COLLEGE OF HEALTH SCIENCE, SCHOOL OF PUBLIC HEALTH,

ETHIOPIAN FIELD EPIDEMIOLOGY TRAINING PROGRAM (EFETP)

Compiled Body of Works in Field Epidemiology

By

Dechasa Nesga Mirkene(BSC)

Cohort VIII

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

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Addis Ababa, Ethiopia

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SCHOOL OF GRADUATE STUDIES

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School of Public Health, College of Health Sciences

Addis Ababa University

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ACRONYMS AND ABBREVIATIONS

AACAHB	Addis Ababa city administration Health Bureau
AAHB	Addis Ababa Health Bureau
AAR	Addis Ababa Region
AAU	Addis Ababa University
AFI	Acute Febrile Illness
AFP	Acute Flaccid Paralysis
AFRO	Africa Regional Office
AIDS	Acquired immune deficiency syndrome
ANC	Ante natal care
AOR	Adjusted Odds Ratio
AR	Attack Rate
ARS	Afar Regional State
ART	Anti retro viral therapy
ASAR	Age Specific Attack Rate
AURTI	Acute Upper Respiratory Tract Infection
AWD	Acute Watery Diarrhea
BoFED	Bureau of Finance & Economic Development
BPR	Business Process of Reengineering
CAR	Contraceptive acceptance rate
CCPO	Curative core process
CDC	Center of Disease Control
CFR	Case Fatality Rate
CI	Confidence Interval
COR	Crude Odds Ratio
CSA	Central statistical agency
DM	Diabetics Mellitus
DMSS	Disease of Musclo Skeletal System
DPHP	Disease prevention and health promotion
EDHS	Ethiopian Demographic and Health survey
EFY	Ethiopian Fiscal year
EHNRI	Ethiopian Health and Nutrition research institute
EMIS	Ethiopia malaria indicator survey
EPHA	Ethiopian Public health association
EPHEM	Ethiopian Public Health Emergency Management
EPI	Expanded Immunization Program
EPTB	Extra Pulmonary Tuberculosis
FMOH	Federal Ministry of Health
FP	Family Planning

GEMS	Global Enteric Multi-Center Study
HHs	Households
HIS	Health Information System
HIV	Human Immono deficiency Virus
HMIS	Health Management and Information System
HMT	Health Management Team
HTN	Hypertension
IDSR	Integrated Disease Surveillance and Response
IHR	International Health Regulation
IMR	Infant Mortality Rate
IPD	Inpatient department
IQR	Inter quartile range
IRS	Indoor residual spraying
ITN	Insecticidal treated mosquito net
IUCD	Intrauterine contraceptive device
L & D	Labor & Delivery
LBRF	Louse born Relapsing Fever
LBW	Low birth weight
LLINS	Long lasting insecticidal net
MAM	Moderate Acute Malnutrition
MCH	Maternal and Child Health
MDG	Millennium Development Goal
MDR	Multi drug resistance
MDSR	Maternal death surveillance and report
MIS	Malaria indicator survey
MOH	Ministry of Health
MOR	Minor Operation room
NNT	Neonatal Tetanus
NPW	Non-Pregnant Women
OPD	Outpatient department
OPV	Oral Polio Vaccine
P.F	Plasmodium Falcifrum
P.V	Plasmodium Vivex
PAB	Protected at Birth
PCV	Pneumococcal Conjugated Vaccine
PHEM	Public Health Emergency Management
PICT	Provided Initiative Counseling & testing
PMTCT	Prevention of Mother to Child Transmission
PNC	Postnatal care
PVP	Positive Predictive Value

RBC	Red Blood Cell
RDT	Rapid diagnostic test
RF	Relapsing Fever
RHB	Regional health bureau
RMSF	Rocky Mountain spotted fever
RRT	Rapid response team
SAM	Sever Acute Malnutrition
SARS	Severe Acute Respiratory Syndrome
SD	Standard Deviation
SPH	School of public Health
SPP	Species
SSAR	Sex Specific Attack Rate
STI	Sexually Transmitted Infection
TBRF	Tick Born Relapsing Disease
UHEW	Urban Health Extension workers
UTI	Urinary Tract Infection
VHF	Viral Hemorrhagic Fever
WHO	World Health Organization

SUMMARY

The Ethiopia Field Epidemiology Training Program (EFETP) is an in-service training program in field epidemiology adapted from the United States Centers for Disease Control and Prevention (CDC) and Epidemic Intelligence Service (EIS) program. The Program is designed to assist the Ethiopian Ministry of Health in building or strengthening health systems by recruiting promising health workers and building their competencies through on-the-job mentorship and training. Field epidemiology training resembles a traditional medical residency program, because trainees spend an extended period of time practicing and developing their skills in “a hands on” manner. Ethiopia adopted the Field Epidemiology Training Program to help improve leadership within Public Health Emergency Management. The EFETP provides residents a Master of Public Health Degree in Field Epidemiology after they complete two years of supervised work in applied or field epidemiology.

The EFETP program has two main components, each of which contributes to the prize of Master degree; classroom-teaching component consist 25% and practical attachment or field placement component (75%), residents spending 75% of their time in the field, consisting of disease investigations, surveillance data analysis, surveillance evaluations and research on national health problems. Residents have the opportunity for public health practice in the real world.

The goal of the EFETP is to strengthen the Ethiopian Public Health Emergency Management system by: Improving public health event detection and response; creating a robust disease surveillance system; building capacity in field epidemiology and public Health; Enhancing evidence-based decision making for public health practice; and Reducing morbidity and mortality associated with priority diseases. Residents are expected to prepare and submit this body of work which will be assessed and evaluated by examiners to make sure that resident has acquired the expected level of competencies during his/her residency. Therefore, this body of work summarizes the required field residency ‘s outputs accomplished at field base during two years’ residencies. It has Nine chapters namely Outbreak Investigation, Surveillance Data Analysis Report, Evaluation of the Surveillance System, Health Profile Summary Report, Scientific Manuscript for peer review journals, Abstract, Protocol/Proposal of Epidemiologic Research Project, Public Health Emergency Management Weekly Bulletin and a Summary of Disaster Situation Visited/Risk Assessment. Accordingly, the document is organized to nine chapters.

The first chapter includes two outbreak investigations and response. Both of the investigations were conducted using case control study design, one on Relapsing Fever Outbreak in Addis Ketema Sub city,

Addis Ababa city administration and the other on Dysentery outbreak in Woreda 9 of Akaki Kality sub city, Addis Ababa City administration. The second chapter contains five years (2012 to 2016) Surveillance Data Analysis of Relapsing Fever in Addis Ketema sub city Addis Ababa City administration. Chapter three contains Measles Surveillance System Evaluation in Addis Ketema Sub city. Chapter four, Five and Six contains Health Profile Description of Woreda Six, Addis Ketema Sub city, Addis Ababa in 2016/2017, Meher health and Nutritional Need assessment conducted in in Afar Regional state, Ethiopia, 2017 and scientific manuscripts for peer reviewed journals respectively. In addition, three abstracts (which were developed from the two outbreak investigation and Surveillance Data analysis) are found in Chapter seven. Chapter Eight presents an Epidemiologic research project entitled "Assessment of community LLITNs ownership, knowledge and utilization in Kunaba woreda, Northern Afar, 2018". The last chapter (Chapter 9) contains additional out puts (One Epidemic Bulletin, Conference attended, Research conducted, abstract summited for scientific presentations).

CHAPTER I OUTBREAK INVESTIGATION

1.1. Relapsing Fever Outbreak Investigation and Response in Addis Ketema Sub city, Addis Ababa, Ethiopia, 2017

ABSTRACT

Background: -Louse born Relapsing Fever is endemic in the mountains of Ethiopia and it accounts 27% of hospital admission. Most of the times it occurs in form of outbreak. In January 2017, a rise of louse-born Relapsing Fever cases was reported to Addis Ababa Health Bureau from Addis Ketema Sub-city. We investigated to identify the source of infection, risk factors and recommend preventive measures to tackle the problem.

Methods: - Facility based unmatched case control study was employed. A total of 112 cases and 223 Controls (screened negative and tested Negative for Relapsing Fever clinically and by the laboratory) were interviewed from February 1 -June 30, 2017. We assessed the residency place, living condition, environmental sanitation and personal hygiene of the participants. We run a Bi variate and Multivariate test to identify risk factors. Mean (SD), Median (IQR), COR, AOR, P values, 95% CI were used to measure the variables.

Results: -We identified 153 total cases and interviewed 112 cases with 223 Controls. The median age of cases and control was 20 (IQR=9) and 23 (IQR=8) respectively. Majority of cases (96%) were Male. The attack rate was 5/10,000 population. Mass sleeping (AOR=8.2 ,95% CI [3.4-19.9]), living on street (AOR= 8.8, 95% CI (2.6, 30.1), Living in Bedroom daily (AOR= 12.2, 95%CI [4.0,37.4) and not changing clothes at night (AOR=4.4, 95%CI [1.7-11.8] were the independent predictors for Relapsing Fever.

Conclusion: - We identified Cases are most likely to be exposed to mass sleeping than controls. Mass gathering of people and poor personal hygiene were source and risk factor for the outbreak. Education on the transmission of Relapsing Fever was given to homeless people. It is recommended the Sub city and Addis Ababa health office has to do on delousing of public bedrooms.

Key words: - *Outbreak, Relapsing Fever, Risk factor, case-control study, Addis Ababa, Ethiopia*

Word Count: *291*

1.1.1. INTRODUCTION

Relapsing Fever is a recurrent febrile infection caused by various Borriella spirochetes transmitted either by lice (epidemic relapsing fever) or by ticks (endemic relapsing fever) in which periods of fever lasting 2–7 days, alternate with afebrile periods of 4–14 days and the number of relapses varies from 1 to 10 without treatment [1]. It has an incubation period of between four and eight days (which range: 2–15) and the symptoms appear suddenly which is associated with circulation of bacteria in the blood [1]. The Febrile periods are often associated with shaking chills, sweats, headache, muscle and joint pain, and can be associated with a rash. Each febrile period terminates by a crisis (abrupt symptom change) [2]. Louse born Relapsing fever is transmitted when an infected louse is crashed or scratched while feeding in the human host [3]. The symptoms increase in intensity over five days on average (range: 2–7), then subside as the pathogenic agent disappears from the blood. After a first remission, spirochaetes reappear in the blood and symptoms recur. The relapse occurs over several days to weeks, but fewer than ten relapses are usually observed among untreated patients. Relapses can occur after delousing [4]. The disease can be severe and death may occur in 10–40% of symptomatic cases in the absence of appropriate treatment, and in 2–5% of treated patients. Relapsing Fever is diagnosed by identification of spirochetes on a peripheral blood smear (either by dark field microscopy or microscopic examination of a stained thick or thin blood film) [5].

As different recent study shows currently Relapsing fever especially LBRF is principally a disease seen in the developing world and it spread from person to person by the body louse and can occur in epidemics, including large ones involving millions of people. Crowded shelters, Famine, war, the movements and congregations of refugees are common predisposing factors for epidemics of LBRF [6].

As Ethiopian public health emergency guide line recommends the thresh hold level for declaring an epidemic for Relapsing fever is an unusual increase of the case or doubling of Relapsing Fever cases on subsequent weeks [7]. Accordingly, in Addis Ketema sub city starting from December 2016 the cases of relapsing fever become above expected which increase through the time.

Statements of the problem

Even though LBRF cases declined significantly worldwide due to the highly-decreased incidence of body louse infestations after the 1940s, still now it remains the most public health problem and a common cause of hospitalization and death in East African countries, particularly in Ethiopia [8]. B.recurrentis is currently endemic in Ethiopia and Sudan. The highlands region of Ethiopia may have hundreds to thousands of cases of LBRF annually. The highest incidence in this region is during the rainy season when the poor gather together in shelters [6].

Because of its public health importance, among disease under surveillance in Ethiopia, relapsing fever is one of weekly report-able disease. As different study shows LBRF is the most common type of relapsing fever which is endemic in our country, Ethiopia and also a Cause of epidemic relapsing fever. Because of the existence of different risk factors that favors the occurrence of epidemic Relapsing Fever such as overcrowded and very populated life in Addis Ababa there is high tendency of Relapsing Fever outbreak.

Starting from January 2017 the increased number of Relapsing Fever reports was noticed in Addis Ketema Sub city indicating outbreaks. Since this sub city is located at high risk area in the city because of different factor, the transmission of Relapsing Fever is easy and many of the population can be affected if not intervened early. Therefore, early investigation and intervention is highly needed in this area and this investigation may lead concerned body to take control measures and prevent further infection of Relapsing Fever by digging out the risk of being infected by the disease.

Significance of the study

In Addis Ketema sub city the case of Relapsing Fever become increasing markedly. Since the socio-economic status and life style of the population living in sub-city predisposes them for occurrence of Relapsing Fever outbreak, it needs further investigation and integrated intervention to shift the trend of Relapsing Fever in the town as a whole. Therefore, this investigation plays a great role to identify the major risk factors, potentially infected group and Relapsing Fever epidemic prone area to implement fruitful intervention and successfully control the out breaks. The result of this study may also help as good input for stakeholders by providing area of focus to control LBRF and interested researcher for further study.

1.1.2. LITERATURE REVIEW

Relapsing fever borreliae were a badly human health affecting disease and feared infectious diseases that is known in history by having devastating impact as causes of both epidemic and endemic infection. More recently the burden of infection is widely overshadowed by other infections such as malaria, which presents in a similar clinical way. Even though it becomes neglected, it remains the most common bacterial infection in some developing countries. The distribution of LBRF has changed dramatically over recent years; with the decrease of this once worldwide infection interrelated directly with the diminished level of infestation with clothing lice. But LBRF remains endemic in areas of extreme poverty such as in Ethiopia and Sudan [9].

Relapsing fever is a rapidly progressive and severe septic disease. The disease is divided into two forms, i.e., epidemic relapsing fever, caused by Borriella recurrentus and transmitted by lice, and the endemic form caused by several Borriella species, such as B. duttonii, and transmitted by soft-bodied ticks. The spirochetes enter the bloodstream by the vector bite and live persistently in plasma even after the development of specific antibodies [10].

LBRF was once a major epidemic disease in many parts of the world [11, 12]. Because the fact that it has no animal reservoir, except the infectious agent B. recurrentus transmission via the human body louse and the association of the latter with poor hygienic conditions during war and destitution LBRF has been rarely encountered in Europe since World War II. Interestingly, this almost neglected disease has reemerged in Europe in the context of the ongoing migration from East Africa such as Eritrea, Somalia, and Ethiopia [13, 14]. The burden of relapsing fever infections occurring in endemic regions is becoming undiagnosed or misdiagnosed as malaria [15].

As study done in Senegal have suggested, relapsing fever borreliae are the cause of approximately 13% of fevers presenting to health facilities, representing 11 to 25 cases per 100-person years [16].

Mortality rates from relapsing fever vary with the infecting agent; Most of TBRF cases have less than 5% mortality. However, with the infection from the East African species, B. duttonii and its louse-borne variant, B. recurrentus mortality can be higher. From Tanzania where B. duttonii is endemic high perinatal mortality rates reaching 475 cases/1000 pregnant women have been reported. On the other hand, higher spirochaetal loads are reported among pregnant individuals compared to non-pregnant controls. There is no life-long post infection prophylaxis to prevent repeat infections being reported amongst individuals living in endemic regions [9].

In Ethiopia, as different reports show there were continuous LBRF out breaks in different regions. In 2012 there were LBRF out breaks in Bahir Dar Amhara region with overall attack rate of 0.26 out of 1000 population with zero death rate. Unmatched community based case control and descriptive cross-sectional outbreak investigation was conducted in Bahir Dar and it shows Poor personal hygiene, overcrowding and lack of alternative clothes are the major risk factors of Relapsing Fever among the cases [3]. The study done in Mekele in 2016 also shows the likely hood of acquiring relapsing fever is higher among those sleep-in mass (>6 member), not wash their body at least weekly and not change their cloth at night [17].

1.1.3. OBJECTIVE

General Objective

- To investigate relapsing fever outbreak for implementation of public health control method in Addis Ketema sub-city, Addis Ababa, 2017.

Specific objectives

- To verify the existence of louse born relapsing fever outbreak in the district
- To characterize Relapsing Fever outbreak in terms of person, place, time.
- To identify risky factors contributing to the occurrence of LBRF outbreak
- To implement control measures

1.1.4. METHODS & MATERIALS

Study Area: This Relapsing Fever outbreak investigation was conducted in Addis Ketema Sub city. Addis Ketema sub city is one of the 10 sub cities in Addis Ababa city administration with total population of 319,757. Having a total area of around 898 ha, it bordered by Gulale sub city in the north, Lideta sub city in the south, Arada sub city in the east, and Kolfe Keranio sub city in the west. The district is located in the northwestern area of the city, not far from its center. Addis Merkato, Africa's largest open-air marketplace, is found in Addis Ketema sub city. There is 10 woredas who are actively reporting surveillance information daily and weekly. Each woreda has established woreda PHEM officer.

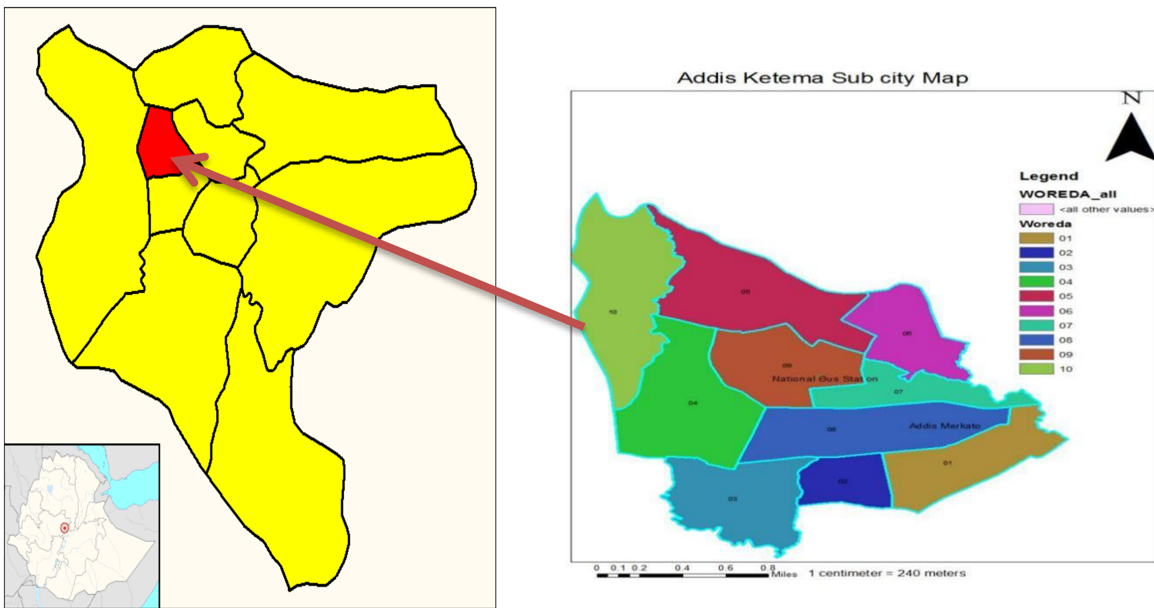

Figure 1. 1 Study area (Addis Ketema Sub city) map,2017

Study period: This study was conducted from February 1, 2017 to June 30, 2017.

Study Design: Unmatched Health Facility based case control study was conducted

Target Population: The populations in Addis Ketema Sub city

Study population: Populations those are constantly Residing in Addis Ketema Sub city and visit health facilities from February to June 30,2017 was used to draw the study unit.

Study unit:

- **Cases: P**atients with clinical features of louse born relapsing fever visited health facilities and tested to be positive for Borellia during first February to 30th June, 2017
- **Control**: - Of patients visited health facilities and tested negative for Relapsing Fever, two patients for each selected cases were interviewed

Sample size determination: Sample size was calculated by epi info version 7.1 depending on exposure percent of cases and controls to hypothesized risk factors using different prior similar study results in different areas as stated in table below. Fleiss with continuity correction sample size determination method was used. 95% CI level, 80% power and 1:2 case to control ratio was used in sample size determination.

Table 1. 1 Sample size Calculation assumptions for each hypothesized risky factor from previous study

S /n	Risky factor	Percent of cases exposed	Percent of controls exposed	OR	Calculated sample size with CIL 95%, Power 80% (Fleiss wcc)		
					Cases	Controls	Total
1.	Not washing closes at least weekly [3]*	75%	27.2%	8.03	15	30	45
2.	Not take body bath at least weekly[3]*	79.4%	64%	2.17	112	223	335
3.	Mass sleeping[17]**	66.7%	11.9%	14	11	21	32
4.	Not changing closes at night[17]**	71.4%	28.6%	6	19	37	56

Key: - * Source—Relapsing Fever outbreak investigation done in Bahir Dar, Addisu Workina Kassa.et.al, 2012, published in 2014

** Source--- Relapsing Fever outbreak investigation done in Tigray by Ibrahim Hassan, 2016

From the above table in order to identify the all hypothesized risky factors, the sample size calculated in 2nd raw 335 (112 cases and 223 controls) was participated in this study.

Sampling procedure

- **Cases:** Because of the nature of outbreak, and due to the fact that no one knows when the outbreak stops and how many cases could come on the next days, we were obligated to give a chance for the first coming relapsing fever cases. Accordingly, all confirmed Relapsing fever patients was selected at health facility until our sample size achieved.
- **Controls:** For each enrolled Relapsing fever cases two individuals visited next to the cases were selected from health facilities at the same days. Blood Film was done for all selected controls and they were enrolled after they are confirmed to be negative for Borriella species by Blood film test.

Selection of Cases and Controls

Inclusion criteria

- **Cases-** Any resident of Addis Ketema sub city who was tested for blood film and confirmed to have Borriella species or clinically suspected to have Relapsing fever infection or suspected to be epidemiologically linked cases within study period and who agreed to participate in the study will be included.

- **Controls**: -Any resident of Addis Ketema sub city presenting to health facility to get health service and tested to be free of relapsing fever or who do not fulfill the above case definition within the study period.

Exclusion criteria

- Family members are excluded both from cases and control groups.
- Relapsing Fever patients come to health facilities from other sub city was excluded from both case control groups

Variables

Independent Variables

- Age
- Sex
- Ethnic groups
- Residency Place
- Mass sleeping
- Knowledge about Relapsing Fever
- Monthly Income
- Personal hygiene
- Not changing cloth at night

Dependent Variables: Relapsing Fever infection

Hypothesis: One year back before we conduct this outbreak investigation, there were suspected breaks in this sub city for which no investigation done except some intervention. While we were conducting five-year surveillance data analysis we tried to review the line lists in each woreda that was documented. The line list Includes suspected risk factor variables column and we able to identified 55% of relapsing Fever treated patients were suspected to exposed for Overcrowded life style (Mass sleeping), 30% poor personal hygiene, 6% lack of shelter and 9% not identified. From this stand and by reviewing different literature, Mass sleeping, and Poor Personal hygiene were hypothesized as risk factors for the relapsing fever outbreak.

Data Collection Tools and Procedures

Since the outbreak was happened one month before starting of Investigation, to get information, we reviewed patient's document from health facilities card, OPD registration and laboratory log book retrospectively. Filled line lists was also used as an additional source of data for descriptive part. For analytical study, structured Questionnaire was prepared and Case and controls were interviewed using standard questionnaire that includes; socio-demographic data, Knowledge to

disease, exposure to risk factors etc. The questionnaires were adopted from different similar studies.

Data Quality Assurance

The questionnaire was checked for validity with sub city PHEM officers before starting data collection. Short description on data collection procedure was given for data collectors. To monitor and improve data collection system and quality, each completed questionnaire was daily reviewed by the principal investigators. Before analysis, data was also cleaned for any missing and logically inconsistent values.

Data processing and statistical analysis

Collected data were checked for completeness and inconsistencies. Then coded and entered into Epi Info Version 7.1.1 and Exported to excel. Data from excel was imported to SPSS version 23 software and recoded. The entered data were cleaned and edited before subsequent analysis. Bivariate and multiple logistic regression analyses were done to identify the relationship between the independent variables (socio economic, Knowledge and Exposure to risk factors) and dependent variable (Relapsing Fever illness). The socio-economic factors; Participant age, residence status, education, occupation, monthly income and Participant sex were entered to the bivariate model with participant category. Similarly, Participant's knowledge level: - Good, and poor Knowledge were entered in to the bivariate model. Additionally; Exposure history to risk factors such as Mass sleeping (greater than six member), Not taking body bath at least weekly, not washing cloth at least weekly, not changing cloth at night, and Having contacts with relapsing fever ill person were entered to bivariate analysis. The three sets of independent variables (socio-economic, Personal and environmental factors) that have p-value equals to or less than 0.2 in the bivariate logistic regression analysis were re-entered into multiple logistic regressions analysis. Median and IQR was calculated for cases and controls groups. AOR, 95% CI, P values were also calculated for each independent variable. All statistical tests were two sided and significant associations was declared at p-value less than 0.05.

Operational Definition

- ***Mass sleeping***: - Sleeping in one place by being equals to or more than 6 members
- ***Homelessness***: - A person who is living out of the home and sleep/ rest on the street

- ***Knowledge Good**:* The participants who answered the most accepted truth about transmission and control measures of Relapsing Fever scores one point for each questions. The Responder scores equals to or greater than the mean score of the series of seven knowledge question (Mean = 2.39 with SD of 1.29) compared to each other is considered as to have good knowledge on relapsing fever transmission and control measures.
- ***Knowledge Poor***: - The Responder scores less than the mean score of the series of seven knowledge question (Mean = 2.39 with SD of 1.29) compared to each other is considered as to have poor knowledge on Relapsing Fever transmission and control measures.
- **Suspected RF case**: -Any person presented with an abrupt onset of rigors with fever, usually remittent, headache, arthralgia and myalgia, dry cough, epitasis.
- **Confirmed RF case:** suspected cases with demonstration of Borriella recurrentus in peripheral blood film.
- **Epidemiologically linked case**: -Is a suspected case, which has contacts (possibly got B. recurrentus) with laboratory confirmed case or another epidemiologically confirmed case.

Relapsing Fever Outbreak declaration criteria

As EPHEM guide line recommends the thresh hold level for declaring an epidemic for Relapsing fever is: -

- Unusual increase of the case
- Doubling of Relapsing Fever cases on subsequent weeks

Accordingly, Increased cases of Relapsing fever was reported in Addis Ketema sub city from January, 2017.

Ethical Consideration

Formal letter was written to Addis Ketema sub city health office from AAU SPH to inform our field deployment. Accordingly, before filed investigation, a formal letter was written by Addis Ketema Sub city health office to each Woreda health office to get permission and facilitate the investigation process. Informed consent was taken from the study units and their families (if children) and any information related with personal identification was not used on the report. Confidentiality of the participants were kept through all data collection.

1.1.5. RESULT

Descriptive epidemiology

Descriptions of Relapsing fever cases by time

In Addis Ketema Sub City Relapsing Fever outbreak was reported in January, 2017. During the study period, we identified 153 confirmed Relapsing Fever cases with overall attack rate of 5 out of 10,000. In this sub city, we identified the same out breaks in the preceding year while we conduct Surveillance data analysis which was ceased through the month and it was reemerged in January 2017. The first case was a 24yrs old man who was living in woreda four locally known as 'Meselemia and was living on street. This patient visited health facility on 24th December after two days of date of onset. The cases reached the maximum level at the end of February (Figure 1.2).

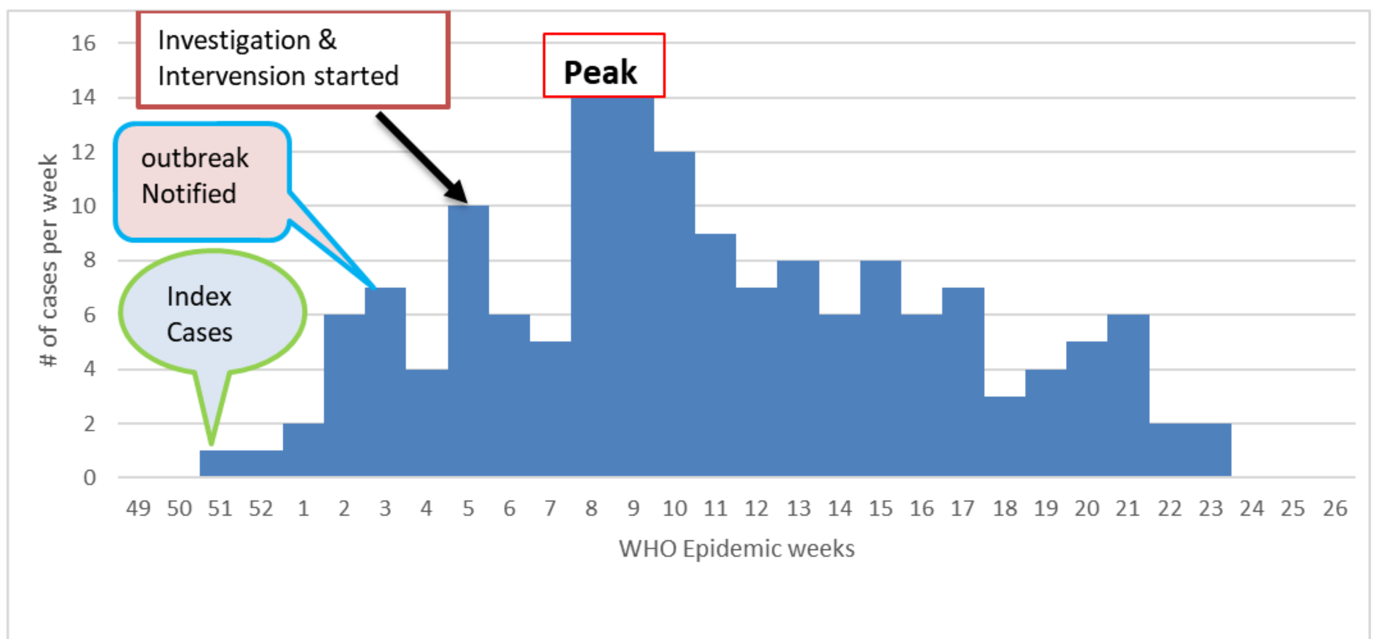

Figure 1. 2 Epi-curve of relapsing fever by epidemic week in Addis Ketema sub city, Addis Ababa, 2017

Description of RF by place

Among Ten Woredas in Addis Ketema Sub city the highest cases of Relapsing fever during the study period was reported from woreda 7 with attack rate of 26/10,000 followed by Woreda 1 with attack rate of 10/10,000, Woreda 4 (Attack rate of 5/10,000) and Woreda 8 with attack rate of

4/10,000. These four areas are those share boundaries with Addis Merkato and National Bus station (Figure 1.3)

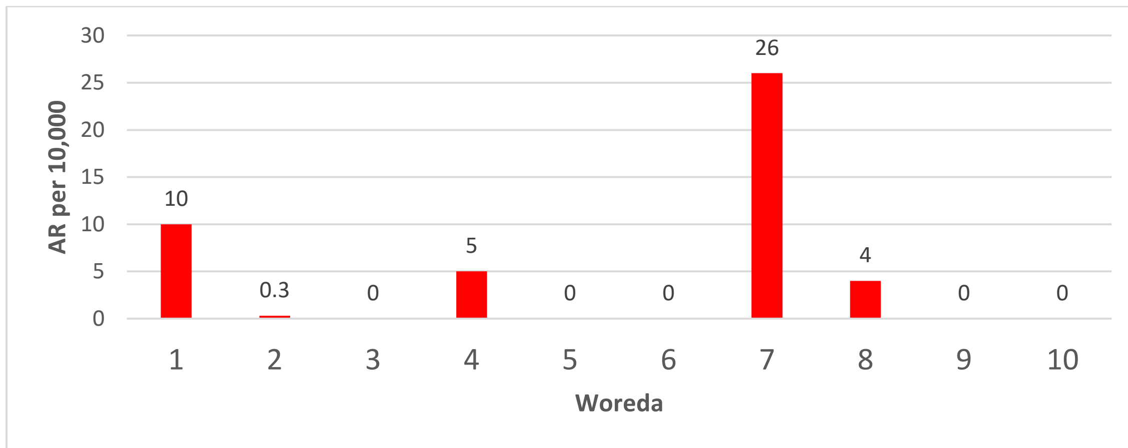

Figure 1. 3 Relapsing Fever case distribution among woredas, 2017

Description of Relapsing Fever by Person

Of 153 identified relapsing fever cases, 147 (96 %) were Males while only 6 (4%) were Females. The Sex specific attack rate was 10 per 10,000 populations among Male population while only 0.4/10,000 population among Females. These accounts 25 folds of cases among Male compared to Females. Among Relapsing Fever cases identified with in the study period, 19 (12.4%) of them were Less than 15yrs age groups with Age specific attack rate of 2 per 10,000 populations, 95 (62.1%) of them were age group of 15-24yrs (ASAR=10/10,000), and the rest was age group of 25-59yrs with Age specific attack rate of 3 per 10,000 (Figure 1.4).

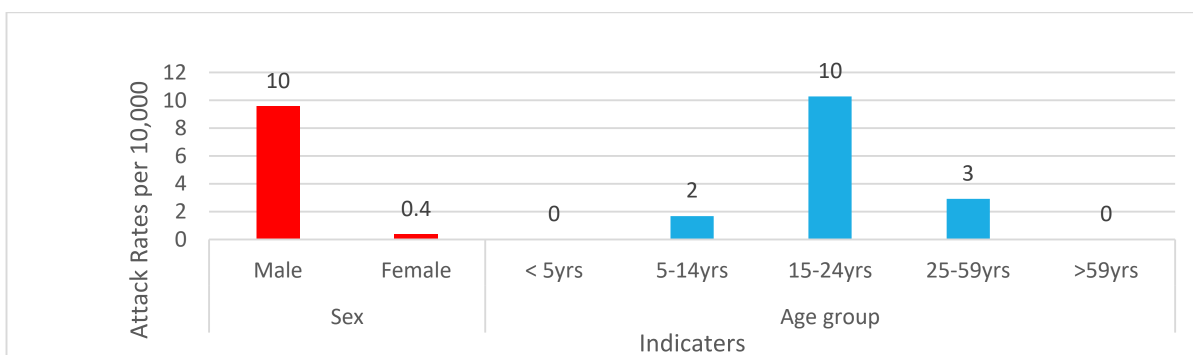

Figure 1. 4 Relapsing Fever cases distribution by age, Addis Ketema sub city, 2017

Among patients visited Health facilities with relapsing fever infection all most all patients who tested positive for Borielia species were experienced a clinical feature of Fever 153 (100%), 148 (96.7%) were experiencing Headache, 64 (42%) Nausea, 50 (33%) complain Vomiting, 144 (94%)

experience Joint pain,110 (72%) were Experiencing Myalgia/Malaise and 13 (8.5%) of them were experiencing Nasal bleeding (Figure 1.5).

