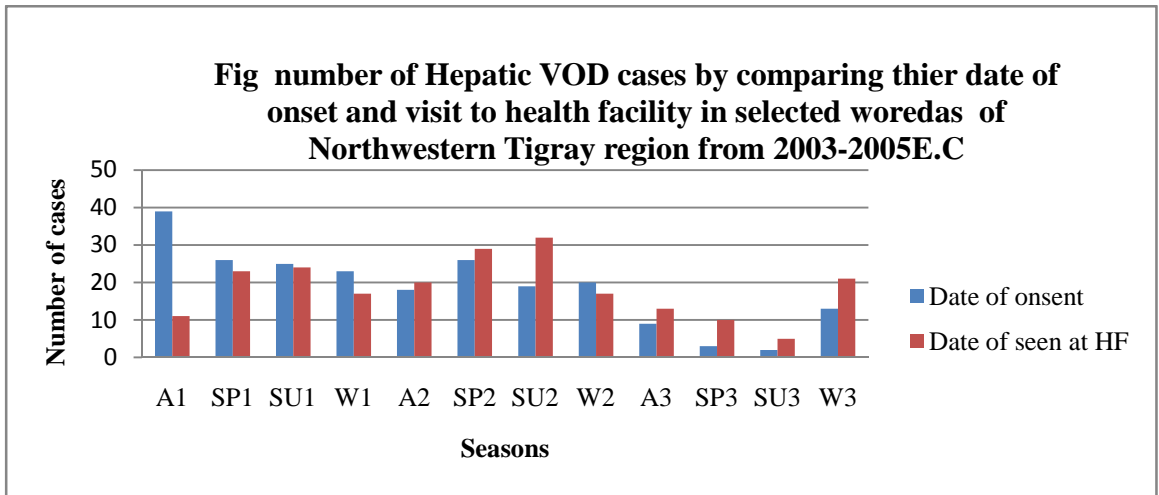
The prevalence rate of Hepatic-VOD has decreased from 2.9/10,000(107) in 2003E.C, 2.3/10,000(86) in 2004E.C to 0.78/10,000(30) in 2005E.C among the three selected woredas of Northwestern Tigray region. It was higher in Medebay zana woreda in all the successive three years that ranges from 3.7/10,000(52)-1/10,000(15). The case fatality also were declined from 16.8 %( 18) in 2003E.C, 10.4 %( 9) in 2004E.C, to 3.3 %( 1) in 2005E.C. Majority of the deaths were occurred in Medebay zana woreda ranging from 11.5 %(6) -6.6%(1) from 2003-2005E.c.



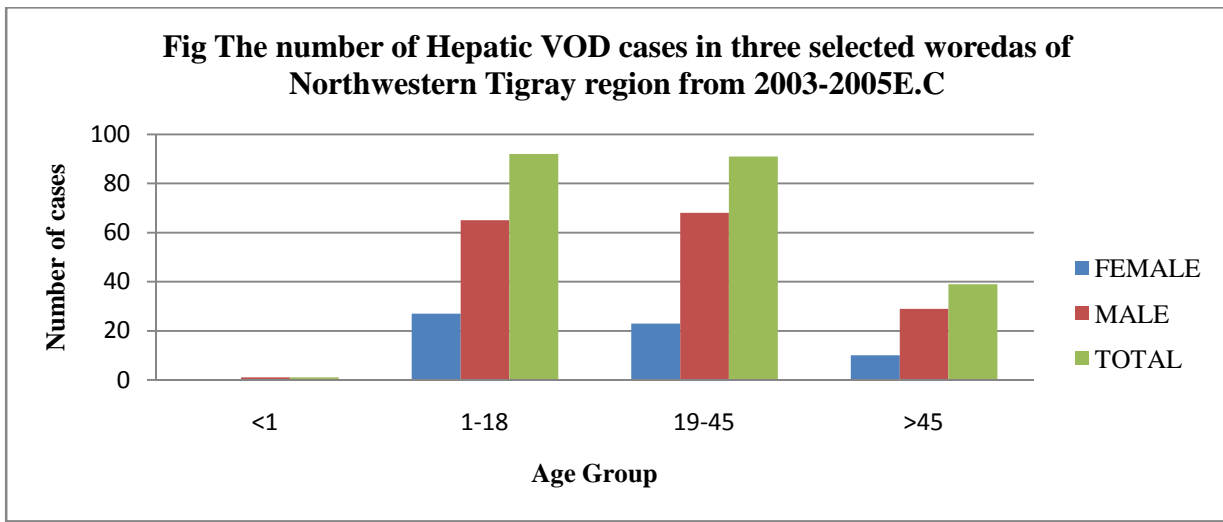
In 2003E.c, majority of the cases were affected during Autumn. However, it was higher during spring and winter in 2004 and 2005E.C respectively.



