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

Equbay G/Egziabher (BSC)

Submitted to the School of Graduate Studies of Addis Ababa University in partial fulfillment for the degree of Master of Public Health in Field Epidemiology

May 2016

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Mr.Muluken Gizaw (BSC, MPH)

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List of Acronyms and Abbreviations

AAU	Addis Ababa University
AFI	Acute Febrile Illness
AIDS	Acquired Immune Deficiency Syndrome
ANC	Antenatal Care
AR	Attack Rate
ART	Anti Retroviral Therapy
AURI	Acute Upper Respiratory Infection
AWD	Acute Watery Diarrhoea
BBL	Benzyl Benzoate Lotion
BCG	Bacillus Chalmette-Therapy
BSC	Bachelor of Science
BoA(RD)	Bureau of Agriculture(Rural Development)
BoWRD	Bureau of Water Resource Development
CAR	Contraceptive Acceptance Rate
CBR	Crude Birth Rate
CDC	Center for Disease Control
CDR	Crude Death Rate
CFR	Case Fatality Rate
CI	Confidence Interval
CHD	Community Health Days
CMAM	Community Management of Acute Malnutrition
CU5	Children Under Five Years of Age
CoWASH	Community Water Sanitation and Hygiene
CPR	Contraceptive Prevalence Rate
CSA-E	Central Statistics Agency-Ethiopia
CTC	Cholera Treating Centre
DST	Drug Susceptibility Test
DPP&FS	Disaster Preparedness and Food Security
DPT	Diphtheria, Purtesis and Tetanus
EDHS	Ethiopian Demographic and Health Survey
EFETP	Ethiopian Field Epidemiology Training Program
EFY	Ethiopian Fiscal Year
EHNRI	Ethiopian Health and Nutrition Research Institution
EHN	Emergency Health and Nutrition
EOS	Enhanced Outreach Strategy
Epi-Link	Epidemiologically Linked
EPHA	Ethiopian Public Health Association

EPHI	Ethiopian Public Health Institute
EPI	Expanding Program on Immunization
FAO	Food Assistant Organization
FH	Family Health
FMOH	Federal Ministry of Health
FMoWIE	Federal Ministry of Water, Irrigation and Energy
GAM	Global Acute Malnutrition
HC	Health Center
HDW	Hand Dug Well
HEW	Health Extension Worker
HF	Health Facilities
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
HP	Health Post
ILI	Influenza Like Illness
IMNCI	Integrated Management of Child Illness
IMR	Infant Mortality Rate
IRS	Indoor Residual Spray
LLITN	Long lasting Impregnated Treated Net
ISS	Influenza Sentinel Surveillance
MCV	Measles Conjugate Vaccine
MDG	Millennium Development Goal
MIS	Malaria Indicator Survey
MUAC	Mid-Upper Arm Circumference
NIL	National Influenza Laboratory
OTP	Outpatient Therapeutic Feeding Programme
P.F	Plasmodium Falciparum
PHEM	Public Health Emergency Management
PLW	Pregnant and Lactating Mothers
PSNP	Productive Safety Net Program
PV	Plasmodium Vivax
PVP	Predictive Value Positive
RBM	Roll Back Malaria
RDT	Rapid Diagnostic Test
REST	Relief Society of Tigray
RRT	Rapid Response Team
RST	Respiratory Synchtial Virus
SAC	School Age Children
SAM	Sever Acute Malnutrition
S.arues	Staphylococcus Arues

SARI	Sever Acute Respiratory Illness
SARS	Sever Acute Respiratory Syndrome
SIAS	Supplementary Immunization Activities
SNNPR	South Nations, Nationalities and Peoples Region
SW	Shallow Well
TFP	Therapeutic Feeding Programme
TFU(SC)	Therapeutic Feeding Unit(Stabilization Centre)
TRHB	Tigray Regional Health Bureau
TSF	Targeted Supplementary Feeding
U5MR	Under Five Mortality Rate
URTI	Upper Respiratory Tract Infection
WASH	Water Sanitation and Hygiene
WASH Co	Water, Sanitation and Hygiene Committee
WDA	Women Development Army
WHO	World Health Organization
WSS	Water Supply Scheme
YLD	Years of Life lost due to Disability
VTM	Viral Transport Media

Executive Summary

This document contains two years output of Field Epidemiology Training Program that to be submitted to AAU school of public health for the final accomplishment of master degree in Field Epidemiology. The Ethiopian Field Epidemiology Training Program is a two-year postgraduate training program. The training is provided in collaboration with Addis Ababa University, School of Public Health, Ministry of Health and Ethiopian Public Health Association. According to the program design, the resident expects to spend 75% of their time in field activities and 25% in class. During the two years residency, the expected outputs for the partial fulfillment of master's degree in field epidemiology were; two diseases outbreak investigations, public health surveillance data analysis, surveillance system evaluation, district health profile, narrative summary of disaster situation report, manuscripts, abstracts, and additional outputs[EFETP Resident manual,2012].

During two years my residency at Addis Ababa University, school of public health and Tigray regional health bureau PHEM, I have conducted the following outputs and activities. The detail outputs that I have accomplished during my residency activities are summarized below;

Chapter I- Outbreak investigations

1. Malaria outbreak investigation in Asgede Tsimbla woreda, Tigray ,Ethiopia, Mar,2016
2. Impetigo outbreak investigation in Klteawleao ,Tigray, Ethiopia,Jul,2015
3. Scabies outbreak investigation in St George church ,Mekelle, Tigray,Sep,2015

Chapter II-Surveillance data analysis

Secondary analysis of 4 years measles surveillance data, Tigray region, Jul, 2011-Jun, 2015.

Chapter III- Surveillance system evaluation

The evaluation was conducted in Kola Temben district and Tigray regional health bureau Ethiopia, Feb, 2016.

Chapter IV- District health profile description

Health profile description was prepared for Klte Awlaelo district, Eastern zone of Tigray, Ethiopia on Apr, 2015.

Chapter V- Scientific manuscript for peer reviewed journals

5.1. Malaria outbreak investigation in Asgede Tsimbla woreda, Tigray, Ethiopia, Mar, 2016.

5.2. Impetigo outbreak investigation in Klte Awlaelo woreda, Tigray, Ethiopia, Jul, 2015.

Chapter VI- Abstracts for scientific conference

Four Abstracts were prepared on three outbreaks (Malaria, Impetigo and scabies) and measles secondary data analysis.

Chapter VII- Narrative report of disaster situation visit

Multi-sectoral belg assessment visit was conducted in six woredas of South and South East zones of Tigray, Ethiopia, on Jun, 2015.

Chapter VIII- Epi Project

Epi project title was selected on prevalence of asymptomatic malaria cases and associated factors among school age children in Asgede Tsimbla, Tigray, Ethiopia. This will be done after resident's graduation, according the program design.

Chapter IX –Additional output report

Secondary analysis of influenza, Mekelle hospital influenza sentinel site (ISS) assigned for sever acute respiratory infections (SARI), Jun, 2013-Jan, 2015.

We conducted emergency health and nutrition assessment in 11 priority one woredas of Tigray region, affected by drought as a result of El Nino effect, from Aug-Oct, 2015. This assessment was conducted as part of early warning and preparedness program for this year ongoing severe drought. I have prepared more than 15 weekly epidemiological bulletins for early interventions by timely dissemination of information for all responsible bodies. In addition, I was participated in weekly Emergency health and nutrition response activities and in all PHEM activities of the region as the program expectation.

Chapter I: Outbreak/Epidemic Investigations

1.1. Malaria Outbreak Investigation in Asgede Tsimbla Woreda, Tigray, Ethiopia, Mar 1-10, 2016

E.Gebreegziabher (BSC) [1], I.Hussein (BSC) [2], N. Dayissa (MD, MPH, PHD) [3], M. Gizaw (BSC, MPH) [4]

Abstract

Introduction: Globally, about 3.2 billion people were at risk of malaria and the disease killed about 584 000 people in 2013, the burden is heaviest in the African Region. In Ethiopia, 68% of the population lives in malaria endemic areas, and malaria was the leading cause of outpatient visits and health facility admissions during 2009/2010. The malaria outbreak investigated to describe, determine the source and risk factors of the outbreak.

Methodology: We investigated malaria outbreak in Asgede Tsimbla woreda from 1-10 Mar, 2016 using descriptive cross-sectional study followed by unmatched case-control study design. We recruited 50 cases and 100 controls. Data entry and cleaning conducted using Epi Info 7.1.6 and exported to SPSS 21 for analysis.

Result: The bed net coverage of the district was 45% or 0.8/house hold. A total of 745 malaria confirmed cases were identified, with 22.2 cumulative incidence rate per 1000 population and 52.4 % positivity rate (68.7%, Plasmodium falciparum) in Asgede Tsimbla district from Jan, 25-Feb, 07, 2016. The outbreak affected six kebeles (22.2 %) of the district. The attack rate ranges from 16.4 to 28.4 per 1000 population by kebele. Majority (58.7%) of the cases were males .The median age was 19 years (range; 3mon-85yrs), age specific attack rate was higher in 15-59yrs age group, 25.2 per 1000 population. Stay inside home in the evening, AOR 0.16 (95%CI; 0.06-0.47) and sleeping under net always, AOR 0.13(95%CI; 0.05-0.3) were protective factors. Presence of sick patient in house hold, AOR 4.7 (95%CI; 1.8-11.8), breeding sites, AOR 5.7(95%CI; 2.2-14.5) and intermittent rivers, AOR 3.9(95%CI; 1.5-10.3) were independent risk factors.

Conclusion: Presence of malaria breeding sites and malaria sick patient in house hold were independent risk factors for the outbreak. The low coverage and utilization of vector control

measures were responsible for the malaria outbreak. Scaling up key anti malaria interventions and utilization of the existing ones were among the recommendations.

Key words: malaria, outbreak, Tigray, risk factors

1. Introduction

Asgede Tsimbla is one of the 8 districts of North Western Zone of Tigray a distance of 195 km far from Mekelle, capital of Tigray .The district is administratively divided in to 27 kebeles with 180161 total population and 41592 households. Public health care services are delivered through one primary hospital, 6 health centers and 25 health posts and the health service coverage of the district was 69.4% for HPS and 83.4% for health centers. The district is located at an altitude of <2000 meter above sea level, i.e. endemic for malaria.

Malaria is caused by parasites of the Plasmodium family and transmitted by female Anopheles mosquitoes. There are four different human malaria species (P. falciparum, P. vivax, P. malaria and P. ovale), of which P. falciparum and P. vivax are the most prevalent and P. falciparum the most dangerous. P. knowlesi is a zoonotic plasmodium that is also known to infect humans [1].

Clinical Presentations: Irregular fever, vomiting, diarrhea, muscle pains, abdominal pain, anorexia, sweating, Headache, chilling and shivering, rigor, and febrile convulsions in young children are among the common features of malaria during the acute attack [2].

Severe and complicated malaria is mostly caused by *P. falciparum* infection. Children and non-immune adults are most at risk of severe malaria. Unless diagnosed and treated promptly, the clinical feature develops to sever complications like; Altered consciousness, prostration (unable to walk or sit up), unable to eat or drink, repeated vomiting, severe dehydration, convulsion or recent history of convulsion, difficult breathing, anemia (pallor), bleeding, no urine out in the last 24 hrs, jaundice and hemoglobinuria [3].

Mode(s) of Transmission: Malaria is almost always transmitted by the bite of an infective female *Anopheles* mosquito. Transmission may occur through transfusions or the use of contaminated needles but these modes of transmission are rare.

Incubation Period: Variable: 12 days for *P. falciparum*, 30 days for *P. malaria* and 14 days for *P. ovale* and *P. vivax*. Inadequate or inappropriate prophylaxis may lengthen.

Period of Communicability: Malaria is not directly communicable from person-to-person except for congenital transmission. Infected human hosts may remain infectious for Anopheles mosquitoes for 1-3 years if they are not adequately treated.

Risk factors: Sleeping outside home, presence of malaria case in home, travel history to malaria endemic areas, sleeping without ITNS, HH with no IRS spray, presence of artificial water holding container near home, presence of mosquito vectors/breeding sites around home or vicinity, unprotected irrigation and presence of intermittent rivers cloths the community are among the risk factors for the disease.

Despite being preventable and treatable, malaria continues to have a devastating impact on people's health and livelihoods around the world. According to the latest available data, about 3.2 billion people were at risk of the disease in 97 countries, territories and areas in 2013, and an estimated 198 million cases occurred (range: 124 million–283 million) and the disease killed about 584 000 people (range: 367 000–755 000) during the same year, The burden is heaviest in the WHO African Region, where an estimated 82% and 90% of all malaria cases and deaths occur in Africa respectively, mostly children aged under 5 years in sub-Saharan Africa[4]. Malaria case incidence and mortality rate decreased by 30% and 47% globally, since 2000 respectively [4]. In most countries where malaria is endemic, the disease disproportionately affects poor and disadvantaged people, who have limited access to health facilities and can barely afford the recommended treatment [1].During 2000–2013, the scale-up of effective malaria prevention and control interventions saved an estimated 4.2 million lives, with 92% of those being children aged <5 years, and decreased malaria mortality by 34% in sub-Saharan Africa [4].

Ethiopia is among the few countries with unstable malaria transmission. Consequently, malaria epidemics are serious public health emergencies in the country, approximately 52 million people (68%) live in malaria-endemic areas in Ethiopia, chiefly at altitudes below 2,000 meters. Malaria is mainly seasonal in the highland fringe areas and of relatively longer transmission duration in lowland areas, river basins and valleys [3]. Depending on variable rainfall, altitude patterns and population movement, malaria transmission tends to be highly heterogeneous geo-spatially within each year as well as between years. Anopheles arabiensis is the main malaria vector; An. pharoensis, An. funestus and An. nili play a role as secondary vectors in Ethiopia [3].An. arabiensis prefers breeding in small, temporary, and sunlit water collections such as rain pools;

however, it can also breed in a wide variety of other types of water bodies, biting occurs in the latter part of time. The normal flight range of An. Gambia is usually less than 1 km, but it can fly up to 7 km with the assistance of wind direction [3].

In 2009/2010 FMOH Ethiopia report, malaria was the leading cause of outpatient visits and health facility admissions, accounting for 14% of outpatient visits and 9% of admissions [5]. According to 2011 MIS report, the parasite prevalence of malaria was 1.3 and slide positivity rages from 25-35%. The most dominant malaria parasites were; P. falciparum 77 % and P. vivax 23% [6].

Malaria interventions are highly cost-effective and demonstrate one of the highest returns on investment in public health .Vector control (LLIN, IRS & environmental management) and case management are among the malaria control and prevention strategies. In Ethiopia, areas <2,000m, 55.2% and 54.8% of households surveyed currently own a mosquito net or LLIN, respectively. In all areas <2,000m, the mean number of nets was found to be 0.8 per household. In Tigray region, percentage of households that have at least one net and more than one net was 65.8 and 35.3 respectively, and average number of nets per households was 1.2 [**6**]. According to 2014/15 FY, The average number of nets per household was 0.8 in Asgede Tsimbla, lower than the regional average.

In Ethiopia, according to WHO recent report during 2006-2011, malaria cases in all ages declined by 66% and slide positivity rate by 37%. According to 2015 world malaria day FMOH report, the number of reported malaria cases, admissions and malaria related deaths has been significantly reduced by 67%, 48% and 55% respectively [5].

In Tigray region, the major transmission season of malaria is from Sep-Dec and 70% of the landmass is endemic for malaria, 70 %(3.8million) of the population resided in those malaria endemic areas [7]. According to HMIS data of Tigray, the proportion of total OPD visits, admissions and deaths due to malaria decreased from 20.5%, 10.5% and 5.1% in 2011/2012 to 11.6%, 4.4% and 1.9% in 2014/15 respectively, in the region. In 2014/15, majority of the cases, 61.1% were P.F [7].

In Asgede Tsimbla, malaria is one of the leading causes of morbidity throughout the year; according to 2014/15(2007EFY) HMIS report the number of malaria cases per 1000 was 106,

stratified as high transmission area or higher risk of malaria. During the same year of the total of 19083 reported malaria cases, 1.9% was inpatients. Majority of the cases, 75.1% were P.F.

Ethiopia as well as Tigray region are working towards malaria elimination by 2030, align with the WHO Malaria GTS which aims to reduce malaria incidence and mortality by 2030 by at least 90%; and also with the African Malaria Strategy (AMS) which targets elimination of malaria from all African countries by 2030 [8] by selecting districts with annual parasite incidence <5(stratified as low malaria transmission) as primary target.

2. Objective

2.1. General objective

To describe malaria outbreak and to determine the source and risk factors of the outbreak in Asgede Tsimbla woreda March 1-10, 2016

2.2. Specific objectives

- To describe malaria outbreak by person, place and time variables
- To determine the source and risk factors associated with malaria outbreak
- Guide control and prevention measures against the disease

3. Methods and materials

3.1. Study area and period

The investigation was conducted in Asgede Tsimbla woreda, North West Zone of Tigray region, Ethiopia. The district has 180161 total populations residing in 27 kebeles; six of them are urban kebeles. The study was conducted from 1-10 Mar, 2016.

3.2. Study design

We applied descriptive cross-sectional study followed by unmatched case control study design by recruiting 50 cases and 100 controls (1:2 ratios of cases to controls) to identify the source and risk factors associated with this outbreak.

3.3. Sampling method

Cases were selected randomly from the list of health facilities registration book and controls were also selected randomly matched by their residence area or neighbors of cases**.**

3.4. Sample size

All confirmed malaria cases from Jan, 25-Feb 07, 2016 were included for the descriptive study and we recruited 50 cases and 100 neighboring controls using purposive sampling method.

3.5. Source population

All residents of Asgede Tsimbla district with 180161 total population.

3.6. Study subjects

All residents of Kisad Gaba

A case: is defined as an individual currently living in the study area and having experience of malaria infection confirmed by microscopy or RDT in the health facilities during the outbreak time (Jan 25- Feb 07, 2016).

A control: is defined as an individual living in the study area neighboring to the case and who had not had self-reported and laboratory confirmed malaria illness within the same period.

Inclusion criteria: All residents of the Kisad Gaba kebele and volunteers for the interview

Exclusion criteria: Gold miners mobilized from another woreda and Eritrean refugees were excluded from the study

3.7. Data sources

Health facility registries, Health post, health center, woreda and regional weekly PHEM data were used for data analysis, in addition to the malaria norm chart of all the visited health facilities**.** Only confirmed malaria cases either by microscopy/RDT were included in the study.

3.7.1 Case Definition

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

Confirmed case: A suspected case confirmed either by microscopy or RDT for Plasmodium parasites in Asgede Tsimbla woreda, from Jan 25-Feb, 7, 2016. We used only confirmed cases.

3.8. Data collection methods and tools

A structured questionnaire was developed and translated to local language prior the field deployment, then demographic information, clinical presentation (for cases only), risk factors and environmental data were collected from each cases and controls through face to face interview to investigate the outbreak.

3.9. Data management and analysis

Data entry and editing was conducted by using Epi-Info 7.1.6 and exported to SPSS version 21 for analysis purpose. Descriptive statistics (Univariate analysis or Frequency), simple cross-tabulations (Bi-variate) and Multi-variate analysis (logistic regression) was done to describe and to determine the risk factors of the outbreak.

3.10. Ethical considerations

A formal letter was written from Tigray Regional health Bureau to the district health office to investigate the outbreak, and the district health office accepted that and a support letter was also written from the district health office to the respective health facilities. The purpose of the investigation was briefed to the study participants, health professionals and kebele administrative. Consent was taken from each study participant prior to data collection.

3.11. Variables

S/No	Dependent variable	Independent variable
1	Disease due to malaria?	Sleeping without LLIN
2		House hold with no IRS
3		Presence of intermittent rivers near community
4		Presence of mosquito breeding sites near HH
5		Sleeping outside home
6		Staying outside over night
7		Travel history

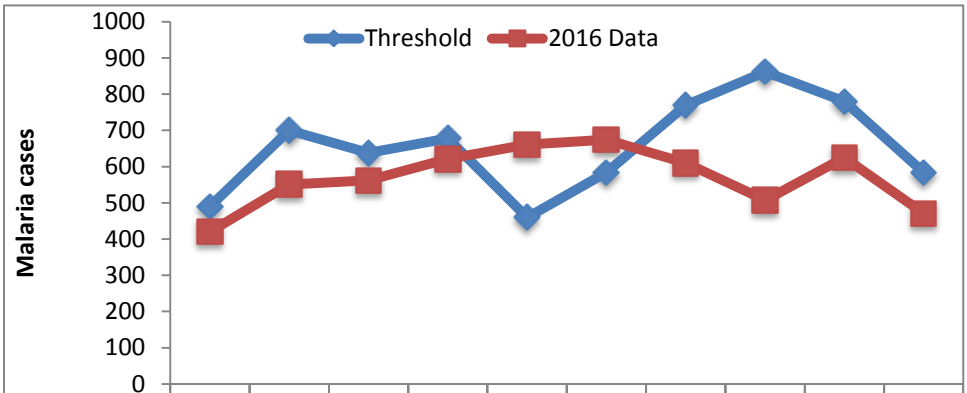
8		Presence of malaria case in HH
9		Presence of any artificial water- holding container close to your HH

4. Result

4.1. Descriptive result

We identified a total of 745 malaria confirmed cases during the outbreak period, WHO week 5-6 in Asgede Tsimbla woreda, from Jan 25-Feb 07, 2016. The average incidence rate (overall attack rate) of the district was 22.2 malaria cases per 1000 population with 52.4% positivity rate during the outbreak period (WHO week 5&6).Majority of the cases,68.7% were plasmodium falciparum(P.F) species ,and 1.5% were mixed infections, with 3.0% (40)admission rate and no reported death. As we can see from the figure below the alert threshold was on week 4 and the norm chart crossed the threshold line at week 5 and 6, and then dropped at week 7.

The weekly malaria data was analyzed at PHCU/Cluster health center (HC) level to know the specific kebeles the malaria outbreak occurred. After that, the norm chart crossed the norm line in Kisad Gaba, D/Mariam and Edaga Hbret cluster HCs, and analysis was also done at their cluster heath post (HP) level, and we identified malaria outbreak in Htsats, Zengorako and Lmat health posts, the norm chart crossed the threshold line at WHO week 5 and 6.



	1	2	3	4	5	6	7	8	9	10
Threshold	490	700	638	678	460	584	770	862	780	584
2016 Data	420	551	562	621	661	674	610	507	625	471

Figure 1.1.1 Malaria epidemic monitoring chart by WHO week number, Asgede Tsimbla woreda, Tigray, Ethiopia, week 1-10, Threshold(2014/15) &2016 data.

The outbreak affected a total of six kebeles (22.2 %) of the district. Of the total of 745 confirmed malaria cases, 174(23.3%) and 171(23.1%) were from E/Hbret and Htsats kebeles respectively. The positivity rate ranges from 47% to 57.8% during the outbreak in the affected kebeles.

The attack rate ranges from 16.4 to 28.4 per 1000 population by kebele; the highest was from K/Gaba ,28.4 malaria cases per 1000 population and the lowest was from D/Mariam and Zengorako Kebeles, 16.3 malaria cases per 1000 population. But it was similar in the remaining kebeles.

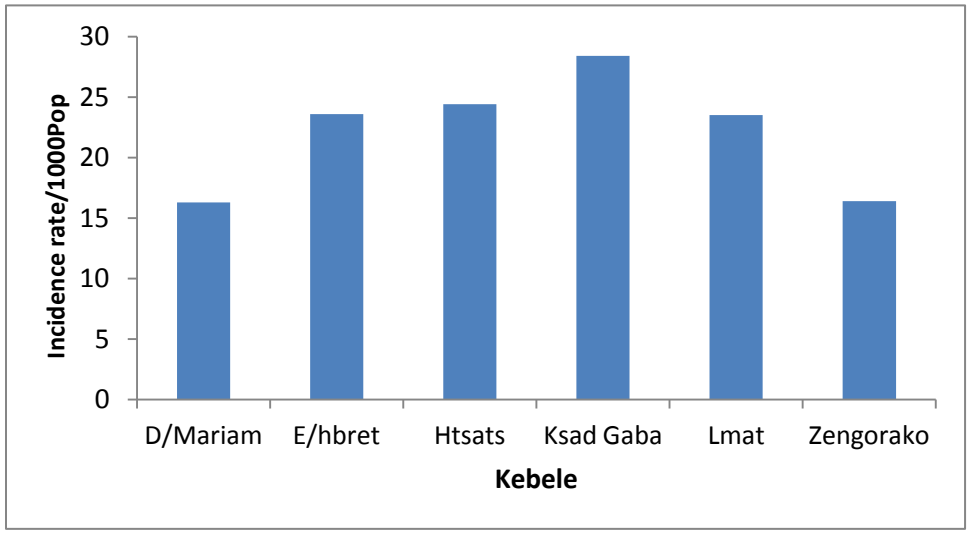


Figure 1.1.2 Malaria incidence rate per 1000 population by each kebele, Asgede Tsimbla, Tigray, Ethiopia, Jan 25-Feb, 07, 2016.

The proportion of malaria cases were, 14.5 %, 29.1%, 54.2% and 2.1% in <5, 5-14, 15-59 and >=60 years age groups respectively. The average ASAR was higher among 15-49 years age group, followed by 5-14 years age group ,25.2 and 22.2 ASAR per 1000 population respectively and the lowest was among >=60 years age group,7.3 ASAR per 1000 population; But this differs from kebele to kebele that ranges from 0-33 ASAR per 1000 population. In <5 years age group,

the highest ASAR was in E/Hbret and Lmat kebeles with 32.5 and 28.4 ASAR per 1000 population respectively.

Table 1.1.1 ASAR of the malaria outbreak by each kebele and age group, Asgede Tsimbla, Tigray, Ethiopia, Jan 25-Feb 07, 2016**.**

S/No	Kebele Name	Tot Population	<5 Yrs		5-14 Yrs		15-49 Yrs		>=60 Yrs	
			Number of cases	ASAR/1000	Number of cases	ASAR/1000	Number of cases	ASAR/1000	Number of cases	ASAR/1000
1	D/Mariam	5689	10	12	20	12.1	60	22.1	3	8.1
2	E/Hbret	7372	35	32.5	66	30.7	70	19.9	3	6.2
3	Htsats	7044	18	17.5	41	20	107	31.8	6	13.3
4	K/Gaba	4361	15	23	38	29.9	69	33.1	2	7
5	Lmat	4591	19	28.4	33	24.7	56	25.5	0	0
6	Zengorako	4521	11	16.7	19	14.4	42	19.4	2	6.8
7	Total/Average	33578	108	21.9	217	22.2	404	25.2	16	7.3

N.B: Population by age group was taken from woreda profile

Of the total of the 745 confirmed malaria cases, 431(57.8%) of them were males. The median age of the cases was 19 years age (age range: 3 months-85 years). Majority of the cases were among 15-49 years age group, 54.2 %(404) followed by 5-14 age group with 29.1 %(217) proportion.

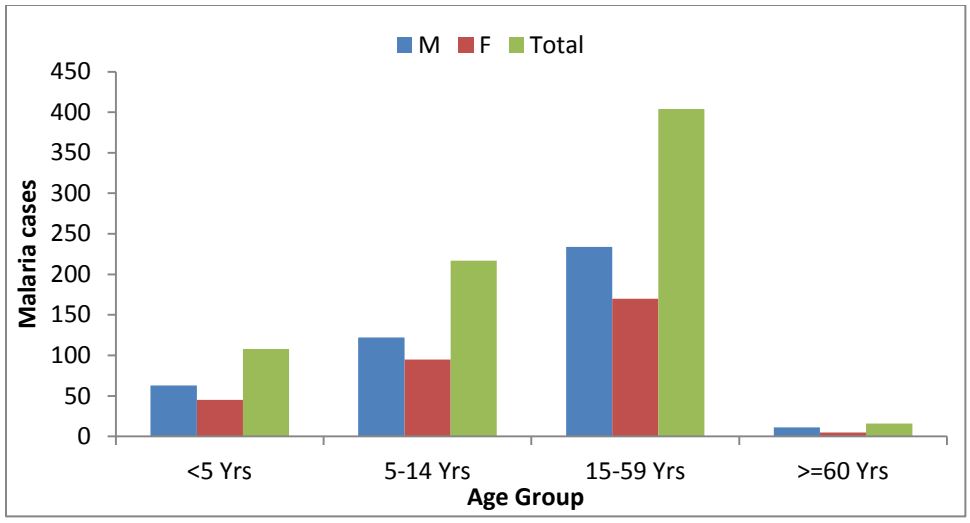


Figure 1.1.3 Number of malaria cases by age group and sex of Asgede Tsimbla district, Tigray, Ethiopia, Jan 25-Feb 07, 2016**.**

The outbreak duration was two weeks, from WHO week 5-6(Jan 25-Feb, 07, 2016) and subsided to normal after week 7as shown below. Interventions were taken at kebele, woreda and regional levels during the outbreak.

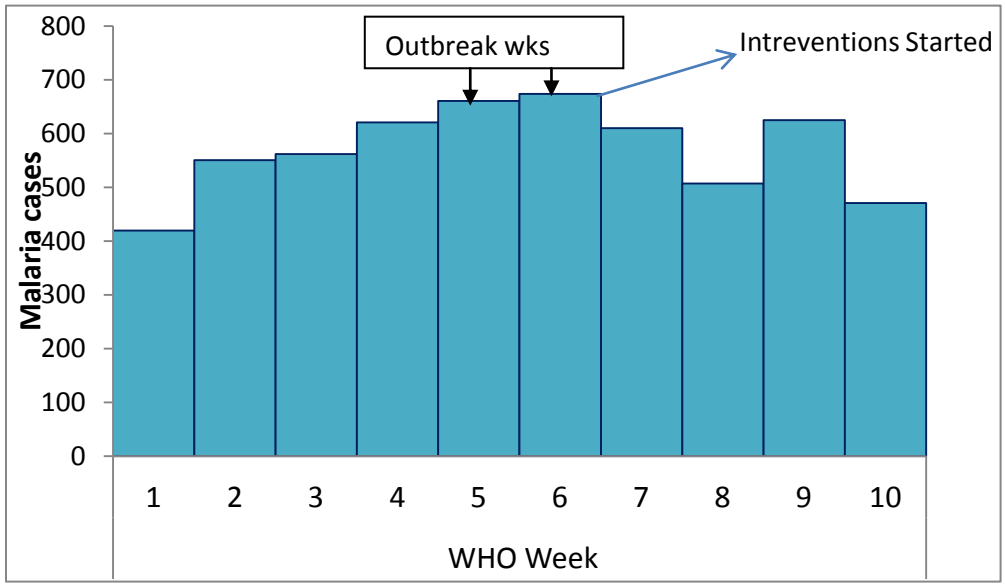


Figure1.1.4Malaria Epi-curve by WHO week number, A/Tsimbla, Tigray, Week 1-10, 2016

Of the total of the interviewed case-control participants, 55.3 %(83) were females, and 63.3 %(95) were in 15-59 years age group followed by 5-14 years age group,18.6%(28). Almost half of

the case-control participants, occupation was Farmers, 40 %(60), and 38 %(57) were married and 40 %(60) had primary educational level, followed by not-applicable.

Table 1.1.2 Demographic characteristics of the case-control study participants of malaria outbreak in A/Tsimbla district, Tigray, Mar 1-10, 2016.

S/No	Variables		Case No (Col %)	Control No (col %)
1	Age Group	<5yrs	9(18%)	12(12%)
		5-14 yrs	12(24%)	16(16%)
		15-59yrs	27(54%)	68(68%)
		>=60yrs	2(4%)	4(4%)
2	Sex	M	24(48%)	43(43%)
		F	26(52%)	57(57%)
3	Occupational status	Farmer	19(38%)	41(41%
		Student	6(12%)	20(20%)
		Not Applicable	17(34%)	18(18%)
		Unemployed	7(14%)	12(12%)
		Employed	1(2%)	8(8%)
4	Marital Status	Single	6(12%)	23(23%)
		Married	18(36%)	39(39%)
		Not Applicable	19(38%)	27(27%)
		Others	7(14%)	11(11%)
5	Educational Status	Illiterate	12(24%)	25(25%)
		Primary	19(38%)	41(41%)
		Secondary	6(12%)	15(15%)
		N/A	13(26%)	16(16%)
		Other	0	3(3%)

Majority of the interviewed cases, 66 %(33) were treated by Coartem, and 30 %(15) were treated by chloroquine .Of the total of 50 interviewed cases, 48(96%), 36 (72%), 30 (60%), 26(52%) and 22(44%) had fever, headache, chills and shivering, anorexia/appetite lose and vomiting respectively.

4.2. Analytical result

The bi-variate analysis result showed that, stay inside during evening and sleeping under bed net always was protective risk factors against the disease. Stay outside over night, presence of malaria sick patient in HH and presence of malaria breeding sites and intermittent rivers near HH or community were significant risk factors. But sleeping inside house, wearing protective cloths and sleeping under net some times were not significant protective factors.

Table 1.1.3 Bi-Variate analysis results of the risk factors of malaria outbreak with crude OR and level of significance, A/Tsimbla, Tigray, Ethiopia, Mar 1-10, 2016.

S/No	Variables		Case No(Col%	Control No (Col %)	COR(95%CI)
1	Sleeping Area	Inside	39(78 %)	80(80%)	0.88(0.4-2.0)
		Outside	11(22%)	20(20%)	
2	Stay outside over Night	Yes	22(44%)	27(27%)	2.1(1.04-4.33)
		No	28(66%)	73(73%)	
3	Sick Patient in HH	Yes	29(58%)	25(25%)	4.1(2.0-8.5)
		No	21(42%)	75(75%)	
4	Bed net presence	Yes	42(84%)	96(96%)	0.22(0.06-0.7)
		No	8(16%)	4(4%)	
5	Bed net utilization	Always	16(32%)	79(79%)	0.12(0.05-0.26)
		sometimes	32(64%)	19(19%)	0.20(0.03-1.5)

		Never	2(4%)	2(2%)	
6	Breeding sites	Yes	28(56%)	21(21%)	4.79(2.3-10.0)
		No	22(44%)	79(79%)	
7	Protective cloth	Yes	45(90%)	94(94%)	0.57(0.17-1.98)
		No	5(10%)	6(6%)	
8	Intermittent Rivers	Yes	21(42%)	21(21%)	2.74(1.3-5.7)
		No	29(58%)	79(79%)	
9	Place of stay/evening	Inside	14(28%)	72(72%)	0.15(0.07-0.32)
		Outside	36(72%)	28(28%)	

By multi-variate analysis, stay inside home in the evening and sleeping under net always were independent protective factors. Presence of sick patient in HH, breeding sites and intermittent rivers was independent risk factors for the development of the disease.

Table 1.1.4 Shows Multi-Variate analysis result of the independent risk factors of the malaria outbreak, A/Tsimbla, Tigray, Mar 1-10, 2016**.**

S/No	Variable	Crude OR (95%CI)	Adjusted OR(95%CI)
1	Presence of Sick Patient in HH	4.1(2.0-8.5)	4.7(1.8-11.8)
2	presence of Breeding site	4.8(2.3-10.0)	5.7(2.2-14.5)
3	Intermittent river	2.7(1.3-5.7)	3.9(1.5-10.3)
4	Stay inside/evening	0.15(0.07-0.32)	0.16(0.06-0.47)
5	Using Bed net always	0.12(0.05-0.26)	0.13(0.05-0.3)

5. Public health interventions taken

- We assessed the affected kebeles with the woreda RRT team ,and reviewed bed net coverage, handling and utilization
- Environmental investigation and management was conducted in all the affected kebeles

- An active case search and early treatment was also conducted in few households to interrupt the transmission.
- Intensive health education was given on mass gatherings like, churches, schools and market areas targeting malaria prevention and control ,especially on bed net handling, utilization and environmental management
- Accordingly more than 30,000 bed nets were given to woreda health office by communicating with regional PHEM and PFSA Mekelle HUB.

6. Limitation of the study

- We used purposive sampling method due to time limitation
- The proportion of malaria confirmed cases by RDT or microscopy was no known
- The health facility registration book did not identify gold miners coming from another woreda
- There was data discrepancy among regional PHEM, woreda PHEM and health facilities.
- There was no weekly report from Htsats camp health center(Eritrean Refuge), the health center serves for the community also
- There was no last year data of RDT/Micro tested, P.F and P.V at health post level

7. Discussion

We identified malaria outbreak in Asgede Tsimbla district from Jan, 25-Feb 07 with 22.2 incidence (attack) rate per 1000 population, according to the national guideline malaria epidemic monitoring chart, the threshold was set the last years data by doubling and current data would be plotted on weekly basis to compare with the threshold, if it crossed the threshold line it is considered as outbreak, in our case the threshold line crossed at WHO week 5&6 with 52.4% positivity rate, greater than 2014/15 regional positivity rate,32.7% and 3% admissions. An epidemiological investigation of malaria outbreak in village santej, district Gandhi nagar, India ,with 15.1 attack rate per 1000 population and 43.5% positivity rate and 17% hospitalizations [9], positivity rate and attack rate was lower than our study finding but hospitalization was higher .Outbreak investigation of malaria in North Lakhimpur district, Pakistan findings showed that, the outbreak affected a total of 7906 malaria cases, with 0.9 attack rate per 1000 population and 1.4% case fatality rate [10], the attack rate was lower than our study finding but there was no

death in our study. Those differences could be due to different in study period and geographical location of the study areas. The attack rate ranges from 16.3-28.4 per 1000 population in the kebeles, the outbreak occurred, the highest attack rate was from K/Gaba kebele ,28.4 per 1000 and the lowest was from D/Mariam and Zengorako kebeles,16.3 attack rate per 1000 population. This variation may be due to coverage, quality and utilization of vector control activities among the kebeles.

The proportion of P.F was 68.7% in our study and this was less than the Pakistan study, 58.4% [10] and lower than 2011 Ethiopian MIS, P.F accounts for 77% of the total confirmed malaria cases [6]. Majority (85%) of the cases were among five and above years old ,similar with malaria outbreak study in Bunga district ,Amhara Region ,85% of the cases were >=5 years old [11],but lower than a pilot study conducted in 10 villages of Amhara region ,>=5 years old accounted for 95.4% of the total malaria cases [12] .The average ASAR ranged from 7.3-25.2per 1000, and it was higher among 15-59 years age group 25.2 average ASAR/1000 but it was similar in <5 and 5-14 years age group , 21.9 and 22.2 average ASAR per 1000 population respectively ,and the lowest was among >=60 years age group,7.3 ASAR/1000 . A study finding in Gandhi Nagar district, India indicated, the ASAR was higher among >=60 years age group with 28.8 ASAR /1000 different with our study, followed by 5-14 and 15-59 years age groups, 17.9 and 15.9 ASAR per 1000 populations respectively [9], lower than our study . There was no any confirmed case of malaria in <5 years age group children in the Indian study [9]. This difference could be due to difference in intervention activities /target groups.

Majority of the cases (57.8%) were males, this was lower than Bunga district malaria outbreak, 69% of the total cases were males [11], and pilot study conducted in 10 villages of Amhara region, 78.4% of the total cases were males but higher than the Indian malaria outbreak investigation,50.6 % of the malaria cases were males [9]. This difference could be due to seasonal human mobility, in the other studies especially in Amhara region most of the cases had travel history, and males are the most dominant agricultural workers in our country. Most common symptoms of the cases were fever, headache and chills and shivering and vomiting, 96%,72%, 60%and 52% respectively, and this was similar with the Indian outbreak investigation study,95.7% of the patients had fever alone or fever with chills followed by headache and vomiting [9]. The outbreak duration was from WHO week 5 to 6(Jan 25-Feb, 07, 2016) following the erratic rain fall and subsided after two consecutive weeks.

Presence of malaria sick patient in HH, OR 4.7(95%CI; 1.8-11.8, P.value=0.001), presence of malaria breeding sites, OR 5.7(95%CI; 2.2-14.5, P.value=0.000) and presence of intermittent rivers nearest to the community, OR 3.9 (95 %CI; 1.5-10.3, P.value=0.006) were independent risk factors for onset of the outbreak. A study in Southern Ethiopia indicated, living in near malaria breeding sites was significant risk factor for malaria, OR 4.9 (95% CI: 2.59–9.35, P.Value=0.006) [13], this was less than to our study presence of breeding sites near HH, but higher than to presence of intermittent rivers closest to the community and the presence of sick patient in HH becomes additional risk factor for malaria transmission.

Sleeping under bed net always, OR 0.13(95%CI; 0.06-0.47, P.value=0.001) and stay inside home in the early night/evening were independent protective factors against the disease malaria. A study conducted in Adami Tulu, Central Ethiopia, indicated general anopheline outdoor abundance was significantly higher than indoors (P.value<0.0001) and the mean hourly man biting density was higher outdoors compared to indoors and peaked during early parts of the night (19-22hrs, depending on the type of anopheles) when people were no more protected (relaxed) by the primary indoor intervention measures [14].

8. Conclusion

Majority (85%) of the cases were >=5 years age. Presence of malaria sick patient in HH, malaria breeding sites near HH and presence of intermittent rivers nearest to the community were independent risk factors for onset of the outbreak. The erratic rain fall as a result of El Nino and higher temperature of the area, together makes favorable condition for malaria breeding during January ,in addition to low LLINS and IRS coverage ,and low utilization of vector control measures were all together responsible for the malaria outbreak . The district is endemic for malaria with high transmission.

9. Recommendations

- Improve awareness of the community towards malaria prevention and control activities by social mobilization, especially on bed net handling, utilization and environmental management.
- Scaled up key anti malarial interventions

- The regional health bureau needs to improve LLINS coverage of the district, according the woreda health office micro -plane, the regional health bureau distributed only 37.4% of the woreda LLINS micro-plane (request) during 2014-2015FY.
- Increase IRS coverage in high transmission areas

- Improve targeting, quality and utilization of the existing malaria intervention activities like, LLINS and IRS at all levels.
- Address of malaria patients must be recorded accurately, to identify residences and travelers coming from another woreda.
- The regional PHEM and woreda health office needs to develop data cross-checking mechanism on regular basis.
- The health facilities should record and report malaria cases accurately to avoid data discrepancy
- The Eritrean refuge health center, must report all cases to woreda health office according to the national standards and TRHB is responsible for this.

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Annex: 1.1

Data Collection questionnaire for malaria outbreak investigation,

I. Socio-demographic information:

1. ID number of respondent_____

2. Age in years_____

3. Sex: M□ F □

4. Address: Region _____Zone_____ Woreda_____ kebele _____village_____

5. Occupation: Employed □unemployed □Student □Pastoralist □farmer

6. Total family members' _____

7. Ethnicity: _____

8. Religious: Orthodox, □Protestant, □Muslim □other □

9. Marital status: Married, □single □Widowed □Divorced□

10. Education status: Illiterate □Primary, □Secondary □tertiary □, non-formal □

11. Case status

a) Case Yes □,

b) Control yes□

II. Clinical presentations:

***(For case only)**

12. What was the first symptom? _____

13. When was the 1st symptom started (date of onset of symptoms)

DD/MM/YY_____

14. What were others symptoms?

a) Fever: Yes □No□, if yes duration of fever____ was it constant fever? Yes □No □or every other days fever? Yes □No□

b) Vomiting: Yes □No□

c) Diarrhea: Yes □No□,

d) Anorexia (appetite loss): Yes □No□,

e) Headache: Yes □No□

f) Sweating: Yes □No□,

g) Chilling and shivering: Yes □No□,

h) Weakness: Yes □No□,

i) Caught: Yes □No□,

j) Back pain: Yes □No□,

k) Muscle pain: Yes □No□,

l) Rigor: Yes □No□,

Ask the following signs (M to Y) for complicated malaria only

m) Altered consciousness (e.g. confusion, sleepy, drowsy, comma) Yes □No□,

n) Not able to drink or feed Yes □No□,

o) Severe dehydration, Yes □No □

p) Persistent fever, Yes □No □

q) Frequent vomiting Yes □No □,

r) Convulsion or recent history of convulsion Yes □No□,

s) Unable to sit or stand up Yes □No□,

t) Pallor (Anemia) Yes □No□,

u) No urine output in the last 24 hours Yes □No□,

v) Bleeding Yes □No□,

w) Jaundice (yellowish coloration) Yes □No □,

x) Difficult breathing Yes □No □

y) Other conditions that cannot be managed at this level_____

15. Did you visit health facilities? Yes □No□, if yes, when did you visit health facilities? DD/MM/YY_____

16. Did you get any treatment 1.Yes □No□, if yes, what treatment did you get?

(a) Coartem Yes □No□, was it for PF Yes □No□,

(b) Chloroquine? Yes □No□, was it for PV Yes □No□,

(c) Quinine tablets Yes □No□, was it for pregnant and <5 Kg? Yes □No□,

(d) Quinine injection Yes □No □, was it for sever malaria Yes □No□,

(e) Other treatment given

_____

_____

17. Did you recover completely after the treatment: Yes □No □

18. Place of residence during 2 weeks before onset of illness;_____

19. Blood samples taken: Yes □No □

20. If yes Q18, what was the result: Positive □negative □

III. Risk Factors:

***(For both cases and controls)**

21. Specific living areas _____

22. Sleeping areas in side home _____outside home_____

23. Do you stay outside over night? Yes □No□

24. Is there anybody in your home with similar sign and symptoms? Yes □No□

25. Did you travel outside your village in the past 2-3 wks Yes □No □

26. If yes Q 24, indicate

(a) Date of travel DD/MM/Y_____

(b) The place of travel———————

(c) Date when you returned back DD/MM/YY_____

27. If Q 24 is yes, is there sick patient (same symptoms) in the place where you have been Yes □No□

28. Is there a similar sick patient in your house hold Yes □No □

29. Do you have bed net in your household Yes □No □, If is yes, how often do you use

Always □Sometimes □Never □

30. Do mothers and children given priority of using bed nets? Yes □No□

31. If yes Q 30 the number of bed nets _____

32. Was deltamethrine sprayed this year? Yes □No□

33. If yes Q31 when? _____

34. If yes Q31 how many? Once □twice □

IV. Environmental investigation

35. Place of stay during night? _____

36. Is there any artificial water -holding containers close to your home? Such as:

a. old tires: Yes □No□,

b. Plant in the containers /flower –pots Yes □No□,

c. plant with temporary water pools Yes □No□,

d. Open deep well: Yes □No□,

e. Broken glass bottles Yes □No □,

f. Cans Yes □No□,

g. Plastic container Yes □No□,

h. Gutter to collect rainwater: Yes □No□

i. Uncovered water storage/ septic tank Yes □No□,

j. Stagnant water Yes □No□,

37. Presence of mosquito vectors/ mosquitoes breeding sites around the home or vicinity? Yes □ No□,

38. If Q 37 yes, presence of larvae in breeding sites Yes□ No□,

39. Types of house screened Yes □No □, unscreened Yes □No □,

40. Do you use repellents Yes-□No□,

41. Protective clothing Yes-□No□,

42. Waste collection: Yes-□No□,

43. Unprotected irrigation Yes-□No□,

44. Presence of Intermittent rivers cloths to the community Yes □No□,

45. Presence of tick grass Yes-□No□,

V. Awareness assessment

46. Do know malaria? Sign and symptoms ----------

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47. How it transmitted? ----------

---

48. How it can be prevented? ----------

1.2. Impetigo Outbreak Investigation, Wukro Klte Awlaelo, Eastern Zone of Tigray, Ethiopia, Jul, 2015.

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Abstract

Introduction: Impetigo is a highly contagious skin infection commonly caused by one of two bacteria – Streptococcus pyogenes *or* Staphylococcus aureus. We received 6 cases of skin disease and one death report on Jun 30, 2015 from Klte Awlaelo district. We investigated this cluster to confirm its etiology, to identify source and potential risk factors of the outbreak.

Methods: We investigated impetigo outbreak from 1-10 Jul, 2015 in Klte Awlaelo district by matched case-control study design. We administered a questionnaire to all the cases (13) and matched controls (52) to identify the risk factors. We used Epi-Info, version 7.6.1 for data entry and analysis. Three swab samples were taken for culture and DST.

Results: We detected an overall incidence rate of 2.4/1000 impetigo cases and one community death in Abrha Atsbha kebele. The median age was 7.o years (range; 4 mon-63 year). The average age specific attack rate of the kebele was 2.4/1000, higher in <1year and 1-4 year age groups, 6.4 ASAR/1000). Majority of the cases were females (69.2%). Direct contact and sharing of items were significant risk factors for the disease, OR 17.1(95%CI; 4.0-92.6) and OR 6.3(95%CI; 1.5-26.9) respectively. All the swabbed samples were positive for Staphylococcus arues.

Conclusion: We have confirmed impetigo outbreak in K/awlaelo district. The highest attack rate was in <5 year age children and Females were more affected than males. The etiologic agent was methiciline resistance staphylococcus aureus. The source of the outbreak was a 4 months old child that had travel history .Direct contact and sharing of items were statistically significant risk factors for the contraction of the disease.

Key words: Impetigo, outbreak, risk factors, children, Tigray.

1. Introduction

Notification of the outbreak: Six skin cases and one suspected death were reported on 30, Jun, 2015 to regional PHEM from Wukro Kilte Awlaelo health office PHEM officer after the health center notified the district. We visited the cases on their house hold on Jul 1, 2015 and the cases were referred to Wukro Hospital for further investigation. Finally we started investigating the outbreak on Jul 2, 2015 after prepared a questionnaire. The investigation was conducted from Jul, 1-10, 2015.

Impetigo is a skin infection commonly caused by one of two bacteria – *Streptococcus pyogenes or Staphylococcus aureus.* This infection affects the epidermis, which is the outer layer of the skin. Impetigo is colloquially known as school sores and is a highly contagious infection. Any part of the skin can be affected by impetigo. However, the areas of skin around the mouth and nose are often affected first. In some people, *S. pyogenes* and *S. aureus* are part of the normal flora (microorganisms that live harmlessly on our skin) of the nose and throat. However, if the skin is broken by a cut, scratch or even a condition like eczema, the organisms can then cause an infection [1].

Impetigo is broadly classified in to two forms: bullous and non-bullous. Non-bullous impetigo is the more common of the two forms, it is also known as impetigo contagiosa i.e. more contagious than bullous impetigo. This can be caused by either S.Pyogene or S.arues, and in some cases both. In this form of impetigo, a number of small blisters form and quickly rapture, causing a yellow crust to form over the top. Bullous impetigo is less common and less contagious. Nearly all cases are the result of S.arues infection. This type of impetigo most commonly affects newborns and infants. In the bullous form, larger blisters develop which are often filled with a yellow fluid. After about 3 days, the blisters burst and a light brown coloured crust forms over the top **[2].**

After being in contact with someone with impetigo, it can take up to 3 days for signs and symptoms to occur if *S. pyogenes* is causing the infection, and up to 10 days if *S. aureus* is the causative organism. The lesions which appear on the skin differ depending on the type of impetigo. Often before the lesions form, the skin is itchy and red. If the infection is severe, there may also be an accompanying fever, enlarged lymph nodes or 'swollen glands' and feelings of sickness. The skin surrounding both types of lesions will be incredibly itchy [2].

Impetigo occurs most frequently among economically disadvantaged children in tropical or subtropical regions, but it is also prevalent in northern climates during the summer months .Its peak incidence is

among children aged 2–5 years, although older children and adults may also be afflicted. There is no sex predilection, and all races are susceptible *[3]*.

Impetigo is very infectious and spreads easily from person-to-person by skin-to-skin contact. For example, when someone touches the rash with their hand and then touches another person the infection can be passed on. Scratching at the blisters, and then touching another part of your body can help to spread impetigo to another location [2]. Impetigo can also be spread by touching objects contaminated with the bacteria like twols, sport materials, clothing, bedding, etc [4].

According to 2010 global burden of skin disease report, skin remains the 18th leading cause of health burden worldwide with 36, 921, 995 global DALYS. Globally, skin conditions were the fourth leading cause of nonfatal disease burden. Skin conditions ranged from the 2nd to 11th leading cause of years lived with disability at the country level in 2010, [5]. According to 2013 WHO global burden of disease report, impetigo accounts for 417,615(1.2% of all skin disease) years of life lost due to disability (YLD) with 140,495,000(2 %) global prevalence [6].

A recent review of the prevalence of childhood skin diseases in developing tropical and subtropical countries concluded that the prevalence of impetigo is commonly in the range of 5–10% **[7].**According to available studies the median prevalence of impetigo in Africa was 7% [IQR 4.1-12.3%] in children under 15 years age **[8].**

In Ethiopia the burden of impetigo is under estimated, because there is no separate reporting format under HMIS for all skin disease including impetigo, in addition to the inaccurate clinical diagnosis of impetigo by health professionals and poor laboratory capacity. There is limited literature concerning impetigo at national and regional levels, the same is true for Tigray region. According to the regional PHEM, there was no any report of impetigo outbreak in the region before.

Objective

General objective

To describe the outbreak, and identify the etiologic agent, source and risk factors of the outbreak in Klte Awlaelo District, Tigray, Ethiopia, 1-10 Jul, 2015.

Specific objective

- To describe the outbreak by place, person and time

- To identify the etiologic agent
- To identify the source and risk factors for the outbreak

Methods and Materials

Study area: the study was conducted in Abrha Atsbha kebele, Wukro Klte Awlaelo district, Eastern Zone of Tigray.

Study period: the study was conducted from 1-10 Jul, 2015.

Study design: We applied both descriptive and 1:4 matched case control study. The matched variables were sex, age group and occupation. There were 13 cases and 52 controls

Study population: Residents of Abrha Atsbha kebele

Study Subjects; All impetigo cases, and matched controls from the same kebele .The response rate were 100%.

Sampling method: all impetigo cases and matched controls by sex, age group, occupation and neighbors with cases, were selected by 1:4 ratios.

Data collection instruments: We used a structured questionnaire to collect information on socio-demographic, clinical status of cases, KAP of the community and possible risk factors for the outbreak. The data was collected through face to face interview by reviewing the line list data, and important pictures were also taken during the data collection.

Data source: Line list, health center registries and woreda health profile.

Case definition

Suspected case: was any person with itchy and red skin and presence of blisters, later the blisters burst and a light brown honey-coloured crust forms over the top, residence of Abrha Atsbha Kebele from Jun 8-Jul 10,2015 .

Epidemiologically linked case: was a case without laboratory testing but met the impetigo case definition and have known contact with laboratory confirmed case.

Laboratory Confirmed case: was defined as a case that met the case definition and showed growth for gram positive Staphylococcus aureus after inoculating in culture media.

Threshold: Greater than or equal to 2 impetigo cases per household or school setting**.**

Enrolment of cases and controls

Cases: those that have clinical sign symptoms of impetigo i.e. presence of blisters that were either laboratory confirmed or epidemiologically linked to the laboratory confirmed cases.

Controls: persons that were free of impetigo disease matched by sex, age group, occupation and residence with the cases, by 1:4 ratio (cases: controls) with voluntary participation.

Data processing and analysis; we used Epi info version 7.6.1 for data entry and univariate, bivariate and multi variant analysis to calculate frequencies, ASAR, and OR with 95% CI and 5 % marginal error were done using Epi info version 7.6.1 .We used Abrha Atsbha kebele (where the outbreak occurred) population as denominator to calculate ASAR and period prevalence.

Laboratory methods; we have collected 3 swabbed samples for culture and DST test,

Variables used;

Dependent Variable	Independent Variable
Impetigo case	Contact history
	Travel history
	Family size
	KAP

Ethical consideration: the TRHB wrote a formal letter to the district health office to investigate the outbreak and the district health office accepted that .We have got consent from cases and controls for sample and data collection after orienting the objective of the investigation.

Result:

Descriptive result

We detected a period prevalence of 2.4/1000 impetigo cases with 3(100%) laboratory confirmed cases and 10 epidemiologically linked cases. We identified 13 impetigo cases and one death in Abrha Atsbha kebele from Jul, 1- 10, 2015.The cases were only from Abrha Atsbha kebele.

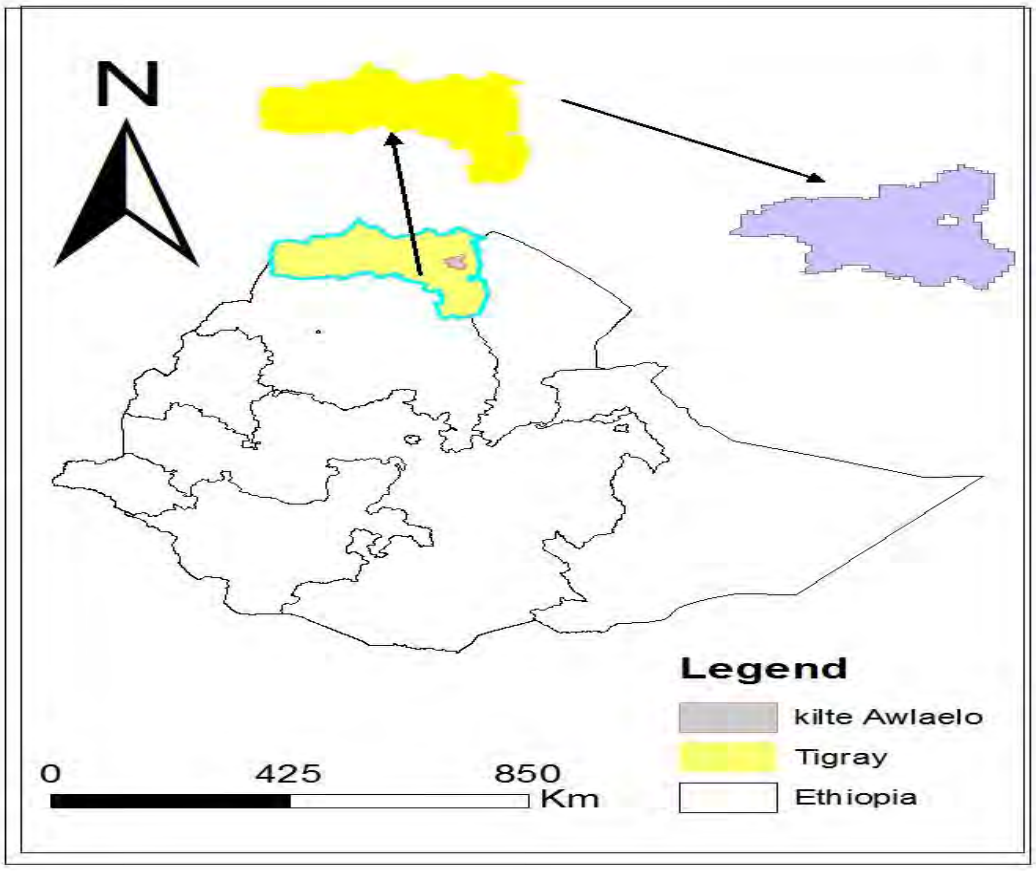

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Figure 1.2.1 Map of the study area (Klte Awlaelo woreda), Tigray, Ethiopia, Jul 1-10, 2015.