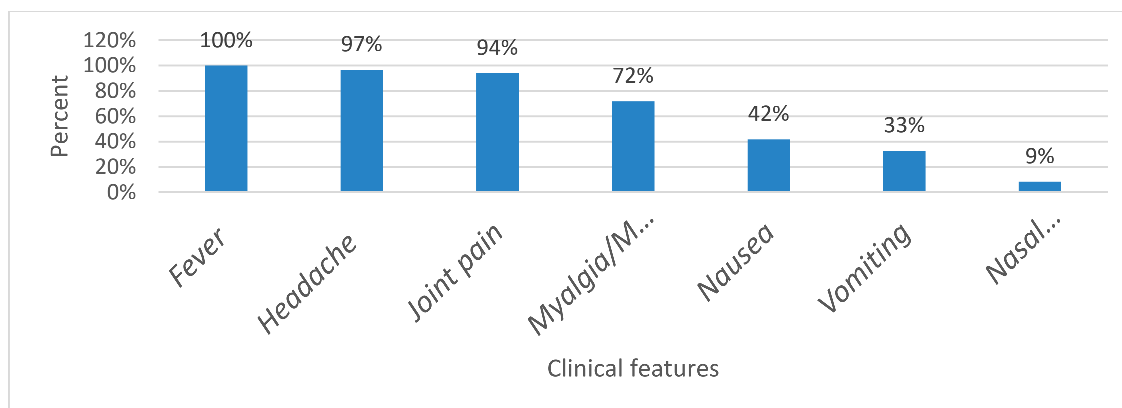

Figure 1. 5 Clinical features of relapsing fevers patients on presentation, Addis Ketema sub city Addis Ababa, 2017

Laboratory result

Retrospectively starting from January, 2017 to June 30, we reviewed laboratory log book and all cases who were included in this investigation and as well treated as Relapsing fever were confirmed cases of relapsing fever. Accordingly, about 153 cases were tested Positive for Borriella species. Hence, based on previous zero report of LBRF and the laboratory result typical louse born relapsing fever, clinical manifestation and treatment given, the existence of outbreak was confirmed.

Analytic epidemiology

A total of 112 LBRF confirmed cases and 223 Screen and Blood film tested Negative controls were interviewed among which 106 (94.6%) of cases and 190(85.2%) of controls were male. Greater than half of the cases, 69 (62%), were age group of 15-24yrs. The Median age of case and control was 20 (IQR = 9) and 23 (IQR=8) respectively. The average monthly income of the participant is 1,165 Eth. birr with SD of 978 (ranges from 0-4000 birr). Among 112 Relapsing Fever cases who were participated in case control studies, most of the case participants, 60 (53.57%), have been living in bed room daily based payment while 14 (12.5%) of them have been living in Home and 38 (33.93%) of them have been living on street. In addition, 100 (89.29%) of the case participant were daily laborer, 6 (5.36%) of them were employed, and the rest, 1 (0.89%) and 5 (4.46%) of them were student and Jobless respectively. Most of the participants were attended elementary school which accounts about 92(82.14%) while 9 (8.04%) of them were

secondary level, 7(6.25%) of them were illiterate, 2 (1.96%) of them were preparatory level and 2(2%) of them were Higher educational level.

Bi-variate logistic regression analysis shows, the statistical difference was observed among the sex of cases and controls having Females 70% less affected compared to Males, (COR=0.3, 95% CI 0.1-0.8 at 0.0110 of p Value), the residency places of cases and controls where those living on street (COR = 35.5 (15.8,79.4), p value 0.000) and in Bed room daily based payment (COR=70(30,159, p value 0.000) were more affected than those live in home (Table 1.2).

Table 1. 2 Bi-variate analysis for Socio economic factor associated with of relapsing fever, 2017

Variables	Category	Case(n=112)	Control (n=223)	COR, 95% CIL	P Value
Sex	Female	6(5%)	33(15%)	0.3(0.1,0.8)	0.0110
	Male	106(95%)	190(85%)	**1**	
Age group	<15	15 (13%)	6(3%)	1	
	15-24	67 (60%)	111 (50%)	0.2 (0.1, 0.7)	0.0029
	25-34	25 (22%)	85 (38%)	0.1(0.04, 0.3)	0.0000
	>34	5(4%)	21 (9%)	**0.09(0.02,0.3)**	**0.0003**
Residency status	Street	38(34%)	15(7%)	35.5(15.8,79.4)	0.0000
	Bed room	60(54%)	12(5%)	70(30,159)	0.0000
	Home	14(12%)	196(89%)	1	
Educational Status	Higher level	2(2%)	7(3%)	1.6(0.2,9.8)	**0.5641****
	Secondary(9-12)	11(10%)	89(40%)	0.7(0.3,2.0)	**0.5323****
	Primary(1-8)	92(82%)	86(39%)	**6.2(2.6,14.7)**	**0.2112****
	Illiterate	7(6%)	41(18%)	**1**	
Occupation	Student	1(1%)	16(7%)	**0.7(0.1,6.3)**	**0.756****
	Housewife	5(4%)	19(9%)	**2.9(0.8,10.8)**	**0.0861**
	Daily Laborer	98(88%)	76(34%)	**14.6(6.0,35.4)**	**0.000**
	Private owner	2(2%)	44(20%)	**0.5(0.1,2.7)**	**0.4220****
	Employed	6(5%)	68(30%)	**1**	
Monthly in come	> 2000 birr	9(8%)	46(21%)	**0.3(0.1,0.6)**	**0.0013**
	1001-2000 birr	31(28%)	68(30%)	**0.6(0.4,1.2)**	**0.1601**
	1000 birr & less	72(64%)	109(49%)	**1**	

Key: ** Variables with P Value of >0.2 and excluded in Multivariate analysis

Of the respondents 58 (52%) cases and 84 (37.7%) controls did not wash their clothes at least weekly (COR = 1.7, 95% CI [1.1, 2.8], 93 (83%) of Cases and 28 (13%) of controls were sleeping

together with a member of greater than six in a single room (COR = 34, 95% CI [18-64], 81 (72%) of cases and 31 (14%) of controls were Not change cloths at night (COR = 16, 95% CI [9-28], and 44 (39%) cases and 24 (11%) controls were not take body bath at least weakly (OR = 5.3 , 95%CI [3-9)] and the associations were statistically significant (Table 1.3).

Table 1. 3 Bi-variate analysis of Personal and Environmental factor associated with RF, 2017

Variables	Category	Case(n=112)	Control (n=223)	COR, 95% CIL	P Value
Not taking body bath at least weekly	Yes	44 (39%)	24 (11%)	5.4 (3, 9)	0.0000
	No	68 (61%)	199 (89%)	**1**	
Not washing cloth at least weekly	Yes	58 (52%)	84 (37.7%)	1.8, (1.1, 2.8)	0.0136
	No	54 (48%)	139 (62.3%)	**1**	
Mass sleeping	Yes	93 (83%)	28 (13%)	34, (18, 64)	0.0000
	No	19 (17%)	195 (87%)	**1**	
Not changing cloth at night	Yes	81 (72%)	31 (14%)	16, (9,28)	0.0000
	No	31 (28%)	192 (86%)	**1**	
Knowledge level	Good	20(20%)	101(45%)	**0.3(0.2,0.5)**	**0.0000**
	Poor	90(80%)	122(55%)	**1**	
Contact History	Yes	3(3%)	7(3%)	**0.8(0.2,3.3)**	**0.8152****
	No	109(97%)	216(97%)	**1**	

Key: ** Variables with P Value of >0.2 and excluded in Multivariate analysis

Multivariate analysis of mass sleeping (AOR = 8.2, 95% CI [3.4,19.9]), living on street (AOR= 8.8, 95% CI [2.6,30.1]), Living in Bed Room (AOR = 12.2, 95% CI [4.0,37.4]) and not changing cloths at night (AOR = 4.4, 95% CI [1.7- 11.8]) showed a statistically significant association. The Odds of acquiring relapsing fever for those sleep in a mass was about 8.2 times, and that of not changing cloths at night was 4.4 times higher compared to sleeping in a member of less six and changing cloths at night. In addition, peoples who were sleeping on street and in bed room rented daily were 8.8 times and 12.2 times more likely to develop Relapsing fever than those live in home respectively. No statistical difference was found on monthly income, occupation, age, sex, Not Taking body bath at least weekly and educational status when compared among both cases and control (Table 1.4).

Table 1. 4 Multivariate logistic regression analysis of factors for relapsing fever

Variables	Category	Case(n=112)	Control (n=223)	COR, 95% CIL	AOR, 95% CIL	P Value
Residency status	Street/Home less	38(34%)	15(7%)	35.5(15.8,79.4)	8.8(2.6,30.1)	0.0005*
	Bed room	60(54%)	12(5%)	70(30,159)	12.2(4.0,37.4)	0.0000*
	Home	14(12%)	196(89%)	1	**1**	
Monthly in come	>2000 birr	9(8%)	46(21%)	**0.3(0.1,0.6)**	0.9(0.2,3.4)	0.8905
	1001-2000 birr	31(28%)	68(30%)	**0.6(0.4,1.2)**	2.8 (0.9,8.1)	0.0568
	1000 birr & less	72(64%)	109(49%)	**1**	**1**	
Not taking body bath at least weekly	Yes	44 (39%)	24 (11%)	5.4 (3, 9)	1.4(0.5,4.0)	0.5375
	No	68 (61%)	199 (89%)	**1**	**1**	
Not washing cloth at least weekly	Yes	58 (52%)	84 (37.7%)	1.8, (1.1, 2.8)	0.4 (0.1,1.0)	0.0705
	No	54 (48%)	139 (62.3%)	**1**	**1**	
Not changing cloth at night	Yes	81 (72%)	31 (14%)	16, (9,28)	4.4 (1.7,11.8)	0.0028*
	No	31 (28%)	192 (86%)	**1**	**1**	
Mass sleeping	Yes	93 (83%)	28 (13%)	34, (18, 64)	8.2(3.4,19.9)	0.0000*
	No	19 (17%)	195 (87%)	**1**	**1**	
Knowledge level	Good	20(20%)	101(45%)	**0.3(0.2,0.5)**	1.3(0.4,3.7)	0.5936
	Poor	90(80%)	122(55%)	**1**	**1**	

Key: * Variables with p value of < =0.05 and reported to have significant association with RF outbreak

Public health Intervention undertaken to control the outbreak

Observation of the situation of street people

On observation, the team identified:

- Around the bus station there were many mass sleeping houses (bed rooms).
- More than 10 Peoples sleeps in a very narrow bed room.
- There were many homeless/street people around bus station and Addis Merkato
- Those bed rooms used for sleeping has poor hygiene and there were no follow ups from government body to keep it save for sleeping.

Actions Taken

- Sub city PHEM officers Discussed with sub city health officers, woreda administration, woredas Health officers and AARHB and activate epidemic response task force to participate in active case detection & educating at gatherings to prevent and control the outbreak.
- Active surveillance and Contact tracing was done and house to house health education was given for contacts.
- The team engaged mass screening and conducted daily reporting cases to next level, Supportive, supervision in the case management & epidemiological linkage.
- Health education for all street and delousing was done
- Mass sleeping houses were identified and reported for Woredas to follow them closely and make them save for sleeping
- Mass sleeping houses and streets were sprayed with Malathion.

1.1.6. DISCUSSION

Relapsing Fever outbreak was recurrently happened in different parts of Ethiopian country in different time and Magnitude including Addis Ababa city administration. Following the high number of cases of relapsing Fever in January, 2017 from Addis Ketema Sub city we conducted outbreak investigation and we reveal that the presence of Louse born Relapsing fever outbreak in this sub city. The index cases were reported in November 2016 from woreda seven and woreda four. Within a month, it was distributed to other Woredas especially those shares the border of Merkato and Autobistera (National Bus station), such as Woreda one, woreda two, Woreda eight and woreda nine. As different literature and studies show mass sleeping and crowded shelters are the major predisposing conditions for relapsing fever outbreak [1]. Our study also witnessed this assumption as we observed cases life condition during our assessment, mass sleeping and overcrowded life style was common among them.

Following our intervention, the number of Relapsing fever cases were observed to be highly increased in the following weeks. The reason behand was, among our intervention, giving health education for population at risk and community active surveillance was the primary action. At this time, we identified many infected persons those were not visited health facility because of lack of money and we send them to be treated for free in mother Teraza Charity clinic. On the other hand,

after receiving health education about the disease, most of infected persons those did not visited health facility was initiated to get treated in health facility.

The death rate from relapsing fever in this sub city was zero and the attack rate was Five out of 10,000 populations which was two folds than Bahir Dar as a case-control outbreak investigation study done in 2012 which shows attack rate of 2.6 out of 10,000 populations [3], and 6 folds than Mekele, Tigray which was 8/100,000 population in 2016 [17].

In our study area Male populations were more affected (10 cases per 10,000) than Females (0.4/10,000 pop) which was about 25 folds compared to female populations. The surveillance data analysis done in Bahir Dar Felege Hiwot Hospital in 2012 shows the same result in which males was affected 11 folds than female [9]. This may be due to the probability that Males are more prone to street life and exposed to mass sleeping. In the same manner age group of 15-24yrs population were more affected (62% of the total case with ASAR of 10 per 10,000) than the other age groups which is the same result with the case-control study done in Bahir – Dar city, Amhara region in 2012 [3]. This age group is a time when one person may be affected by peer pressure to go out of the family member and try to produce their own property. Due to this, most of the adolescent are prone to live on the street or daily based payment Bedroom and most of the time they prefer to sleep in a mass to minimize the cost. Living in daily based payment Bedrooms were 10 folds (54%) among cases than control where mass sleeping and not changing cloth is common.

Relapsing Fever is highly incident in the woredas those are bordering Addis Merkato open market center and National bus station locally known as “Autobistera”. These woredas are woreda Seven, Woreda one, woreda Four, and Woreda Eight in decreasing order. Due to the sake of Daily food and income from Marketing process and transportation system, most of the population migrates towards this area which makes it an overcrowded place in the town. Closer to Merkato and bus station Mass sleeping houses for renting with low cost were also identified in this area where many peoples were using for sleeping at night after they performing their daily job. This type of lifestyle may highly contribute to transmission of Relapsing Fever infection through body louse because of possible presence of mass sleeping and poor hygiene.

Our study shows Mass sleeping, not changing cloths at night and residence place are significantly associated with the occurrence of relapsing fever in Addis Ketema Sub city in 2017. The Odds of acquiring relapsing fever for those sleep-in mass (AOR= 8.2, 95% CI [3.4-19.9]) was 8.2 times

higher when compared to those sleep in a member of less than six. This finding is supported by the study done in Mekele, Tigray in 2016 (AOR=15.9, 95% CI [4.8-60.1]) [17]. In such situation, the transmission of LBRF is very high and it also exposes them to have poor personal and environmental hygiene. On the other hand, peoples those have no habits of changing clothes at night (AOR=4.4, 95% CI [1.7-11.8]) was found to be 4.4 times more infected by relapsing fever compared to those has habits of changing clothes at night. The possible assumption may be those not change their cloths at night were due to lack of other reserve cloths and they tend to wear it for a long period of time which in turn leads to have poor hygiene because it is not cleaned regularly. This favors body louses to be bread easily which is the major relapsing fever transmitting agent.

The odds of contracting Relapsing Fever were found to be 8.8 times higher among those live on street (AOR=8.8, 95% CI [2.6-30.1]) and 12.2 times higher among those live in Bed Room (AOR= 12.2, 95% CI [4.0-30.4) when compared with those live in normal house. In our study, peoples those considered as living in normal house were those who have their own house or those who rents house for regular life and they have good opportunity to keep their personal hygiene and environmental sanitation than those live on street or in rental bedroom. They are also less likely to exposed for mass sleeping while mass sleeping is the other associated risk factors in our study area.

No statistical difference was found on age, sex, ethnicity and educational status compared both cases and control which is similar with the study done in Bahir Dar, 2012. However, unlike the study done in Bahir Dar in 2012 [3], Not washing closes at least weakly (AOR= 13.23, 95% CI [5.5-31.8] in Bahir Dar) and Not taking Body bath at least weekly (AOR = 8.01, 95% CI [3.5,18.3] in Bahir Dar) also have no direct association with louse born Relapsing Fever outbreaks in Addis Ketema Sub-city [3]. The difference may be due to the sampling method which is Community based sampling method in Bahir Dar and Health Facility Based in case of our study.

1.1.7. LIMITATIONS

- Study design effect (Possible Bias due to unmatched study design, Hospital based selection)
- Representativeness Issue (Hospital based Case control selection)

1.1.8. CONCLUSION

- There were RF outbreak in Addis Ketema sub city in 2017
- Geographically linked to Addis Merkato and National Bus station areas were highly affected area (Woreda 1, 4,7,8)
- Males are more affected than Females
- Mass sleeping, residency status and poor personal Hygiene were significantly associated with Relapsing fever outbreak in Addis Ketema Sub city in 2017

1.1.9. RECOMMENDATION

Sub city

- Sub city has follow closely the timeliness and completeness of reports
- Providing chemicals for delousing bed rooms in collaboration with AAHB and other stake holders

Woredas level

- Close flow up of Bed rooms to keep clean (safe for life) and Delousing
- Control measures to decrease the number of people sleep in one bed room

Health Facilities level

- Early case detection to initiate intervention early
- Continuous health education for community (cause, transmission, prevention)

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1.2. Dysentery outbreak investigation and Response in Woreda 9 Akaki Kality sub city, Addis Ababa, Ethiopia, 2018

ABSTRACT

Introduction: Dysentery is an infectious gastrointestinal disorder, characterized blood in loose stool. Shigellosis is the most common cause of outbreak of bloody diarrhea worldwide. Worldwide, the incidence of shigellosis is estimated to be 164.7 million cases per year. In Ethiopia total of 267,489 dysentery cases and 229 deaths were reported in 2015/2016. This study was aimed to investigate dysentery outbreak in Woreda Nine, Akaki Kality Sub city, Addis Ababa, 2018 from Feb 19 to March 11.

Methods**:** We conducted unmatched Case control study by recruiting 21 cases and 42 controls. The sample size was calculated by Epi info 7.1.1 using case control ratio of 1:2 with an assumption of proportion of controls with exposure 53.7% and Cases with exposure 14.8% at 95% CI and 80% power. Each independent Variables was cross tabulated in bi variate analysis and variables with p value of 0.2 and less was run in Multivariate logistic regression. Variables with P value of less than 0.05 was reported as independent determinants of dysentery outbreak.

Result**:** A total of 57 dysentery cases were identified with overall attack rate of 9 per 1000 population. Female were more affected than males with Sex Specific Attack Rate of 10 and under five children were more affected with Age Specific Attack Rate of 35 per 1000 populations. Unprotected water source for domestic use (AOR=6.2 95% CI [1.1-34.7]), eating vegetables/Fruits (AOR=8.8, 95% CI 1.3-60.7), eating uncooked food (AOR=6.2, 95% CI 1.1-35.4), and Family monthly income were found to be independent determinants of dysentery outbreak in Woreda 9 Akaki Kality Sub city.

Conclusion and Recommendation: Unprotected water source is suspected to be the common source for dysentery outbreak. Maintaining damaged water pipes and improving the water coverage of the area with expected quality is important to prevent similar problem.

Key Words: Dysentery diarrhea; Case Control; Outbreak Investigation, Akaki Kality, 2018

Word Count: 295

1.2.1. INTRODUCTION

Diarrhea is the passage of three or more loose or liquid stools per day, or more frequently than is normal for the individual [1]. It is responsible for 1.7 billion morbidities and 760, 000 mortality of children every year and kills 2,195 children every day more than malaria, measles, and AIDS combined [1].

Depending on their clinical features, diarrheal diseases can be classified in to three as acute watery diarrheas (diarrhea without blood lasting less than 14 days), acute bloody diarrhea which is called dysentery diarrhea (diarrhea with blood lasting less than 14 days) or persistent diarrhea (diarrhea with or without blood that lasts at least 14 days). All of which are potentially life-threatening and require different treatment courses [2].

Dysentery, defined as diarrhea with visible blood, can be caused by many different organisms, including shigella spp, enterohemorrhagic, Escherichia Coli serotype O157:H7, Campylobacter jejuni, enteroinvasive E. coli, Salmonella spp and infrequently, Entamoeba histolytica. Of these organisms, the only ones known to cause large epidemics are shigella dysenteries serotype 1 (sd1), and much less frequently, E. coli O157:H7 [3]. Dysentery is an infectious gastrointestinal disorder, characterized by inflammation of the intestines, mainly the colon. WHO defines dysentery as any episode of diarrhea in which there is blood in loose and watery stool [4]. Dysentery can mainly spread among people through contaminated food and water as well as poor sanitation. Shigellosis is the most common cause of outbreak of bloody diarrhea worldwide with secondary infection rates as high as 40% in the household and case fatality rate of 15-20% [4].

In 2016, a quantitative molecular analysis from the Global Enteric Multicenter Study (GEMS) identified an increased burden of Shigellosis and reported it as the leading pathogen among the top six attributable pathogens causing childhood diarrhea. Shigellosis occurs predominantly in developing countries due to overcrowding and poor sanitation. Infants, non-breast fed children, children recovering from measles, malnourished children, and adults older than 50 years have a more severe illness and a greater risk of death [5].

Worldwide, the incidence of shigellosis is estimated to be 164.7 million cases per year, of which 163.2 million (99%) were in developing countries, where 1.1 million deaths occurred. About 60% of all episodes and 61% of all deaths attributable to shigellosis involved children younger than 5 years. The incidence in developing countries may be 20 times greater than that in developed

countries. Although the relative importance of various serotypes is not known, an estimated 30% of these infections are caused by S dysenteries [6].

Even though mortality rates among older children, adolescents and adults are lower than those observed in children under five, diarrhea still poses a substantial burden accounting for approximately 2.8 billion diarrhea episodes among older children, adolescents and adults. For patients of all ages acute bloody diarrhea (dysentery) is a medical emergency that warrants serious medical investigation [7].

In Ethiopia, bloody diarrhea is being reported weekly as part of priority disease. Ethiopia 2015/2016 annual performance report showed that a total of 267,489 dysentery cases and 229 deaths were reported from all regions of the country. Majority of cases were reported from Oromia and Amhara Regions (83,980 (31.4%) and 60,877 (22.8%), respectively. The incidence rate was highest in Benishangul Gumuz Region (1,751/100,000 population) [8]. In 2017 also, the dysentery case reports continued increasing with national attack rate of 7.65 in 25th WHO Epi week and Benishangul Gumuz Region was with highest attack rate (27.5/100,000) followed by Tigray Region (AR=20.6/100,000) and Addis Ababa (AR=17.1/100,000) [9].

From 19th February to March 11, 2018 there were an increased reports of bloody diarrhea(dysentery) from Akaki Kality Woreda Nine specifically from Tulu Dimtu health center. Due to its location this health center is mostly being providing health services for the residents of recently built Condominium houses. Even though this area is susceptible for such condition due multiple health factors, to control the problem early, focused intervention is more effective. Hence, we conducted this investigation to identify the major determinants of diarrheal dysentery disease in this woreda, so that the sub city and other stake holders able to give proper and targeted intervention to tackle the problem.

Statement of the problem

Dysentery infection is continued to be one of the major cause of morbidity weather as Endemic Epidemic occurrences in developing country. If not early identified and managed, acute bloody diarrhea or dysentery may cause intestinal damage, sepsis, malnutrition and dehydration especially in children [10]. In different time outbreak was reported in Ethiopia and currently as WHO weekly Bulletin shows Addis Ababa Reports high number of dysentery cases in week 25 following Benishangul Gumuz and Oromia region. In Akaki Kality Sub city Woreda Six, before three and Four months the maximum weekly dysentery cases were Nine (ranges from 0-9). However,

starting from the 19th of February, unusual number of dysentery cases were reported from this District which urges the Woreda, sub City and other stake holders to take possible control action before further distribution and damages.

Significance of the study

Dysentery infection is caused by different etiologic organisms which are mostly results from Environmental sanitation and personal hygiene problem. The effective disease outbreak control measures could be affected by how specific and how targeted the implemented intervention is. Since, in our study area, Akaki Kality sub city, Woreda Nine Tulu Dimtu Condominium is a newly constructed residence area There may be many factors that associated with the outbreak of dysentery disease secondary to possible shortage of water and poor sewerage system. To minimize the attach rate of dysentery disease by implementing successful intervention source identification is very important. Therefore, this outbreak investigation helps to identify the main source and risk factors of the outbreak which helps Woreda Health office, Sub city Health Office, and other stake holders to intervene early and successfully. Furthermore, the result of this Investigation could help as constructive input and reference for interested researcher.

1.2.2. LITERATURE REVIEW

Dysentery is common in Ethiopia, ranking among the top ten causes of outpatient visits. There are two main types of dysentery, caused by different infectious agents. Bacillary dysentery, or shigellosis and amoebic dysentery. Although Shigella infection can occur at any age, it is rare in infants less than six months of age and most common in children aged two to three years. This age-distribution is unlike amoebic dysentery, which is rare in children less than five years of age. Two-thirds of the cases of shigellosis and most of the deaths are in children below ten years, and (like all diarrheal diseases) the effects are most severe in malnourished children [11].

There were various reports of diarrhea with blood in Ethiopia and also reports of Shigelloses outbreaks in some parts of the country. In March 2010, Addis Ababa University (AAU) Technology Campus reported occurrence of an outbreak of diarrheal illness among students. A total of 104 suspected cases were identified, based on the case definition, with an attack rate of 6.8%. Stool culture confirmed Shigella flexneri species in 5/11 (45%) of specimens tested. Risk factors associated with illness included eating specific foods at specific meal times [12].

Case control study outbreak investigation was done in Bibugn District, East Gojjam Zone, Amhara region in 2016 and it shows disposing refuses in open field (AOR=2.71 (1.37-5.38), draw drinking water by dipping compared to pouring (AOR=2.50 (1.21-5.14)), not separately storing drinking water from water for other uses (AOR=3.00 (1.39-6.48)) were significantly associated with dysentery outbreak [2]. Other dysentery outbreak occurred in Dera Woreda in 2015 with overall attach rate of 2.3 per 1000 population. No access to latrine, washing hands without soap and not using latrine are identified to be significantly associated with the outbreak in Dera Woreda Amhara region [13].

1.2.3. OBJECTIVE

General objective

- To investigate dysentery outbreak and implement intervention measures in Woreda Nine, Akaki Kality Sub city, Addis Ababa, 2018

Specific Objectives

- To describe the dysentery distribution in terms of time, person & place
- To identify the risk factors associated with dysentery outbreak
- To take possible intervention

1.2.4. METHODS AND MATERIALS

Study area: Akaki-Kality sub city is one of the ten sub city found in Addis Ababa city Administration. It is located on south & south east direction of the city on the distance of 12-35 Km from the center of Addis. The sub city has 11 district out of which 3 are rural type the rest 8 is Urban type. Among districts found in this Sub city district 9 is the one which is located on the South East margin of the sub city starting from the center. This Woreda is bordered by Woreda 10 and 11 on the North, Woreda 02 and Oromia regional state on the south, Woreda 08 and 01 on East direction and Oromia regional state on West direction. According to population projection from 2007 CSA, there is about 6,365 population living in the Woreda among which 3,246 are Female population and 3019 are Male Population (Male to Female ration of 0.9:1). Six months back the resident of the Woreda gets health services from the neighboring Woreda Health facility and now two governmental Health center are built and are providing comprehensive health service. The settlement style of the woreda was used to be scarcely populated, but currently there are many Condominium houses constructed and there are many newly settled population specially, in the

area called Tulu Dimtu. There are two Governmental health facilities and five Private clinics which are currently providing health care service for the community. This study was conducted from February 19 to March 11, 2018

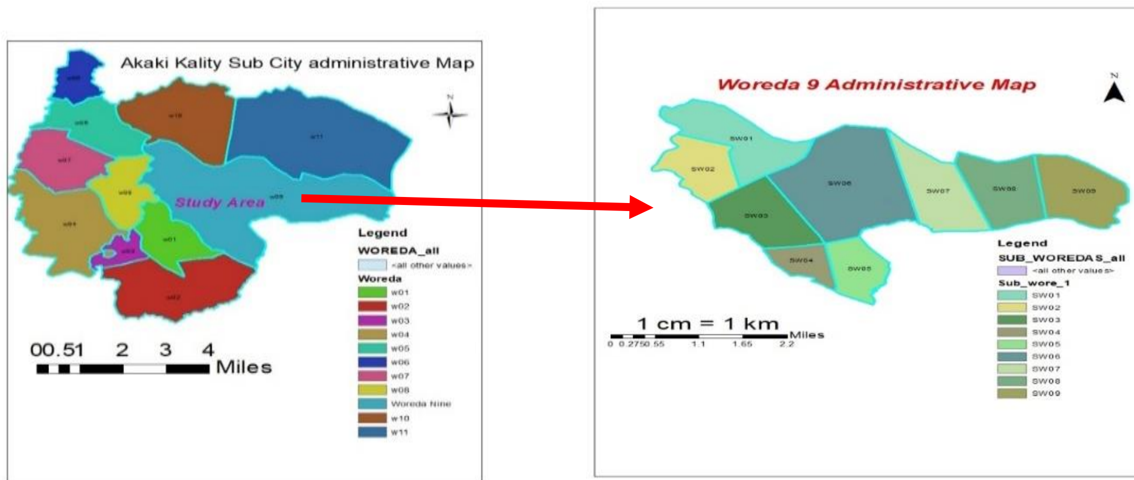

Figure 1. 6 Administrative map of the study area

Study Design: Unmatched Facility Based case –control study was conducted.

Target population: All population in Akaki Kality sub city Woreda 9 where cases and controls recruited were our source of study population

Study population

- **Cases:** any person residing in Tulu Dimtu Condominium Woreda 9 Akaki Kality sub city and who had bloody diarrhea within the period February 19 to March 11, 2018.
- **Controls: A**ll people without diarrhea symptoms during the study period and residing in similar area with cases

Study Unit

- **Case**: Patients Visited health center from February 19 to March 10, 2018 with a compliant of bloody diarrhea was interviewed until the needed sample size achieved.
- **Control**: Of patients visited health facilities, two patients for each selected cases were interviewed**.**

Inclusion and Exclusion Criteria

Inclusion Criteria

- **Cases:** All patients presenting with symptoms of bloody diarrhea from February 19 to March 11 and agreed to participate in the study were included.
- **Controls:** Any resident of Tulu Dimtu Condominium Woreda Nine Akaki Kality sub city during the study period and who did not develop signs and symptoms of diarrhea with in the study period were included.

Exclusion criteria

- Family members except one cases were excluded from cases.
- Children under fifteen not accompanied by close family or guardians (those knows fully about the child) were excluded from both cases and controls.

Variables

Dependent variable: Bloody Diarrhea cases.

Independent variables

- Socio-demographic variables
    - Age, Sex, family size, Educational status, Family monthly income, etc.
- Environmental variables
    - Latrine availability, hand washing facility, source of water, etc.
- Behavioral variables
    - Latrine utilization, hand washing practices, Waste disposal practice, etc.

Sample Size determination: Sample size was calculated using Epi-info 7 stat calc for unmatched case-control study. Different study result was used to extract hypothesized variables those used in sample calculation. From the series of Variables used, the one with higher sample size was accepted for the assumptions values applied in our sample size calculation. The assumptions were:

- *Two sided confidence level (1-α) =95%*
- *Power (% chance of detecting) = 80%*
- *Ratio of controls to case= 1: 2*
- *Proportion of controls with exposure = 53.7%*
- *Least extreme odds ratio to be detected =*
- *Proportion of case with exposure = 14.8%*

Therefore, the final sample size was calculated to be 63 (21 cases and 42 non cases) (Table 1.5).

Table 1. 5 Assumption used in Sample size calculation from different study

S/n	Variables	% of Case exposed	% of control Exposed	OR	Sample case	Sample controls	Total
1.	Latrine Availability*	21.6%	82.4%	0.1	13	26	39
2.	Using soap after latrine*	16%	84%	0.04	15	30	45
3.	Always wash hand after toilet*	11.8%	57.8%	0.1	15	30	45
4.	Protected water (Treating water with chemical)**	14.8%	53.7%	0.14	21	42	**63**
5.	Open filled disposal of garbage**	87%	43.5%	8.69	17	34	51

** Addis Alem (15)* *** Meklit (13)*

Sampling Procedure: All patients presenting with bloody diarrhea cases were interviewed until the calculated sample size was achieved. For every selected cases two consecutive patients with no bloody diarrhea were selected from similar residency area with cases and interviewed at the same day. Both cases and controls were recruited in similar Health center.

Data collection procedures & tools

Descriptive study: Line lists from Health center was taken. Patient medical records and Laboratory registration book was reviewed to identify any missed cases. We cleared information concerning any recent change in the case definitions, reporting situations, laboratory diagnosis tools and population size. All patients visit health facilities from this woreda with in the study period and those fulfill the case definition of dysentery were included in the descriptive study.

Analytic Study: A structured interviewer-administered questionnaire which was adopted from different similar study was used to collect data on factors associated with contracting bloody diarrhea (Personal factors, Environmental Factors, and Food/drinking exposure factors). For each selected cases two controls were recruited at the same day at health centers and asked similar questions with the cases. Data was collected by principal investigator and co-investigator including woreda PHEM officer, heath center workers.

Operational Definition

Unprotected water source: - households report to use water from river, open wells, Visible pipe line leakage source, bought from those individuals fetch from unknown source and quality.

Dysentery: patients present complaining bloody diarrhea or/and microscopic stool examination report of RBC in stool.

Suspected cases: A person with diarrhea with visible blood in stool.

Confirmed cases**:** Suspected case with stool culture positive for *Shigella dysentariae 1*.

Dysentery Outbreak**:** Unusually increased in number of bloody diarrhea cases OR Doubling of cases on subsequent weeks [14].