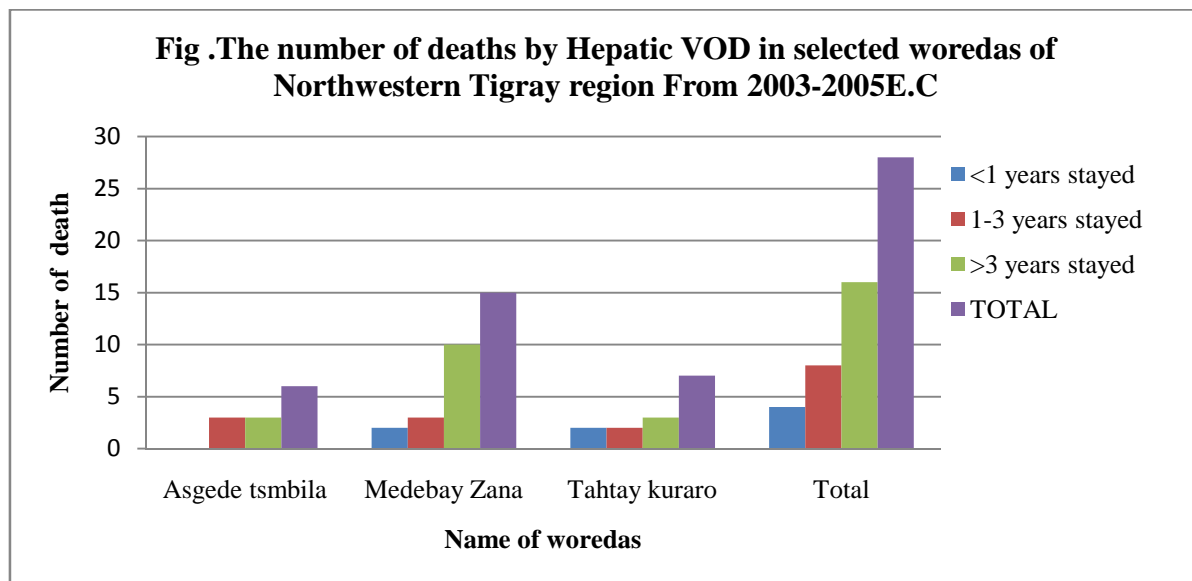
As shown from the graph below, the number of cases by their date of onset and the date who visited to nearby health facility was inconsistent throughout the three successive years in which most of the cases didn't visit health facility on the time of their illness to get appropriate treatments in 2003E.C .however, all the cases have been enrolled to the Hepatic –VOD treatment unit (health facility) intermittently after a house to house search by the health workers. Consequently, the number of new cases were lower than those visited the health facility from 2004-2005E.C in all seasons.



In all age groups, males were highly affected than females and Majority of the cases were among age groups of 1-18 and 19-45 that could be considered as adults.



The graph indicated that, the cases could persist long time after they infected with the disease. Even there was no death with 1 year time of infection in Asgede Tsimbla and most of the cases were died after 3 and above of their infection.



### Discussions and recommendations

The prevalence as well the case fatality of Hepatic VOD was decreasing throughout the year in all woredas of Northwestern of Tigray region. This could be due to the behavioral change of the community towards its prevention and control. The multi-disciplinary approach had a great role to create awareness of health professionals on HVOD, educating the community using brochures, leaflets, posters and the weed itself about the causes, prevention and consequences of HVOD. As a result of such advocacy, many people from the communities are able to identify the weed and aware of its consequences. However, still few professionals who are expected to be well versed of the causes and prevention methods of the disease were not aware of the HVOD. As a result, the new cases of H-VOD didn't come earlier to nearby health facilities. Majority of the cases were males than females and in age groups ranging from 19-45years age. This may coincide with agricultural practice in which most of the time males and these age groups are more likely to participate in wedding practice that could directly expose to *A. conyzoides* weed infestation in the communal grazing land. Most of the cases were not recovered apart from partial improvement and they have died after long time staying more than 3 years due to frailer of proper case management .therefore, Strengthening a sustained training of professionals in human and animal VOD surveillance and case management is very crucial to monitor the trend of the disease and evaluate the effects of intervention efforts. Inaddtion to this, *A. conyzoides* requires weeding in cultivated lands both late in the crop season and off season, from communal lands, pond areas and mountains innervations (improving soil fertility, environmental rehabilitation and the like) and continuous monitoring found mandatory.