The median age of the impetigo cases were 7.o year with (IQR 3.6-30.0 year) and 4 monhs-63 year age range. The age specific attack rates were higher among <1year age group infants (one case) and 1-4 age group children (4 cases) with 6.4 ASAR/1000). Whereas, it was similar among the other age groups that ranges from 1.3-1.7 ASAR/1000(the lowest was among 10-14 age group with one case and 1.3

ASAR/1000) but the total ASAR of the kebele was 2.4 /1000.(Age group population was taken from woreda profile)

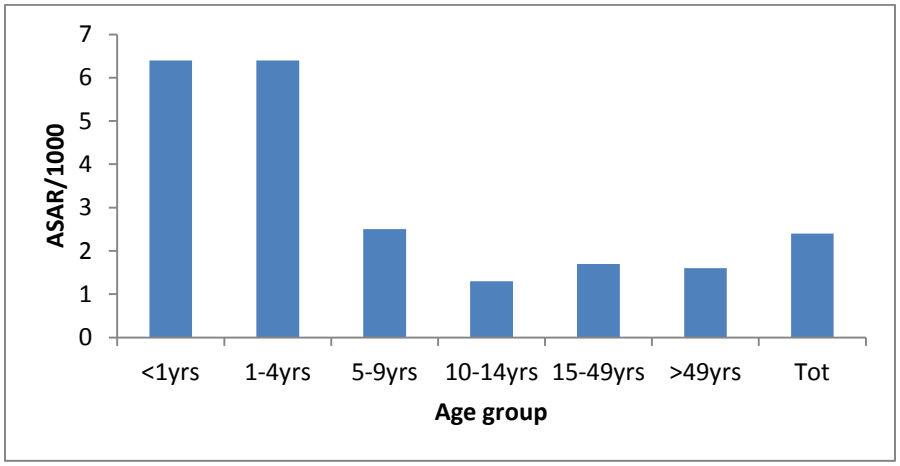

Figure 1.2.2 Shows the ASAR/1000 of the impetigo outbreak in Klte Awlaelo woreda, Tigray Region, Ethiopia, 1-10 Jul, 2015.

Among all, the total number of impetigo cases were higher in females 69.2 %(9) than males. In addition to this ,females were highly affected in 15-49 yrs age group as compared to males and there was no male impetigo case in <1yrs and >49yrs age groups as shown below (Fig:2). Whereas, it was similar in the remaining age groups.

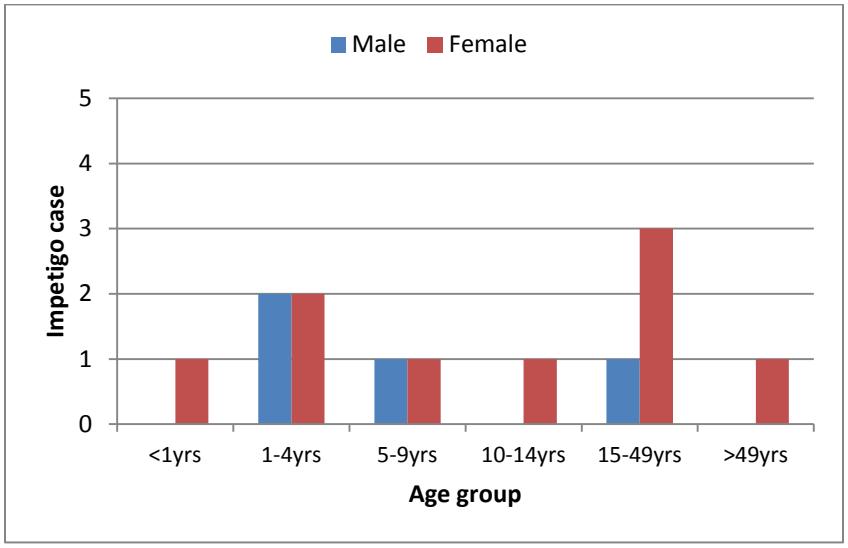

Figure 1.2.3 Number of impetigo cases by sex and age group in Klte awlaelo woreda, Tigray region, Ethiopia, 1-10 Jul, 2015

The index case (4 month child) has had travel history to areas with impetigo and she was sharing breast milk with a 2 year old child that had blisters around mouth. The index case developed blisters (onset of symptoms) on 6/9/2015 before she returned to her kebele. As shown below the epidemic curve is propagated that indicates person to person transmission with its peak from 30 Jun- 1 Jul, 2015.

The impetigo outbreak subsided one month after our intervention started, and there was no facility report on impetigo for three months in the affected kebele.

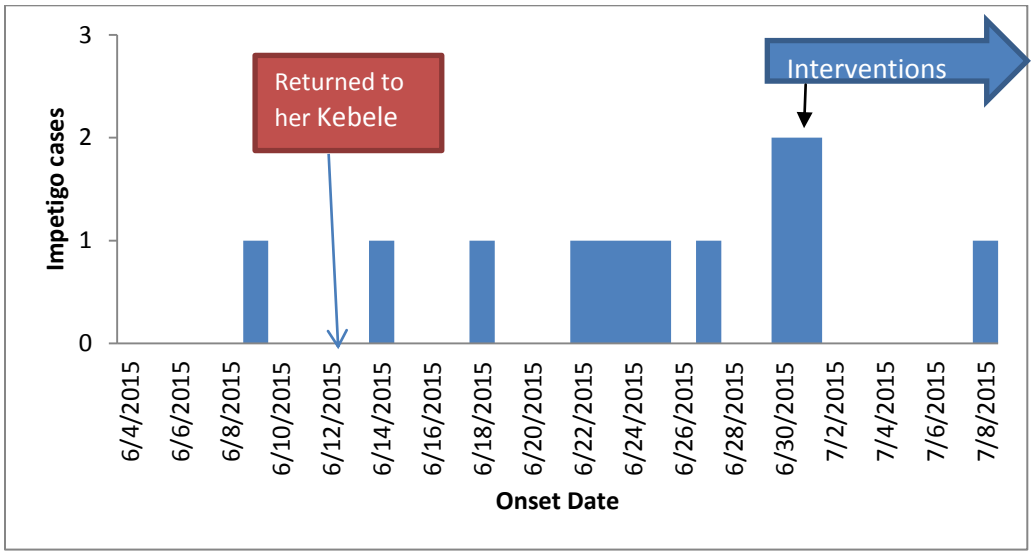

Figure 1.2.4 Shows number of impetigo cases by date of blister onset, Klte awlaelo district, Tigray Region, Ethiopia, 8, Jun-10, Jul, 2015.

Case control study result (Analytic)

We conducted a matched case control study by recruiting 13 impetigo cases and 52 controls by 1: 4 ratio matched by sex, age group and occupation. Through bivariate analysis we found that having direct contact with untreated (active) impetigo case was (Mantel Hansel Odds Ratio (MHOR=17.13, 95%CI; 4.0-92.6) and sharing of items with impetigo case (MHOR=6.3, 95% CI 1.5-26.9) were statically significant risk factors associated with the contraction of impetigo.

Table 1.2.1 Analytic result of Impetigo outbreak, Klte Awlaelo, Tigray, Ethiopia, Jul, 2015

S/No	variables		Cases (col %)	Controls (col %)	COR(95%CI)	MHOR(95%CI)	Remark
1	Direct	Yes	10(76.92)	8(15.38)	18.33(4	17.13(4.	Statistically

	contact	No	3(23.08)	44(84.62)	.1-81.7)	0-92.6)	significant
2	Sharing of items	Yes	6(46.15)	6(11.54)	6.6(1.7-26.2)	6.3(1.5-26.9)	Statistically significant
		No	7(53.85)	46(88.46			
3	Knowledge toward disease	Yes	5(38.46)	10(19.23)	2.63(0.7-9.8)	2.58(0.64-9.87)	Statistically insignificant
		No	8(61.54)	42(80.77)			

Laboratory result:

We have done culture and DST to indentify the etiologic agent .The culture result showed that the etiologic agent was gram positive staphylococcus Aureus. We used blood agar to grow the bacteria. According to DST result, the bacteria were methiciline resistance staphylococcus Aureus, i.e. resistance to oxacilline.

Table 1.2.2 DST results of the impetigo swabbed samples, Klte Awlaelo, Tigray, Ethiopia, Jul, 2015.

S/No	Name of Drug	Sample1	Sample 2	Sample 3
1	Oxacilline(OX)	Resistance	Resistance	Resistance
2	Cephaloxin(CLT)	S	S	Hetro
3	Erythromycin(E)	Hetro	Hetro	S
4	Cloxacilline(CXC)	S	S	S
5	Clindamycine(DA)	S	S	S
6	Cotrimixazole(SXT	S	Hetro	Hetro
7	Chloramphnicol(CHL)	S	S	S
8	Tetracycline(TE)	Hetro	Hetro	S

Environmental investigation:

We interviewed cases, controls, HEWs and households to know water access and personal hygiene practice of the community; accordingly even though they have protected water spring access with in

3km distance but hand washing practice of the community was poor, with no soap in most of the households and this makes vulnerable for skin disease.

Prevention and control measures taken

During the investigation period we made active impetigo case search to find additional cases, and we admitted 6 active impetigo cases in Wukro Hospital in separate room until the etiologic agent indentified. This minimized secondary transmission (spread).

There was panic in the community especially due to the death of the 1 year and 4 months female child because of complications associated with the diseases .In addition to this there were additional 4 impetigo cases in the same house hold. Due to this there was no funeral ceremony as usual and no one was interested to visit the victims' house. We have given health education about impetigo in mass gatherings by collaborating with local leaders and health professionals. Emphasis was given on personal hygiene practice to prevent the disease, mode of transmission and the disease is caused by bacteria not wrath of god and it is also curable disease. We gave appropriate drugs after the etiologic agent and DST results were identified. We discussed with the health professionals on the choice of drugs and finally distributed the DST results to all the health facilities and woreda health office.

Limitation of the study

The sample size, 13 case patients for the matched case control were small. We tested only 3 samples out of 13 cases even though 100 % of the samples were positive. We used public transport to investigate the outbreak by waiting for more than 3 hours in the bus station and this was difficult to conduct the outbreak. There was no available Global Positioning System (GPS) apparatus during the field visit and this makes difficult to indicate the real location of the cases.

Discussion

Even though impetigo is not a fatal disease, our findings indicated that there was one community death. During her visit to the nearest health center, the deceased case was with 75% W/H measurement, registered in her card and this indicates that the case was Moderate acute malnutrition. According to family history the case has developed symptoms like high grade fever and discoloration of skin before death, those factors may be cause of death. The prescribed drug at the health center was Amoxicillin.

The age specific attack rate were higher among <1 and 1-4 age groups (6.4 ASAR/1000), when we compared with other age groups. Impetigo is a disease of babies and children, and may constitute 4–6%

of all bacterial infections in the pediatric population; this is due to their soft skin [9]. A study conducted in southwestern part of Ethiopia (Seca Quorsa and Ule-Oke rural communities of Jimma zone) indicated that impetigo was more prevalent in the younger groups [10]. Another study in Fiji indicated that the prevalence of impetigo was 25.6% (95% CI 24.1-27.1) in primary school children and 12.2 % (95% CI 9.3-15.6) in infants [11], similar with our finding.

According to our study 9(69.2 %) of the total cases were females and this was higher among 15-49 year age group females with 3(33.3%). This may be due to the reason that most of the time females are responsible for child care in the society and most of the cases were preschool children with 6.4 ASAR/1000(<1 and 1-4yr age groups), there will be high frequency of contact during day and night especially with those in child bearing age group (15-49), this makes them vulnerable to the disease. A case-control study with 1:2 ratio(n=7), outbreak of staphylococcal impetigo in a maternity ward linked to an asymptomatic healthcare worker, in France hospital indicated that females comprised 57.1 % of the total impetigo cases (hospital neonates) [12], this is lower than to our study findings i.e. 69.2%.

Contact history and sharing of items were statistically significant risk factors for the development of the disease, with adjusted OR equal to 17.1 [(95% CI: 4.0-92.6), p= 0.0005] and 6.3 [(95% CI: 1.5-26.9), p=0.006] respectively. A case -control study of an outbreak of hospital - acquired Staphylococcus aureus skin infection among newborns, Nan Province, Thailand, January 2008 findings indicated that exposure (contact) to nurses aid A4 (carrier) and ward sharing with symptomatic cases were significantly associated risk factors with illness, with adjusted OR equal to 80.3 [(95% CI: 4.8 –1350.3), p=0.002] and 35.6 [(95% CI: 1.9 – 654.7), p=0.016] respectively [13].

Swabs were taken from 3(23.1%) of the patients and S.arues was grown in 100% of the cases where swabs has been taken. An 11.5-year population-based incidence study of impetigo from a community in Western Norway, indicated that 76% S.arues was grown from 80% of the bacterial swabbed samples (i.e. 80% of the cases) [14],even though our swabbed samples was low i.e. 3(23.1%) , the positivity rate was higher in all the studies, but higher in our study. According to our DST result, the causative agent was methiciline resistance staphylococcus aureus (i.e. resistance to antibiotics like oxacilline), this was similar with a cohort study conducted among players on a high school foot ball team-New York city, 2007, with four confirmed MERSA cases, among 51 players [15].

Conclusion

We have confirmed impetigo outbreak in K/awlaelo district, Tigray region with one dea. The highest attack rate was among <5 year age group children (6.4 ASAR/1000, for <1 &1-4 age groups) and Females were more affected than males especially in 15-49 age groups. The etiologic agent was methiciline resistance staphylococcus aureus. The source of the outbreak was a 4 months old child that had travel history .Direct contact and sharing of items were statistically significant risk factors for the contraction of the disease, according to our findings.

Recommendation

- The regional health bureau needs to create awareness on skin disease especially on impetigo to health professionals by coordinating with Mekelle University Ayder referral hospital dermatology department.
- Deliver health education to the community to create awareness regarding impetigo skin disease mode of transmission and control measures.
- Treatment guidelines must be prepared for all skin disease including impetigo, for appropriate prescribing practices.
- The HMIS unit must develop separate reporting format for all skin disease including impetigo to know their burden, and this is critical to allocate resources and guide control measures.
- The surveillance system needs to be flexible to include public health problems other than the notifiable disease under surveillance system and must be sensitive for unusual occurrence of cases for early detection and control.

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Annex: 1.2

a. Questionnaire for Case – Control study on Suspected Impetigo Outbreak Investigation in Wukro kilte Awlaelo, Tigray Region, Jul, 2015

2. Data collector information: Name:_____ Phone number: _____
3. Date of Data collection:_____
   Region_____ Zone_____ District_____ Kebele _____ Got _____
   House: Longitude:_____ Latitude:_____
4. Who is answering the questionnaire?;
   ☐ Parent/ guardian of sick person ☐ Sick person ☐ other (please specify) _____
5. *Respondent category*: ☐ case ☐ control Active case: Yes☐ No ☐

I. **Socio-demographic information**

1. Patient Name_____ 3. Age**:** years_____ months ____
2. Patient phone number: _____ (whose phone#?) _____ 4. Sex**:** ☐ Male ☐ Female
3. What is your occupation?**:**

☐ Farmer ☐ Merchant ☐ Housewife ☐ Unemployed ☐ Government
☐ Pastoralist ☐ Student ☐ Not applicable ☐ other _____

4. What is your ethnicity?

☐ Oromo ☐ Tigre ☐ Amhara ☐ Gurage ☐ Other (specify) _____

5. What is your religion?**:** ☐ Orthodox ☐ Protestant ☐ Muslim ☐ Catholic ☐ other_____
6. What is your marital status ?: ☐ Single ☐ Married ☐Widowed ☐ Divorced ☐ Not applicable
7. Have you ever attended school?: ☐ yes (go to question 8) ☐ No (go to question 9)

8. What is the highest level of education you have completed? (read answers): ☐ KG ☐ Primary ☐ Secondary ☐ Tertiary ☐ Not applicable
9. Father's occupation : ☐ Farmer ☐ Merchant ☐ Unemployed ☐ Government ☐ Student ☐ Pastoralist ☐ Other _____
10. What is your annual income? ----------
11. Parent's of case/control's education : Mother: ☐ Illiterate ☐ Primary ☐ Secondary ☐ Tertiary
    Father: ☐ Illiterate ☐ Primary ☐ Secondary ☐ Tertiary
12. Family size :_____

II. <u>Knowledge Questions</u>

1. What is impetigo, or are you not sure? _____
2. How do you think impetigo is transmitted? You can pick more than one response:
   ☐ Through the air ☐ via fomites ☐ sharing of items with ill person ☐ pick or touch sore of ill person ☐ other _____
3. How do you think impetigo can be prevented? :
   ☐ Chemoprophylaxis ☐ There is no prevention ☐ personal hygiene practice ☐ local healing ☐ other
4. Who do you think can be affected by impetigo, or are you not sure?
   ☐ Pre school age Children ☐ young Children ☐ People over 18 years old
   ☐ Any age groups of both male and women ☐ don't know ☐ other (specify):_____
5. Do you think frequent hand washing can prevent impetigo? ☐ Yes ☐No ☐ Don't know
6. Where did you go first when you get impetigo? ☐ Health Facility ☐ Traditional Healers ☐ Holy Water ☐ Stayed at home ☐ other :(Specify)_____
7. How do you think impetigo can be cured? ☐ Using modern medicine ☐ Using traditional Medicine ☐ Holly water ☐ by feeding nutritious foods ☐ keeping the sick person indoor ☐ Other (Specify)_____

III. Clinical presentations *<u>(for case ONLY)</u>*

8. In which pat of your body have you seen rash (blisters) first?
   a) Nose b) around mouth c)legs d) hands
9. What were the symptoms?
   a) itching: ☐ Yes ☐ No
   b)blisters: ☐ yes ☐ No, if yes, small or large
   b) Fever : ☐ yes ☐ No
   c) sores around mouth &nose: ☐ Yes ☐ No

10. What is the date when you first saw a rash on your mouth or nose? : ____/_____/_____

11. Were you in your home village when you first noticed you were ill?

☐ Yes (skip to question 14) ☐ No (go to next question)

12. Where were you when the illness started?

District; _____Kebele; _____

13. How long have you had a rash? (Duration of rash) _____days

14. Do you still have the rash? ☐ yes ☐ No

15. Did you visit health facility for this illness?

☐ Yes (date went to facility____/____/____) ☐ No (go to question # 17)

16. How long were you sick before visiting the health facility? _____ in days/hours

17. Admitted: ☐ Yes ☐ No, If yes**,** date admitted:___/___ /_____

a. Treatment given? ☐ yes ☐ No, if yes

☐ Oral antibiotics, specify-------- ☐ Vitamin A☐ Supplementary food

☐ Antibiotic cream /ointment, specify----------☐ Anti pyretic ☐ other _____

b. Outcome: ☐Alive ☐ death

18. Did you have any of the following complications when you were sick with impetigo?

I. Sepsis(cellulites): ☐ yes ☐ No

II. Pneumonia: ☐ yes ☐ No

III. Kidney infection: ☐ yes ☐ No

IV. Scarring : ☐ yes ☐ No

19. Did you travel seven days prior to or seven days after rash onset?

☐ Yes (go to question #19) ☐ No (go to question #20)

20. Where did you travel to? ☐ School ☐ Neighbor ☐ Market ☐ Other_____

21. Do you have any contact history with someone else seven days before and after rash onset?

☐ Yes ☐ No ☐ If yes with whom_____

IV. Risk factors

EXPOSURE:

22. Did you have any travel history outside of your village 7 days to areas with active impetigo cases before onset of symptoms?

☐ Yes, ☐ No. If yes, District _____ Kebele _____

23. Did you have contacted with a person with rash and skin infection (impetigo) within the last 7 days? (cases: before onset of illness) ☐ yes ☐ No ☐ Don't know

24. If yes, who and where did you have contact with? Name**:**----------place----------

25. Have you share any items (objects) of the diseased person? ☐yes, ☐ No, if yes specify----------

26. Was there other person with impetigo symptoms in your household?: ☐ Yes, if yes how many_____ ☐ No

27. Did you have any broken epidermis? (Entry for bacteria): ☐yes, ☐ No.

(For cases: before symptom onset)

If yes, where: ☐ legs, ☐ hands ☐ around face

28. How many times do you wash your hands with soap/day? ☐ Non ☐one ☐two ☐ three ☐ other-----

29. How long does it take you to walk to the health facility from your house?

☐ Less than 10 minutes ☐ 10-30 minutes ☐31 minutes – 1 hour

☐ More than 1 hour ☐ More than 2 hours

How many rooms are there in your house? _____

1.3. Outbreak Investigation of Scabies, St.Goerge Church, Mekelle, Tigray, Ethiopia, Sep 25-29, 2015.

E.G/Egziabher (BSC.)[1], N.Dayissa (MD, MPH, PHD) [2], M.Gizaw (BSC, MPH) [3]

Abstract

Background: Scabies is a parasitic skin disease that is caused by the scabies mite (Sarcoptes scabiei).More than hundred million cases of human scabies occur worldwide every year. A suspected outbreak of scabies occurred in St.Goerge church, Mekelle, Tigray, from Jul-Sep, 2015.We investigated this outbreak to identify the source and risk factors of the outbreak and make recommendations.

Methods: We conducted a case -control study design to investigate the outbreak from 26-29, Sep, 2015. We administered a questionnaire to cases and controls living in the church to identify the source and risk factors of the outbreak. We applied 1:2 ratio of cases to controls (24 cases: 48 controls).We analyzed using Epi-info 7.1.6.

Results: We identified 24 cases (attack rate: 27.5%).All are males and the median age was 18 years (age range: 13-28yrs). The source of the outbreak was 19 yrs adult that had travel history to areas with scabies outbreak. Contact history (OR: 8.2, 95% CI: 2.3-28.6) and sharing of beds, cloths or items (OR: 4.3, 95% CI: 1.3-14.9) were identified as risk factors for the disease, and knowledge of students towards scabies transmission (OR: 0.13, 95% CI: 0.04-0.4) was a protective factor.

Conclusions: The index case, 19 years old adult men which had travel history to areas with scabies outbreak (Hntalowejirat woreda) was the source of the outbreak. Direct contact and sharing of cloths were the risk factors for the occurrence of the outbreak; knowledge towards the disease was protective. We administered mass treatment, health education and recommended to have water supply access.

Key words: Scabies, outbreak, risk factors, attack rate, Tigray.

2. Introduction

2.1. Notification of the outbreak:

Five clinically suspected cases of scabies have been reported to Mekelle zonal heath department from Ayder hospital and the zonal heath department notified to the regional PHEM on Sep, 25, 2015. The team was deployed on Sep, 26, 2015 to investigate this outbreak after we have designed a questionnaire to collect the required data's after a literature review from different sources.

2.2. Background

Scabies is an ectoparasitic infestation of the skin caused by the human itch mite, (Sarcoptes scabiei var. hominis) **(1)**. Scabies infestations are generally categorized as typical, atypical or crusted/keratotic (Norwegian). Persons with atypical or crusted scabies are very contagious than typical scabies, so a single patient or staff member with crusted scabies can easily lead to an outbreak in the facility **(2)**. *Sarcoptes scabiei* infestation is specific to humans and is different from the mite infestations that affect dogs and other animals, which are more commonly known as mange. Mites from mange-infested animals can burrow into human skin but cannot reproduce, so they die within a few days **(3)**.

Figure 1.3.1 **Shows scabies mite (*Sarcoptes scabiei* var. *hominis)***

TRANSMISSION/COMMUNICABILITY: Scabies is transmitted primarily through prolonged, direct skin-to-skin contact with an infected person, and may also be transmitted through shared clothing, towels, bedding, linens, carpets, and furniture. An infected person can spread scabies even if he/she does not have symptoms. On a person, scabies mites can live for as long as one to two months and 2 to 5 days on surfaces (off a person). A person is no longer considered contagious 24 hours after start of effective treatment. On a person, scabies mites can live for as long as 1-2 months. Off a person, scabies mites usually do not survive more than 48-72 hours. Scabies mites will die if exposed to a temperature of 50°C (122°F) for 10 minutes ***[4].***

Incubation period: The time between contact with the mite and the appearance of symptoms varies. If a person has never had scabies before, symptoms typically appear two to six weeks (2-6 weeks) after initial exposure. If a person has had scabies before, symptoms can occur one to four (1-4) days following mite exposure. Because of the long incubation period, many people can be exposed to scabies before the infested person is diagnosed. After receiving appropriate treatment, symptoms (especially itching) may continue for several weeks, but will gradually disappear ***[5].***

SYMPTOMS: The most common signs and symptoms of a typical scabies infestation are intense itching (pruritus), especially at night, and a pimple-like (papular) itchy rash. The rash may contain tiny blisters (vesicles) and scales. Tiny, raised, crooked grayish-white or skin-colored burrows are sometimes seen on the skin; the burrows can be a centimeter or more in length. The itching and rash may affect any part of the body, or may be limited to common sites like the webbing between the fingers, wrist, elbow, armpit, shoulder blades, breasts, waist, genitals, buttocks, and knees. Skin sores and secondary bacterial skin infections can occur due to scratching of affected areas ***[5].***

It is estimated that more than 300 million cases of scabies occur worldwide every year; most of the cases were from developing countries due to low access to hygiene and sanitation facilities. Anyone who has had contact with the mite can catch scabies. Scabies infestations can affect people from all socioeconomic levels without regard to age, sex, race or standards of personal hygiene. Scabies spreads rapidly under crowded conditions where there is frequent skin-to-skin contact between people, such as hospitals, institutions, child-care facilities, and nursing homes **[5].**

Scabies is a contagious skin disease and known to predispose to secondary bacterial infections, in particular by Streptococcus pyogenes and Staphylococcus aureus. Reports of scabies patients co-infected with methiciline resistant S. aureus (MRSA) pose a major concern for serious down-stream complications .Impetigo is a secondary infection to scabies and it can cause systemic infections **[4].**

In Africa, as well as Ethiopia the burden of scabies is not known or under estimated, because most of the scabies cases are diagnosed as skin disease, not reported specifically. In Ethiopia there is no specific reporting format for scabies on monthly HMIS report. There is no available data on scabies in Tigray region, because there is no specific reporting format for scabies on the monthly HMIS report, the monthly HMIS reporting format was developed at national level, it is reported as skin disease, in

addition to the low awareness of health professionals towards the disease. According to the regional PHEM report, scabies was reported as an epidemic before 10 years in the region. Scabies was the primary cause of impetigo, and it can cause social and economical impacts, especially on school children and productive age groups respectively.

3. Objective

3.1. General objective

To describe and identify source and risk factors of the scabies outbreak in St.Goerge church, Mekelle zone, Tigray, Ethiopia, Sep, 2015.

3.2. Specific objective

- To describe the magnitude of the outbreak by place, person and time.
- To identify source and risk factors of the outbreak.
- To take possible prevention and control measures.

4. Methods and Materials

4.1.1. Study Area and Time: We conducted scabies outbreak investigation in St.Goerge Church, Mekelle Zone, Tigray from Sep 26-29, 2015.

4.1.2. Study Design: Descriptive and unmatched case control study design was carried out to identify source and risk factors of the outbreak.

4.1.3. Study Subjects: 24 cases and neighboring controls (48) were interviewed with5% non-response rate.

4.1.4. Sampling size: Cases and controls (1:2 ratios) were selected matched by their residence irrespective of their exposure status, 72 sample size.

4.1.5. 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 students. The data was collected through face to face interview with the respondents, by reviewing the line list data of the Zonal health department.

4.1.6. Data Entry, Cleaning & analysis: we used Epi-info software for data entry, cleaning and analysis. We conducted Uni, Bi and Multi -variant analysis to see the possible risk factors associated with this outbreak with 95% CI and P-value <0.05.

4.1.7. Ethical Clearance: The Zonal health office has accepted for the investigation of scabies outbreak through the formal letter of TRHB and all the respondents as well as the church leaders were well informed about the objectives of the outbreak investigation 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.

4.1.8. Scabies Case Definitions

When investigating an individual case of scabies or an outbreak of scabies, the following definitions are used to classify suspected cases, confirmed cases, and contacts:

• **Suspected case**: A student with a typical infestation of intense itching (pruritus), especially at night, and a pimple-like (papular) itchy skin rash, residing in St.Goerge church, from Jul 25-Sep 29, 2015.

• **Confirmed case**: A person who has a skin scraping in which mites, mite eggs or mite feces have been identified by a trained health care professional i.e. laboratory professional.

• **Contact**: A person *without* signs and symptoms consistent with scabies who has had direct contact (particularly prolonged, direct, skin-to-skin contact) with a suspected or confirmed case in the six weeks preceding the onset of scabies signs and symptoms in the case.

Communicability: 2 weeks after the original infestation even with asymptomatic individuals. A patient is no longer infectious 24 hours after effective treatment.

5. **Result**

5.1. Descriptive Result

The median age of the spiritual students was 18 years old (age range: 13-28yrs) and all of the students are males. Of the total of 87 students 24(27.5%) of them were infected with scabies. The occupational and marital statuses of the students were unemployed and single respectively.

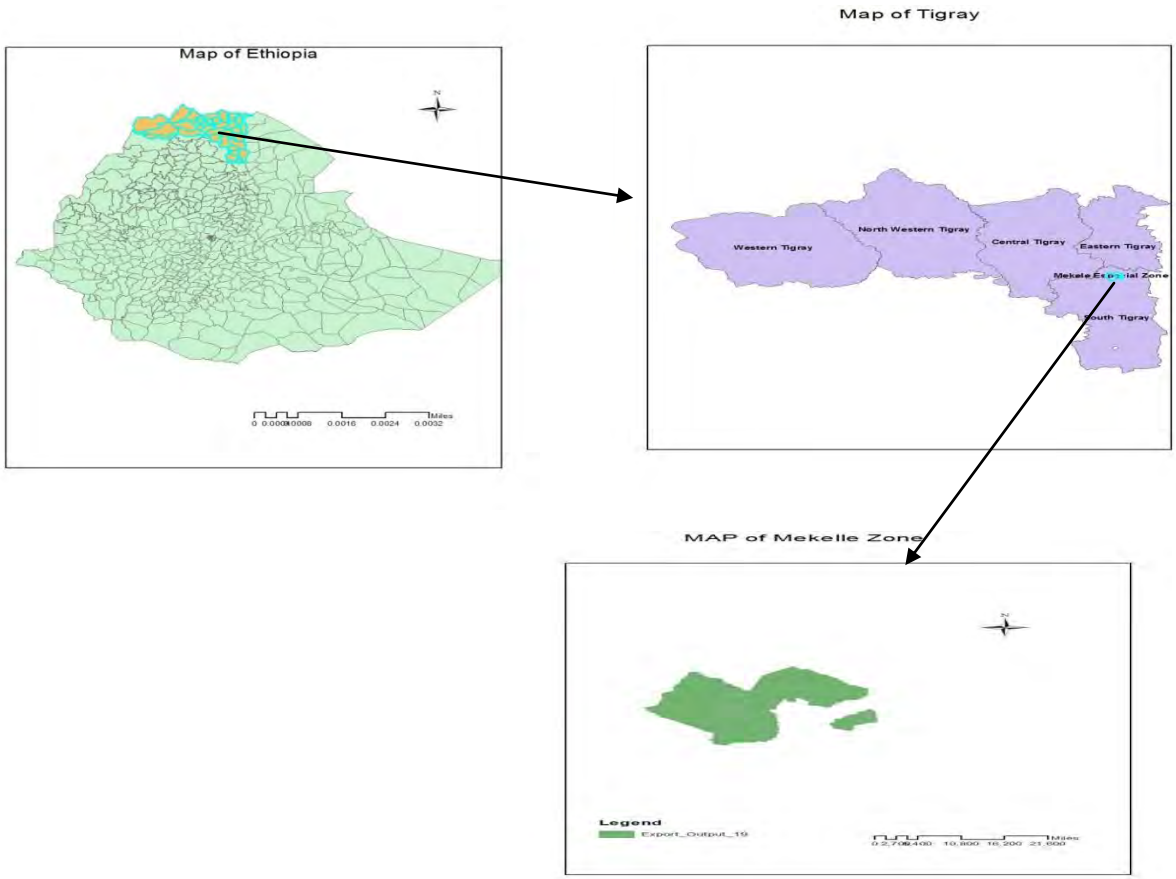

Figure 1.3.2 Shows the spot map of scabies cases in St.Goerge church, Mekelle city, Tigray region, Jul Sep 26-29, 2015**.**

Majority of the study subjects were Tigraway (61.7%), primary education status (98.5%) and 63.2% of them were among 15-19 years age group.

Table 1.3.1 Shows the socio-demographic characteristics of the cases and controls, in St.Goerge Church, Mekelle Zone, Tigray, Ethiopia, Sep 26-29, 2015.

Variables		Case-status	
		Cases(%)	Controls (%)
Ethnicity	Tigraway	12(57.14)	30(63.83)
	Amhara	9(42.86)	17(36.17)
Number of students/room	<6	10(47.6)	28(59.6)
	>=6	11(52.4)	19(40.4)
Educational status	Primary	21(100)	46(97.9)

	2o&above	0(0)	1(2.1)
Age Group(Years)	<15	2(9.5)	5(10.6)
	15-19	15(71.4)	28(59.6)
	20-24	3(14.3)	11(23.4)
	>=25	1(4.8)	3(6.4)

The attack rate (risk) was higher among 15-19 years age group with 34.1 %(15/44) followed by <15 year age group, 28.6 %(2/7), and it was 21.4% (3/14) and 25% (1/4) attack rate in 20-24 and >=25 year age groups respectively.

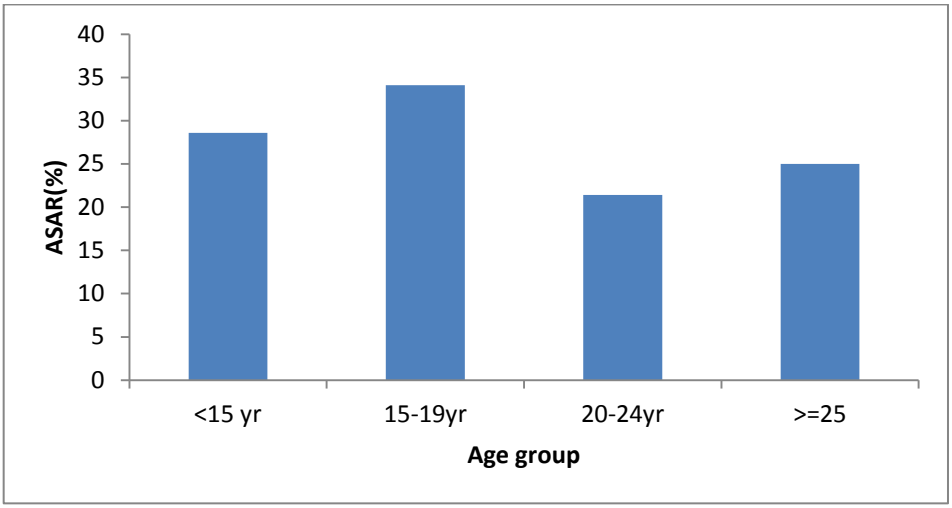

Figure 1.3.3 Shows attack rate of scabies cases by age group, St George church, Mekelle, Tigray, Ethiopia, Sep 26-29, 2015.

The index case was 19 year age male, which had traveled history to scabies epidemic area of Hintalo wejirat district. He developed symptoms on Jul, 25, 2015 after returned to St. George church school. Sixteen (76.2%) of the cases were active cases with no treatment at time of interview, only five patients or cases (23.8%) were taken treatment for scabies in Ayder referral hospital . As shown in the figure below the Epi-curve has indicated a propagated pattern with its peak on week 34 and 37, which indicates

Person to person transmission. The duration of the outbreak was from Jul, 25-Sep, 29, 2015 but it was subsided after 10 weeks.

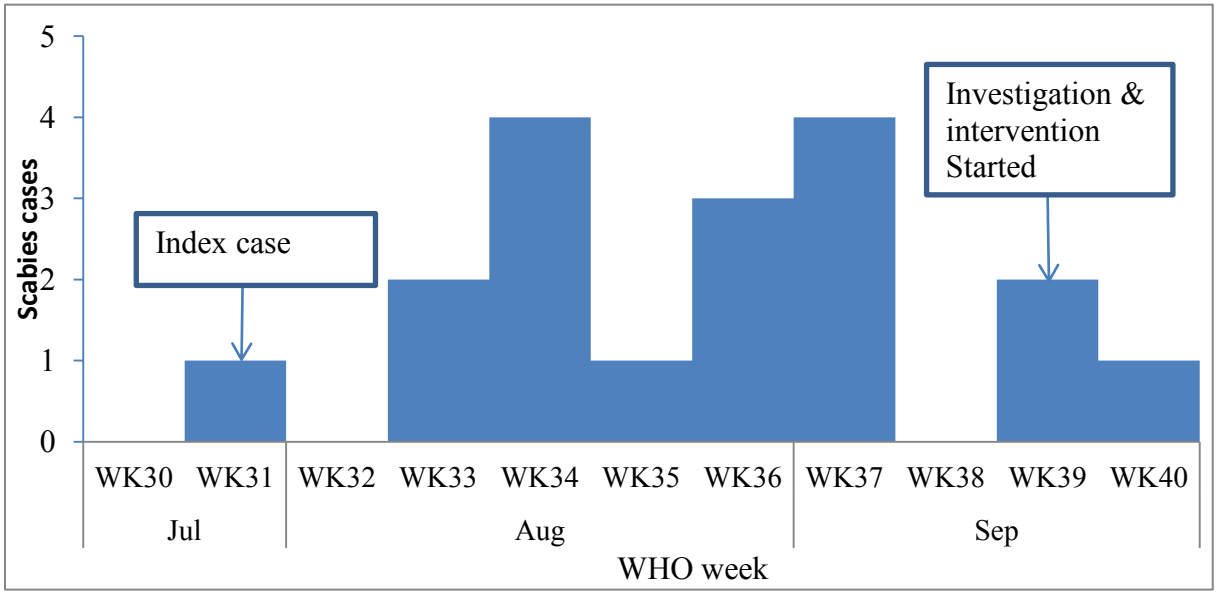

Figure 1.3.4 Epi -curve of scabies cases by WHO week, St George church, Mekelle, Tigray, Ethiopia, Jul 25-Sep 29, 2015.

5.2. **Analytical Result**

By bivariate analysis, we determined knowledge of scabies transmission was a protective factor for developing the disease and it is statistically significant. Contact history and sharing of beds, cloths or items were statistically significant risk factors for the development of the disease, according to bivariate analysis as shown below.

Table 1.3.2 Shows Odds ratio and 95% CI of the risk factors of scabies outbreak, St.Goerge church, Mekelle, Tigray, Ethiopia, 25-29 Sep, 2015.

S/No	Variables		Cases (Col %) (N=21)	Controls(Col%) (N=47)	OR(95%CI)
1	Knowledge of scabies transmission	Yes	10(47.6)	41(87.2)	0.13(0.04-0.4)
		No	11(52.4)	6(12.8)	
2	Contact	Yes	17(80.9)	16(34.04)	8.2(2.3-28.6)

	History with scabies case	No	4(19.1)	31(65.96)	
3	Sharing of bed & cloths with ill person	Yes	9(42.9)	7(14.9)	4.3(1.3-13.9)
		No	12(57.1)	40(85.1)	

5.3. Environmental investigation:

We conducted environmental investigation with woreda and Mekelle health office staffs, there was no water and latrine access in the dormitory camp of the students, and they used open deification around the church area. In addition, they traveled more than 2 kilometers to access water for bathing and washing their cloths, they used unprotected water sources like rivers. The houses used for sleeping were also constructed by the students themselves with poor quality. The houses were also crowded in addition to the poor sanitation of the houses and the students as well.

5.4. Prevention and control measures taken:

- We gave mass treatment (12.8% BBL) for all the students by communicating with Tigray regional health bureau PHEM and pharmacy departments, according to the treatment guide line.
- We discussed with the church leaders, student representatives and Sub-city regulatory department for water and latrine access opportunities.
- We delivered intensive health education about the disease, especially on mode of transmission, prevention measures, hygiene and sanitation practices and actions to be taken when someone develops the disease.

6. Limitation of the study

- The sample size 68 (21 cases & 47 controls) for the case-control study was small, with 5% non-response rate.
- Lack of base line data and guideline at national and regional level
- Limited literature review
- Since most of the cases were adults, age range 13-28 years, we cannot conclude the affected age group.

7. Discussion

All the cases and controls were males (100%).The percentage of male study subjects in scabies among primary school children study in Egypt were 48.5% *[6],* and this difference was due to the reason that in our country almost all of the enrolled spiritual students are males.

The attack rate (risk) of the scabies outbreak was 27. 5%(24/87), but it was 8.7% in a study conducted among primary schoolchildren in Egypt, this difference may be due to frequent skin contact or prolonged skin contact, low socio-economic status, rural residence and poor housing (absence of solid floor and no toilet and water access in the compound) in our study case. In addition, the socio-economic status of the Egyptian students may also be better, since 41% of the students were urban residences *[6],* because being a rural residence was a risk factor for the development of the disease with, OR 1.2(95% CI :1.1-1.4*) [7].* Scabies was observed in 23.6% of the population surveyed, according to the national prevalence survey of scabies in Fiji [7], lower than to our study finding, this can be due to differences in socio-economic status of the study groups.

Majority of the cases were adults aged 15-19 age group, 15 (71.4%) of the total cases, this is the age category most students started school church, separated from their family, and 44(64.70%) of the total students were also with in this age group. In Fiji, the prevalence of scabies was highest in children aged five to nine years (43.7%), different with our study findings. This can be due to the reason that there was substantial over-representation of younger age groups (54% of the sample was aged less than 15 years in the Fijian study [*7*], but in our study over-representation was for above 15 years age group (89.7%), opposite and higher than the Fijian prevalence study.

The bivariate analysis result indicated that, knowledge of the students towards mode of transmission of the disease was protective factor for the development of the disease. Contact history and sharing of beds, cloths or items were independent risk factors for the development of the disease. A study of Scabies among primary school children in Egypt showed that Sharing of clothes with other family members was reported by 34.3% of children, and this habit was found to significantly increase the risk of scabies infection (OR =2.492, 95% CI =1.635–3.797) [*6*] ,this is less than with our study finding ,RR 4.3(95% CI; 1.3-13.9). Contact history with scabies case was significant risk factor, OR 8.2(95%CI; 2.3-28.6). An outbreak of scabies in a teaching hospital in USA showed that physical contact with a scabies case was a significant risk factor, OR 4.5(95% CI; 1.26-17.45) [8] lower than our study finding.

8. Conclusion

The source of the outbreak was 19 yrs old men that had travel history to areas with scabies outbreak. We have investigated scabies outbreak in St George church, mekelle city with 27.5 over all incidence rate or attack rate. Fifteen (71.4%) of the cases were between 15-19 years age group. Contact history and sharing of beds, cloths or items with active scabies case were significant risk factors for the development of the disease. This was the result of drought due to ElNino effect, which resulted in shortage of water for personal hygiene and sanitation, making vulnerable for the disease. According to the regional PHEM information the disease was seen before 10 years in the region, as a public health problem.

9. Recommendations

- **Church leaders:**
  - ✓ The church must construct latrine and safe water supply to improve hygiene and sanitation activities.
  - ✓ Continuous discussion needs to conduct among the church students, church leaders and health extension workers to improve the poor personal hygiene and sanitation practices of the students.
- **Sub-city and City health offices**:
  - Screen new students coming from other places for skin rashes frequently and separate room must be given if they have visible skin rash to try to prevent re-emergence of scabies and further scabies outbreaks.
  - Establish a surveillance system for skin rashes in the facility for early detection of potential scabies cases in patients and staff. Early detection and treatment of cases are essential in preventing outbreaks.
    - ➢ Educate all staff about scabies.
    - ➢ Maintain a high index of suspicion that scabies may be the cause of undiagnosed skin rash.
    - ➢ Screen all new patients and staff for skin rashes that may be compatible with scabies to try to prevent scabies from entering a facility.
    - ➢ Consult with an experienced dermatologist for assistance in differentiating skin rashes and confirming the diagnosis of scabies.

- Scabies must be included as weekly reportable disease until the outbreak stopped, and all the actual scabies cases should be registered with appropriate information.
- Deliver health education to the community regularly through health extension workers and during mass gatherings like church to create awareness regarding scabies mode of transmission, personal hygiene and sanitation practices and control mechanisms.
- Regular inspection must be conducted for the church school campus to improve hygiene and sanitation practices.
- Conduct active surveillance in all the churches and holly waters found in the city, to reduce further spread to the community.

❖ **Regional PHEM**

- According to the national PHEM guideline, any public health problem or trait must include to the reportable disease under surveillance, scabies is emerged as a public health problem following drought, due to the El Nino effect.

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Annex: 1. 3

1.2 Questioner for Scabies data collection matched case control study, Klte Awlaelo, Tigray, Ethiopia, Jul, 2015.

1. *Data collector information:* Name:_____ Phone number*:* _____
2. *Date of Data collection:*_____

*Region*_____ *Zone*_____ *District*_____ *Kebele* _____ *Got* _____

House: Longitude:_____ *Latitude:*_____

3. *Who is answering the questionnaire?*

☐ Parent/ guardian of sick person ☐ Sick person ☐ other (please specify) _____

4. *Respondent category*: ☐ case ☐ control active case: Yes☐ No ☐

1.2. Socio-demographic information

5. Patient Name_____
6. Patient phone number: _____
7. Age**:** years_____ months ____
8. Sex**:**☐ Male ☐ Female
9. Father's occupation : ☐ Farmer ☐ Merchant ☐ Unemployed ☐Government ☐Student ☐ Pastoralist ☐ Other _____
10. How much is your annual income? ----------
11. Parents of case/control's education : Mother: ☐ Illiterate ☐ Primary ☐ Secondary ☐Tertiary

Father: ☐ Illiterate ☐ Primary ☐ Secondary ☐ Tertiary

Family size :_____

1.3. Knowledge Questions

12. What is Scabies, or are you not sure? ☐ Yes ☐No ☐ Don't know

13. How do you think Scabies is transmitted? You can pick more than one response:

☐Through skin contact ☐ by sharing clothes of ill person ☐close contact with an ill person

☐Other _____

14. How do you think Scabies can be prevented? :

☐ Personal hygiene& sanitation ☐Avoid contact with Scabies patient ☐ local healing ☐other--

15. Who do you think can be affected by Scabies, or are you not sure?

☐ Children less than 5 years old ☐ Children between 5-18 years ☐ People over 18 years old

☐ Any age groups of both male and women ☐don't know ☐ other (specify):_____

17. Do you think good personal hygiene can prevent scabies? ☐ Yes ☐No ☐ Don't know

18. Where did you go first when you get Scabies? ☐ Health Facility ☐ Traditional Healers

☐ Holy Water ☐ Stayed at home ☐other :(Specify)_____

19. How do you think Scabies can be cured? ☐ Using modern medicine ☐ Using traditional Medicine

☐ Holly water ☐ by feeding nutritious foods ☐ keeping the sick person indoor

☐ Other (Specify)_____

1.4. Clinical presentations *(for case ONLY)*

1. What were the symptoms?

A. skin rash: ☐ Yes ☐ No C. tiny red burrows: ☐ Yes ☐ No

B. red bumps and blisters: ☐ Yes ☐ No D. relentless itching: ☐ Yes ☐

2. When is the date when you first saw a rash on your body? : ____/_____/_____

3. Were you in your home village when you first noticed you were ill?

☐ Yes (skip to question 15) ☐ No (go to next question)

4. Where were you when the illness started?

District; _____Kebele; _____

5. How long have you had a rash? (Duration of rash) _____days

6. Do you still have the rash? ☐Yes ☐ No

7. Did you visit health facility for this illness?

☐ Yes (date went to facility____/____/____) ☐ No (go to question # 8)

8. How long were you sick before visiting the health facility? _____ in days/hours

a. Treatment given? ☐ yes ☐ No, if yes

☐5% Permethrin cream ☐ 25% benzyl benzoate lotion ☐10%Sulfur ointment ☐10% Crotamiton cream ☐1% lindane lotion

16. Did you have the following Complications

a. Secondary infection? ☐ Yes ☐ No

b. Bacterial skin infection such as impetigo? ☐ Yes ☐ No

Exposure (Risk factors)

1. Have ever have any skin contact with Scabies disease case (the last two month)
   ☐ Yes ☐ No
2. Have you ever had a sexual contact with a Scabies partner (the last two month)
   ☐ Yes ☐ No
3. At what frequency did you wash your body ……..
4. Have you ever travel to a place with a scabies epidemic area (the last two month) ☐ yes ☐ No
5. Have you share any clothes with friends with Scabies case ☐ yes ☐ No
6. How many members of family living together ……
7. How many sleeping rooms (beds) ……
8. Did you have the following access for personal hygiene? water ☐ yes ☐ No

   Toilet ☐ yes ☐ No

Chapter II: Surveillance Data Analysis

2.1. Measles Secondary Data Analysis of Tigray Region, Ethiopia Jul, 2011-Jun, 2015.

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Abstract

Introduction; The Africa region as well as Ethiopia is working towards measles elimination by 2020. In Africa, measles incidence per million populations was decreased from 223.8 in 2011 to 118.8 in 2012. In Ethiopia, measles incidence per million populations was increased from 39.8 in 2011 to 49.2 in 2012. We analyzed four years' measles data to see its magnitude and to describe the data by place, person and time variables.

Methods; We defined a suspected measles case as any person with fever, rash, cough and either conjunctivitis or coryza. We used HMIS data from Jul, 2011-Jun, 2015 retrospectively and analysis was done by MS-excel 2007 and Epi-info 7.6.1.

Results; During the study period we identified a total of 5231 measles suspected cases with 38.7% admissions and 20 (0.38%) mortality rate. Measles incidence rate was increased from 12.7 in 2011/12 to 49.9 in 2014/15 per 100,000 populations. Majority (55.2%) of the cases were males and 48.6 % of the total cases were >=15 years age older. The cumulative age specific attack rate was 47.5, 20.9 and 22.4 in <5 years, 5-14 years and >=15 years age groups per 100,000 population respectively, the highest attack rate was during 2014/2015. Majority, 55.1 % of the total cases were from western zone with highest average incidence rate 167.7 /100000 populations. The cumulative MCV1 vaccination coverage of the region was 86.3% during the study period.

Conclusion; The highest proportion of >=15yrs old adult cases indicated shifting of the disease towards adults, making public health problem of the region. Future interventions like SIAS need to target those at risk adults.

Key words; Measles, vaccination, incidence, Tigray

Background

Tigray administrative region is found in the northern part of Ethiopia, 783km far from Addis Ababa, capital city of Ethiopia. The region is administratively divided into 7 Zones (1 special zone), 52 Woreda (34 rural and 18 urban) and 814 Kebeles (753 Rural and 61 Urban), with 5,055,999 total population. Public health care services in Tigray are delivered through 1 specialized hospital, 15 general hospitals, 20 primary hospitals, 204 health centers and 712 health posts, achieving primary healthcare coverage of 91.7% on average according to the standard professional mix required for different health facility levels ,and the health seeking behavior of the region was 1.2 (WHO standard 2.5). The regional coverage of health professionals is 88.4% according to the standard professional mix required for different health facility levels.

Introduction

Measles is an acute, highly contagious viral disease caused by measles RNA virus, family paramyxo viridae and genus morbillivirus. The primary site of infection is the respiratory epithelium of the nasopharynx. This highly contagious virus is transmitted primarily by respiratory droplets or airborne spray to mucous membranes in the upper respiratory tract or the conjunctiva. Measles is a pathogenic systemic infection. Common source outbreaks associated with airborne transmission of measles virus have been documented [1].

Signs and 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. Koplik's spots may be seen on the buccal mucosa in over 80% of cases.

Incubation Period and period of communicability: The incubation period is approximately 10–12 days from exposure to the onset of fever and other nonspecific symptoms and 14 days (with a range of 7–18 days),from exposure to the onset of rash. Measles can be transmitted from four days before rash onset (i.e., one to two days before fever onset) to four days after rash onset. Infectivity is greatest three days before rash onset. Measles is highly contagious. Secondary attack rates among susceptible household contacts have been reported to be 75%–90%. Due to the high transmission efficiency of measles, outbreaks have been reported in populations where only 3% to 7% of the individuals were susceptible [1].

Complications: Many children experience uncomplicated measles. However, in about a third of the cases, measles is followed by at least one complication caused by disruption of epithelial surfaces and immunosuppressant. Complications are more common in young children below 5 years of age and complication rates are increased in persons with immune deficiency disorders, malnutrition, vitamin A deficiency, and inadequate vaccination. Immuno-compromised children and adults are at increased risk for severe infections and super infections [1].

Risk Factors: 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 [1].

Control strategies: In 2001, countries in the World Health Organization (WHO) African Region began accelerated measles control activities to reduce measles deaths by half by 2005 compared to the estimated number of measles deaths in 1999. Implementation of the recommended strategies led to a 75% reduction in estimated measles mortality in the African Region by 2005. Following this progress, in 2006 the African Region adopted a goal to achieve 90% measles mortality reduction by 2010 compared with the estimate for 2000. By 2008 in the African Region, reported measles cases decreased 93% and estimated measles mortality decreased 92% compared with 2000.The strategies include improving routine vaccination coverage, providing a second opportunity for measles vaccination through supplementary immunization activities (SIAs), improving measles-case management, and establishing case-based measles surveillance. Since 2002, Ethiopia adopted these regional goals and strategies and has been taking important steps to control measles [1].

During 2000-2013,Globally estimated death and reported incidence of measles decreased by 75% and 72% respectively, but measles remains a leading cause of vaccine preventable disease in children <5 years old [2]. Measles is one of the leading causes of death among young children even though a safe and cost-effective vaccine is available. In 2014, there were 114 900 measles deaths globally – about 314 deaths every day or 13 deaths every hour. Measles vaccination resulted in a 79% drop in measles deaths between 2000 and 2014 worldwide. In 2014, about 85% of the world's children received one dose of measles vaccine by their first birthday through routine health services – up from 73% in 2000. During

2000-2014, measles vaccination prevented an estimated 17.1 million deaths making measles vaccine one of the best buys in public health [3].

Since measles virus infects only humans, elimination is possible, and all regions of the World Health Organization (WHO) except the South-East Asia Region have set an elimination goal to be achieved by 2020 or sooner. The Africa region as well as Ethiopia is also working towards measles elimination by 2020 (as indicated in Resolution AFR/RC61/WP/1: Measles elimination by 2020: A strategy for the African region, 61st Regional committee meeting 2011).Thanks to intensive vaccination and surveillance efforts, elimination was achieved in the WHO Region of the Americas in 2002 and in many other countries such as Finland (in 1994) and South Korea (in 2006) [1].

On the basis of measles case-based surveillance data, in the African region, the number of measles cases reported through WHO-UNICEF joint reporting form (JFR) was 194,346 in 2011 and 106,052 in 2012 with 223.6 and 118.8 measles incidence per million populations respectively. Confirmed measles incidence was also decreased from 50.4 in 2011 to 29.0 in 2012 per million populations. In 2012, 16 of 43 (37%) WHO AFR member states met the measles pre elimination incidence target of fewer than five cases per million. In Ethiopia, measles incidence per million populations was increased from 39.8 in 2011 to 49.2 in 2012 according to case –based WHO surveillance report [4].

Measles is one of the communicable diseases causing preventable mortality and morbidity in Ethiopia. Epidemiological surveillance of measles is a major public health strategy in prevention and control of diseases. The Ethiopian national Immunization Program was established in the 1980s, and currently delivers service through static and outreach sites nationwide. The current routine immunization schedules recommend a dose of measles vaccination at 9 months of age. The WHO UNICEF coverage estimates for measles vaccination for Ethiopia also indicate an increase from 37% in 2000 to around 80% in 2010, then dropped to 66% in 2012 [1].

Case Fatality: In Ethiopia, the expected case-fatality rate is between 3% and 6%; the highest case-fatality rate occurs in infants 6 to 11 months of age, infants with malnourished, immunodeficiency and lack of access to medical care are at greatest risk. This may be under estimate due to incomplete reporting of measles outcome illness. In certain high risk populations, case fatality rate as high as 30% have been reported in infants aged less than one years of age.

In Tigray region, measles is one of the public health problems with high morbidity and mortality despite the control and prevention efforts. The vaccination coverage was increased from 37% in 20000 to 90 % in 2014/15, but large outbreaks were reported from many districts of the region in the past years.

Rationale of the Analysis

Ongoing analysis of surveillance data is important for detecting outbreaks and unexpected increases or decreases in disease occurrence, monitoring disease trends, and evaluating the effectiveness of disease control programs and policies. This information is also needed to determine the most appropriate and efficient allocation of public health resources and personnel.

The African region as well as Ethiopia is also working towards measles elimination by 2020 (as indicated in Resolution AFR/RC61/WP/1: Measles elimination by 2020: A strategy for the African region, 61stRegional committee meeting 2011). The analysis can help to evaluate regional performance towards measles elimination targets by 2020.

Even though measles morbidity and mortality is decreased from past times due to vaccination but many measles outbreaks were reported from different districts of Tigray region as well as throughout the country every year.

Objective

General objective

To describe measles cases in Tigray region, from Jul, 2011- Jun, 2015.

Specific Objective

- To review the trends of the four years measles data of Tigray region.
- To describe measles cases by time, person and place
- To see the magnitude of the measles problem in Tigray region.
- To draw possible recommendations on the control and prevention of measles.