Environmental assessment

Immediately after the outbreak was reported, we moved to the area and assessed the food source, water source, Community Health service and other environmental exposure of the community including waste disposal and sewerage system. Accordingly, we able to identify the community water shortage and as alternative most of the residents of Tulu Dimtu condominium were obligated to find water from sources other than tap water. Close to the outbreak area a water source which is leaking from the big city water pipe and accumulated in an open hole was found. Most of the community found in Tulu Dimtu Condominium uses this untreated/unprotected water for domestic use. At the same time this water is used for cattle which furthermore make this water dangerous for human being. Having this information, we develop our hypothesis and started our investigation.

Laboratory Investigation

Water sample taken from open source found around Tulu Dimtu condominium where most of the community uses as alternative source of water at the time of city water shortage by buying from individuals those fetch and provide to community. In addition, other water sample from the pipe that provide common water for community those residing in woreda 9 Tulu Dimtu condominium was taken in aseptic technique by EPHI lab technician. For most of the patient complaining bloody diarrhea stool sample was taken for microscopic examination.

Data processing and statistical analysis

Descriptive Study: Filled line list obtained from Woreda PHEM office were cross checked with Patients cards and laboratory tests. Dysentery cases distribution by age, place, and time was identified. Laboratory test results were represented by graphs. Median ages of the affected people, AR and CFR were calculated.

Analytic Study: Collected data were checked for completeness and inconsistencies. Then coded and entered to Epi Info Version 7.1.1 and Exported to excel. Data from excel was imported to SPSS version 23 software. The entered data were cleaned and edited before subsequent analysis. Bivariate and multiple logistic regression analyses were done to identify the relationship between the independent variables (socio economic Factors, and Exposure to risk factors) and dependent variable. The socio-economic factors; Participant age, residence status, education, occupation, monthly income and Participant sex were entered to the bivariate model with participant category. Similarly, Participant's Personal hygiene, Environmental sanitation, and exposure to Food/drinking were entered into bivariate analysis. To minimize possible confounders, the sets of independent variables that have p-value equals to or less than 0.2 in the bivariate logistic regression analysis were re-entered in multiple logistic regressions analysis. Median and IQR was calculated for cases and controls groups. AOR,95% CI, P values were also calculated for each independent variable. All statistical tests were two sided and significant associations was declared at p-value less than 0.05.

Ethical clearance

Formal letters were written for Woreda 9 Health office and for Tulu Dimtu health center from Akaki Kality Sub city. Informal consent was obtained verbally from each participants before interview. No personal identification such as Name was taken and confidentially was kept through data collection.

Dissemination of findings

The result of Dysentery disease outbreak Investigation was communicated to Woreda 9 health office, Akaki Kality sub city health office, Addis Ababa Regional Health bureau and Addis Ababa university, school of public Health Field Epidemiology Training Program. In addition, the result of this study will be published, presented on national/international scientific conferences when opportunities and funds are available.

1.2.5. RESULT

Descriptive Epidemiology

According to our investigation a total of 57 dysentery cases with no death were reported with in three WHO Epi weeks (8th, 9th, and 10th). The number of case was increased from week to week which its pick on 9th week. As it is shown in the below trend line graphs the Woreda threshold line was crossed in 8th week and continued above threshold up to 10th WHO Epi weeks of 2018. This is higher than the usual number of cases evidencing an outbreak. According to national guideline the dysentery outbreak threshold is unusually increasing in number of cases or doubling of cases on subsequent weeks. The trend line of Dysentery cases showed that the current case trend line crossed the threshold levels (see figure 1.7).

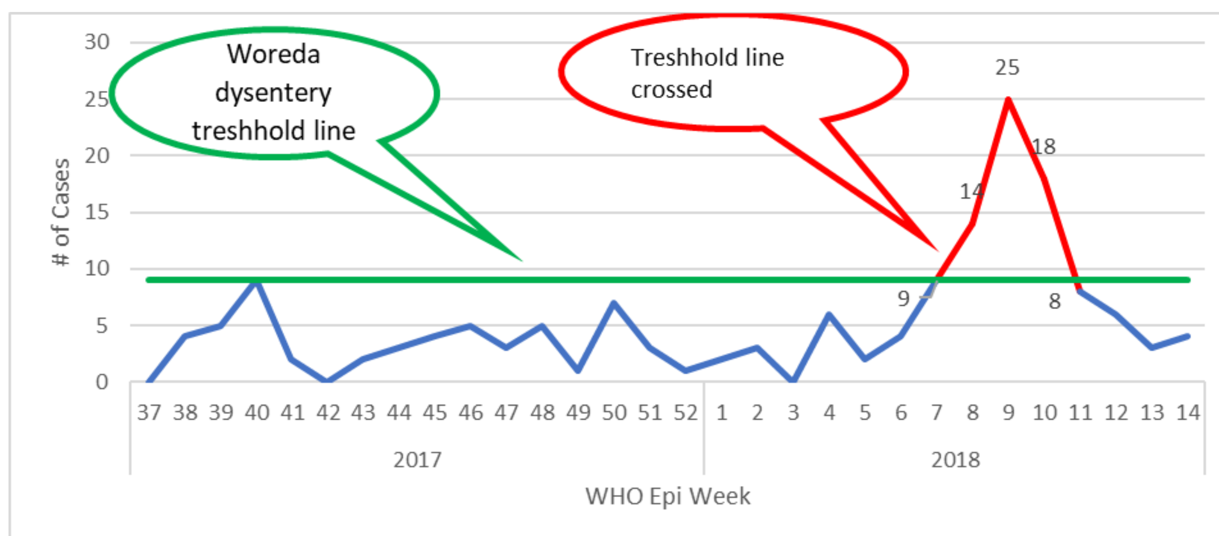

Figure 1. 7 Dysentery trend line in Akaki Kality Sub city Woreda Nine Tulu Dimtu Health Center,2017/2018

In our study area, the mean age of affected population was 14yrs (SD 11yrs) and the most affected age group was age group of less than 5 year children accounting about 16 (28%) cases with Age Specific Attack Rate of 35 per 1000 population followed by age group of 5-14yrs children with ASAR of 15 per 1000 population. Of the total cases 32 (56%) of them was Female population with sex specific attack rate of 10 per 1000 population (Figure 1.8)

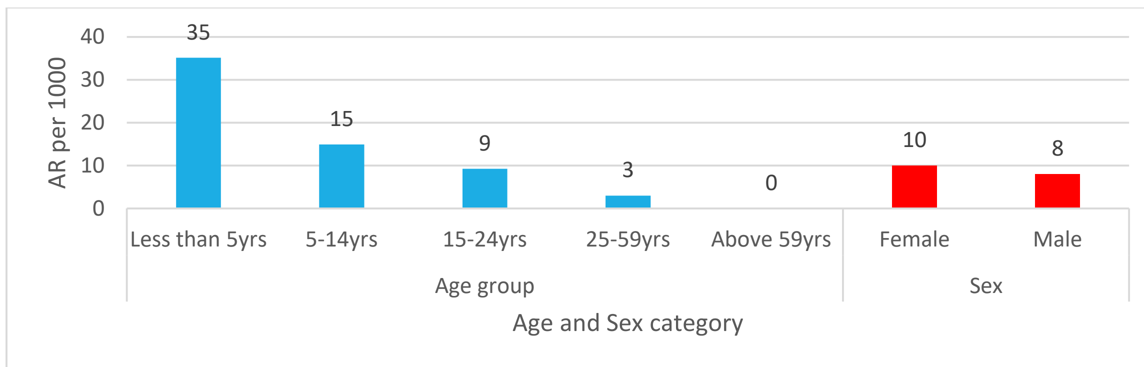

Figure 1. 8 Age and Sex Specific AR of Dysentery cases in Akaki Kality woreda 9 Akaki Kality sub city,2018

The usual dysentery cases threshold in the woreda was passed after the 7th Epi week & dysentery outbreak was reported on the last day of 8th week (Feb 25,2018). In the period of outbreak, the highest cases were reported in week Nine where the intervention and Investigation initiated. Just following the intervention, the cases started declining and was controlled after 10th week of WHO Epi week. The overall attack rate of dysentery cases during outbreak (Feb 19 to March 11) was 9 per 1000 population with zero case fatality rate (Figure 1.9).

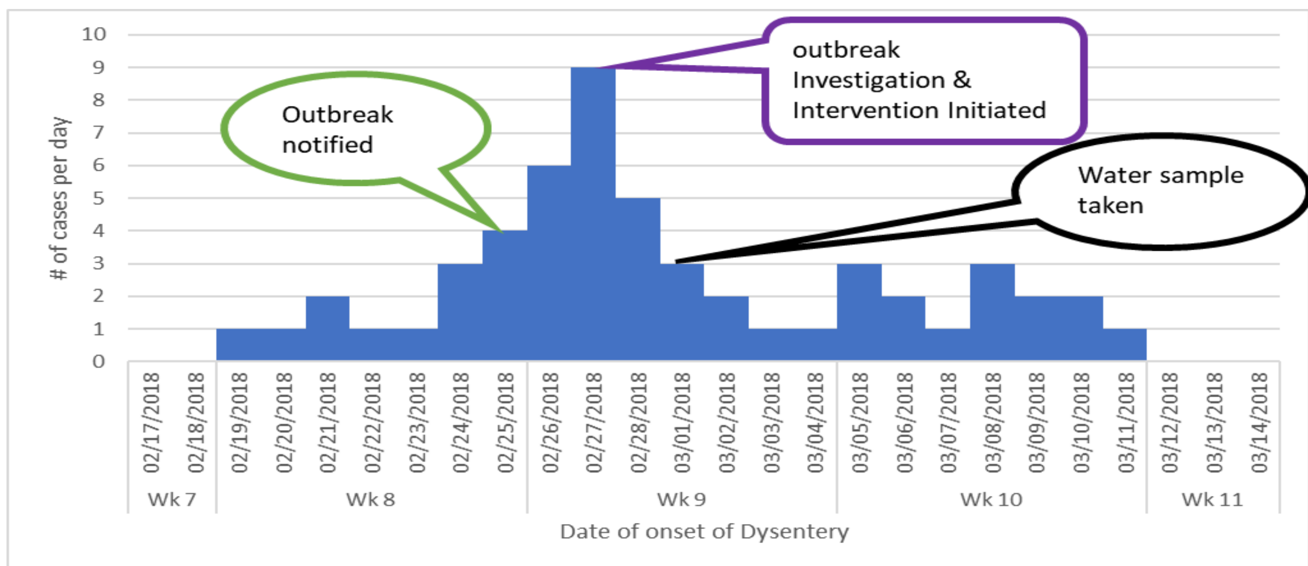

Figure 1. 9 Epi Curve of dysentery outbreak in Akaki Kality Woreda 9 Tulu Dimtu Condominium Feb 19 to March 11,2018

Visible Blood with frequent loose stool is the main clinical features of patients with dysentery disease. In our study area, we able to identify that all patients diagnosed as dysentery during the period of February 19 to March 11,2018 were complaining bloody diarrhea while 54% of them have Fever on the top of bloody diarrhea. Few of them (18%) also had a compliant of Vomiting (Figure 1.10).

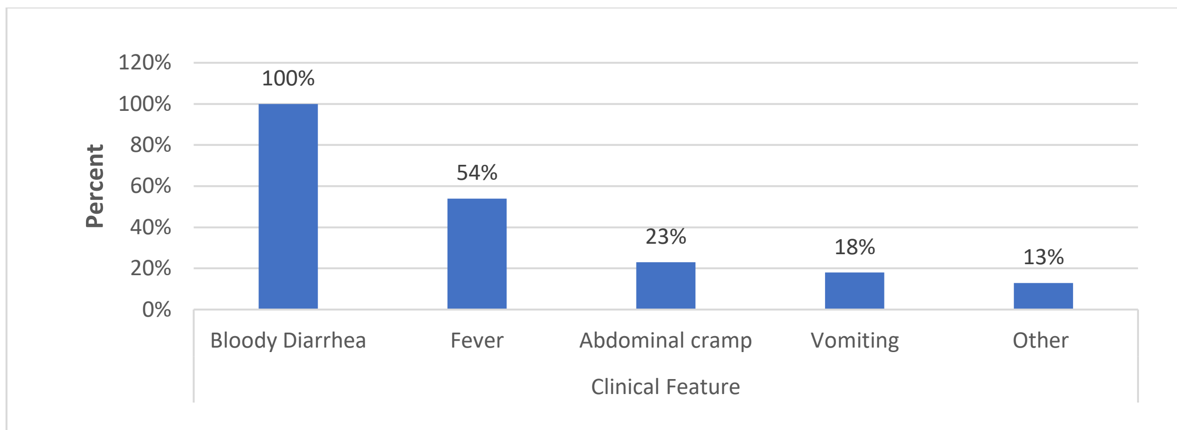

Figure 1. 10 Clinical features of the diarrheal case patients presented to Tulu Dimtu Health Center, Feb 19 to March 11,2018

Laboratory

Among a total case, microscopic stool examination was done for 54(95%) of patients at health center and 83% of the sample was reported to have many pus cells and red blood cells while the rest 12% was reported as Tropozoit of Entamoeba Histolytica. Water sample from nine site was also taken from tap water and River water and sample from Six Site was found to be unsafe for human consumption (Figure 1.11).

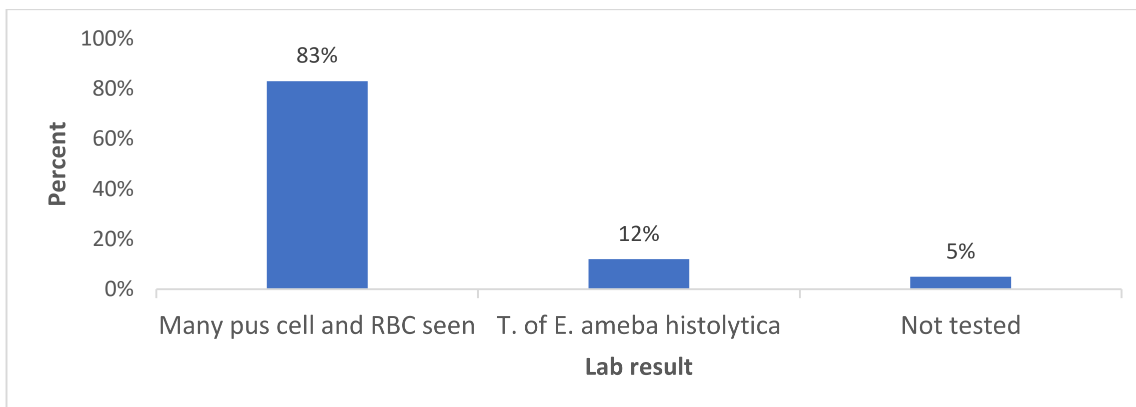

Figure 1. 11 Lab test result of Dysentery cases during outbreak in Akaki Kality woreda 9,2018

Analytic Epidemiology

A total of 21 Dysentery cases and 42 controls were interviewed among which 13(62%) cases and 16(38%) controls were Male. The mean age of case participant was 24yrs (SD 15.7yrs) while those of controls was 22yrs (SD 14yrs).

Among socio economic factors run in Bi variate analysis only monthly income shows significant association having COR of 0.1(0.02-0.5) and 0.3(0.1-0.9) for those get monthly income of 2001-4000 Eth birr and above 4000 Eth birr compared to those get monthly income of less than 2001 respectively (Table 1.6).

Table 1. 6 Bivariate analysis of socio demographic factors for Dysentery outbreak in Akaki Kality sub city, Woreda 9, Tulu Dimtu Condominium, 2018

Variables	Category	Case(n=21)	Control (n=42)	COR (95% CI)	P Value
Age groups	15 to 34yrs	10(48%)	21(50%)	1	Reference
	5 to 14yrs	1(5%)	5(12%)	0.4(0.04-4.1)	0.4443**
	>34yrs	5(24%)	8(19%)	1.3(0.3-5.0)	0.692**
	<5yrs	5(24%)	8(19%)	1.3(0.3-5.0)	0.692**
Sex	Female	8(38%)	26(62%)	0.4(0.1-1.1)	0.0738*
	Male	13(62%)	16(38%)	1	
Educational status	Illiterate	3(14%)	1(2%)	1	Reference
	Primary(1-8)	7(33%)	14(33%)	0.16(0.01-1.9)	0.2189**
	Secondary(9-12)	7(33%)	17(40%)	0.13(0.01-1.6)	0.7065**
	Higher Education	4(19%)	10(23%)	0.13(0.01-0.7)	0.2929**
Monthly Income	Less than 2001	12(57%)	8(19%)	1	
	2001 to 4000 birr	3(14%)	19(45%)	0.1(0.02-0.5)	0.0017*

Key: *Variables with P value of 0.2 or less and moved to Multi Variate logistic regression ** Variables not run in Multi variate logistic analysis b/c P value greater than 0.2

Furthermore, different environmental factors and personal factors was run in Bivariate analysis. Among them again Hand wash after defecation (COR=5.2(1.2-23.5), P value=0.0219), Eat raw (uncooked) food [COR=6.7(2.0-21.8), p value 0.0009], using unprotected water source for domestic use [COR=9.0(2.7-30.5), P value 0.0001], and Eat left over food [COR=6.5(1.5-28.6), P value 0.0073] were found to be significantly associated with the dysentery outbreak in Woreda 9 Tulu Dimtu Condominium. Even though the only aforementioned variables show significant association, to minimize the possible confounders we selected variables those have p value of less or equals to 0.2 and processed again in multiple logistic regression (Table 1.7).

Table 1. 7 *Bivariate analysis of Personal and Environmental risk factors for Dysentery outbreak in Akaki Kality sub city, Woreda 9, Tulu Dimtu Condominium, 2018*

Variables	Category	Case(n=21)	Control (n=42)	COR (95% CI)	P Value
Travel History	Yes	3(14%)	8(19%)	0.7(0.2-3.0)	0.638**
	No	18(86%)	34(81%)	1	
Contact History	Yes	2(10%)	4(10%)	1.0(0.2-5.9)	1.0000**
	No	19(90%)	38(90%)	1	
Hand wash after	Some times	6(29%)	3(7%)	5.2(1.2-23.5)	0.0219*
defecation	Always	15(71%)	39(93%)	1	
Use detergent for	Some times	10(48%)	10(24%)	2.9(0.9-8.8)	0.055*
hand wash	Always	11(52%)	32(76%)	1	
Use detergent for	Yes	17(81%)	38(90%)	0.4(0.1-2.0)	0.2845**
utensils wash	No	4(19%)	4(10%)	1	
Use unprotected	Yes	16(76%)	11(26%)	9.0(2.7-30.5)	0.0001*
water source	No	5(24%)	31(74%)	1	
Eat food out side	Yes	9(43%)	10(24%)	2.4(0.8-7.3)	0.1204*
	No	12(57%)	32(76%)	1	
Eat raw food	Yes	12(57%)	7(17%)	6.7(2.0-21.8)	0.0009*
	No	9(43%)	35(83%)	1	
Eat left over food	Yes	7(33%)	3(7%)	6.5(1.5-28.6)	0.0073*
with in 48hrs	No	14(67%)	39(93%)	1	
Vegetables or fruits	Yes	10(48%)	13(31%)	2.0(0.7-5.9)	0.195*
48hrs back	No	11(52%)	29(69%)	1	
Meat	Yes	9(43%)	13(31%)	1.7(0.6-4.9)	0.3501**
	No	12(57%)	29(69%)	1	

Key: *Variables with p value of < = 0.2 & moved to Multi Variate logistic regression ** Variables not run in Multi variate logistic analysis b/c P value greater than 0.2

In multivariate logistic regression monthly income of the participant 2001-4000 birr (AOR=0.1 (95% CI 0.01-0.6)], greater than 4000 birr per month (AOR= 0.1 (95% CI 0.01-0.9) shows significant association with the outbreak. In addition, using unprotected water source for domestic use (AOR=6.2 (95% CI 1.1-34.7)), Eating vegetables with in the last 48hrs (AOR=8.8 (95% CI 1.3-60.7) and eating uncooked food (AOR=6.2(95% CI 1.1-35.4) were found to be the independent determinants of dysentery outbreak in Akaki Kality Woreda Nine, Tulu Dimtu Condominium in

2018. There was no difference observed between cases and controls those wash their hands after Toilet, use detergents for hand washing, eat any lest over with in 48hrs back and use private toilets compared to the counterpart (Table 1.8).

Table 1. 8 Multi variate logistic regression of risk factors for Dysentery outbreak in Akaki Kality Woreda 9, 2018

Variables	Category	AOR	95% CI	P-Value
Sex	Male	1		
	Female	0.8	0.1-4.5	0.7701
Monthly income	**Less than 2001**	1		
	2001 to 4000 birr	0.1	0.01-0.6	0.0194*
	>4000	0.1	0.01-0.9	0.0465*
Hand wash after toilet	Sometimes	3.3	0.2-51.8	0.3902
	Always	1		
Hand wash with soap	Sometimes	0.9	0.2-4.7	0.8601
	Always	1		
Eat uncooked food with in 48hrs back	Yes	6.2	1.1-35.4	0.0397*
	No			
Unprotected water source for domestic use	Yes	6.2	1.1-34.7	0.0369*
	No	1		
Eat vegetables/fruits with in 48hrs back	Yes	8.8	1.3-60.7	0.0266*
	No	1		
Eat any leftover food with in 48hrs back	Yes	6.6	0.5-91.2	0.1595
	No	1		
Types of latrine	Private	0.5	0.03-6.3	0.5628
	Community	1		

Key: * Variables found to be significantly associated with outbreak

1.2.6. PUBLIC HEALTH INTERVENTION UNDERTAKEN

- Sub city PHEM officers Discussed with sub city health officers, woredas Health officers and activate epidemic response task force
- Rapid response team move to the site and conduct Environmental assessment
- Some water source was identified to be not safe for the community which they are using at the time routine city water is interrupted.

- Aqua tab was distributed for community
- Health education was started in Tulu Dimtu Health center routinely.

1.2.7. LIMITATION

- Most of the diagnosis was made depending on microscopic lab test and clinically. No culture test was done.
- The causative agent of the dysentery was not isolated by Culture.
- There is a newly built Condominium house and many populations flow to there. Because of this the correct population size of the population is not well known and may be different from the population projected from 2007 CSA which we used to calculate attack rates in our investigation, hence the AR that we found may differ.

1.2.8. DISCUSSION

The Dysentery infections could be acquired from eating contaminated food and drinking contaminated water. The FMOH/PHEM guideline sets the threshold for epidemic detection and action as a cluster of acute bloody diarrhea cases in the same settlement in one week. Hence, unusually increased in number of the case or doubling of cases compared to the same weeks should be declared as an outbreak [14]. Therefore, in our study area the trend line crossed the Woreda threshold on 8th WHO epidemic week and curve fell dawn after getting its peak. This sharp increase and decrease of the epidemic curve typical a characteristic of common source type of epidemic. Most of the cases (84%) were residents of Tulu Dimtu Condominium where there is shortage of water and shares the same exposure.

In the period of outbreak Females was more affected than Males with sex specific attack rate of 10 per 1000 population. This may be because of the Female population have a direct contact with Food and water, and also they have more responsibility to care their children. This result is similar with the finding of the study done in Bibugn district, Northern Ethiopia [2]. The overall attack rate during the outbreak was 9 per 1000 population which is higher than the outbreak reported in 2015 from Dera Woreda and unlike this study result (where the higher AR was reported among age group of 15-44yrs), in our study area the higher age specific Attack rate observed among under five children [13].

The study tried to identify several risk factors associated with contracting dysentery in Tulu Dimtu Condominium Woreda nine. Among risk factors cross tabulated with dysentery illness significant

association was observed among using unprotected water source for domestic use, monthly income of the community, eating uncooked food and Vegetables.

The odds of developing dysentery diarrhea were 6.2 time higher among those use unprotected water source for domestic use than those use safe water (AOR= 6.2, 95% CI [1.1-35.4]). This result is comparative result with the case control study conducted in Dera Woreda Amhara region in 2015 [13]. Most of the times some vegetables are eaten uncooked and these vegetables are washed by the water available in the house. As we can see from the study, 76% of the cases use unprotected water source for domestic use which indicates Vegetables those eaten uncooked in the community is washed by this water. Such types of vegetables indirectly expose for water born disease. In our investigation we prove this truth and the odds of contracting Dysentery was found to be 8.8 times higher among individuals those eat Vegetables/Fruits 48hrs back prior to the study than the counterpart group (AOR=8.8, 95% CI [1.3-60.7]). The family monthly income of the family was also one of the independent determinants of dysentery outbreak in Tulu Dimtu Condominium. The odds of being infected by dysentery was 99% less among family who have average monthly income of more than 4000 than those who have monthly income of less than 2001 birr (AOR=0.1, 95% CI [0.01-0.9]). The possible suggestion is, as we observed and get information from the residents there were water shortage in the site and the community obligated to see other option at the time of water shortage. Accordingly, most of them bought water which is fetched from unprotected source. Hence, those who have better monthly income buys bottled water for domestic use rather than from unprotected source.

The outbreak investigation conducted in Dera woreda shows no access to latrine (AOR 7.2 (95% 1.8 – 29.4)), and washing hands without soap (AOR 5.1 (95% 2.4 -11.1)) are associated risk factors for contracting dysentery washing hands without soap [11]. However, in our study there were no difference observed between case and controls who are using detergent for hand washing and owning latrine. This difference may be due to life style difference in both study. In our study area most of the participants were the resident of Condominium and all of constructed condominium have separate toilets and the cases and controls may have the same accesses to toilet

1.2.9. CONCLUSION

- The trend line of Dysentery in Akaki Kality Woreda 9 shows the existence of outbreak from February 19 to March 11.
- Unprotected water source for domestic use, eating uncooked food and Vegetables were found to be risk factors for dysentery outbreak while monthly income was found to be protectives factor.
- The possible source of outbreak was common source which is contaminated water.

1.2.10. RECOMMENDATION

Short time

- The health centers and Woreda health office are better to strengthen routine health education on personal hygiene and environmental sanitation.
- Sub city have to sustain and substitute water guards for community timely.
- City WASH bureau has to assess the water coverage of woreda and maintain broken pipes to keep its safety
- Unprotected water source/open source are better to be covered and treated

Long time

- Addis Ababa water bureau would have solved the shortage/interruption of water observed in woreda by constructing additional water schemes for community

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CHAPTER II SURVEILLANCE DATA ANALYSIS

Surveillance Data analysis of Relapsing Fever in Addis Ketema Sub-city, Addis Ababa, Ethiopia, 2012-2016

ABSTRACT

Back ground: - Relapsing fever is a recurrent febrile infection caused by various Borriella spirochetes transmitted either by lice (epidemic relapsing fever) or by ticks (endemic relapsing fever). In both forms, the interval between fevers ranges from 4 to 14 days. This surveillance data analysis study could help to identify the trends of Relapsing fever in Addis Ketema Sub City with in the past five years and compare it with the current status of disease which may give information on the trends of Relapsing fever. This study is aimed to describing magnitude and distribution of relapsing fever from 2012-2016.

Methods: - This retrospective record review of surveillance data was conducted in Addis Ketema sub city by using secondary data that was recorded in sub-city from 2012-2016 and analysis was done within one month (Jan 16/2017- Feb 15/2017). Data was collected from documented PHEM report in Sub city. The result was presented as narration, tables and graphs.

Result: -Three hundred eighty-one Relapsing Fever cases were reported in the past five years (2012-2016) with Zero Case Fatality rate. The overall prevalence rate of relapsing fever in Addis Ketema sub city in the past five years (2012-2016) was 13 cases per 10,000 cases. The trend of Relapsing fever was increasing from 2012 to 2016 from 10 cases per 100,000 to 83 cases per 100,000 populations. High prevalence rate was recorded in the area adjacent to Addis Merkato Market center and National Bus Station (District Seven 48/10,000, District 8 20/10,000, and District one 11/10,000 population)

Conclusion: - The trend of Relapsing Fever was increasing and there were unrecognized Outbreak in Addis Ketema Sub-city in 2016. Therefore, it is recommended to follow the trend of Relapsing Fever in sub-city closely and give appropriate interventions by giving special attention for Woredas those identified as high-risk areas.

Key Words: - Surveillance data analysis, Relapsing fever, Addis Ketema Sub city, 2012-2016.

Word count:300

2.1. INTRODUCTION

Relapsing fever is a recurrent febrile infection caused by various Borriella spirochetes transmitted either by lice (epidemic relapsing fever) or by ticks (endemic relapsing fever). Relapsing fever was once a disease of global epidemic importance. However, widely as a result of the decrease of the clothing louse Pediculus humanus, it is now restricted to areas where clothing lice are still commonplace, such as Ethiopia [1]. It is characterized by recurring episodes of fever, which accompanies spirochetemia and nonspecific symptoms (e.g., headache, myalgia, arthralgia, shaking chills, and abdominal symptoms) after infection with one of several species of Borriella. [2]. The disease relapses are due to antigenic variation by the spirochetes. Each serotype of Relapsing Fever is individually defined by antigenically distinct surface proteins. Crowded shelters, Famine, war, the movements & congregations of refugees are common predisposing factors for epidemics of LBRF [2].

The epidemiology of LBRF is not as well characterized as that of TBRF, probably in part because of the higher prevalence of the former in regions with relatively few resources for communicable disease surveillance. Historically, LBRF has been described in North America and Europe, but it is now only uncommonly reported in these regions. Reports of disease in the highlands of Ethiopia have included many documented cases, despite a recent decline; in that country, more cases have occurred in male than in female patients. Seasonality has not been reported consistently except sometimes it is reported to be the highest incidence in this region is during the rainy season when the poor gather together in shelters [2,3].

Relapsing fever especially LBRF is principally a disease seen in the developing world and it spread from person to person by the body louse and can occur in epidemics, including large ones involving millions of people. Louse-borne relapsing fever is more severe than the tick-borne variety with a mortality rate of 1% with treatment and 30–70% without treatment [4-6]. Even though LBRF cases declined significantly worldwide, due to the highly decreased incidence of body louse infestations after the 1940s, still now it remains the most public health problem and a common cause of hospitalization and death in East African countries, particularly in Ethiopia [7]. B. recurrentus is currently endemic in Ethiopia and Sudan. The highlands region of Ethiopia may have hundreds to thousands of cases of LBRF annually. The highest incidence in this region is during the rainy season when the poor gather together in shelters [3].

Statements of the problem

LBRF remains the most public health problem and a common cause of hospitalization and death in East African countries, particularly in Ethiopia. Because of its public health importance, among disease under surveillance in Ethiopia, relapsing fever is one of weekly reportable disease. As different study shows LBRF is the most common type of relapsing fever which is endemic in our country, Ethiopia and human being is the only reservoir of B.recurentis. It is very prone to the occurrence of epidemic. Because of there is different risk factors that favors the occurrence of epidemic RF such as crowdedness and very populated life in Addis Ababa in different parts of the city, there is continuous reporting high number of cases which indicates the presence of outbreak but sometimes by default not considered as outbreak. Among sub cities those are considered as highly populated area, part of Addis Ketema sub city is the leading because there is high follow of population from all over the country towards the central part of the town which is a shopping center for the country as a whole, & which hosts millions of population every day. As a result, to get their daily food, there are high numbers of daily laborers who are working in the market. To minimize the costs that they pay for the charge of housing, these daily laborers sometimes dwells/sleep outside or by grouping together they sleep in a very narrow and poor hygiene house. This condition favors the occurrence of LBRF which needs special consideration.

Therefore, this study will assess the trends of RF in these sub city and will describe the magnitude of Relapsing fever in Addis Ketema Sub city in the past five years there by identifying whether there were out breaks in the last five years, indicating where was the area that high number of cases reported and providing possible recommendations for future control measures. This study also helps interested body to undergo research to tackle further spread of LBRF in this town and as well in the country.

Significance of the study

Surveillance plays a great role in early detection of unusual trend of any disease and gives immediate respond to disease outbreak which in turn helps to produce healthy and productive society. To do so well organized chain between health facilities, Woreda health office, Sub city health office, regional health bureau and FMOH is mandatory.

But merely the presence of surveillance structure is not enough to tackle the occurrence of different disease outbreak. Therefore, Ongoing and continuous analysis of surveillance data is important for

early detecting outbreaks and unexpected increases or decreases in disease occurrence which may be neglected some times in different areas unless there is no marked increments of disease trends indicating clear out break. And also continuous and ongoing trend analysis is needed for monitoring disease trends and evaluating the effectiveness of disease control programs and policies and to determine the most appropriate and efficient allocation of public health resources and personnel. In good surveillance system trend analyses should be performed at regular intervals to identify changes in disease reporting.

Accordingly, to strengthen disease surveillance system, under supervision of PHEM and AAHB, Addis Ketema sub city establishes PHEM case team in early 2016 G.C. But since this PHEM structure is established very recently, there were no trends of surveillance data analysis.

As sub city surveillance team document indicates Typhoid, Typhus, Dysentery and Relapsing fever are the front coming diseases in descending order. Depending on this while the first three diseases was done by other person I am interested to do a retrospective study of surveillance data analysis in Addis Ketema Sub city from 2012-2017 on Relapsing Fevers by selection criteria of:

- Highly public concern.
- Reliability of the diagnosis.
- Highly contagiousness, but easily preventable by good sanitary conditions of the disease among others prioritized.
- High Death rate if not managed early

Hence, this surveillance data analysis study will help to identify the trends of Relapsing fever in Addis Ketema Sub City with in the past five years and compare it with the current status of disease which may give information on the trends of Relapsing fever. It may also help to identify whether there were unrecognized out break or not and it uses to compare the trend of disease in Addis Ketema sub city with that of other place which stated in different ways.

2.2. LITERATURE REVIEW

Relapsing fever borreliae were a badly human health affecting disease and feared infectious diseases that is known in history by having devastating impact as causes of both epidemic and endemic infection. More recently the burden of infection is widely overshadowed by other infections such as malaria, which presents in a similar clinical way. Even though it becomes neglected, it remains the most common bacterial infection in some developing countries [8].

The distribution of LBRF has changed dramatically over recent years; with the decrease of this once worldwide infection interrelated directly with the diminished level of infestation with clothing lice. But LBRF remains endemic in areas of extreme poverty such as in Ethiopia and Sudan [8].