## References

1. Proceedings of the scientific review forum and technical report on pyrrolizidinealkaloid (PA) induced hepatic veno-occlusive disease (Hepatic-VOD) from northwest and central zones of Tigray region, Ethiopia, National planning and coordinating committee sponsored by Ethiopian public health association, April, 2013, Addis Ababa, Ethiopia

## 10.4 MALARIA SURVEILLANCE DATA ANALYSIS IN TIGRAY REGION FROM SEP.14- OCT.16/2013

**Back ground;** We analyzed malaria surveillance data to assess the incidence and trends of the diseases. It is also helpful to indicate the completeness and timeliness of the report in Tigray region that consists of 12 town woredas and 34 rural woredas with a total population of 4,929,999 from 14/09/ 2013-06/10/2013.

### **Malaria**

Malaria is seasonal in most parts of Ethiopia, with unstable transmission that lends itself to the outbreak of epidemics. The transmission patterns and intensity vary greatly due to the large diversity in altitude, rainfall, and population movement; areas below 2,000 meters (m) are considered to be malarial (or potentially malarial). Those areas are home to approximately 68% (52 million) of the Ethiopian population and cover almost 75% of the country's landmass. In Ethiopia, the prevalence of malaria was 0.7% for nationwide and 0.9% for Malarial areas (below 2,000m) in 2007. however in Tigray region, it was 2.6 % ( 132,943) during 2011/12. so that, a routine surveillance data analysis is required for early detection and mitigation of the disease.

**Suspected case definition;** Any person with fever or fever with headache, rigor,

back pain, chills, sweats, myalgias, nausea, and vomiting diagnosed clinically as malaria.

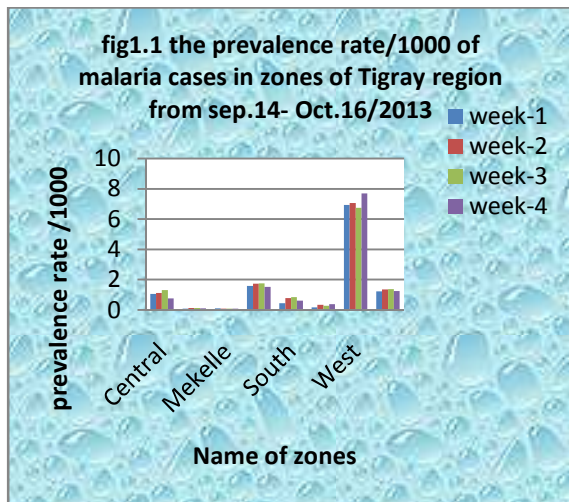
**Confirmed case definition;** a suspected case confirmed by microscopy or RDT for plasmodium

Parasites.

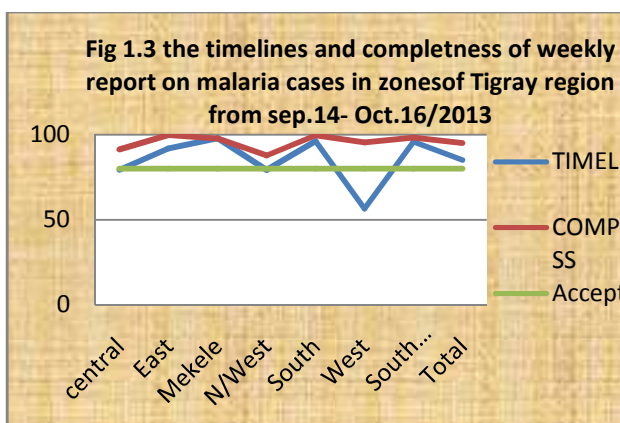
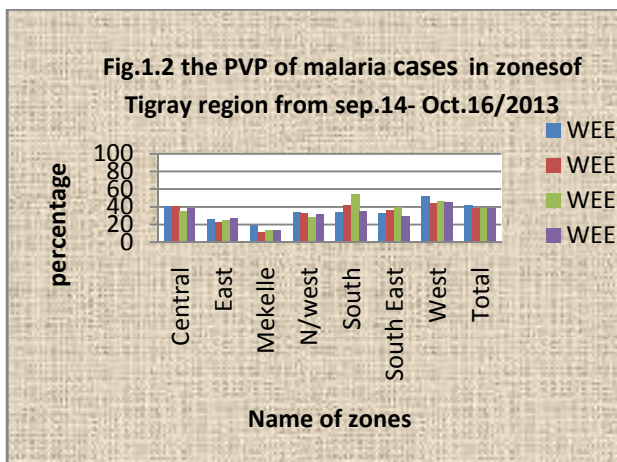
**Methods;** we extracted the four weekly data from integrated diseases surveillance that have been reported on September, 2013. The overall data was reported by private and governmental health institutions that existed in Tigray region.