Methods and materials

Study period

A retrospective measles surveillance data analysis was conducted from Jul, 2012-Jun, 2015 using regional PHEM and HMIS data.

Study area

Tigray region is found in the northern part of Ethiopia a distance of 783 km far away from Addis Ababa, capital city of Ethiopia. The measles data was collected from all health facilities of the region on weekly and monthly basis.

Study subjects

All measles cases that meet measles case definition, from Jul, 2011-Jun, 2015.

Study Design: a cross sectional surveillance report based on retrospective record review of secondary data.

Data source

Previously collected weekly surveillance report of regional health bureau PHEM, Monthly HMIS data, measles guidelines and different literatures were used.

Case definition

Suspected case: Any person with fever and maculopapular (nonvesicular) generalized rash and cough, coryza or conjunctivitis (red eyes) OR any person in whom a clinician suspects measles.

Confirmed case: A suspected case confirmed by laboratory (positive IgM antibody) or epidemiological link to confirmed cases in an epidemic.

Measles-associated death: Is one occurring within 30 days of rash onset and not obviously due to another cause (WHO).

Data analysis plan

Data was analyzed using MS-Excel 2007 and EPI info version 7.1.1.2 after cleaning and merging the data.

Result

Of the total of 5231 measles cases 38.7 %(2023 measles cases) were inpatient cases. There were 20 deaths with 0.38% average case fatality rate (mortality rate) in the region from Jul, 2011- Jun, 2015.

Distribution of measles cases by time

As shown below (Fig: 1), the number of annual reported measles cases were increased by 66.6% average, from 625 in 2011/12 to 2645 in 2014/15. The annual increase ranges from 26.7% from 2011/12 to 2012/13 to 125.5% from 2013/14 to 2014/15 respectively. Half of the reported cases (50.6%) were on, 2014/15.

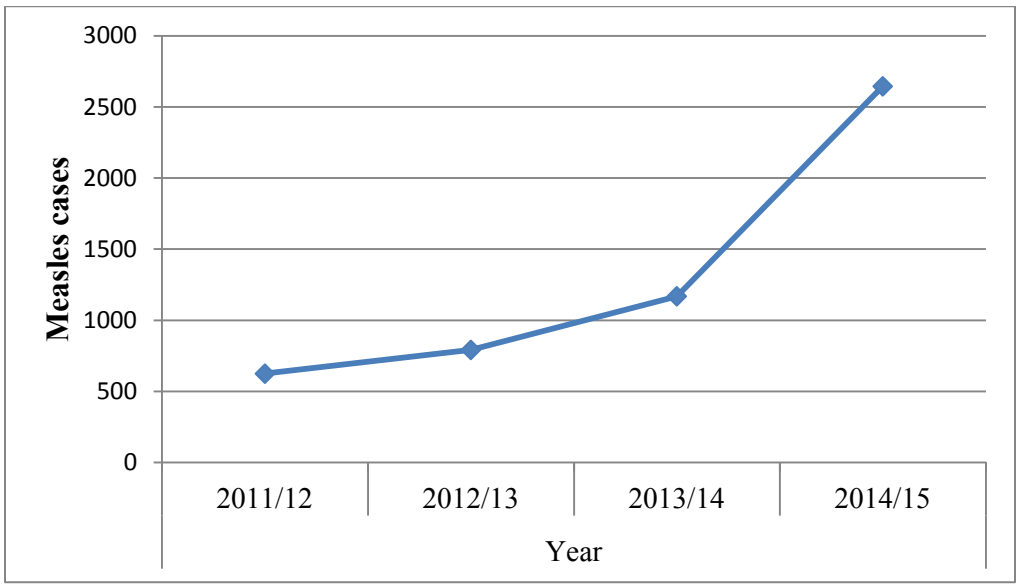

Figure 2.1 Trend of measles cases of Tigray Region, Ethiopia, Jul, 2011-Jun, 2015.

The measles incidence rate per 100,000 populations were also increased from 12.7 on 2011/12 to 49.9 on 2014/15, as shown below (fig: 2). The cumulative incidence rate of the region was 25.2 per 100,000 populations during the study period.

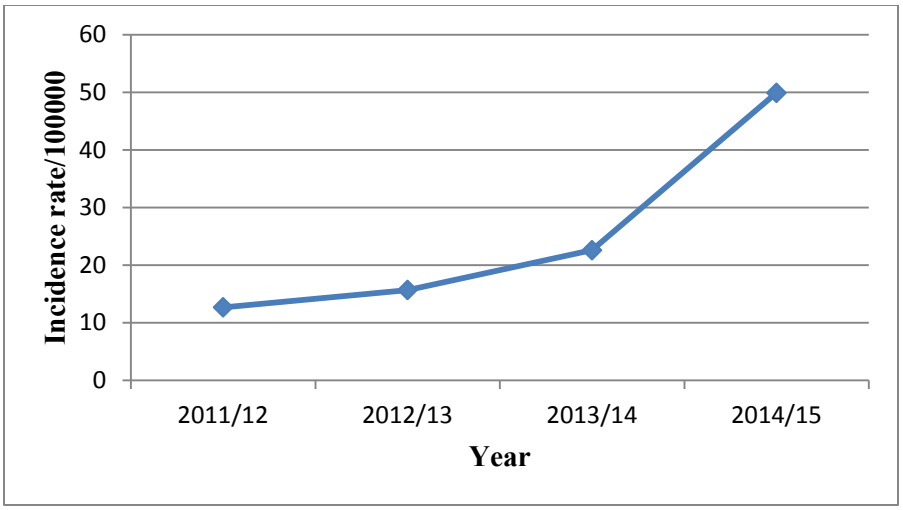

Figure 2.2 measles Incidence rate per 100,000 populations by year, Tigray, Ethiopia, Jul, 2011-Jun, 2015.

As shown below, measles mortality rate were 0.16 %(1/625), 0.08 %(1/1169) and 0.68 %(18/2645) in 2011/12, 2013/14 and 2014/15 respectively, there was no reported measles death in 2012/13. The mortality rate from measles was higher in 2014/15; that accounts for 90% of the total deaths associated from measles.

During Jul, 2011-Jun, 2015, the average admission rate or complications from measles was 38.7%. The highest admission rate or complication was in 2014/15 with 50.5% followed by 2012/13, 41.3% and the least was in 2013/14, 18.9% admission rate.

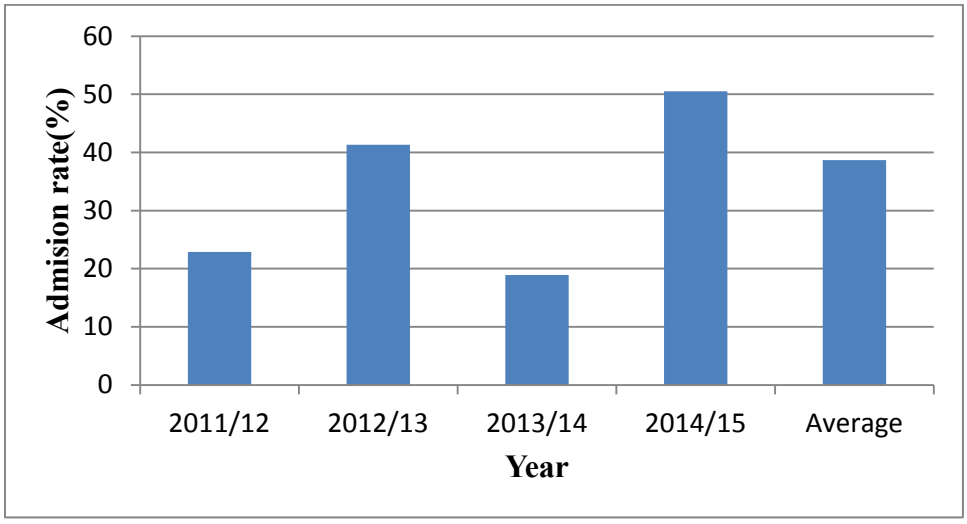

Figure 2.3 Measles Admission rate or complications by each year, Tigray, Ethiopia, Jul, 2011-Jun, 2015.

Measles associated case fatality rate ranges from 0.08%-0.68%, the cumulative case fatality rate was 0.38% during Jul, 2011-Jun, 2015.

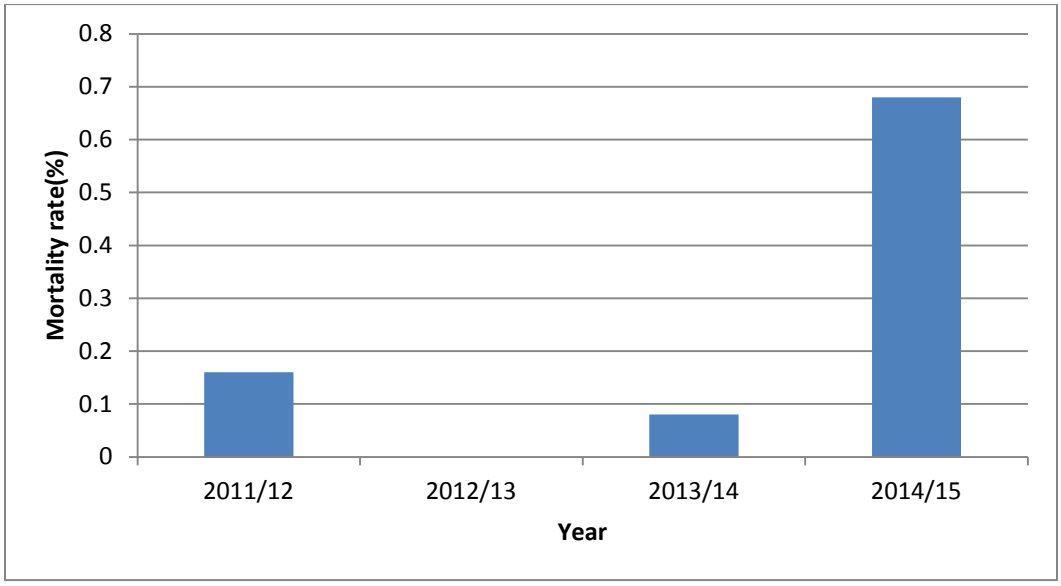

Figure 2.4 Measles associated case fatality rate by year, Tigray, Ethiopia, Jul, 2011-Jun, 2015.

Distribution of measles cases by person

Of the total of 5231 measles cases, 2888(55.2%) were males. When we compared by age group, 27.8%, 23.6% and 48.6% of the total measles cases were <5 years, 5-14years and >=15 years age group respectively. Of the total of, 2027 total admissions 1134(55.9%) were males and 70.1% of them were >=15 years age group adults.

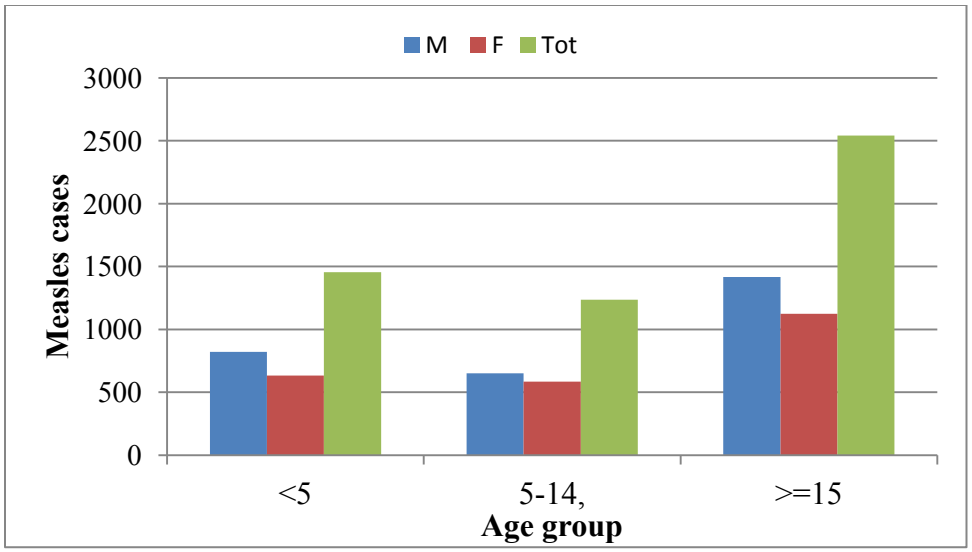

Figure 2.5 Number of measles cases by age group and sex, Tigray, Ethiopia, Jul, 2011-Jun, 2015**.**

Age specific attack rate (ASAR) was increased in all age groups over time, with the exception of >=15 years age group that showed slight decrease from 2011/12 to 2012/13(ASAR: 9.7 to 8.9 per 100000 populations). The cumulative age specific attack rate was 47.5, 20.9 and 22.4 in <5 years, 5-14 years and >=15 years age groups per 100000 populations respectively. The highest age specific attack rate was recorded during the year, 2014/15 in all age groups.

Table 2.1 Age specific attack rate and number of measles cases by age group, Tigray, Ethiopia, Jul, 2011-Jun, 2015.

Year	<5			5-14			>=15		
	Tot cases	Tot Pop	IR/100000	Tot cases	Tot Pop	IR/100000	Tot cases	Tot Pop	IR/100000
2011/12	211	736249	28.7	147	1423414.5	10.3	267	2748662.6	9.7
2012/13	228	755052.5	30.2	312	1459768.1	21.4	252	2818862.5	8.9
2013/14	387	774336.3	49.9	320	1497050.2	21.4	462	2839233	16.3
2014/15	627	794112.6	78.9	457	1535284.4	29.8	1561	2911746.2	53.6

Tot/Aver	1453	3059750.4	47.5	1236	5915517.2	20.9	2542	11318504.3	22.4

As shown in Fig: 4, 18(90%) of the total 20 deaths from measles were in >=15 years age group adults, and the remaining 2(10%) of the deaths were in <5 years age group children, there was no any reported death in 5-14 years age group. Of the total measles deaths, 16(80%) of them were females.

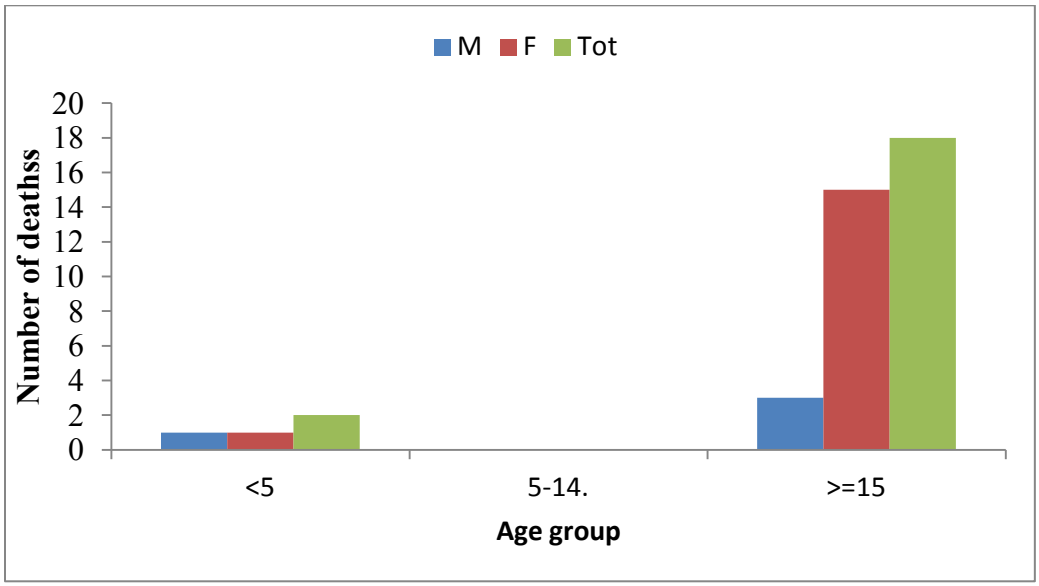

Figure 2.6 Number of measles associated deaths by age group and sex, Tigray, Ethiopia, Jul,2011-Jun,2015.

Distribution of measles cases by place

The average incidence rate of measles ranged from 2.5 to 167.6 per 100000 populations, the least was from Eastern Zone and the highest was from Western Zone respectively. The incidence rate was increased over time in Western and Mekelle special Zones, but it shows irregular trend in the remaining zones. Except in South and South East Zones, the highest incidence rate was recorded in 2014/15 in all Zones of the region.

Table 2.3 shows annual incidence rate and number of measles cases by zone, Tigray, Ethiopia, Jul, 2011-Jun, 2015

S/No	ZONE	2011/12		2012/13		2013/14		2014/15		Cumulative IR/100000
		Total cases	IR/100 000	Total cases	IR/100 000	Total cases	IR/100 000	Total cases	IR/100 000	
1	N/West	154	18.4	176	20.5	39	4.4	584	64.6	26.9
2	Central	78	6	79	5.9	17	1.2	282	20.3	8.4
3	Eastern	21	2.4	15	1.7	19	2	37	4	2.5
4	South	120	17.2	38	5.3	216	29.4	75	9.9	15.5
5	West	99	24.4	453	108.9	802	188	1527	349	167.6
6	S/ East	132	22.9	2	0.3	13	2	17	2.7	7
7	Mekelle	21	8.5	29	11.5	63	24.4	123	46.4	22.7
	TOT/Cm	625	12.7	792	15.7	1169	22.6	2645	49.9	25.2

N.B: Tot/Cm =Total measles cases, Cm=Cumulative incidence rate/100,000

Of the total of 5231 measles cases, 2881(55.1%) were from Western zone of Tigray, followed by N/Western Zone, 953 (18.2%) and the least was from Eastern Zone with 1.8(92) relative frequency.

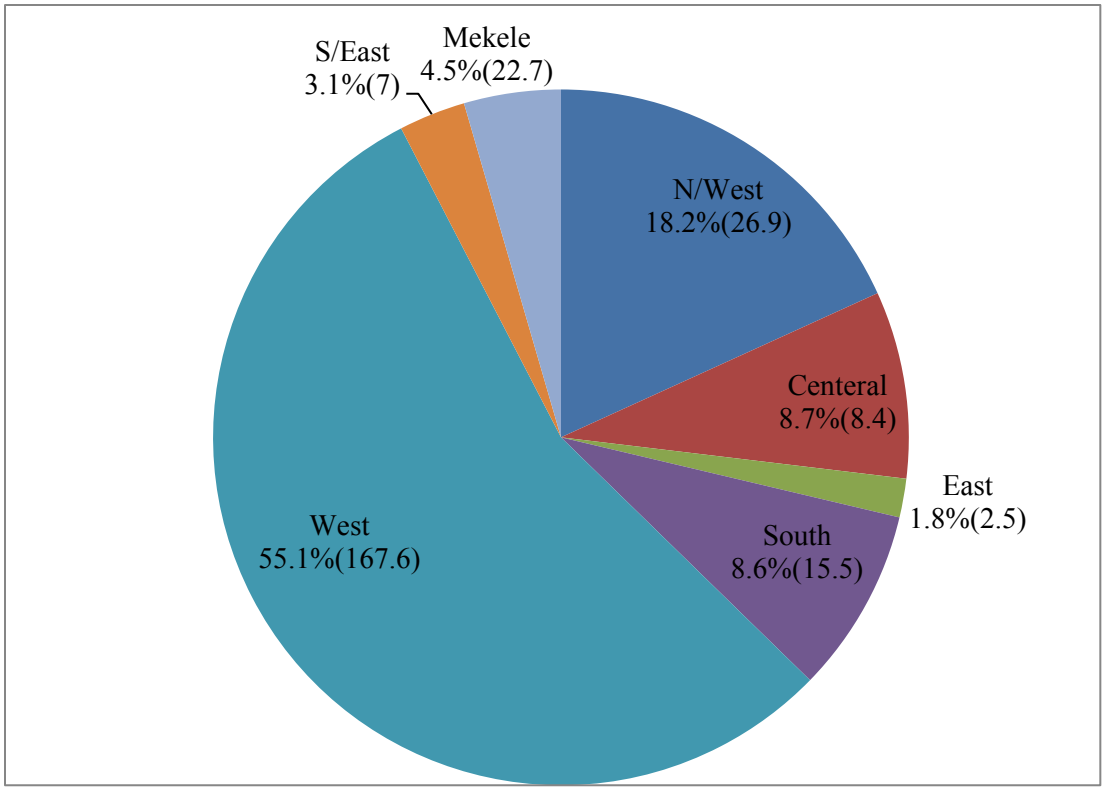

Figure 2.7 Shows the relative frequency and incidence rate of measles per 100,000 populations by Zone, Tigray region, Ethiopia, Jul 2011-Jun, 2015.

Vaccination Coverage

MCV1 vaccination coverage was increased from 78% in 2011/12 to 90% in 2012/13, but it was almost constant in the remaining years, the cumulative MCV1 vaccination coverage was 86.3% in four years. But the incidence rate was increased in <5 years age group all over the years, with 47.5 average incidence rate per 100,000 populations. There was no available measles data for <1 year age group infants (MCV1 target group).

Table 2.4 MCV1 Vaccination coverage, Number of measles cases and incidence rate by year, Tigray. Ethiopia, Jul, 2011-Jun, 2015

Year	<1 Year age group		< 5Year age group	
	Eligible	MCV1 Coverage (%)	No of measles cases	IR/100000
2011/12	158048	78	208	28.7
2012/13	162084	90	228	30.2
2013/14	166224	87	386	49.9
2014/15	170469	90	621	78.9
Average	164206	86.3	1443	47.5

The highest cumulative MCV1 coverage was in N/Western Zone followed by Western zone that was 100.9 % and 93.0% cumulative vaccination coverage respectively and the least was from Mekelle Zone, 76% cumulative MCV1 coverage.

Table 2.5 Shows MCV1 coverage and measles incidence rate per 100000 populations by Zone, Tigray, Ethiopia, Jul, 2011-Jun, 2015

S/ No	ZONE	2011/12		2012/13		2013/14		2014/15		Cumulative	
		MCV1 coverage	IR/10 0000	MCV1 coverage	IR/100 000	MCV1 coverage(	IR/10 0000	MCV1 coverage	IR/10 0000	MCV1 coverage	IR/10 0000
1	N/West	88.7%	18.4	104.4%	20.5	103.7%	4.4	107.1%	64.6	100.9%	26.97
2	Central	82.8%	6	86.7%	5.9	84.1%	1.2	87.5%	20.3	85.3%	8.4
3	Eastern	61.6%	2.4	81%	1.7	66.8%	2	75%	4	71.1%	2.5
4	South	81.5%	17.2	86.9%	5.3	91.3%	29.4	92.8%	9.9	88.1%	15.5
5	Western	81.1%	24.4	100.3%	109	93.6%	188	97.2%	349	93.0%	167.6

6	S/East	85.2%	22.9	90%	0.3	86.9%	2	96.1%	2.7	89.5%	7
7	Mekelle	65%	8.5	80.8%	11.5	83.4%	24.4	74.6%	46.4	76	22.7
	Average	78%	12.7	90%	15.7	87.1%	22.6	90%	49.9	86.3%	25.2

Laboratory Result

Of the total of 256 suspected measles samples sent to national referral laboratory from Jan,2014-Feb,2015, 173(67.6%) of them were with valid results that have lab result, of those 102(58.9%) were positive for IGM antibody. The positivity rate ranges from 34.5%, in Eastern zone to 76.9% in mekelle zone. There were 82(32.4%) samples with no lab result or missing value, from the total of 256 referral samples sent for confirmation. During the same time period the highest missing value was from Western zone of Tigray followed by central zone, 54.2 %(13/24) and 51.6 %(32/62) respectively and the least was from Southern zone ,12.5%(5/40). There was no lab result for the remaining years. Due to those limitations, we were unable to calculate annualized incidence rate for confirmed measles cases.

Table 2.6 Total suspected measles samples sent, tested samples, positivity rate and missing values by zone, Tigray, Ethiopia, Jan, 2014-Feb, 2015.

Zone	Total sent samples	Samples with Valid Result	Confirmed (Pos rate %)	Missing Value (%)
Central	62	30	22(73.3)	32(51.6)
N/West	66	48	25(52.1)	18(27.3)
West	24	11	8(72.7)	13(54.2)
East	36	29	10(34.5)	7(19.4)
Mekelle	16	13	10(76.9)	3(18.7)
S/East	12	7	3(42.8)	5(41.7)

South	40	35	24(68.6)	5(12.5)
Regional Total	256	173	102(58.9)	82(32.4)

Limitations of the study

- The HMIS measles data was by age group, unable to calculate mean age /median and SD of the measles cases, in addition the number of measles cases in MCV1target age group (<1 year) were not known, unable to compare with MCV1 vaccination coverage specifically.
- The vaccination status of the cases was not known.
- There was data discrepancy between HMIS and PHEM annual aggregated data.
- The HMIS data was aggregated by year, unable to draw Epi curve, during outbreaks.
- There was no documented data of case based, line list and outbreak investigation reports in the regional PHEM.
- There was no documented data of measles samples sent to national referral laboratory and their result feed backs by year, except for 2014 and 2015(two months only).

Discussion

In Tigray region, reported measles cases increased by 66.6% from 625 cases in 2011/12 to 2645 in 2014/2015, largely because of increased measles outbreaks in different districts of the region. During 2000-2014, the number of annually reported measles cases decreased worldwide by 69%, from 853479 to 267482, but the results for 2014 showed little change from the 280795 reported cases in 2013*[5]*. According to WHO-UNICEF joint report, in African region reported measles cases were decreased from 194,346 in 2011 to 106,052 in 2012*[4*]; however, the number of cases were increased to 171,178 in 2013.But the reporting cases decreased by 57%, from 171178 cases in 2013 to 73914 cases in 2014, but this was largely because of decreases in DRC (88381 to 33711) and Nigeria (52852 to 6855); however, outbreaks occurred in Ethiopia (12739 cases) and Angola (11699 cases) in 2014. *[5]*. Half of the reported cases (50.6%) were in 2014/15, this was largely due to large outbreaks occurred in many districts of the region at the same period of time, the outbreak ended after six months period (Oct, 2014-Mar, 2015).

In the region, the cumulative incidence rate of measles was 25.2 per 100,000 population during the study period; the incidence rate increased from 12.7 to 49.9 per 100000 population during 2011/12-2014/15, and this was above the incidence target of measles (<5 cases per million) and below cumulative incidence of South African measles outbreak study from 2009-2011, which was 37 IR per 100,000 population *[6]*. During 2000-2014, measles incidence decreased globally by 73%, from 14.6 to 4 per 100,000 population, it was also decreased from 5.2 in 2011to 4.0 in 2013[7], but there was no any change between 2013 and 2014 *[5]*. The high burden of measles incidence in Tigray region was due to repeated outbreaks occurred during the study period. Sixty six percent of all admissions and 90% of all deaths were in 2014/15; this was due to the reason that 50.6% of the total reported cases and the highest incidence rate, 49.9IR per 100,000 were during this year, as a result of large outbreaks, which covered many districts. According to Feb, 2015 WHO report in Ethiopia, the incidence of confirmed measles cases was increased from 6.5 in 2013 to 14.6 in 2014, which is parallel with our study finding *[8]*.

Of the total reported measles cases the proportion of males was 55.2%. Measles outbreak in South Africa, 2009-2011, the proportion of males were 52 %*[6]* and analysis of national measles surveillance data in Italy from Oct, 2010-Dec, 2011 of the total of 5565 cases ,53.1% of them were males *[9]* ,almost similar with our findings. Even though 48.6% of the reported cases were >=15 years age group, but the cumulative incidence rate(ASAR) was higher among <5 year age group children, 47.5 IR per 100000 population, followed by >=15 years age group adults, 22.6 cumulative IR per 100000 population. In Italy, analysis of national measles surveillance data from Oct, 2010-Dec, 2011, showed that 62% of the reported measles cases were aged 15-44 years, indicating age shift *[9]*. Various outbreak investigation activities conducted in Angola, Burkina Faso, DRC and Ethiopia, indicated that the primary causes were an accumulation of susceptible older children and adolescents, shifting susceptibility towards older age groups but the burden of measles remain in under five children. *[4]*.

The average regional MCV1 vaccination coverage was 86.3% during the four years period; however, incidence rate was increased in all years especially in <5 and 5-14 years age group due to subsequent outbreaks occurred each year, MCV1 vaccination coverage was 90% in 2014/15, that was achieved one of the 3 milestones for measles control by 2015, but 50.6% of the reported cases were during this year. In addition, according to world health organization (WHO) African Region, the MCV1 vaccination coverage of Ethiopia was 68% and 66% in 2011 and 2012 respectively*[4]*. Due to those reasons the

high MCV1vaccination coverage of the region can be either due to in accurate report or there may be a problem on cold chain system.

Of the total reported measles cases 2888(55.1%) were from Western zone of Tigray with 167.6 cumulative incidence during the study period, followed by N/West Tigray, 953 (18.2%) and 26.9 cumulative incidence rate per 100000 populations; however, the vaccination coverage of MCV1 was higher in the two zones than others .This variation can be due to movement of susceptible persons to those areas from different directions and the hot climate that can affect the cold chain management of the vaccine, that affects its potency ,because the outbreaks were reported from those zones during the study period. The least reported cases were from Eastern Zone with 1.8% relative frequency and 2.5 IR per 100000 populations, followed by South East, 3.1 % and 7 relative frequency and IR per 100000 populations respectively.

During Jul, 2011-Jun, 2015, the cumulative admission rate or complications from measles was 38.7 %, higher than the frequency of complications of European countries (range; 11.6%-38.6%), that lied in the upper range [9], and also greater than the proportion of measles complications, one third of measles cases (33.3%) develop at least one complication [1].The cumulative case fatality rate of the region was 0.38% during the study period, this is below the expected case fatality rate of measles, i.e. 3%-6% of the country, Ethiopia [1].

Conclusion

Generally**,** the incidence of measles was increased from 12.7 in 2011/12 to 49.9 in 2014/15 per 100,000 populations, half of the reported cases, 25.5% of all admissions and 90% of all deaths was in 2014/15, due to the large outbreaks occurred during this period.

Of the total reported cases, 48.6% of the cases were in >=15 years age group adults and 90 %(18/12) of the total deaths were also in this age group during the study period, this showed that age shifting of the disease towards adults, making adult measles a public health problem of the region. But the incidence rate (ASAR) of measles was higher in <5 years age group all over the study period. With cumulative incidence rate of 47.5 per 100000 population, followed by >=15 years age group with 22.6 cumulative incidence rate or ASAR per 100000 population.

More than half (55.1%) of the total reported cases were from Western Zone of Tigray with 167.7 cumulative incidence rate per 100000 population, followed by North Western Zone , by 18.2% relative frequency and 26.9 IR per 100000 population respectively. Indicating the highest affected zones were Western and North Western parts of Tigray.

Recommendations

To regional Health Bureau/FMOH:

- Future interventions like SIAS should target adults at higher risk or extending vaccination programs to adults, in addition to the routine vaccination activities to decrease the burden of measles in the region.
- Increase MCV1 vaccination coverage to over 90% at regional and Zonal level to interrupt transmission and prevent outbreaks, to achieve measles elimination goal by 2020.
- Measles case based data, line list data's and outbreak investigation reports must be kept documented at regional level.
- The regional HMIS and PHEM case teams have to crosscheck reports coming from lower level on monthly basis, to identify the gaps for inaccurate reporting.

District health office;

- Should have one reporting system to avoid report discrepancy.
- Improve surveillance approaches for early detection of outbreaks and timely interventions.
- Improve awareness of the people towards measles transmission, control and prevention mechanisms through continual health education programs.

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Chapter III: Surveillance System Evaluation

3.1. Surveillance System Evaluation of Measles and Malaria diseases in Kola Temben Wereda, Tigray, Ethiopia, Feb, 2016.

E.Gebreegziabher (BSC) [1], N.Dayissa (MD, MPH, PHD)[2], M.Gizaw(BSC,MPH)[3]

Executive Summary

Introduction: Tigray region is administratively divided into 7 Zones (1 special zone), 52 Woredas (34 rural and 18 urban) and 814 Kebeles (753 Rural and 61 Urban), with 5,055,999 total population and K/Temben woreda is one of the rural woredas with 147797 total population. The health seeking behavior of the region was 1.2 (Who standard 2.5). In Ethiopia, there are 22 reportable diseases under surveillance. Measles is one of the immediately reportable diseases under elimination and malaria is one of the weekly reportable diseases under control and prevention. The purpose of evaluating public health surveillance system is to ensure that problems of public health importance are being monitored efficiently and effectively. Public health surveillance systems should be evaluated periodically to determine how well they operate to meet their stated purposes and objectives. There is high burden of malaria and measles in Tigray region as well as K/Temben, and the woreda was not evaluated for those diseases before. The objective of this study is to evaluate the surveillance system performance of core functions, supportive activities and system attributes of malaria and measles in K/Temben district.

Methods: The surveillance system was conducted from Feb 18-28, 2016 in two HCs and HPs of K/Temben, woreda health office and regional PHEM. The health facilities were selected purposively, by considering access to public transport and diseases under surveillance were selected based on the public health importance of the study area. We have collected the data through face to face interview by using structured questionnaire designed for surveillance system evaluation, and through observation and document review of health facilities and health offices. The data was analyzed using MS-Excel-2007.

Results: The HCs, district health office and regional PHEM have PHEM guideline, but not the health posts. Standard case definition was found in 75% of the visited health facilities, but there was no any community case definition in the HPs. There was a functional RRT committee in the district health office and visited health centers with documented meetings. The report completeness and timeliness of the health centers and the district was 100% in the past six months. Except the regional PHEM, the

surveillance data was not analyzed and interpreted for public health action at each level .There was data discrepancy among PHEM and HMIS reports in both the district and regional level. Eighty percent of the surveillance focal persons were satisfied by the surveillance system. There was no reported measles case in the past six months (WHO expectation one/six month) indicating less sensitivity of the system, but the average PVP of the district for measles was 88%(range;80-100%) in 2014.

Conclusion: The regional PHEM provides feedback to all the districts on quarterly basis, but there was no any weekly bulletin distributed to the districts. Supportive supervision was also conducted regularly at each level. Data was not utilized properly at all the district and health facilities, poor analysis practice. The reported data of malaria and measles among HMIS and PHEM lacks consistency, difficult for future plan and prioritization. The report completeness and timeliness of the district and the region was above the national requirement (>80%).

1. Back ground

Tigray administrative region is found in the northern part of Ethiopia, 783km far from Addis Ababa, capital city of Ethiopia. The region is administratively divided into 7 Zones (1 special zone), 52 Woreda (34 rural and 18 urban) and 814 Kebeles (753 Rural and 61 Urban), with 5,055,999 total population. Public health care services in Tigray are delivered through 1 specialized hospital, 15 general hospitals, 20 primary hospitals, 204 health centers and 712 health posts, achieving primary healthcare coverage of 91.7% on average according to the standard professional mix required for different health facility levels ,and the health seeking behavior of the region was 1.2 (WHO standard 2.5). The regional coverage of health professionals is 88.4% according to the standard professional mix required for different health facility levels. K/Temben is 115kms far from mekelle, capital city of Tigray region .Kola Temben is one of the 12 weredas of central zone of Tigray region with 147,797 total populations.

2. Introduction

According to CDC definition public health surveillance is the ongoing systematic collection, analysis and interpretation of health-related data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these to those who need to know. The final link in the surveillance chain is the application of these data to prevention and control i.e. surveillance is information for action [1].

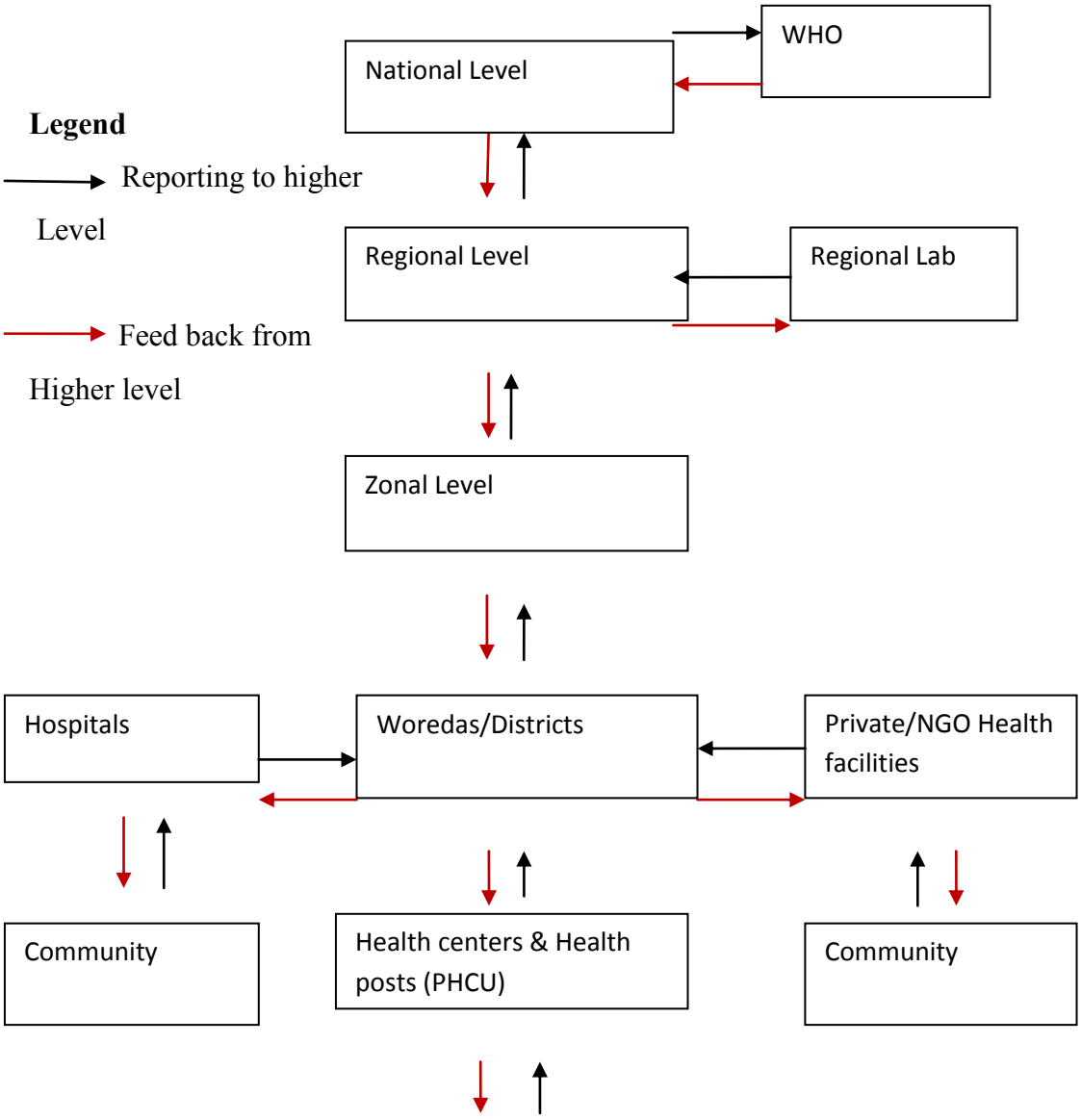
The purpose of the surveillance system indicates why the system exists; its objectives relate to how the data are used for public health action .Objectives of surveillance system include:

- ✓ To detect epidemics/outbreaks so that they can be controlled in a timely manner,
- ✓ To predict epidemics so that health services can plan to respond, prevent where possible, treat and control priority diseases,
- ✓ To monitor trends of priority diseases in order that changing trends inform policy decision,
- ✓ To evaluate an intervention so that effective and efficient actions/policies are identified and supported [1, 2].

In Ethiopia, there are 21 reportable disease under 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. Measles is one of the immediately reportable diseases targeted for elimination. The surveillance objective of malaria is to control and prevent malaria by rapidly scaling-up malaria control interventions to achieve a 50% reduction of the malaria burden, in line with global Roll Back Malaria (RBM) partnership objectives [3]; and it is among the weekly reportable diseases under PHEM.

Data and information flow are from lower level to higher level and feed back is vice versa. The Ethiopian public health surveillance system data flow is as shown below.



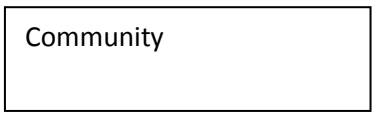


Figure 3.1 Shows the flow of surveillance data and information throughout the health system.

The purpose of evaluating public health surveillance system is to ensure that problems of public health importance are being monitored efficiently and effectively. Public health surveillance systems should be evaluated periodically to determine how well they operate to meet their stated purposes and objectives. Evaluation findings should yield specific recommendations for improving surveillance quality, efficiency and usefulness [1].

Public health surveillance is conducted within a broader public health system that requires the application of surveillance data for public health action and therefore their performance is influenced by data providers, health care providers, diagnostic laboratories, and organizational logistics. Functional public health surveillance systems support the following core activities: detection, confirmation and registration of case patients; reporting or notification, data analysis and interpretation; and feedback and dissemination. These core activities, the associated response capacity and performance, and managerial and support functions of the surveillance system can be evaluated together with the surveillance system attributes (e.g.; sensitivity, flexibility, timeliness and representativeness) according to the systems priority and its objectives [1].

3. Statement of the problem

Malaria is caused by parasites of the *Plasmodium* family and transmitted by female *Anopheles* mosquitoes. There are four different human malaria species (*P. falciparum*, *P. vivax*, *P. malariae* and *P. ovale*), of which *P. falciparum* and *P. vivax* are the most prevalent and *P. falciparum* the most dangerous [4].

Despite being preventable and treatable, malaria continues to have a devastating impact on people's health and livelihoods around the world. According to the latest available data, about 3200 million people were at risk of the disease in 97 countries, territories and areas in 2013, and an estimated 198 million cases occurred. In the same year, the disease killed about 584 000 people, 78% were children aged under 5 years, mostly from sub -Saharan Africa. [4].

Malaria is ranked as the leading communicable disease in Ethiopia, accounting for about 30% of the overall Disability Adjusted Life Years lost. Approximately 68% of the total population lives in areas at significant risk of malaria. According to the FMOH, in 2010/2011, malaria was the leading cause of outpatient visits, accounting for 15% of all visits, and health facility admissions, with 15% of all admissions. Malaria is one of the top ten causes of in-patient deaths among children less than five years of age and adults [5]. But Ethiopia planned to reduce malaria mortality rate and parasite prevalence from 4 in 2012 to 0.6 in 2020 per 100,000 population at risk and 1.3 in 2011to <1 in 2020 respectively [6]. According to 2007EFY annual report, the prevalence of confirmed malaria cases in Tigray region was 4.9% with 1.5% admission rate and it was also among the top ten leading causes of morbidity.

Measles is one of the most infectious human diseases and can cause serious illness, lifelong Complications and death. Prior to the availability of measles vaccine, measles infected over 90% of children before they reached 15 years of age. These infections were estimated to cause more than two million deaths and between 15 000 and 60 000 cases of blindness annually worldwide. In some developing countries, case-fatality rates for measles among young Children may still reach 5–6%. By 2010, estimated global measles mortality decreased 74% from 535 300 deaths in 2000 to 139 300 in 2010. The WHO African region accounted for 36% of estimated measles mortality in 2010[7].

Even though measles is a vaccine preventable disease, in Ethiopia, according to 2013 WHO report, the incidence of measles was 6.5 per 100,000 total population with 6137 total confirmed measles cases (lab confirmed, Epi-Link, and clinically confirmed). The total number of confirmed measles cases was doubling in 2014, with 14100 cases and 14.61 incidence rate per 100,000 total populations, this can be due the occurrence of measles outbreaks in many parts of the country in 2014, including Tigray region [8]. According to 2007 EFY Tigray regional health bureau PHEM/HMIS report, the prevalence of measles was 50 per 100,000 total population, this was higher than the 2014 national incidence, 14.61 per 100,000 and this is due to many outbreaks in different woredas of West, North West and Central zones of Tigray at specified time.

4. Rationale of the evaluation

The public health surveillance system should operate in a manner that allows effective dissemination of health data so that decision makers at all levels can readily understand the implication of the information. Due to this Public health surveillance systems should be evaluated periodically, to assess the quality, efficiency, efficacy and its usefulness [1].

Malaria surveillance systems are getting better, but still only 14% of global estimated cases are recorded because of incompleteness or inconsistency of reporting over time [9].According to 2011 world malaria report, Ethiopia reported 4,068,764 clinical and confirmed malaria cases to WHO, the estimated annual number of malaria cases, however, ranges from 7-8 million per year, considering there is only 40% reporting completeness by Public Health Emergency Management (PHEM) and this needs periodic evaluation for next improvement[5].

According to 2007 EFY Tigray regional health bureau annual report, the prevalence of confirmed malaria cases was 4.9% (262406) with 70.3% P.F cases and 1.5 %(3920) admissions. The prevalence of confirmed malaria cases in K/Temben woreda was also 3.6 %.

In Tigray region, the prevalence of measles was 50 per 100,000 total populations in 2007 with 2645 total measles cases, 50.5 % admissions and 18 deaths. According to 2007 EFY data, the prevalence of measles in central zone and K/Temben were 20 and 20 per 100000 populations respectively. In 2014/15, there were many measles outbreaks in many woredas of the region; K/Temben was among the woredas that experienced measles outbreak. In addition, the woreda was not also evaluated for the selected diseases before.

5. Objective

5.1. General objective

To evaluate the existing surveillance system in Kola Temben woreda, Central Zone of Tigray region specifically on malaria and measles, Feb,2016.

5.2 Specific Objectives

- To investigate the implementation of core functions of the surveillance system in respect to case detection, registration, confirmation, reporting, epidemic preparedness and response.

- To assess supportive functions of the surveillance system such as supervision, staff training, information feedback, logistics and budget support.
- To assess the main attributes of the surveillance system (e.g. sensitivity, simplicity, PVP etc)
- To draw possible recommendations for further improvement

6. Methods and Materials

6.1. Study area: The surveillance evaluation was conducted in Tigray region and Kola Temben woreda. Tigray region is found in northern part of the country 783km far from Addis Ababa, capital city of the country, Ethiopia. The region consists of 7 administrative zones and 18 town and 34 rural woredas. Kola Temben is among the 12 rural woredas of central zone of Tigray.

6.2. Study population: K/Temben and Tigray region population.

6.3. Study period: The assessment was conducted from Feb 18-28, 2016.

6.4. Study unit: Two health centers and health posts of K/Temben woreda, woreda health office and Tigray regional PHEM.

6.5. Sample size and sampling: We enrolled the regional PHEM, district health office and two health centers and health posts. As long as, the regional health bureau prioritized this woreda according to high prevalence of malaria and measles, we have selected this woreda purposively and the health centers and health posts were also selected purposively, by considering access to public transport. In addition the woreda was also selected for malaria elimination program. Disease under surveillance was selected based on the public health importance of the study area and the study area was not evaluated for those diseases before.

6.6. Data collection procedures:

6.6.1. Case definition

Malaria;

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

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

Measles;

Suspected: Any person with fever and maculopapular (nonvesicular) generalized rash and cough, coryza or conjunctivitis (red eyes) OR any person in whom a clinician suspects measles

Confirmed: A suspected case confirmed by laboratory (positive for IgM antibody) or epidemiologically linked to confirmed case in an epidemic.

6.6.2. Data collection method; we have collected the data through face to face interview by using structured questionnaire, observation and document review of health facilities and health offices.

6.6.3. Data collection instruments; We used structured questionnaire adopted from WHO/AFRO and CDC standard questionnaire which were designed for surveillance system evaluation, annual performance reports of regional health bureau, health facilities and health offices and additional publications to collect data for this purpose.

6.6.4. Consent and confidentiality; A formal letter was written to all woreda health offices and health facilities from Tigray regional health bureau. Consent will be taken from all responsible health professionals for interview as well as document review after informing the purpose of the study, and confidentiality of the information and data they will provide us.

6.7. Data analysis: The data will be analyzed using Ms-Excel 2007 after cleaning the collected data.

6.8. Dissemination of data: Result of the analysis will be disseminated to regional health bureau PHEM, woreda health office and to AAU EFETP program after incorporating comments.

7. Result

Population under surveillance

Table 3.1 shows population under surveillance, number of HCs and HPs by place of residence, Tigray region, Ethiopia, Feb, 2016.

S/No	Name of institution	Total population	No of Health Centers	No of Health posts
1	Tigray Region	5,055,999	204	712
2	Kola Temben woreda	147797	7	27
3	Work Amba Cluster	28589	1	4
4	Guya Cluster	34358	1	10
5	Bega Sheka Kebele	6316	0	1
6	Dembela Kebele	9885	0	1

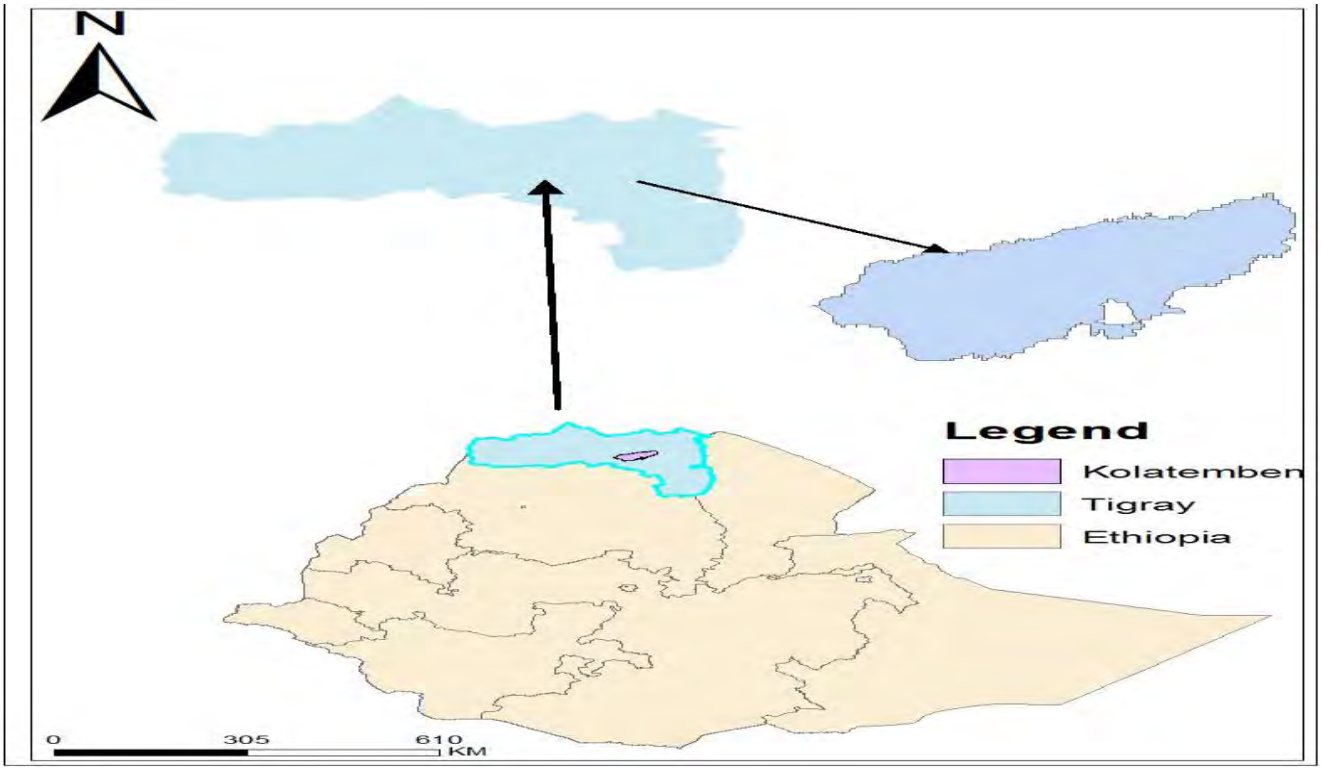


Figure 3.2 Map of Kola Temben district, Tigray, Ethiopia, Feb, 2016.

7.1. Core functions of the surveillance system

7.1.1.Availability of the national surveillance manual (National PHEM Guideline)

The PHEM guideline (surveillance manual) was available in 2(50%) of the assessed health facilities of K/Temben district, only in the health centers. The district health office and the regional health bureau have national PHEM guideline in place.

7.1.2.Case detection and registration

Case definition:

Standard case definition: Was available in the regional PHEM, district health office and 3(75%) of the health facilities visited for measles and malaria, but in Dembela health post we got a standard case definition for AFP only.

Community case definition: There was no written community case definition for the immediately and weekly reportable disease under surveillance, in all the visited health posts. According to the heath extensions and supervisors information, there was no any distributed community case definition of malaria and measles or other priority disease for the women development army, schools and the community.

The visited health centers have clinical registers that correctly filled with necessary information that can identify cases, but in case of health posts they used family folders (health cards) to registered cases. There were assigned trained PHEM focal person at all the district and health center levels, but they are not fully assigned for PHEM they have additional tasks. There was a functional RRT committee in the district health office and visited health centers with documented meetings, 5-7 times in the past six month period .In addition, the RRT committee of the respective district and health centers were conducted active surveillance in the community, schools and religious places like holly water 3-5 times per six month period, according to their plane to search cases and to verify rumors coming from the community, but the active surveillance management tool was not filled properly at all levels e.g. no conclusion for rumors after investigation. There was also epidemic committee at district and kebele level called stream committee, in addition to the task force at all levels.

Malaria and measles cases detected by the surveillance system get laboratory tests for confirmation in all the visited health facilities. Malaria suspected cases get confirmation by microscopic and RDT at health centers and health posts respectively, it takes 30-45 min to release result. But suspected measles samples were sent to national referral laboratory (EPHI), for confirmation, the regional laboratory has no capacity to confirm measles. All the visited health centers and the district have the capacity to collect, handle and transport (ship) specimens for the next level with proper cold chain management, but the refrigerators temperature was not controlled regularly, with no temperature logs. As the district PHEM focal person information, the measles turnaround time (TAT) was more than a month, even it can lost with no feedback ,this makes difficult for early intervention. There is no established system how to deliver laboratory test results (feedback) sent to national referral laboratory for confirmation to the respective districts and health facilities. Even though the TRHB PHEM officers have assigned clusters (zones) for support and follow up, there was no any laboratory result sent to the officers or to the regional PHEM coordinator, but a copy of the case investigation form sent to the national referral laboratory was also sent to the regional PHEM.

7.1.3. Reporting

All the visited health facilities have appropriate surveillance reporting forms in the last six months with no interruption, but there was shortage of case investigation forms at another two HCs according the district information. The forms are supplied by national PHEM and distributed by regional PHEM, and sometimes the district health office distributes the forms to the respective health facilities by duplicating. Case investigation, line list, weekly reporting and rumor log book are some of the formats.

Report completeness and timeliness are one of the indicators of the national PHEM guideline. According to the regional PHEM six month feedback, the weekly report completeness and timeliness of the district was 100%, i.e. all the expected health facilities were reported completely and timely to the district and region. Timeliness of reporting from health posts to health centers then to district was difficult to measure, because there was no any written feedback given to the HPs and HCs from health centers and district respectively. Even though it is difficult to measure, most of the immediately reportable diseases were not submitted (notified) on time to the regional PHEM, according to the national PHEM guideline reporting frequency, the district must notify the region within one and half an hour time frame. But when we see the six month line list report of rabies and anthrax of the district, there were cases reported even after 2 days (date district notified the region-date patient seen at health

facility).The visited health facilities have reported malaria cases accurately from the registry to the weekly summary report for next level, there was no any measles report. The reporting means for the next level was through office or mobile phones, this is one of the challenges of the reporting system, because there is no monthly or weekly mobile card fee for this purpose.

7.1.1.Data analysis

There was no any data analysis practice by place and person at all levels. Malaria trend analysis was done in the two health centers (Work Amba & Guya) and Dembela health post, but there was no any trend analysis done at Bega health post. The reported number of cases was described by weekly basis at all levels in table forms; the surveillance focal person is responsible for data analysis.

The district health office and the visited health facilities did not have defined action threshold for malaria, measles and any other priority disease under surveillance, even the term was not clear to the health facility surveillance focal persons. But the district and the evaluated heath facilities have appropriate denominators.

7.1.2. Epidemic preparedness and response

There was a written documented epidemic preparedness and response plan at the regional and district level that considered this year ongoing drought, developed jointly with other case teams. But there was no epidemic preparedness and response plan at health facility levels. In addition the health centers did not have a written management protocol for malaria and measles.

Even though the district health office and the regional PHEM have a budget line for epidemic response and have some emergency stocks of drugs and supplies in the past one year, they experienced shortage of TTC eye ointment and Vit-A during the last year measles outbreak. The regional PHEM and the district health office have a functional epidemic management committee and RRT team with documented review meetings alerted due to the current drought.

There was no any outbreak in the past six months in K/Temben district, but there are ongoing scabies epidemics in 9 districts of the region. In addition there was also an outbreak of malaria in Hawzen and Mereb Leke woredas. There were outbreaks of measles in many districts of the region including K/Temben in the past one year that resulted in 20 deaths, 0.38% CFR.

The district and all the health facilities have implemented prevention and control measures like environmental sanitation, health education and treatment of cases for malaria and measles based on the available data. The regional PHEM conducted malaria outbreak investigation in the past six month with in 48 hrs of notification and identified the risk factors associated with this outbreak. The regional PHEM was also investigated two outbreaks out of the five measles outbreaks in the past one year within 72hrs after the districts notified the region. K/temben was also investigated measles outbreak in the past one year after 10 days of the outbreak detection; the outbreak was detected after 20 days of the onset of measles cases by regional health bureau staffs during supportive supervision. There was a written report of all the investigated outbreaks at regional and district level. Both the measles outbreaks were with acceptable case fatality rates in all the districts. At regional level, the case fatality rate of measles outbreak was 0.38% in 2007 EFY that was within the acceptable range of measles case fatality rate, 0.1-10 % (CDC, 2015).

7.2. Supportive functions of the surveillance system

7.2.1. Feedback and Supervision

The regional health bureau was conducted an integrated supportive supervision for all the visited health centers, one health post and the district health office once in the past six months, the surveillance practices were reviewed at all the visited health facilities and district appropriate to their level. All the health facilities were supervised two times by the district health office in the last six months; in addition the health posts were also supervised by their respective clusters two times in the last six months. All the supervisions were supported by checklist with documented feed backs at all level. All the district officers were also assigned to their respective clusters for regular support, but this was biased towards their specific expertise.