Relapsing fever is a rapidly progressive and severe septic disease. The disease is divided into two forms, i.e., epidemic relapsing fever, caused by Borriella recurrentus and transmitted by lice, and the endemic form caused by several Borriella species, such as B. duttonii, and transmitted by soft-bodied ticks. The spirochetes enter the bloodstream by the vector bite and live persistently in plasma even after the development of specific antibodies [9].

LBRF was once a major epidemic disease in many parts of the world [4, 10]. Because the fact that it has no animal reservoir, except the infectious agent B. recurrentus transmission via the human body louse and the association of the latter with poor hygienic conditions during war and destitution LBRF has been rarely encountered in Europe since World War II. Interestingly, this almost neglected disease has reemerged in Europe in the context of the ongoing migration from East Africa such as Eritrea, Somalia, and Ethiopia [11, 12]. The burden of relapsing fever infections occurring in endemic regions is becoming undiagnosed or misdiagnosed as malaria [13].

As study done in Senegal have suggested, relapsing fever borreliae are the cause of approximately 13% of fevers presenting to health facilities, representing 11 to 25 cases per 100 person years [14]. Again Studies of febrile patients in Morocco have showed that 20.5% were due to TBRF [15]. Although not at as much as the two above countries, TBRF cases are more frequently being detected in the USA [16, 17].

Mortality rates from relapsing fever vary with the infecting agent; Most of TBRF cases have less than 5% mortality. However, with the infection from the East African species, B. duttonii and its louse-borne variant, B. recurrentus mortality can be higher. From Tanzania where B. duttonii is endemic high perinatal mortality rates reaching 475 cases/1000 pregnant women have been reported. On the other hand, higher spirochaetal loads are reported among pregnant individuals compared to non-pregnant controls [8]. There is no life-long post infection prophylaxis to prevent repeat infections being reported amongst individuals living in endemic regions [8].

In Ethiopia, as of study done in 2014 indicates LBRF is within the top ten causes of hospital admissions, associated with significant morbidity and mortality [5]. Other reports also show, in

2010 for instances, in Southern Ethiopia (Hosanna hospital), LBRF admissions accounts 27% of total admissions and 6% of mortality rate in South Western Ethiopia (Jimma hospital) [18]. The study done in Bahirdar Felega Hiwot Hospital shows the prevalence of RF in Bahirdar Was 4.9 as of 2014 [7].

2.3. OBJECTIVES

2.3.1. General Objective

- To assess the epidemiology of Relapsing Fever in Addis Ketema sub city from 2012-2016 by describing its magnitude and distribution

2.3.2. Specific Objectives

- To show the trends of Relapsing fever in Addis Ketama sub-city over five years (2012 to 2016)
- To describe distribution of Relapsing fever in Addis Ketema sub city in the period from 2012 to 2016.
- To identify the high-risk area in sub-city

2.4. METHODS AND MATERIALS

2.4.1. Study area and period

This surveillance data analysis was conducted in Addis Ketema Sub city. Addis Ketema sub city is one of the 10 sub cities in Addis Ababa city administration with total population of 319,138. Having a total area of around 898 ha, it borders with Gulale sub city in the north, Lideta sub city in the south, Arada sub city in the east, and Kolfe Keranio sub city in the west.

The district is located in the northwestern area of the city, not far from its center. Addis Merkato, Africa's largest open-air marketplace, is found in Addis Ketema sub city. This surveillance data analysis is done using data from 2012- 2016

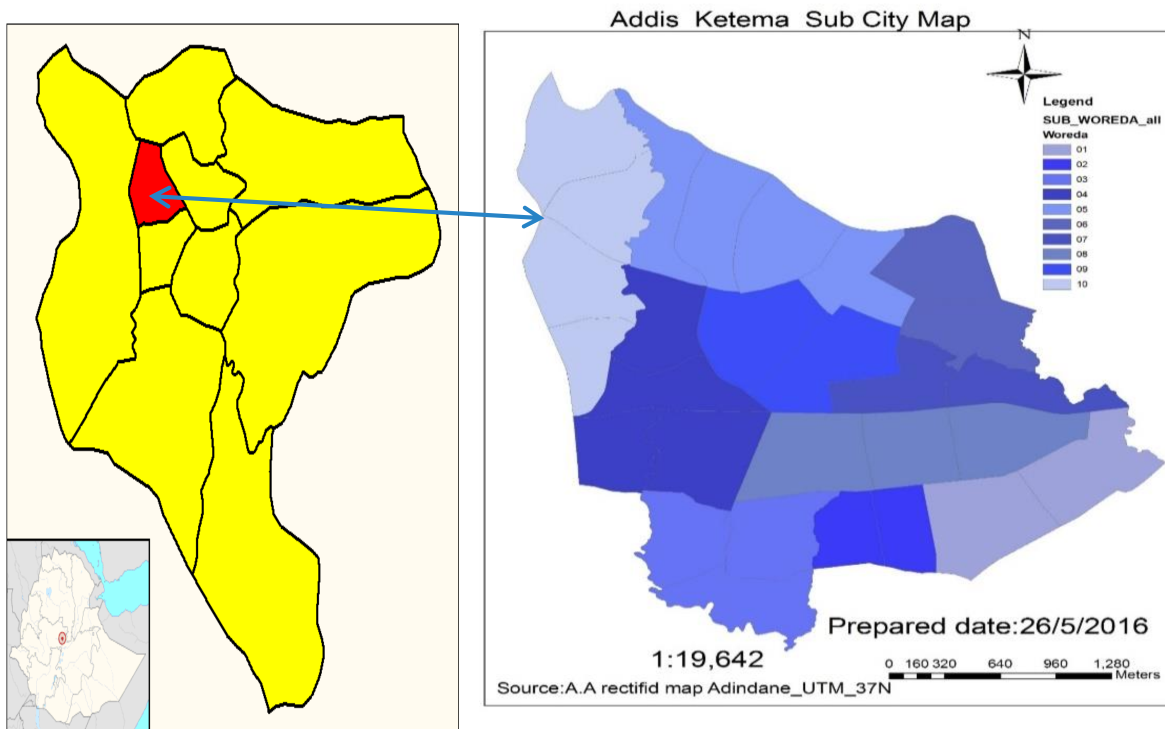

Figure 2. 1 Addis Ketema sub city map. (study area map)

Study Design: A retrospective descriptive study design was conducted to assess the last 5 years (2012-2016) surveillance data of Relapsing fever.

Data collection procedure: The data was collected using secondary data from sub city. Five years back document was Extracted from Sub city PHEM Data base. Extracted data was cross checked with weekly PHEM and IDSR documents from Each Woredas by the principal investigator.

2.4.2. Case Definition(PHEM)

Suspected case: -Any person presented with an abrupt onset of rigors with fever, usually remittent, headache, arthralgia and myalgia, dry cough, epitasis.

Confirmed case: -suspected cases with demonstration of Borriella recurrentus in peripheral blood film.

2.4.3. Data entry and analysis

The data collected through document review were edited, coded and cleaned before it entered to a computer. Then it was analyzed by using Excel 2016.

2.4.4. Source of data & information

To analyze surveillance data in Addis Ketema sub city we used pre documented (reported) secondary data in sub-city PHEM Materials. e.g. weekly reports from all health center and private health institution that report to the sub city health office and PHEM Electronic materials. Even though the main source of information is from sub city to complete some information that may missed in sub-city and to keep reliability of information, Relapsing Fever cases documented in RHB and in each woreda Health office in Addis Ketema sub city were also thoroughly reviewed and compared.

2.4.5. Variables

Dependent variables: Relapsing fever cases

Independent variables**:** Age, Sex, Woreda, Year, Month

2.4.6. Data quality control and presentation

The principal investigator checked the collected data for completeness, accuracy, clarity and consistency throughout the data collection period in order to maintain the quality of data. After data collected and analyzed the results were presented by table, graphs, by charts, Maps…. etc.

2.4.7. Ethical issues

Ethical clearance was secured by writing formal letter from Addis Ababa university school of public health to Addis Ketema health office and Official permission was obtained from concerned authorities of the health office. The surveillance officers and other health professionals were informed about the objective and purpose of the Surveillance data analysis in order to cooperate with data analyzer throughout data collection and analysis.

2.4.8. Dissemination of findings

The result of Relapsing fever surveillance data trend analysis was communicated to Addis Ketema sub city health office, Addis Ababa Regional Health bureau and Addis Ababa university school of public Health Field Epidemiology Training Program.

2.5. RESULT

2.5.1. Description of Relapsing Fever by Time

During the last 5 years (2012-2016) 381 cases of Relapsing fevers cases were reported to Addis Ketema Sub city PHEM department from respective 10 woreda with Overall prevalence rate of – 13 per 10,000 populations and Zero Case Fatality Rate (CFR). The mean number of cases reported per year was 76 (SD=105). Among 381 reported cases 324 (85%) were treated as outpatient while 57 (15%) of them were treated as in patient. (Figure 2.2).

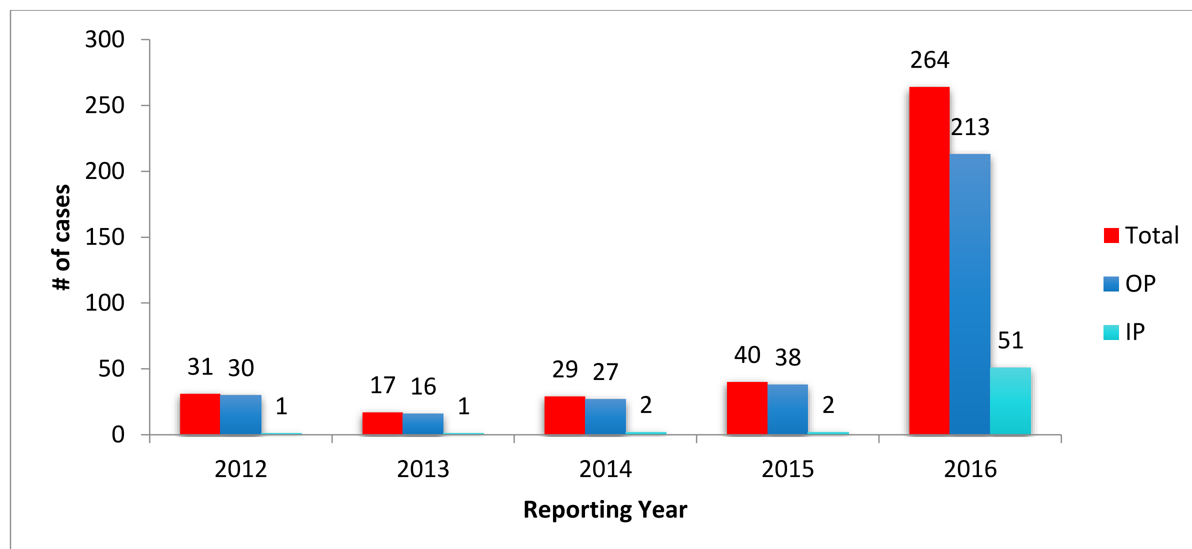

Figure 2. 2 Relapsing fever cases in Addis Ketema sub city by case management status (outpatient vs in patient)

In Addis Ketema Sub-city with in the last 5 years, the highest case was reported in 2016 with a Prevalence rate of 85 per 100,000 populations followed by 2015 which accounts about 13 cases per 100,000 populations while the least cases were in 2013 having prevalence rate of 6 cases per 100,000 populations (Table 2.1).

Table 2. 1 Relapsing Fever cases distribution in Addis Ketema sub city, Addis Ababa, Ethiopia, 2012- 2016

Year	Population	Cases	Prevalence/100,000	OP	OP%	IP	IP%	CFR
2012	286,192	31	11	30	96.8	1	3.2	0.0
2013	292,231	17	6	16	94	1	6	0.0
2014	298,397	29	10	27	93	2	7	0.0
2015	304,694	40	13	38	95	2	5	0.0
2016	312,005	264	85	213	80.7	51	19.3	0.0

IP Inpatient; OP:-Outpatient; CFR: Case fatality rate

The trends of Relapsing Fever were decreasing through 2012 to 2013 from 11 cases per 100,000 populations to 6 cases per 100,000 populations and was increasing from 2013 to 2016. Relapsing cases reported in 2016 was about 14 folds compared to 2013 reported cases and 6.5 folds compared to 2015 Relapsing Fever reported cases (Figure 2.3).

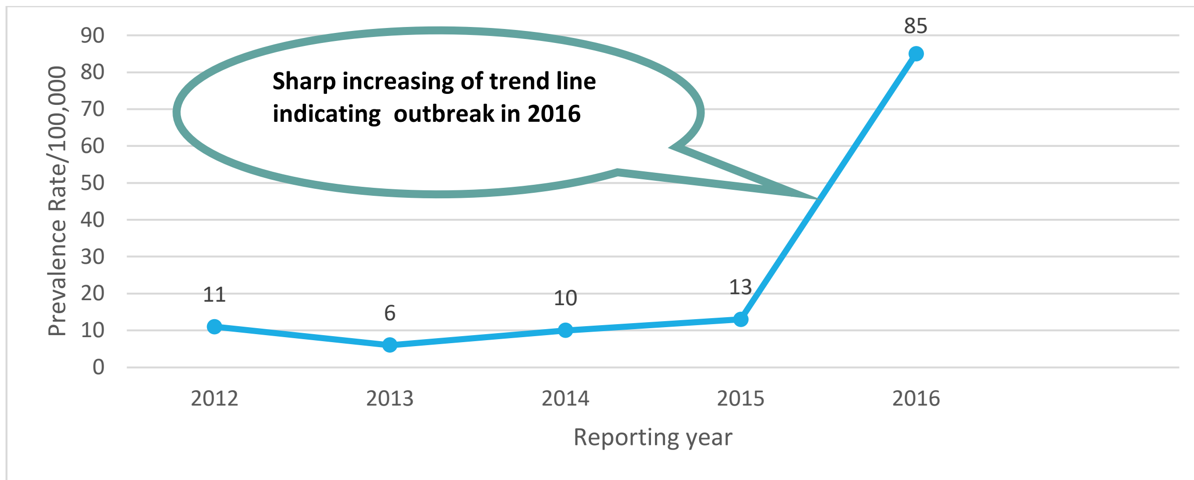

Figure 2. 3 Trends of Relapsing Fever case in Addis Ketema sub city, Addis Ababa Ethiopia, 2012-2016

When we see the seasonality of Relapsing Fever, as this data analysis shows the least cases of Relapsing Fever was reported in January, February, November and December having average case report of 3%, 2%,4% and 2% of total report respectively, while the higher cases reported in August, June, and October in decreasing order through the last 5 years accounting 17%, 14% and 13% of the total cases respectively (Figure 2.4).

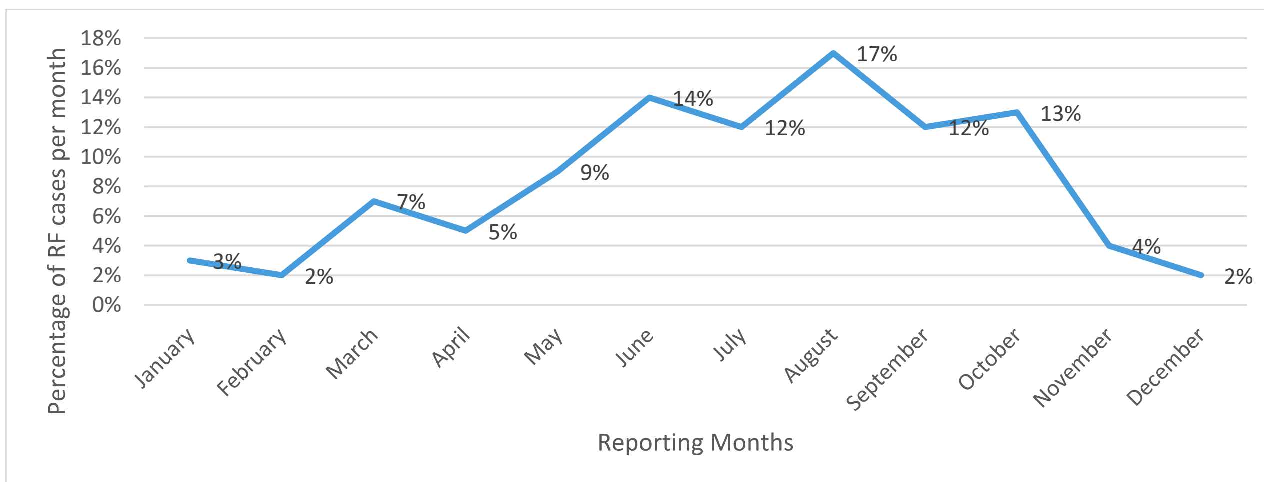

Figure 2. 4 Seasonality of RF cases in Addis Ketema Sub city, Addis Ababa Ethiopia, 2012 to 2016

On the other hand, as we can see from the above trend line graph (Figure 2.3), compared to the rest years, the cases of Relapsing fever were very high in 2016 which accounts more than half of the total cases reported in five years back. This shows the presence of outbreak in Addis Ketema sub city which extends from June to October in 2016 (Figure 1.5).

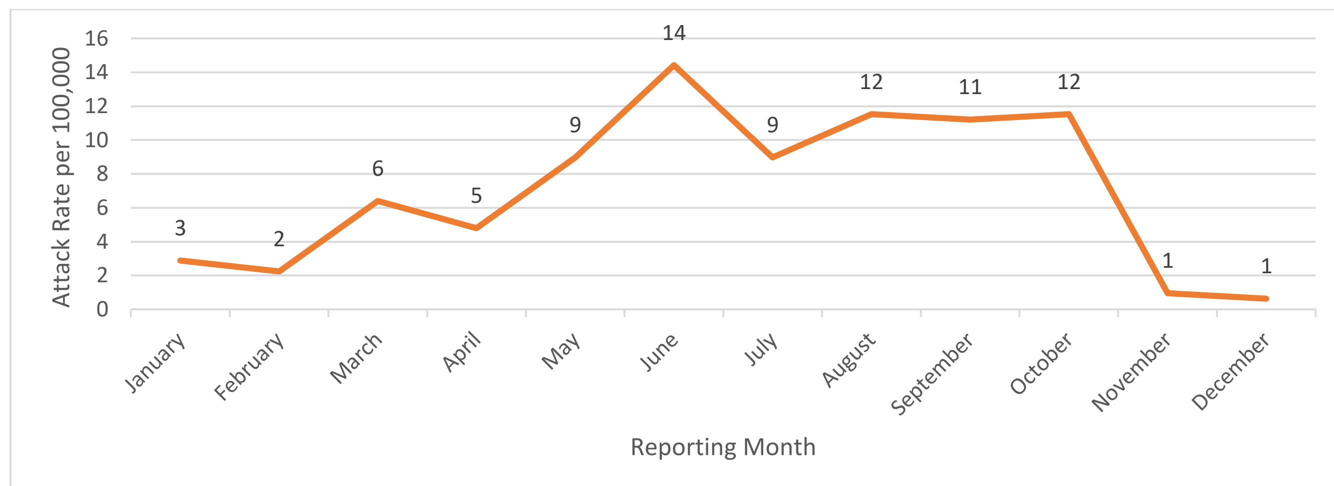

Figure 2. 5 Monthly Relapsing Fever trends in Addis Ketema sub city, Addis Ababa, Ethiopia, 2016

In this outbreak year, in 2016, the highest case was reported in June with Attack rate of 14 cases per 100,000 population followed by August and October with Attack rate of 11 cases per 100,000 populations. The overall attack rates accounts about 85 per 100,000 populations and the outbreak declined in November.

2.5.2. Description of Relapsing Fever by Place

When we compare each woredas those expected to report RF cases for Addis Ketema sub-city based on three year reports (from 2014 -2016), by excluding cases reported in 2012 and 2013 because there were no Woreda based documents in these years, woreda 07 reports more cases than the others having overall prevalence rate of 48/10,000, followed by woreda 08 and Woreda 01 with overall prevalence rate of 20 and 11/10,000 cases from 2014 to 2016 respectively, while the least Relapsing Fever reported in Addis Ketema sub city was from Woreda 03 and 10 which was reported one cases each from the year of 2014- 2016 (Table 2.2).

Table 2. 2 Relapsing fever distribution in Addis Ketema Sub city, Addis Ababa, Ethiopia, 2014-2016

Woredas	Average Pop. At risk	Number of cases from 2014 -2016	Prevalence rate per 10,000
Woreda 1	37,646	41	11
Woreda 2	30,705	13	4
Woreda 3	32,929	1	0.3
Woreda 4	37,471	33	9
Woreda 5	33,798	7	2
Woreda 6	26236	3	1
Woreda 7	32329	156	48
Woreda 8	22426	44	20
Woreda 9	32454	34	10
Woreda 10	19038	1	0.5

In 2016 alone among 10 woredas, Woreda 07 is the most leading woredas by reporting high number of case,137 (41 cases per 10,000 population) followed by Woreda 08 reporting 27 (12 cases per 10,000 population) cases (Figure 2.6).

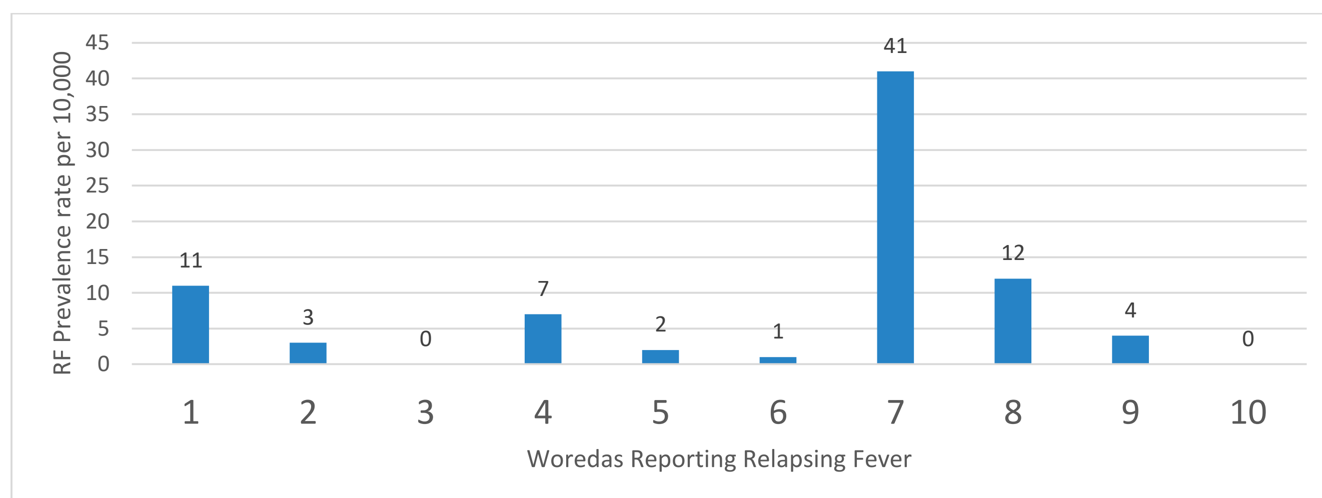

Figure 2. 6 RF cases distribution by woreda, Addis Ketema sub city, Addis Ababa, Ethiopia, 2016

2.5.3. Description of relapsing fever by person

To describe relapsing fever case trends in terms of person, because the reporting format that was provided for all health facility did not incorporate it, there were no sex and age variables which was document whether in sub cities or woredas. But in 2016, we tried to collect the cases from

every health facilities laboratory log books, and we found that the most affected sex was Male accounting 247 (93.5%) cases among 264 identified cases while females were only 17 (6.3%) cases. The sex specific prevalence rate was 16 per 10,000 populations among Male population and 1.1 per 10,000 among female population. The most affected age group were age group of 15yrs – 24yrs accounting 20 cases per 10,000 populations (Figure 2.7).

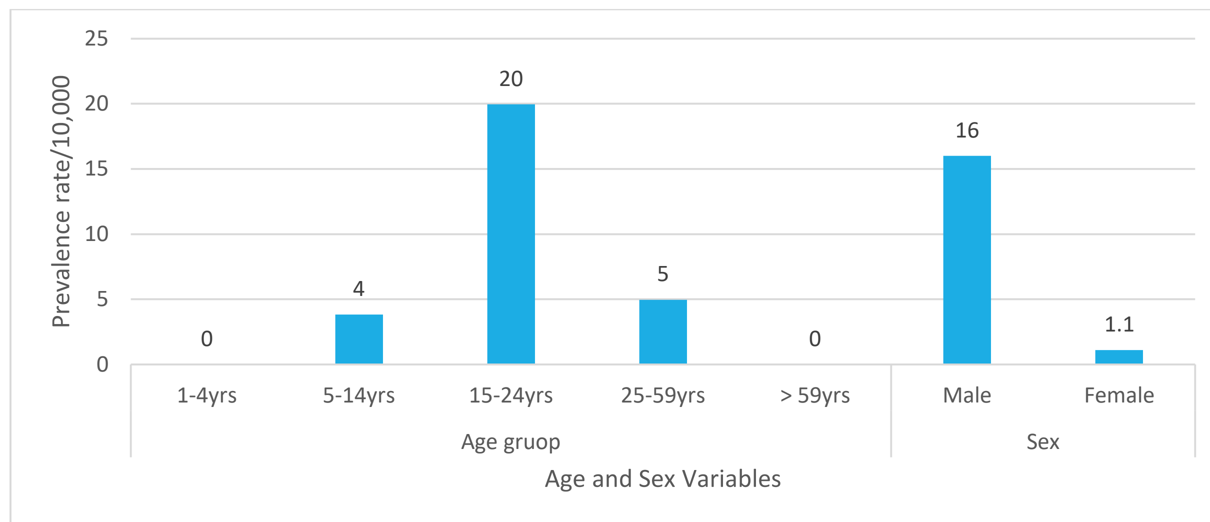

Figure 2. 7 Age & sex distribution of Relapsing Fever in Addis Ketema Sub city, Addis Ababa, Ethiopia, 2016.

2.6. DISCUSSION

Disease trend analysis is a core functions of surveillance system which helps all woredas, sub cities, health bureaus and other stake holders in early disease outbreaks identification and notification. The epidemiology of relapsing fever varies depending on the life style of the society. Overcrowded life style, refugee camps and other related conditions Favors the transmission of relapsing Fever. Among priority disease in Ethiopia relapsing fever is the one which is being reported to the next level starting from community level in weekly bases. Despite some cases documentation gaps in Addis Ketema sub city, especially which hinders us from describing Relapsing Fever cases in terms of Age and Sex, the data found in sub-city and each woredas in combination, by having a report completeness ranges from 83%-96% shows there were continuous case reports within the past five-year in Addis Ketema Sub city with an average prevalence rate of 13 per 10,000 populations. This was lower through the year compared to Bahir Dar Felege Hiwot Hospital which was 46/1000 in 2014 [7].

From this data analysis, the highest cases of Relapsing Fever were reported in 2016, 85 cases per 100,000 populations among which higher cases were (48/10,000 cases) from woreda 07, 20/10,000

cases from Woreda 08, 11/10,000 cases from Woreda 1, 10/10,000 cases are from Woreda 9 and 9/10,000 cases were from woreda 4. All of this five Woredas are geographically located at the center of Addis Ababa town encircling (bordering) Addis Merkato Market center and National Bus Station locally named as "AUTOBISTERA"; where many peoples tend to live in mass and on street. As different studies show the major risk/predisposing factors for Relapsing fever are crowded shelters/mass sleeping [3]. Our study also indicates there were high number of cases in such area. In this area, due to different factors such as: for e.g. for the sake of daily income, many peoples who are living in this area works in Merkato market center as daily laborer and because of cost minimization whether they rest on street at night time or they live in mass in a very narrow room. Again, the area is a very slum area which is risky factor for Relapsing Fever outbreak.

As different study shows about the epidemiology of Relapsing Fever, Seasonality has not been reported consistently [2]. In the same manner, even though the cumulative results of Relapsing Fever cases reported with in five year shows high prevalence rate in August, November, and June accounting 15%, 13.93%, and 13.7% respectively, when we see separately each year the cases reported has no consistent seasonality.

Louse-borne relapsing fever has a mortality rate of 1% with treatment and 30–70% without treatment [4-6]. However as available data from sub city and woredas shows, with in past five years there were no death (Death rate 0%) from Relapsing Fever which indicates the presence of early detection and treating of cases in this sub city.

2.7.LIMITATION

- Lack of demographic information to analyze the data by age and sex, because the PHEM reporting format lacks this variable.
- Many patients who complains relapsing fever move to charity organization which found in Arada Sub city called Mother Tereza Charity organization and they treated there due to fee free services and those treated there were not reported to sub city.
- Relapsing Fever cases those did not visit health facility was not included to calculate prevalence since data was taken from health facilities.

2.8. CONCLUSION

In Addis Ketema Sub-City Relapsing Fever is being reported from all expected Woredas despite different under reporting and miss-documentation. The cases reported is increasing from year to year with high peak showing outbreaks in 2016 through the year, which may urge integrated intervention of concerned bodies. Especially in woredas those are bordering Addis Merkato market center, and National Bus station(Autobistera) the incidence of Relapsing fever was very high.

2.9.RECOMMENDATION

- Prevalence of relapsing fever cases was increasing from time to time. Therefore, appropriate intervention such as continuous delousing, decreasing risk of Relapsing Fever infection by identifying risk factor is important (Health center & Woredas health office).
- Continuous Health education for community on prevention of Relapsing Fever by woreda health bureau is important. (Woreda Health Office)
- Supervised Community bed rooms and delousing by chemical is required regularly. (Regulatory office)
- Regional Health Bureau has to manipulate Surveillance data on regular basis to see the trend. (AAHB)
- Weekly reporting format is better to be revised and incorporate Demographic information such as Age and sex. (EPHI)
- Further study has to be conducted to identify risk factors.

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CHAPTER III SURVEILLANCE SYSTEM EVALUATION

Measles Surveillance System evaluation in Addis Ketema Sub-city, Addis Ababa, Ethiopia, 2017

ABSTRACT

***Back ground*: -** The initiative to strengthen the disease surveillance system that promotes the integration of surveillance activities in Ethiopia was started in 1996. The information from a public health surveillance system can be used for immediate public health action, program planning and evaluation, and formulating research hypotheses. This study was aimed to evaluate the performance of the existing surveillance system and the attributes of surveillance systems in 2017.

***Methods*: -** A descriptive cross sectional study design was used. Data was collected from sub city Health office, 10 Health centers and 10 woreda health office which were selected purposively. Secondary data from registry were reviewed and primary data was collected from 21 surveillances focal person using Standard tools adapted from CDC surveillance system guide line. The study was conducted from June to July, 2017.

***Result*: -** Twenty-one measles cases were reported. Sample sent to national laboratory for Confirmation. Seventy percent of Woredas and 40% of health centers perform trend analysis for Measles. Completeness and timeliness of reports in the sub city was 94% and 85% respectively. Fifty percent of Woredas did not conducted supervision for corresponding health facilities in the last six months. No budget allocated for surveillance purpose at sub city level, woredas level and health center level. All health facilities in sub cities were well engaged to surveillance system. Urban health extension workers are actively participating in community case detection and reporting. PPV of measles in sub-city was 11%.

***Conclusion and Recommendation*: -** From our study we observed that there were Poor trend data analysis performance, no allocated budget for Surveillance system, poor supervision and feed back in sub-city and woredas. Accordingly, we recommended regular supervision, proper feedback and budget allocation is important to improve the surveillance system in the sub city.

Key words: - System Evaluation, Surveillance, Measles, Addis Ketema Sub City,2017

Word Count: 294

3.1. INTRODUCTION

Effective Communicable and non-communicable diseases control rely on effective public health surveillance and response system that promote better coordination and integration of surveillance function through ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action. Recognizing this, the initiative to strengthen the disease surveillance system that promotes the integration of surveillance activities in Ethiopia was started in 1996 [1].

The information disseminated by a public health surveillance system can be used for immediate public health action, program planning and evaluation, and formulating research hypotheses. Therefore, a functional disease surveillance system is essential for defining problems and taking action. Not only the presence of public health surveillance system is enough, but also Proper understanding and use of this essential epidemiological tool (public health surveillance) helps health workers to set priorities, plan interventions, mobilize and allocate resources, detect epidemics early, initiate prompt response to epidemics, and evaluate and monitor health interventions. It also helps to assess long-term disease trends [2].

Surveillance should be conducted for diseases and conditions considered to be of public health importance. The list of diseases and syndromes in the national health information system (HIS) is useful for planning and routine management but too expensive for effective and useful surveillance in view of the limited human and financial resources.

Ethiopia had introduced Integrated Disease Surveillance and Response (IDSR) in 1998, focusing on 17 priority communicable diseases for early detection and effective response. Integrated Disease Surveillance and Response (IDSR) is a comprehensive regional framework endorsed by Member States of the World Health Organization Regional Office for Africa (WHO/AFRO) for strengthening national public health surveillance and response systems in Africa. In Africa, ministries of health are organizing and strengthening national disease surveillance programs by adopting IDSR and modifying the strategy to meet their country's epidemiologic profile [3,4].

Recently Federal Ministry of Health (FMoH) underwent the Business Process of Reengineering (BPR) and identified the IDSR to be one of the core processes of FMoH. Accordingly, IDSR was evaluated and recommended to establish Public Health Emergency Management (PHEM) in 2009 [5]. This new structure is extended down to the district level in their capacities. This is designed as

a cutting edge for better tracking and monitoring of diseases of public health concerns. Moreover, as member state of the WHO, Ethiopia is implementing the International Health Regulation (IHR) which was declared by member states in 2005. These all are good opportunities to strengthen surveillance [6].

PHEM is designed to ensure rapid detection of any public health threats, preparedness related to logistic and fund administration, and prompt response to and recovery from various public health emergencies, which range from recurrent epidemics, emerging infections, nutritional emergencies, chemical spills, and bioterrorism [1].

Based on the assignment, PHEM identified 19 communicable diseases and two health problems (Sever Acute Malnutrition (SAM) and Maternal Death) based on their potential to cause outbreaks, became international concern and diseases on eradication/elimination and health burden for the country (Table 3.1). In addition to these 19 communicable diseases and two health problems, PHEM is also monitoring any clustering of diseases in the country. Other diseases, which are not included and monitored by PHEM, will be monitored through Health management and Information system (HMIS) [5]. These diseases and conditions are selected based on one or more of the following criteria [7].