### **Result**

Among the total zones of Tigray region, The prevalence of malaria was higher in western zone with the prevalence of 7.2/1000 during the fourth week of September 2013. however, it was similar in the remaining zones with a range of 1- 1.5/1000 except in Eastern and South Eastern zones that indicated less than 0.5/1000 in the four successive weeks



In all zones, the proportion of clinically suspected cases to the microscopic/RDT confirmed cases (PVP) was less than 60%. In addition to this; it fluctuated from week to week.

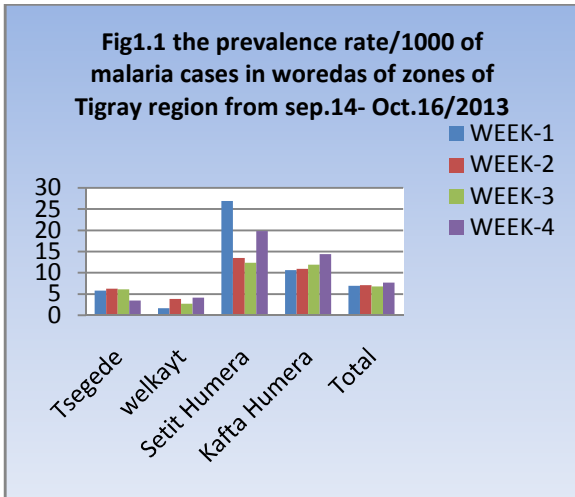


As shown from the fig.1.3, the timeliness and completeness of the report has indicated above the acceptance level (>80%) except the timeliness of western zone that indicated as the report was sent after the report period labeled.

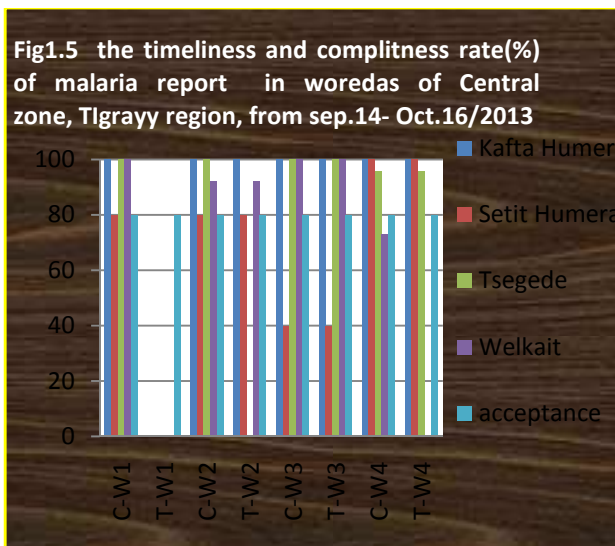
**Table 9.4.1. The comparison of malaria parasite species in zones of Tigray region during sep. 2013.**

zones	p. Falcipurum		p.vivax	
	No	R.F	No	R. F
central	4166	76.2	1300	23.7
East	182	47.2	203	52.7
Mekelle	38	36.8	65	63.1
N/west	4154	76.1	1301	23.8
South	1054	56.4	814	43.5
S/East	447	68	210	31.9
West	8340	78.4	2288	21.5
total	18381	74.8	6181	25.1

These woredas are the most malaria prevalent areas in the region in which the prevalence was higher in Setit humera with 27.5/1000 in the first week of September, 2013. However; the remaining woredas has indicated a prevalence rate of less than 10/1000.



In all woredas of central zone, there were no a timely report of malaria disease in the first week of September ,2013.However, the completeness of the report was > 80% for the four successive weeks in all woredas except to that of Setit humera woreda which shown a 40% of completeness during the third week.



**Conclusion;** Eventhough, there are areas of an altitude <200m in all zones of Tigray region, majority of the malaria cases were in central zone with prevalence rate of 7.5/1000.Among the woredas of central zone, the prevalence was higher in Setit Humera woreda with 27.5/1000.this is due to, most of the people who reside in central zone are more likely to go hospital which is found in this woreda. In all Zones as well as woredas of the region, the PVP for malaria was low which indicated less than 60%. This is b/se of the poor quality of Microscopic/ RDT facilities in the health institutions. The timeliness and complexness of the report was below the acceptance level (80%) in most of the woredas in central zone especially Setit humera. This can influence for the early detection of a threshold as well as to take an effective interventions.

So that, we recommend conducting an early assessment of the disease in those areas with higher prevalence, quality assurance of

N.B, C-W=Completeness of Week

T-W=Timeliness of Week