Neither the health centers nor the health posts received a report or bulletin from their next higher level in the past one year according on the data they have provided, the feed backs were through oral communication. But the regional PHEM gives feedback to the district health office quarterly based on the data they provided. The feedbacks include total number of cases reported, completeness and timeliness of the district, status of the district (rank) and possible recommendations. But there was data discrepancies between the district reported cases and the feedback given by the regional PHEM e.g. measles, meningitis, typhoid fever etc. The health centers and the health posts were conducted meetings

with the community members two and six times in the past six months respectively by integrated all their activities.

7.2.2. Training

The interviewed surveillance focal persons were taken training on disease surveillance and epidemic management in 2007 and 2008 EFYs for five days by regional health bureau. But there was only one trained personnel in each health center and this can have a negative impact when the personnel cleared the facility. The HEWs were also taken similar trainings on the last weeks of their graduation year. In addition, all the surveillance focal persons and HEWs were also given refreshment trainings by the district health office bi annually.

7.2.3. Resources and materials

Reporting formats, functional refrigerator, laboratory supplies, stationery materials, electricity and motor bicycles were available in all health centers and the district. The districts have also telephone service, hygiene and sanitation materials, 6 Vehicles (4-ambulances), printers and desk top computers. The regional PHEM have also all the necessary materials and supplies for surveillance purpose, in addition to the email service and individual lap top computers, but there was no fax, radio call and photocopy services. The health posts have mobile net work access and posters only.

Generally the district, Guya HC surveillance focal persons and Bega health post HEW were satisfied with the current surveillance system, but Work Amba HC surveillance focal person and Dembela health post HEW were not satisfied with the surveillance system, they recommended to have surveillance office at HC level , decrease the burden of the surveillance focal person and to increase number of HEWs at the health post level to address all the households, that have low health seeking behaviors for the priority diseases under surveillance respectively .

7.3. Attributes of the surveillance system

7.3.1. Usefulness

All the health facilities and district reported surveillance data to regional and national PHEM through case based and weekly reports, but the surveillance data was not analyzed and interpreted for public health action at each level except the regional PHEM. Even though the surveillance focal persons are responsible for data analysis at each level, they have limited technical skills to analyze data in addition

to the work over load. Surveillance activities was considered as additional duty ,most of them were engaged in routine patient diagnosis and they have also assigned clusters for outreach activities to support the 16 components of the health extension workers . Malaria trend was plotted in 75% of the visited health facilities and the district on weekly basis, but there was no any data analysis practice for measles cases at all levels. At regional level surveillance data was analyzed for all the reportable disease by place and time variables, and disseminated to FMOH and health bureau higher officials, partners and PHEM officers for information and action.

Generally all the interviewers responded that, the surveillance system helped them to detect outbreaks early, to estimate the magnitude of morbidity, mortality and related factors. The health facilities were implemented prevention and control activities as their routine activity, not prioritized based upon the surveillance data they have.

7.3.2. Simplicity

All the health facilities and the district surveillance focal persons responded that, they feel that data collections on a case report form are simple and not time consuming (i.e. less than 15 minutes). The malaria and measles case definitions were also easily understandable by most of the health professionals for case detection. The surveillance data was managed by computer at regional level only, but the district and health facilities used paper forms.

7.3.3. Flexibility

The district health office and 50% of the health facilities (one HP&HC) responded that the current reporting formats can be used for other newly occurring health event (disease) without much difficulty, because it has other option. Whereas the remaining health facilities said that, it is difficult to include other newly occurring health events. With the exception of the district health office, all the visited health facilities responded that any change in the existing procedure of case detection, reporting and formats will not be difficult to implement. The district health office concern was it needs additional budget and much time for training and awareness to implement at all levels.

7.3.4. Data quality

The data collection formats for the priority disease are clear and easy to fill for all the reporting sites surveillance focal persons, but not for all the facility health professionals. The reporting

sites/surveillance focal persons were trained and supervised regularly. In the past month, all the reports were complete (with no blank or unknown responses) in all the health facilities and the district. But there was no any cross checking mechanisms for the reported data from lower level, before sending to the next higher level.

Report consistency: the reported number of cases was significantly different between monthly HMIS data and weekly PHEM aggregate data for malaria and measles.

Table 3.2 Shows malaria and measles data discrepancy at district and regional level among HMIS and PHEM in 2007 EFY, Tigray, Ethiopia, Feb, 2016.

	Malaria		Measles	
	District	Regional	District	Regional
HMIS	5916	262402	32	2645
PHEM	5478	251880	65	701

7.3.5. Acceptability

Except in Work Amba health center, all the reporting agents accept and well engaged in the surveillance system activities, especially the WDAs. In Work Amba HC, the reason for the poor participation of the agents was lack of awareness of those activities and reporting formats are difficult to understand and time consuming. Even though there was no any per diem, transport access and mobile card fees for active surveillance and communication purposes, 80% of the interviewed surveillance focal persons and 70% of the health professionals were interested and satisfied by the surveillance system.

7.3.6. Representativeness

The health service coverage of the district was shown below, according to the national Health Service coverage standards, the health center to population ratio was above the national standard, >100% coverage, but HP :population ratio was below the national standard(1HP to 5000 population) or low coverage (i.e. 91.3%).

Table 3.3 Shows health service coverage of K/Temben woreda, Tigray, Feb, 2016

Type of health institution	Number HFs	Health institution to population Ratio(coverage %
Hospital	0	0: 147797(0)
Health center	07	1:21114(118%)
Health post	27	1:5474(91.3%)

Even though the health seeking behaviors of the population for malaria and measles was increasing from time to time, but malaria was well represented than measles, due to some traditional and religious believes towards measles, the late detection of measles' outbreak in the past year can be one indicator of this. According to district and Work Amba health center information, urban residences were well represented by the surveillance data than rural residents, due to better access and awareness; there was no urban setting in the remaining health facilities. The district surveillance officer believed that the weekly surveillance report represents the situation of the district at that time, because the health service coverage and health seeking behavior of the district population was good, and most of the services were also exempted.

7.3.7. Timeliness

The weekly monitoring chart of the district indicated that, the timeliness of all the health centers were 100% in the past six months. The chart did not indicate the health posts timeliness; the health posts were measured by their respective cluster health centers to which they submitted the weekly data. But there was no documented timeliness result of the health posts in the evaluated health centers. The immediately reportable diseases were not notified according to the national time frame to the next higher level because of network problem in the health facilities especially HPs.

7.3.8. Stability

Since all the weekly surveillance data were reported by individual mobile phones to the next higher level, this needs mobile card allowances especially for the health facilities with no telephone service. In addition per diem and transport must be considered for the health professionals conducting active surveillance for motivation, despite those issues the surveillance system is going as needed.

7.3.9. Sensitivity

According to the response of the surveillance focal persons, the surveillance system captures most of the priority disease in the community/district. But this can be affected by the presence of case definitions, ability of the health professionals and laboratory capacity to detect cases at each level. According to WHO standard, a district with 100,000 populations expects to detect at least two measles cases annually, but the district did not detect any measles cases in the last six months.

7.3.10. PVP

The surveillance focal persons of the evaluated health facilities/district said that, most of the malaria and measles reported cases were actually cases.

Even though there was no any measles case detected in the past six months, from May, 2014-Jan, 2015, 11 serum samples were taken from suspected measles cases and sent to national referral laboratory for confirmation from the district, the feedback indicated that PVP of the district was 88%, two samples were with missing value.

PVP=A/A+B, A-true positive, B-False positive

Table 3.4 Shows PVP of measles cases of the health centers from May, 2014-Jan, 2015, K/Temben, Tigray, Feb, 2016.

S/No	Name of HF	Sent samples	IgM Pos	Missing value	PVP
1	WorkAmba HC	5	4	0	80
2	Guya HC	6	4	2	100
3	District total	11	8	2	88

7.3.11. Completeness

Report completeness is the proportion of health facilities reported completely compared to the expected. Accordingly, the report completeness of the district and health centers was 100% in the past six month. There was no documented data for the health posts.

8. Limitation of the study

- ✓ The system evaluation was conducted in two health centers and health posts of the district only and this can affects the representativeness issue, we used public transport that was difficult to increase the number of health facilities.
- ✓ The weekly surveillance data lacks age and sex variables, unable to describe the number of cases by person.
- ✓ The time of detection and notification of the immediately reportable disease were not documented at each level, unable to evaluate timeliness according to the national time frame.

9. Discussion

Even though the rapid response team was functional with documented review meetings and active surveillance findings at all levels, useful for case detection. But there was no descriptive data analysis practice by person and place in all the visited health facilities and the district health office, that indicates poor practice of interpretation and utilization of surveillance data for action at all levels. Thus, the surveillance data has limited usefulness.

The weekly report completeness and timeliness, simplicity, acceptability, PVP (measles) of the district and all the visited health facilities were met the surveillance objectives. Even though all the health professionals responded that, the district population has good health seeking behavior but the health seeking behavior of the population was 1.2 at regional level that is half of the WHO standard, 2.5(every one is expected to visit HF, 2.5 times per annum). This can affects the representativeness issue.

The district did not detect any measles case in the past six month (WHO expectation; one measles' case per six month); there were also huge data discrepancy among HMIS and PHEM annual reports, makes difficult to take appropriate interventions and preparation of future plans, so the sensitivity and data quality of the surveillance system did not met its objectives.

10. Conclusion

The regional PHEM provides feedback to all the districts on quarterly basis, according the data they provided but there was no any weekly bulletin distributed to the districts. Supportive supervision was also conducted regularly at each level. But the district health office and the health centers did not gave any written feedback to their respective health centers and health posts according the data they provided respectively. Data was not utilized properly at all the district and health facilities, poor analysis practice. The reported data of malaria and measles among HMIS and PHEM lacks consistency, difficult for future

plan and prioritization. The report completeness and timeliness of the district and the region was above the national requirement (i.e. >80%).

11. Recommendations

- The woreda health office/regional PHEM should allocate a budget line at woreda as well health facility level for public health surveillance activities like, active surveillance (transport and per diem) and communication purposes (mobile card fees).
- The regional PHEM should disseminate the weekly epidemiological bulletins to each district according the data they provided, for timely public health actions.
- The district health office and health centers should do and disseminate epidemiological bulletins or written feedbacks regularly to all the reporting health facilities for timely feedbacks and interventions.
- There must be cross checking of reports at all levels before sending to the next higher level, especially for unexpected reports.
- The regional health bureau should develop electronic reporting systems like e-PHEM for accurate surveillance data.
- The national referral laboratory and PHEM should establish result dispatching mechanisms for the referral samples sent from each health facilities and districts for confirmation.

7. References

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Annex: 3.1

3.1. Data collection tools for surveillance system evaluation in Kola Temben woreda and Tigray regional health bureau, Feb, 2016.

I. Health Post Level Questionnaire

Identifiers

Assessment team	Type of health facility
Date	District
Interviewer	Region/province
Respondent	Respondents position-
Name of health facility	Surveillance system

1. Number of Health Post with national surveillance manual

   Is there a national manual for surveillance at Health Post?

   Observe national surveillance manual:

   Yes No Unknown Not applicable

I. Case detection and registration _____

2. Does the Health Post have a clinical register?

   Yes No Unknown Not applicable

3. Does the Health Post correctly register cases during the previous 30 days?

   Yes No Unknown Not applicable

4. Does the Health Post have standardized case definitions for the priority diseases (each priority disease) Meningitis, AFP (polio), measles, malaria?

   Yes No Unknown Not applicable

II. Data reporting _____

5. Does the Health Post have appropriate surveillance forms for that site at all times over the past 6 months

   Yes No Unknown Not applicable

6. Does the Health Post 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 Meningits Y N U N/A

7. Does the Health Post that reported each reporting period to the next higher level during the past 3 months?

Yes ☐ No ☐ no Known ☐ Not applicable ☐

8. 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

9. 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

10. Does the Health Post have means for reporting to next level by e-mail, telephone, fax or radio

How do you report?

a. Mail

b. Fax

c. Telephone

d. Radio

e. Electronic

f. Other

11. Strengthening reporting

How can reporting be improved?

_____

_____

III. Data analysis

Percent of sites that:

12. Does the Health Post describe data by person (outbreaks, sentinel)

Observe description of data by age and sex

Yes ☐ No ☐ Unknown ☐ Not applicable ☐

13. Does the Health Post describe data by place

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

Yes No Unknown Not applicable

14. Does the Health Post describe data by time

Observed description of data by time: Yes☐ No ☐ Unknown☐ Not applicable ☐

15. Does the Health Post Perform trend analysis

Observed line graph of cases by time

Yes ☐ No☐ Unknown ☐ Not applicable ☐

IV. Epidemic response_____

16. Does the Health Post implemented prevention and control measures based on local data for at least one epidemic prone disease?Yes ☐ No ☐ Unknown ☐ Not applicable ☐

V. <u>Feedback</u>

17. Does the Health Post have received a report or bulletin from a higher level during the past year on the data they have provided

Yes ☐ No ☐ Unknown☐ Not applicable ☐

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

19. Does the health post receive at least 1 report or bulletin from a higher level during the past year on the data they have provided?

Yes No Unknown Not applicable

20. Doe the health post conducted at least semi-annual meetings with community members to discuss results of surveillance or investigation data?

Yes No Unknown Not applicable

21. How many meetings has the health post conducted with the community members in the past six months? _____

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

VI. Supervision:

22. Was HEWs supervised in the past 6 months?

Yes No Unknown Not applicable

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

24. 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

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

Yes ☐ No ☐Unknown ☐ Not applicable ☐

VII. Training

25. Number of HEWs trained in disease surveillance and epidemic management?

Yes ☐ No ☐ Unknown ☐ Not applicable ☐

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

_____

VIII. Resources

27. Does the Health post have

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

28. Data management

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

29. Communications

a. Telephone service

b. Fax

c. Radio call

d. Computers that have modems

30. 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. Other:

31. Hygiene and sanitation materials

a. Spray pump

b. Disinfectant

32. Protection materials (list) _____ _____ _____

_____

_____

IX. Satisfaction with surveillance system

33. Satisfaction with the surveillance system

Are you satisfied with the surveillance system?

Yes ☐ No ☐ Unknown ☐ Not applicable ☐

34. If no, how can the surveillance system be improved? _____

_____

35. Opportunities for integration

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

_____

_____

_____

Attributes

a) Usefulness

1. Total population of the district under surveillance_____

2. How many cases and deaths reported in the district from the following disease past 6month ?.

   a) Malaria cases _____Deaths _____

   b) Measles cases _____Deaths _____

3. Does the surveillance system help?

   a) To detect outbreaks of these selected priority diseases early? Yes No N/A

   b) To estimate the magnitude of morbidity , mortality and factors related to these

      Diseases? Yes No N/A

   c) Permit assessment of the effect of prevention and control programs?

      Yes No N/A

b) Simplicity

4. Do you feel that data collections on a case report form are time consuming? Yes No N/A

5. If yes, how long it takes to fill the format? a, <5 minute b- 10-15minuts c- >15 minutes

c) Flexibility

6. Do you think that the current reporting formats used for other newly occurring health

   Event (disease) without much difficulty? Yes No N/A

7. Do you think that any change in the existing procedure of case detection, reporting, and formats will be difficult to implement? Yes No N/A

If yes, how_____

d) Data Quality

8. Are the data collection formats for these priority diseases clear and easy to fill for

   All the data collectors/ reporting sites? Yes No N/A

9. Are the reporting site / data collectors trained/ supervised regularly? Yes No N/A

   If, **Observe:** Review the last months report of these diseases

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

11. Percent of reports which are complete(that is with no blank or Unknown responses) from the total reports _____

e) Acceptability

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

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

13. **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.

    c) Reporting formats are difficult to understand

    d) Report formats are time consuming

    e) If Others: _____.

f) Representativeness

14. What is the health service coverage of the district? _____%.

15. Do you think, the populations under surveillance have good health seeking behavior for these priority diseases? Yes No N/A

46. Who do you think is well represented by the surveillance data? Urban / rural

g) Timeliness

47. What proportion of health facilities reports in acceptable time------?

h) Stability

48. Was there lack of resources that interrupt the surveillance system?

Yes No N/A

If yes, how did you manage it? _____

49. What do you suggest to overcome such problems? _____.

---

i. Sensitivity:

Do u thing the surveillance system captures most of the priority disease (cases) under surveillance in the HP/Community? Yes, No, If No what is the reason----------

j. PVP:

Do u think cases reported by the surveillance system are actually cases? E.g. measles

Yes, NO, If No gives explanations

II. HEALTH Center Level Questionnaire

Identifiers

Assessment team_____ Type of health facility_____

Date_____ District Name_____

Interviewer_____ Region/province_____

Respondent_____ Country_____

Name of health facility_____ Surveillance system _____

---

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

Obs Observe national surveillance manual:

Yes ☐ No ☐ unknown ☐ Not Applicable ☐

I. Case detection and registration

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

Observe the existence of a clinical register?

Yes ☐ No ☐ unknown ☐ Not Applicable ☐

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

Observe the correct filling of the clinical register during the previous 30 days

Yes ☐ No ☐ unknown ☐ Not Applicable ☐

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

5. Yes ☐ No ☐ unknown ☐ Not Applicable ☐

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

Yes____ No ____ unknown ____ Not Applicable_____

II. Case confirmation

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

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

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

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

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

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

Y: □ N: □ U :□ N/A:□

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

Y: □ N: □ U :□ N/A:□

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

Y: □ N: □ U :□ N/A:□

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

Y: □ N: □ U :□ N/A:□

III. Data reporting

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

Y: □ N: □ U :□ N/A:□

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

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

a. Obs Measles Y: □ N: □ U :□ N/A:□

b. Obs Malaria Y: □ N: □ U :□ N/A:□

c. Obs AFP (polio) Y: □ N: □ U :□ N/A:□

a. Obs Meningitis Y: □ N: □ U :□ N/A:□

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

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

Obs Weekly: /12 times the number of sites

Obs immediately: /-- times the number of sites

16. On time (use national deadlines)

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

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

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

How do you report?

a. Mail

b. Fax

c. Telephone

d. Radio

e. Electronic

f. Other

18. Strengthening reporting

How can reporting be improved?

_____

_____

IV. Data analysis

Percent of sites that:

19. Does the Hospital/health Center have described data by person (outbreaks sentinel)?

Observed description of data by age and sex

Y: □ N: □ U:□ N/A:□

20. Does the Hospital/health Center have describe data by place

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

Y: □ N: □ U:□ N/A:□

21. Does the Hospital/health Center have described data by time?

Observed description of data by time

Y: □ N: □ U:□ N/A:□

22. Does the Hospital/health Center have Perform trend analysis?

Observed line graph of cases by time

Y: □ N: □ U:□ N/A:□

23. Does the Hospital/health Center have an action threshold for each priority disease?

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

Y: □ N: □ U:□ N/A:□

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

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

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

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

27. Does the Hospital/health Center have appropriate denominators

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

Y: □ N: □ U:□ N/A:□

V. Epidemic preparedness

28. Does the Hospital/health Center have a standard case management protocol for epidemic prone diseases

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

Y: □ N: □ U:□ N/A:□

VI. Epidemic response

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

Y: □ N: □ U:□ N/A:□

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

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

Y: □ N: □ U:□ N/A:□

VII. Feedback

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

Y: □ N: □U:□ N/A:□

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

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

Y: □ N: □U:□ N/A:□

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

VIII. Supervision:

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

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

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

Y: □ N: □U:□ N/A:□

IX. Training

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

Y: □ N: □ U:□ N/A:□

36. Number of Health Personnel trained _____

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

_____

X. Resources

38. Number of Hospital/Health center that have Logistics

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

39. Data management in Health Center/Hospital

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

40. Communications in Health Center/Hospital

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

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

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

42. Hygiene and sanitation materials in Health Center/Hospital

a. Spray pump

b. Disinfectant

43. Protection materials (list) _____ _____ _____

_____

_____

XI. Satisfaction with surveillance system

44. Satisfaction with the surveillance system in Health Center/Hospital

Are you satisfied with the surveillance system?

45. Y: □ N: □ U :□ N/A:□

If no, how can the surveillance system are improved? _____

_____

46. Opportunities for integration

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

_____

_____

_____

III. DISTRICT Level Questionnaire

Identifiers

Assessment team_____ District_____

Date_____ region/province_____

Interviewer _____ country_____

Respondent_____ surveillance system_____

Is the Districts has 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 □

I. Case confirmation

Is the Districts has the capacity to transport specimens to a higher level lab

2. Does the District have the capacity to transport specimens to a higher level lab?

3. Yes □ No □ unknown □ Not Applicable □

4. Does the District has fully employed District focal person On PHEM?

Yes □ No □ unknown □ Not Applicable □

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

Yes □ No □ unknown □ Not Applicable □

II. Data reporting_____

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

Yes □ No □ unknown □ Not Applicable □

7. 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)

8. Number of weekly reports submitted on time: ____/12 times the number of health facility

9. Number of immediately reports submitted on time: _____/3 times the number of health facilities

10. Is the Districts have means for reporting to next level?

How do you report:

a. Mail

b. Fax

c. Telephone

d. Radio

e. Electronic

f. Other

Strengthening reporting

11. How can reporting be improved?

_____

_____

III. Data analysis

12. I. Is the District Describe data by person (case based, outbreaks, sentinel)

Obs Observed description of data by age and sex

Yes □ No □ unknown □ Not Applicable □

13. Describe data by place

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

Yes □ No □ unknown □ Not Applicable □

14. Describe data by time

Obs Observed description of data by time

Yes □ No □ unknown □ Not Applicable □

15. Perform trend analysis

Obs Observed line graph of cases by time

Yes □ No □ unknown □ Not Applicable □

16. List:

_____

_____

17. Have an action threshold for each priority disease

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

Yes □ No □ unknown □ Not Applicable □

18. If yes, what is it? _____cases _____% increase _____rate

(Ask for 2 priority diseases)_

_____

_____

19. Have appropriate denominators

Does the District have demographic data at site (E.g. population <5 yr, population by village, total population)

20. Yes □ No □ unknown □ Not Applicable □

21. Who is responsible for data analysis? _____

22. How often does the District analyze the collected data?

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

IV. Outbreak investigation

23. Does the Districts were investigated outbreaks in the past 6moths?

Yes □ No □

Number of outbreaks suspected in the past 6 months:_____ Investigated_____?

have you ever conducted an outbreak investigation

Has your District ever investigated an outbreak?

Yes ☐ No ☐ unknown ☐ Not Applicable ☐

V. Epidemic preparedness

24. Have your District a plan for epidemic preparedness and response?

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

Yes ☐ No ☐ unknown ☐ Not Applicable ☐

25. have your District have emergency stocks of drugs and supplies at all times in past 1 year?

Observed the stocks of drugs and supplies at time of assessment

Yes ☐ No ☐ unknown ☐ Not Applicable ☐

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

Yes ☐ No ☐ unknown ☐ Not Applicable ☐

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

Yes ☐ No ☐ unknown ☐ Not Applicable ☐

28. Does your District that have an epidemic management committee?

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

Yes ☐ No ☐ unknown ☐ Not Applicable ☐

29. Does the District have a rapid response team (RRT) for epidemics?

Yes ☐ No ☐ unknown ☐ Not Applicable ☐

VI. Responses

30. Does the District implemented prevention and control measures based on local data for at least one reportable disease or syndrome?

Yes ☐ No ☐ unknown ☐ Not Applicable ☐

31. In how many time do you respond to Epidemic situation?

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

Yes ☐ No ☐ unknown ☐ Not Applicable ☐

32. Does your District achieved acceptable case fatality rates (e.g. 10% for Meningococcal CSM 1% for Cholera) during the most recent outbreak?

Yes ☐ No ☐ unknown ☐ Not Applicable ☐

Obs what was the case fatality rate for most recent outbreak? (Observe from outbreak report)

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

Yes ☐ No ☐ unknown ☐ Not Applicable ☐

VII. Feedback

34. Does the District gives written feedback to the lower/higher level in the last year?

Yes ☐ No unknown ☐ Not Applicable ☐

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

35. How many feedback bulletin or reports has the District received in the last year from the higher level? a) 1 b) 3 c) 6 d) 9 E) 12 F) Not received

VIII. Supervision

36. How many times have you been supervised by the higher level in the last 6 months?

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

Yes ☐ No ☐ unknown ☐ Not Applicable ☐

37. Number of Observed appropriate review of surveillance practices in the District in the past 6 month?_____

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

Expected ☐ Achieved: ☐ Not Done: ☐

(Obtain required number of visits from central level)_____

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

Reason 1_____

Reason 2_____

Reason 3_____

IX. Training

40. Number of health personnel (in position of responsibility) trained in disease surveillance? _____

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

40. Number of Health personnel in the District have been trained in surveillance and epidemic management? _____

X. Resources

42. I. Do the District have Important Logistics?

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

43. Data management

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

44. Communication

- ***a.*** Telephone service
- ***b.*** Fax
- ***c.*** B 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.*** Other:

46. Hygiene and sanitation materials

- ***a.*** Spray pump
- ***b.*** Disinfectant

XI. Surveillance co-ordination:

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

Yes ☐ No ☐ unknown ☐ Not Applicable ☐

XII. Satisfaction with surveillance system with surveillance system

48. Are you satisfied with the surveillance system?

Yes ☐ No ☐ unknown ☐ Not Applicable ☐

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

_____

_____

---

50. Opportunities for integration

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

_____

_____

Attributes

a) Usefulness

51. Total population of the district under surveillance_____

52. How many cases and deaths reported in the district from the following disease past 6month?.

a) Malaria cases _____Deaths _____

b) Measles cases _____Deaths _____

53. Does the surveillance system help?

a) To detect outbreaks of these selected priority diseases early? Yes / No

b) To estimate the magnitude of morbidity, mortality and factors related to these diseases? Yes/ No

c) Permit assessment of the effect of prevention and control programs? Yes/ No

b) **Simplicity**:

54. Do you feel that data collections on a case report form are time consuming? Yes/No

55. If yes, how long it takes to fill the format? a, <5 minute b- 10-15minuts c- >15minutes

c) Flexibility:

56. Do you think that the current reporting formats used for other newly occurring health event (disease) without much difficulty? Yes / No

57. Do you think that any change in the existing procedure of case detection, reporting, and formats will be difficult to implement? Yes/ No

If yes, how_____.

d) Data Quality:

49. Are the data collection formats for these priority diseases clear and easy to fill for all the data collectors/ reporting sites? Yes/ No

50. Are the reporting site / data collectors trained/ supervised regularly? Yes/No

If, **Obe:** Review the last months report of these diseases

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

52. Percent of reports which are complete(that is with no blank or Unknown responses) from the total reports _____

e) Acceptability:

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

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

53. **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.

c) Reporting formats are difficult to understand

d) Report formats are time consuming

e) If Others: _____.

f) Representativeness:

54. What is the health service coverage of the district? _____%

55. Do you think, the populations under surveillance have good health seeking behavior for these priority diseases? Yes/ No

56. Who do you think is well represented by the surveillance data? Urban / rural

g) Timeliness:

57. What proportion of health facilities reports in acceptable time? ----------%

h) Stability:

58. Was there lack of resources that interrupt the surveillance system? Yes/No

If yes, how did you manage it?_____

---

59. What do you suggest to overcome such problems?_____

IV. Regional Level Questionnaire

Background Information of the Region/Zone

1. Name of Region/Zone_____
2. Number of Zone/District: _____1. Total_____ 2. Urban_____ 3. Rural_____

I. Availability of a National Surveillance Manual

1. Is there a national manual for surveillance?

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

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

   _____

   _____

   _____

3. Is surveillance/IDSR included in the annual health plan (EFY 2007) of the zone/Region?

   1. Yes 2. No

II. Case Detection and Registration

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

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

5. Did you conduct an active surveillance in the last six months? Yes/ no
6. If yes, how many times……? (Obs: document)
7. Is there a functional RRT at ur institution level**?** Yes/ no
8. What about epidemic committee at regional level? Yes/ no
9. Did all the cases detected by the surveillance get a laboratory test? Yes/ no

III. Data reporting

10. Is the region responsible for providing surveillance forms to Districts/Zones?

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

11. If yes, is there shortage of appropriate surveillance forms at any time during the last 6 months?

    1. Yes 2. No 3. Unknown 4. Not applicable, if yes list————————

12. What are the reporting units for the surveillance system?

    1. Public health facilities

    2. NGO health facilities

    3. Military health facilities

    4. Private health facilities

    5. Others_____

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

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

    Weekly: _____ /12 times the number of Districts

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

14. On time (use national deadlines)

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

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

    1. Yes 2. No

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

    1. Less than 1 hour

    2. 2-24 hour

    3. 1- 2 days

    4. 3- 7 days

    5. After 1 week

17. Means of reporting to next level by:

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

IV. <u>Data analysis</u>

Does the regional level/Zonal Level

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

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

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

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

20. Describe data by time? Observe description of data by time:

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

21. Perform trend analysis? Observe line graph of cases by time

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

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

_____

_____

_____

_____

_____

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

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

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

25. How often do you analyze the collected data?

1. Daily

2. Weekly

3. Every 2 weeks

4. Monthly

5. Quarterly

6. As needed……..

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

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

V. Outbreak Investigation

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

28. List the diseases: _____

_____

_____

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

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

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

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

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

VI. Epidemic preparedness(relevant for epidemic prone diseases)

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

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

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

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

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

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

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

    1. Yes ☐ 2. No ☐ 3. Unknown ☐ 4. Not applicable ☐,if yes list————————

38. Is there a budget line for epidemic response?

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

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

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

40. Does the regional PHEM have a functional task force?(see plan, minutes) Yes ☐ No ☐

41. Does the region/Zone have a rapid response team for epidemic? observe minutes

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

VII. Response to epidemics

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

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

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

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

VIII. Feedback

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

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

IX. Supervision

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

Obtained required number of visits from regional/zonal level _____

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

_____

_____

_____

X. Training

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

48. Have you been trained in disease surveillance?

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

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

_____

_____

_____

XI. Resources

Percent of sites that have:

50. Data management

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

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

51. Communications

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

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

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

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

Email 1. Yes 2. No 4. Unknown 5. Not applicable

52. Budget line——————— and Logistics———————

XII. Surveillance

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

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

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

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

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

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

_____

_____

XIII. Surveillance Co-ordination

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

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

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

_____

_____

Questionnaire for Attributes and level of Usefulness in 2015

59. Total population under surveillance?————

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

S/N	Diseases	2011		2012		2013		2014		2015	
		Cas	Death	Case	Death	case	Death	Case	Death	case	Death

		e									
2	Malaria										
4	Measles										

Level of Usefulness of the Surveillance System for these selected priority diseases

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

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

1. Yes 2. No

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

1. Yes 2. No

3. Permit assessment of the effect of prevention and control programs?

1. Yes 2. No

4. Interventions and diseases trends analyzed

1. Yes 2. No

<u>Describe Each System Attributes</u>:

I. **Simplicity**:

1. Is the case definition of Meningitis, malaria, AFP (polio), neonatal tetanus, Meningitis and measles easy for case detection by all level health professionals?
1. Yes 2. No

2. What are the organizations which need to receive reports of the surveillance data?

3. Do you feel that, data collections for surveillance are time consuming?1.Yes 2.No

4. How long it takes to fill the format? 1. <5 minute 2. 10-15minuts 3. >15minutes

5. How long does it take to have laboratory confirmation of

A. MENINGITIS _____

B. Measles _____

C. Malaria _____

II. **Flexibility**:

1. Can the current reporting formats be used for other newly occurring health event (disease) without much difficulty?

   1. Yes 2. No

2. Do you think that any change in the existing procedure of case detection, reporting, and formats will be difficult to amend?

   1. Yes 2. No

   Comment:_____

   _____

   _____

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

1. Are the data collection formats for these priority diseases clear and easy to fill for all the data collectors/ reporting sites? 1. Yes 2. No

2. Are the reporting site / data collectors trained/ supervised regularly? Yes/No

3. Are there any crosschecking mechanisms for the reported data from lower level?

   1. Yes 2.No

4. Review the last month's report of these diseases

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

   _____

5. What was the report completeness of the region in 2007EFY?_____

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

   _____

   _____

IV. **Acceptability**:

1. Do you think all the reporting agents accept and well engaged to the surveillance activities?

   1. Yes 2. No

2. If yes, how many are active participants (from the expected)? _____

3. If No, what is the reason for their poor participation in the surveillance activity?

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 _____

V. **Representativeness**:

1. What is the health service coverage of the zone/ region? _____%

2. Do you think, the populations under surveillance have good health seeking behavior for these diseases?

1. Yes 2. No

3. Do you think the weekly surveillance report represents all cases in the community/Facility? 1. Yes 2. No

VI. Timeliness:

1. Do u thing all the immediately reportable disease reported as needed? Yes/No
2. What was the timeliness of the region in 2007EFY?————

VII. **Sensitivity** :

1. Do you thing the surveillance system picks most of the reportable disease in the facility/community? 1.Yes 2.No

VIII. **Predictive value positive**:

1. Do you think cases reported on weekly bases are actually true cases? 1. Yes 2. No

IX. **Stability**:

1. Was the new BPR restructuring affect the procedures and activities of the surveillance of these diseases? 1. Yes 2. No

2. Was there lack of resources that interrupt the surveillance system? 1. Yes 2. No

Chapter IV: Health Profile Description Report

4.1. Health profile description of kilte Awlaelo woreda, Tigray region, Ethiopia, Apr, 2015.

Executive summary

Introduction: Most of the districts have unique social, economic, demographic, and geographic characteristics this difference can result in distinctive challenges in terms of health care planning and provision. District health profile seeks to present the health of residents using long-term trends and predictive models, where possible, to aid in decision making for evidence based action. The production of health profile is being guided by both public health and geographical perspectives. And its primary objective is to provide a broad overview of the social, economic, demographic, and geographic health status of the residents provided by their respective health unit, it includes also environmental health reports. Kenya has a total population of 44,900,000(WHO, 2015) with annual population growth rate of 2.6%, total fertility rate of 4.9 %, mean size of 4.2 persons per house hold, 94 U5MR and 55 IMR per 1000 live births, 530 MMR per 100,000, 46 % CPR and 92% ANC (at least one visit). Ethiopia has a total population of 97,000,000(WHO, 2015 report) with 2.6% annual population growth rate, average size of 4.6 persons per house hold, 1:1.05 male to female sex ratio, 46, 31, 59 and 88 PMR, CMR, IMR and U5MR per 1000 live births respectively, 470 MMR per 100,000 reproductive age mothers ,10% skilled deliveries, 29% CPR, 19%ANC(four or more times), 7% PNC and 34% full immunization coverage(for children aged 12-23 month) and 34.5 % CBR.

Methodology: The health profile assessment of the district was conducted on Apr, 2015. A one year(2006E.c) health and health related data was collected by interviewing experts using semi structured questionnaire, reviewing annual reports and by observing available documents and charts posted on the wall. The collected data was also analyzed by using MS-excel 2007 for drawing charts and tables.

Result: the district has 18 rural and 1 urban kebeles with a total population of 125835, of whom women account 50.8% and male to female sex ratio of 1:1.03.The climate of this woreda is woyna dega with average annual temperature of 12-26 oc and annual rain fall of 350-450mm.

Agriculture is the main source of the economy of the district that accounts 94 % followed by 4% and 2% merchants and government employees respectively. From the total area of 1016757.63 hectares, 20,420

hectare is appropriate for farming with 25.2 and 18.2 kuntals average productivity of the land per hectare and annual income per house hold respectively.

The primary education coverage of the district was 90% with 61 primary schools and 3 secondary schools and 49.5% female enrollment. The safe water supply, latrine coverage and presence of HIV club of the schools were 78.25, 92% and 96% respectively. Out of the 22 health facilities 18 (81.8%), 11(50%), 8(22.7%) and 20(91%) of them has access to transportation, safe water supply, electric power supply and telecommunication service respectively. The health service coverage of the district was 80% with 1:25077, 1:7402 and 1:1234 health centers, health posts and total health care workers to population ratio respectively. Respiratory tract infection, other unidentified disease and non-bloody diarrhea were the common causes of outpatient visit in both adults and pediatrics .The full immunization coverage and CPR of the district was 74% and 38 %, lower than the regional average.

Conclusion: Full immunization coverage of the district was 74%. The low contraceptive prevalence rate of the district contributes for the increased number of unwanted pregnancies and this leads to high abortion rate in the district. Respiratory tract infection, other unidentified disease and non-bloody diarrhea were the leading causes of outpatient visit in both adults and pediatrics.

Key words: health profile, District, health indicator, health service coverage,

1. Introduction

Most of the districts have unique social, economic, demographic, and geographic characteristics this difference can result in distinctive challenges in terms of health care planning and provision .District health profile seeks to present the health of residents using long-term trends and predictive models, where possible, to aid in decision making for evidence based health planning, service provision, academic research, public inquiry and inquiry by other stake holders.

The production of health profile is being guided by both public health and geographical perspectives. And its primary objective is to provide a broad overview of the social, economic, demographic, and geographic health status of the residents of the countries served by their respective health unit. It is common knowledge that the health and socio economic well being of the people are fundamentally linked to this natural and built environment in time, the district health profile will include an environmental health report that will outline environmental health indicators such as disease and injury prevalence, health hazard types and trends, food and water safety and other emergent environmental factors that impact human health.

Kenya has a total population of 44,900,000(WHO, 2015) and total area of 582,646 square kilometers with mean house hold size of 4.2 persons (urban=3.1, Rural=4.6, 2008) predominantly dependent on agriculture with strong industrial base. The annual population growth rate of the country was 2.6% similar to Ethiopia as of 2008 with 22% urban residence , 43% and 6.9 % of the total population was , <15 years old and pregnant women 15-49 years old respectively. The health indicators of the country was, U5MR ,94 per 1000 live births, IMR,55/1000 live births, 530 MMR per 100,000, 46 % CPR and 92% ANC (at least one visit) with 4.9 % total fertility rate, according to 2008 WHO report [1] .

Ethiopia has a total population of 97,000,000(WHO, 2015 report) and total area of 1.1 million square kilometers with average temperature of 10 degree Celsius in the high lands to as high as 47 degree Celsius in the afar depression. The average annual population growth rate of the country was 2.6 % in 2007 census with sex ratio of 95 males to 100 females (1:1.05) and average size of 4.6 persons per house hold. The age structure of the selected categories is 47%, 6.2% and 4 % for < 15 years, women 15-49 years and >64 years old respectively, this was also similar with Kenya (according to 2008 WHO report).HEW provides basic prevention, promotion and curative health services to the rural community especially to reduce under five, maternal death and death due to HIV and malaria cases and to increase

immunization and contraceptive prevalence rate coverage through basic behavioral communication. According to 2011 EDHS, access to improved water source, electricity and non-improved toilet facilities was 54%, 23%, 82% respectively with highest coverage in the urban area than rural areas [2].

According to 2011 EDHS report Ethiopia was characterized with 46, 31, 59 and 88 PMR, CMR, IMR and U5MR per 1000 live births respectively. The MMR, skilled deliveries, CPR, ANC(four or more times),PNC and full immunization coverage(for children age 12-23 months) of the country was 470 per100,000 reproductive age mothers, 10% , 29% ,19% ,7% and 34% respectively with 34.5 % CBR(urban-26,rural-36) per 1000 live births .But the above health indicators varies from region to region for example ,the IMR,CMR and U5MR of Tigray region was 59,25 and 83 per 1000 live births respectively in the same year period [2].

Tigray is one of the nine national regional states of Ethiopia, with an estimated 5,128,532 total population in 2006EFY (projected from 2007 census) [3]. The annual population growth rate for Tigray is 2.5% and the total fertility rate is 4.5 children/woman of reproductive age [4].
. The region is administratively divided into 7 Zones, 52 Weredas (34 rural and 18 urban) and 763 Kebeles (702 Rural and 61 Urban). The climate of the region is characterized as 39% kola (semi-arid), 49% woyna dega (warm temperate), and 12% dega (temperate). The annual regional rainfall ranges from 450 to 980mm. The region is located at an altitude of 550(Tekeze -3935(Ksad Gudo Mountain) meters above sea level [3].
Public health care services in Tigray are delivered through 1 specialized hospital, 15 general hospitals, 20 primary hospitals, 204 health centers and 712 health posts. The region has demonstrated its emphasis on disease prevention and health promotion through investment in primary health care unit or PHCU (health post, health center, and primary hospital) facilities, achieving primary healthcare coverage of 91.7% on average [**5**].
The contraceptive prevalence rate (CPR), ANC 1st visit, ANC 4th visit, and postnatal care of the region was 57.5%,100%,56% and 71.2% respectively, with 59.2% skilled delivery [3].

2. Rationale of the study:

Health profile is important for prioritizing health program and health related problems of the community at all levels. In our country, writing health profile it is not familiar or common at ,especially at district level, even though it is basic for planning and for appropriate intervention; and is an entry point for

operational research. As we know many Stake holders were working on health in the country, Ethiopia as well as the region, Tigray and they may need compiled health and health related issues, health profile but due to lack of this information they made their project intervention haphazardly.

Therefore this health profile used to access compiled health and health related issues of the district for planning, prioritizing health program and health related problems, and also used for comparing the district performance with the regional health profile/performance.

3. Objective

3.1. General objective

To assess and describe health status, health indicators of the district ,and to identify problems for priority settings, Klte Awlaelo ,Tigray ,Ethiopia, Apr,2015.

3.2. Specific Objective:

- To assess health and health related indicators of kilte Awlaelo district.
- To describe existing health system of the district.
- To assess primary health care coverage of the district.
- To describe endemic diseases as well as its control and prevention program in the district.

4. Methodology:

4.1. Study area:

Wukiro kilte Awlaelo is one of the 9 woredas of the eastern zone of Tigray a distance of 45 km from mekelle, capital city of Tigray region, with a total projected population of 125,835 as of 2007 E.c and 100% physical health service coverage .

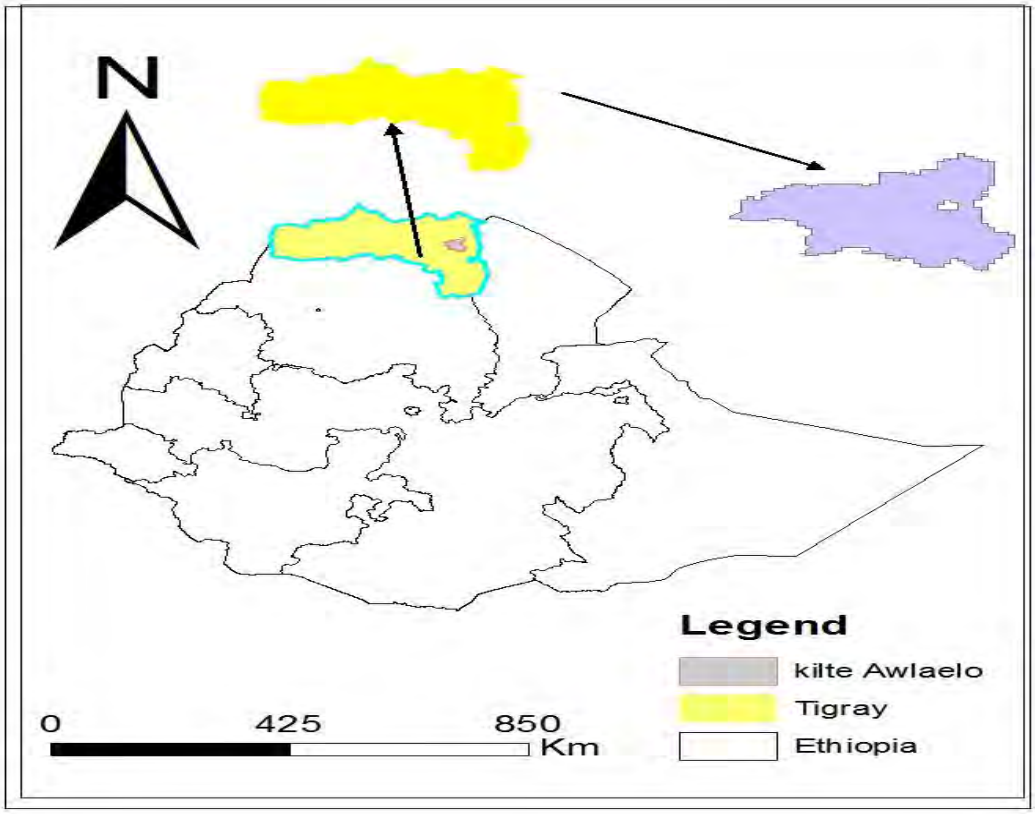

Figure 4.1 Shows map of Klte Awlaelo District, Tigray, Ethiopia, April, 2015**.**

4.2. Study period

A one year data of the district health profile assessment was conducted, but we used two or three year's data for some health indicators for comparison.

4.3. Data collection Procedures and Instruments:

The health profile proposal was submitted for mentors and field supervisor and finalized by incorporating the comments. An official letter was written mainly to the woreda health office by the regional health bureau for getting permission for the health profile data collection. The health profile data was collected from different sectors of the district such as woreda Health office, woreda planning

office, Education office, agricultural office, Woreda Administrative office, and Regional health bureau annual reports.

The data was collected by a semi-structured questionnaire through face to face interview to responsible persons, experts and heads, by reviewing records, observing the annual reports and health indicators of the district that posted on the wall.

4.4.Variables

Dependent variables	Independent variables
• Health service delivery • Maternal and child health • Top ten disease • Occurred disasters and outbreaks	• Health professionals • Health facilities • Sanitation facilities • EPI coverage

4.5. Data management and analysis plane

The collected data was cross checked, cleaned and entered in to a computer and analyzed using MS-excel, 2007 and finally written by MS-word, 2007.

5. Results

5.4. **Historical aspect of the area**.

Woreda at a glance: Wukiro kilte Awlaelo is found in the eastern zone of Tigray a distance of 45 km from mekelle, capital city of Tigray. The name was given due to the reason that there were two wukiro kebeles in the district when the woreda was declared administratively as an independent woreda since 1987 E.c.

Abrha We Atsbha and Nejash are the two religious historical places found in the woreda and visited by many tourists. Abrha we Atsbha was found in the 4th century and responsible for the Orthodox Church, Nejash mosque was also built in the 5th century by profit Mohamed it is believed as the first place for Islamic religion.

5.5. Geography and climate

Wukiro kilte Awlaelo is one of the 9 woredas of eastern zone of Tigray region which is located 45 and 832 km far from mekelle, capital city of Tigray region, and Addis Ababa, capital city of the country, Ethiopia, respectively. Its topographic features range from 1980-2300 meters above sea level, the climate varies from cold season of rain fall (Jun-Aug) to temperate season of 9 months with annual rain fall 350-450mm, and annual temperature of 12-26 oc. The total area of the woreda is 1,016,757.63 hectare from this 20,420(0.2%) hectare is suitable for agriculture, 30,758(3.0%) hectare is covered naturally, 16,459 (1.6%) hectares is protected from animal and human contact, 7867.85 hectare is used for grazing, and the remaining is for residence, neighbors and other purposes.

6.3. Administrative setup

The woreda has a total of 19 administrative kebeles with 18 rural and one urban kebeles. The woreda is bounded by; Enderta to the south, saesea tsaeda emba to the north, Hawzen and D/Tenben to the west and Atsbiwenberta to the east. The woreda office for all sectors is found in Wukiro ketema, center of the administrative kebeles. Each sectors of the woreda are responsible to support and manage the overall activities of their respective sectors with defined roles and responsibilities. For example the woreda health office conducts regular supportive supervision, reports to upper level and controls every activity of the district health facilities.

6.4. Demographic information

According to the regional conversion factor the estimated (projected) total population of the woreda as of, 2007 EFY is 125835 based on the 2011 national census from those female accounts 50.8 %(63924) with male to female sex ratio of 1:1.03 similar with 2011, national census of Ethiopia, i.e. 1:1.05(EDHS, 2011).The total live births of the woreda were 3901 with annual population growth rate of 2.5.

Age structure: Under one year population 3662(2.9%), under-5 year population 18732(14.9%), under 15 year population ,54,989 with 43.4% relative frequency, ≥ 64 years population 6520(5.2%) .The total number of women in child bearing age (i.e. women 15-49 years of age) was 29546(23.5%), with an average of 6623 population and 4.4 persons per kebele and house hold respectively. Even though there are different religious followers in the woreda but there was no available data by religion at the time of data collection.

Table 4.1 Shows the population size (estimated from 2011 census) and number of households of kilte Awlaelo district, Tigray, Ethiopia, Apr, 2015.

S/No	Name of kebele	Population size			Number of house hold
		Male	Female	Total	
1	Agulae(urban)	2639	3214	5853	1330
2	Myweini	3226	3109	6335	1440
3	Hadnet	3426	3426	6852	1547
4	Debrebirhan	2684	2674	5358	1218
5	Kihen	2840	2887	5727	1302
6	Mesanu	3333	3560	6893	1567
7	Nejash	4393	5050	9443	2146
8	Gemad	2436	2475	4911	1116
9	Tahtay A/sindad	5210	5474	10684	2428
10	Laelay A/sindad				
11	Tsaedanaele	2243	2335	4578	1040
12	Abrha Atsbha	2582	2765	5347	1215
13	Aynalem	4271	4379	8650	1966
14	Hayelom	4419	4433	8852	2012
15	Genfel	3331	3731	7062	1205
16	Gulle	2145	2228	4373	994
17	Tsigereda	3910	4170	8080	1336
18	Myquiha	4233	4377	8610	1957
19	D/tsion	4073	4150	8223	1869
Total				125835	28588

6.5. Economy (main stay of the economy, average income levels, etc)

Agriculture is the main source of economy in the woreda that accounts 94 %, followed by 4 % and 2 % merchants and government employees respectively. The average productivity of the land was 25.2 kuntals per hectare, with average house hold income of 18.6 kuntals/year. Bakella, Barley, wheat, teff, sorghum, atter are the widely and commonly cultivated crop products in the woreda. From the total area of 1016757.63 hectare, 20,420 hectare is appropriate for farming but only 19290(94.5%) hectare was covered by crops, cereals, vegetables and fruits up to 2006 EFY. 7,524.50 hectare was cultivated and covered by irrigation up to 2006 E.c. The total average GDP from agriculture of the woreda was 485,743kuntal/year in 2006.

6.6. Education and school health

The woreda has a total of 64 schools from those 61 were primary schools and 3 were secondary schools with a total enrollment of 29440 students as of 2006E.c, 49.5% were females. The primary education coverage of the district was 90 % but there were no preparatory schools and TEVET/college in the woreda .The safe water supply and latrine coverage of the schools was 78.5% and 92 % respectively. 96% of the schools have HIV club.

6.7.Facilities (transportation, telecommunication, power supply …)

Out of the 22 health facilities 18 (81.8%), 11(50%) and 8(22.7%) of them has access to transportation, safe water supply and electric power supply respectively. Of the 22 health facilities, 20(91%) of them has access to telecommunication. The average distance from the woreda office (found in Wukiro town) to each health facilities ranges from 5-37 kms.

6.8.Health delivery system

6.8.1. District health structure /organogram

The organizational structure of the woreda health office is as shown below; as we can see there were four core processes under the district health office.

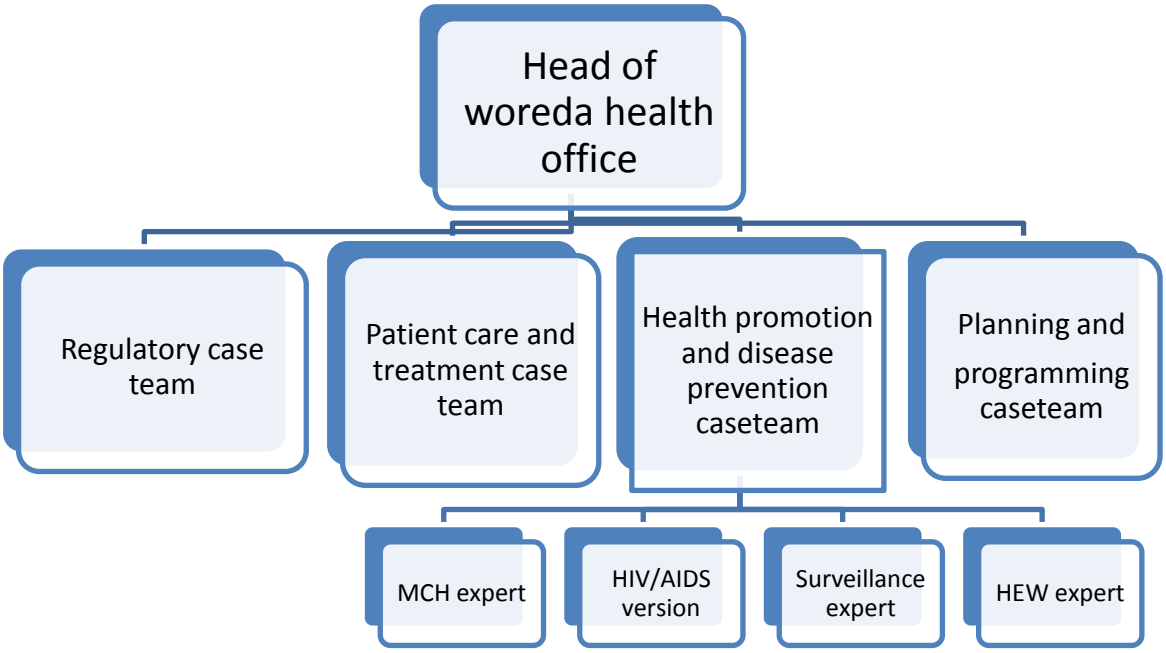

Figure 4.2 **Organizational Structure of Klte Awlaelo district health office, Tigray, Ethiopia, Apr, 2015**

6.8.2. Health Facilities

The potential health service coverage of the district was 100%.The number of health care facilities to population ratio was as shown below.

Table 4.2 Shows the number of health care facilities to population ratio of kilte Awlaelo district, Tigray, Ethiopia, Apr, 2015**.**

Type of health institution	Number HFs	Health institution to population Ratio(coverage %
Hospital	0	0:125835(0)
Health center	05	1:25077(99.7%)
Health post	17	1:7402(67.5%)
Private clinic	3	1:41945

Rural drug vendor	4	1:31459
Physical health service coverage		100%

6.8.3. Human resource for health institutions and district health office.

Table 4.3 Shows the required and available number of health care personnel to population ratio of wukiro kilte awlaelo district, Tigray, Ethiopia, Apr, 2015.

Profession	Total Filled number	Required(Sanctioned)	Qualification	Health workers :population ratio
Physician	0	0		0:125835
Health officer	4	10		1:31459
Nurse	45	54	1-BSC	1:2796
Midwife	4	15		1:7387(15-49 female pop/n)
HEW	28	44		1:4494
Laboratory	8	15	2-BSC	1:15729
Pharmacy	10	12	2-BSC	1:12584
Environmental health	3	8	BSC	1:41945
Total health care professionals	102			1:1234

6.8.4. Top ten causes of OPD visit (Morbidity)

Since any of the health facilities doesn't have inpatient service there were no recorded data on the ten top causes of adult and pediatric admission and mortality in the woreda health office during the data collection period.

Table 4.4 Ten top causes of morbidity (outpatient visit) of Klte Awlaelo, Tigray, Ethiopia, Apr, 2015.

S/No	Adult	Under five

	Disease classification	Number(Relative frequency)	Disease classification	Number(Relative frequency)
1	Acute upper respiratory tract infection	4286(20.8%)?	Non-Bloody diarrhea	1423(27.4%)
2	Other unspecified disease	3375(16.3%)	Other unspecified disease	882(17%)
3	Dysphasia	2961(14.3%)?	Acute URTI	847(16.3%)
4	Non-Bloody diarrhea	1841(8.9%)	Pneumonia	573(11.0%)
5	Disease of musculoskeletal system and connective tissue	1810(8.8%)?	Infection of the skin or subcutaneous tissue	455(8.8)
6	Infection of the skin or subcutaneous tissue	1793(8.7%)	Disease of eye and adynexia	335(6.5%)
7	Trauma	1461(7.1%)	Diarrhea with blood(dysentery)	221(4.2%)
8	Disease of eye and adynexia	1117(5.4%)	Acute febrile illness	171(3.3%)
9	Other unspecified infection or parasite	1058(5.1%)	Other unspecified disease of the skin or subcutaneous tissue	171(3.3%)
10	Pneumonia	952(4.6%)	Trauma	114(2.2%)
Total		20654(100%)		5192(100%)

Source; District HMIS data

6.8.5. Vital statistics and health indicators

Data on the following indicators was found from 2006 EFY annual report and 2007 EFY estimated population of the woreda health office (projected from, 2011 census).

Table 4.5 Shows vital statistics and health indicators of the woreda heath office, Tigray, Ethiopia, Apr, 2015**.**

S/No	Parameter	Number (relative frequency)	Remark
1	Total population	125835	
2	Male	61911(49.2%)	
3	Female	63924(50.8%)	
4	<1 years old	3662(2.91%)	
5	<5 years old	18372(14.6%)	
6	<15 years old	54,989(43.7%)	
7	Women in child bearing age (15-49 years)	29545(23.5)	
	Non-pregnant females	25293(20.1%	
	Pregnant females	4278(3.4%)	
	Total skilled deliveries	2517(97.9%),Total delivery=2571	472(18.8%) were by referral to other health facilities, House delivery-54(2.1%) 2006 EFY report
	Total maternal deaths	5	MMR=5/29545(17/100,000
8	Number of live births	2043	2006 EFY report
9	Number of Still births	17	2006 EFY report
10	Average house hold size	4.4	
11	Dependency ratio	95.6%	
12	PMR	No data	
13	IMR	No data	
14	Child MR	No data	
15	U 5 MR	No data	
16	CBR	No data	
17	CDR	No data	

6.8.6. District health budget allocation

Total budget allocation of the woreda health office from 2005-2007 EFY was as under**.** As we can see from the graph below the 2007 EFY health budget was low as compared from 2005 & 2006EFY.