- Diseases which have high epidemic potential (anthrax, avian human influenza, cholera, Measles, meningococcal meningitis, pandemic influenza, smallpox, severe acute respiratory syndrome (SARS), viral hemorrhagic fever (VHF), and yellow fever),
- Required internationally under IHR 2005 (smallpox, poliomyelitis due to wild-type poliovirus, human influenza caused by a new subtype, SARS),
- Diseases targeted for eradication or elimination (poliomyelitis due to wild-type poliovirus, dracunculiasis, neonatal tetanus (NNT),
- Diseases which have a significant public health importance (rabies, dysentery, malaria, relapsing fever, typhoid fever, typhus and severe malnutrition);
- Diseases that have available effective control and prevention measures for addressing the public health problem they pose [7].

Measles is one of the diseases among the 21 Nationally Notifiable diseases in Ethiopia and is among diseases those have high epidemic potential and Immediately reportable disease.

Table 3. 1 Disease under routine surveillance in Ethiopia

Immediately reportable disease		Weekly reportable disease	
1.	Acute Flaccid Paralysis(AFP)	1.	Dysentery
2.	Anthrax	2.	Malaria
3.	Avian Human Influenza	3.	Meningitis
4.	Cholera	4.	Relapsing Fever
5.	Dracunculiasis (Guinea worm)	5.	Typhoid Fever
6.	Measles	6.	Typhus
7.	Neonatal Tetanus	7.	Severe Acute Malnutrition(SAM)
8.	Pandemic Influenza		
9.	Rabies		
10.	Severe Acute Respiratory Syndrome (SARS)		
11.	Small Pox		
12.	Viral Hemorrhagic Fever		
13.	Yellow Fever		
14.	Maternal death		

The overall purpose of surveillance of these diseases is to monitor the trend against the seated tolerance limits, and pick any deviation from the limit at the earliest point in time and have prompt response. Furthermore, as early warning system, it guides prevention and risk reduction actions like vector control and so on [6]. For these purposes, each of these diseases has case definition(s) and integrated diseases reporting formats defined by the FMOH/PHEM and the WHO; and reporting is institutionalized into the health facilities and health offices. And also, for each immediately or weekly reportable diseases FMOH/PHEM states thresh holds (The maximum tolerable level of disease). If the thresh hold is passed by considering out break it should be notified to next level as soon as possible [7].

Nationally the reporting channel and periodicity of measles is as follows: -

- From community or health post or health center to woredas health office within 30 minutes,
- From woreda health office to zone/region within another 30 minutes,
- From zone to regional office within another 30 minutes,
- From region health bureau to federal level within another 30 minutes,
- MOH to WHO within 24 hours of detection.

Therefore, because of its essential role in better tracking and monitoring of public health events from its root, and only the literally presence of tracking and monitoring system is not enough to achieve the goal, frequent and timely evaluation of the system is highly required which should be standardized for all districts, zones, region and as well country wide.

3.1.1. Statement of the Problem

Measles is a highly contagious, leading cause of death but vaccine preventable disease. It results in a systemic illness which causes profound immunosuppression often leading to severe complications. In 2010, the World Health Assembly declared that measles can and should be eradicated. It has been eliminated in the Region of the Americas, and the remaining five regions of the World Health Organization (WHO) including Ethiopia have adopted measles elimination goals. Significant progress has been made through increased global coverage of first and second doses of measles-containing vaccine, leading to a decrease in global incidence of measles, and through improved case based surveillance supported by the WHO Global Measles and Rubella Laboratory Network [8,9,10].

Despite the fact that a safe and effective vaccine has been available for over 50 years Measles is a leading cause of death among children. It is life threatening especially in low-income countries where children have limited or no access to medical treatment, and are often malnourished. Measles outbreaks are particularly deadly during emergency settings in communities experiencing, or recovering from conflict or natural disaster. During outbreaks, public health authorities spend time tracing potential contacts, answering calls from the public and money treating people in hospital. Sick children stay home from school and parents stay home to care for them [11].

As CDC reports of 2016 shows Globally, each year there is about 267,000 measles cases reported and 146,000 estimated deaths, mostly children [12]. In the same manner in Ethiopia, only in 2015, a total of 2,190 suspected measles cases was reported in 61 separate outbreaks. Of these, 929 have been positively confirmed. Children under 5 years of age made up 28% of the cases, whereas those over 15 years of age represented 33% of the measles cases [13].

Since 2002, Ethiopia adopted accelerated measles control activities to reduce measles morbidity and mortality as a regional goals and strategies and has been taking important steps to control and ultimately to eliminate measles by 2020. Among those strategies, Case-based measles surveillance

is the one which is currently undergoing in the country as well in Addis Ketema sub-city which needs periodical evaluation to keep sustainability, effectiveness and efficiency of the system [14].

Hence, Effective and efficient Public Health Surveillance plays a great role in minimizing the impact of all infectious disease. Measles is among infectious disease prioritized public health problem, which are under routine surveillance system of Ethiopia. Because of socio-economic status and different predisposing conditions, Addis Ketema sub city is one part of Addis Ababa city administration where outbreak of Measles happen repeatedly.

Therefore, Public health surveillance systems should be evaluated periodically to ensure that problems of public health importance are being monitored efficiently and effectively. But the information from the study area PHEM officer shows, public health surveillance system evaluation was not conducted before more efforts needed to be done to promote and strengthen Measles surveillance system for early outbreak detection and to plan possible interventions.

3.1.2. Rationale of the study

Assessing the effectiveness and efficiency of Public health surveillance system in achieving the stated objectives of health sector is part of the development or improvement of the existing resources, infrastructure and design. This improves the information provided and thereby helps improve service provision and delivery. Especially, with the implementation of the new structure for surveillance system (PHEM) in the sector, the change in the quality of information need to be assessed particularly for diseases which exert high public health stress. Measles is of such diseases which can be impacted for the better or worse by the change in the structure.

Therefore, this study was conducted to evaluate public health surveillance systems in Addis Ababa region Addis Ketema Sub city, to determine how well they operate to meet their stated purpose and goal as well to provide specific recommendation towards improving surveillance quality, efficiency and usefulness of the system.

3.2. OBJECTIVES

3.2.1. General Objective

- To ensure that problems of public health importance are being monitored efficiently and effectively in Addis Ketema sub city, 2017.

3.2.2. Specific objectives:

- To evaluate the performance of the existing surveillance system of Measles.

- To evaluate the key attributes of surveillance system (sensitivity, simplicity, positive predictive value, flexibility, completeness, timeliness, acceptability, representativeness, acceptability and specificity).
- To describe the core activities (case detection, reporting, data analysis and response) of the surveillance system in Addis Ketema Sub-city.

3.3. METHODS AND MATERIALS

3.3.1. Study Area and Period

This Measles Surveillance System Evaluation was conducted in Addis Ketama Sub city which is one of the 10 sub cities in Addis Ababa city administration. It has a total population of 319,757. Having a total area of around 898 ha, it bordered by Gulale sub city in the north, Lideta sub city in the south, Arada sub city in the east, and Kolfe Keranio sub city in the west. The district is located in the northwestern area of the city, not far from its center. Addis Merkato, Africa's largest open-air marketplace, is found in Addis Ketema sub city. There is 10 woredas who are actively reporting surveillance information daily and weekly. Each woreda has established woreda PHEM officer. This surveillance system evaluation was conducted from June 13, 2017 to August 30, 2017.

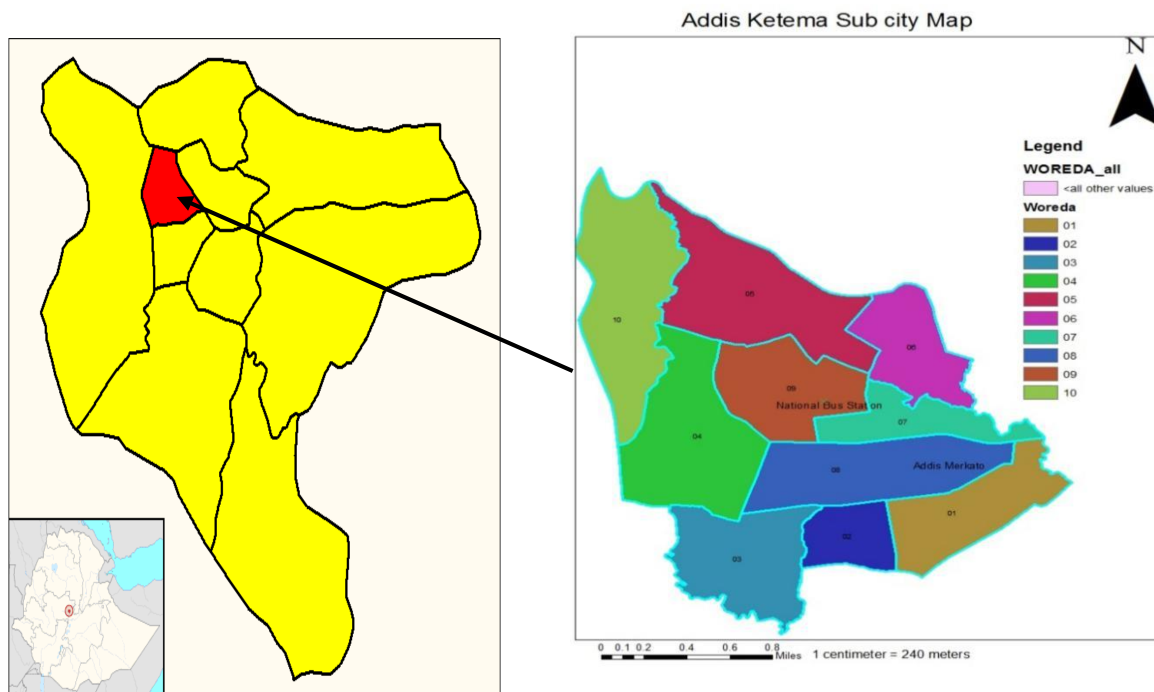

Figure 3. 1 Study area Map, 2017

Study Design: A descriptive cross-sectional study was conducted to evaluate the performance of Addis Ketema sub city Measles surveillance system.

Study Population: Woreda Health Offices and Health Facilities providing health services in Addis Ketema sub city were our study population.

Study Unit: Sub city and Ten Woreda health offices with their corresponding ten governmental health centers were selected purposively. The selected health offices' PHEM officer/surveillance focal persons were interviewed.

Sampling Method & Sample size: - Addis Ketema Sub City Health Department and All Woredas found in Sub city with their corresponding 10 Governmental Health center was selected purposively and 21 persons was interviewed (10 Woreda PHEM officer, 10 health centers PHEM officer, and one Sub city PHEM officer).

Source of Data: Secondary data of Measles reports from the most recent one year during data collection was obtained from PHEM departments of health facilities, Woredas and sub city health offices. Records of disease and laboratory registration books, feedback reports of surveillance and summery report sheet was reviewed. Surveillance focal persons at sub city, Woredas and at health facility levels was interviewed to get the important data of the existing surveillance system of the sub city. To get Measles laboratory test results, data was also received from Measles national laboratory(EPHI).

Data Collection procedure: Data was collected using tools adopted from WHO and updated CDC surveillance system evaluation guide lines which are designed for the assessment of national communicable disease surveillance system. Performance of the core activities, supportive activities and attributes of surveillance system of the sub city was assessed by observing posted charts and tables, checking availability of guidelines and standard case definitions, reviewing records from registrations and report formats. Focal persons of PHEM at sub city, Woreda and at health facilities was interviewed to get the important data of the existing surveillance system of the sub city.

Data Quality Control: After data collected using WHO/CDC tools for surveillance evaluation by principal evaluator daily, Completeness and consistency of collected data was checked before data entry and analysis.

Data Analysis and Presentation: The collected data was entered to Microsoft Excel version 2016. The result was presented by using tables, graphs and texts.

Dissemination of the Result: The result of this study was presented to Addis Ababa University School of Public Health, Ethiopian Field Epidemiology Training Program Department. It was communicated to Addis Ketema Sub-City Health Office, and Addis Ababa City Administration Health Bureau (AACAHB) PHEM department.

3.3.2. Operational Definitions

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

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

Feasibility: Ease which statistical information can be obtained from the agency. This includes the ease with which the existence of information can be ascertained, as well as the suitability of the form or medium through which the information can be accessed. The cost of the information may also be an aspect of accessibility for some users. Willingness of persons and organizations to participate in the surveillance system. And it will be measured quantitatively through reviewing completeness of report forms for the past three months and timeliness of data reporting.

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

Data Quality: Data quality reflects the completeness and validity of the data recorded in the public health surveillance system.

Flexibility: A flexible public health surveillance system can adapt to changing information needs or operating conditions with little additional time, personnel, or allocated funds. Flexible systems can accommodate, for example, new health-related events, changes in case definitions or technology, and variations in funding or reporting sources. In addition, systems that use standard data formats (e.g., in electronic data interchange) can be easily integrated with other systems and thus might be considered flexible.

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

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

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

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

Completeness: proportion of all expected data reports that were actually submitted to the public health surveillance system.

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

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

3.3.3. Ethical consideration

Ethical clearance was secured by writing formal letter from Addis Ababa university school of public health to Addis Ketema Sub-city health office and Official permission was obtained from Sub city health office. Verbal consent was requested to all the participants during data collection. To insure confidentiality names and other identifying information was not included.

3.4. RESULT

3.4.1. Meeting with Stakeholders

Before we conduct this evaluation, we had had a meeting with Sub City Disease prevention and health promotion head office, and Sub city PHEM case team who are working in area of surveillance. We discussed on the purpose of this evaluation, point to be evaluated and area of interest. Accordingly, we identified areas of interest and got some important information about and found no previous baseline assessments done on Measles surveillance system. They recommended us to conduct our evaluation on one immediately reportable disease (Measles). This meeting was helped us as a first step for our assessment.

3.4.2. Public Health Importance of Measles in Addis Ketema sub city

In the last 29 epidemiologic weeks of 2017 about 30 Measles was reported to sub city. Among them 26 (87%) were under five children, three (10%) of them were 5-14yrs old and the rest (3%) was above 15 yrs. old. The Highest age specific Incidence rate(ASIR) was observed among under Five Children having 11 cases per 10,000 populations (Figure 3.2).

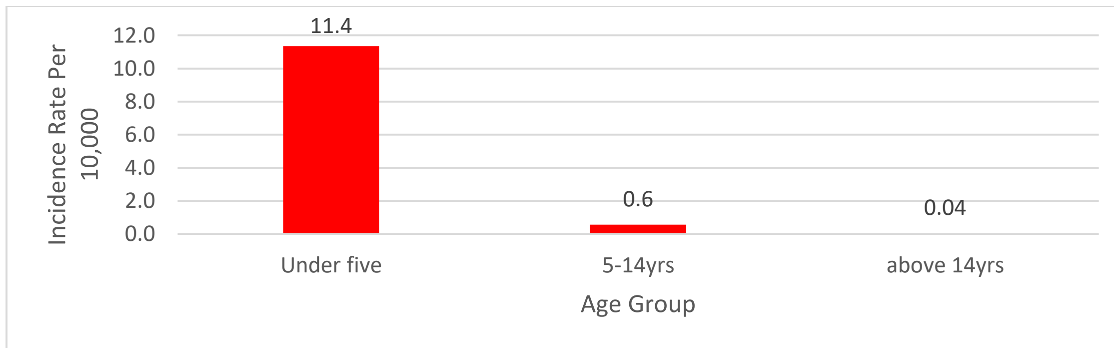

Figure 3. 2 Age specific Incidence Rate of Measles in Addis Ketema Sub city, Addis Ababa, Ethiopia, 2017

The cases were continuously reported through the year with a maximum case per week of two as shown in the below trend line (Figure 3.3).

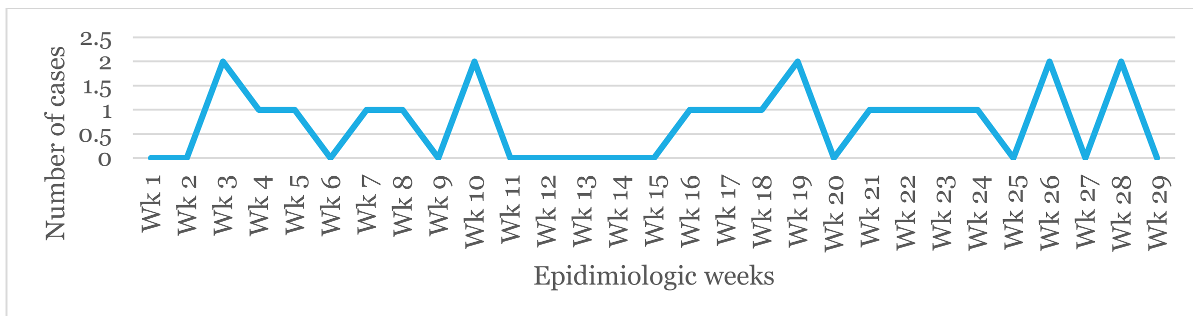

Figure 3. 3 Measles cases trend in Addis Ketema Sub city, 2017

3.4.3. Reporting Flow in Sub City

Following the national PHEM guideline, In Addis Ketema sub city, the cases of Measles are reported to Woreda PHEM officer Immediately with in 30min. District health office collects immediately report of Measles and send immediately with in 30 min to sub-city. For those weekly reportable disease Woredas collect reports from each health facilities and report for sub city on Tuesday. The sub city health office reports to regional health bureau on Wednesday (Figure 3.4).

Figure 3. 4 Case Reporting system flow in Addis Ketema Sub-city

3.4.4. Populations under Surveillance

The national PHEM targeted all the population in the country to be under surveillance for all twenty-one priority diseases. Addis Ketema sub city follows the same structure, with a total population of 319,757 (projected from the 2007 national census) (Table 3.2).

Table 3. 2 *Population under Surveillance in the assessed Woreda /districts of Addis Ketema Sub city, 2017.*

Woredas	Under surveillance Population	Total Number of Health Facility	Total HF engaged to Measles and RF surveillance system
Woreda 1	27183	7	7
Woreda 2	31,959	2	2
Woreda 3	34,338	4	4
Woreda 4	40,001	5	5
Woreda 5	31,312	6	6
Woreda 6	29,309	5	5
Woreda 7	35,272	9	9
Woreda 8	35,444	22	22
Woreda 9	34,096	12	12
Woreda 10	20,843	5	5
Total	319,757	77	77

HF: - Health Facility, Source Each woreda Health office

3.4.5. Core functions of the surveillance system

Case Detection and registration: - Standard case definitions for all prioritized diseases and National Guide line for notifiable disease are available at sub city level, woredas and visited Health Facilities. The measles cases are detected and reported by using this standard case definition and guide line. Sub city PHEM office, and two woredas have Rumer logbook. None of visited health facilities have prepared logbook (Table 3.3).

Table 3. 3 *Case detection, registration and case confirmation in Addis Ketema sub-city*

Indicators	Sub city (n=1)	Woredas (n=10)	Health Facilities (n=10)	Remark
Availability of National guide line	1	10	10	
Standard case Definition	1	10	10	
Rumer logbook	1	2	0	
Case detection capacity	NA	10	10	Clinically

Reporting: - Addis Ketema Sub city obtains notifiable disease reports regularly from ten woredas, except sometimes as a rumor some reports are received directly from community or private clinics. Sub city reports for Addis Ababa Health Bureau every Wednesday using Phone and paper by compiling immediately and weakly reportable disease after summiting reports from expected Woredas. Within the last six months there was no shortage of reporting format in all visited health center and health offices. The weekly report rates of visited sites over the past 29 weeks (WHO week 1-29/2017) prior to assessment were 100%. All reports were sent to the next level via personal mobile phones except sub city health office uses personal e-mail and office telephone service to report to the regional health bureau by PHEM focal person.

Case confirmation (Laboratory): - The laboratory capacity to collect, test, transport and roles in surveillance of Measles and other priority diseases like Malaria and AFP were assessed. Neither of Woredas PHEM office or Sub city PHEM office have capacity to confirm cases because they are assigned to receive reports from each health facilities rather than case confirmation. Malaria, Dysentery, Typhoid, Typhus, relapsing fever cases are confirmed at health center level by laboratory staff. However, Other priority diseases of surveillance like measles and AFP laboratory test (virology) are performed at national lab center. Because of the result of Measles dalliance, it is difficult to confirm outbreak of measles easily. All visited health centers have the capacity to collect and transport these samples to regional or national (EPHI) lab center using guidelines.

Table 3. 4 The capacity of case confirmation in Addis Ketema sub city at different level

Capacity to confirm cases of	Sub city (n=1)	Woredas (n=10)	Health Facilities (n=10)
Acute Flaccid Paralysis(AFP)	No	No	No
Anthrax	No	No	No
Avian Human Influenza	No	No	No
Cholera	No	No	No
Measles	No	No	Yes
Pandemic Influenza	No	No	No
Rabies	No	No	No
Severe Acute Respiratory Syndrome (SARS)	No	No	No
Small Pox	No	No	No
Viral Hemorrhagic Fever	No	No	No
Yellow Fever	No	No	No
Dysentery	No	No	Yes (10)
Malaria	No	No	Yes (10)
Meningitis	No	No	No
Relapsing Fever	No	No	Yes (10)
Typhoid Fever	No	No	Yes
Typhus	No	No	Yes

Data Analysis and interpretation: - Sub city officer has trained on surveillance system. The data was being analyzed regularly every month describing the trends in terms of time place and Person. But, in all Woredas and visited health facilities there were limitation of data analysis regularly. Out of ten Visited woreda health office and ten corresponding health centers seven of woredas and only four of health centers have trend of data analyzing for some reportable disease (commonly for measles, typhoid fever and dysentery). To detect possible out breaks early, for each notifiable disease, the threshold is clearly stated in all woredas and Health facilities, which is adopted from national disease under surveillance guide line (EPHEM Guide line). Accordingly, all of the staff are informed that the threshold for measles is Five suspected cases in one month or three confirmed cases in one month (Table 3.5).

Table 3. 5 Measles Data analysis and interpretation practice in Addis Ketema Woredas and Health centers, 2017

Variables	Woreda		Health centers	
	Number	%	Number	%
Have trend of data analyzing	7	70%	4	40%
Threshold is clearly stated	10	100%	10	100%
Staffs are well informed the threshold of measles and RF	10	100%	10	100%

Epidemic Preparedness: - Some part of Woredas (Woreda 1, 4,7,8) of the sub city had experienced Relapsing Fever outbreak and there was no Measles out breaks reported. The occurred RF outbreak was not reported within 48hrs to respective health office. Sub city health office and most of woredas (70%) health office has written plan of epidemic preparedness and response. But, all visited health Facilities except one health centers have no Written plan of Epidemic preparedness and response. There were emergency stocks of drugs and supplies during the year in all visited Woredas and Health facilities. All visited health facilities and health offices have organized rapid response team.

Outbreak Investigation: - In this year (2017) Relapsing Fever out breaks were happened in Addis Ketema Sub city and Investigation was conducted along with Addis Ababa university Field epidemiology. Other than relapsing fever, in 2017 there were no Measles and other cases outbreak in this sub city.

Responses and Controls: - Relapsing Fever out breaks were happened and the risk factors was identified to be mass sleeping and Bed rooms those are located around Addis Merkato and National Bus station which are being rented to more than six peoples in small rooms for low cost are the main source of transmission for relapsing Fever. Depending on this, many interventions was done by sub city. Among interventions, mass delousing, Bed room delousing, chemical spray and distribution are the major ones.

In all woredas and Health Centers including sub city the Rapid Response Team (RRT) routinely evaluate their performance level of preparedness and response activities in the last one year.

3.4.6. Supporting functions of the Surveillance system

Supervision and Feed Back: - To strengthen surveillance system and support the staffs, Sub city conducts supervision for Woredas and Health Facilities. Sub city provide feed backs in written form at least monthly. Otherwise, Dissemination of surveillance information and supervision at all Woreda levels of health system assessed were limited in the past six months. Among ten Woredas visited, five of them conducted supervision every two –four weeks with support of checklist and five of them did not. Woredas those had conducted supervision provided feedback for the corresponding health facility orally and in written form.

Training: - There are two PHEM staffs working at sub city level on surveillance system. Both of them were trained on surveillance. All visited Woreda health office have one trained PHEM focal person and Among 10 Health centers six of them has trained IDSR focal person while four of them has no trained man power.

Materials and Resources Available for Surveillance: - Resources for data management, communications and logistics were available at sub city health office level only. Sub city health office PHEM has computers, telephone and internet services but has no independent access of budget line. The districts health offices PHEM have no computers and internet services. The logistics and budget constraints were complained at all assessed level of health institutions. Regarding man power, in sub-city two trained persons are working on collecting, compiling, reporting cases to higher level and supervising lower levels. One person in each woredas and health centers are allocated for surveillance purpose but some of them have no enough training on surveillance.

3.4.7. Surveillance attributes

Completeness and Timeliness: As shown in the table below Completeness of sub city report in the last 29 weeks was calculated in two ways. The first one is sub city level completeness which is about 100% and the second is Woreda level which ranges from 72% to 100%.

The other measurement is the timeliness of report which is 90% in Sub-city level and 67% to 100% at Woreda level. (Table 3.6)

Table 3. 6 Completeness and timeliness of measles reports in Addis Ketema sub city, 2017

Reporting site	Total HF expected to report	Average Health Facility Reported	Health Facilities report on time	Completeness	Timeliness
Sub City (Addis Ketema)	10 woredas	10 woreda	9	100%	90%
Woreda 1	7	7	6	100%	98%
Woreda 2	2	2	2	100%	100%
Woreda 3	4	4	3	100%	96%
Woreda 4	5	5	5	100%	100%
Woreda 5	6	6	5	100%	83%
Woreda 6	5	5	4	100%	80%
Woreda 7	9	7	7	78%	78%
Woreda 8	18	16	13	89%	72%
Woreda 9	12	9	8	75%	67%
Woreda 10	5	5	4	100%	80%

Use fullness: Early detection of epidemics of diseases under surveillance was a common understanding of all the respondents as the major use of the surveillance system and most of them replied they use the system for assessment of routine program monitoring and some of them also uses it for early warning as well. Surveillance system is considered to be useful if it addresses detection of diseases or events, detecting changes in trends including outbreak detection and permitting assessment of prevention and control programs. Moreover, this well understood use of the surveillance system has so many challenges in the area of case detection, reporting and response following it. The surveillance system in the PHEM is organized in such a way that the community and all other health facilities under the FMoH will have active role in the detection of cases with the help of case definitions. In the study area, dissemination of case definitions of these diseases was very good and there were two types of case definitions. Standard case definition and

community cases definitions in all visited districts. However, there were lack of resources and logistic for early case investigation at the community level and lack of budget for supervision of the health facilities affects surveillance performance. In addition, there was no regular surveillance data analysis in Six (60%) of assessed Health Facilities and three (30%) of Woredas which highly contributes to detect changes in disease trends or to detect outbreaks (Figure 3.5)

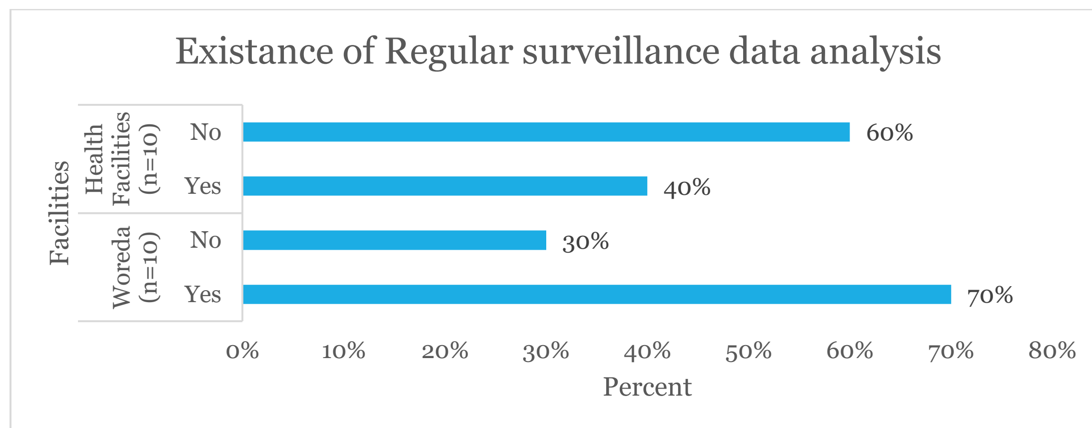

Figure 3. 5 Surveillance data analysis practice in assessed woredas and health centers

Simplicity: All respondents agreed that the case definitions of Measles for identification of suspected cases are easy to understand and apply by all levels of health professionals. But to confirm cases, it was limitation on Measles cases because it takes long period of time (more than a week) to receive the result or sometimes totally not received from National Laboratory where the test is performed. This leads to dalliance of epidemiological intervention at the time of outbreaks. Otherwise, the route of data flow is clear and simple as it was set in the surveillance guideline. There was no lack of reporting format at all level. In the case of measles case based reporting it takes only 5 to 10 min to complete case based format. But, collecting weekly reports from registration books was one challenge in Health facility which took 40-60 min to fill a single report by collecting data from registers. Logistics like telephone, public transport and internet service were other major challenges especially in all health centers to facilitate reporting system. This affects timeliness of the report. The health workers at the health facility and districts usually use their personal mobile phones.

Acceptability: Acceptability of the surveillance system was assessed based on the engagement of the reporting agents and active participation in case detection and reporting. The reporting rate of all assessed health facilities were 100% over the past 29 reporting weeks. But the average completeness of surveillance data was only 92.5% in all visited health centers. There is a total of

77 health facilities in Addis Ketema Sub city. Ten Health centers, two Private hospitals, Four Higher Private clinics, 24 Medium clinics, 13 primary clinics, Eight specialty clinics, 13 dental clinics, Two diagnostic laboratory, and one Ophthalmologic Clinics. All of Health facilities are Expected to be engaged to Surveillance system. Among them 100% of them were well engaged to surveillance system and are expected to send Measles reports to Sub city through 10 woreda Health offices. Accordingly, they are sending Measles reports to the next level using National surveillance system. All of selected and interviewed health facilities and Woredas replied they believe the existing surveillance system is very important for public health intervention and they accept Measles surveillance system. All participants (disease reporting facilities) follow and identify all reportable disease using standard case definitions and reports them by using the current reporting format.

Flexibility: Most of the respondents 14 (67%) reported that the current reporting format (weekly and immediately) is not difficult to use for new diseases or events, while the rest 7 (33%) reported it is difficult to use existing format for newly occurring disease. Some gaps raised by the respondents were no place is available for personal variables like age and sex in the current reporting format for weekly reportable diseases that makes difficult to analyze the personal variables. However, adding new variables like age and sex for weekly reportable diseases is difficult for implementation but it is easy for immediately reportable diseases (case based format). All of the respondents said integration of the existing surveillance is not easy to integrate with other reporting systems (Table 3.7).

Table 3. 7 Flexibility of current measles reporting format in Addis Ketema Sub city, Addis Ababa, Ethiopia, 2017

Variables	Difficult (n= 21)		Easy (n= 21)	
	Immediately reporting format	Weekly reporting format	Immediately reporting format	Weekly reporting format
Current reporting format use for new event	7	7	14	14
To analyze the disease in terms of personal variables	0	21	21	0
Adding new variables like age and sex to existing format	0	21	21	0

The Quality of Data: We assessed the quality of data in terms of completeness, cleanness of reports, validness of the number of cases in registration and those in reporting format, inclusion of all the necessary variables that should filled in reporting format and summary report of weekly

reportable disease on weekly basis. For health facilities, we counted and compared the reported Measles cases with summary report to go to higher level and Out Patient Department (OPD) registration books for the previous months. Accordingly, in most of the health facilities 8 (80%) the number of cases recorded in Registration book is similar with those reported to next level, report formats are clearly filled and no missed variables on formats while reporting.

Sensitivity: The sensitivity of the surveillance of Measles in the detection of cases and outbreaks were seen separately. In detection of cases, Health facilities use standard case definitions. All person with fever and maculopapular (non-vesicular) generalized rash and cough, coryza or conjunctivitis (red eyes) OR any person in whom a clinician suspects measles is reported to the second level and the sample is sent to national laboratory to confirmation. But due to the dalliance of the result sometimes it is difficult to confirm early. Depending on the case definitions that currently the health facilities are using to detect cases, most probably all suspected cases of measles were correctly being reported to the next level without any missing of cases. Even though, in Addis Ketema sub city Measles cases were being identified and reported in this way, it was not possible to measure the sensitivity quantitatively because of lack false negative Value. On the other hand, Outbreak detection depends on regular data analysis, health-seeking behavior of the society, availability of laboratory services, definitions and prevalence of action thresholds, timeliness and completeness of reporting. Action threshold was available in all assessed health facilities and health offices but, Data analysis was not regularly performed in most of Woredas and assessed Health facilities which may decrease the sensitivity of the system to detect the outbreak.

Positive Predictive Value: In the past 29 epidemic weeks about 27 suspected Measles samples were sent to laboratory from Addis Ketema sub city for confirmation among which only three of them was found to be Igm Positive for measles virus. The rest 24 of them was stated as suspected cases. From this we calculated the PVP was 11%.

Representativeness: All respondents replied the surveillance system enables them to follow the health and health related events in whole community. In Addis Ketema sub City the case definitions those used to monitor disease outbreak is classified into two. Community based and standard case definitions. Health extension workers monitors disease occurrences in the community level using the loose community based case definitions and reports cases for corresponding Health Center. By using standard case definition and laboratory if possible, the health workers in health center again screen them for suspected cases. In this integrated way, the

report is compiled and transferred to next level. However, other than health facilities, there were different traditional healers and religious areas where some of community may visit at the time of illness. The existing surveillance system did not incorporate those areas and none of either traditional healers or Religious organization were engaged to reporting system. Lack of this makes the surveillance systems of Addis Ketema Sub city unrepresentative.

Stability: The surveillance system ensured to function in proper way and according to the standard guideline. As all participants replied there were no new restructuring affects the procedure and activities of the surveillance and there was no lack of resources that interrupt the system. Reports were collected and aggregated by health facility and reported directly to the regional PHEM regularly without any interruption.