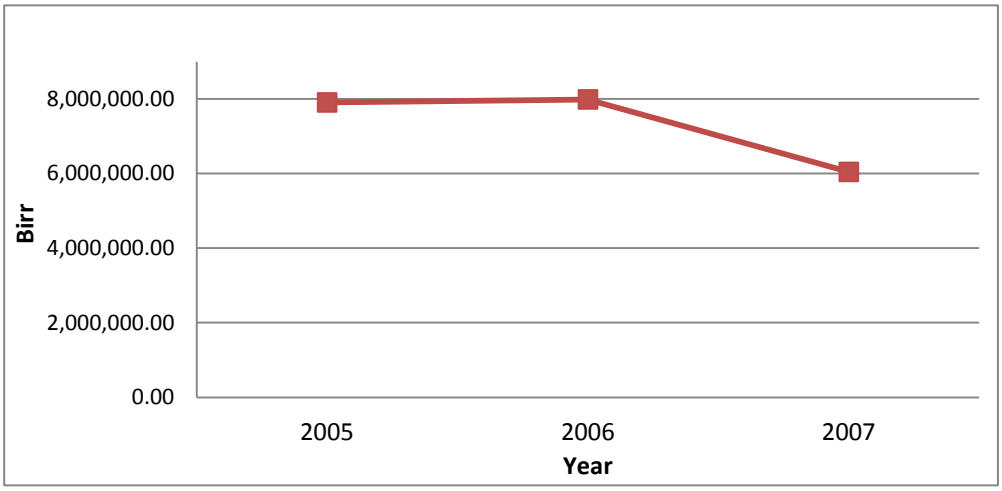

Figure 4.3 Shows three years district health budget allocation, Tigray region, Ethiopia, 2007 EFY**.**

6.8.7. Disaster and outbreak situation in the woreda

There was no any disaster situation and outbreak occurred since the last year.

6.8.8. Community health services

There were a total of 709 developmental armies in all kebeles of the woreda that mainly supports the maternal and child health: environmental sanitation like Latrine and hand washing coverage and utilization. The HEWs are responsible for the 16 health extension packages set by the Ethiopian FMOH mainly to improve maternal and child health by increasing immunization, ANC, PNC and CPR coverage of the community.

6.8.9. Status of primary health care components –with focus on the eight PHC elements.

6.8.9.1. MCH, EPI and Family planning

MCH

The ANC, PNC, CPR, TT2 (pregnant) and TT2 (non-pregnant) coverage were 91%, 66%, 38%, 95% and 90% respectively.

Immunization coverage

Measles immunization was 71% below the recommended one, 85% (measles efficacy), the full immunization coverage was 74%.There were no data concerning polio, penta-2 and PCV vaccine coverage during the data collection period.

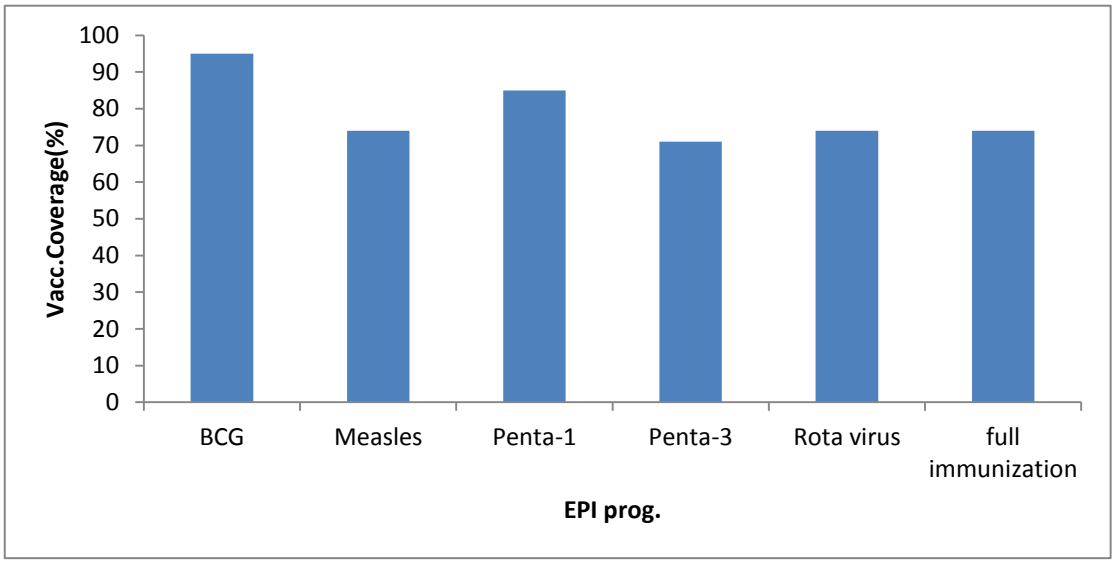

Figure 4.4 Shows immunization coverage of the district health office, Tigray, Ethiopia, 2007 E.c.

6.8.9.2. Environmental sanitation and hygiene

There was WASH program in the woreda with the support of EU/UNICEF/Government of Ethiopia, goal; to serve 1.5 million people in 78 woredas and also 156 schools in the country to accelerate progress towards MDG on water and sanitation service.

Table 4.6 Shows environmental sanitation and hygiene coverage of the district, Tigray, Ethiopia, 2007 E.c.

Description	Coverage (%)	Remark
Latrine coverage	92.6	

Latrine utilization rate	88	
Safe water supply	72.7	
No of kebeles with safe water supply access	16	

6.8.9.3. Health Education

There is health education program in the schools; community and health centers. Health extension workers are responsible for the health education program in the school and community targeting on the 16 health extension package programs, like environmental sanitation; family planning; malaria; HIV AIDS ; nutrition and training ,support and follow up for households etc to achieve MDG goals. Health education on HIV/AIDS were given for 59885 persons since 2006 EFY.

6.8.9.4. Endemic Disease

Malaria:

There are 16 malarious kebeles with 43,650 populations at risk in the woreda. The ITNS coverage was 87% from those 76 % households use ITNS properly (utilization rate). According to 2006 E.c malaria report there were a total of 1997 malaria cases with 320(16.0%) confirmed cases with no reported death but there was no data by age and sex .The low number of malaria confirmed cases is because of supply shortage of RDT in the health posts. The incidence rate of confirmed malaria was 7.3/1000, 2006 EFY.

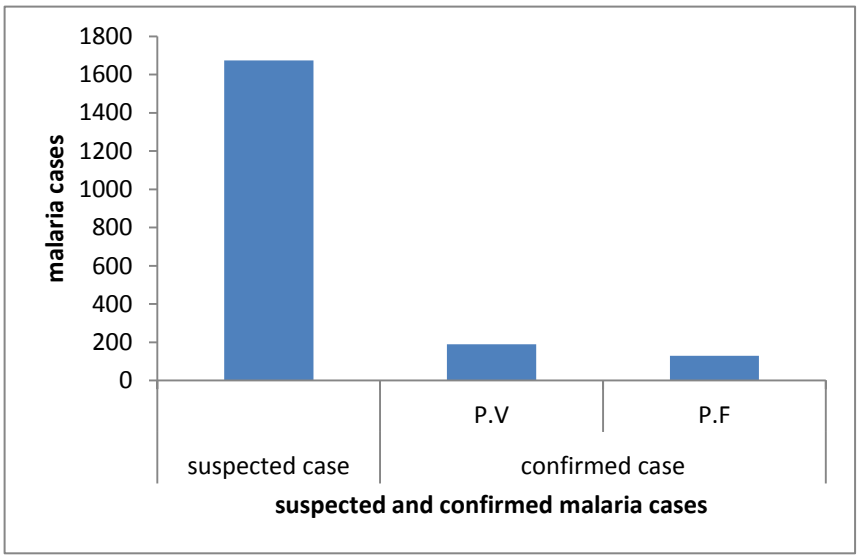

Figure 4.5 Number of Suspected and Confirmed Malaria cases in 2007EFY, Klte Awlaelo, Tigray, Ethiopia, Apr, 2015.

TB/Leprosy

A total of 92 TB cases were registered with 9 extra PTB and one death. All of the TB cases were screened for HIV with 4 (4.3%) positive results. There were no data on PTB negative, PTB positive, TB detection rate, TB Rx completion rate, TB Rx cure rate and TB Rx success rate. There was no registered leprosy case in the woreda in 2006 EFY.

HIV/AIDS:

There are a total of 348 persons living with HIV/AIDS, 252 (72.4%) are females. From the total persons livings with HIV/AIDS 140(40.2%) were on ART. There is only one ART site in the district. The prevalence and incidence of HIV in the district, since 2006 EFY was 0.28% and 0.04%respectively. As shown below there is no data by age and sex on the total HIV tested persons on 2006 EFY.

Table 4.7 Shows proportion of HIV positives among total HIV tested individuals of the district, Tigray, Ethiopia, 2007 E.c

Descriptions	Total HIV tested	Negative	Positive	2006 EFY % achievement
Total HIV tested	20007	19961	46	74%
PMTCT	2925	2915	10	70%
VCT+PIHCT	17082	17051	31	113%
Partner testing	1612	1607	5	39%

Nutrition:

There were OTP and CBN program in all the health facilities and kebeles respectively. There were a total of 278 and 120 admissions to OTP in 2006 and 2007 (8-month report) EFY respectively. Even though there were PSNP program in all the kebeles but there were no OTP and TFU sites in all the health facilities in the district .There were a total of 624 and 117 moderate and severe acute malnutrition

cases in the six month period of 2007 EFY respectively. From the total of weighted 2736 <2 years children in 2006 EFY, 1589 and 165 were under weight and severe underweight respectively with a relative frequency of 64.1 % of the total underweight <2 years children.

Essential drug shortage

TTC, RDT and Anti-retroviral treatment drugs were the main supply shortage in 2006 EFY.

6. The major health problem of the district;

Even though the incidence of disease varies among adults and pediatrics, respiratory tract infection, other unspecified disease and non-bloody diarrhea were the most common disease of the district.

7. Limitations

- ✓ Since there was no culture and tourism office in the woreda information on the two commonly known historical places (Abrha we Atsbha and Nejash) was limited.
- ✓ Due to the absence of inpatient service in all of the health facilities there was no recorded data on the ten tope causes of admission and death in the district health office.
- ✓ Since there was no recorded data on vital statistics mortality measures, PMR, IMR, CMR, U5MR and CDR of the district was not measured.
- ✓ There was no documented data for TB cases and their outcomes.

8. Discussion

Kilte Awlaelo has a total area of 1,016,757.63 hectares, from this 30758(3%), 20,420(2%), 16459 (1.6%) and 7867.85(0.8%) is covered naturally, by agriculture, free of human and animal contact and for grazing purpose respectively. The annual income from agriculture in the year, 2006 E.c was 485,743 kuntals and the average productivity of the land was 25.2 kuntals per hectare with an average income of 18.6 kuntals per house hold per year but malnutrition was a major health problem of the district 741 sever and moderate malnutrition cases per six month in 2007 E.c and 1754(64.1%) underweight children <2 years age in 2006 E.c, were registered this figure is higher as compared to the national, 38 % underweight for under 5 children, according EDHS,2011 [2]. This may be due to poor feeding practice of the community.

The annual population growth rate of the district was 2.5 similar with population growth rate of the region as well as the country, Ethiopia, 2.5 [2]. The male to female sex ratio of the district was

1:1.013(97 males per 100 females) this is also parallel with the national sex ratio i.e. 95 males per 100 females (1:1.05), according to 2011, EDHS report [2].

The national standard for health facility to population ratio is (1HC:25,000, 1HP:5,000 and 1HEW: 2,500 population), the health service to population ratio of the district was 1:25077(99.7%), 1:7402(67.5%) and 1:4494 (55.6%) for health centers, health posts and health extension workers respectively and this is low when we compared to the national standard .The health work force coverage (Health professional to population ratio) of district was,1:4494,1:31459,1:2796,1:7387,1: 1:15729 and 1:12584 for HEWs, Health officers, Nurses, Midwifes, Laboratory and Pharmacy professionals respectively. This was lower than the regional coverage, 1:3799, 1:8996 and 1:1648 HEWs, Health officers and Nurses respectively, [4]. The total health care worker to population ratio of the district was 1:1234 this is lower than the regional average and national standard.

Respiratory tract infection was the leading cause of outpatient visit followed by other unspecified disease and non-bloody diarrhea. Even though, the environmental sanitation and hygiene coverage and utilization rate of the district was high but diarrheal diseases were among the ten top causes of morbidity in all age groups in the district, this needs house hold survey to verify the coverage.

Full immunization coverage of the district was 74 in 2006 EFY and 84% in 2007 EFY, and the regional full immunization coverage was 90%, higher than the district [5].

The incidence of HIV/AIDS was higher among females than males and the prevalence of HIV/AIDS of the district was 0.3% that is lower than, the national prevalence of HIV, 2.4% and the rural prevalence of HIV, 0.6% [2].

Contraceptive prevalence rate of the district was 38%, lower than 58% and 66% of the regional coverage and 2015 MDG goal of the country respectively [4]. Due to this low coverage of contraceptive prevalence rate there was high incidence of unwanted pregnancies that leads to high abortion rate in the district. ANC 1st and post natal care coverage of the district was 91% and 66% respectively, lower than the regional coverage, that was 100% and 71.2 % respectively [4].

Even though institutional delivery is increasing from time to time in the district, but there were five maternal deaths in the district with 17/100,000 MMR in the year, 2006 E.c that accounts for 4.3 % of the regional total maternal death (116 deaths) in the same year period, of the total maternal deliveries 18.8%

were referral deliveries, outside of the district health institutions. According to 2007 EFY district annual report, Still birth rate was 0.7 %(7/1000 births), the regional still birth rate was 1.9(19/1000 births), higher than the district [5].

9. Conclusion

The average health facility service coverage of the district was 83.6 %(for HCs &HPs) lower than the desired national standard with only one ART site and no inpatient service in addition to the shortage of health care professionals like HEW, midwifes, HO and lab personnel etc.

The environmental sanitation and hygiene coverage and utilization rate of the district was high but diarrheal diseases were among the ten top causes of morbidity in all age groups in the district.

The low contraceptive prevalence rate of the district contributes for the increased number of unwanted pregnancies that leads to abortion. Since malnutrition is a major health problem of children under 5years age, the community awareness on feeding practice must be improved by health education.

10. Recommendation

- The HEW workers should create more awareness on latrine utilization and creating open defecation free community by mobilizing schools and development armies as their primary target to decrease diarrheal and eye disease, those diseases were among the ten top causes of morbidity in adults and under five children.
- The district health office, Tigray regional health bureau, FMOH and all responsible governmental and NGO needs to increase the health service coverage by constructing additional health facilities, expanding ART sites and increasing the number of health care professionals as to the required standard ,especially the HPs and HEWs to improve the health of the community.
- The district health care workers must need to create awareness on contraceptive use and consequences of abortion, to increase contraceptive prevalence rate by targeting schools and women development armies to have good family plan.
- The district health office must record all health indicators, especially IMR, CMR, U5MR, and CDR for prioritizing resources and future planning.
- Document all PTB cases with their outcome as the national standard.

- Even though malnutrition is a major health problem of children under 5 years of age in the district it was not listed in the ten top causes of morbidity in pediatrics. In addition to the creation of awareness on feeding practice for mothers, the district needs to have TSF and TFU programs by communicating with partners that have focus on this specific area of interest due to the high burden of malnutrition in the community.

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Annex: 4.1

4.1.Health profile checklist:

Region_____Zone_____Woreda_____Respondant_____Intervie wer_____

1. **Historical back ground of the area**

1.1Establishment time of the area as woreda_____

1.2 Name of historical places_____

1.3 Historical Nomination_____

2. Population and demography

2.1. Total population of the woreda _____Male _____Females____

2.2. M to F Ratio_____

2.3. Ethnic composition_____

2.4. Population density_____

2.5. Total live births _____

2.6. Under one year population_____

2.7. Under five year population_____

2.8. Reproductive year female population_____

2.9. Annual growth rate_____

2.10. Religion:

Orthodox_____

Muslim_____

Protestant_____

Catholic _____

Others_____

3. Geographic and climate condition

3.1. Square km of the area_____

3.2. Location of the district from capital of the region_____

3.3. Boundaries_____

3.4. Altitude of the area_____

3.5. Latitude of the area_____

3.6. Longitude_____

3.7. Annual Rainfall _____Main rainy season_____

3.8 .Annual Temperature _____

3.9. Maximum temp_____

3.10. Minimum temp_____

4. Political and administrative organization

4.1Number of Kebeles (Urban)____(Rural)____Total _____

4.2 Number of Kebeles with transportation access_____

4.3 Number of Kebeles without transportation access _____

4.4 Number of Kebeles with electric power _____

4.5 Number of Kebeles without electric power_____

4.6 Number of kebeles with telephone service (cable based/wireless_____

4.7 Number of Kebeles without telephone service_____

4.8 How many supporting NGOs are in the area _____

4.9 Ruling political party _____

4.10 Bank_____

5. Productivity and income

5.1 main base of economy _____

5.2 Average income level_____

5.3 part of the population (%) whose economic source is from

a) Farming _____

b) Animal production_____

c) Trade _____

d) Government employee (salary**)** _____

e) Others_____

5.4. Productivity of the land/hectare _____kuntals/hectare

5.5. Common crop products_____

5.6. GDP (during harvesting season/ meher) _____kuntals

5.7. GDP from irrigation_____kuntal

5.8 .Total GDP_____kuntals

5.9. Employment rate & unemployment rate_____

6. Water supply

6.1. Source of water_____

6.2. Number of pipe water supply_____

6.3. Is there chlorination of water_____

6.4. Frequency of chlorination_____

7. Education

7.1. Number of enrolled elementary schools (male and female)_____

7.2. Number of enrolled secondary schools (male and female)_____

7.3. Number of colleges/universities total number of students_____

7.4. Number of teachers at elementary_____ secondary_____ and colleges/universities_____

8. **Social situation:**

8.**1.** Number of libraries_____

8.2. Number of NGO working on public health_____

8.3. Number of youth clubs_____

9. Health service institutions and infrastructure

S.NO	Type of health institution		No of institutions
1	Nu -	with sustainable/ 24 hour /electric power	

		without sustainable/ 24 hour /electric power	
		with telephone service(cable based/mobile)	
		without telephone service (cable based/mobile)	
		with piped water supply	
		Without piped water supply	
2	Number of Health Centers	with sustainable/ 24 hour /electric power	
		without sustainable/ 24 hour /electric power	
		with telephone service (cable based/mobile)	
		without telephone service (cable based/mobile)	
		with piped water supply	
		Without piped water supply	
3	Number of Hospitals		
4	Number of Health centers		
5	Number of Health post		
6	Number of private clinics		
7	Number of Pharmacies		
8	Number of Drug vendors		
9	Number of Diagnostic laboratories		
10	Hospital to population ratio		
11	Health center to population ratio		
12	Health posts to population ratio		
13	Physical health service coverage		

9.14. Top 10 diseases of morbidity and mortality in adult OPD:-

Morbidity cases			Mortality cases		
Rank	Diseases	%	Rank	Disease	%
1			1		

2			2		
3			3		
4			4		
5			5		
6			6		
7			7		
8			8		
9			9		
10			10		

9.11. Top 10 Diseases of morbidity and mortality in under 5 OPD:-

Morbidity cases			Mortality cases		
Rank	Diseases	%	Rank	Disease	%
1			1		
2			2		
3			3		
4			4		
5			5		
6			6		

7			7		
8			8		
9			9		
10			10		

10. **Health staff to population ratio:**

Health officers_____

Nurses_____

Medical lab_____ Pharmacy_____ Environmental _____

Health extension workers_____

Other_____

11. Vital statistics and health indicators

S. No	Indicator	Rural	Urban	Total
1	Under 5 population			
2	Productive age female (15-49 years)			
3	Pregnant women			
4	Live births			
5	Total fertility rate			
6	Crude birth rate			
7	Crude death rate			
8	maternal mortality rate			
9	Child mortality			
10	Under 5 mortality rate			

11	Infant mortality rate			
12	Dependency ratio			
13	Average household size			

12. Maternal health coverage

S.No	Type of service	Coverage (%)
1	Antenatal care (ANC) Coverage (%)	
2	Contraceptive acceptance rate (CAR (%))	
3	Contraceptive prevalence rate (CPR (%))	
4	Post natal care (PNC) Coverage	
5	Proportion of delivery attended by skilled personnel	

13. Endemic disease

A) Tuberculosis

S. No	Cases	Number		
		male	female	total
1.	TB case detection rate			
2.	TB treatment success rate			
3.	TB treatment cure rate			
4.	Defaulters			

b) MALARIA

S. No	Malaria cases		Adult		Under 5		Preg.	Total		M + F
			Male	Female	Male	Female		M	F	
1	Confirmed malaria cases	PF								
		PV								

		Mixed								
2	Admission cases due to malaria									
3	IRs coverage	Urban								
		Rural								
4	Households with at least one LLIN	Urban								
		Rural								

c) HIV/AIDS

HIV prevalence_____

HIV Incidence_____

VCT_____

PMTCT_____

ON ART_____

PITC_____

14. DISASTERS AND OUT BREAKS OCCURRED, immediately reportable disease

14.1 Were any disasters occurred in these years_____?

14.2 If Q.14.1 is yes list the name

_____

_____

_____

14.3 Which of the above mentioned disaster(s) was (were) Happened more than once?

_____

_____

14.4 How many out breaks occurred in the last 5 years_____

(List_____

14.5 Which of the above mentioned out break(s) was (were) occurred more than once?

_____

_____

15. **Nutrition, food shortage**_____

Healtheducation_____

Health budget allocation

_____Essentia

ldrugsandothersupplies_____

_____

16.**Discussion of the highlights and the main findings of the health profile assessment and description**

_____

_____

_____

Chapter V: Scientific Manuscripts for Peer Review Journals

5.1. Malaria Outbreak Investigation in Asgede Tsimbla Woreda, Tigray, Ethiopia, Mar 1-10, 2016

E.Gebreegziabher (BSC) [1], I. Hussein (BSC) [2], N. Dayissa (MD, MPH, PHD) [3], M. Gizaw (BSC, MPH) [4]

Abstract

Introduction: About 3.2 billion people were at risk of malaria and the disease killed about 584 000 people in 2013, the burden is heaviest in the WHO African Region. In Ethiopia, 68% of the population lives in malaria endemic areas, and malaria was the leading cause of outpatient visits and health facility admissions during 2009/2010. We investigated malaria outbreak in Asgede Tsimbla to describe, and to identify source and risk factors of the outbreak.

Methodology: We investigated malaria outbreak in Asgede Tsimbla woreda from 1-10 Mar, 2016 using descriptive cross-sectional followed by unmatched case-control study design. We recruited 50 cases and 100 controls. Data entry and cleaning was conducted by using Epi Info 7.1.6 and exported to SPSS 21 for analysis.

Result: We identified a total of 745 malaria confirmed cases with 22.2 incidence rate per 1000 population and 40 % positivity rate (68.7% , P.F) in Asgede Tsimbla district from Jan, 25-Feb, 07, 2016. The outbreak affected six kebeles (22.2 %) of the district. The attack rate ranges from 16.4 to 28.4 per 1000 population by kebele. Majority (58.7%) of the cases were males .The median age was 19 years (range; 3mon-85yrs), ASAR ranged from 7.3 in >=60yrs to 25.2 in 15-59yrs age groups per 1000 population respectively. Stay inside home in the evening, AOR 0.16 (95%CI; 0.06-0.47) and sleeping under net always, AOR 0.13(95%CI; 0.05-0.3) were protective factors. Presence of sick patient in HH, AOR 4.7 (95%CI; 1.8-11.8), breeding sites, AOR 5.7(95%CI; 2.2-14.5) and intermittent rivers, AOR 3.9(95%CI; 1.5-10.3) was independent risk factors.

Conclusion: Presence of malaria breeding sites and malaria sick patient in HH were independent risk factors for the outbreak. The erratic rain fall due to El Nino and low coverage and utilization of vector control measures were responsible for the malaria outbreak. Scaling up key anti malaria interventions and utilization of the existing ones were among the recommendations.

Key words: malaria, outbreak, Asgede Tsimbla, risk factors

5.1.1. Introduction

Malaria is caused by parasites of the Plasmodium family and transmitted by female Anopheles mosquitoes. There are four different human malaria species (P. falciparum, P. vivax, P. malariae and P. ovale), of which P. falciparum and P. vivax are the most prevalent and P. falciparum the most dangerous [1].

Malaria is almost always transmitted by the bite of an infective female Anopheles mosquito. Incubation period varied 12 days for P. falciparum and 14 days for P. vivax. Fever, Headache, vomiting, diarrhea, muscle pains, abdominal pain, anorexia, chilling and shivering, sweating, rigor are among the common clinical features of malaria during the acute attack [2]. Altered consciousness, prostration, unable to eat or drink, repeated vomiting, severe dehydration, convulsion, difficult breathing, anemia (pallor) and bleeding are among the severe complications from malaria, and Severe and complicated malaria is mostly caused by P. falciparum infection [3]. Sleeping/staying outside home, presence of malaria case in HH, travel history to malaria endemic areas, sleeping without ITNS, HH with no IRS spray, presence of mosquito vectors/breeding sites around home or vicinity, are among the risk factors for the disease [3].

Despite being preventable and treatable, malaria continues to have a devastating impact on people's health and livelihoods around the world. According to the latest available data, about 3.2 billion people were at risk of the disease in 97 countries, territories and areas in 2013, and an estimated 198 million cases occurred and the disease killed about 584 000 people during the same year, The burden is heaviest in the WHO African Region, where an estimated 82% and 90% of all malaria cases and deaths occur in Africa respectively, mostly children aged under 5 years in sub-Saharan Africa [4].

In Ethiopia, approximately 52 million people (68%) live in malaria-endemic areas, chiefly at altitudes below 2,000 meters. Malaria was the leading cause of outpatient visits and health facility admissions, accounting for 14% of outpatient visits and 9% of admissions in the country during 2009/2010 [5]. According to 2011 MIS report, the parasite prevalence of malaria was 1.3 and slide positivity rages from 25-35%. The most dominant malaria parasites were; P. falciparum 77 % and P. vivax 23% [6]. In Tigray region, 70% of the landmass is endemic for malaria, and 70 %(3.8million) of the population resided in those malaria endemic areas [7]. The proportion of total OPD visits, admissions and deaths due to malaria was 11.6%, 4.4% and 1.9% in the region during 2014/15 respectively. In Asgede Tsimbla, malaria is one of the leading causes of morbidity throughout the year; according to 2014/15(2007EFY)

HMIS report the number of malaria cases per 1000 was 106, stratified as high transmission area or higher risk of malaria.

Malaria interventions are highly cost-effective and demonstrate one of the highest returns on investment in public health. Vector control (LLIN, IRS & environmental management) and case management are among the malaria control and prevention strategies. In Ethiopia, according to WHO recent report during 2006-2011, malaria cases in all ages declined by 66% and slide positivity rate by 37% due to those interventions. Africa as well as Ethiopia are working towards malaria elimination by 2030, which aims to reduce malaria incidence and mortality by 2030 by at least 90%; and elimination of malaria from all African countries by 2030 [8] by selecting districts with annual parasite incidence <5. Despite this progress, malaria outbreaks have been reported from many regions of the country due to poor targeting, quality, low coverage and utilization of malaria intervention activities. We investigated the malaria outbreak to identify the source and risk factors, and to guide control and prevention measures.

5.1.2. Methods

Study area and period

Asgede Tsimbla is one of the 8 districts of North Western Zone of Tigray a distance of 195 km far from Mekelle, capital of Tigray .The district is administratively divided in to 27 kebeles with 180161 total population and 41592 households. The district is located at an altitude of <2000 meter above sea level, i.e. endemic for malaria. The study was conducted from 1-10 Mar, 2016.

Study design

We applied descriptive cross-sectional study followed by unmatched case control study design by recruiting 50 cases and 100 controls (1:2 ratios of cases to controls) to identify the source and risk factors associated with this outbreak.

Sampling method

Cases were selected from the list of health facility registration book and controls were neighbors of cases**.**

Sample size: We selected 50 cases and 100 neighboring controls by applying purposive sampling method from the kebele, the outbreak occurred.

Source population

All residents of Asgede Tsimbla district with 180161 total population.

Study subjects

All malaria confirmed cases from Jan 25-Feb 07, 2016 and interviewed cases and controls, residents of Kisad Gaba during the study period.

A case: is defined as an individual currently living in the study area and having experience of malaria infection confirmed by laboratory or Rapid diagnostic Test (RDT) in the nearby health facility during the outbreak time (Jan 25- Feb 07, 2016).

A control: is defined as an individual living in the study area neighboring to the case and who had not had self-reported and laboratory confirmed malaria illness within the same period.

Inclusion criteria: All residents of the six kebeles and volunteers for the interview

Exclusion criteria: Gold miners mobilized from another woreda and Eritrean refugees were excluded from the study

Data sources

Health facility registries, Health post, health center, woreda and regional weekly PHEM data were used for data analysis, in addition to the malaria norm chart of all the visited health facilities**.** Only confirmed malaria cases either by microscopy/RDT were included in the study.

Case Definition

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

Confirmed case: A suspected case confirmed microscopy or RDT for Plasmodium parasites in Asgede Tsimbla woreda, from Jan25-Fe 7, 2016. We used only confirmed cases.

Data collection methods and tools

A structured questionnaire was developed and translated to local language prior the field deployment, then demographic information, clinical presentation (for cases only), risk factors and environmental data were collected from each cases and controls through face to face interview to investigate the outbreak.

Data management and analysis

Data entry and editing was conducted by using Epi-Info 7.1.6 and exported to SPSS version 21 for analysis purpose. Descriptive statistics (Univariate analysis or Frequency), simple cross-tabulations (Bi-variate) and Multi-variate analysis (logistic regression) was done to describe and to determine the risk factors of the outbreak.

Ethical considerations

A formal letter was written from Tigray Regional health Bureau to the district health office to investigate the outbreak, and the district health office accepted that and a support letter was also written from the district health office to the respective health facilities. The purpose of the investigation was briefed to the study participants, health professionals and kebele administrative. Consent was taken from each study participant prior to data collection.

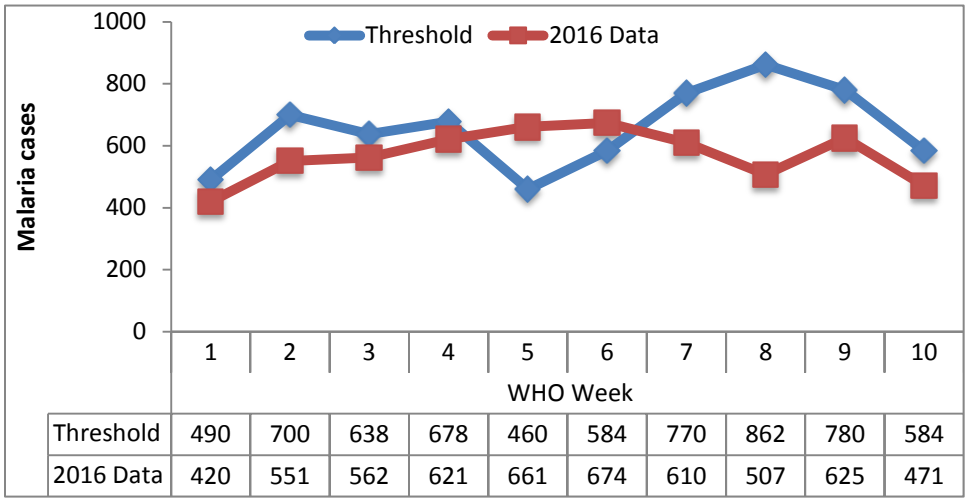
Variables:

S/No	Dependent variable	Independent variable
1	Disease due to malaria	Sleeping without LLIN
2	Death due to malaria	House hold with no IRS
3		Presence of intermittent rivers near community
4		Presence of mosquito breeding sites near HH
5		Sleeping outside home
6		Staying outside over night
7		Travel history
8		Presence of malaria case in HH
9		Presence of any artificial water- holding container

5.1.3. Result

Descriptive Result

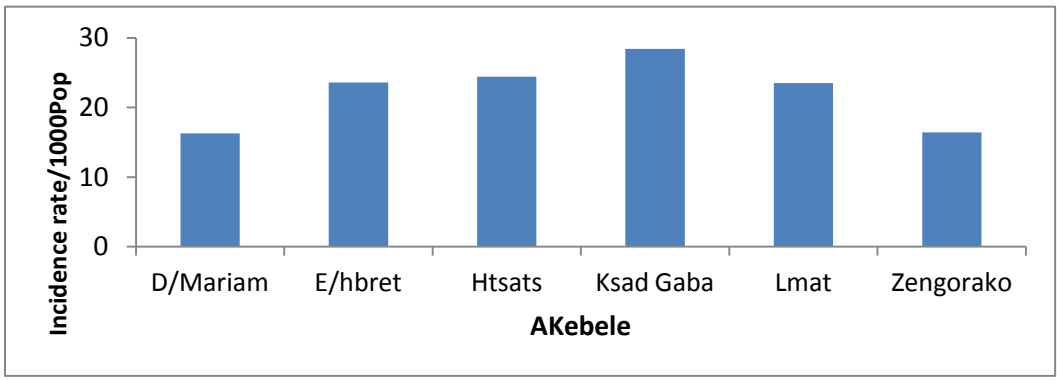
We identified a total of 745 malaria confirmed cases during the outbreak period, WHO week 5-6 in Asgede Tsimbla woreda, from Jan 25-Feb 07, 2016. The average incidence rate (overall attack rate) of the district was 22.2 malaria cases per 1000 population with 52.4% positivity rate and 3% admission. Majority of the cases, 68.7% were plasmodium falciparum (P.F) species, and 1.5% were mixed infections. The norm chart crossed the threshold line at week 5&6.



	1	2	3	4	5	6	7	8	9	10
Threshold	490	700	638	678	460	584	770	862	780	584
2016 Data	420	551	562	621	661	674	610	507	625	471

Fig: 5.1.1 Malaria epidemic monitoring chart by WHO week number, Asgede Tsimbla woreda, Tigray, Ethiopia, week 1-10, Threshold(2014/15) &2016 data.

The outbreak affected a total of six kebeles (22.2 %) of the district with a total of 745 confirmed malaria cases and 47-57.8% positivity rate. incidence rate (Attack rate) by kebele ranges from 16.4 to 28.4 per 1000 population.



Fig; 5.1.2 Malaria incidence rate per 1000 population by each kebele, Asgede Tsimbla, Tigray, Ethiopia, Jan 25-Feb,07,2016.

Of the total of the 745 confirmed malaria cases, 431(57.8%) of them were males. The median age of the cases was 19 years old (age range: 3 months-85 years). More than half (54.2%) of the cases were among 15-59 years adults ,followed by 5-14 school age children,29.1%. The average ASAR was higher among 15-49 years age group, followed by 5-14 years age group ,25.2 and 22.2 ASAR per 1000 population respectively and the lowest was among >=60 years age group,7.3 ASAR per 1000 population.

Table: 5.1.1 ASAR of the malaria outbreak by each kebele and age group, Asgede Tsimbla, Tigray, Ethiopia, Jan 25-Feb 07, 2016.

S/ No	Kebele Name	Tot Population	<5 Yrs		5-14 Yrs		15-49 Yrs		>=60 Yrs	
			Number of cases	ASAR /1000	Number of cases	ASAR/ 1000	Number of cases	ASAR/ 1000	Number of cases	ASAR/ 1000
1	D/Mariam	5689	10	12	20	12.1	60	22.1	3	8.1
2	E/Hbret	7372	35	32.5	66	30.7	70	19.9	3	6.2
3	Htsats	7044	18	17.5	41	20	107	31.8	6	13.3
4	K/Gaba	4361	15	23	38	29.9	69	33.1	2	7
5	Lmat	4591	19	28.4	33	24.7	56	25.5	0	0
6	Zengorako	4521	11	16.7	19	14.4	42	19.4	2	6.8
7	Total/Average	33578	108	21.9	217	22.2	404	25.2	16	7.3

Note: Age group population was used from woreda profile.

The outbreak subsided in week 7 after two weeks as shown below

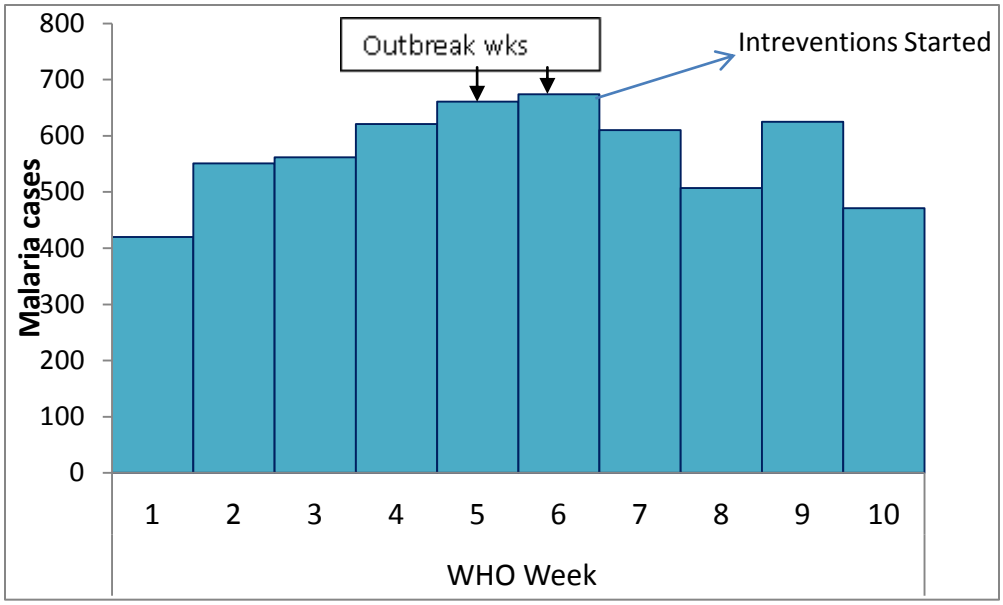


Fig: 5.1.3 Malaria Epi-curve by WHO week number, A/Tsimbla, Tigray, Ethiopia, week 1-10, 2016.

Of the total of the interviewed case-control participants, 55.3 %(83) were females, and 63.3 %(95) were in 15-59 years age group followed by 5-14 years age group,18.6%(28). Almost half of the case-control participants, occupation was Farmers, 40 %(60), and 38 %(57) were married and 40 %(60) had primary educational level.

Analytical Result

The bi-variate analysis result showed that, Stay outside over night, OR 2.1(95%CI; 1.04-4.33), presence of malaria sick patient in HH ,OR 4.1(CI;2.0-8.5) and presence of malaria breeding sites, OR 4.8(CI;2.3-10) and intermittent rivers near HH or community, OR 2.7(CI;1.3-4.7) were significant risk factors. Stay inside during evening, OR 0.15(CI; 0.03-0.7), presence of bed net, OR 0.22(0.06-0.7) and sleeping under bed net always, OR 0.12(0.05-0.26) were protective factors against the disease. But sleeping inside house, wearing protective cloths and sleeping under net some times were not significant protective factors.

By multi-variate analysis, stay inside home in the evening and sleeping under net always were independent protective factors. Presence of sick patient in HH, breeding sites and intermittent rivers was independent risk factors for the development of the disease.

Table: 5.1.2 Shows Multi-Variate analysis result of the independent risk factors of the malaria outbreak, A/Tsimbla, Tigray, Mar 1-10, 2016.

S/No	Variable	Crude OR (95%CI)	Adjusted OR(95%CI)	P.Value (Adjust)
1	Presence of Sick Patient in HH	4.1(2.0-8.5)	4.7(1.8-11.8)	0.001
2	presence of Breeding site	4.8(2.3-10.0)	5.7(2.2-14.5)	0.000
3	Intermittent river	2.7(1.3-5.7)	3.9(1.5-10.3)	0.006
4	Stay inside/evening	0.15(0.07-0.32)	0.16(0.06-0.47)	0.001
5	Using Bed net always	0.12(0.05-0.26)	0.13(0.05-0.3)	0.000

More than 30,000 bed nets were distributed to the district as a public health intervention after reviewing bed net coverage of each kebele, in addition to other malaria intervention activities done.

5.1.4. Discussion

We identified malaria outbreak in Asgede Tsimbla district from Jan, 25-Feb 07 with 7.4 incidence (attack) rate per 1000 population and 3% admissions. The norm chart crossed the threshold line at WHO week 5&6 with 40% positivity rate. An epidemiological investigation of malaria outbreak in village Santej, district Gandhi Nagar, India was 15.1 attack rate per 1000 population and 43.5% positivity rate and 17% hospitalizations [9], the positivity rate was consistent with our study findings, but attack rate and hospitalization were higher than our study. Another study, outbreak investigation of malaria in North Lakhimpur district, Pakistan findings showed that, the outbreak affected a total of 7906 malaria cases, with 0.9 attack rate per 1000 population and 1.4% case fatality rate [10], different with our study . The attack rate ranges from 16.3-28.4 per 1000 population in the kebeles, the outbreak occurred, the highest attack rate was from K/Gaba kebele ,28.4 per 1000 and the lowest was from D/Mariam and Zengorako kebeles,16.3 attack rate per 1000 population. This variation may be due to coverage, quality and utilization of vector control activities among the kebeles.

The proportion of P.F was 68.7% in our study and this was less than the Pakistan study, 58.4% [10] and lower than 2011 Ethiopian MIS, P.F accounts for 77% of the total confirmed malaria cases [6]. Majority (85%) of the cases were among five and above years old ,similar with malaria outbreak study in Bunga

district ,Amhara Region ,85% of the cases were >=5 years old [11],but lower than a pilot study conducted in 10 villages of Amhara region ,>=5 years old accounted for 95.4% of the total malaria cases [12] .The average ASAR ranged from 7.3-25.2per 1000, and it was higher among 15-59 years age group 25.2 average ASAR/1000 but it was similar in <5 and 5-14 years age group , 21.9 and 22.2 average ASAR per 1000 population respectively ,and the lowest was among >=60 years age group,7.3 ASAR/1000 . A study finding in Gandhi Nagar district, India indicated, the ASAR was higher among >=60 years age group with 28.8 ASAR /1000 ,different with our study , followed by 5-14 and 15-59 years age groups, 17.9 and 15.9 ASAR per 1000 populations respectively [9], lower than our study . There was no any confirmed case of malaria in <5 years age group children in the Indian study [9]. This difference could be due to difference in intervention activities /target groups.

Majority of the cases (57.8%) were males, this was lower than Bunga district malaria outbreak, 69% of the total cases were males [11], and pilot study conducted in 10 villages of Amhara region, 78.4% of the total cases were males but higher than the Indian malaria outbreak investigation,50.6 % of the malaria cases were males [9]. This difference could be due to seasonal human mobility, in the other studies especially in Amhara region most of the cases had travel history, and males are the most dominant agricultural workers in our country. Most common symptoms of the cases were fever, headache and chills and shivering and vomiting, 96%,72%, 60%and 52% respectively, and this was similar with the Indian outbreak investigation study,95.7% of the patients had fever alone or fever with chills followed by headache and vomiting [9]. The outbreak duration was from WHO week 5 to 6(Jan 25-Feb, 07, 2016) following the rain fall and subsided after two consecutive weeks.

Presence of malaria sick patient in HH, OR 4.7(95%CI; 1.8-11.8, P.value=0.001), presence of malaria breeding sites, OR 5.7(95%CI; 2.2-14.5, P.value=0.000) and presence of intermittent rivers nearest to the community, OR 3.9 (95 %CI; 1.5-10.3, P.value=0.006) were independent risk factors for onset of the outbreak. A study in Southern Ethiopia indicated, living in near malaria breeding sites was significant risk factor for malaria, OR 4.9 (95% CI: 2.59–9.35, P.Value=0.006) [13], this was lower than to our study presence of breeding sites, but higher than presence of intermittent rivers closest to the community.

Sleeping under bed net always, OR 0.13(95%CI; 0.06-0.47, P.value=0.001) and stay inside home in the early night/evening were independent protective factors against the disease malaria. A study conducted in Adami Tulu, Central Ethiopia, indicated general anopheline outdoor abundance was significantly

higher than indoors (P.value<0.0001) and the mean hourly man biting density was higher outdoors compared to indoors and peaked during early parts of the night (19-22hrs, depending on the type of anopheles) when people were relaxed or no more protected by the primary indoor intervention measures [14].Sampling method, data discrepancy among regional, woreda PHEM and health facilities, and the unknown proportion of malaria confirmed cases either by RDT or microscopy were among limitations of the study.

Presence of malaria breeding sites and malaria sick patient in HH were independent risk factors for the outbreak. The deficient rain fall and higher temperature of the area, in addition to low LLINS and IRS coverage, and low utilization of vector control measures were all together responsible for the malaria outbreak. Scaling up key anti malaria interventions, along with improving utilization of the existing ones should be implemented on the future.

5.1.5. **References**

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5.2. Impetigo Outbreak Investigation in Wukro Klte Awlaelo Woreda, Tigray, Ethiopia, 1-10, Jul, 2015.

E.Gebreegziabher (BSC) [1], A.Edris (BSC) [2], N.Dayissa (MD, MPH, PHD) [3], M.Gizaw (BSC, MPH)[3]

Abstract

Introduction: Impetigo is a highly contagious skin infection commonly caused by one of two bacteria – *Streptococcus pyogenes* or *Staphylococcus aureus.* We received 6 cases of skin disease and one death report on Jun 30, 2015 from Klte Awlaelo district. We investigated this cluster to confirm its etiology, describe its magnitude, identify potential risk factors and make recommendations.

Methods: We investigated impetigo outbreak from 1-10 Jul, 2015 in Klte Awlaelo district by matched case-control study design. We administered a questionnaire to all the cases (13) and matched controls (52) to identify the risk factors. We used Epi-Info, version 7.6.1 for data entry and analysis. Three swab samples were taken for culture and DST.

Results: We detected a period prevalence of 2.4/1000 impetigo cases and one community death in Abrha Atsbha kebele. The median age was 7.o years (range; 4 mon-63 year). Age specific attack rate of the kebele was 2.4/1000, higher in <1year and 1-4 year age groups, 6.4 ASAR/1000). Majority of the cases were females (69.2%). Direct contact and sharing of items were significant risk factors for the disease, OR 17.1(95%CI; 4.0-92.6, F= 0.0005) and OR 6.3(95%CI; 1.5-26.9, P= 0.006) respectively. All the samples were positive for S.arues.

Conclusion: We have confirmed impetigo outbreak in K/awlaelo district. The highest attack rate was in <5 year age children and Females were more affected than males. The etiologic agent was methiciline resistance staphylococcus aureus. Direct contact and sharing of items were statistically significant risk factors for the contraction of the disease.

Key words: Impetigo, outbreak, risk factors, children, Ethiopia.

Introduction

Klte Awlaelo district is found in eastern zone of Tigray region with 125835 total population ,19 kebeles and the health service coverage of the district is 99.7%(for Health centers and 67.5(for health posts. We received a report of, 5 cases with skin disease and one community death from the district health office on 30 Jun, 2015.

Impetigo is a highly contagious skin infection commonly caused by one of two bacteria – *Streptococcus pyogenes or Staphylococcus aureus* [1]. It is broadly classified in to two forms: bullous and non-bullous. Non-bullous impetigo is the more common of the two forms and more contagious than bullous impetigo [2]. Any part of the skin can be affected by impetigo. However, the areas of skin around the mouth and nose are often affected first [1].

Impetigo is very infectious and spreads easily from person-to-person by skin-to-skin contact [2]. It can also be spread by touching objects contaminated with the bacteria like twols, sport materials, clothing, bedding, etc [4]. Impetigo occurs most frequently among economically disadvantaged children; its peak incidence is among children aged 2–5 years [3].

Globally, skin conditions were the fourth leading cause of nonfatal disease burden. Skin conditions ranged from the 2nd to 11th leading cause of years lived with disability at the country level in 2010, [**5**]. According to 2013 WHO global burden of disease report, impetigo accounts for 417,615(1.2% of all skin disease) years of life lost due to disability (YLD) with 140,495,000(2 %) global prevalence [**6**]. According to available studies the median prevalence of impetigo in Africa was 7% [IQR 4.1-12.3%] in children under 15 years age **[8].** In Ethiopia the burden of impetigo is not known or under estimated, there was any documented outbreak of impetigo in the region before.

The main aim of this outbreak investigation was to confirm its etiology, describe its magnitude, identify potential risk factors and make recommendations on the future.

Methods and Materials

Study area: the study was conducted in Abrha Atsbha kebele, Wukro Klte Awlaelo district, Eastern Zone of Tigray.

Study design: We applied both descriptive and 1:4 matched case control study. The matched variables were sex, age group and occupation. There were 13 cases and 52 controls.

Study Subjects; All impetigo cases, and matched controls from the same kebele.

Sampling method: All impetigo cases and matched controls by sex, age group, occupation status and neighbors with cases, were selected by 1:4 ratios.

Data collection instruments: We used a structured questionnaire to collect information on socio-demographic, clinical status of cases, KAP of the community and possible risk factors for the outbreak. The data was collected through face to face interview by reviewing the line list data, and important pictures were also taken during the data collection.

Data processing and analysis; We used Epi info version 7.6.1 for data entry and univariate, bivariate and multi variate analysis to calculate frequencies, age specific attack rate, and OR with 95% CI or 5 % marginal error were done using Epi info version 7.6.1 .We used Abrha Atsbha kebele (where the outbreak occurred) population as denominator to calculate ASAR and period prevalence.

Laboratory methods: We have done culture and DST to identify the etiologic agent.

Variables used;

Dependent Variable	Independent Variable
Impetigo case	Contact history
	Travel history
	Sharing of items
	Family size
	KAP

Ethical consideration: The regional health bureau wrote a formal letter to the district health office to investigate the outbreak and the district health office accepted that .We have got consent from cases and controls for sample and data collection after orienting the objective of the investigation.

Results

Descriptive result

We detected a period prevalence of 2.4/1000 impetigo cases with 3(100%) laboratory confirmed cases and 10 epidemiologically linked cases. We identified 13 suspected impetigo cases with one community death in Abrha Atsbha kebele from Jul, 1- 10, 2015.The cases were only from Abrha Atsbha kebele.

The median age of the impetigo cases were 7.o year with (IQR 3.6-30.0 year) and 4 monhs-63 year age range. The age specific attack rates were higher among <1year age group infants and 1-4 age group children with 6.4 ASAR/1000). Whereas, it was similar among the other age groups that ranges from 1.3-1.7 ASAR/1000(the lowest was among 10-14 age group, with 1.3 ASAR/1000) but the total ASAR of the kebele was 2.4 /1000.

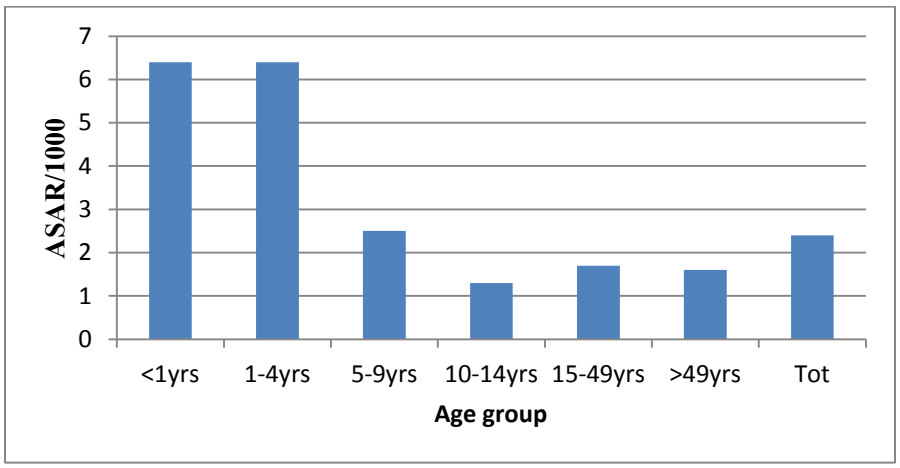

Fig: 5.2.1 Shows the ASAR/1000 of the impetigo outbreak in Klte Awlaelo woreda, Tigray Region, Ethiopia, 1-10 Jul, 2015.

Of the total of impetigo cases, 69.2 %(9) of the cases were females. In addition to this, females were highly affected in 15-49 yrs age group as compared to males.

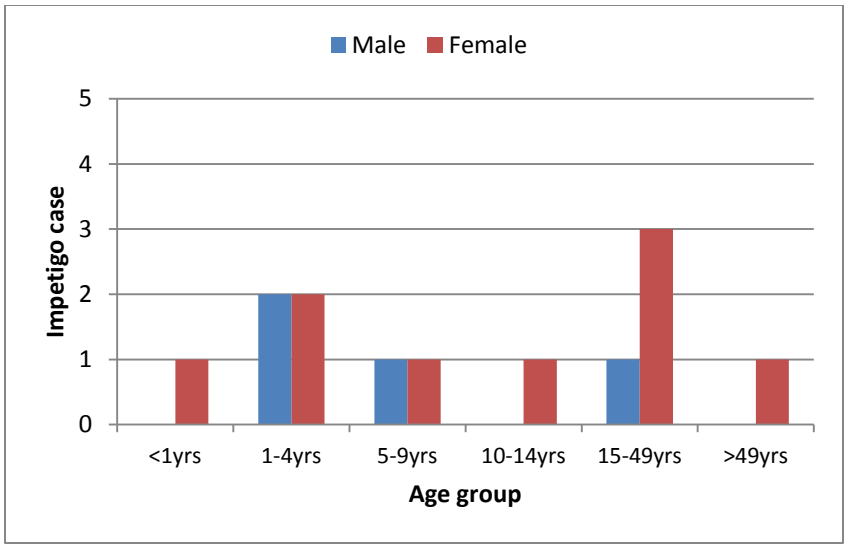

Fig: 5.2.2 Number of impetigo cases by sex and age group in Klte awlaelo woreda, Tigray region, Ethiopia, 1-10 Jul, 2015

The index case (4 month female) has had travel history to areas with impetigo and she was sharing breast milk with a 2 year old child that had blisters around mouth .The epidemic curve is propagated that indicates person to person transmission with its peak from 30 Jun- 1 Jul, 2015.

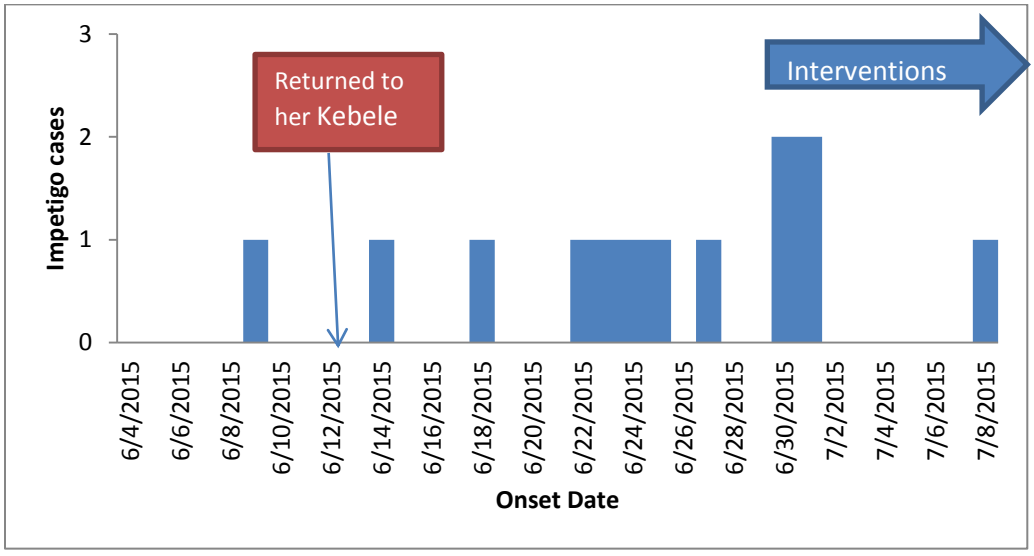

Fig: 5.2.3 Shows number of impetigo cases by date of blister onset, Klte awlaelo district, Tigray Region, Ethiopia, 8, Jun-10, Jul, 2015.

Analytic study

We conducted a matched case control study by recruiting 13 impetigo cases and 52 controls by 1: 4 ratio matched by sex, age group and occupation.

Table: 5.2.1 Analytic results of impetigo outbreak, Klte Awlaelo, Tigray, Ethiopia, Jul, 2015.

S/No	variables		Cases (col %)	Controls (col %)	COR(95%CI)	MHOR(95%CI)	Remark
1	Direct contact	Yes	10(76.92)	8(15.38)	18.33(4.1-81.7)	17.13(4.0-92.6)	F.value
		No	3(23.08)	44(84.62)			
2	Sharing of items	Yes	6(46.15)	6(11.54)	6.6(1.7-26.2)	6.3(1.5-26.9)	P.value
		No	7(53.85)	46(88.46			
3	Knowledge toward disease	Yes	5(38.46)	10(19.23)	2.63(0.7-9.8)	2.58(0.64-9.87)	P.Value
		No	8(61.54)	42(80.77)			

Direct contact and sharing of items were significant risk factors for the development of the disease, OR 17.1(95%CI; 4.0-92.6, Fisher exact value; 0.0005) and OR 6.3(95%CI; 1.5-26.9, P.value; 0.006) respectively.

Laboratory result

We have done culture and DST to indentify the etiologic agent .The culture result showed that the etiologic agent was gram positive staphylococcus Aureus. We used blood agar to grow the bacteria. According to DST result, the bacteria were methiciline resistance staphylococcus Aureus, i.e. resistance to oxacilline.

Limitation of the study

The sample size, 13 case patients for the matched case control were small. We tested only 3 samples out of 13 cases even though 100 % of the samples were positive. We used public transport to investigate the

outbreak by waiting for more than 3 hours in the bus station and this was difficult to conduct the outbreak. There was no available Global Positioning System (GPS) apparatus during the field visit and this makes difficult to indicate the real location of the cases.

Discussions

Even though impetigo is not a fatal disease, our findings indicated that there was one community death. During her visit to the nearest health center, the deceased case was with 75% W/H measurement, registered in her card and this indicates that the case was Moderate acute malnutrition. According to family history the case has developed symptoms like high grade fever and discoloration of skin before death, those factors may be cause of death. The prescribed drug at the health center was Amoxicillin.

The age specific attack rate were higher among <1 and 1-4 age groups (6.4 ASAR/1000), when we compared with other age groups. Impetigo is a disease of babies and children, and may constitute 4–6% of all bacterial infections in the pediatric population; this is due to their soft skin **[9].** A study conducted in southwestern part of Ethiopia (Seca Quorsa and Ule-Oke rural communities of Jimma zone) indicated that impetigo was more prevalent in the younger groups **[10].** Another study in Fiji indicated that the prevalence of impetigo was 25.6% (95% CI 24.1-27.1) in primary school children and 12.2 % (95% CI 9.3-15.6) in infants [**11**], similar with our finding.

According to our study 9(67.2 %) of the total cases were females and this was higher among 15-49 year age group females with 3(33.3%). This may be due to the reason that most of the time females are responsible for child care in the society and most of the cases were preschool children with 6.4 ASAR/1000(<1 and 1-4 age groups), there will be high frequency of contact during day and night especially with those in child bearing age group (15-49), this makes them vulnerable to the disease. A case-control study with 1:2 ratio(n=7), outbreak of staphylococcal impetigo in a maternity ward linked to an asymptomatic healthcare worker, in France hospital indicated that females comprised 57.1 % of the total impetigo cases (hospital neonates) **[12],** this is lower than to our study findings i.e. 67.2%.

Contact history and sharing of items were statistically significant risk factors for the development of the disease, with adjusted OR equal to 17.1 [(95% CI: 4.0-92.6), p= 0.0005] and 6.3 [(95% CI: 1.5-26.9), p=0.006] respectively. A case -control study of an outbreak of hospital - acquired Staphylococcus aureus skin infection among newborns, Nan Province, Thailand, January 2008 findings indicated that exposure (contact) to nurses aid A4 (carrier) and ward sharing with symptomatic cases were significantly

associated risk factors with illness, with adjusted OR equal to 80.3 [(95% CI: 4.8 –1350.3), P=0.002] and 35.6 [(95% CI: 1.9 – 654.7), P=0.016] respectively **[13].**

Swabs were taken from 3(23.1%) of the patients and S.arues was grown in 100% of the cases where swabs has been taken. An 11.5-year population-based incidence study of impetigo from a community in Western Norway, indicated that 76% S.arues was grown from 80% of the bacterial swabbed samples (i.e. 80% of the cases) **[14],**even though our swabbed samples was low i.e. 3(23.1%) , the positivity rate was higher in all the studies, but higher in our study**.** According to our DST result, the causative agent was methiciline resistance staphylococcus aureus (i.e. resistance to antibiotics like oxacilline), this was similar with a cohort study conducted among players on a high school foot ball team-New York city, 2007, with four confirmed MERSA cases, among 51 players **[15].**

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Chapter VI: Abstracts for scientific presentations

6.1. Malaria Outbreak Investigation in Asgede Tsimbla Woreda, Tigray, Ethiopia, Mar 1-10, 2016

E.Gebreegziabher (BSC) [1], I. Hussein (BSC) [2], N. Dayissa (MD, MPH, PHD) [3], M. Gizaw (BSC, MPH) [4]

Abstract

Introduction: About 3.2 billion people were at risk of malaria and the disease killed about 584 000 people in 2013, the burden is heaviest in the WHO African Region. In Ethiopia, 68% of the population lives in malaria endemic areas, and malaria was the leading cause of outpatient visits and health facility admissions during 2009/2010. We investigated malaria outbreak in Asgede Tsimbla to describe its magnitude, identify risk factors and to give recommendations

Methodology: We investigated malaria outbreak in Asgede Tsimbla woreda from 1-10 Mar, 2016 using descriptive cross-sectional study followed by unmatched case-control study design. We recruited 50 cases and 100 controls by simple random sampling. Data entry and cleaning was conducted by using Epi Info 7.1.6 and exported to SPSS 21 for analysis.

Result: We identified a total of 745 malaria confirmed cases with 22.2 incidence rate per 1000 population and 52.4 % positivity rate (68.7% , P.F) in Asgede Tsimbla district from Jan, 25-Feb, 07, 2016. The outbreak affected six kebeles (22.2 %) of the district. The attack rate ranges from 16.4 to 28.4 per 1000 population by kebele. Majority (58.7%) of the cases were males .The median age was 19 years (range; 3mon-85yrs), ASAR ranged from 7.3 in >=60yrs to 25.2 in 15-59yrs age groups per 1000 population respectively. Stay inside home in the evening, AOR 0.16 (95%CI; 0.06-0.47) and sleeping under net always, AOR 0.13(95%CI; 0.05-0.3) were protective factors. Presence of sick patient in HH, AOR 4.7 (95%CI; 1.8-11.8), breeding sites, AOR 5.7(95%CI; 2.2-14.5, P.value=0.000) and intermittent rivers, AOR 3.9(95%CI; 1.5-10.3) was independent risk factors.

Conclusion: Presence of malaria breeding sites and malaria sick patient in HH were independent risk factors for the outbreak. The erratic rain fall and low coverage and utilization of vector control measures were responsible for the malaria outbreak. Scaling up key anti malaria interventions and utilization of the existing ones were among the recommendations.

Key words: malaria, outbreak, Tigray, risk factors

6.2. Impetigo Outbreak Investigation in Wukro Klte Awlaelo Woreda, Tigray, Ethiopia, 1-10, Jul, 2015.

E.Gebreegziabher (BSC) [1], A.Edris (BSC) [2], N.Dayissa (MD, MPH, PHD) [3], M.Gizaw (BSC, MPH) [3]

Abstract

Introduction: Impetigo is a highly contagious skin infection commonly caused by one of two bacteria – *Streptococcus pyogenes or Staphylococcus aureus.* We received 6 cases of skin disease and one death report on Jun 30, 2015 from Klte Awlaelo district. We investigated this cluster to confirm its etiology, describe its magnitude, identify potential risk factors and make recommendations.

Methods: We investigated impetigo outbreak from 1-10 Jul, 2015 in Klte Awlaelo district by matched case-control study design. We administered a questionnaire to all the cases (13) and matched controls (52) to identify the risk factors. We used Epi-Info, version 7.6.1 for data entry and analysis. Three swab samples were taken for culture and DST.

Results: We detected a period prevalence of 2.4/1000 impetigo cases and one community death in Abrha Atsbha kebele. The median age was 7.o years (range; 4 mon-63 year). Age specific attack rate of the kebele was 2.4/1000, higher in <1year and 1-4 year age groups, 6.4 ASAR/1000). Majority of the cases were females (69.2%). Direct contact and sharing of items were significant risk factors for the disease, OR 17.1(95%CI; 4.0-92.6) and OR 6.3(95%CI; 1.5-26.9) respectively. All the samples were positive for Staph. Arues.

Conclusion: We have confirmed impetigo outbreak in K/awlaelo district. The highest attack rate was in <5 years age children and Females were more affected than males. The etiologic agent was methiciline resistance staphylococcus aureus. Direct contact and sharing of items were statistically significant risk factors for the contraction of the disease.

Key words: Impetigo, outbreak, risk factors, children, Ethiopia.

6.3. Outbreak Investigation of Scabies in St.Goerge Church, Mekelle , Tigray, Ethiopia, Jul 25-Sep 29, 2015.

Equbay G/Egziabher (BSC.)[1], Negussie Dayissa (MD, MPH, PHD) [2], Muluken Gizaw (BSC, MPH) [3]

Abstract

Background: Scabies is a parasitic skin disease that is caused by the scabies mite (Sarcoptes scabiei).More than hundred million cases of human scabies occur worldwide every year. A suspected outbreak of scabies occurred in St.Goerge church, Mekelle, Tigray, from Jul-Sep, 2015.We investigated this outbreak to describe, to identify source and risk factors of the outbreak.

Methods: We conducted a case-control study to investigate the outbreak. We administered a questionnaire to 21 cases and 47 controls (1:2 ratio) living in the church to identify the source and risk factors. We analyzed using Epi-info 7.1.6. Non-response rate was 5%

Results: We identified 24 diseased (attack rate: 27.5%).All are males and the median age was 18 years. Contact history (OR: 8.2, 95% CI: 2.3-28.6) and sharing of beds, cloths or items (OR: 4.3, 95% CI: 1.3-13.9) were identified as risk factors for the disease, and knowledge of students towards scabies (OR: 0.13, 95% CI: 0.04-0.4) was a protective factor. There was no water supply access.

Conclusions: The index case, 19 years old men which came from Hntalowejirat was the source of the outbreak. Contact with active case and sharing of cloths were the main risk factors for the occurrence of the outbreak. We administered mass treatment, health education and recommended to supply water.

Key words: Scabies, outbreak, risk factors, attack rate, Tigray.

6.4. Measles Secondary Data Analysis of Tigray Region, Ethiopia Jul, 2011-Jun, 2015.

E.Gebreegziabher (BSC) [1], N.Dayissa (MD, MPH, PHD)[2], M.Gizaw(BSC,MPH)[3]

Abstract

Introduction; The Africa region as well as Ethiopia is working towards measles elimination by 2020. In Africa, measles incidence per million populations was decreased from 223.8 in 2011 to 118.8 in 2012. In Ethiopia, measles incidence per million populations was increased from 39.8 in 2011 to 49.2 in 2012. We analyzed measles four years' data to see its magnitude and to describe by place, person and time variables.

Methods; We defined a suspected measles case as any person with fever, rash, cough and either conjunctivitis or coryza. We used HMIS data from Jul, 2011-Jun, 2015 and analysis was done by MS-excel 2007 and Epi-info 7.6.1.

Results; During the study period we identified a total of 5231 measles suspected cases with 38.7% admissions and 20 (0.38%) mortality rate. Measles incidence rate was increased from 12.7 in 2011/12 to 49.9 in 2014/15 per 100,000 populations. Of the total 55.2% of the cases were males and 48.6 % of the total cases were >=15 years age old. The cumulative age specific attack rate was 47.5, 20.9 and 22.4 in <5 years, 5-14 years and >=15 year age group per 100,000 population respectively, the highest attack rate was during 2014/2015. The highest incidence rate was from Western zone (average IR; 167.7 /100000 population), 55.1% of the total cases .The cumulative MCV1 vaccination coverage of the region was 86.3% during the study period.137

Conclusion; The highest proportion of adult cases >15yrs indicated shifting of the disease towards adults, making public health problem of the region. Future interventions need to target those at risk adults.

Key words; Measles, vaccination, incidence, Tigray

Chapter: VII Disaster Management Situation Report

7.1.Narrative Summary of six Belg Woredas of South and South-East Zones of Tigray, Jan-May, 2015.

1. Introduction

A community needs assessment is a dynamic ongoing process undertaken to identify the strengths and needs of the community, enable the community-wide establishment of health, WASH, nutrition and education priorities and facilitate collaborative action planning directed at improving community health status and quality of life. The health and socio-economic well being of people are fundamentally linked to their natural and built environment. Along with emergency preparedness, the timeliness and quality of assessments help determine an effective humanitarian response.

The overall purpose of the assessment process was to verify the effect of Belg seasonal rains and harvest failure in beneficiary woredas livelihoods and identify gaps to ensure appropriate and effective humanitarian planning and responses, which will lead to reducing morbidity, mortality and acute malnutrition in the most vulnerable areas both for food and non-food components.

The non-food assessment covers Health, WASH, Nutrition and Education, and it helps to assess the health, sanitation and nutritional status of the belg beneficiary weredas. Detailed information was collected on health, WASH and nutrition, general information was collected on education because the assessment time was near school close, less intervention.

2. Objectives

- To assess the extent, types, magnitude, severity and likely of the different hazards and risk populations in the most vulnerable Woredas
- To identify the existing or potential health, Nutrition, WASH and Education conditions of the six belg beneficiary woredas
- To assess the magnitude and likelihood of the emergency situations
- To assess the level of humanitarian crisis and the need for emergency aid

- To recommend appropriate intervention

3. Methodology

Study area;

There are only six belg beneficiary woredas (five from south zone and one from south- east zone) in tigray region. The names of the woredas are Raya Azebo, Raya Alamata, Ofla, Emba Alaje, Endamekoni and Hintalo wejerat (south-east zone). The average distance from Mekelle, capital city of tigray regional state, ranges from 40 to 160 km.

Study period;

The assessment was conducted from Jun, 23-29, 2015.

Data collection procedure;

After general briefings/debriefings with woreda sector heads especially woreda administrator, health, agriculture, water and education sectors were conducted the food and non-food teams were assigned to their respective sectors. Socio- demographic, health profile, epidemic risk factors, nutrition, WASH and education data was collected using nationally standardized non-food belg assessment questionnaire through semi structured interview. The assessment was conducted by multi-sectoral collaboration composed of federal and regional government, UNICEF, WFP, FAO, USIAD and REST. Finally, briefing was given to southern zone head and experts on the overall findings of the assessment by the team members.

Variables; Gender, vulnerable age group population, number of cases and deaths, risk factors and SAM cases

Data management and analysis plan;

The analysis was done by using Ms-excel 2007after the data was cleaned, we use graphs and tables for data presentation.

4. Result

The Belg multi-agency seasonal assessment was conducted from 23 to 29 June 2015 in 6 Belg-producing woredas located in south and south-eastern zones of Tigray which includes Hintalo-Wejerat, Ofla, Alaje, Endamekoni, Raya Alamata and Raya Azebo woredas. The assessment findings are presented as follows.

4.1. Socio-Demographic profile

The total population of the 6 belg beneficiary woredas was 784,949 living in 120 kebeles that accounts for about 15 % of the total regional population with 1:1 male to female sex ratio. Almost half of the kebeles 57 (47.5%) are belg producing with a total population of 369,432,that accounts 47 % of the woredas total population.

Table 8.1 Socio-demographic profile of the assessed kebeles and weredas (2007 projected population), 2015.

Name of Woreda	Woreda level data				Basic data in Belg producing kebeles				
	No of kebele	Total Pop/n	Under 5	pregnant	Reproductive(15-49)age Females	No of kebeles	Total pop/n	Under 5	Pregnant women
H/Wejerat	23	172,452	25,178	5863	43113	8		25747	
E/Alaje	21	120,989	17,668	3,750	27827	2	16,880	2,435	567
E/Mekoni	20	93,716	13,683	3,186	18837	9	54,868	7,105	1,866
Ofla	21	138,563	20,230	4,711	32424	10	65,831	8,525	2,238

R/Alamata	15	95,094	13,884	3,233	22328	10	76,992	9,970	2,618	
R/Azebo	20	164,135	24,012	5,580	38571	18	154,861	22,610	5,265	
Total	120	784,949	114,655	26,323	183100	57	369,432	50,645	12,554	

4.1.2. Health Profile

4.1.2.1. PHE-Coordination and response

- In all the visited 6 woredas, there is PHE coordination and response system with
  - Functional multi-sectoral PHEM coordination forum , except in E/Alaje which is not active,
  - There were Preparedness and response plan in place with trained RRT personnel in the woreda health office and health centers, except Ofla, trained RRT personnel was available only at HC level.
  - All of the woredas have access to emergency response fund but there was no specified budget for preparedness and response activities at wereda health office or PHEM level but there was allocated budget for preparedness and response activities at woreda level that could be used for any emergency response other than PHE.

4.2.2. Morbidity (Top 5 causes of morbidity)

According to 2007 EFY report, the top 5 causes of morbidity for under 5 and above 5 years age were different as indicated in table: 2 below.

- In under 5 children, diarrhea (non-bloody & bloody), pneumonia and acute upper respiratory tract infection were the top three morbidities affecting most children in all woredas
- In above 5 years age, acute upper respiratory tract infection, acute febrile illness and trauma were the top three causes of morbidity.

Even though the latrine coverage, utilization rate and safe water supply coverage of the belg assessed weredas were high, but diarrheal disease was among the top five causes of morbidity, since this contradicts with the findings, it needs survey especially to now the latrine utilization rate of each wereda.

Table 8.2 Top 5 morbidity causes in six Belg beneficiary woredas of south and south-east zones, Tigray, 2015.

Rank	H/Wajirat	Alaje	E/Mekoni	Ofla	R/Alamata	R/Azebo
	For under-5 years					
1	Diarrhea non-bloody	Diarrhea non bloody	Pneumonia	Diarrhea non-bloody	Diarrhea non bloody	AURTI
2	Pneumonia	Pneumonia	Diarrhea non-bloody	Pneumonia	AURTI	Diarrhea non-bloody
3	ARTI	Diarrhea with blood	Diarrhea with dehydration	Diarrhea with blood	AFI	Pneumonia
4	Skin infection	Other unspecified diseases	Other unspecified diseases	ARTI	Pneumonia	AFI
5	Bloody diarrhea	Unspecified infectious & parasitic disease	AURI	Skin Infection	Helmentasis	Intestinal parasites
	Above 5 years					
1	ARTI	AURTI	AURI	AFI	AFI	AURTI
2	Trauma	Trauma	Other unspecified diseases	AURTI	AURTI	AFI
3	Unspecified infection	Single spontaneous delivery	Musculo-skeletal sys & connective tissue disease	Trauma	Malaria	Trauma
4	AFI	AFI	Dyspepsia	Musculo-skeletal sys infection & disease	Masculo-skeletal sys & connectivity tissue disease	Pneumonia
5	Skin infection	Dyspepsia	Trauma	Skin infection	Trauma	Intestinal parasites

4.2.3. Cases and Deaths of major Epidemic prone diseases, Jan –May, 2015.

Malaria; There were a total of 2221 confirmed malaria cases from Jan-may, 2015 in the six belg beneficiary weredas of south and south-eastern zones of Tigray with no reported death and this was similar with the last year similar season, 2127 cases. In general malaria shows decrement from Jan to May, 2015. The average incidence of malaria in all the assessed weredas was 6.1 per 1000, in R/Alamata it was 13.6 per 1000 higher than the zonal average by two fold. The incidence of malaria was stable in most of the weredas during the

belg season, but there was a peak in Jan and Feb, in R/Azebo, H/wejerat and R/alamata respectively.

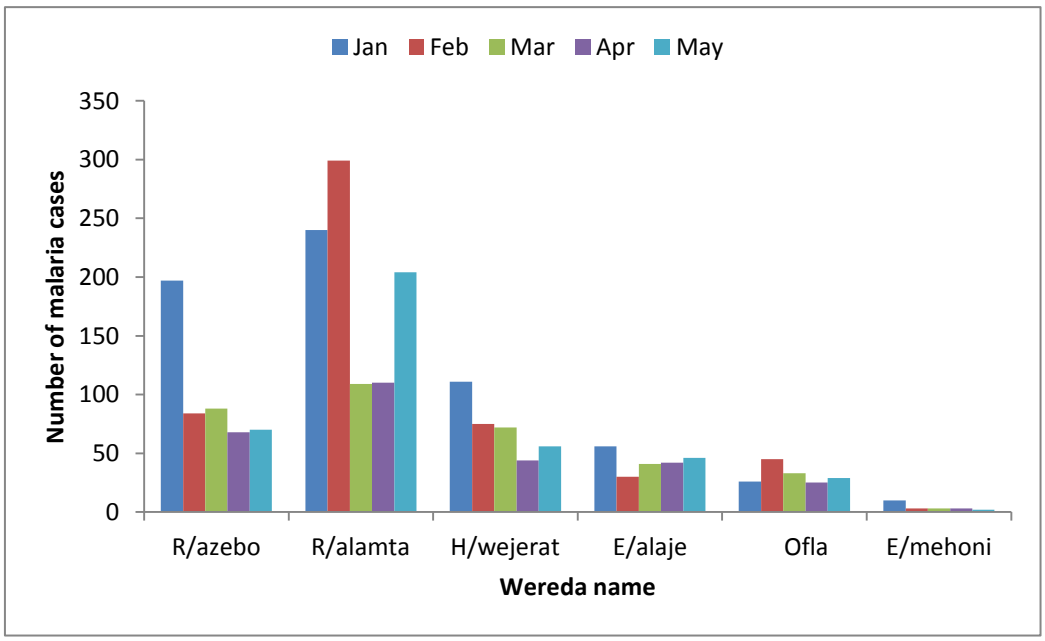

Figure 8.1 Number of malaria confirmed cases in six belg beneficiary weredas, Tigray, Jan-May, 2015.

Dysentery; A total of 1,513 dysentery cases were reported from all the six belg beneficiary weredas in the period of Jan-May, 2015.Majority of the cases were from R/Alamata, R/azebo and E/Alaje. As shown from the figure the trend of dysentery cases were fluctuated from month to month during the belg season.

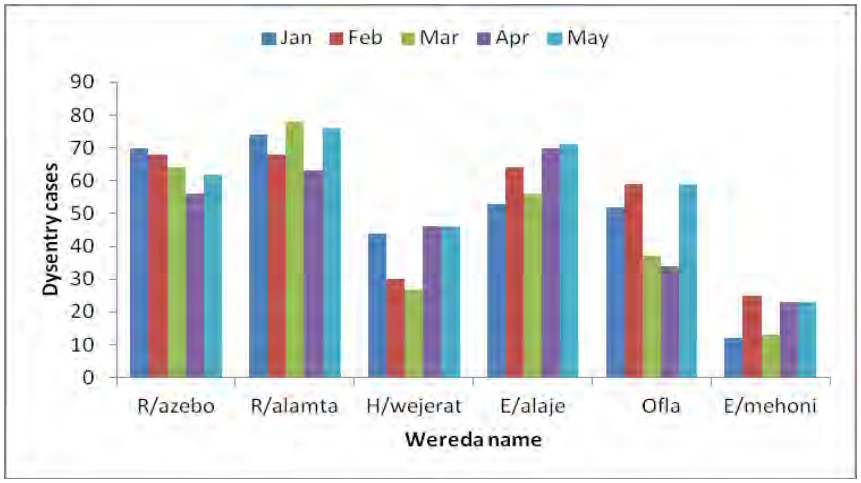

Figure 8.2 Number of dysentery cases in six belg weredas, Tigray, Jan-May, 2015.

Measles; Of the total of 20 measles cases, 13(65%) were from E/Mehoni wereda, the other 7(35%) were from H/wejirat, R/alamata and R/azebo with 3, 2 and 2 number of measles cases respectively.

Rabies; there were 4 rabies cases with one reported death in Ofla wereda,

Polio; There was only one polio reported case from R/Alamata in the same period, Jan-May, 2015.

AWD and Meningitis; there was no any reported AWD or Meningitis case in the six belg beneficiary weredas during the belg season(Jan-May,2015)

4.2.4. Report on outbreaks

There was measles outbreak in the last 3 months in E/Mehoni wereda with 13 reported cases. Since polio is under eradication program one case of polio is considered as an outbreak, in R/alamata there was one polio reported case during the belg season. At the time of assessment there was no outbreak (ongoing) in all the belg weredas. On the other hand, there was no any epidemic of Meningitis and AWD in the assessed 6 Belg producing woredas in the last 3 years.

4.2.5. Preparedness (Emergency Drugs)

The level of preparedness or the availability of emergency drugs and supplies enough for one month were good in Ofla and H/wejerat weredas but there was a shortage of

- Glove in Endamekoni & Raya Alamata woredas and
- Coartem in Raya Azebo woreda

There was no any stock of Amoxil sups and Vit- A in E/Alaje wereda at the time of assessment. Lab supply of RDT (Pastorex) and LP set for meningitis and CTC kit for AWD were not available in all woredas during the assessment time.

4.2.6. Risk Factors for Major Epidemic Prone Diseases

4.2.6.1. Malaria

There were a total of 363,377(46.3%) population at risk for malaria, living in the 63 malarious kebeles (43-full and 20-partial malarious risk kebeles). 234986(64.6%) of the risk populations for malaria were from R/azebo and R/alamata with greater proportion from R/azebo, 164,135(45.1%) of the total risk population. The LLINS and 2006 IRS coverage of R/azebo and R/alamata was >80 %, 81%, < 80 %(78%) and 93% respectively. The LLINS coverage of

H/wejerat, Ofla, E/Alaje and E/Mehoni was <80 %,> 80%, <80 %(71%) and 0% respectively, but IRS was not conducted in 2006E.c in these weredas. The number of malarious kebeles differs from wereda to wereda, the highest proportion was from R/azebo, 21 kebeles followed by R/alamata, 10 kebeles.

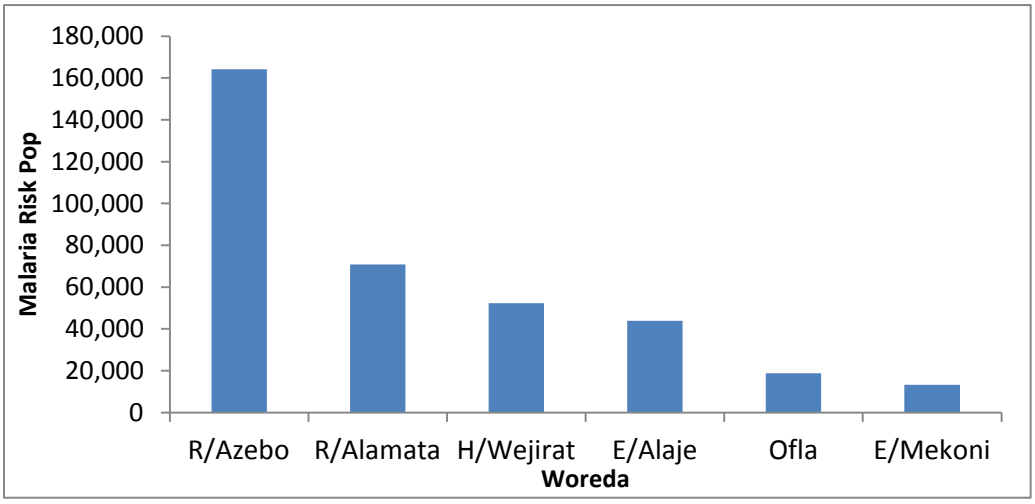

Figure 8.3 Shows malaria risk population of each woreda, 2015.

4.2.6.2. **Meningitis**: there were no an outbreak of meningitis in the past three years in all the assessed weredas. Since there was no vaccination conducted in the past 3 years and the increase in temperature can be favorable for the agent, it can happen at any time, LP set and RDT kits are used for early detection of the cases

4.2.6.3. **AWD**: There was no any outbreak of AWD in the last three years. The latrine coverage, latrine utilization rate and safe water supply coverage of the weredas were good with the exception of H/wejerat and R/azebo with 62% and 72% water supply coverage respectively.

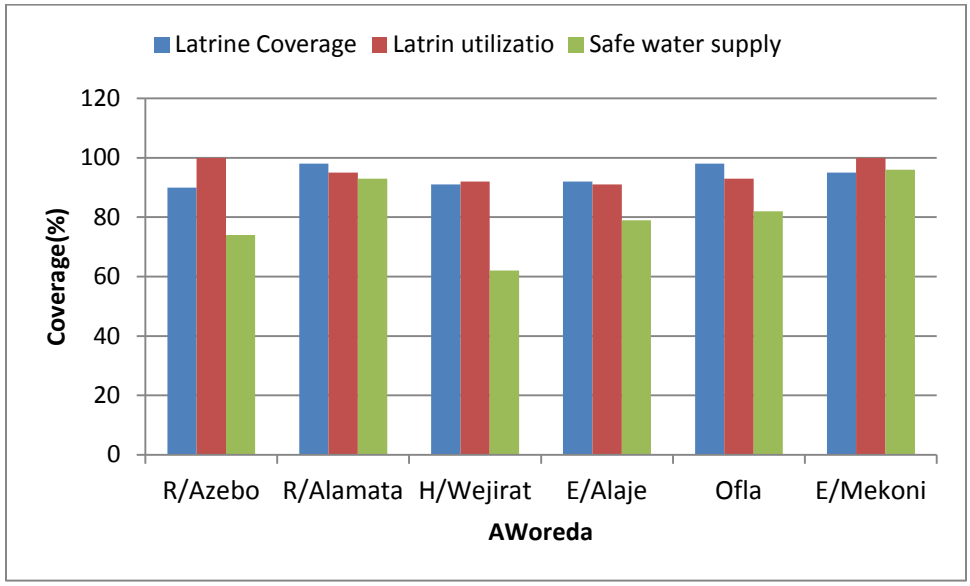

Figure 8.4 Latrine Coverage, Utilization rate and Safe water supply coverage of the woredas, 2015.

MCV1 vaccination coverage was >90% in all woredas, the highest was from R/Azebo and H/Wejirat.

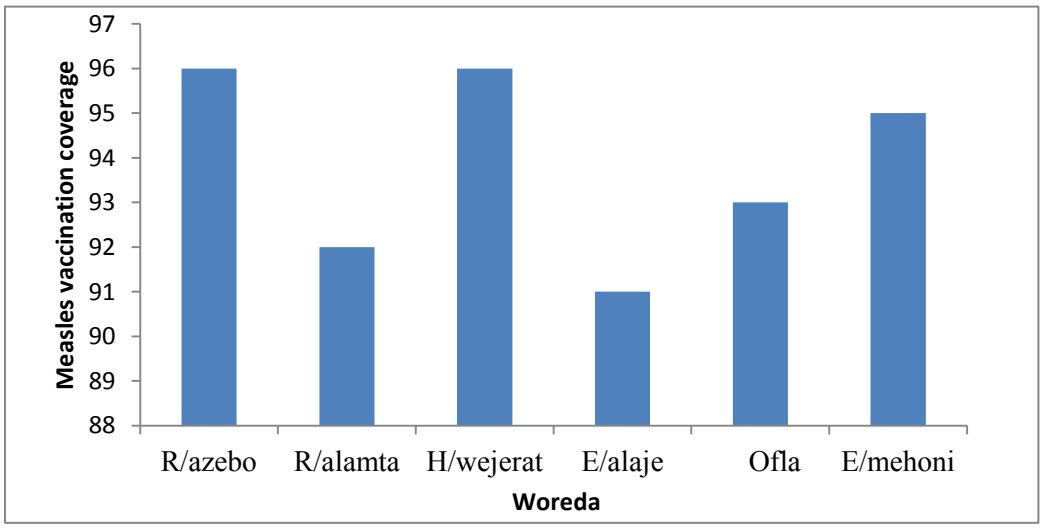

Figure 8.5 Measles vaccination coverage of the six belg beneficiary weredas for <1 year children, 2014.

4.2.6.5 Any other risks of epidemics

The major anticipated threats for epidemics in the visited woredas were vary in coverage and location. Some of the threats identified were outside Belg producing kebeles. Though they may

not be included for Belg emergency response, they are included in this report as part of the early warning system along with the risks identified for Belg producing kebeles.

- Malaria still remains as a threat in most Belg producing woredas with a total of 363,377 people at risk notably in Raya Azebo, Raya Alamata and Alaje woredas
- Dysentery was observed as a threat in Ofla woreda especially 3 kebeles (Zata, Fala & Hashenge) with higher cases from January to May 2015, due to water contamination.
- Rabies is also raised as a potential threat in Ofla especially in Gual Menkerios kebele with 3 cases and 1 death report, for which mass vaccination was conducted for more than 400 dogs and 11 dogs, were also killed, but still there are incoming unvaccinated dogs from Amhara region of neighboring Waghimra zone.
- One suspected polio case was found in R/Alamata in April 2015, which needs close follow up on vaccination conditions.
- During the measles epidemic response of E/mehoni wereda, the main challenge was mass gathering of people due to social issues and the presence of susceptible (unvaccinated) children coming from the neighboring kebeles of Sekota, Amhara region.

4.3. Nutrition

The nutrition situation in all the 6 visited Belg beneficiary woreda was normal and stable. All woredas have rolled out the CMAM service to all health facilities (HPs, HCs & hospitals), which are functional and have the necessary supplies both at OTP and SC (TFU) level.

On the other hand, the monthly nutritional screening coverage for children 6-59 months and Pregnant & Lactating Women (PLW) is very low in all woredas except H/Wejerat which is relatively better but below the target planned and cannot represent the situation at the ground since many eligible are not captured as indicated in table 3 below.

There are 134 OTP and 12 SC (TFU) sites providing CMAM services in the 6 woredas, which means all health facilities, have TFP services. Out of the SAM cases identified, 95.6% (480) in 5 woredas from Jan to May 2007 EC were admitted in the CMAM services, which is very good as shown in table 5. But, the SAM cases admission trend was slightly increasing with the low screening coverage. The necessary CMAM supplies are available in all woredas except F100 in Alaje woreda that need to be improved. The number of SAM cases were significantly decreasing in 2007 EFY when we compare with 2006 EFY of the same belg season in all weredas.

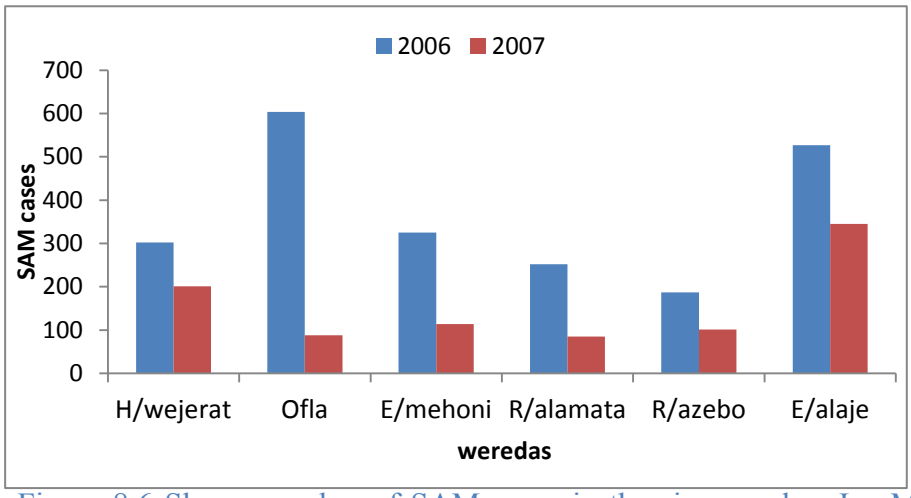

Figure 8.6 Shows number of SAM cases in the six woredas, Jan-May (2006 and 2007 EFY) Jun, 2015.

The screening coverage was decreased in 2007EFY compared with 2006EFY similar time in all woredas.

Table 8.3 Shows screening coverage of 6-59 months children of all woredas, 2006&2007 EFY.

		2006		2007		
wereda name	Screened	% coverage	No of SAM	Screened	% coverage	No of SAM
H/wejerat	22439	94.5	302	22449	89.2	368
Ofla	16231	97.5	527	4801	30.3	378
E/mehoni	11901	91	325	8341	68.7	258
R/alamata	17799	91	604	8611	48	305
R/azebo	13427	101.2	252	8063	65.1	178
E/Alaje	19959	95.2	187	12786	53.2	233
Total	101,762		2197	65051		1720

Table 8.4 Shows number, coverage and malnutrition cases of screened PLM in all the assessed weredas, 2006& 2007 EFY report, Apr, 2015.

	2006 EFY	2007 EFY

Wereda name	Screened PLM	% coverage	<21 cm PLM	Screened PLM	% coverage	<21 cm PLM
H/wejerat	4628	74.7	248	4840	83.6	No data
Alaje	No data	No data	No data	2700	57	60
E/mehoni	2143	62.7	1582	1813	56.3	96
Ofla	2991	58	1935	409	8.7	208
R/alamata	2879	82.4	903	1722	53.2	108
R/azebo	3209	58.2	1521	2239	40.1	1375

Malnutrition: the 2006EFY screening coverage was better both in children and pregnant and lactating mothers than, 2007EFY of the same belg season especially in children.

Average 2007 EC monthly nutritional screening data for children 6-59 months and PLW in the visited woredas was <70% and <60%, respectively except H/Wejerat, which indicates that there were children & PLW not monitored, hence the number of SAM cases reported (identified & admitted) were not representative since the status of many children was unknown.

4.4. WASH

4.4.1. Hazard Type and number of population affected/At Risk of WASH emergency

The onset of the rain was very late and ceased early. It was erratic and unevenly distributed. There are pocket areas/kebeles in each wereda that didn't get rain at all or got inadequate rainfall. This pattern of rainfall distribution coupled by other technical and administrative factors severely affects the provision of safe water supply in 5 Woredas. Ponds tend to dry, the yield of ground water sources deteriorated and residents of these areas forced to travel long distance to fetch water (Up to 5hrs) and to drink from unprotected water sources. Therefore, construction and rehabilitation of water supply schemes (both for community and Institutions) disinfection of water sources, provision of household water treatment chemicals, construction and rehabilitation of Latrines for institutions (Schools, Health institutions) and provision of water by trucks in the

severely drought affected kebeles and villages have identified as priority requirements as emergency response in these Woredas. Accordingly the findings are briefly summarized below:

Total population of the 6 Woredas was 784,949 of whom about 50.6% were females. There were 3 weredas with total affected population of 18873, 93.5 % of them were from Raya azebo wereda. The total at risk population of the 5 woredas were 50500, 16366(32.4%), 13960(27.6%) and 10128(20.1%) were from Raya azebo, H/Wejerat and E/Alaje respectively. People living in the drought affected Weredas were traveling long distance to fetch water from protected and unprotected sources. On average they travel to 5 hrs (especially Raya azebo H/wejerat)). In most cases fetching water from far areas is burden of children and women apart the health hazard.

Table 8.5 Hazard Type and number of population affected/At Risk of WASH emergency in all woredas, Jan-May, 2015.

Woreda name	Hazard type	No of Kebeles affected by water supply shortage	Total Population		Affected Population		At risk population	
			Male	Female	Male	Female	Male	Female
Raya Azebo	Drought	5(kukufto,Horda, Erba,Genete,Hawelti)	21,948	24456	9555	8090	6584	9782
Raya Alamata	Drought	2kebeles(Gerjela and lalydayu)	7867	8150			2360	3260
Ofla	-	-	-	-	-	-	-	-
Endamekoni	Drought & flood	2(tatayhaya&shimta)	6641	6085	91	79	1992	2434
Emba-Alaje	Drought & flood	2 kebeles(sesat and ayba)	8271	8609	518	540	4963	5165

H/wejerat	Drought	4 kebeles (Tsehafti, Senaele, Sebebera, ,gonka)	14702	13218			7351	6609
Total		**15 Kebeles**	**59429**	**60518**	**10164**	**8709**	**23250**	**27250**

4.4.2. Status of Community Water Supply Schemes in Belg assessed woredas

A total of 22 water schemes in 15 kebeles of the visited five Woredas were malfunctioned; 2DWs, 4 SWs, 10 HDWs and 6 protected springs are non-functional due to mechanical, drought and flood problem. This results in decreasing water yield, especially in HDWs and springs. There were no non-functional water schemes in H/Wejerat and Ofla woredas.

Table 8.6 Status of water supply schemes of the 6 belg beneficiary wereda, 2015.

Name of wereda	Water supply coverage	No of none functional water schemes				Type/ level of damage	Remark
		Borehole	Shallow well	Hand dug well	Protected spring		
Raya alamata	93	-	4	2	1	Drought due to water level decrease	
Raya azebo	72	2	-	-	-	Drought	
E/Mehoni	86	-	-	4	-	Drought	
Ofla	91	_	-	-	-		
E/Alaje	79	-	-	4	5	Flood and drought	
H/wejerat	62	-	-	-	-		

4.4.3. School WASH

Of the existing 334 primary schools in the 6 Weredas; 160 have access to water supply (26 schemes are non-functional) and 174 don't have water supply access.119 schools have separate block latrines, 132 have single block latrine, 40 have substandard type of latrine and 43 schools don't have any sanitation facility.

4.4.4. Health facility WASH

Of the existing 131 health institutions in the visited Weredas: 51 have access to water supply (24 schemes are nonfunctional) and 80 don't have access to water supply. 121 have latrine facilities, 8 have substandard type of latrine and 2 health posts have no access to latrine.

4.4.5. Major NGOs and donors assisting WASH activities in the six woredas:

UNICEF, World Bank, REST, Orthodox Church 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.

4.4.6. RECOMMENDED INTERVENTIONS AND REQUIRED BUDJET

Moreover, in all the visited Weredas, there were no HH water treatment chemicals in stock for which people in the affected areas use unprotected water sources that could cause water related health problems. This could be more critical where people use surface water for drinking and domestic use.

Table 8.7 Rehabilitation of water schemes and required budget in all woredas, Jan-May, 2015**.**

Woreda Name	Rehabilitation								Total required Budget/birr
	Deep Weel	Cost	Shallow Well	Cost	Hand Dug well	Cost	Spring	Cost	
Raya Azebo	1 (Pipe extension,1200 m,21/2	340,000	0	0	0	0	0	0	340,000

	HDP								

Raya Alamata	0	0	2	140,000	0	0	0	0	140,000
Ofla	0	0	0	0	0	0	0	0	0
Enda Mekoni	0	0	0	0	0	0	0	0	0
Emba-Alaje	0	0			2	70,000	2	130,000	200,000
H/Wejirat	0	0	0	0	0	0	0	0	0
Total	1	340,000	2	140,000	2	70,000	2	130,000	680,000

Table 8.8 Required Water Treatment Chemicals by Woreda and Health institutions, different intervention mechanisms have been proposed as follows**:** Jan-May, 2015.

S/No	Wereda	Population risk/ affected	Hygiene promotion	Cost	Provision of laundary+body Soap	Cost	Training of HEWs	Cost	Total Budget
1	Raya Alamata	10172		20,000	8137.6	81376	10	9400	110776
2	Raya Azebo	34012		35,000	27209.6	272096	18	16120	323216

3	Ofla	23107		23,000	18485.6	184856	10	9400	217256
4	Endamehoni	4596		5,000	3676.8	36768	6	6040	47808
5	Alaje	11186		10,000	8948.8	89488	4	4360	103848
6	Hintalo-Wejerat	13960		14,000	11168	111680	6	6040	131720
	Regional Bureaus			15,000				10000	25000
	total	97033				776264	54	61360	959,624.

An estimated amount of 2,121,832 Birr is required for WASH emergency intervention in the Belg beneficiary Weredas of Tigray, until end of Dec. 2015.

Table 8.9 Summary of total estimated budget required for WASH Emergency Response in the belg assessed woredas Jan-May, 2015.

S/No	Intervention type	Budget Required (Birr)
1	Water treatment chemicals	482,208.00
2	Water Tracking	0.00

3	Rehabilitation of Community water supply schemes	680,000.00
4	Construction of new water Schemes (Community, School & Health institution)	0.00
5	Hygiene promotion	959,624.00
Sum Total		2,121,832

4.5. Education

The overall situation of education (teaching & learning) process was stable and normal in all Belg producing woredas. The failure of Belg production season had no significant impact. Currently schools have finished 2nd semester exams and are preparing to close for more than 2 months.

The assessment on education was done to review the situation even though we are in the last month for closing and there may not be any response. But the assessment finding will serve as a basis for next year preparation when schools are opening and serve as an input for next Meher season assessment.

In the visited woredas, though the magnitude is not higher and not different from schools in other kebeles that are not Belg season beneficiaries,

- Some students are reported to have dropped following Belg season failure in the second semester looking for income/employment in R/Alamata and Endamekoni woredas but no dropouts reported in other woredas in relation to Belg failure.
- School building roofing was damaged due to wind in Endamekoni (Tsedka School in Jemma kebele) that left 80 students to stay in open sheds till community reconstructed the 2 class room roofing.
- Roof water harvesting schemes could not provide service in some schools like in Endamehoni (5 schools) due to Belg rain failure

Overall, the education system is not affected with the failure of Belg rains, even the dropouts reported in the woredas were lower this year when we compared to the last year. In R/Azebo wereda dropout rate for 2007 EC was 0.36% compared to 1.12% in 2006 EC while in Endamekoni woreda 2007 EC dropout rate was 0.97% ,lower than 1.15% in 2006 EC as indicated in table 7 below.

Table 8.10 Educational situations in six woredas of south and south East zones of Tigray, Jan-May, 2015.

S/N	Woredas	2006 EC			2007 EC woreda level			2007 EC Belg kebeles		
		No of Students	No of Dropouts	% of Dropouts	No of Students	No of Dropouts	% of Dropouts	No of Students	No of Dropouts	% of Dropouts
1	H/Wejerat	No data	No	No data	No data	No	No data	No data	83	No data
2	Alaje	31,193	406	1.30%	33,085	110	0.33%	3,732	23	0.62%
3	E/Mehoni	19,951	230	1.15%	20,038	195	0.97%	10,384	42	0.40%
4	Ofla	26,690	449	1.68%	30,059	190	0.63%	9,770	136	1.39%
5	R/Alamata	Noda	255	No data	22,303	151	0.68%	14,665	103	0.70%
6	R/Azebo	31,000	350	1.13%	35,279	127	0.36%	No data		No data
	Total	108,834	1,690	1.55%	140,764	773	0.55%	38,551	387	1.00%

Some woreda education offices (Endamekoni, R/Alamata,) recommended importance of school feeding programs in improving enrollment, containing and minimizing dropout of students and developing sustainable mechanism to secure availability of local school feeding supply like pilot sweet potato production in one school in R/Alamata.

Discussion

During the belg season, Jan-May, 2015 the amount of rain decreased in amount and distribution from the previous years. Non-Bloody diarrhea and Pneumonia was the top five diseases in under five years age, AURTI and AFI were the leading causes of morbidity in greater than five years age.

The average incidence rate of malaria was 6.1per 1000 total population, similar with the last year belg season, but it was higher in R/Alamata with 13.6 per 1000 total population and showed slight increase from the last year belg season. Almost half, 46.3% of the total population is at

high risk for malaria, most of them are from R/Azebo and R/Alamata. There was measles outbreak in Enda Mehoni woreda in the past six month, with 3 confirmed and 9 suspected cases. Malaria, Dysentery, AWD and measles were the epidemic prone disease, because of the belg failure.

The screening coverage of children 6-59 months decreased from an average of 94.6 %(range; 91-101.2%) in 2006 E.C belg season to 59.1% (range; 30.3-89.2%) in 2007E.C belg season. This can worsen the malnutrition condition in the area in addition to the belg failure, making vulnerable for the nutritional problem.

Water Hygiene and Sanitation, 27250 populations were at risk for WAHS emergency, residing in 15 kebeles of the districts, due to drought as the result of belg failure. In those kebeles, 22 water schemes were not functional, due to decrease surface water /water level as a result of drought, 10 of them were hang dug well.

Half of, 48% of the schools have access to water. Of the total schools, 43 schools have no any access to sanitation facilities; this needs urgent intervention to improve school WASH.

Conclusion:

- Diarrhea, Pneumonia, AURTI, Trauma were among the top five causes of morbidity.
- Malaria and dysentery were the major epidemic prone disease
- 66.1% of the malaria confirmed cases were from R/Alamata (43.3%) and R/Azebo, with slight increase in R/alamata, compared with the last year belg season.
- The nutrition status in all the 6 visited Belg beneficiary woredas were normal and stable with decreased SAM cases.
- Generally this year belg has been failed when we compared with the previous years belg seasons. The recurrent drought creates cumulative effect on the ground and surface water potential of the woredas, especially in Raya-azebo and H/wejerat woredas.
- Communities are using unprotected source and travelling long distance.
- Access of water supply for Institutions (schools & health facilities) is very low. Most of the schools and health facilities in the assessed woredas do not have access to water supply.

- In all the six woredas water treatment at source even at household level was not carried out during the belg season this is due to shortage of water treatment chemicals ,as a result water borne diseases were the dominant type of diseases in all the assessed woredas.

Recommendation

- An effective intervention should be taken in decreasing the top five leading causes of morbidity targeting pneumonia, diarrhea, AURTI and trauma.
- Adequate emergency drugs and supplies mainly for epidemic prone diseases in drought-affected areas should be timely maintained by Woreda Health Offices and health facilities.
- The existing Multi-sectoral PHEM coordination forum and Rapid Response Team should be strengthened with regular meeting for early public health intervention.
- The increased malaria cases in R/alamata ,needs special intervention
- Provision of Water Treatment Chemicals: most of the affected communities' utilizing unprotected water sources such as rivers, unprotected springs, ponds etc.
- Rehabilitation of Existing schemes**:** for all affected or at risk kebeles especially in Hawelti kebele.
- Maintaining existing water schemes by close monitoring of water levels through periodic check and follow up
- Institutional WASH facilities should be fulfilled in low coverage areas
- A community awareness to decrease student dropout should be promoted.
- School feeding is important ,to decrease dropout

Chapter VIII: Protocol/Proposal for Epidemiological Research Project

8.1. Prevalence of Asymptomatic Malaria and Associated Factors among School Children in Asgede Tsimbla District, Northern Ethiopia, 2016.

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Executive Summary

Introduction: Malaria is responsible for up to 50% of hospital visits and admissions and can account for up to 40% of public health expenditures, in Africa. Approximately 75% of Ethiopia's landmass is malaria-endemic, 65%(57.3 million) of the total population; The malaria transmission pattern in Ethiopia is seasonal and unstable often characterized by focal and large-scale cyclic epidemics, areas of disease are primarily associated with altitude and rainfall.

Malaria interventions are highly cost-effective and demonstrate one of the highest returns on investment in public health. In Ethiopia, according to WHO recent report during 2006-2011, malaria cases in all ages declined by 66% and slide positivity rate by 37%. In Tigray region the proportion of total OPD visits, admissions and deaths due to malaria decreased from 20.5%, 10.5% and 5.1% in 2011/2012 to 11.6%, 4.4% and 1.9% in 2014/15 respectively, according to regional HMIS report. According to 2007EFY, Asgede Tsimbla is stratified as high risk for malaria (>100 cases/1000 population) and 58% of the reported cases were in 5-14 years age children.

The high prevalence of asymptomatic infections, which contribute to disease transmission is among the challenges threaten continued progress towards the disease. For a successful malaria elimination program study of parasite carriers, especially asymptomatic malaria is an issue to interrupt the transmission in a population. The district faced two malaria outbreaks in 2015/16.

Objective: To determine the prevalence of asymptomatic malaria and associated risk factors among school age children in Asgede Tsimbla district, North Ethiopia.

Methodology: A cross-sectional school based study design (survey) will be conducted from May-Dec, 2016 in Asgede Tsimbla district, North West Tigray. The number of schools (16) will be selected randomly. A total of 411 school children aged 5-14 years will be selected by using

sample size calculation formula for cross sectional study. Data will be collected by standard data collection tool and managed by Epi-Info version 7.6.1, then exported to SPSS 21 for analysis.

The proposal will be presented and approved by Institutional review board of AAU for ethical issues and the final result will be disseminated to responsible organizations after incorporating comments. The study will be conducted from May-Dec, 2016 with 83,600 total budget.

1. Background

Asgede Tsimbla is one of the 8 districts of North Western zone of Tigray a distance of 195 km far from Mekelle, capital of Tigray .The district is administratively divided in to 27 kebeles with 180161 total population and 41592 households. Public health care services are delivered through one primary hospital, 6 health centers and 25 health posts and the health service coverage of the district is 69.4% for HPS and 83.4% for health centers. The district is located at an altitude of <2000 meter above sea level, malaria endemic area.

1.1.Introduction

Malaria is caused by parasites of the Plasmodium family and transmitted by female Anopheles mosquitoes. There are four different human malaria species (P. falciparum, P. vivax, P. malariae and P. ovale), of which P. falciparum and P. vivax are the most prevalent and P. falciparum the most dangerous. P. knowlesi is a zoonotic plasmodium that is also known to infect humans [1].

Malaria is responsible for up to 50% of hospital visits and admissions and can account for up to 40% of public health expenditures. Malaria accounts for 40% of total government spending on public health in Africa, consumes 25% of household incomes in Africa, and costs Africa US$ 12 billion in direct costs every year and much more in lost productivity [2].

Approximately 75% of Ethiopia‘s landmass is malaria-endemic, with 65 %(57.3 million) of the total population; The malaria transmission pattern in Ethiopia is seasonal and unstable often characterized by focal and large-scale cyclic epidemics, areas of disease are primarily associated with altitude and rainfall. The peak of malaria illness incidence usually follows the main peak rainfall season (June to September) each year. Depending on variable rainfall, altitude patterns and population movement, malaria transmission tends to be highly heterogeneous geo-spatially

within each year as well as between years [3]. In Tigray region, the major transmission season of malaria is from Sep-Dec and 70% of the landmass is endemic for malaria, 70 %(3.8million) of the population resided in those malaria endemic areas.

In 2009/2010 FMOH report, malaria was the leading cause of outpatient visits and health facility admissions, accounting for 14% of outpatient visits and 9% of admissions. According to MIS 2011 report, the parasite prevalence of malaria was 1.3 and slide positivity rages from 25-35%. The most dominant malaria parasites were; P. falciparum 77 % and P. vivax 23% [3].

Malaria interventions are highly cost-effective and demonstrate one of the highest returns on investment in public health .Vector control (LLIN, IRS & environmental management) and case management are among the malaria control and prevention strategies .Between 2000 and 2013, a substantial expansion of malaria interventions contributed to a 47% decline in malaria mortality rates globally, saving an estimated 4.3 million lives. In the WHO African Region, the malaria mortality rate in children under 5 years of age was reduced by 58% [1]. In Ethiopia, according to WHO recent report during 2006-2011, malaria cases in all ages declined by 66% and slide positivity rate by 37%. According to 2015 world malaria day FMOH report, the number of reported malaria cases, admissions and malaria related deaths has been significantly reduced by 67%, 48% and 55% respectively [4].

In Ethiopia, areas <2,000m, 55.2% and 54.8% of households surveyed currently own a mosquito net or LLIN, respectively. In all areas <2,000m, the mean number of nets was found to be 0.8 per household. In Tigray region, percentage of households that have at least one net and more than one net was 65.8 and 35.3 respectively, and average number of nets per households was 1.2 [4]. According to 2014/15 FY, The average number of nets per household was 0.8 in Asgede Tsimbla, lower than the regional average.

In Tigray region the proportion of total OPD visits, admissions and deaths due to malaria decreased from 20.5%, 10.5% and 5.1% in 2011/2012 to 11.6%, 4.4% and 1.9% in 2014/15 respectively, according to regional HMIS report. In 2014/15, majority of the cases, 61.1% were P.F. Despite this effort malaria is the leading cause of OPD visit in the region.

In Asgede Tsimbla, malaria is one of the leading causes of morbidity throughout the year; according to 2014/15(2007EFY) HMIS report the number of malaria cases per 1000 was 106, stratified as high transmission area or higher risk of malaria. During the same year of the total of 19083 reported malaria cases, 1.9% was inpatients. Majority of the cases, 75.1% were P.F. Majority of the reported cases, 57.9% were among school age children (5-14 years age group).

1.2.Statement of the problem/ Justification of the study

The high prevalence of asymptomatic infections, which contribute to disease transmission is among the challenges threaten continued progress towards the disease [5]. For a successful malaria elimination program study of parasite carriers, especially asymptomatic malaria is an issue to interrupt the transmission in a population.

The incidence of clinical attacks of malaria in school-age African children is poorly defined because this age group is not included routinely in household-based cluster surveys such as malaria indicator surveys, demographic health surveys or multiple indicator cluster surveys [6]. Due to low coverage and utilization of malaria interventions in the district, the burden lies in school age children, 58% of total malaria cases were in 5-14 years age in 2014/15 and its consequences affect school performance.

It is even more important to assess the situation of the malaria prevention and control activities towards elimination by 2030. School children indicate as good proxy for malaria transmission in a wider community and school provide a good entry point for malaria prevention and control, as intervention for community mobilization. This will be the first malaria epidemiological study conducted in asymptomatic school children in Asgede Tsimbla. The aim of this study is to identify the prevalence of malaria disease by parasite species (P.F&P.V) and the risk factors for malaria disease among asymptomatic school age children of Asgede Tsimbla, Tigray, Ethiopia.

2. Literature review

Despite being preventable and treatable, malaria continues to make a devastating impact on people's health and livelihoods around the world. An estimated 3.2 billion people (around 44% of the world's population) were at risk of being infected with malaria and developing disease in 2013. Of this 1.2 billion people are at higher risk (>1 case per 1000 population) of malaria [5].

According to the latest estimates, 198 million cases of malaria occurred globally in 2013 (uncertainty range 124–283 million) and the disease led to 584 000 deaths (uncertainty range 367 000–755 000), representing a decrease in malaria case incidence and mortality rates of 30% and 47% since 2000, respectively. The burden is heaviest in the WHO African Region, where an estimated 82% and 90% of all malaria cases and deaths occur respectively, and in children aged <5 years, Africa account for 78% of all deaths. About 1,600 people die every day from malaria; more than 1,400 of those people are in Africa [5]. Malaria is the leading cause of outpatient consultations and of health facility admissions, in Ethiopia as well as Tigray [7].

The age distribution of cases of malaria is influenced strongly by the intensity of malaria transmission, in areas of high transmission, the main burden of malaria, including nearly all malaria deaths, is in young Children [6]. In 2010, it was estimated that over 500 million school age children were at risk of malaria infection, 200 million in sub-Saharan Africa [8]. As expected, the prevalence of P. falciparum in African school-age children varies widely from area to area, even within the same country, depending on the level of transmission. For example, in Uganda 14–64% of school-age children were parasitaemic at any one time, with the parasite rate depending upon transmission setting and season. Country wide survey conducted in 480 Kenyan Schools between September 2008 and March 2010 found an overall prevalence of malaria parasitaemia of 4%, but this ranged from 0 to 71% between schools [9]. The Gambia, and Mauritania, the prevalence of infection in school age children ranged from 5 to 50%, with prevalence rates showing marked seasonal variation [10]. In Ethiopia, in low transmission area the estimated prevalence of malaria ranged from 0-15% in 2009, in 5-16 year age group school children [11] and the annual incidence was 0.03 during 2009-2011(101weeks follow up) among 5-14 years age group children in low transmission settings, the sample size was 2,075 [12[.

The number of school-age children who die from malaria each year is not known but a study by Murray et al. 2012, using a combination of vital registration data and verbal autopsy data, estimated that in 2010, 6–9% of all malaria deaths occur in the 5 -14 year age group, giving a figure in the range of 70–110 000 deaths per year [13].