***Table 3. 8** Surveillance Attributes Summery table, Addis Ketema Sub city, 2017*

S/n	Surveillance attributes	Finding in sub-city
1.	Completeness	• 100% sub city level • 92.5%(average) in Woreda level
2.	Timeliness	• 90% in sub city level • 67% to 100% at Woreda level.
3.	Useful ness	• All believed the existing system helps them to detect any outbreak • But only 40% of health Centers and 70% of Woreda health office perform trend analysis of measles
4.	Simplicity	• It takes 5-10min to fill the format • Lab. Confirmation takes more than week/Absent
5.	Acceptability	• All health facilities in sub city (100%) accepted and engaged to the system • Cases are being identified using standard case definition in facilities and community based case definition in communities.
6.	Flexibility	• Easy to use for new disease (67%) • Difficult to use for new disease (33%)
7.	Sensitivity	• Measles case definition at facility level and Community level is very broad enabling communities and health professions to easily identify measles cases. • But to put the sensitivity of the case definition quantitatively there were no documented false negative value.
8.	PPV	• 11%
9.	Representativeness	• Disease identified at community level and health facility level • Traditional healers and Religious organization were ignored
10.	Stability	• No any restructuring affected the existing reporting system in the study period.

3.5. DISCUSSION

Among 21 diseases under surveillance in Ethiopia, Measles were the major disease burdens of Addis Ketema sub city that were being reported from most of woredas and remain main threats of epidemic to community. Detection of a priority disease under surveillance depends on the availability and sensitivity of its case definitions. These case definitions must be used at all levels including the community, health professionals working at health posts, health centers, hospitals, health offices at different levels, private health facilities, other government health facilities and NGO clinics to detect easily.

In the study area availability of Measles case definition and community case definition helps to identify any suspected measles case outbreak early. But, posting this case definition is limited. The challenge of Measles case confirmation laboratory is the major problem in outbreak identification in visited sub city. The report flow of Measles in Addis Ketema Sub city is the same with national reporting system.

In strengthening Surveillance system, capacitating the staffs by up-to-date training, Supportive supervision and providing feedback are a key function of public health surveillance system. Regarding this there is a gap on regular/continuous supervision for lower level and documenting feed backs especially in health facilities. This may negatively affect the of surveillance system.

Epidemic preparedness refers to the existing level of preparedness for potential epidemics and includes availability of preparedness plans, stockpiling, designation of isolation facilities, setting aside of resources for outbreak response. There is no written epidemic preparedness and response plan at Some of visited woredas and Health facilities. This may result in weak case detection and response during epidemics. The aim of preparedness is to strengthen capacity in recognizing and responding to public health emergencies through conducting regular risk identification and analysis, establishing partnership and collaboration, enhancing community participation and implementing community-based interventions and strategic communication during the pre-emergency phase and ensuring their monitoring and evaluation. Additionally, shortage of resources for data management is being a challenge to generate and disseminate PHEM reports timely through maintaining their quality. There were no problems on the simplicity of the system regarding case definitions of selected diseases, reporting system and additional data collected on cases at all visited levels.

Reliable reporting of surveillance data throughout the country is important so that program managers, surveillance officers and other health care staff can use the information for action. The routine flow of surveillance data is usually from reporting sites (community and health facility) to the next level up to the central levels. The reporting rate of visited heath centers and health offices over the past 29 weeks were high 100% and Average completeness of reporting health facilities at Woreda and sub city level is also high 94% and 100% respectively. This includes all private and governmental health facilities of the sub city which indicates that there is representativeness of the surveillance system. According to national PHEM guidelines acceptable level of completeness were 80% and above. But completeness of Measles case surveillance data cross checked from registry and summery report format of two of visited Woredas were below 80% which is low when compared to the acceptable standard.

It was agreed by most of respondents that the surveillance system is flexible for newly occurring health and health related events. But still there is some challenges on the flexibility of report format especially for weekly reporting format as 33% of the respondents complain on adding newly occurring disease is difficult. Reporting formats of priority diseases are easy and clear to fill for data collectors at Woreda and Health facility level.

Furthermore, to perform and monitor disease surveillance in a better way resource allocation is important. But, in the study area lack of resources and logistic for early case investigation at the community level and lack of budget for conducting supervision and providing feedback to health facilities and Woredas affects the use fullness of the system. In addition, Lack of Feedback and supervision, training of staff, refunding of transport and telephone expenditures and perdiem has impact on the overall performance of the surveillance system.

3.6. CONCLUSION

- Measles cases are detected early in all assessed woredas using standard case definition for Health facilities and Community case definitions for community based surveillance.
- Early Measles case confirmation was challenging due to dalliance of the result from national laboratory.
- Poor trend data analysis performance was observed in most of Health centers and some of woredas.
- There is good epidemic preparedness in sub-city, Woredas, and Health centers.

- In the study Year, one outbreak (relapsing fever) was happened and investigation with intervention was done accordingly.
- The completeness and Timeliness of Measles reports in some woredas was Lower than expected national standard.
- Acceptability of Measles surveillance is very high in Sub city.
- Poor Flexibility of reporting format, low measles positive predictive value was identified.
- Inadequate resources for communication (telephone, internet), for data management (computer at Woredas), budget for conducting supportive supervision and training of staffs or health care provider.
- Representativeness of surveillance system were affected due to not involving reports from Traditional healers and religious organization

3.7. RECOMMENDATION

- Regular supervision and Feedback provision to strengthen the system from higher level (woreda, Sub city, Health bureau).
- Regular trend analysis to detect possible out breaks at Health facility level, Woreda level, and Sub city level.
- Revising weekly reporting format to incorporate required variables (Sex, Age….)
- Allocating enough budget to facilitate Surveillance system independent of the other budget.
- Availing communication system for health centers and woredas for early information sharing with higher level.
- Expanding disease detection and reporting system to traditional healers and religious organization

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CHAPTER IV HEALTH PROFILE DESCRIPTION REPORT

Health Profile Description of woreda 06, Addis Ketema sub city, Addis Ababa City Administration, 2017

ABSTRACT

Introduction: Health Profiles is a program used to improve availability and accessibility for health and health-related information. It provides a summary of health information of the community as a whole which helps in disease prevention, health promotion, and health related issues intervention. The Main objective of this study is to assess the Health and health related profile of Addis Ketema sub city Woreda 06 district in 2017.

Methods: This health profile description was done in Addis Ketema Sub city Woreda 06. Cross sectional retrospective descriptive study was conducted. Woreda historical background, overall health profile, maternal health, child health, epidemic prone disease situation, and other health hazard situation were assessed.

Result: -In Woreda 6 the health service is being provided by 7 Health facilities (all type). In this woreda Crude birth rate was 7 per 1000 with zero neonatal mortality rate and contraceptive acceptance rate of this Woreda accounts about 57% while ANC1 coverage in 2017 was 96%. The majority of TB cases detected in 2009 EFY in Woreda 6 was clinically diagnosed (smear negative) type of TB which accounts about 48% of the total cases. In this year among total live born babies, low birth weight percentage (<2500gm) were 2.4%.

Conclusion: - AURTI is the leading cause of morbidity both in Adult and Pediatrics. TB treatment cure rate and treatment success rate were more than expected, while Vaccine coverage, TB detection rate, ANC, and PNC were low. Problem of Poor sewerage system, low latrine coverage (private), & over crowdedness/mass sleeping were identified. Community mobilization on maternal health improving liquid waste disposal is recommended to build healthy community.

Key Words: Health profile, Woreda 6Addis Ketema sub city, Addis Ababa, 2017

Word count: 269

4.1. INTRODUCTION

Well organized information is an input in democratization process, good governance and for filling the development gaps. The availability of reliable, adequate and up-to-date information has a paramount significance for the purpose of allocating budget, planning, formulating and monitoring development projects. In addition, it provides relevant and up to date information, which could serve as an input by both decision and policy makers. Among the major information required in one country or district, which enables government, policy makers and all other stake holders to allocate important resources, Health profile is the one [1].

Health Profiles is a program used to improve availability and accessibility for health and health-related information. It provides a summary of health information of the community as a whole which helps in disease prevention, health promotion, and health related issues intervention. The profiles give a snapshot overview of health status for each local authority [2].

The health and wellbeing of any population requires a holistic approach that includes the involvement of many agencies and gives ownership to the communities involved. The increasing return to the principles of public health signifies that a merely medical approach to health issues cannot by itself resolve multi-directed health problems in increasingly complex cities. Government health strategy documents increasingly recognize the need of views of the people receiving services in needs-based service delivery and support the involvement of individuals and communities as a key objective in the future delivery of health services [3].

Currently, the concept of health, as defined by the World Health Organization (WHO), is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. Taking this perspective, one moves beyond disease absence as defining health status to one that incorporates the complex perceptions about health and health related conditions. Hence, Health Profiles are about the health of people and about the conditions in which they live. It is essential tool for change and thus must be an integral part of local decision-making and strategic planning processes. The preparation of profiles provides a lively, scientifically and evidence based account of health in the district; it can stimulate public interest and political commitment; and it can identify targets for the future and monitor progress towards them. The health profile description highlights several important aspects of public health data. Demographic data, infrastructure of the district, socio-economic information, health care coverage, vital statistics,

education coverage and other all health-related information were collected to address important public health problems and to facilitate effective public health actions.

Health description is also crucial for prioritizing health and health related problems of the community at any level. Housing is one of the critical problems of the Addis Ababa. Most houses of the city are old, unplanned and inconvenient for living. Because of rural-urban migration and natural increase there is an alarming population increase in the city. This causes shortage of social utilities including housing. Sanitation and sewerage management and disposal is a serious socio-economic problem of the city [4,5,6].

Therefore, this health profile description is important for advocacy, program planning, implementation and evaluation of health care.

Significance of the study

Health description is crucial for prioritizing health and health related problems of the community at any level. By compiling all aspects of community health information, this study is aimed to provide relevant information for government, non – government organizations, policy makers and researchers, which helps them for taking appropriate decision making and designing appropriate intervention, development strategies.

Specially, the information generated from this health profile description could help sub city health office, Health center, woreda and other health stake holder in public health planning, resource allocation, intervention and system evaluations as well.

Scope of the profile

The all information used in this Health description were exclusively collected from Woreda 6 administration regarding this Woreda. Hence, the result of this profile assessment represents only Addis Ketema sub-city Woreda 06 administration. The scope of this study is limited to presenting major health and Health related issues (educational status of population, water supply of the woreda, socio economic status, health service coverage, etc. in 2017. Therefore, the result could not represent either the status of whole sub city or other woredas which are not included in this study.

4.2. OBJECTIVE

General Objective

- To assess the Health and health related profile of Addis Ketema sub city Woreda 06 in 2017

Specific Objectives

- To describe the demographic characteristics of the population in Addis Ketema sub city Woreda 06 in 2017
- To describe health service infrastructures in Addis Ketema sub city woreda 06 in 2017
- To assess the status of health delivery system in woreda 06 in 2017
- To describe the health status of the population in Addis Ketema sub city Woreda 06 in 2017 by using different health and health related indicators.
- To identify the health problems of the Woreda.

4.3. METHODS AND MATERIALS

4.3.1. Study Area and Period

Addis Ababa lies 9°1′48″N latitude and 38°44′24″E longitude. The city is located at the center of the country, at an altitude ranging from 2,100 meters at Akaki in the south to 3,000 meters at Entoto Hill in the North which makes Addis Ababa the third highest city in the world. This city has a Sub-tropical highland climate with average temperature differences of up to 12.2°C, depending on elevation and prevailing wind patterns.

This city administration is built up from 10 sub cities. Among 10 sub-cities found in Addis Ababa, this health profile was collected in Addis Ketema sub city Woreda 06. Woreda 06 is one of woredas found in Addis Ketema Sub city, located in North - East part of the sub city and It has a total of 29,308 populations settled on land mass of 8.98 square kilometer (Atlas of Addis Ababa 2010). The district is bounded by Addis Ketema sub-city Woreda 07 on South, Gulale sub city on North, Addis Ketema sub city Woreda 5 on West, and Arada Sub city on East. This study was done from February 16,2017 to March 16, 2017 by collecting health and health related issues of the woreda.

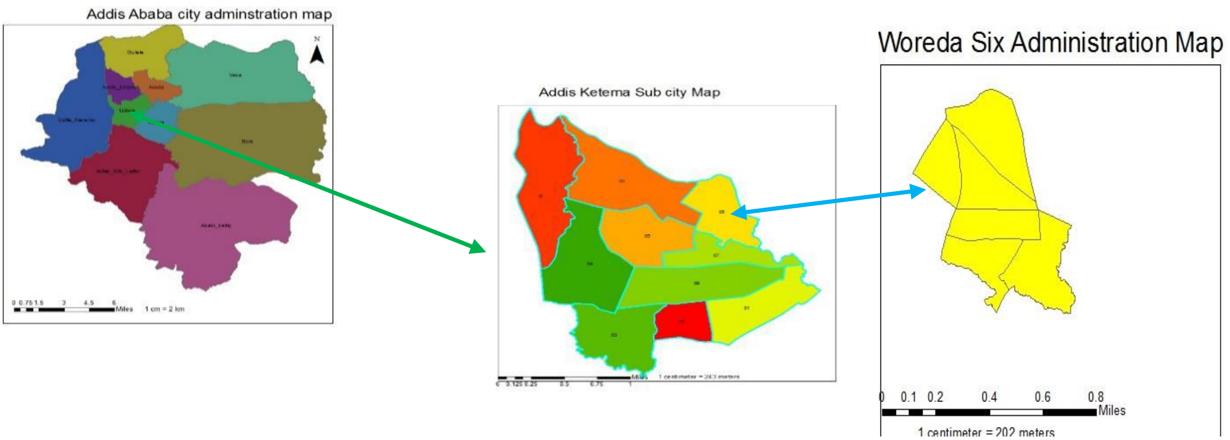


Figure 4. 1 Map representation of Study area

Sample size and sampling techniques: Purposive sampling technique was used. The study sample was selected by discussing with Sub city health office and among 10 woredas found in sub- city woreda 06 was selected.

Data collection procedures: Data was collected by using prepared standard checklists. Accordingly, all concerned body were interviewed and in addition direct observation and discussion with authorized person was used.

Source of the Data: Secondary data (administrative data) was used to prepare/compile this profile. The sources of data include:

- Addis Ketema Sub-Cities health office, Plan and Program Core Process
- Sector Bureaus, Authorities and Agencies in sub cities (Addis Ketema Sub City Education office Addis Ketema Sub City Bureau of Finance and Economic Development (BoFED)
- Woreda 06 administrative bureaus
- Review of related Literatures conducted in Addis Ababa & Addis Ketema Sub City

Data Analysis Procedure: Data was analyzed by using Microsoft Excel, to organize and analyze data appropriately. Frequency distribution tables and figures (descriptive statistics) are used to show the results.

Data Quality Assurance: To keep the data quality check list was prepared accordingly the information to be collected. Then data was checked for completeness and clearness.

Data Management and Presentation: The data collected from the above organizations was checked for completeness and validity; then it was analyzed using Excel 2016 and the result were presented using tables, different figures and charts.

Ethical considerations: Official letter was obtained from Addis Ketema sub city Health office to the study area of woreda health office and other relevant offices to accept the legality of this study. The purpose and objective of the study was briefly explained to the respected Offices based on their level of responsibility.

Dissemination of findings: The result of the study was disseminated to Addis Ababa university school of public health, Addis Ketema sub city Health office, and Woreda 06 Health Office.

4.3.2. Operational Definition

Maternal mortality rate: - Number of deaths assigned to pregnancy-related causes during a given time interval

Infant mortality Rate: - Number of deaths of children < 1 year of age reported during a given time period among Number of live births reported during the same time period.

Crude Mortality Rate: - The crude mortality rate is the mortality rate from all causes of death for a population.

Crude Birth Rate: - Number of live births during a specified time interval

Neonatal mortality Rate: - Number of deaths among children < 28 days of age during a given time interval

Fully vaccinated: - Children under one who took whole vaccinations available in Ethiopia.

Skilled Birth Attendant Delivery: - delivery which is attended by health professionals in Facility

Traditional Birth Attendant Delivery: - Delivery attended by Non-health professionals (home Delivery)

New OPD visit: - a person who visits Health Facility for a compliant of disease he didn't treated before

Repeat OPD visit: - a person who visit Health facility for some complaints of disease he had treated before in the same year and not improved.

Expected pregnancy: - Number of women expected to be pregnant in the given year among reproductive age groups

Live birth: - It is proportion of stillbirths from total births attended by skilled health attendants.

Contraceptive acceptance Rate(CAR): - proportion of women of reproductive age (15-49 years) who are not pregnant who are accepting a modern contraceptive method (new and repeat acceptors).

Ante natal care 1(ANC1): - Number of pregnant Women received ante natal care at least one time.

Antenatal care 4(ANC 4): - Number of pregnant Women received ante natal care at least four time.

Institutional maternal Death: - number of maternal deaths among all deliveries attended in the given institution by condition related to pregnancy.

Post Natal Care Coverage: - Proportion of women who seek care, at least once during postpartum (within 42 days after delivery), from a skilled health attendant.

Still Birth rate: - proportion of stillbirths from total births attended by skilled health attendants.

TB treatment cure rate: - percentage of a cohort of new smear-positive TB cases registered in a specified period that was cured as demonstrated by bacteriologic evidence (a negative sputum smear result recorded during the last month of treatment and on at least on one previous occasion during treatment).

TB detection Rate: - TB case detection rate is number of new pulmonary and extra pulmonary (all forms) TB cases detected, among the TB cases estimated to occur countrywide.

TB treatment success rate: - ***a*** percentage of a cohort of new TB cases registered in a specified period that successfully completed treatment.

4.4. RESULT

4.4.1. Historical Aspects of Woreda 6

Woreda 6 administration is one of Woredas found in Addis Ketema Sub city which is built up of seven Ketenas as current classification or five Kebeles as Former classification. Three years ago, this woreda is known by the history of poverty. Most of the Dwellers of this Woreda were living under extreme poverty. But currently as a result of different development strategic plan prepared by Woreda administration through a time this history of poverty is being changed. Among strategies that was applied to convert the history of Poverty, grouping societies into small enterprise is the major one. Currently many of peoples living in this woreda are employee and the part of populations are working by grouping as small Enterprises. Even though there are some improvements when compared to the previous year still now there are many peoples who have no jobs. In this year, 2017, about 667 peoples (299 males and 368 females) were registered as Job-less populations. (*Source: - Cultural and tourism office)*

4.4.2. Geography and Climate

Woreda 6 is one of the district in Addis Ketema Sub-city, located in North - East part of the sub city and It has a total land mass of 8.98 square kilometer (Atlas of Addis Ababa 2010). The district is bounded by Addis Ketema sub-city Woreda 07 on South, Gulale sub city on North, Addis Ketema sub city Woreda 5 on West, and Arada Sub city on East. Its annual average temperature is about 18 ^{0}c. Regarding the specific altitudes of Woreda 6 there is no data, but as a sub city, Addis Ketema sub-city has altitude of ranged from 2343 to 2546 meters above sea level which has a range of 203 meters.

4.4.3. Administrative and Political Structure

Woreda 6 is classified in to 7 Ketenas. All Sector offices are accountable for Woreda administration.

4.4.4. Demographic Information

Woreda 6 has a total population of 29,308 in 2009, of which 14,947 (51%) are Female and 14,361 (49%) are Male; female to male ratio was 1:0.97. Out of the total population 656 (2.2%) are under 1 year, 2,098 (7.15%) are under 5 years and women of child bearing age 15-49-year accounts 10,152 (34.6%) of the District population. The average population living in one square kilometer is about 3,264. Populations are distributed differently among seven Ketenas. (*Source: -Woreda 6 Health office*)

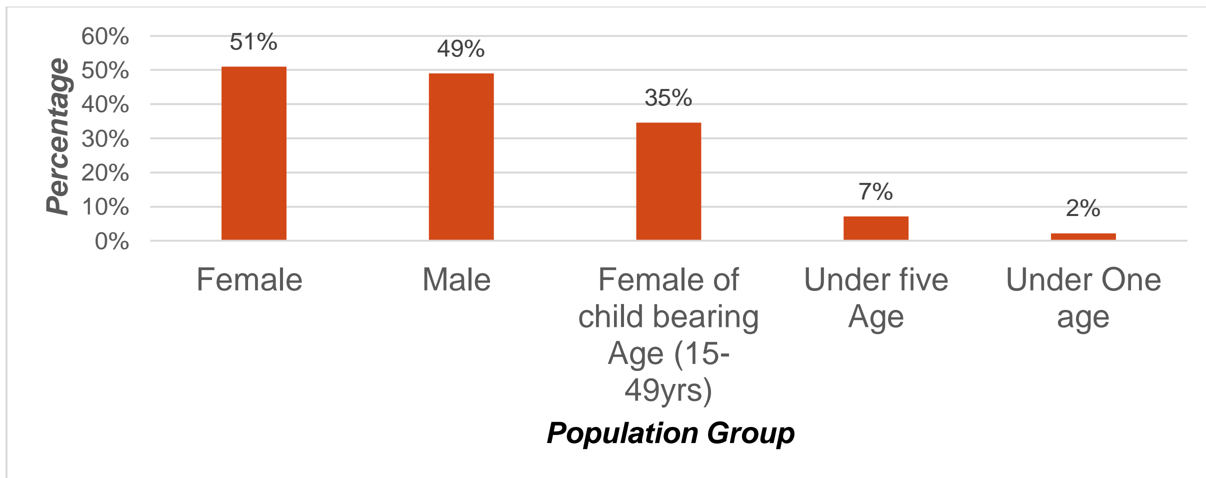


Figure 4. 2 *Woreda 06 population classification by sex and age, 2017*

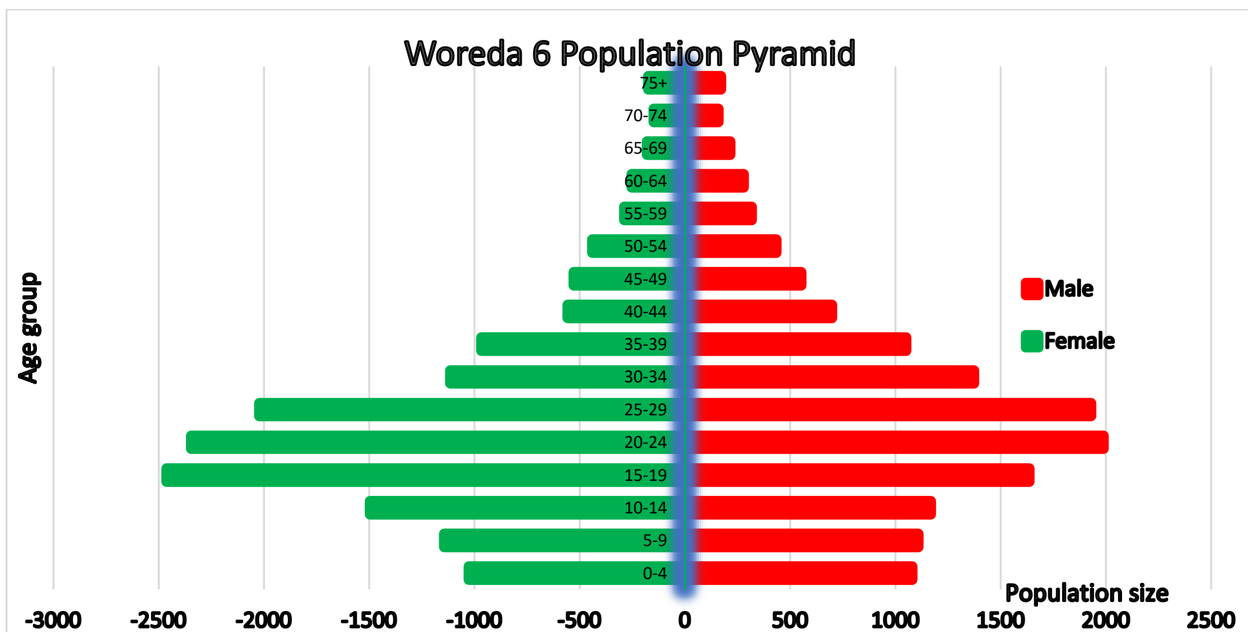
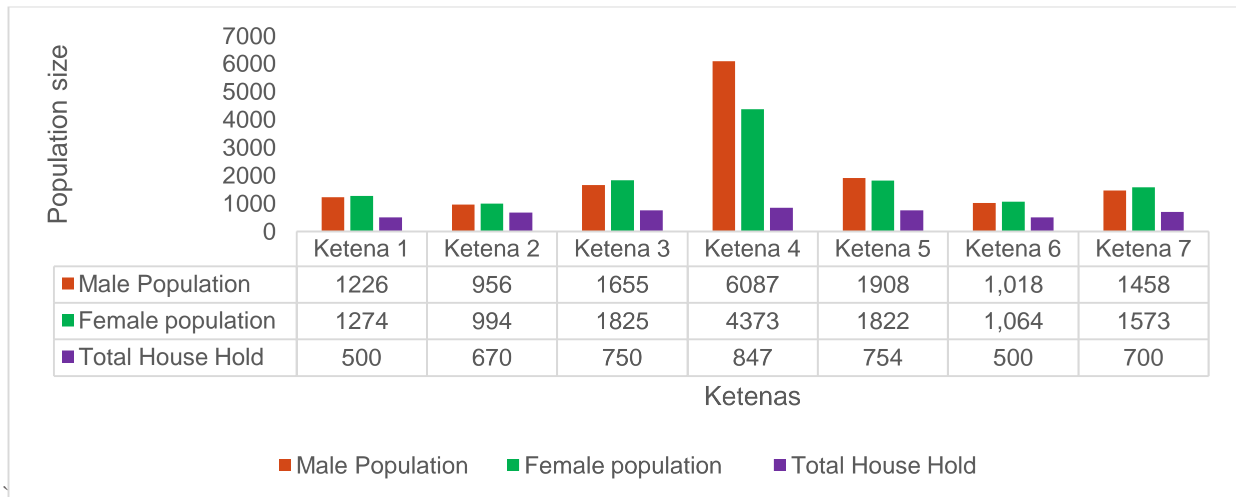


Figure 4. 3 ***Population Pyramid of Woreda 6, Addis Ketema Sub city, 2017***

According to information taken from Woreda Health Extension worker Woreda population house to house count was performed in 2015 by UHEW under supervision of Woreda Administration which is done every two years. Among 7 Ketenas, Ketena four looks highly over crowded with average of 12 members living in one house. In this woreda the average person per house is 6 members. (Figure 4.4)



	Ketena 1	Ketena 2	Ketena 3	Ketena 4	Ketena 5	Ketena 6	Ketena 7
Male Population	1226	956	1655	6087	1908	1,018	1458
Female population	1274	994	1825	4373	1822	1,064	1573
Total House Hold	500	670	750	847	754	500	700

Figure 4. 4 *Woreda 6 Population distribution according to Ketenas*

4.4.5. Religion and Ethnic composition

The residents of Woreda 6 is composed of Varity of religions. Among them Orthodox religion followers are the majority in woreda accounting 43%, and 37%, 18%, and 2% of the populations are constituted by Muslim, Protestant and others respectively (Figure 4.5). Regarding ethnic composition of Woreda there is no data.

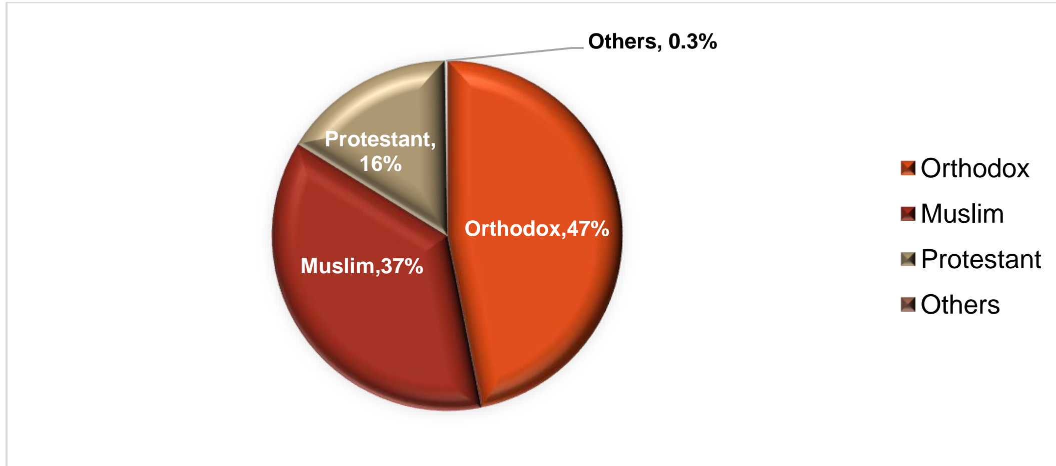


Figure 4. 5 *Religion composition of Woreda 6 population (source: - Woreda culture and tourism bureau)*

4.4.6. Infrastructures (Public Service Facilities)

Communications: -Telecommunication service in Addis Ababa is all most 100% whether through wire or wireless phone. In the same manner Woreda 6 is also has 100% telecommunication coverage.

Transportation: -All woredas in the sub city has assess to road whether. And in Woreda 6 each Kebeles have easy access to road

Water Supply: - even though there is some times interruption of water due to different issues the potable water supply coverage is 100% in this Woreda.

Energy Supply: - Electric Power is the main sources of energy in the this Woreda. As other part of Addis Ababa Addis Ketema Sub city Woreda 6 population gets 24 hrs. electric power supply.

4.4.7. Education and School Distribution

To increase the coverage of education in Woreda 6 the learning teaching process is performed in two ways; Regular and irregular. Regular learning process is being given at day time for all eligible students. Irregular type of learning is prepared for a person who is unable to attend regular type of learning because of their work which includes older peoples. Addis Ketema Sub city Woreda 6 administration has a total of 7 schools; of these four KGs and three primaries exist with a total of 2,647 regular students, 476 (257 male & 219 Females) KG students and 2,171 (988 male and 1183 Female students) primary students are enrolled in 2017. Females account 53% of the total regular students enrolled (Table 4.1).

Table 4. 1 Number and types of schools, number of students and teachers found in Woreda 6,2017

S/No	Types of School	Number School	Owners of school		Number of student			Number of Teachers		
			P	G	Male	Female	Total	Male	Female	Total
1.	KG	4	3	1	257	219	476	0	27	27
2.	Primary	3	2	1	988	1183	2171	74	20	94
	Total	7	5	2	1245	1402	2647	74	47	121

P= private owner, G= governmental owner: Source woreda 6 Educational bureau

In addition to the regular students there are also about 214 irregular students; 83 Males and 131 Females. The Majority of the schools in this woreda is owned by private owner three KG and two primary schools. Only two schools, one KG and one primary schools, are owned by government. There are no secondary and higher schools in this woreda. When we see the number of teachers in this woreda about 27 Female teachers are teaching in KG schools and about 94 primary school

teachers (74 males and 20 Females) are teaching in primary schools. In average teacher to regular student ratio in this Woreda is 1:23 in primary school and 1:18 in KG school (Figure 4.6).

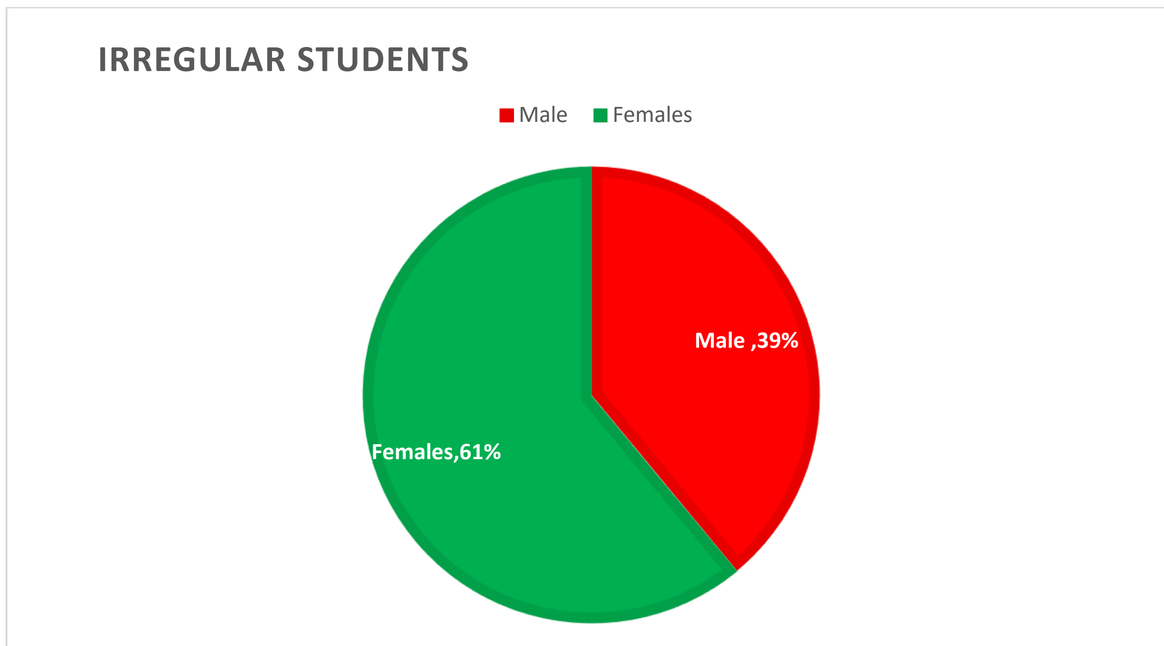


Figure 4. 6 Irregular (Night) students by sex in Addis Ketema SC, Woreda Six2017(Source: - Woreda Education Bureau)

From the above when we see educational coverage of Addis Ketema Sub city Woreda 6 there is about 99.6% of KG education coverage, 91% Regular primary education coverage and 45% irregular primary and basic educational coverage in 2017 (Figure 4.7).