A study conducted in South West Nigeria among rural children indicated that, malaria parasites were encountered in 35/178 (19.7%) of the asymptomatic enrollees. Parasite density was ≤500/µl

in 51.4% (18/35), 501–1,000/µl in 9 (25.7%) and 1,000–4,720/µl in 8 (22.9%) of the children [14]. A cross -sectional survey in southern Malawi, among 5796 individuals aged greater than six months (88% were asymptomatic), PCR prevalence ranges from 5-20% in dry season and 9-32% in rainy season. Participants aged 6–15 years were at higher risk of infection (OR=4.8; 95%CI, 4.0–5.8) and asymptomatic infection (OR=4.2; 95%CI, 2.7–6.6) than younger children in all settings. School-age children used bed nets less frequently than other age groups [15].

A cross-sectional study among asymptomatic malaria and associated factors in Pawe, Northern Ethiopia showed that, prevalence of asymptomatic malaria was 14.5%. *Plasmodium falciparum* accounted for majority (59%) of cases. Participants who reported no utilization of net [(AOR = 2.1; 95% CI=1.5, 4.2)], lived more than 60 minutes walking distance from the nearest health facility [(AOR) = 2.3; 95% CI = (1.2, 4.1)], come from household having more than 7 members [(AOR = 2.4; 95% CI = (1.8, 5)] and who were not taking ACT had higher odds of asymptomatic malaria [16].A cross sectional study among school children in Sanja Town, northwest Ethiopia, showed the prevalence of asymptomatic malaria was 6.8%. The majority of parasitemic study participants had low parasite density 65.5% (17/26). Level of grade, age, bed net usage, and frequent exposure to malaria infection were associated with risk of asymptomatic malaria [17].

3. Objectives of the study

3.1.General objective

To determine the prevalence of asymptomatic malaria and associated factors among school age children in Asgede Tsimbla district, North Ethiopia, May-Dec, 2016.

3.2.Specific objectives

- To describe the prevalence of asymptomatic malaria with respect to plasmodium parasite species
- To identify the risk factors associated with malaria disease
- To guide control and prevention measures and to document lessons learnt

4. Methods and materials

4.1.Study area and period

Asgede Tsimbla is found in North West zone of Tigray region a distance of 195 far from Mekelle, Capital of the region. The district is administratively divided in to 27 kebeles (06 urban

and 21 rural) with 180161 total population. The district is located at an altitude of <2000 meter above sea level. The study will be conducted in Asgede Tsimbla district from May-Dec, 2016.

4.2. Study setting: The study will be conducted in primary schools of Asgede Tsimbla district.

4.3.Source population: All children aged 5-14 years

4.4.Study Subjects: All randomly selected malaria asymptomatic children aged 5-14 years

Inclusion criteria: All School children whose axillary body temperature (in the range of Normal T^0 ; < 37.5 ^{O}C and present at the time of data collection.

Exclusion criteria: All school children aged 5-14 years with the presence of malaria related symptoms and those who had taken anti malaria drugs before one month of the data collection or those on malaria treatment during data collection**.**

4.5.Study design: We will use a cross-sectional study design to assess the prevalence of malaria using RDT/microscopy and associated factors.

4.6.Sampling procedure: Of the total of 46 primary schools, we will select 16 schools by simple random sampling method, 34.7% of the total schools.

4.7.Sample size: By using sample size calculation formula for cross sectional study

$N= Z^2 P(1-P), \quad N= \frac{(1.96)^2\ 0.58(1-0.58)}{d^2}, \quad N=\frac{3.84*0.25}{(0.05)^2} = \frac{}{0.0025} = 374$

Z-Z value for P=0.5 or 95% confidence limit,

P=Estimated prevalence, we used 58% prevalence of asymptomatic malaria a study done in northern Ethiopia, 2014.

d=desired precision, 5 %(0.05) was taken and considering 10% non-response rate, we will recruit 411 students. Of the total of 2550 primary school students**,** 411 study subjects will be recruited for the RDT and microscope prevalence study and associated factors by considering proportion, according to the number of students per school, by considering 5% Confidence limit and 0.58 prevalence of malaria in asymptomatic cases.

4.8.Data collection procedure: We will use a standard data collection tool, and the data collection will be conducted for 15 days by trained health professionals under supervision.

4.9. Materials/Instruments: Automatic lancet, Disposable glove, Cotton, Forested slide, Capillary tube, Slide box and rack will be used for sample collection and handling. RDT and Primo star light microscopy will be used for malaria confirmation, including species identification (P.F &P.V).

4.10. Personnel: We will recruit 5 data collectors with a minimum of diploma qualification and 2 supervisor's minimum of BSC in qualification; training will be given for five days.

4.11. Data quality control: Pre- test/field testing will be conducted before starting the actual data collection to identify potential problems and the collected data will be checked on daily basis.

4.12. Data management and analysis: Data entry and cleaning will be conducted using Epi-info version 7.6.1 and exported to SPSS 21 for analysis**.** The level of statistical significance will be set as $p \leq 0.05$ and 95% Confidence limit.

4.13. Ethical considerations: The proposal will be approved by institutional review board of AAU school of public health, after approval support letter will be written from Tigray regional health and education bureaus and Asgede Tsimbla district health and education offices. Participation will be fully voluntary and informed written consent will be obtained from each study participants and guardians of the selected children. Children with positive result in microscopic examination and/ or rapid test will be linked to nearby health facility to get anti-malarial drugs, referral forms will be given. All personal information's will be kept confidentially.

4.14. Variables

S/No	Dependent variable	Independent variable
1	Disease due to malaria	Sleeping without LLIN
2	Death due to malaria	House hold with no IRS
3		Presence of stagnant water body
4		Presence of intermittent rivers near community
5		Unprotected irrigation
6		Sleeping outside home
7		Staying outside over night

8		Travel history
9		Presence of malaria case in HH
10		Presence of any artificial water- holding container close to your HH
11		Engaged in gold mining

4.15. Operational definitions

Malaria Asymptomatic: Any one with the absence of malaria related symptoms and whose axillary body temperature (in the range of Normal T^0 ; < 37.5 ^OC)

School age children: Any children aged 5-14 years enrolled in school.

Asymptomatic malaria case: the presence of malaria parasites in peripheral blood of infected school children but without an obvious signs and symptoms of the disease.

LLIN User: Every child slept under bed net always.

HHs with IRS: Households sprayed IRS in the past six month

4.16. Result dissemination plan: The draft document will be finalized after incorporating comments from mentors and any relevant body, then it will be submitted to AAU, SPH, world malaria day 2017, after completed the final research, then the final research will be presented to those organizations/institutions separately. Finally we will publish through EPHA, Ethiopian world malaria day, 2017 or other grants, and disseminate the research findings to responsible organizations.

4.17. Work and Budget plan

Table 9.1 Detail work plan of the research project work.

Major Activities	Study period,May-Dec,2016							
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Writing proposal								

Proposal submission								
Reviewing process & incorporate comments								
Presentation of the proposal								
Getting ethical clearance								
Arranging Administrative & procurement issues								
Giving training for data collectors & supervisors								
Data collection (Field)								
Data entry								
Data analysis and interpretation								
Writing progress report								
First draft								
Submitting Final report								
Dissemination of finding								

Table 9.2 The detail budget plan of the research project work**:**

S/No	Budget category	Unit Cost	Multiplying Factor	Total Cost(ETB)
1	Personnel	Per diem	Personnel*days*unit cost	
	Principal Investigator	400	20*400	8000
	Supervisors	300	2*15*300	9000
	Data collectors	200	5*200*15	15000
	Sub total			32000
2	Training	Cost per item	Number of days	
	Hall rent	1000	5	5000

	Tea/Coffee	100/individual/day	5	4000
	Sub total			9000
3	Transport	Unit Cost	Car*day*cost	
	Car rent	1500	1*20*1500	30000
	Sub total			30,000
4	Miscellaneous costs		5000	5000
	Sub total			5000
5	Total			76,000
	Contingency(10% of total)			7600
6	Grand total			83,600

5. References

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Annex: 8.1

8.1. Data Collection tool for malaria outbreak investigation,

I. Socio-demographic information:

1. ID number of respondent_____

2. Age in years_____

3. Sex: M□F □

4. Address: Region _____Zone_____ Woreda_____ kebele _____village_____

5. Occupation: Employed □unemployed □ Student □ Pastoralist □farmer

6. Total family members' _____

7. Ethnicity: _____

8. Religious: Orthodox, □Protestant, □Muslim □other □

9. Marital status: Married, □single □Widowed □ Divorced□

10. Grade: One □ Two □ Three□ Four □ Five Six □ Seventh□ Eight□

11. Auxiliary temperature———————

12. RDT Result; Positive □ Negative □

13. Microscopic result; Positive □ Negative □

14. If positive malaria species; PF □ PV□

III. Risk Factors

21. Specific living areas _____

22. Sleeping areas in side home _____outside home_____

23. Do you stay outside over night? Yes □No□

24. Is there anybody in your home with similar sign and symptoms? Yes □No□

25. Did you travel outside your village in the past 2-3 wks Yes □No □

26. If yes Q 24, indicate

(a) Date of travel DD/MM/Y_____

(b) The place of travel———————

(c) Date when you returned back DD/MM/YY_____

27. If Q 24 is yes, is there sick patient (same symptoms) in the place where you have been Yes □ No □

28. Is there a similar sick patient in your house hold Yes □ No □

29. Do you have bed net in your household Yes □ No □, If is yes, how often do you use

Always □ Sometimes □ Never □

30. Do mothers and children given priority of using bed nets? Yes □ No

31. If yes Q 30 the number of bed nets _____

32. Was deltamethrine sprayed this year? Yes □No□

33. If yes Q31 when? _____

34. If yes Q31 how many? Once □twice □

IV. Environmental investigation

35. Place of stay during night? _____

36. Is there any artificial water -holding containers close to your home? Such as:

a. old tires: Yes □No□,

b. Plant in the containers /flower –pots Yes □No□,

c. plant with temporary water pools Yes □No□,

d. Open deep well: Yes □No□,

e. Broken glass bottles Yes □No □,

f. Cans Yes □No□,

g. Plastic container Yes □No□,

h. Gutter to collect rainwater: Yes □No□

i. Uncovered water storage/ septic tank Yes □No□,

j. Stagnant water Yes □No□,

37. Presence of mosquito vectors/ mosquitoes breeding sites around the home or vicinity?

Yes □ No□,

38. If Q 37 yes, presence of larvae in breeding sites Yes□ No□,

39. Types of house screened Yes □No □, unscreened Yes □No □,

40. Do you use repellents Yes-□No□,

41. Protective clothing Yes-□No□,

42. Waste collection: Yes-□No□,

43. Unprotected irrigation Yes-□No□,

44. Presence of Intermittent rivers cloths to the community Yes □No□,

45. Presence of tick grass Yes□ No□,

V. Awareness assessment

46. Do know malaria? Yes □ No □,

47. Sign and symptoms

a) Fever: Yes □No□

b) Vomiting: Yes □No□

c) Diarrhea: Yes □No□,

d) Anorexia (appetite loss): Yes □No□,

e) Headache: Yes □No□

f) Sweating: Yes □No□,

g) Chilling and shivering: Yes □No□,

h) Weakness: Yes □No□,

i) Caught: Yes □No□,

j) Back pain: Yes □No□,

k) Muscle pain: Yes □No□,

l) Rigor: Yes □No□,

47. How it transmitted? ----------

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48. How it can be prevented? ----------

Chapter XV: Other Additional output reports

9.1. Surveillance data analysis of influenza, Mekelle Hospital sentinel site, Tigray Region, Ethiopia, Jun, 2013-Feb, 2015.

Executive summary

Introduction; Influenza is an acute viral infection of the respiratory tract caused by a virus family called *Orthomyxoviridae (1)*. Influenza virus mainly attacks the upper respiratory tract (but could also attack lower respiratory tract and cause pneumonia).

There are limited data regarding the burden and the impact of influenza in tropical and subtropical regions including Ethiopia and this makes the entire continent particularly vulnerable to the spread of novel influenza viruses having pandemic potential. It is also known that in Africa lower respiratory tract infection/pneumonia are among the top causes of morbidity and mortality, especially among children <5 years of age.

There are three types of influenza viruses: A, B and C .Influenza A and B are responsible for most clinical illness. Influenza-A is also sub divided in to seasonal, H1N1, H1N2, H3N2 and (influenza A (H1N1) pdm2009).

The ILI and SARI surveillance sites were started in Ethiopia since, 2008 by the initiation of CDC and WHO, currently there are 8 influenza surveillance sites (3 ILI and 5 SARI sites) nationally and mekelle hospital is one of the SARI site.

From the total of 1,006 swabbed specimens, of which 999 were tested at national influenza laboratory(NIL) by PCR, with 284 testing positive for Influenza; 93 for Flu B, 63 A/seasonal H3, and 128 were influenza A (H1N1) pdm 2009 during 2008-2009 period.

Methodology; A surveillance data of mekelle hospital SARI patients meeting criteria for SARI case definition collected from Jun, 2013-Feb, 2015 was analyzed.

Result; from the total of swabbed and tested 250 SARI cases in the NIL ,13(5.2%) were positive for influenza with 12(92.3%) influenza A type .From the total influenza A positive cases seasonal H3N2 sub-type accounts for 11(91.7%) of influenza A sub-type. All of the confirmed cases for influenza were in less than five year age children.

Conclusion; all of the confirmed influenza cases was seen in under five children. Most of the confirmed cases were from three neighboring woredas of mekelle zone with highest increase in December, 2014. The most circulating type was influenza A, sub-type seasonal H3N2.

Key words: Influenza, SARI, Mekelle Hospital, Confirmed, under five

Introduction

Influenza is an acute viral infection of the respiratory tract caused by a virus family called *Orthomyxoviridae (1)*. Influenza virus mainly attacks the upper respiratory tract (but could also attack lower respiratory tract and cause pneumonia).

There are three types of influenza virus: A, B and C .Influenza A and B are responsible for most clinical illness [2]. Influenza type C. Influenza A infects multiple species, including humans other mammals, and wild and domestic birds and it can cause epidemic disease in humans. Influenza-A is also sub divided in to seasonal, H1N1, H1N2, H3N2 (through antigenic drift) and (influenza A (H1N1) pdm2009) through antigenic shift. The pandemic influenza A (H1N1) pdm2009 was detected in our country since June, 2009 (called yehdar beshta).

The disease is characterized by the sudden onset of fever, chills, headache, myalgia and extreme fatigue [3]. Other common symptoms include a dry cough, sore throat and stuffy nose. The risk of serious illness from influenza is higher amongst children under six months of age, older people and those with underlying health condition such as respiratory or cardiac disease, immuno suppression and pregnant women. Serological studies in health care professionals have shown that approximately 30 to 50% of influenza infections can be asymptomatic but this may vary depending on the characteristics of the influenza strain.

Severe acute respiratory illness (SARI) is one of the world's most common causes of pediatric hospitalization and mortality, with severe outcome disproportionately

Affecting the poorest countries, such as those in sub-Saharan Africa [4] .Despite the public health and clinical importance of SARI, most sub-Saharan African countries have had no or weak surveillance for overall and cause-specific SARI hospitalization and mortality.

With the support of CDC, influenza surveillance in Ethiopia was initiated in 2008. Ethiopia has selected 20 priority diseases with mandatory reporting, among those required to be reported immediately are avian-human influenza, pandemic influenza, and severe acute respiratory infection (SARI). In Ethiopia, currently eight sentinel sites (five SARI and three ILI sites) are actively working. Mekelle Hospital is one of the five national SARI sentinel sites started on June, 2013.

According to 2012&2013 fiscal year EHNRI annual report on influenza sentinel surveillance of the total of 1,006 specimens, 999 were tested at national influenza laboratory(NIL) by PCR, with 284 testing positive for Influenza; 93 for Flu B, 63 A/seasonal H3, and 128 were influenza A (H1N1) pdm 2009[5].

According to IHR 2005, Ethiopia has made it mandatory to report 20 priority diseases .Among those that are required to be reported immediately are avian-human influenza, pandemic influenza, and sever acute respiratory infection (SARI).

There was also a needed to have a baseline data at regional or national PHEM for decision makers (since the hospital was best SARI site).

Influenza is estimated to result in up to five million cases of severe illness and 250,000 to 500,000 deaths worldwide each year with the average attack rates ranging from as low as 10% to 20% in the community ,to as high as 50% in selected groups and closed settings in an outbreak situations.

Even though the burden of SARI respiratory tract infection/pneumonia are among the top causes of morbidity and mortality in Ethiopia, especially among children <5 years of age but few data are available to allow an estimation of respiratory disease burden that is due to influenza.

Sentinel surveillance is also the most efficient way to collect high-quality data in a timely way. Most of the routine surveillance data's of the Tigray regional health bureau PHEM were not available, not organized to conduct data analysis.

General objective

To describe SARI cases in mekelle hospital influenza sentinel surveillance site, Tigray region.

Specific Objective

•To describe the SARI influenza sentinel surveillance data by person, time and place

•To identify the circulating strain of influenza among SARI cases in mekelle hospital sentinel site, Tigray region.

•To draw possible recommendations on the control and prevention of influenza.

Methodology

Study area:

Mekelle hospital is found in the capital city of Tigray region, Mekelle. Mekelle the capital city of Tigray region is found in the northern part of Ethiopia a distance of 783 km far away from Addis Ababa, capital city of Ethiopia. The surveillance data was collected from mekelle hospital SARI registration log book that met the SARI case definition. Since the surveillance site catchment area population is not well defined it is difficult to know health service coverage and other indicators.

Study period

A sentinel surveillance data of mekelle zonal hospital from June, 2013-Feb, 2015 was collected retrospectively.

Study population; All mekelle hospital clients from Jun, 2013-Feb, 2015**.**

Data Source; All admission cases of mekelle hospital from Jun, 2013-Feb, 2015**.**

Study subjects; All registered admission cases that meet criteria for SARI case definition from Jun.2013-Feb, 2015**.**

Case definition for SARI

For person's ≥5 years:

Any severely ill person presenting with manifestations of acute lower respiratory infection with:

•Sudden onset of fever (>38 oc) and:

•Cough or sore throat and

•Shortness of breath or difficulty breathing, with or without clinical or radiographic findings of pneumonia and

•Requiring hospitalization or any person who died of an unexplained respiratory illness.

For children <5 years:

Clinical case definition for pneumonia (IMCI definition).

Any child age 2 months to 5 years presenting with cough or difficult breathing and

•50 or more breaths per minute for infant 2 months up to 1 year

•40 or more breaths per minute for young child 1 year up to 5 years

Confirmed influenza case: Is a case that meets the clinical case definition and is laboratory confirmed (laboratory results must be positive for influenza virus).

Data collection procedure: Previously collected influenza sentinel surveillance data of mekelle hospital SARI site was reviewed.

Variables; Mekelle hospital SARI registration log book consists of sex (male and female), age (in month and year), residence (woreda and zone) and some clinical features.

Data management and analysis plan

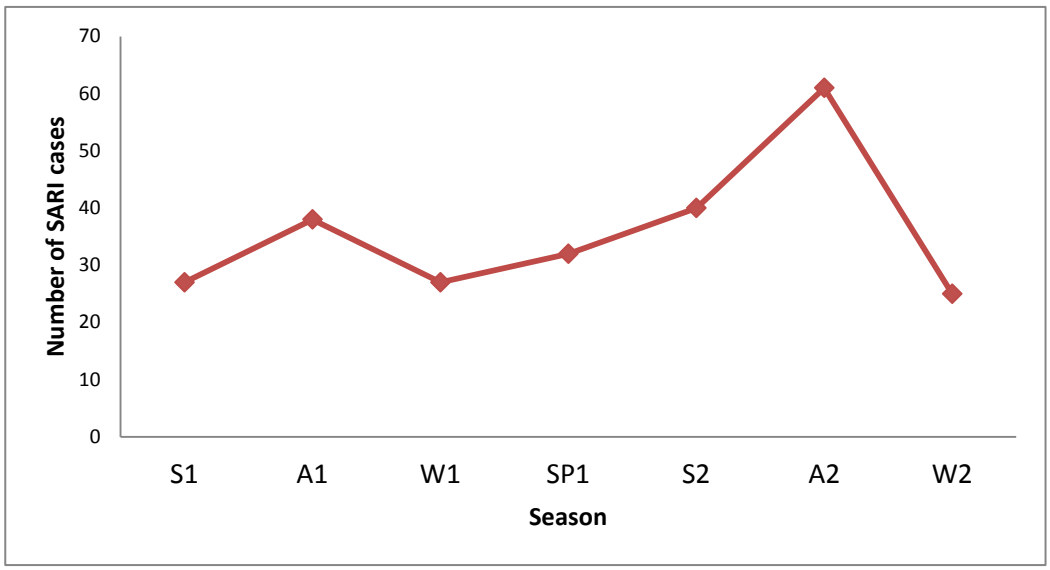
After the data was cleaned by ms-excel 2007 it was exported to Epi-Info version 7.1.3.10 for descriptive analysis. Ms-excel 2007 was also used for analysis.

Result

A total of 250 SARI cases were found registered that meet SARI case definition with age range from 2 months-92 years and there was no reported death from June, 2013-Feb, 2014.

1. The frequency distribution of SARI cases by time.

As the graph shows it doesn`t show regular trend but it was increased from W1-A2 and then dropped on W2. The peak was on A2 this may be due to cold season and the irregularity may indicate seasonal variation of the cases or availability of bed or oxygen on the surveillance site because SARI cases need hospitalization with artificial respiration.

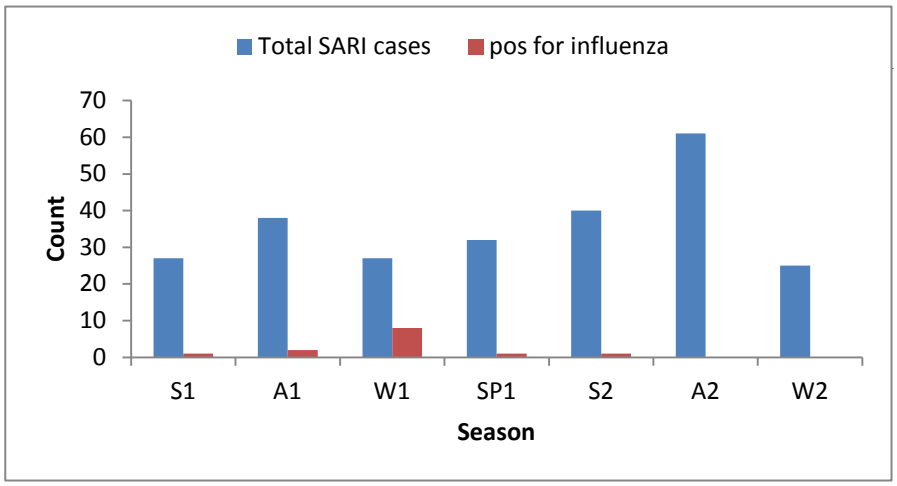


S1- Summer1 (jun-aug,2013) ,A1-Atunum1(sep-nov,2013), W1- Winter1(dec-feb,2014), sp1-Spring1(mar-may,2014),S2-Summer2(jun-aug,2014),A2-Atunum2(sep-nov,2014),W2-Winter2(dec-feb,2015).

Figure 9.1.1 Seasonal trends of SARI cases, mekelle hospital ISS, Tigray region, Jun, 2013-Feb, 2015.

The proportion of confirmed cases for influenza was almost the same on S1, A1 (1 more case), SP1 and S2 but it peaks on W2 with 8 confirmed cases (61.5 %) conversely there was no confirmed case on W2 the same season with W1.This can be due to secondary transmission during the outbreak time, most of the confirmed cases was happened on December, 2013.

Figure 9.1.2 Seasonal proportion of SARI cases positive for influenza, mekelle hospital ISS, Tigray Region, Jun, 2013-Feb, 2015.



S1=Summer1(Jun-Aug,2013),A1=Atunum1(Sep-Nov,2013),W1=Winter1(Dec-Feb,2014),SP1=Spring1(Mar-May,2014),S2=summer2(Jun-aug,2014),A2=Atunum2(Sep-Nov,2014),W2=Winter2(Dec-Feb,2015).

Most of the SARI patients were influenza –A (H3N2) positive with cumulative percent of 84.5% in the period, Jun, 2013-Feb, 2015. When we see the number of confirmed influenza-A cases by date of onset most of the cases 7(46 %) was seen in December with peak on Dec, 18, 2013.

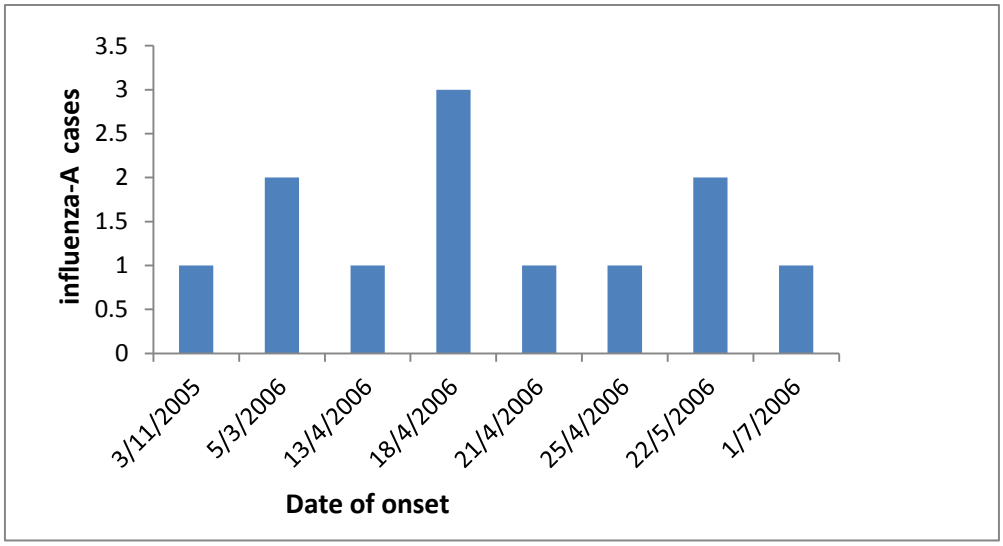


Figure 9.1.3. The number of confirmed influenza-A cases by date of onset, mekelle hospital ISS, Tig Region, Jun, 2013-Feb, 2015

2. Distribution of SARI cases by person

The majority of the SARI patients (cases) were children <1 year age group 114 (45.6%) and 1-4 year age group 113(45.2%).This was due to the reason that pneumonia was the leading cause of admission in under five children age group in the hospital during that period of time. From the total laboratory tested SARI cases 13(5.2%) were positive for influenza virus, 4(30.8%) were <1 year age group and 9(69.2%) were 1-4 years age group children. The proportion of ≥5 years age group SARI cases was 23(9.2%) with no confirmed cases.

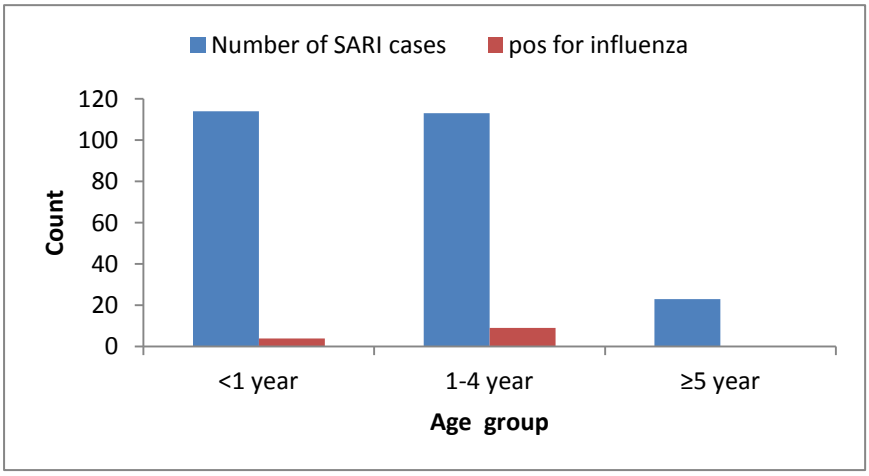


Figure 2 The proportion of SARI cases positive for influenza by age group, mekelle hospital, Tigray, Jun, 2013-Feb, 2015.

From the total SARI cases (patients) 54.8 % were males higher than females with lab result of 6(46.2% and 7(53.8%) males and females respectively.

Table 2 Shows the frequency distribution of SARI cases by sex and lab result, mekelle hospital ISS, Tigray region, Jun, 2013-Feb, 2015.

Sex	Frequency	Cumulative percent	Lab result	Cumulative percent
Male	137	54.8	6	46.2
Female	113	45.2	7	53.8
Total	250	100	13	100

3. Distribution of SARI cases by place;

The majority of the cases were from mekelle zone, 199 (79.6%) and 9(69.2%) SARI cases and confirmed cases respectively and all the confirmed cases were from three neighboring woredas (hadnet, k/woyane and semen) of mekelle zone. The remaining 4(30.8%) confirmed cases were from h/wejirat, wukiro, d/temben and abala (afar region) woredas outside mekelle zone with a total relative frequency of 51(20.4%) SARI cases**.**

Table 3 shows the proportion of SARI cases positive for influenza by zone and woreda, mekelle hospital ISS, Tigray region, Jun, 2013-Feb, 2015.

Zone	Woreda	Number of SARI cases	Relative frequency (%)	Lab result	Relative Frequency (%)
Mekelle	Semen	60	24	2	15.4
	Adi Haki	4	1.6	0	0
	Hadnet	68	27.2	4	30.8
	Ayder	6	2.4	0	0
	K/Woyane	46	18.4	3	15.4

	Quiha	2	0.8	0	0
	Hawelti	13	5.2	0	0
South – East	H/Wejerat	8	3.2	1	7.7
	Enderta	30	12.0	0	0
	D/Temben	7	2.8	1	7.7
Zone-2	Abala	3	1.2	1	7.7
Eastern	Wukro	3	1.2	1	7.7
Total		250	100	13	100

Discussion;

During the 22 months of influenza surveillance site of mekelle hospital, influenza virus was found a common contributor to respiratory illness, affecting only under five children, which is different from 30 months Tanzania national influenza sentinel surveillance that affects all age groups [5]. This difference may be due to the reason that mekelle hospital ISS is only designated for SARI cases with proportion of 90.8% under five children where as the Tanzania national influenza sentinel surveillance includes both ILI and SARI cases with proportion of 64% under five children, due to the reason that ILI cases has great chance to include >=5 years old outpatient cases.

Of the total 250 laboratory tested SARI cases 13(5.2%) was positive for influenza that is less than to the Tanzania national influenza sentinel surveillance with 51(7.3%) confirmed influenza

cases from the total of 695 laboratory tested SARI cases. Both the national labs use the same type of instrument called, rRT-PCR.

After further characterization for the influenza positive samples, of the total 13 positive influenza cases 12(92.3%)was influenza-A type and only 1(7.7%) was influenza-B type, this was almost similar to the Tanzania SARI surveillance result, from the total of 51 influenza positive samples, 45(88.2%) and 6(11.8%) was influenza-A and B types respectively. From the total of 12 influenza-A types, seasonal A (H3N2) sub-type accounts for 11 (84.6%) followed by swine flu A/H1 that accounts for only 1(15.4%). When it compares with Tanzania, from total of 45 influenza-A types seasonal A (H3N2) accounts for 35(77.8%) this small difference may be due to the outbreak of A (H1N1) pdm09 during the surveillance period, that accounts for 9(20.0%) of the influenza-A cases followed by only 1(2.2%) seasonal A (H1N1) case with no confirmed swine flu A/H1 case.

10(76.9%) of the confirmed cases was seen from Nov, 2013-Jan, 2014, this may be due to the cold season that can lead to an increased SARI cases but in case of Tanzania majority of the cases appear from Feb,2010-Sep,2010 with slight increase from Aug-Oct,2009. This variation could be due to the 2009 pandemic influenza outbreak in Tanzania or seasonal variation of the two countries, E.g. Dareselam has higher temperature from Dec-Jan but mekelle has lowest temperature at the same period.

Surveillance of SARI cases conducted among children <5 years age in kibra, a densely populated urban slum in Nairobi, Kenya indicates that from the total of 815 swabbed samples tested for influenza viruses, parainfluenza viruses (PIV), respiratory syncytial virus (RSV), adenovirus, and Rhinovirus/Entrovirus was 13.7%,15.0%,20.7%,29.5% and 47.5 % respectively. But RSV and influenza A and B were important contributors to SARI cases in children estimated to account for 16.2% and 6.7% of SARI cases respectively when compared with controls, the other types of pathogens were not statistically significant when compared with controls [6].

Limitation

The SARI registration log book doesn`t have vaccination status and enough clinical information according to SARI case definition that have missed signs and symptoms of SARI cases and this

makes difficult to compare influenza positive and negative SARI cases by their vaccination status and clinical information.

There were no confirmed influenza case from Feb, 2014-Feb, 2015.

The SARI surveillance system was biased towards under five children or low health care utilization may make a health facility-based surveillance approach less effective, E.g.; Elderly.

The SARI surveillance system was facility-based rather than population based, although it did give us important information about the epidemiology of inpatient influenza cases, it could not inform us about over all burden of disease in the population.

Since mekelle hospital is the only SARI influenza sentinel surveillance site and its catchment population is difficult to determine, the findings may not be generalizable to the regional even to the zonal distribution of the disease.

It can under estimate the burden of respiratory infections due to SARI cases since there was no test for other viral and bacterial pathogens that could have caused SARI.

Conclusion

All of the influenza confirmed cases was detected in under five children. Most of the confirmed cases 9(69.2%) were from hadnet, k/woyane and semen woredas of mekelle zone .Most of the cases was occurred on Nov and Dec, 2013 with highest proportion in December. The most circulating type was influenza A, sub-type seasonal H3N2.

Continuous influenza surveillance will provide a frame work for detecting and following future influenza outbreaks and pandemics especially when all the swabbed samples will be tested for other viral and bacterial pathogens in addition to influenza, and will also provide a better understanding of the epidemiology and seasonality of influenza in the hospital, to estimate regional and national burden of SARI cases.

Recommendation to EPHI

To know the burden of respiratory infections due to SARI all the swabbed naso/oro -pharyngeal samples should be tested for other viral or bacterial pathogens. A case control study conducted in <5 years age children in Kenya indicates that, RSV and influenza A and B were important

contributors to SARI cases in children estimated to account for 16.2% and 6.7% of SARI cases respectively when compared with controls.

Future interventions to reduce influenza –associated hospitalizations should target <5 years age children but efforts should be made to better understand influenza for other age groups by adding ILI cases to the influenza sentinel surveillance.

The SARI registration log book must include vaccination status, all the signs and symptoms of individual cases, according to the SARI case definition for further comparison among the influenza positive and negative SARI cases.

It is better to increase the number of influenza sentinel surveillance sites to know the circulating strain and burden of respiratory infections for decision making.

The influenza sentinel surveillance system needs strengthening for detecting emerging and re-emerging future influenza outbreaks and pandemics but this needs timely feedback of lab results for early intervention.

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Surveillance of Severe acute respiratory infection (SARI) in <5year age children in kibra, a densely populated urban slum in Nairobi, Kenya, 2007–20

9.2. Emergency Health and Nutrition activities (EHN)

Emergency Health and Nutrition Preparedness Status Assessment Tool.

The purpose of the assessment is to check the functional ability of the various elements, either singularly or interactively as applicable

Key Preparedness Assessment Components are:

1. Over all coordination[20%]
2. Human resource for emergency response [15%]
3. Communication and social mobilization-Public awareness and community engagement [10%]
4. WASH- Water ,Hygiene and sanitation [10%]
5. Case management-Inpatient case management, outpatient case management, Supplementary feeding [20%]
6. Epidemiological Surveillance [10%]
7. Supply and logistics management [15%]

Grading for each of the assessment component: Grading will be made in colour code,

Red (<50%)

Yellow (50-80%) and

Green >80%

Finally overall grading will be made to evaluate the status of preparedness at each levels.

Scale 1-5: 5= >=90%, 4=80-90%, 3=70-80%, 2=50-70%, 1=<50%

Level assessed: Region -Tigray Zone -Central

Table 4 Narrative summary of each woredas by each assessment component with their respective colour code

Woreda Name	Over all coordination	Human resource	Social Mobilization	WASH	Case-Management	Surveillance	Supply	Average result
M/Leke	43	87	90	90	84	80	86	80
Ahferom	35	83	90	80	76	80	86	78
W/Leke	30	96	90	80	86	85	83	79
K/Temben	33	97	90	85	67	85	83	77
T/Abergele	30	86	90	90	86	85	80	78
Average	34.2	89.8	90	85	79.8	83	83.6	78.4

Table 5 Emergency Health and Nutrition Assessment result of the visited woreda, Aug, 2015.

Woreda-<u>Tanqua Abergele</u>

S/NO	**Key Preparedness Components:**	**Wt**	
	Component 1- Overall Coordination:	**20**	**6.0(30.0 %)**
1.1	Existence of functional multi-sectoral Emergency Health and Nutrition Coordination Committee	4	1
1.2	Existence of functional technical sub-committees of the Emergency Health and Nutrition with focal points and clear mandate constituted	2	1
1.3	Membership to the Emergency committees in hot-spot priority 1,2 and 3 woredas reviewed and updated, and every one informed of the roles and	2	1

	responsibility		
1.4	Existence of clear TOR for the EHN coordination committee and technical sub-committees	2	0
1.5	Established procedures for command & control, coordination mechanisms, clearance of key technical and information products	1	0
1.6	Developed plans of actions for the coordination committee	3	0
1.7	Identify, orient and assign emergency health and nutrition (EHN) focal points at all levels	1	1
1.8	Weekly/ every two weeks minuted meetings and monitoring mechanisms of the coordination body at this level	3	0
1.9	Linkages and reporting mechanisms with other higher and lower level coordination committee	2	2
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 2- Human resource for Emergency Response	**15**	**14.5 (96.7%)**
2.1	Health workers identified, trained and assigned for acute malnutrition case management	4	4
2.2	Health workers identified, trained and assigned for Water, Hygiene and sanitation (WASH) activities	2	2
2.3	Health workers identified, trained and assigned for surveillance and outbreak response	2	2
2.4	Health workers identified, trained and assigned for logistics and supply management	2	2
2.5	Team identified, trained and assigned for communication and social mobilization within health and other sectors	1.5	1
2.6	Identified and trained Health Development Army at community level on emergency health and nutrition preparedness and response	1.5	1.5
2.7	Human resource availability and capacity gap analyzed and gap filled	2	2
	Key Preparedness Actions:	**Wt**	**Scale 1-5**

	Component 3- Communication and Social Mobilization – Public awareness and community engagement	**10**	**8 (80%)**
3.1	Established functional communication coordination mechanism	1	1
3.2	Established mechanisms for engaging with Health development army (HDA) and local community networks (edir, ekub…) for social mobilization	2	2
3.3	Orientation made about EHN preparedness and response to HDA, elders and influential leaders in the community	1	1
3.4	Health and nutrition emergency preparedness and response activities as standing agenda of HDA regular meeting	3	2
3.5	Disseminated targeted messages for health care workers, local and traditional leaders, churches, schools and other community stakeholders	2	2
3.6	Established plan for reviewing, revising and monitoring impact of communication and social mobilization activities	1	0
	Component 4 – WASH-Water, Hygiene and Sanitation		
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 4- WASH-Water, Hygiene and Sanitation	**10**	**7 (70%)**
4.1	Is there a functional WASH coordinating committee/task force at this level with defined TOR and Plan of action	**2**	0
4.2	Water sources identified for human and animal consumption	**2**	2
4.3	Water trucking capacity / easy accessibility	**2**	1
4.4	Water treatment chemical available or easily accessible	**2**	2
4.5	General hygiene and sanitation promotion activities at health facility, community and at school	**2**	2
	Component 5 – Case Management		
	[The purpose of the assessment is to check the operational capacity to safely treat complicated SAM cases which includes the availability of the number of qualified health professionals		
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 5- Case Management	20	

	a) Stabilization Centre (SC)	**9**	**7.5(83.3 %)**
5.1	At least one in-patient facility/ SC set up in each woreda ready to provide care to patients with Complicated Sever Acute Malnutrition.	1.5	1.5
5.2	In case surge, are all of the health centers and hospitals ready to provide in-patient services for complicated SAM cases?	1	1
5.3	Assessed health workers capacity for in-patient SAM management and gap identified at each of the health facility for SC	1	1
5.4	24/7 – service provision during working and non-working hours for SC	1	1
5.5	Critical supplies (F-75, F-100, ReSoMal, antibiotics, NG-tube) for SC for at least 3 month available	2	1
5.6	Availability of food for care-takers in each SC	0.5	0
5.7	Health facility (HP, HC and Hospitals) with safe water availability (for SC)	1	1
5.8	Health facilities with functional anthropometric measurement equipments for SC	0.5	0.5
5.9	Availability of protocols for the management of SAM cases	0.5	0.5
	b) Out-patient therapeutic care (OTP)	**9**	**8.5(94.4 %)**
5.1.1	All of the health facilities (HP, HC and Hospitals) provide care to patients with uncomplicated Sever Acute Malnutrition in OTP	1.5	1
5.1.2	Assessed health workers capacity for out-patient SAM management and gap identified at each of the health facility for OTP	2	2
5.1.3	Daily SAM case identification and admission to OTP in all health posts and health centers or through mobile health and nutrition team in pastoralist areas	1.5	1.5
5.1.4	Health facilities with functional anthropometric measurement equipments for OTP	1	1
5.1.5	Critical supplies (RUTF, Amoxicillin…) for OTP for at least 3 month available	2	2
5.1.6	Health facilities (Health Center and Health Post) with safe water and hand washing facilities for OTP	0.5	0.5
5.1.7	Availability of protocols for the management of SAM cases	0.5	0.5

	c) Supplementary Feeding Program (SFP)	2	2(100%)
	Arrangements made with relevant sectors for managing moderately acutely malnourished children and Pregnant and lactating women	2	2
	Component 6 – Epidemiological Surveillance		
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 6 - Epidemiological Surveillance and Response	**10**	**7 (70%)**
6.1.	Availability for weekly disease surveillance system (PHEM) in place	1	1
6.1.	Availability of functional weekly malnutrition surveillance system in place - recording, analysis and reporting of SAM and MAM cases from OTP, SC , SFP and other health facilities (Mobile health and nutrition service)	1.5	1
6.3.	Health and health related woreda profile mapped	1	0
6.4.	Rapid nutritional screening conducted recently in all kebeles in the woreda (EOS, CHD, routine screening, rapid nutrition assessment)	1.5	1.5
6.5.	Assigned trained focal points for recording, monitoring and reporting of diseases and acute malnutrition cases	1.5	1.5
6.6.	Availability of weekly disease and malnutrition reporting formats (standard case definitions, PHEM reporting form)	0.5	0.5
6.7.	Practice of daily/ weekly data analysis, interpretation and use	1	0
6.8.	Established system to identify unusual occurrence of diseases at community level	1	1
6.9.	Established rapid response team for any disease outbreak	0.5	0.5
6.1	Defined operational budget, supply and logistics for rapid emergency response of any disease outbreaks.	0.5	0
	Component 7 – Logistics and Supply Management		
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 7- Logistic and Supply Management	**15**	12.5 (83.3%)

7.1	Established logistics and supply management team/ taskforce	3	3
7.2	Supply requirement identified	1.5	1.5
7.3	Mapped available supply and logistics gap identified	1	0
7.4	Measures taken to fill the identified supply gaps	1	0.5
7.5	Mechanisms to regularly request and report supply in place [(use of Report and Requisition Form (RRF), Health Post Monthly Reporting and Resupply(HPMRR)]	2	2
7.6	Established mechanisms to monitor and track supply distribution and proper use at different levels (Woreda, Health Facility, Household)	2.5	2.5
7.7	Identified, oriented and assigned HDA to monitor the utilization of Ready to Use Therapeutic Food (RUTF) and Targeted Supplementary Food (TSF) at House Hold level	2	2
7.8	Minimal stock level defined for commodities supplied through UNICEF and other agencies at each levels (Health Facility, Woreda, Region)	2	1

Woreda- <u>kola Temben</u>

S/NO	**Key Preparedness Components:**	**Wt**	**6.5(33%)**
	Component 1- Overall Coordination:	**20**	
1.1	Existence of functional multi-sectoral Emergency Health and Nutrition Coordination Committee	4	1
1.2	Existence of functional technical sub-committees of the Emergency Health and Nutrition with focal points and clear mandate constituted	2	1
1.3	Membership to the Emergency committees in hot-spot priority 1,2 and 3 woredas reviewed and updated, and every one informed of the roles and responsibility	2	1
1.4	Existence of clear TOR for the EHN coordination committee and technical sub-committees	2	0

1.5	Established procedures for command & control, coordination mechanisms, clearance of key technical and information products	1	0
1.6	Developed plans of actions for the coordination committee	3	0.5
1.7	Identify, orient and assign emergency health and nutrition (EHN) focal points at all levels	1	1
1.8	Weekly/ every two weeks minuted meetings and monitoring mechanisms of the coordination body at this level	3	0
1.9	Linkages and reporting mechanisms with other higher and lower level coordination committee	2	2
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 2- Human resource for Emergency Response	**15**	**14.5 (97%)**
2.1	Health workers identified, trained and assigned for acute malnutrition case management	4	4
2.2	Health workers identified, trained and assigned for Water, Hygiene and sanitation (WASH) activities	2	2
2.3	Health workers identified, trained and assigned for surveillance and outbreak response	2	2
2.4	Health workers identified, trained and assigned for logistics and supply management	2	2
2.5	Team identified, trained and assigned for communication and social mobilization within health and other sectors	1.5	1
2.6	Identified and trained Health Development Army at community level on emergency health and nutrition preparedness and response	1.5	1.5
2.7	Human resource availability and capacity gap analyzed and gap filled	2	2
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 3- Communication and Social Mobilization – Public awareness and community engagement	**10**	**9 (90%)**
3.1	Established functional communication coordination mechanism	1	1

3.2	Established mechanisms for engaging with Health development army (HDA) and local community networks (edir, ekub…) for social mobilization	2	2
3.3	Orientation made about EHN preparedness and response to HDA, elders and influential leaders in the community	1	1
3.4	Health and nutrition emergency preparedness and response activities as standing agenda of HDA regular meeting	3	2
3.5	Disseminated targeted messages for health care workers, local and traditional leaders, churches, schools and other community stakeholders	2	2
3.6	Established plan for reviewing, revising and monitoring impact of communication and social mobilization activities	1	0
	Component 4 – WASH-Water, Hygiene and Sanitation		
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 4- WASH-Water, Hygiene and Sanitation	**10**	**8.5 (85%)**
4.1	Is there a functional WASH coordinating committee/task force at this level with defined TOR and Plan of action	**2**	0
4.2	Water sources identified for human and animal consumption	**2**	2
4.3	Water trucking capacity / easy accessibility	**2**	1
4.4	Water treatment chemical available or easily accessible	**2**	2
4.5	General hygiene and sanitation promotion activities at health facility, community and at school	**2**	2
	Component 5 – Case Management		
	[The purpose of the assessment is to check the operational capacity to safely treat complicated SAM cases which includes the availability of the number of qualified health professionals		
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 5- Case Management	20	
	a) Stabilization Centre (SC)	**9**	**13(67%)**

5.1	At least one in-patient facility/ SC set up in each woreda ready to provide care to patients with Complicated Sever Acute Malnutrition.	1.5	1.5
5.2	In case surge, are all of the health centers and hospitals ready to provide in-patient services for complicated SAM cases?	1	1
5.3	Assessed health workers capacity for in-patient SAM management and gap identified at each of the health facility for SC	1	1
5.4	24/7 – service provision during working and non-working hours for SC	1	1
5.5	Critical supplies (F-75, F-100, ReSoMal, antibiotics, NG-tube) for SC for at least 3 month available	2	1
5.6	Availability of food for care-takers in each SC	0.5	0
5.7	Health facility (HP, HC and Hospitals) with safe water availability (for SC)	1	1
5.8	Health facilities with functional anthropometric measurement equipments for SC	0.5	0.5
5.9	Availability of protocols for the management of SAM cases	0.5	0.5
	b) Out-patient therapeutic care (OTP)	**9**	**6(66.6%)**
5.1.1	All of the health facilities (HP, HC and Hospitals) provide care to patients with uncomplicated Sever Acute Malnutrition in OTP	1.5	1
5.1.2	Assessed health workers capacity for out-patient SAM management and gap identified at each of the health facility for OTP	2	2
5.1.3	Daily SAM case identification and admission to OTP in all health posts and health centers or through mobile health and nutrition team in pastoralist areas	1.5	1.5
5.1.4	Health facilities with functional anthropometric measurement equipments for OTP	1	1
5.1.5	Critical supplies (RUTF, Amoxicillin…) for OTP for at least 3 month available	2	2
5.1.6	Health facilities (Health Center and Health Post) with safe water and hand washing facilities for OTP	0.5	0.5
5.1.7	Availability of protocols for the management of SAM cases	0.5	0.5
	c) Supplementary Feeding Program (SFP)	2	2(100%)

	Arrangements made with relevant sectors for managing moderately acutely malnourished children and Pregnant and lactating women	2	2
	Component 6 – Epidemiological Surveillance		
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 6 - Epidemiological Surveillance and Response	**10**	**7 (70%)**
6.1.	Availability for weekly disease surveillance system (PHEM) in place	1	1
6.1.	Availability of functional weekly malnutrition surveillance system in place - recording, analysis and reporting of SAM and MAM cases from OTP, SC , SFP and other health facilities (Mobile health and nutrition service)	1.5	1
6.3.	Health and health related woreda profile mapped	1	0
6.4.	Rapid nutritional screening conducted recently in all kebeles in the woreda (EOS, CHD, routine screening, rapid nutrition assessment)	1.5	1.5
6.5.	Assigned trained focal points for recording, monitoring and reporting of diseases and acute malnutrition cases	1.5	1.5
6.6.	Availability of weekly disease and malnutrition reporting formats (standard case definitions, PHEM reporting form)	0.5	0.5
6.7.	Practice of daily/ weekly data analysis, interpretation and use	1	0
6.8.	Established system to identify unusual occurrence of diseases at community level	1	1
6.9.	Established rapid response team for any disease outbreak	0.5	0.5
6.1	Defined operational budget, supply and logistics for rapid emergency response of any disease outbreaks.	0.5	0
	Component 7 – Logistics and Supply Management		
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 7- Logistic and Supply Management	**15**	12.5 (83.3%)
7.1	Established logistics and supply management team/ taskforce	3	3
7.2	Supply requirement identified	1.5	1.5

7.3	Mapped available supply and logistics gap identified	1	0
7.4	Measures taken to fill the identified supply gaps	1	0.5
7.5	Mechanisms to regularly request and report supply in place [(use of Report and Requisition Form (RRF), Health Post Monthly Reporting and Resupply(HPMRR)]	2	2
7.6	Established mechanisms to monitor and track supply distribution and proper use at different levels (Woreda, Health Facility, Household)	2.5	2.5
7.7	Identified, oriented and assigned HDA to monitor the utilization of Ready to Use Therapeutic Food (RUTF) and Targeted Supplementary Food (TSF) at House Hold level	2	2
7.8	Minimal stock level defined for commodities supplied through UNICEF and other agencies at each levels (Health Facility, Woreda, Region)	2	1

Woreda- <u>Werie Leke</u>

S/No	**Key Preparedness Components:**	**Wt**	**6.0(30.0%)**
	Component 1- Overall Coordination:	**20**	
1.1	Existence of functional multi-sectoral Emergency Health and Nutrition Coordination Committee	4	1
1.2	Existence of functional technical sub-committees of the Emergency Health and Nutrition with focal points and clear mandate constituted	2	1
1.3	Membership to the Emergency committees in hot-spot priority 1,2 and 3 woredas reviewed and updated, and every one informed of the roles and responsibility	2	1
1.4	Existence of clear TOR for the EHN coordination committee and technical	2	0

	sub-committees		
1.5	Established procedures for command & control, coordination mechanisms, clearance of key technical and information products	1	0
1.6	Developed plans of actions for the coordination committee	3	0
1.7	Identify, orient and assign emergency health and nutrition (EHN) focal points at all levels	1	1
1.8	Weekly/ every two weeks minuted meetings and monitoring mechanisms of the coordination body at this level	3	0
1.9	Linkages and reporting mechanisms with other higher and lower level coordination committee	2	2
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 2- Human resource for Emergency Response	**15**	**14.5 (96.7%)**
2.1	Health workers identified, trained and assigned for acute malnutrition case management	4	4
2.2	Health workers identified, trained and assigned for Water, Hygiene and sanitation (WASH) activities	2	2
2.3	Health workers identified, trained and assigned for surveillance and outbreak response	2	2
2.4	Health workers identified, trained and assigned for logistics and supply management	2	2
2.5	Team identified, trained and assigned for communication and social mobilization within health and other sectors	1.5	1
2.6	Identified and trained Health Development Army at community level on emergency health and nutrition preparedness and response	1.5	1.5
2.7	Human resource availability and capacity gap analyzed and gap filled	2	2
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 3- Communication and Social Mobilization – Public awareness and community engagement	**10**	**8 (80%)**

3.1	Established functional communication coordination mechanism	1	1
3.2	Established mechanisms for engaging with Health development army (HDA) and local community networks (edir, ekub…) for social mobilization	2	2
3.3	Orientation made about EHN preparedness and response to HDA, elders and influential leaders in the community	1	1
3.4	Health and nutrition emergency preparedness and response activities as standing agenda of HDA regular meeting	3	2
3.5	Disseminated targeted messages for health care workers, local and traditional leaders, churches, schools and other community stakeholders	2	2
3.6	Established plan for reviewing, revising and monitoring impact of communication and social mobilization activities	1	0
	Component 4 – WASH-Water, Hygiene and Sanitation		
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 4- WASH-Water, Hygiene and Sanitation	**10**	**7 (70%)**
4.1	Is there a functional WASH coordinating committee/task force at this level with defined TOR and Plan of action	**2**	0
4.2	Water sources identified for human and animal consumption	**2**	2
4.3	Water trucking capacity / easy accessibility	**2**	1
4.4	Water treatment chemical available or easily accessible	**2**	2
4.5	General hygiene and sanitation promotion activities at health facility, community and at school	**2**	2
	Component 5 – Case Management		
	[The purpose of the assessment is to check the operational capacity to safely treat complicated SAM cases which includes the availability of the number of qualified health professionals		
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 5- Case Management	20	
	a) Stabilization Centre (SC)	**9**	**7.5(83.3%)**

5.1	At least one in-patient facility/ SC set up in each woreda ready to provide care to patients with Complicated Sever Acute Malnutrition.	1.5	1.5
5.2	In case surge, are all of the health centers and hospitals ready to provide in-patient services for complicated SAM cases?	1	1
5.3	Assessed health workers capacity for in-patient SAM management and gap identified at each of the health facility for SC	1	1
5.4	24/7 – service provision during working and non-working hours for SC	1	1
5.5	Critical supplies (F-75, F-100, ReSoMal, antibiotics, NG-tube) for SC for at least 3 month available	2	1
5.6	Availability of food for care-takers in each SC	0.5	0
5.7	Health facility (HP, HC and Hospitals) with safe water availability (for SC)	1	1
5.8	Health facilities with functional anthropometric measurement equipments for SC	0.5	0.5
5.9	Availability of protocols for the management of SAM cases	0.5	0.5
	b) Out-patient therapeutic care (OTP)	**9**	**8.5(94.4%)**
5.1.1	All of the health facilities (HP, HC and Hospitals) provide care to patients with uncomplicated Sever Acute Malnutrition in OTP	1.5	1
5.1.2	Assessed health workers capacity for out-patient SAM management and gap identified at each of the health facility for OTP	2	2
5.1.3	Daily SAM case identification and admission to OTP in all health posts and health centers or through mobile health and nutrition team in pastoralist areas	1.5	1.5
5.1.4	Health facilities with functional anthropometric measurement equipments for OTP	1	1
5.1.5	Critical supplies (RUTF, Amoxicillin…) for OTP for at least 3 month available	2	2
5.1.6	Health facilities (Health Center and Health Post) with safe water and hand washing facilities for OTP	0.5	0.5
5.1.7	Availability of protocols for the management of SAM cases	0.5	0.5
	c) Supplementary Feeding Program (SFP)	2	2(100%)

	Arrangements made with relevant sectors for managing moderately acutely malnourished children and Pregnant and lactating women	2	2
	Component 6 – Epidemiological Surveillance		
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 6 - Epidemiological Surveillance and Response	**10**	**7 (70%)**
6.1.	Availability for weekly disease surveillance system (PHEM) in place	1	1
6.1.	Availability of functional weekly malnutrition surveillance system in place - recording, analysis and reporting of SAM and MAM cases from OTP, SC , SFP and other health facilities (Mobile health and nutrition service)	1.5	1
6.3.	Health and health related woreda profile mapped	1	0
6.4.	Rapid nutritional screening conducted recently in all kebeles in the woreda (EOS, CHD, routine screening, rapid nutrition assessment)	1.5	1.5
6.5.	Assigned trained focal points for recording, monitoring and reporting of diseases and acute malnutrition cases	1.5	1.5
6.6.	Availability of weekly disease and malnutrition reporting formats (standard case definitions, PHEM reporting form)	0.5	0.5
6.7.	Practice of daily/ weekly data analysis, interpretation and use	1	0
6.8.	Established system to identify unusual occurrence of diseases at community level	1	1
6.9.	Established rapid response team for any disease outbreak	0.5	0.5
6.1	Defined operational budget, supply and logistics for rapid emergency response of any disease outbreaks.	0.5	0
	Component 7 – Logistics and Supply Management		
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 7- Logistic and Supply Management	**15**	12.5 (83.3%)
7.1	Established logistics and supply management team/ taskforce	3	3
7.2	Supply requirement identified	1.5	1.5

7.3	Mapped available supply and logistics gap identified	1	0
7.4	Measures taken to fill the identified supply gaps	1	0.5
7.5	Mechanisms to regularly request and report supply in place [(use of Report and Requisition Form (RRF), Health Post Monthly Reporting and Resupply(HPMRR)]	2	2
7.6	Established mechanisms to monitor and track supply distribution and proper use at different levels (Woreda, Health Facility, Household)	2.5	2.5
7.7	Identified, oriented and assigned HDA to monitor the utilization of Ready to Use Therapeutic Food (RUTF) and Targeted Supplementary Food (TSF) at House Hold level	2	2
7.8	Minimal stock level defined for commodities supplied through UNICEF and other agencies at each levels (Health Facility, Woreda, Region)	2	1