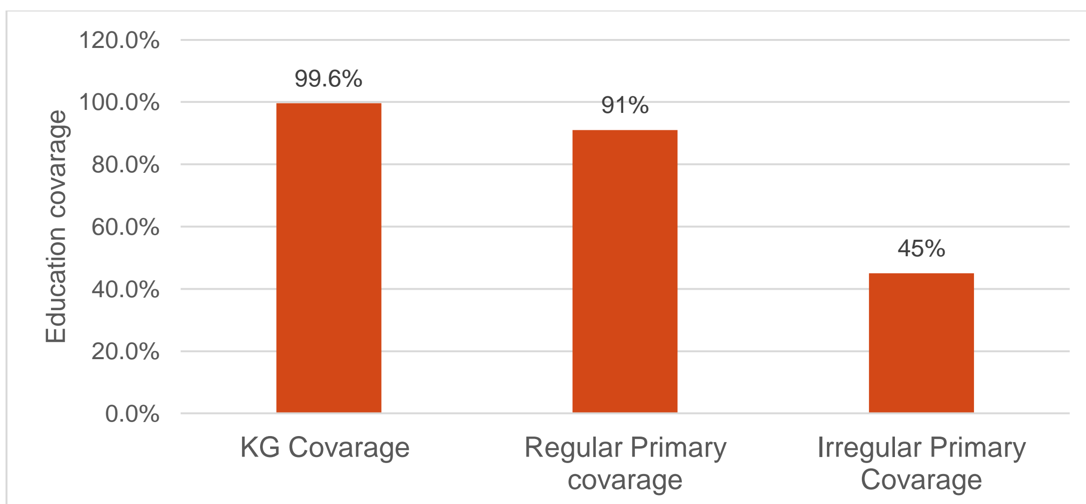


Figure 4. 7 *Educational coverage in Addis Ketema Sub city Woreda 6,2017 (source: - Woreda Education Bureau)*

4.4.8. Woreda's Health system

Woreda Health Service Delivery Organo-Gram

- Woreda Health Office
  - Medical Director
    - DPHP
      - Family Health
        - Maternal Health
        - Childhood Health
      - Communicable disease
        - PHEM
        - HIV
        - TB/Leprosy
        - STI
    - CCPO
      - OPD/IPD
      - Injection & MOR
      - Card room
      - Pharmacy
      - Laboratory
      - Emergency
    - Metron
    - Human resource
    - Finance
    - UHEW

Figure 4. 8 Oregano-gram of Woreda 6 health service in 2017

Woreda Health Office is currently well organized, and to achieve the maximum Health coverage, it is integrated with a total of 7 Health Facilities among which there is one governmental Health Center with Health center to population ratio of 1: 29,308 and two private primary clinics with clinic to population ratio of 1: 14,654, two private specialty clinics (one physiotherapy and one maternal Health serving clinic), one diagnostic Laboratory (1: 29,308 laboratories to population

ratio). There is also 19 drugs and medical equipment whole sellers in Woreda. Except pharmacy that found in one health center, there is no pharmacy in this Woreda (Table 4.2).

Table 4. 2 ***Health Facilities distribution in Addis Ketema Sub city Woreda 6***

S/N	Type		Number			Health facility to Population Ratio	Remark
			Governmental	Private	Total		
1	Hospital		0	0	0	-	
2	Health Center		1	-	1	1:29,308	
3	Pharmacy/Drug stores		0	0	0	0	
5	Diagnostic laboratory		0	1	1	1: 29,308	
6	Clinics	Primary	0	2	2	1: 14,654	
		Medium	0	0	0	0	
		Higher/specialty	0	2	2	1: 14,654	
Total			1	5	6	1: 4,187	

The health centers found in this Woreda currently is serving as the seat of Woreda Health Office and Woreda Health Extension workers on the top of community Health serves. It is giving medical serves for about 29,308 populations.

When we see accessibility of transportation in woredas Health facility, even though there is no data about the length of the roads, all facilities are easily accessible by community using asphalt roads and other wise cobblestone roads. All facilities have 100% safe water coverage and get 24 hrs. electric power.

Together with Health center, Woreda health office establishes emergency health management team (Rapid response team and maternal death surveillance and reporting committee).

4.4.9. Health indicators and Vital statistics.

Health indicators and vital statistics are important for estimation of the district's or country's development to know the health service coverage of one country or one district. In Addis Ketema Sub- city Woreda 6 some of important Vital statistics were not well documented and there is no data about death. In this Woreda, in 2015crude birth rate was about 8/1000, and in 2016 it was

7/1000 while in 2017 it was about 14/1000. Again, there was about 10/1000 neonatal mortality rate in 2015 and in 2016, while it was 0 in 2017. (Table 4.3)

Table 4. 3 *Major Health indicators and Vital statistics in in Woreda 6, 2015-2017*

S/n	Indicators	2015		2016		2017	
		Number	%	Number	%	Number	%
1.	Total population	26,207	100%	27,757	100%	29,308	100%
2.	Male	13,890	53	14,111	49%	14,361	49%
3.	Female	12,317	47	13646	51%	14,947	51%
4.	Under 1 years old	587	2.24%	599	2.24%	656	2.24%
5.	Under 5 years old	1,876	7.16%	1916	7.16%	2,098	7.16%
6.	Under 15yrs	6,282	23.97%	6,414	23.97%	7,025	23.97%
7.	Women 15- 49 years old	9,078	34.64%	9,269	34.64%	10,152	34.64%
8.	Expected Pregnancy	610	2.33%	623	2.33%	683	2.33%
9.	Urban population	26,207	100%	26,757	100%	29,308	100%
10.	Rural population	0	0%	0	0%	0	0%
11.	Total live births	197	0.75%	194	0.7%	417	1.4%
12.	Neonatal mortality Rate	2	1%	2	1%	0	0%
13.	Crude birth rate	8/1000	0.8%	7/1000	0.7%	14/1000	1.4%
14.	Crude death rate	No data					
15.	IMR	No data					
16.	Under 5 Mortality Rate	No data					

4.4.10. Maternal Health

Maternal Health is the health service which focuses on basic maternal health service indicators, i.e. Antenatal, delivery, postnatal care and Family Planning. In Addis Ketema Sub city Woreda 6 administration Maternal health service is being provided by one Governmental Health center and one Non-Governmental Health Organization (Marry-stopes).

Contraceptive acceptance rate (CAR)

CAR is proportion of women of reproductive age (15-49 years) who are not pregnant who are accepting a modern contraceptive method (new and repeat acceptors) [4]. In 2015 contraceptive acceptance rate of Woreda 6 was 27% and in 2016, it was about 67% while in in 2017 there were about 5,386 reproductive age women able to receive Family planning service. From this, any types of contraceptive acceptance rate of this Woreda accounts about 57% (Table 4.4).

Table 4. 4 ***Contraceptive services in Woreda 6 from the year of 2015- 2017***

Service year	Total population	Estimated number of reproductive age women (15yrs-49yrs) (34.64% of Total	Expected pregnancy (2.33% of total pop)	Total number of reproductive age women who are not pregnant*	Total number of reproductive age Women receive FP service (New +	Acceptance rate
2015	26,207	9,078	610	8,468	2,275	27%
2016	26,757	9,269	623	8,646	5,784	67%
2017	29,308	10,152	683	9,469	5,386	57%

* Total number of reproductive age women who are not pregnant = Total number of reproductive age women minus Expected pregnant women in the year. *Source: Felege Meles Health center*

On the other hands, in 2017, when we see the CAR by methods short term methods are mostly used accounting about 3643 (67.9%) among which oral contraceptives is the leading method followed by injectable types of method. Long term methods account about 1741 (32.4%) and permanent method accounts about 0.03%. In general, CAR of Woreda 6 is improved from 2015-2017 in the aspects of methods. Again, in this woreda even though it is not this much, there are reproductive age women who received permanent types of family planning methods. Fortunately, this type of family planning service was being provided by Marries Stopes International Ethiopia founds in this woreda (Figure 4.9).

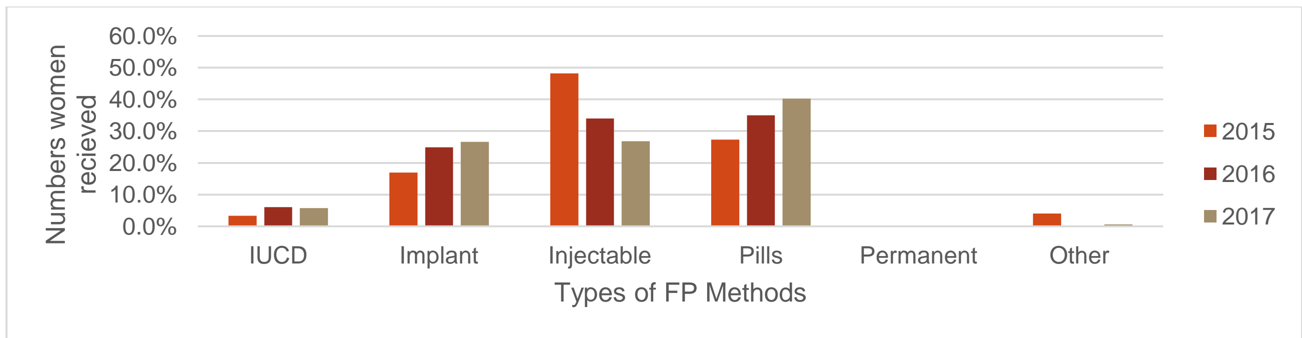


Figure 4. 9 Contraceptives services by types, 2015- 2017

Comparing the three years' trends of Contraceptives utilization in Woreda Six of Addis Ketema, long term acceptance rate was increased by 10% (from 20.6% in 2015 to 32.4% in 2017) (Figure 4.10).

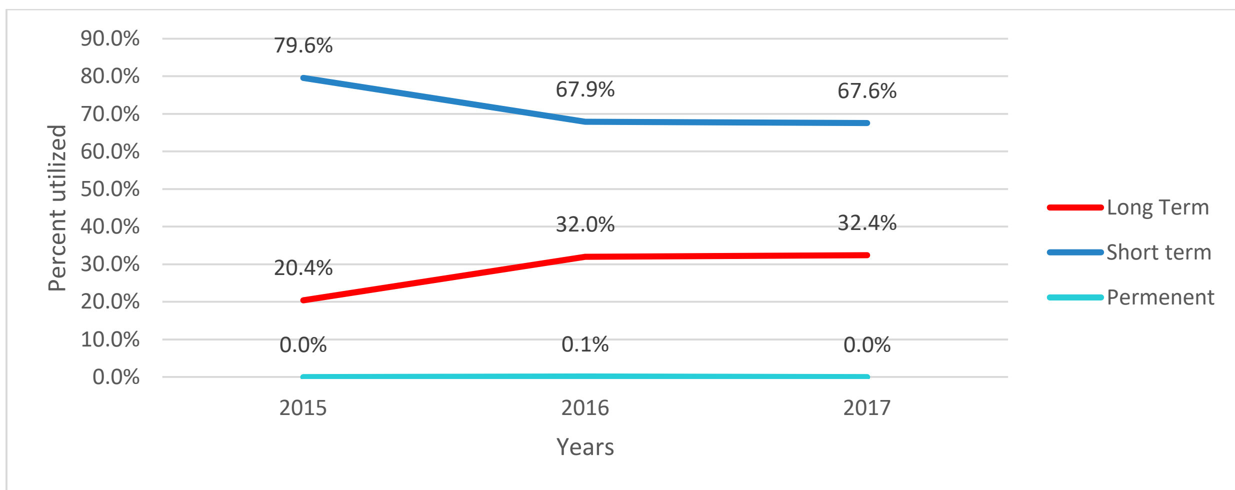


Figure 4. 10 Contraceptive acceptance rate by methods in 2015-2017

Antenatal care (ANC) coverage

To have healthy pregnancy and to save the life of mother and new born infant antenatal care is crucial. Starting from the early pregnancy time all mothers have to receive at least three time of checkup by skilled health profession. Accordingly, the Antenatal care coverage of Woreda six was assessed and it shows ANC1 >100% in 2015 and 2016 while it was about 96% in 2017. Among pregnant women those attends ANC1 about 37% in 2015, 40.5% in 2016 and 50.5% in 2017 of them was attended ANC4 (Table 4.5).

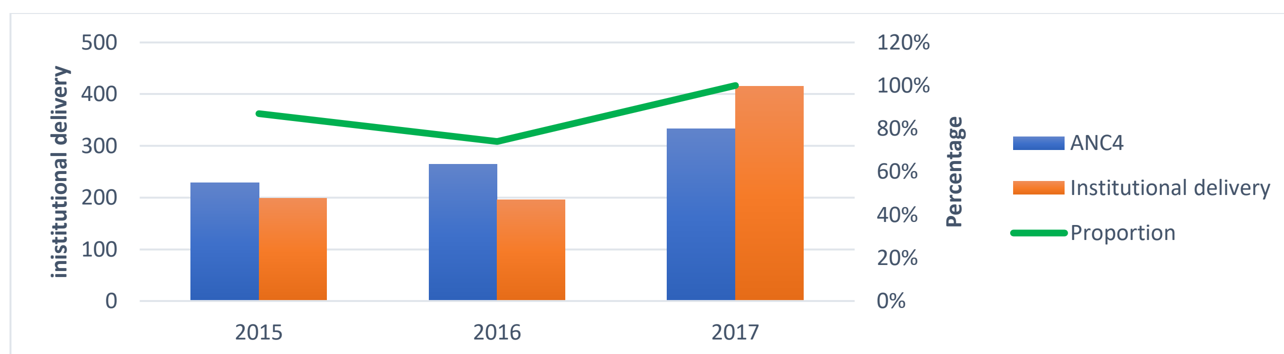
Table 4. 5 ANC 1 and ANC 4 coverages in Woreda 6, 2015-2017

Service Year	Total population	Expected pregnancy (2.33%) of total population	ANC1	ANC 1 coverage	ANC 4	ANC 4 Coverage
2015	26,207	610	613	>100%	229	37%
2016	26,757	623	652	>100	264	40.5%
2017	29,308	683	659	96%	333	50.5%

Source: - *Felege Meles Health center*

Deliveries attended by Skilled Health Attendant

It is a Proportion of deliveries attended by skilled health attendants (excluding trained or untrained traditional birth attendants) is sometimes called "supervised deliveries." A *skilled health attendant* [skilled birth attendant] is an accredited health professional – such as a midwife, doctor or nurse – who has been trained in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborns [4]. In Woreda 6 in the year of 2017, there were about 415 Institutional deliveries which is attended by skilled health professionals. It is more than those who attended ANC4 in this woreda with a possible reason that St. Paul hospital is performing Cesarean section in this Woreda in collaboration with Felege Meles Health center. Those women who give births by Cesarean section in this health center are sometimes referred from other woredas and be counted in this woreda (Figure 4.11).



Source: - Felege Meles Health center

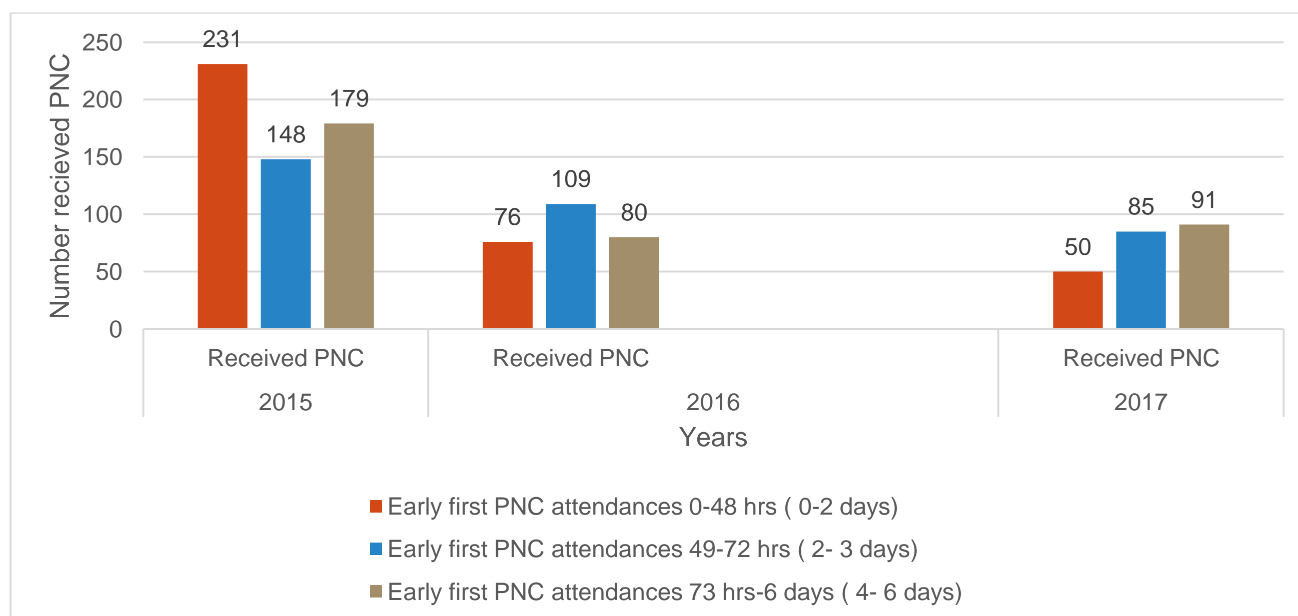
Figure 4. 11 *Proportion of Delivery attended by skilled birth attendants in Woreda 6, Addis Ketema, 2015-2017*

Institutional Maternal Death

Maternal death is stands for number of maternal deaths among all deliveries attended in the given institution. It is death of a woman from conditions caused by pregnancy, which occurs from time of conception to six weeks postpartum, but not from incidental or accidental causes. The cause of death could be direct – abortion, hemorrhage, hypertension, obstructed labor or sepsis; or could be indirect like heart disease aggravated by pregnancy, or malaria in pregnancy. In Woreda six Institutional delivery service is being given in Felege Meles Health center. Within three years back (2015-2017) there were no Institutional maternal death reported.

Postnatal care (PNC) coverage:

PNC coverage is Proportion of women who seek care, at least once during postpartum (within 42 days after delivery), from a skilled health attendant. Accordingly, in Addis Ketema sub city Woreda 6 the average post-natal care (PNC) coverage were 94% in 2015, 46% in 2016, and 18% in 2017. From this, the PNC coverage was decreasing through 2015 to 2017 (Figure 4.12)



Source: - Felege Meles Health center

Figure 4. 12 Post Natal coverage in Woreda 6, Addis Ketema sub city, Addis Ababa, 2015-2017

Stillbirth Rate

It is proportion of stillbirths from total births attended by skilled health attendants [4]. In Woreda 6 there were two still births in 2015, two still births in 2016 and one still births in 2017. When we see still birth rate through past three years in this Woreda it accounts 1% in 2015, 1% in 2016 and 0.2 % in 2017 (Figure 4.13).

Neonatal Death Rate

It is proportion of deaths within the first 28 days of life from total births attended by skilled health attendants in the facility. In 2015 there were about 197 live births ,194 live births in 2016 and 414 live births in 2017. Among live births there were 2 neonatal deaths in 2015, two deaths in 2016 and zero neonatal death in 2017. From this Neonatal death rate in Woreda 6 was 1%, 1%, Zero in 2015,2016 2017 respectively (Figure 4.13).

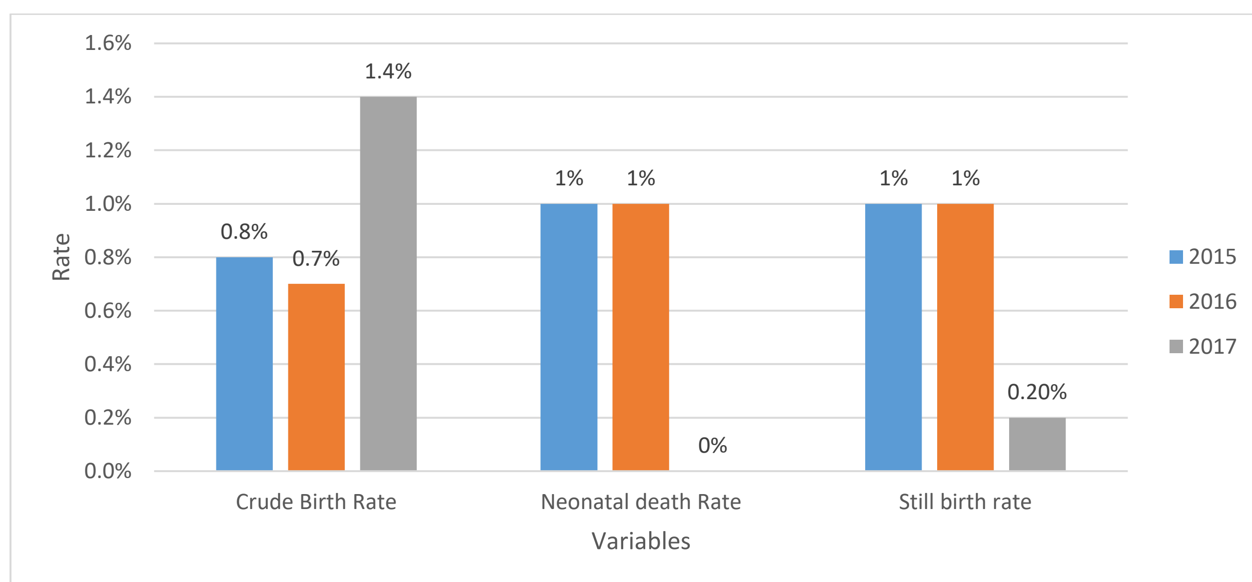


Figure 4. 13 CBR, Neonatal and still birth rate in Woreda 6, Addis Ketema Sub city, Addis Ababa, 2016-2017

4.4.11. Child Health

Child health is health service focused on children from neonatal age. Among these health services the main indicators which are going to be discussed in this writing are: -proportion of Low birth rate, proportion of Moderate or Severe malnutrition, protection at birth(PAB) against neonatal Tetanus, and Immunization coverage.

Nutritional assessment

Proportion of low birth weight (LBW) is percentage of live born babies who weigh less than 2500g. In Woreda 06 in 2015 there were about 8 (4%) of live births assessed to be underweight which decreased to 7 (3.6%) in 2016 & 10 (2.4%) in 2017 (Table 4.6)

Table 4. 6 *Number of live births, and under weight babies in Woreda six, 2015-2017*

Year	Number of live birth	# of underweight babies	Proportion
2015	197	8	4%
2016	194	7	3.6%
2017	414	10	2.4%

Source: - Felege Meles Health center

Proportion of moderate/severe malnutrition: percentage of weights reflecting moderate/severe malnutrition amongst weights-for-age recorded for children under 5 years of age. In Woreda 6 in 2017 there were about 5,497 under five children were assessed and measured for malnutrition among which about 17 (0.3%) were found to be moderately malnourished(MAM) and three children (0.05%) were found to be severely malnourished (SAM). When we compare this with the past two years the capacity of assessment in this woreda increases and malnutrition problem is decreased (Table 4.7).

Table 4. 7 *Proportion of moderate/severe malnutrition in 2015-2017*

Years	# of less 5yrs children measured	MAM	MAM%	SAM	SAM%
2015	3891	64	1.6%	9	0.2%
2016	5240	74	1.4%	15	0.3%
2017	5497	17	0.3%	3	0.1%

Source: - Felege Meles Health center

Key: - MAM: - Moderately Acute malnutrition, SAM: - Sever acute malnutrition

Immunization coverage

Immunization coverage is a proportion of surviving infants who vaccinated with different types of antigen. Among vaccination those have being given in Ethiopia the major indicators are Pentavalent one, Pentavalent three, BCG, Measles, number of infant whose mothers had protective doses of TT against NNT (at least TT2) and Fully immunization. These Immunization Services are being provided only in one Health center in woreda.

Pentavalent first dose(DPT1-HepB1-Hib1) immunization coverage: is proportion of surviving infants who receive a first dose of pentavalent vaccine before their first birth day. It is a vaccine type given to prevent against Diphtheria, Pertussis Tetanus toxoid, Hepatitis B, and Hemophilus influenza b. Accordingly, with in the past one year about 504 infants were vaccinated Pentavalent 1 which accounts pentavalent coverage of 74%. (Table 4.8)

Table 4. 8 *Immunization coverage in Woreda 6 in 2015-2017*

	Reporting Years	2015	2016	2017
	Survival Infant	612	623	683
BCG	# Vaccinated Children	460	437	430
	Coverage	75%	70%	63%
Penta 1	# Vaccinated Children	503	466	504
	Coverage	82%	75%	74%
Penta 3	# Vaccinated Children	493	494	489
	Coverage	81%	79%	72%
Measles	# Vaccinated Children	428	473	523
	Coverage	70%	76%	77%
Fully Immunized	# Vaccinated Children	428	473	521
	Coverage	70%	76%	76%

Protection at birth (PAB) against neonatal tetanus is proportion of infants who were protected from neonatal tetanus (NNT) at birth by the immunization of their mothers with tetanus toxoid (TT) before the birth. In 2017, among estimated live births during the year, 522 mothers of infants received at least two doses of TT before the birth. This shows the proportion of PAB accounts about 76% in Woreda 6 (Table 4.9).

Table 4. 9 *Coverage of protection at birth from Neonatal tetanus in woreda 6, 2015-2017*

Year	Estimated number of live birth during the year	Number of infants whose mother had protective doses of tetanus	PAB Coverage
2015	612	493	81%
2016	623	443	71%
2017	683	522	76%

4.4.12. Disease prevention and Control

Top 10 causes of morbidity

In Addis Ketema Sub city Woreda 6 administration acute upper respiratory infection 3531 (23.23%) followed by Disease of musculoskeletal system 1,798 (11.83%) and Dyspepsia 1523 (10.02%) are the top three causes of morbidity in adults' outpatient visit in 2017.

On the other hand, in the same year again acute respiratory tract infection 1,853 (45.6%), non-bloody diarrhea 809 (19.91%) and other or unspecified disease of the skin and sub cutaneous tissue 258 (6.35%) are the top three causes of morbidity in under five children Outpatient visit.

Table 4. 10 Top ten causes of morbidity in woreda six among adult and children population, Addis Ketema 2017

S/no	Adult (>5 year)	Number	%	Pediatrics (under 5 year)	Number	%
1	Acute Upper respiratory infection.	3299	23.43	Acute Upper respiratory infection.	1369	38.43
2	Diseases of Musclo- skeletal system and connective tissue	1797	12.76	Pneumonia	605	16.98
3	Dyspepsia	1573	11.17	Diarrhea(non-bloody)	599	16.82
4	Epidemic typhus	1406	9.98	Other or un specified disease of skin and sub cutaneous tissue	273	7.66
5	AFI	1288	9.15	AFI	220	6.18
6	HTN and related diseases	1159	8.23	Other or un specified infectious and parasitic disease	151	4.24
7	UTI	1101	7.82	Other or un specified disease of eyes and adnexa	116	3.26
8	Infections of skin & sub cutaneous tissue.	926	6.58	Other or un specified disease of digestive system	92	2.58
9	Other or un specified disease of eyes and adnexa	828	588	Otitis	75	2.11
10	Trauma (injury, fracture, etc)	705	5.01	Trauma (injury, fracture, etc)	62	1.74

In combination (Adult & Under five), acute upper respiratory infection is the leading cause of morbidity accounting 29.5% of total cases seen in outpatient followed by diarrhea 9.93% (Figure 4.14).

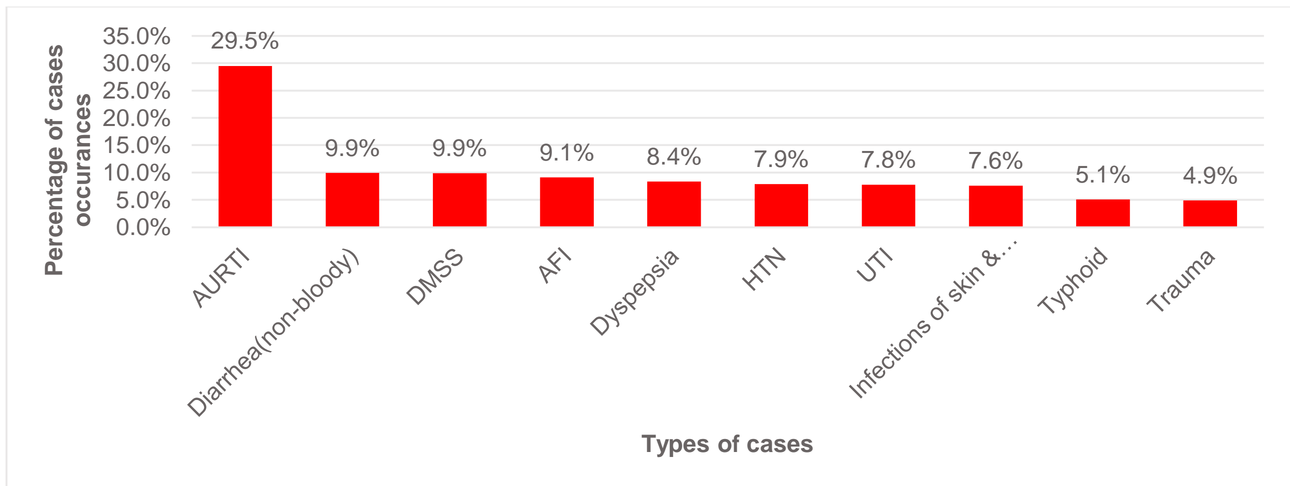


Figure 4. 14 ***Top ten causes of morbidity in all age, 2017***

Top 10 causes of Mortality

There was no information on mortality in the Woreda 6.

4.4.13. Communicable Disease

Malaria

Even though Addis Ababa is not malarias area, sometimes, because of it is market center, people come to this town from all direction. While this they may come after they infected by malaria and develops clinical features after they arrive in the town. Accordingly, in 2017, among 11 RDT done, there were about 4 confirmed malaria cases treated with prevalence rate of 1.4 per 10,000 populations in Woreda 6 all of which were tested plasmodium vivex positive. There were no admission and death from malaria in this Woreda (Figure 4.15).

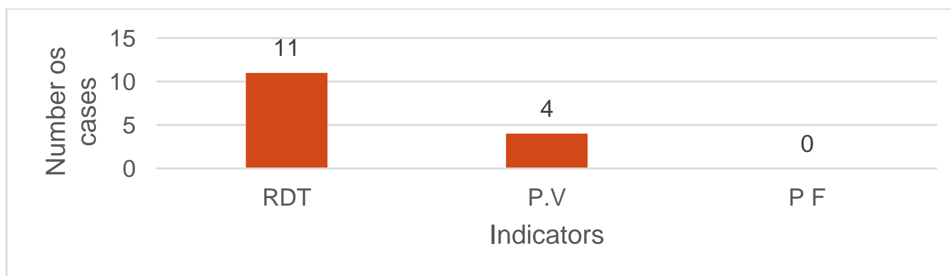


Figure 4. 15 Malaria cases seen in Woreda 6 by type, 2017

Tuberculosis and Leprosy

TB and Leprosy treatment service is being given by only one Health center (Felege Meles HC) in Woreda 6. This health center started TB and Leprosy treatment service in 2015. Since then there is no leprosy cases detected.

Tuberculosis case Detection and treatment rate

There are different measures (indicators) of TB services in a given area. In this writing *TB detection Rate, TB treatment success rate and TB treatment cure rate* were measured. According to data taken from Felege Meles Health Center, since this service is being provided only in this health center in Woreda, within the past two years and half, about 49 New bacteriologically confirmed PTB case were detected among which 20 in 2015, 15 in 2016, and 14 cases in 2017, about 61 New clinically diagnosed PTB were detected out of which 20 cases in 2015, 22 cases in 2016, and 16 cases in 2017, and about 80 Extra Pulmonary Tuberculosis cases were detected. Among EPTB, 32 cases were detected in 2015 while another 32 cases and 16 cases were detected in 2016 & 2017 respectively (Figure 4.16).

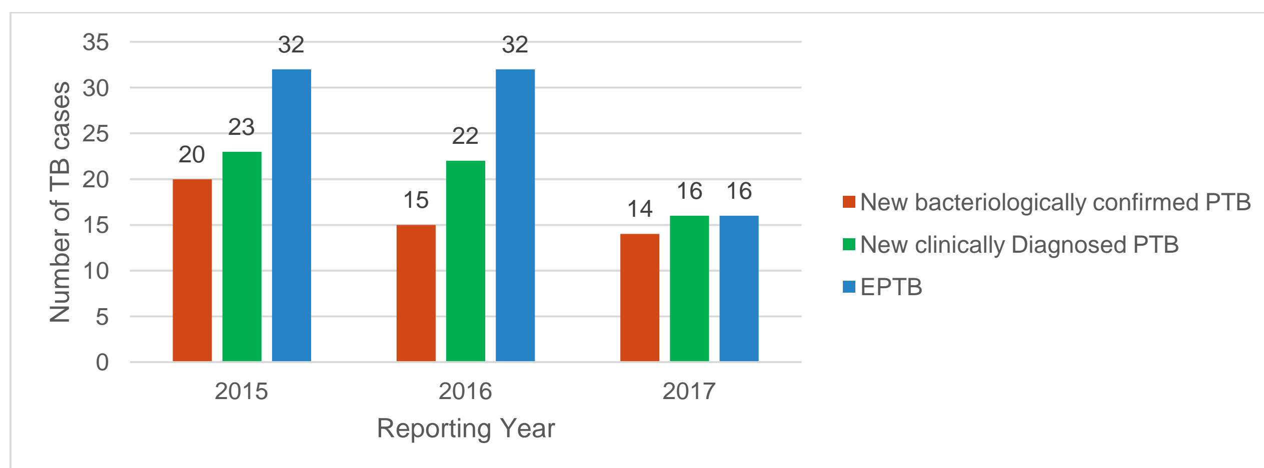


Figure 4. 16 *All forms Tuberculosis detected from the year of 2015 to 2017, Woreda 6*

TB case detection rate is number of new pulmonary and extra pulmonary (all forms) TB cases detected, among the TB cases estimated to occur countrywide.

$$\text{TB detection rate} = \frac{\text{All forms of TB detected during reporting period}}{\text{Estimated number of all new forms of TB cases}} \times 100$$

TB detection rate of woreda 6 was greater than 100% both in 2015 and 2016. In 2017 the annual estimated TB case (all type) was 66 cases per total population. In this Woreda about 46 all type of TB cases was detected. This accounts about 70% TB detection rate (Table 4.11).

Table 4. 11 Case Detection Rate of TB all forms in Woreda 6 by year, 2015-2017

Reporting Year	Total Population	AAR Estimated prevalence rate per 10,000	Woreda 6 Estimated number of new TB cases	Number of TB cases detected (all forms)	Expected TB detection rate	Case Detection Rate	Prevalence per 10,000
2015	26,207	21.1	55	75	26%	>100%	29
2016	26,757	19.2	51	69	66%	>100%	26
2017	29,308	22.4	66	46	66%	70%	16

AAR= Addis Ababa region

As shown below, when we compare the prevalence of TB cases separately, even though the prevalence of all types of TB cases become decreasing among the three types shown in the following graphs, EPTB has higher prevalence than other except in 2017 in which it is equally prevalent as clinically diagnosed PTB (Smear negative PTB) (Figure 4.17).