Woreda- <u>Ahferom</u>

S/NO	**Key Preparedness Components:**	**Wt**	**6.0(30.0%)**
	Component 1- Overall Coordination:	**20**	
1.1	Existence of functional multi-sectoral Emergency Health and Nutrition Coordination Committee	4	1
1.2	Existence of functional technical sub-committees of the Emergency Health and Nutrition with focal points and clear mandate constituted	2	1
1.3	Membership to the Emergency committees in hot-spot priority 1,2 and 3 woredas reviewed and updated, and every one informed of the roles and responsibility	2	1
1.4	Existence of clear TOR for the EHN coordination committee and technical	2	0

	sub-committees		
1.5	Established procedures for command & control, coordination mechanisms, clearance of key technical and information products	1	0
1.6	Developed plans of actions for the coordination committee	3	0
1.7	Identify, orient and assign emergency health and nutrition (EHN) focal points at all levels	1	1
1.8	Weekly/ every two weeks minuted meetings and monitoring mechanisms of the coordination body at this level	3	0
1.9	Linkages and reporting mechanisms with other higher and lower level coordination committee	2	2
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 2- Human resource for Emergency Response	**15**	**14.5 (96.7%)**
2.1	Health workers identified, trained and assigned for acute malnutrition case management	4	4
2.2	Health workers identified, trained and assigned for Water, Hygiene and sanitation (WASH) activities	2	2
2.3	Health workers identified, trained and assigned for surveillance and outbreak response	2	2
2.4	Health workers identified, trained and assigned for logistics and supply management	2	2
2.5	Team identified, trained and assigned for communication and social mobilization within health and other sectors	1.5	1
2.6	Identified and trained Health Development Army at community level on emergency health and nutrition preparedness and response	1.5	1.5
2.7	Human resource availability and capacity gap analyzed and gap filled	2	2
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 3- Communication and Social Mobilization – Public awareness and community engagement	**10**	**8 (80%)**

3.1	Established functional communication coordination mechanism	1	1
3.2	Established mechanisms for engaging with Health development army (HDA) and local community networks (edir, ekub…) for social mobilization	2	2
3.3	Orientation made about EHN preparedness and response to HDA, elders and influential leaders in the community	1	1
3.4	Health and nutrition emergency preparedness and response activities as standing agenda of HDA regular meeting	3	2
3.5	Disseminated targeted messages for health care workers, local and traditional leaders, churches, schools and other community stakeholders	2	2
3.6	Established plan for reviewing, revising and monitoring impact of communication and social mobilization activities	1	0
	Component 4 – WASH-Water, Hygiene and Sanitation		
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 4- WASH-Water, Hygiene and Sanitation	**10**	**7 (70%)**
4.1	Is there a functional WASH coordinating committee/task force at this level with defined TOR and Plan of action	**2**	0
4.2	Water sources identified for human and animal consumption	**2**	2
4.3	Water trucking capacity / easy accessibility	**2**	1
4.4	Water treatment chemical available or easily accessible	**2**	2
4.5	General hygiene and sanitation promotion activities at health facility, community and at school	**2**	2
	Component 5 – Case Management		
	[The purpose of the assessment is to check the operational capacity to safely treat complicated SAM cases which includes the availability of the number of qualified health professionals		
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 5- Case Management	20	
	a) Stabilization Centre (SC)	**9**	**7.5(83.3%)**

5.1	At least one in-patient facility/ SC set up in each woreda ready to provide care to patients with Complicated Sever Acute Malnutrition.	1.5	1.5
5.2	In case surge, are all of the health centers and hospitals ready to provide in-patient services for complicated SAM cases?	1	1
5.3	Assessed health workers capacity for in-patient SAM management and gap identified at each of the health facility for SC	1	1
5.4	24/7 – service provision during working and non-working hours for SC	1	1
5.5	Critical supplies (F-75, F-100, ReSoMal, antibiotics, NG-tube) for SC for at least 3 month available	2	1
5.6	Availability of food for care-takers in each SC	0.5	0
5.7	Health facility (HP, HC and Hospitals) with safe water availability (for SC)	1	1
5.8	Health facilities with functional anthropometric measurement equipments for SC	0.5	0.5
5.9	Availability of protocols for the management of SAM cases	0.5	0.5
	b) Out-patient therapeutic care (OTP)	**9**	**8.5(94.4%)**
5.1.1	All of the health facilities (HP, HC and Hospitals) provide care to patients with uncomplicated Sever Acute Malnutrition in OTP	1.5	1
5.1.2	Assessed health workers capacity for out-patient SAM management and gap identified at each of the health facility for OTP	2	2
5.1.3	Daily SAM case identification and admission to OTP in all health posts and health centers or through mobile health and nutrition team in pastoralist areas	1.5	1.5
5.1.4	Health facilities with functional anthropometric measurement equipments for OTP	1	1
5.1.5	Critical supplies (RUTF, Amoxicillin…) for OTP for at least 3 month available	2	2
5.1.6	Health facilities (Health Center and Health Post) with safe water and hand washing facilities for OTP	0.5	0.5
5.1.7	Availability of protocols for the management of SAM cases	0.5	0.5
	c) Supplementary Feeding Program (SFP)	2	2(100%)

	Arrangements made with relevant sectors for managing moderately acutely malnourished children and Pregnant and lactating women	2	2
	Component 6 – Epidemiological Surveillance		
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 6 - Epidemiological Surveillance and Response	**10**	**7 (70%)**
6.1.	Availability for weekly disease surveillance system (PHEM) in place	1	1
6.1.	Availability of functional weekly malnutrition surveillance system in place - recording, analysis and reporting of SAM and MAM cases from OTP, SC , SFP and other health facilities (Mobile health and nutrition service)	1.5	1
6.3.	Health and health related woreda profile mapped	1	0
6.4.	Rapid nutritional screening conducted recently in all kebeles in the woreda (EOS, CHD, routine screening, rapid nutrition assessment)	1.5	1.5
6.5.	Assigned trained focal points for recording, monitoring and reporting of diseases and acute malnutrition cases	1.5	1.5
6.6.	Availability of weekly disease and malnutrition reporting formats (standard case definitions, PHEM reporting form)	0.5	0.5
6.7.	Practice of daily/ weekly data analysis, interpretation and use	1	0
6.8.	Established system to identify unusual occurrence of diseases at community level	1	1
6.9.	Established rapid response team for any disease outbreak	0.5	0.5
6.1	Defined operational budget, supply and logistics for rapid emergency response of any disease outbreaks.	0.5	0
	Component 7 – Logistics and Supply Management		
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 7- Logistic and Supply Management	**15**	12.5 (83.3%)
7.1	Established logistics and supply management team/ taskforce	3	3
7.2	Supply requirement identified	1.5	1.5

7.3	Mapped available supply and logistics gap identified	1	0
7.4	Measures taken to fill the identified supply gaps	1	0.5
7.5	Mechanisms to regularly request and report supply in place [(use of Report and Requisition Form (RRF), Health Post Monthly Reporting and Resupply(HPMRR)]	2	2
7.6	Established mechanisms to monitor and track supply distribution and proper use at different levels (Woreda, Health Facility, Household)	2.5	2.5
7.7	Identified, oriented and assigned HDA to monitor the utilization of Ready to Use Therapeutic Food (RUTF) and Targeted Supplementary Food (TSF) at House Hold level	2	2
7.8	Minimal stock level defined for commodities supplied through UNICEF and other agencies at each levels (Health Facility, Woreda, Region)	2	1

Woreda- <u>Mereb Leke</u>

S/NO	**Key Preparedness Components:**	**Wt**	**6.0(30.0%)**
	Component 1- Overall Coordination:	**20**	
1.1	Existence of functional multi-sectoral Emergency Health and Nutrition Coordination Committee	4	1
1.2	Existence of functional technical sub-committees of the Emergency Health and Nutrition with focal points and clear mandate constituted	2	1
1.3	Membership to the Emergency committees in hot-spot priority 1,2 and 3 woredas reviewed and updated, and every one informed of the roles and responsibility	2	1
1.4	Existence of clear TOR for the EHN coordination committee and technical sub-committees	2	0

1.5	Established procedures for command & control, coordination mechanisms, clearance of key technical and information products	1	0
1.6	Developed plans of actions for the coordination committee	3	0
1.7	Identify, orient and assign emergency health and nutrition (EHN) focal points at all levels	1	1
1.8	Weekly/ every two weeks minuted meetings and monitoring mechanisms of the coordination body at this level	3	0
1.9	Linkages and reporting mechanisms with other higher and lower level coordination committee	2	2
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 2- Human resource for Emergency Response	**15**	**14.5 (96.7%)**
2.1	Health workers identified, trained and assigned for acute malnutrition case management	4	4
2.2	Health workers identified, trained and assigned for Water, Hygiene and sanitation (WASH) activities	2	2
2.3	Health workers identified, trained and assigned for surveillance and outbreak response	2	2
2.4	Health workers identified, trained and assigned for logistics and supply management	2	2
2.5	Team identified, trained and assigned for communication and social mobilization within health and other sectors	1.5	1
2.6	Identified and trained Health Development Army at community level on emergency health and nutrition preparedness and response	1.5	1.5
2.7	Human resource availability and capacity gap analyzed and gap filled	2	2
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 3- Communication and Social Mobilization – Public awareness and community engagement	**10**	**8 (80%)**
3.1	Established functional communication coordination mechanism	1	1

3.2	Established mechanisms for engaging with Health development army (HDA) and local community networks (edir, ekub…) for social mobilization	2	2
3.3	Orientation made about EHN preparedness and response to HDA, elders and influential leaders in the community	1	1
3.4	Health and nutrition emergency preparedness and response activities as standing agenda of HDA regular meeting	3	2
3.5	Disseminated targeted messages for health care workers, local and traditional leaders, churches, schools and other community stakeholders	2	2
3.6	Established plan for reviewing, revising and monitoring impact of communication and social mobilization activities	1	0
	Component 4 – WASH-Water, Hygiene and Sanitation		
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 4- WASH-Water, Hygiene and Sanitation	**10**	**7 (70%)**
4.1	Is there a functional WASH coordinating committee/task force at this level with defined TOR and Plan of action	**2**	0
4.2	Water sources identified for human and animal consumption	**2**	2
4.3	Water trucking capacity / easy accessibility	**2**	1
4.4	Water treatment chemical available or easily accessible	**2**	2
4.5	General hygiene and sanitation promotion activities at health facility, community and at school	**2**	2
	Component 5 – Case Management		
	[The purpose of the assessment is to check the operational capacity to safely treat complicated SAM cases which includes the availability of the number of qualified health professionals		
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 5- Case Management	20	
	a) Stabilization Centre (SC)	**9**	**7.5(83.3%)**

5.1	At least one in-patient facility/ SC set up in each woreda ready to provide care to patients with Complicated Sever Acute Malnutrition.	1.5	1.5
5.2	In case surge, are all of the health centers and hospitals ready to provide in-patient services for complicated SAM cases?	1	1
5.3	Assessed health workers capacity for in-patient SAM management and gap identified at each of the health facility for SC	1	1
5.4	24/7 – service provision during working and non-working hours for SC	1	1
5.5	Critical supplies (F-75, F-100, ReSoMal, antibiotics, NG-tube) for SC for at least 3 month available	2	1
5.6	Availability of food for care-takers in each SC	0.5	0
5.7	Health facility (HP, HC and Hospitals) with safe water availability (for SC)	1	1
5.8	Health facilities with functional anthropometric measurement equipments for SC	0.5	0.5
5.9	Availability of protocols for the management of SAM cases	0.5	0.5
	b) Out-patient therapeutic care (OTP)	**9**	**8.5(94.4%)**
5.1.1	All of the health facilities (HP, HC and Hospitals) provide care to patients with uncomplicated Sever Acute Malnutrition in OTP	1.5	1
5.1.2	Assessed health workers capacity for out-patient SAM management and gap identified at each of the health facility for OTP	2	2
5.1.3	Daily SAM case identification and admission to OTP in all health posts and health centers or through mobile health and nutrition team in pastoralist areas	1.5	1.5
5.1.4	Health facilities with functional anthropometric measurement equipments for OTP	1	1
5.1.5	Critical supplies (RUTF, Amoxicillin…) for OTP for at least 3 month available	2	2
5.1.6	Health facilities (Health Center and Health Post) with safe water and hand washing facilities for OTP	0.5	0.5
5.1.7	Availability of protocols for the management of SAM cases	0.5	0.5
	c) Supplementary Feeding Program (SFP)	2	2(100%)

	Arrangements made with relevant sectors for managing moderately acutely malnourished children and Pregnant and lactating women	2	2
	Component 6 – Epidemiological Surveillance		
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 6 - Epidemiological Surveillance and Response	**10**	**7 (70%)**
6.1.	Availability for weekly disease surveillance system (PHEM) in place	1	1
6.1.	Availability of functional weekly malnutrition surveillance system in place - recording, analysis and reporting of SAM and MAM cases from OTP, SC , SFP and other health facilities (Mobile health and nutrition service)	1.5	1
6.3.	Health and health related woreda profile mapped	1	0
6.4.	Rapid nutritional screening conducted recently in all kebeles in the woreda (EOS, CHD, routine screening, rapid nutrition assessment)	1.5	1.5
6.5.	Assigned trained focal points for recording, monitoring and reporting of diseases and acute malnutrition cases	1.5	1.5
6.6.	Availability of weekly disease and malnutrition reporting formats (standard case definitions, PHEM reporting form)	0.5	0.5
6.7.	Practice of daily/ weekly data analysis, interpretation and use	1	0
6.8.	Established system to identify unusual occurrence of diseases at community level	1	1
6.9.	Established rapid response team for any disease outbreak	0.5	0.5
6.1	Defined operational budget, supply and logistics for rapid emergency response of any disease outbreaks.	0.5	0
	Component 7 – Logistics and Supply Management		
	Key Preparedness Actions:	**Wt**	**Scale 1-5**
	Component 7- Logistic and Supply Management	**15**	12.5 (83.3%)
7.1	Established logistics and supply management team/ taskforce	3	3
7.2	Supply requirement identified	1.5	1.5

7.3	Mapped available supply and logistics gap identified	1	0
7.4	Measures taken to fill the identified supply gaps	1	0.5
7.5	Mechanisms to regularly request and report supply in place [(use of Report and Requisition Form (RRF), Health Post Monthly Reporting and Resupply(HPMRR)]	2	2
7.6	Established mechanisms to monitor and track supply distribution and proper use at different levels (Woreda, Health Facility, Household)	2.5	2.5
7.7	Identified, oriented and assigned HDA to monitor the utilization of Ready to Use Therapeutic Food (RUTF) and Targeted Supplementary Food (TSF) at House Hold level	2	2
7.8	Minimal stock level defined for commodities supplied through UNICEF and other agencies at each levels (Health Facility, Woreda, Region)	2	1

9.3. Epidemiological Bulletins

PUBLIC HEALTH EMERGENCY MANAGEMENT CASE TEAM (PHEM)

WHO WEEK 31, 2015 EPIDEMIOLOGICAL BULLETIN**.**

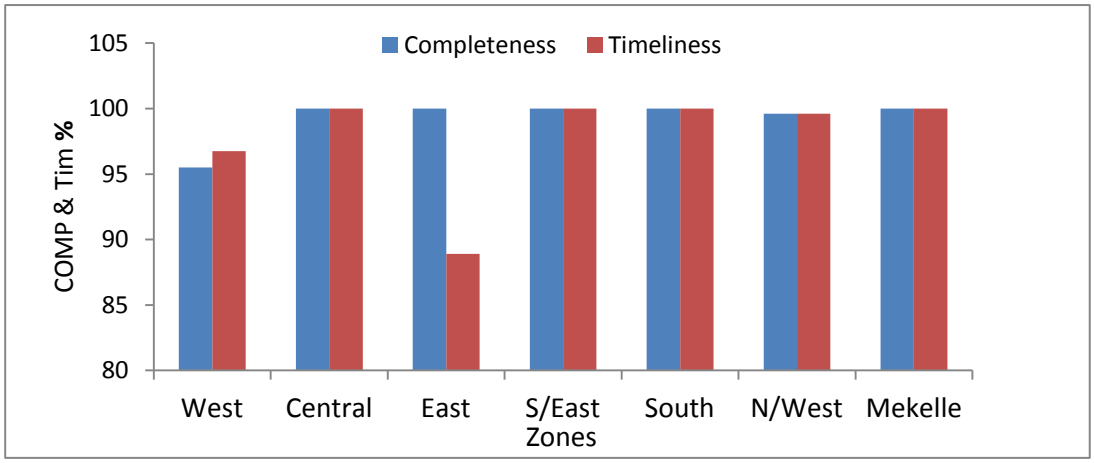
Introduction

Weekly bulletin provides information on the 22 priority diseases under surveillance and also used to monitor disease trends and distribution to take evidence based action timely. It also helps to know report completeness and timeliness of the woredas, zones and the region as a whole.

Report Completeness and Timeliness

Is one of the indicators of national PHEM guideline? The average report completeness and timeliness of this week was 99.54% and 97.48 % respectively. The report timeliness of Wolkait, A/Tsimbla and Wukro town was 87%, 97 % and 0 respectively. Report completeness of K/Humera, Wolkait & A/Tsimbla was 95%, 87% &97% respectively.

Figure 3 completeness and timeliness by zone, TRHB PHEM, WHO week 31, 2015.



Malaria

Of the total of 13729 suspected cases of malaria tested by RDT/Microscopy, 4385 (29.6%) were confirmed cases with 14 inpatient cases &no death. 65.4 %(2869) of the cases are P.F. Of the total malaria cases, 1891(43.1%), 1263(28.8%) and 837(19.1%) were from N/west, West and central zones of tigray respectively.

Figure 4 Shows number of tested, confirmed, P.F and P, V malaria cases by zone, Tig RHB PHEM, WHO week 31, 2015.

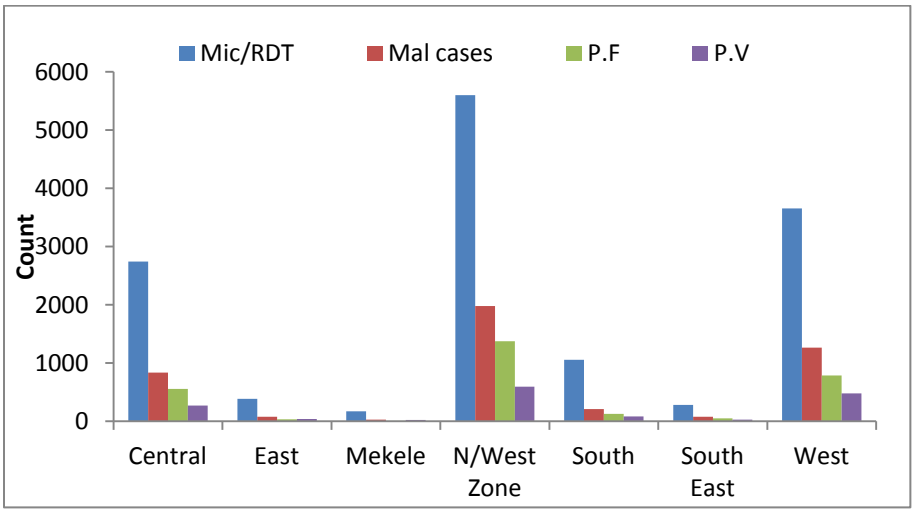
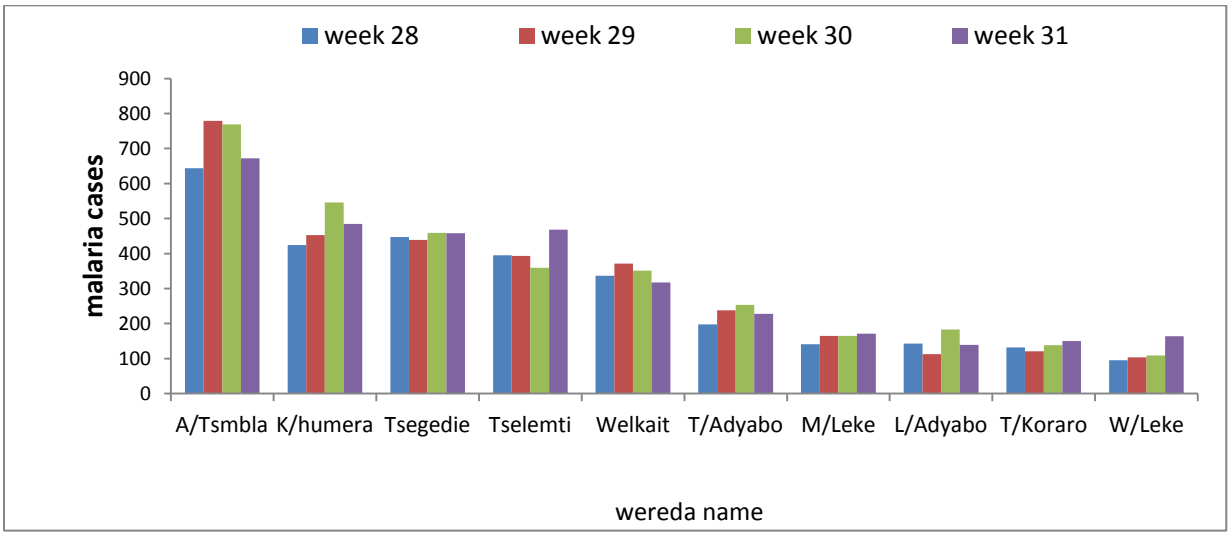


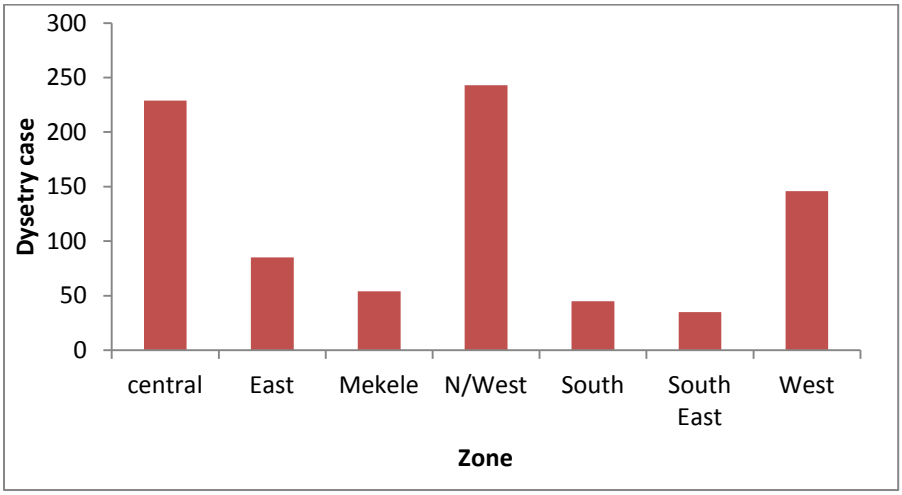
Figure 5 Malaria cases by week, top ten weredas, TRHB PHEM WHO week 28-31, 2015.



Dysentery

There were a total of 835 dysentery cases with 2 inpatients. The highest reported cases of dysentery were from N/west, 243 (29.1%) followed by Central and west with 229(27.4%) and 146(17.5%) cases respectively with no reported death.

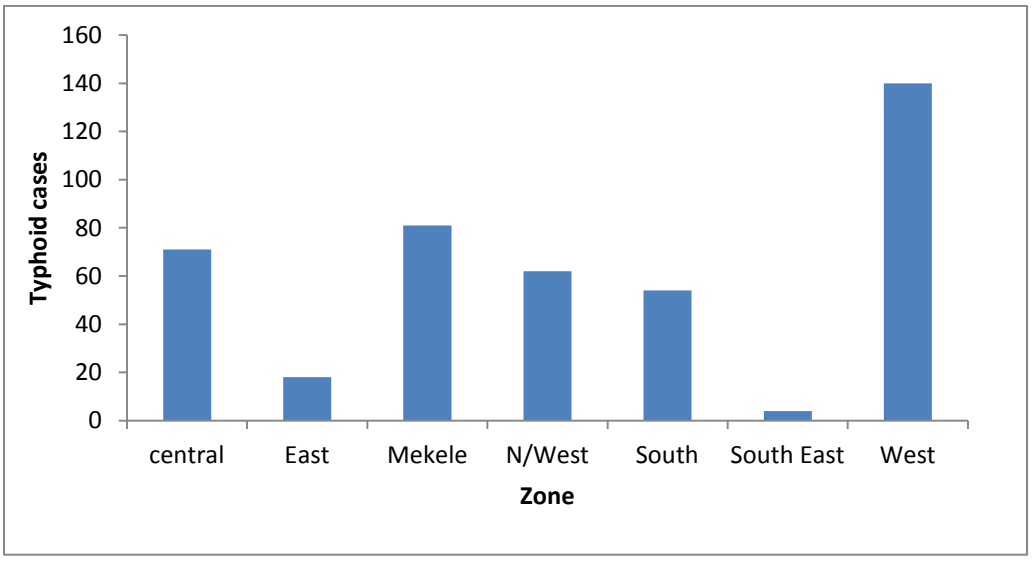
Figure 6 Total number of dysentery cases by zone, TRHB, WHO week 31, 2015



Typhoid Fever

Of the total of 430 typhoid fever cases 140(32.6%), 81(18.8%), 71(16.5) cases were from N/west, and mekelle and Central zones respectively.

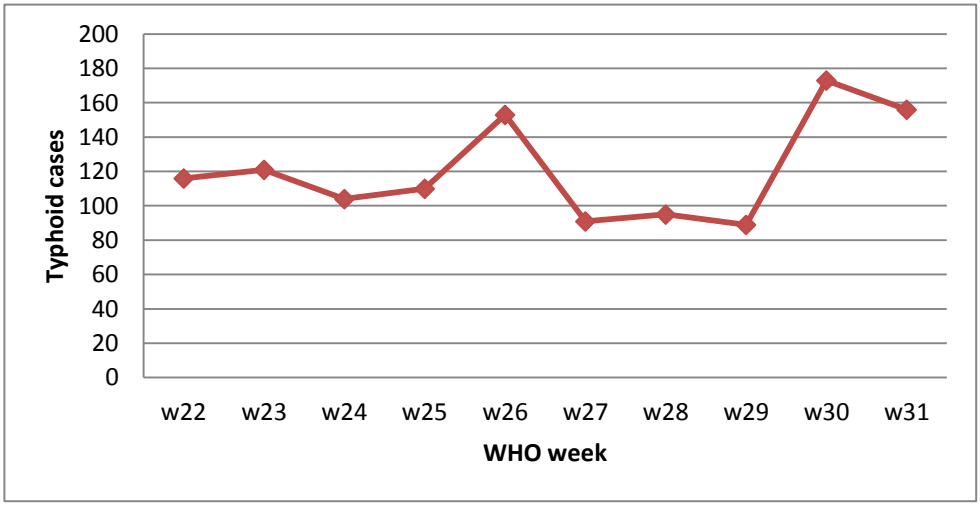
Figure 7 Number of typhoid fever cases by zone, TRHB PHEM, WHO week 31, 2015.



Malnutrition (SAM)

There were a total of 156 SAM cases with 7 admissions, and 1 death from mekelle. 77(49.35%) of the cases were from central zone. The up & down of the SAM trend may be due to the screening capacity of weredas.

Figure 40 Number of typhoid fever cases by zone, TRHB PHEM, WHO week 31, 2015.



Measles cases:

According to WHO week 31 reports, there were 4 measles cases. Two of them are from Medebay Zana and, the remaining cases are from mekelle and Hawzen weredas each.

Anthrax: There were two reported cases of anthrax from T/Maychew and Wukro kilte awlaelo weredas.

Meningitis: There was one reported meningitis case from Gulomekeda woreda in this week. The case is a 6 yr age male, vaccinated one.

Rabies

There were 23 total rabies cases with no death. 11, 9 and 2 of the cases were from Central, Eastern and Southern zones of Tigray respectively.

There was no reported case: Cases of maternal death, AFP ,epidemic typhus, relapsing fever, SARS, Avian human influenza, AWD, Drancunculiasis (guinea worm),HVOD ,Pandemic influenza, small box, yellow fever, viral hemorrhagic fever and Neonatal tetanus in the WHO week 31

1.1.1. TRHB PHEM Weekly Epidemiological Bulletin, WHO week 39-41, 2015.

Introduction:

Weekly bulletin provides information on the 22 priority diseases under surveillance and also used to monitor disease trends and distribution to take evidence based action timely. It also helps to know report completeness and timeliness of the woredas, zones and the region as a whole.

Report Completeness and Timeliness

Is one of the indicators of national PHEM guideline? The average report completeness and timeliness of week 39, 40 & 41 was 100% & 98.53% respectively.

Malaria

The positivity rate of week 39, 40 & 41 of the region was 34.2%, 33.8% & 32.5% respectively. The highest proportion was from western zone, with average positivity rate of 42.6%.

Figure 41 Shows malaria positivity rate, Tig RHB PHEM, WHO week 39-41.

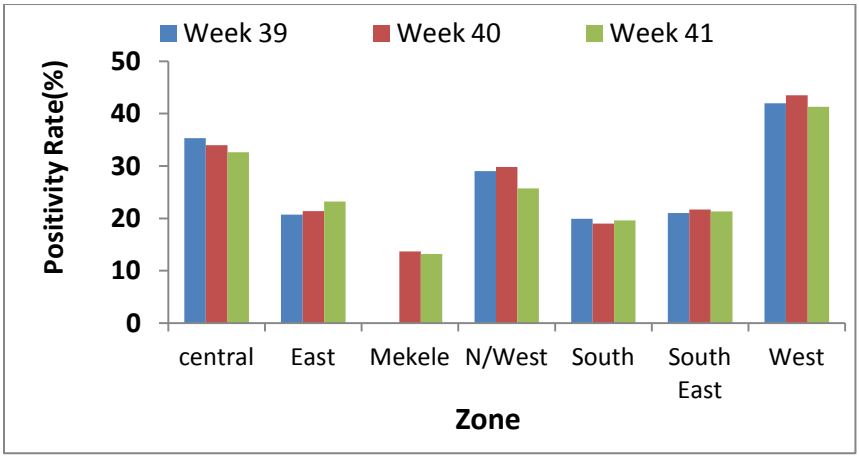
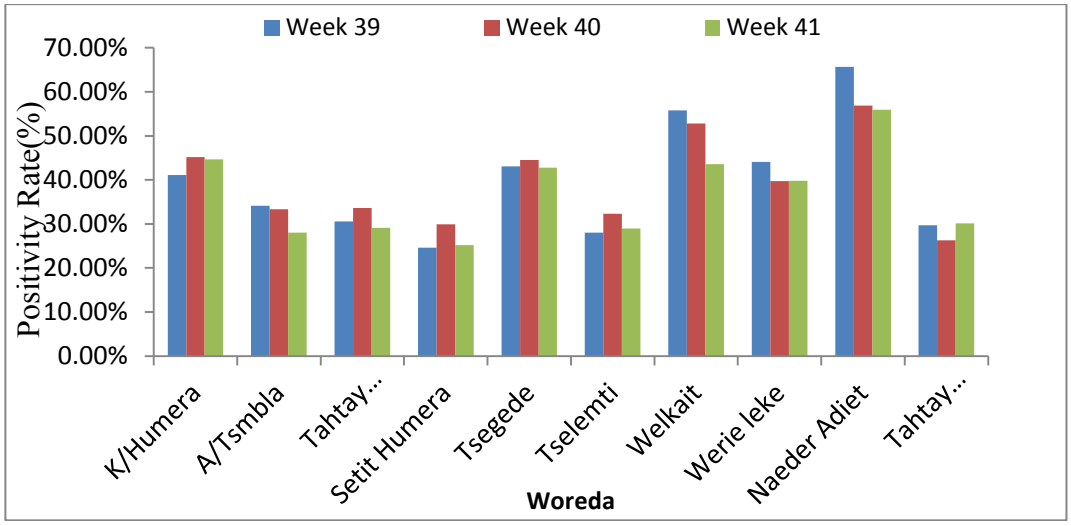


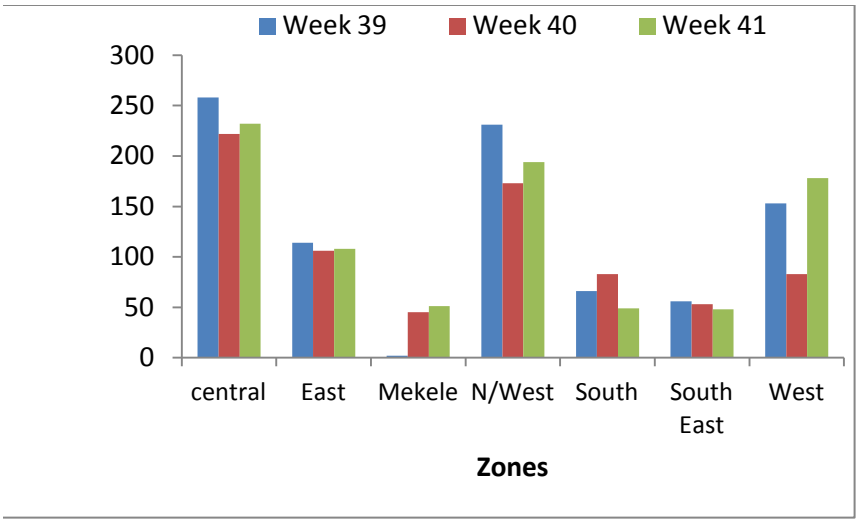
Figure 42 Positivity rate of malaria in ten top weredas, TRHB PHEM, Week 39-41, 2015.



Dysentery

The number of dysentery cases of week 39, 40 & 41 were 880,765 & 856 respectively. 710(28.4%) of the cases were from central zone followed by North West zone, 598(23.9%) cases.

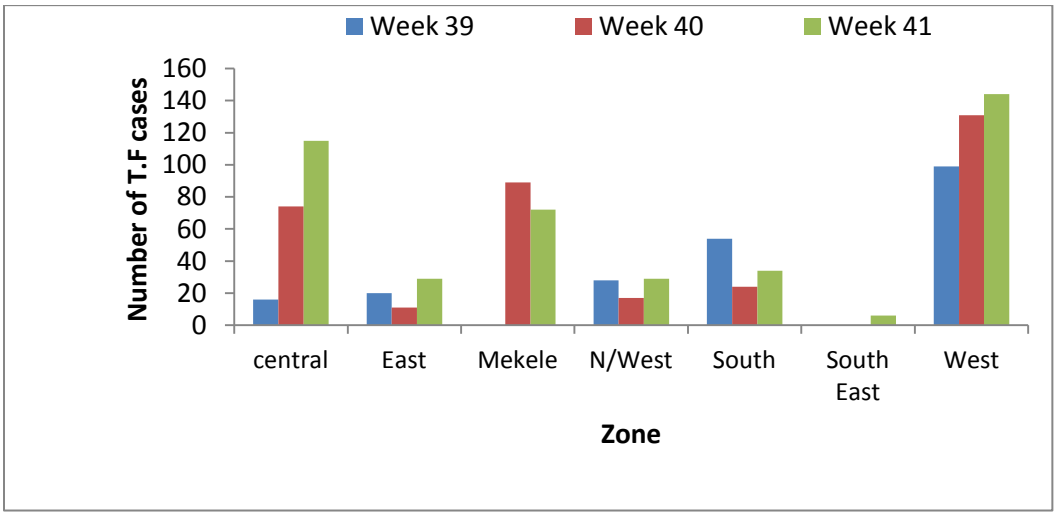
Figure 43 Number of Dysentery cases by Zone, Tigray, Ethiopia, WHO week 39-41, 2015.



Typhoid Fever

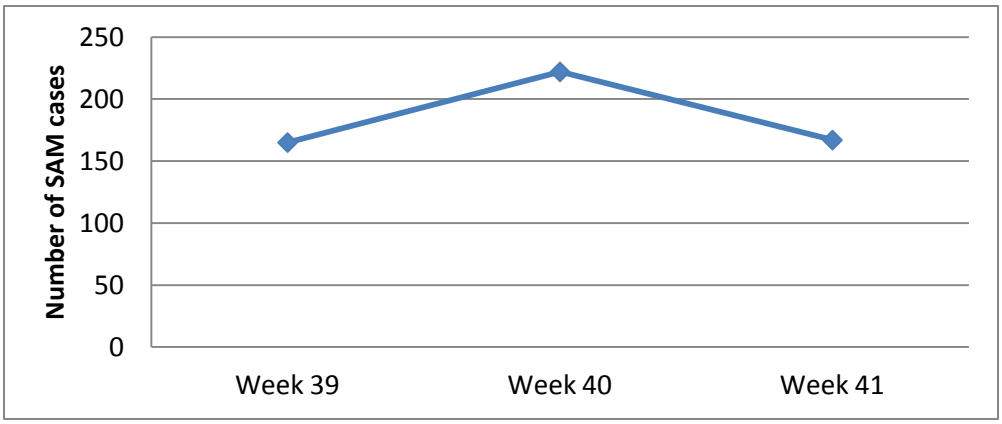
Of the total of 982 typhoid fever cases 374(38.0%), & 205(20.9%) were from West and Central zones of tigray respectively.

Figure 44 Number of T.F cases by Zone, TRHB PHEM, WHO week 39-41, 2015.



Malnutrition (SAM): There were a total of 554 SAM cases with 33 (5.9%) admissions in week 39-41. 153(27.6%) of the cases were from central zone followed by south east zone 112(20.2%). But this depends up on the screening capacity of woredas.

Figure 45 Shows SAM trend by week, TRHB PHEM, WHO week 39- 41, 2015**.**



Anthrax: There were four cases of anthrax during the 3 week period; all are from Adwa woreda, central zone of Tigray.

Meningitis: There were two reported cases from Tsegede woreda in week 40 & 41.

Rabies: There were 32, 7&33 reported cases of rabies in WHO week 39, 40 & 41 respectively. 36(50%) and 15(20.8%) of the total reported cases were from central & mekelle zones of tigray respectively.

Epidemic Typhus: There was one reported case of epidemic typhus from mekelle zone on week 41.

AFP: There was one reported case of AFP from Ayder hospital, mekelle zone on week 40.

There was no reported case of

RF, SARS, Avian human influenza, AWD, Drancunculiasis (guinea worm), HVOD, Pandemic influenza, small box, yellow fever, VHF, Measles and Neonatal tetanus in WHO week 39-41

9.3.3. TRHB PHEM Weekly Epidemiological Bulletin, WHO week 50-51, 2015.

Introduction:

Weekly bulletin provides information on the 22 priority diseases under surveillance and also used to monitor disease trends and distribution to take evidence based action timely. It also helps to know report completeness and timeliness of the woredas, zones and the region as a whole.

Report completeness and Timeliness

Is one of the indicators of national PHEM guideline? The report completeness and timeliness was 100% for both week 50 & 51.

III. Malaria

The average positivity rate of week 50&51 was, 24.1 & 22.2 % respectively. The highest positivity rate was from western zone; with 38.6 %& 35.3% in week 50 & 51 respectively.67.2 % were P.F with 68(0.7%) inpatients.

Figure 46 Shows malaria positivity rate by zone, Tig RHB PHEM, WHO week 50-51.

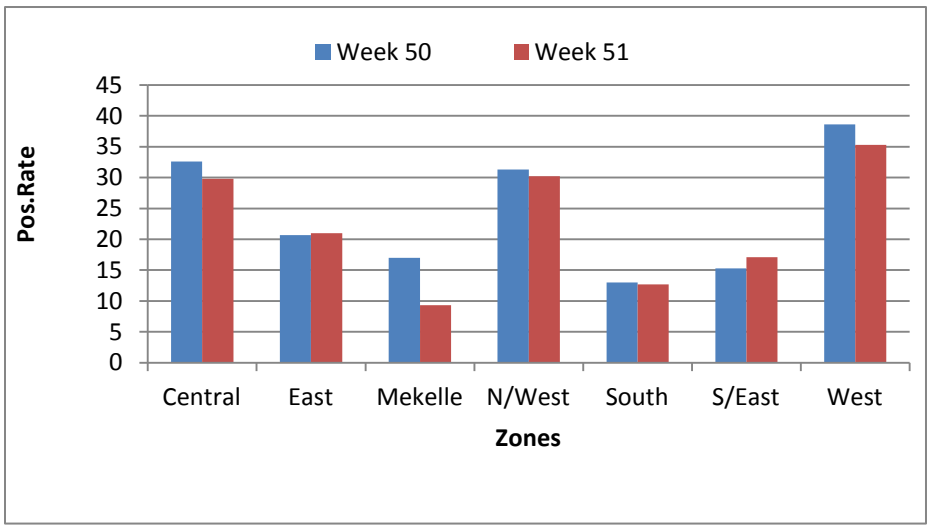
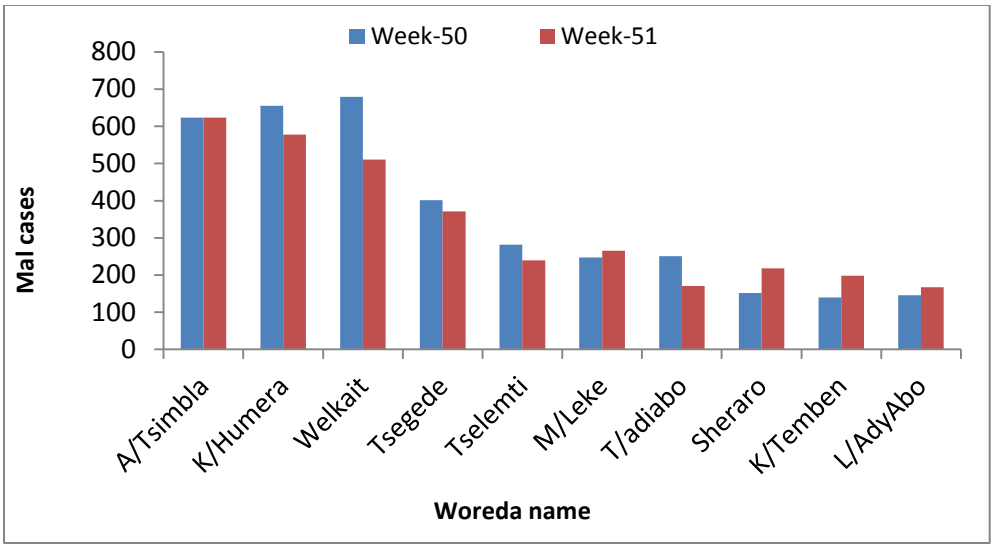


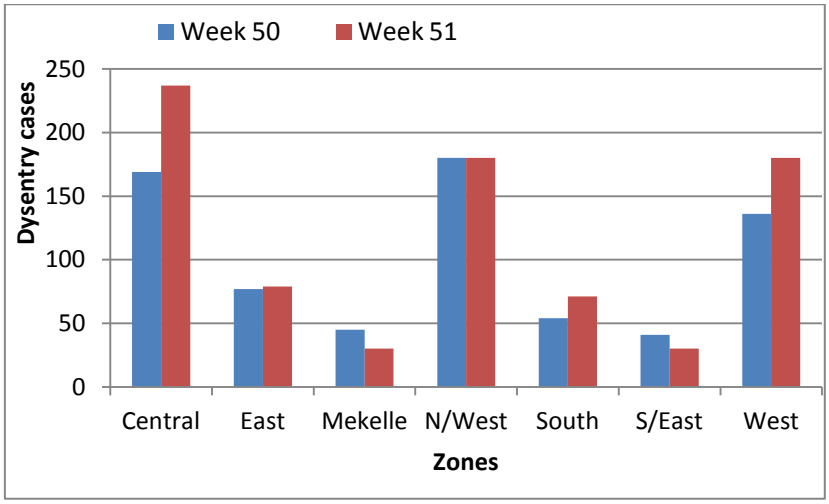
Figure 47 Number of malaria cases, ten top weredas, TRHB PHEM, Week 50-51, 2015.



Dysentery

The number of dysentery cases of week 50 & 51 were 702& 811 respectively. 406(26.8%) of the cases were from central zone followed by North West zone, 360(23.8%) cases.

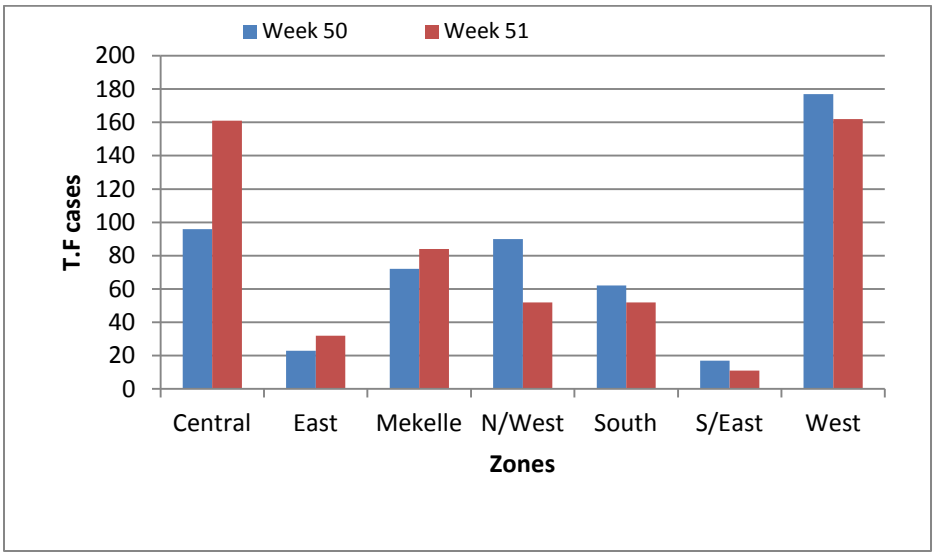
Figure 48 Number of dysentery cases by zone, TRHB, WHO week 50-51, 2015.



Typhoid Fever

The number of typhoid fever cases was 542&579 in week50&51 respectively. 339(30.2%), & 258(23.0%) were from West and Central zones of Tigray respectively.

Figure 49 Number of T.F cases by zone, TRHB PHEM, WHO week 50-51, 2015.



Malnutrition (SAM)

There were a total of 767 SAM cases with 63 (8.2%) admissions in week 49-51. 275(35.8%) of the cases were from central zone followed by North west zone 148(19.3%). There were 3 deaths in week 51.

Figure 50 Shows SAM trend by week, TRHB PHEM, WHO week 49-51, 2015

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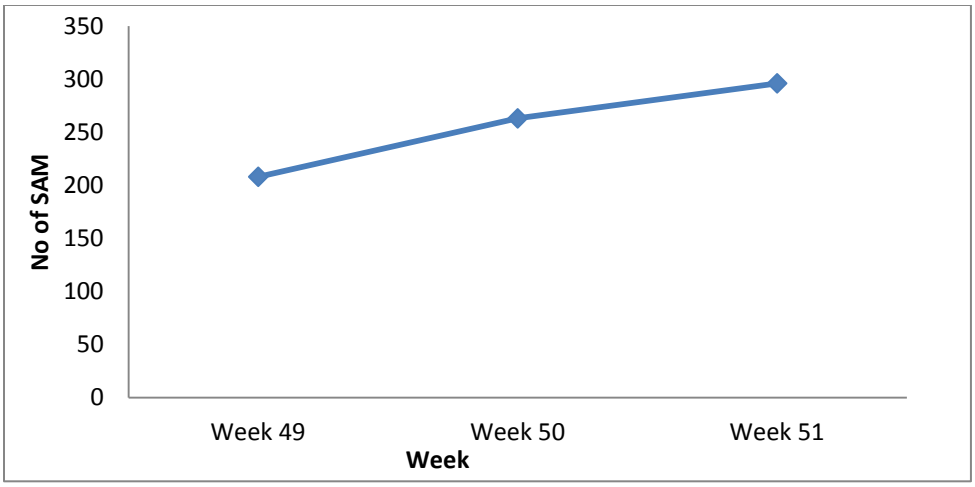


Anthrax: There were three cases of anthrax during week 50&51; all are from Abi adi, central zone of Tigray.

Measles: There was one reported case, from Mekelle zone in week 51.

Rabies: There were 32, 7&33 reported cases of rabies in WHO week 39, 40 & 41 respectively. 36(50%) and 15(20.8%) of the total reported cases were from central & mekelle zones of tigray respectively.

Epidemic Typhus

There were five reported cases of epidemic typhus from Maychew Town on week 51.

RF: There was one reported case of RF from Mekelle zone on week 51.

NNT: There were two reported cases of NNT from Abi adi and Wolkait in week 51.

HVOD: There was one reported case of HVOD in week 51 from L/Adyabo woreda.

There was no reported case of

AFP, Meningitis ,SARS, Avian human influenza, AWD, Drancunculiasis (guinea worm), Pandemic influenza, small box, yellow fever and VHF in WHO week 50-51.

9.3.4. TRHB PHEM Malaria Epidemiological Bulletin, WHO week 1-11, 2007 &2008 EFY.

Introduction

Weekly bulletin provides information on the 22 priority diseases under surveillance and also used to monitor disease trends and distribution to take evidence based action timely. It also helps to know report completeness and timeliness of the woredas, zones and the region as a whole.

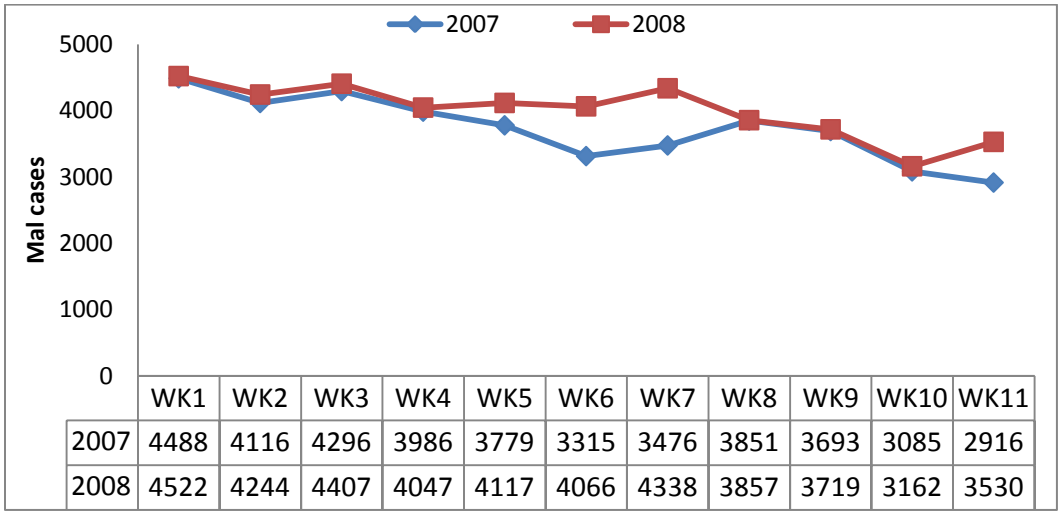
Report Completeness

Is one of the indicators of national PHEM guideline? The report completeness was 100% for both 2007 and 2008 (week 1-11).

Malaria

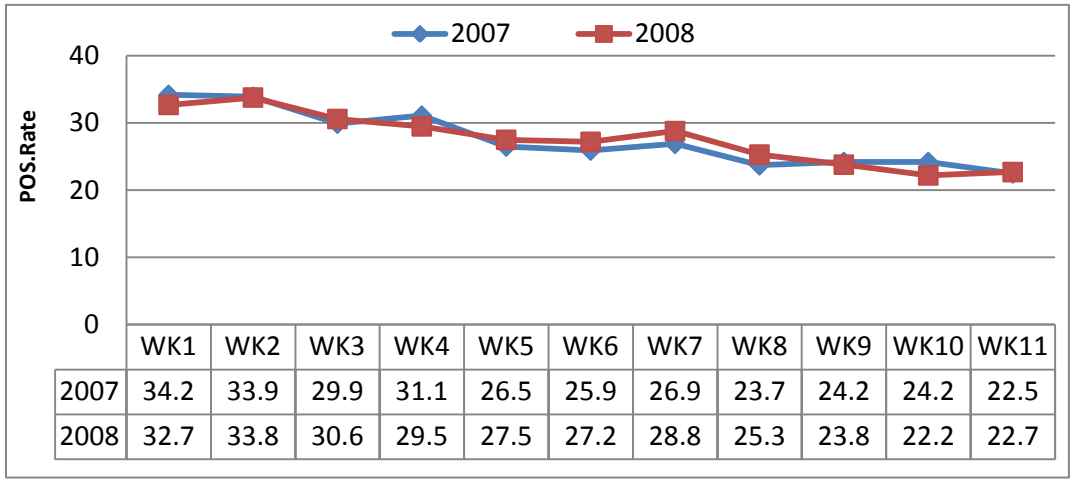
The numbers of malaria cases were higher in 2008 than 2007 in all the weeks, as shown in the graph below it was above 2007 norm line in all WHO weeks, especially in week 5,6,7 and 11. The average positivity rate of 2007 & 2008 were 27.6% & 27.8 % respectively. The graph shows decreasing trend from week 1-11 in both weeks (years) with some exceptions.

Figure 51 Trend of malaria cases by week, TRHB PHEM, WHO week 1-11, 2007 &2008**.**



	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11
2007	4488	4116	4296	3986	3779	3315	3476	3851	3693	3085	2916
2008	4522	4244	4407	4047	4117	4066	4338	3857	3719	3162	3530

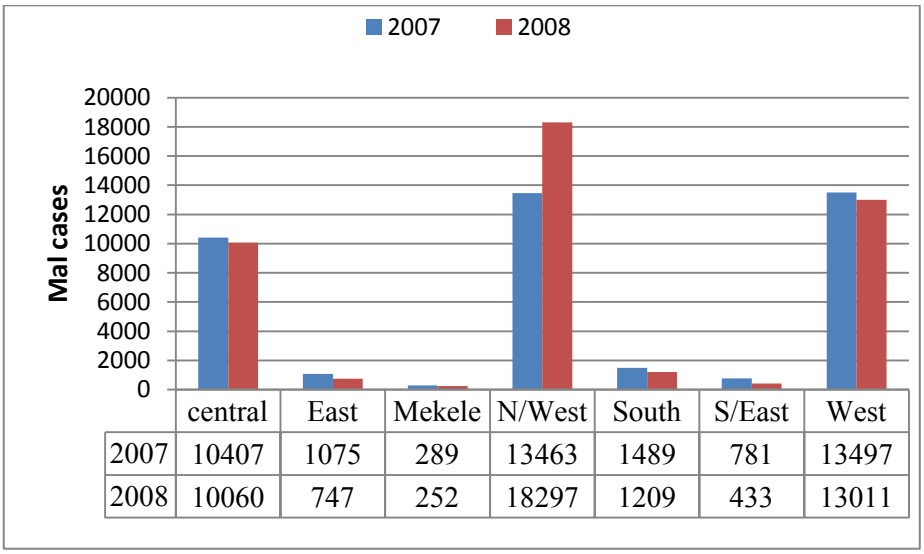
Figure 52 Trend of malaria positivity rate by week number, TRHB PHEM, WHO week 1-11, 2007&08



	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11
2007	34.2	33.9	29.9	31.1	26.5	25.9	26.9	23.7	24.2	24.2	22.5
2008	32.7	33.8	30.6	29.5	27.5	27.2	28.8	25.3	23.8	22.2	22.7

When we compared 2007 & 2008 week 1-11 malaria data by zone, it shows decreasing trend with the exception of North West zone.

Figure 53 Number of malaria cases by zone, TRHB PHEM, Week 1-11, 2007& 2008.



	central	East	Mekele	N/West	South	S/East	West
2007	10407	1075	289	13463	1489	781	13497
2008	10060	747	252	18297	1209	433	13011

When we compare the number of malaria cases among the top ten top woredas of Tigray (according to 2007 and 2008 Week 1-11 data), it shows an increase in A/Tsimbla, Tselemti, Wolkait, Tsegede and M/Leke woredas. But it shows a decreasing trend in the remaining woredas, During the same time. This does not indicate cluster of

Malaria cases at PHCU or hospital levels, further analysis must be done at woreda and health facility level.

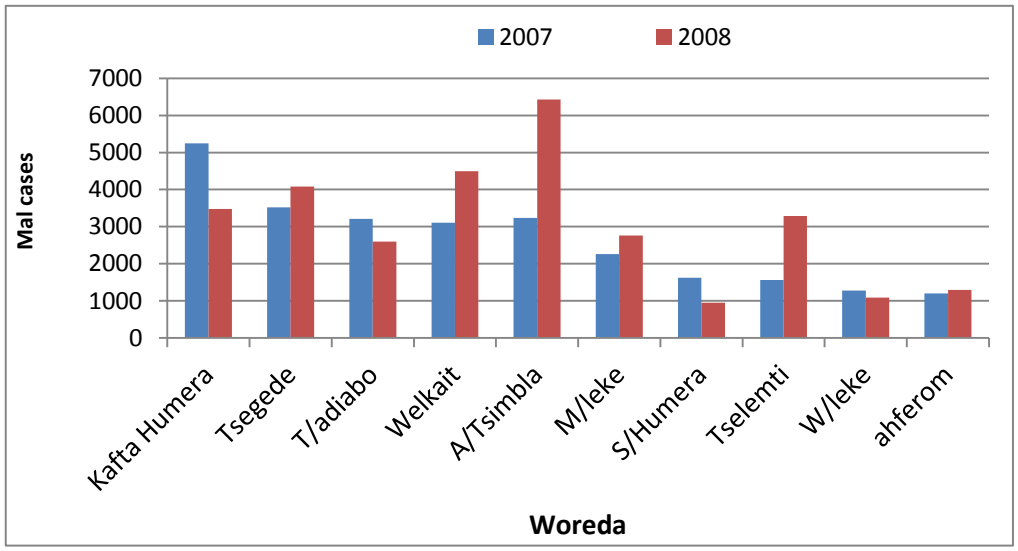



Figure 54 Number of Malaria cases in Top ten woredas of Tigray, Ethiopia, WHO week 1-11, 2007/2008.