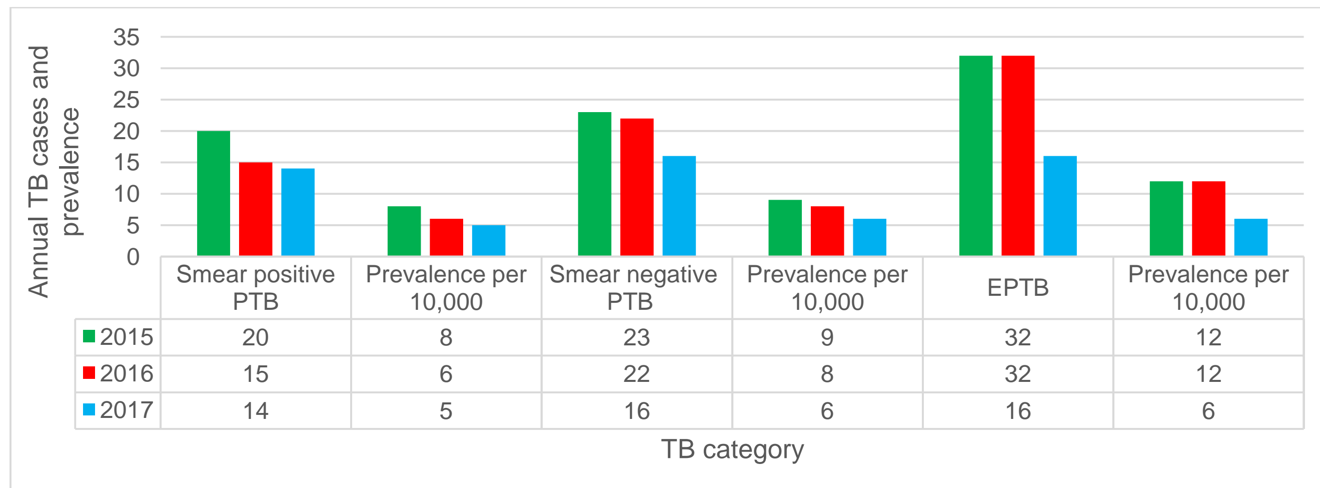


Figure 4. 17 TB prevalence according to TB Category in Woreda 6 ,2015 -2017

When we see the prevalence of all types of TB in this Woreda, it accounts about 29/10,000 in 2015 EFY, 26/10,000 in 2016 and 16/10,000 in 2017. From this we observe that there were decreasing of TB cases among all categories of TB in woreda (Figure 4.18).

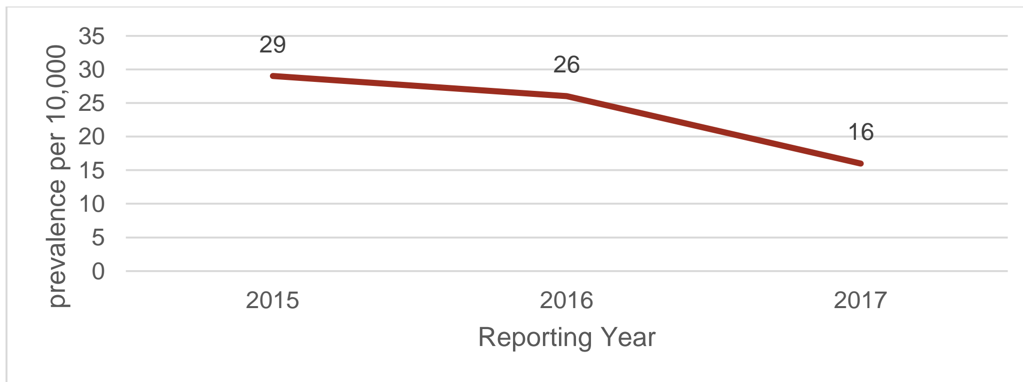


Figure 4. 18 TB (all type) prevalence in Addis Ketema Sub city Woreda 6, 2015 – 2017

When we see the prevalence of TB by sex, it is highly prevalent among Male population than Female population which is about 19/10,000 among male and 13/10,000 among Female population (Figure 4.19).

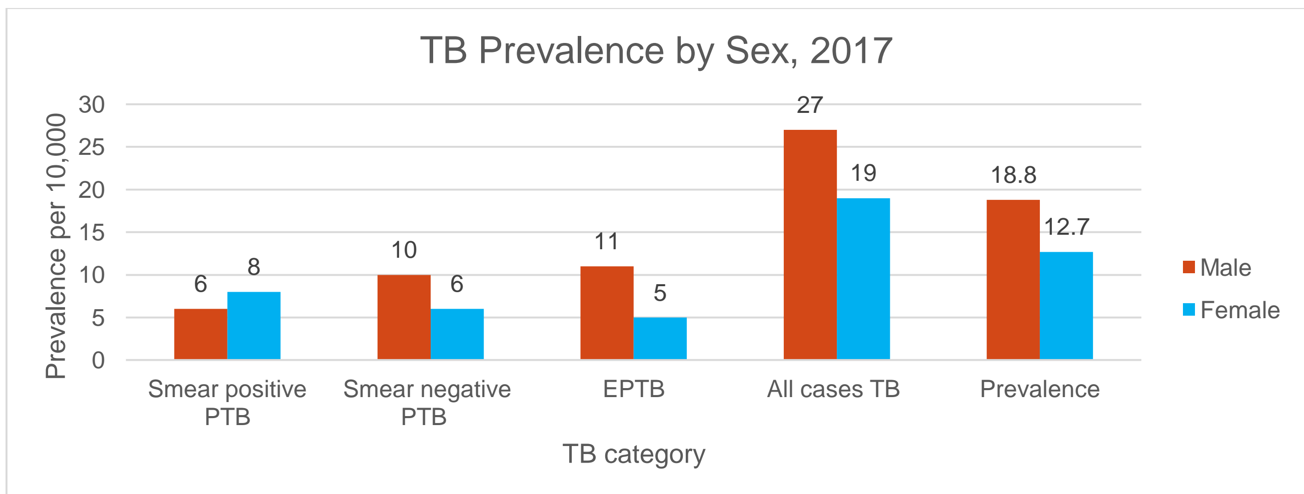


Figure 4. 19 TB case distribution by sex in Woreda 6, Addis Ketema sub city, 2017

The other indicators of Tuberculosis status in a given area/ country/district are *TB treatment success rate and TB cure rate.*

TB treatment success rate is a percentage of a cohort of new TB cases registered in a specified period that successfully completed treatment. Successful completion entails clinical success with or without bacteriological evidence of cure.

TB Rx Success Rate (all type) = <u>*Complete TB Rx successfully after 6 months of enrollment*</u> *X 100*

New TB cases (all type) Enrolled 6-month back

In Addis Ketema Sub city Woreda 6 the overall (all types TB in one) TB treatment success rate in 2015 was 91% which is decreased to 89% in 2016. When we see TB treatment success rate in 2017 it shows about 98% which is better than 2016 (Table 4.12).

Table 4. 12 ***Tuberculosis treatment success rate in Addis Ketema sub city Woreda 6, 2015-2017***

Reporting Year	Total Number of New TB (all type) patient enrolled in the cohort	Number of TB Patients complete treatment successfully in the year	Expected TB success rate	TB success Rate
2015	45	41	42%	91%
2016	65	58	63%	89%
2017	46	45	63%	98%

TB treatment cure rate: is percentage of a cohort of new smear-positive TB cases registered in a specified period that was cured as demonstrated by bacteriologic evidence (a negative sputum smear result recorded during the last month of treatment and on at least on one previous occasion during treatment).

$$\text{TB Rx Cure Rate} = \frac{\text{Smear negative after treatment in a cohort}}{\text{New smear positive in the specified cohort}} \times 100$$

In Addis Ketema Sub city Woreda 6 the last three-year TB treatment cure rate was decreasing from 100% in 2015 to 78.6% in 2017 (Table 4.13).

Table 4. 13 ***Tuberculosis cure rate in Addis Ketema Sub city Woreda 6 ,2015–2017***

Reporting Year	Number of New smear positive patient enrolled in the year	Number of TB Patients tested smear Negative after treatment in the year	Expected cure rate	TB cure rate
2015	11	11	-	100%
2016	13	11	-	84.6%
2017	14	11	63%	78.6%

Source: - Felege Meles Health center.

TB case detection through community TB care

In TB prevention, the participation of community plays a great role. Urban Health extension works are a focused man power in Ethiopia to screen the community home to home for different health events. In this woreda as it will be discussed in this writing latter, there are HEW who are actively working in this woreda. But when we see the number of TB cases detected in community and referred to Health facility through HEW, it is not as good as expected (Table 4.14).

Table 4. 14 *TB case detection through community TB care, Woreda 6, 2015-2017*

S/n	Indicators	2015	2016	2017
1	Number of notified TB cases (all forms) referred by the community	0	1	0
2	Total number of TB cases (all forms) diagnosed during the same period	45	65	46
3	TB cases (all forms) provided treatment observation (DOT) by community	0	0	0
4	Total number of cohort TB cases (all forms) registered during the same cohort period in the facility	45	65	46

Tuberculosis Treatment Out comes

Tuberculosis treatment always ends with either of the following results. The patient may complete treatment success fully and weather he/she cure or not, or ends with death, or the patients may have lost from follow up or after successful treatment there may be treatment failure or the tuberculosis may resist all drugs and the client may have transferred to MDR TB treatment. In this woreda this all outcomes were assessed retrospectively starting from 2015 and it shows in general death rate is higher in smear negative PTB patients followed by smear positive and EPTB patients. Most of the patients' status ends with successful treatment cure. There are very few patients lost from follow up. Within the last three years there were no MDR TB cases in Woreda 6 (Figures 4.20)

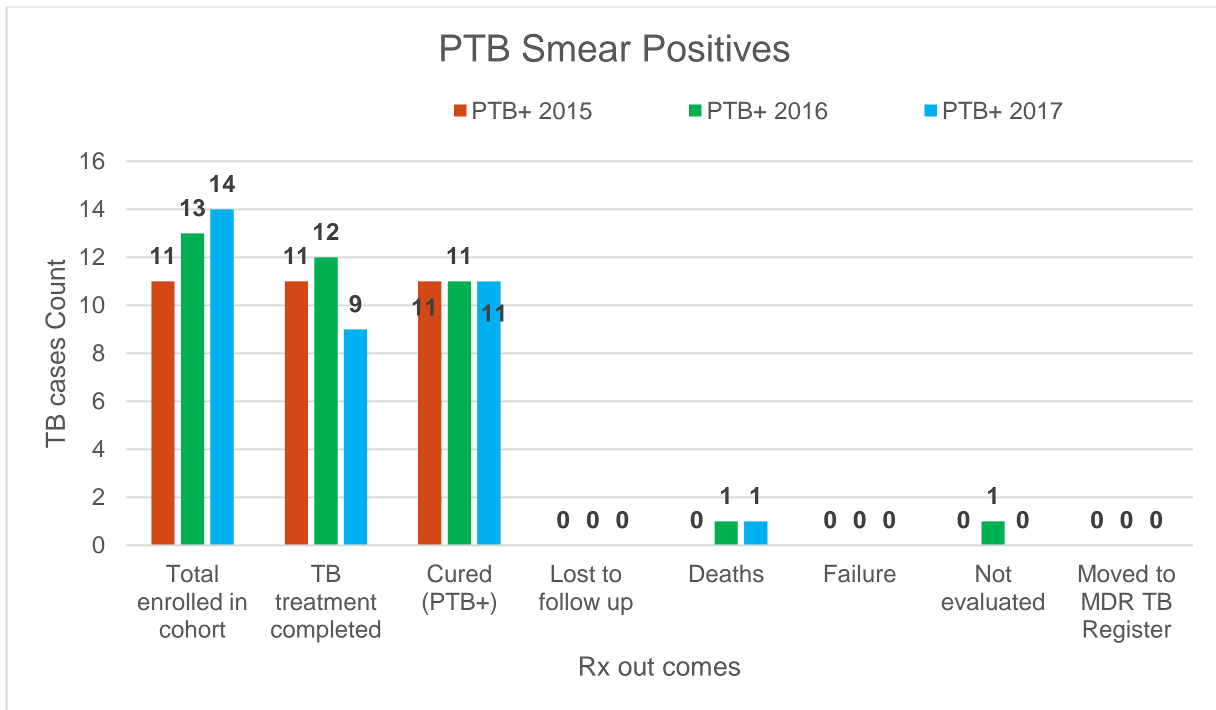


Figure 4. 20 Treatment out comes for Smear positive PTB patients in woreda 6, 2015-2017

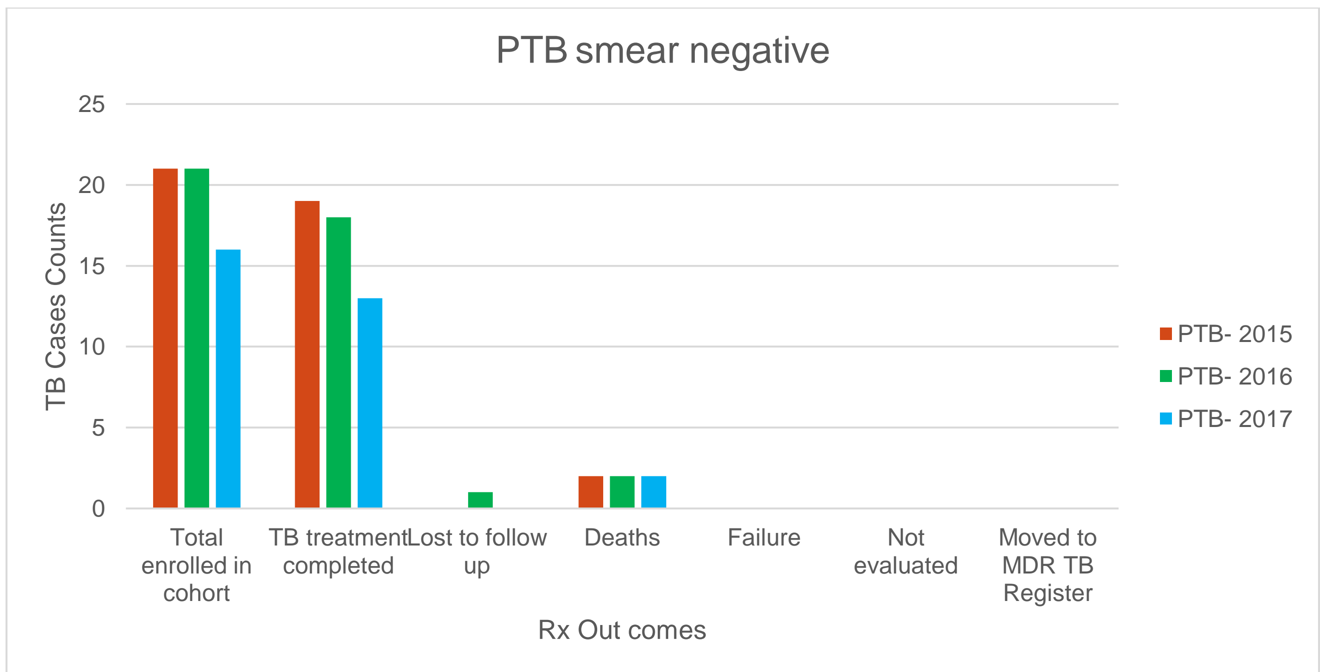


Figure 4. 21 *Treatment out comes for Smear Negative PTB patients in woreda 6, 2015-2017*

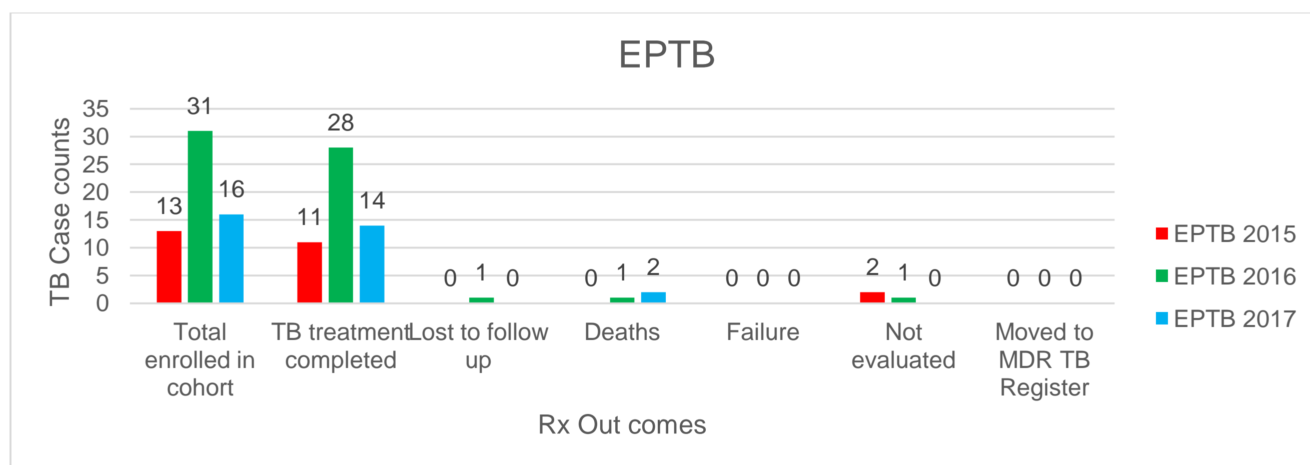


Figure 4. 22 ***Treatment out comes for EPTB patients in woreda 6, 2015-2017***

TB/HIV

TB/HIV is one health indicators which is given for weather HIV positive patient or TB patients. It is classified in to two.

- HIV screening for TB patients
- TB screening for HIV positive patients

In Addis Ketema Sub city woreda 6 Health delivery, there were about 45 TB patients tested for HIV in 2015 among which 28 were Male and 27 were Female. Of tested, 16 (35.5%) of them were tested HIV positive. In 2016, also about 65 TB patients were tested for HIV (32 Male and 33 Female) and 12 (18%) of them found HIV positive while in 2017 there were about 46 TB patients tested for HIV and 17 (37%) of them tested HIV Positive (Table 4.15).

Table 4. 15 Proportion of HIV screening for TB patients Enrolled to TB clinic in Felege Meles Health center, 2015- 2017

Year	HIV screening for TB patients								
	2015			2016			2017		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Total TB patient enrolled to DOTs	28	27	45	32	33	65	28	18	46
Enrolled TB case and Tested for HIV	28	27	45	32	33	65	28	18	46
TB patient tested HIV positive	10	6	16	5	7	12	8	9	17
Screening rate	100%	100%	100%	100%	100%	100%	100%	100%	100%
HIV Prevalence rate among TB patients	35%	22%	35.5%	15.6%	21%	18%	28.5%	50%	37%

As stated above, TB, TB/HIV and HIV service is being provided in Felege Meles Health Center in woreda 6 and even though TB treatment service is started from the very beginning of the Health center begins other health delivery service, HIV treatment service was started in 2016. Therefore, TB screening for HIV patient is zero in 2015. In 2016, there were about 98 HIV positive patients screened for TB among which about 11% found to have active TB while in 2017 about 110 HIV patients were screened and 20 (18%) of them were found to have active TB (Table 4.16).

Table 4. 16 ***Proportion of TB screening for HIV patients Enrolled to ART clinic in Felege Meles Health center, 2015- 2017***

Year	**TB screening for HIV patients**								
	2015			2016			2017		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Enrolled HIV patient case and screened for TB				30	68	98	35	75	110
Found to have active TB				3	8	11	8	12	20
TB prevalence among HIV patients				10%	12%	11%	22.8%	16%	18%

Source: Felege Meles Health center

HIV/AIDS

HIV testing and counseling(HCT)

HIV/AIDS testing is other health indicators that is done in different health service delivery site whether by voluntary initiated counseling and testing or by provider initiated testing and counseling. In 2017 about 1,268 Male and 1,818 Females were tested of which 30 Male and 34 Female found to be HIV positives (Table 4.17).

Table 4. 17 HCT Coverage and positivity rate in woreda 6 by sex, 2015-2017

Activity	2015			2016			2017		
	M	F	Total	M	F	Total	M	F	Total
Number of individuals who have been tested for HIV (VCT + PICT)	385	576	961	37	1060	1097	1,268	1,818	3,086
Clients testing positive for HIV	9	14	23	2	13	15	30	34	64
Sero prevalence rate	2.3%	2.4%	2.4%	5.4%	1.2%	1.4%	2.4%	1.9%	2%

Anti-retroviral Therapy

Anti-retroviral therapy is given only in Felege Meles Health center in woreda 6 and was started in 2016. Since then about 43 patients were started ART among which 40 of them are adult and 3 are less than 15 yrs. old children. At the end of 2017 there were about 110 (35 Male and 75 Female) HIV positive clients are actively following their medication (Table 4.18).

Table 4. 18 HIV status in Addis Ketema Sub city Woreda 6, 2015 – 2017

Indicators	Age	2015*			2016			2017		
		M	F	Total	M	F	Total	M	F	Total
Newly Enrolled	0-4yrs				0	0	0	0	0	0
	5-14yrs				3	1	4	0	0	0
	>15yrs				6	15	21	13	20	33
	Total				9	16	25	13	20	33
Ever started	0-4yrs				0	0	0	0	0	0
	5-14yrs				1	2	3	1	2	3
	>15yrs				5	15	20	21	77	98
	Total				6	17	23	22	79	101
Currently on ART	0-4yrs				0	0	0	0	0	0
	5-14yrs				1	0	1	1	1	2
	>15yrs				12	25	37	34	74	108
	Total				13	25	38	35	75	110

**HIV service was not started in 2015 in this Woreda*

PMTCT

In Addis Ketema sub city like the other HIV related service, PMTCT service is being provided only in Felege Meles Health center. Accordingly, in 2015 about 513 pregnant women were tested for HIV and among them about 13 of them were found to be HIV positive. Of those tested HIV in this year only six of them were started ART. In 2016 about 512 pregnant women were tested among which 7 of them were found to be positive and 6 of them were started on ART while in 2017 there were 667 pregnant women tested among which 10 of them were positive and all started on ART (Option B+).

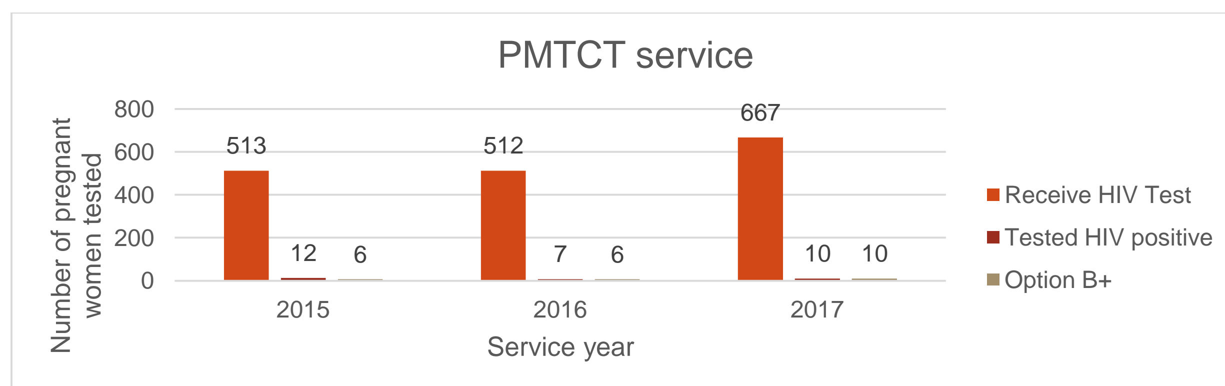


Figure 4. 23 PMTCT and Option B^{+} service in Addis Ketema Sub-city Woreda 6, 2015 -2017

The proportion of HIV Positivity among pregnant women were 2.5% in 2015, 2% in 2016 and 1.5% in 2017. The highest percent of HIV positive Pregnant women is started on ART based on Option B^{+} in 2017 which is 100% of them, while in 2015 it was 50% and in 2016 it was 18% the lowest (Table 4.20).

***Table 4. 19** PMTCT services in Woreda 6, 2015 to 2017*

Indicators	2015	2016	2017
Percentage of pregnant and lactating women who were tested for HIV and who know their results	513	512	667
Number of women tested positive for HIV	12	7	10
Number of HIV Positive pregnant and lactating women who received ART at ANC+L&D+PNC for the first time based on option B+.	6	6	10
Proportion of positivity	2.3%	1.4%	1.5%
Percentage started ART	50%	85.7%	100%

4.4.14. Integrated Disease Surveillance Report(IDSR)

There were two Health facilities expected to report Daily and weekly reportable disease in this woreda. Accordingly, Disease under surveillance are regularly reported to sub city from one Governmental Health center and from one private clinic. In the reporting, Year of 2017 there were about four confirmed malaria cases, 51 dysentery cases (Prevalence = 1.7 per 1000population) and 657 (Prevalence = 22/1000 population) typhoid and 518 (prevalence = 18/1000 population) Typhus cases were reported among weekly reportable disease (Table 4.21).

Table 4. 20 ***Weekly reportable disease in Addis Ketema Sub city, Woreda 6, 2017***

Weakly Reportable		Number Reported
Malaria	RDT	11
	P. V	4
	P F	0
Meningitis		0
Dysentery		51
Typhoid Fever		657
Relapsing Fever		2
Epidemic Typhus		518
SAM		1

Among daily reportable disease, other than Acute Watery Diarrhea outbreak which was about 76 (AR = 2.5/1000 population) cases reported and Two measles cases, there were no cases reported (Table 4.22).

Table 4. 21 Immediately Reportable Disease in in Addis Ketema Sub city, Woreda 6, 2017

Diseases	Number of reported	Diseases	Number of reported
Acute Flaccid paralysis	0	Pandemic Influenza	0
Anthrax	0	Rabies	0
Cholera(AWD)	76	MDSR	0
Dracunculiasis (Guinea Worm)	0	SARS	0
Avian Human Influenza	0	Small Pox	0
Measles	2	Viral Heamorogic Fever	0
Neonatal Tetanus	0	Yellow Fever	0

4.4.15. Hygiene and Environmental Health

Latrine coverage

The latrine coverage of Addis Ketema Sub city Woreda 6 is estimated to be about 97% among which 80% of them are using community latrine and only about 17% of the population have their own toilet. Still there are 3% of populations who have no access to latrine (Figure 4.23).

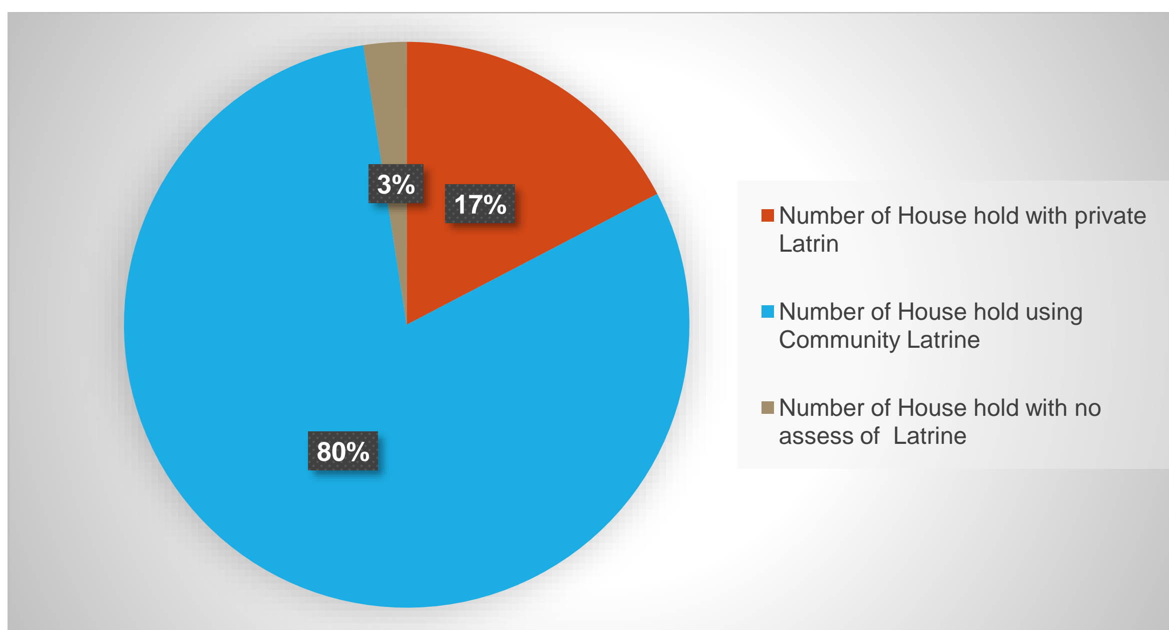


Figure 4. 24 Latrine coverage in Addis Ketema Sub city Woreda 6, 2017

Waste management (Solid & Liquid).

Hygiene and environmental Health has a great impact on Human health. Our environment may be contaminated in different ways. If these contaminants are not managed timely, it may disturb human health. In Addis Ketema Sub-city Woreda 6 administration environmental contaminants are dispelled in two ways. Solid wastes are avoided by Woreda employed staffs for this purpose. According to information from Woreda municipal under the office of the municipal, there are about 20 road cleaners (19 females and 1 male) and 4 locally organized groups under which there are about 12 members for each group a total of 48 (5 Male and 43 Female), house to house Solid waste collectors. These solid wastes are collected in to specific area and it is transported to city solid waste disposal area by vehicles. The second types of environmental contaminants are liquid waste. This type of waste is such as toilet, road side sewerage, and different liquid produced at home. Toilet waste is managed by the city's water and sewage authority. This authorized body

collect the waste from each toilet by vehicles and dispose it when the community informs them. There is no clear data regarding the schedule, and how quickly they collect this wastes after the community inform them. The road side waste management is a concern of road and construction authority and regarding this there is no data. But from the woreda health office information, in this woreda, there is some road side sewerage system management.

4.4.16. Budget allocation for health

The main source of budget for Health expenditure in Addis Ketema sub city Woreda 6 is a budget that is allocated from Ethiopian Government. In 2017 about 33.6% of total Woreda's budget was allocated for health sector. (Figure 4.24)

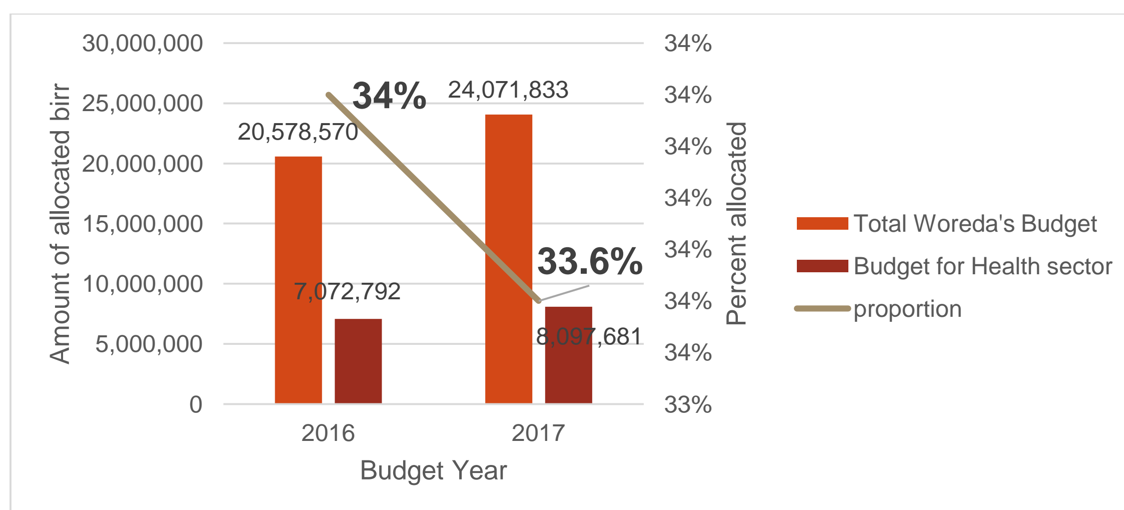


Figure 4. 25 Woreda's Budget allocation for health, 2016 -2017

4.4.17. Human Resources

There is a total of 142 staffs working in government health facilities and two private clinics (no data about others private clinic human resource) in which all health facilities were staffed with all types of professionals and each facility communicate with Woreda health office. When we see the ratio of Health worker to population in this Woreda one health officer is suspected to give serves for about 2,254 and one BSC or Clinical Nurse is suspected to serve about 792 people (Table 4.23).

Table 4. 22 *Man power of district health office and health facility in 2017*

S/no	Type	Number		Total	HW: Population Ratio (Total Pop. 29,308)	Remark
		M	F			
	Physician	-	-	-		
	Health officer	7	6	13	1: 2254	
3	Laboratory technician/technologist	4	2	6	1: 4885	
4	Pharmacy technician/pharmacist	4	2	6	1: 4885	
	Nurse (BSC & clinical)	13	24	37	1: 792	
6	Midwife (degree & Diploma)	4	6	10	1 :2931	
7	Radiologists	-	-	-	-	
8	Sanitarian	-	17	17	-	In health center
9	UHEWs	0	12	12	1: 2442	
10	Other health workers	-	-			
11	Supportive staffs.	15	26	41	-	

4.4.18. Disaster situation in the woreda

In Addis Ketema Sub city Woreda 6 administration with in the last year there were no any Disaster (natural & Man made). But, as other sub city Woreda in Addis Ababa, starting from June 2016 up to September in this budget year, Acute Watery Diarrhea (AWD) was occurred which affects about 76 people (32 Female and 44 male). It was controlled by integrated intervention from all health prevention aspects.

4.5. DISCUSSION

Health center is One of the satellite facility in the primary Health Care Unit which provides both preventive and curative out and in-patient service, and designed to serve 25,000 populations in rural area and 40,000 in urban area according to the new health policy (FMOH policy). Woreda 6 administration has one Health center which is serving Woredas population which accounts less than 30,000. This is below the recommendation of FMOH which may be a good opportunity to give quality service for community.

Through the year 2016- 2017 the crude birth rate is increasing which may urge the improving of contraceptives acceptance rate which is decreased from 67% in 2016 to 57% in 2017. Even though the overall CAR of the woreda was decreased in contrast long-term contraceptive acceptance rate shows slight increments. IUCD acceptance rate was increased from 3.4% to 5.75%, Implant from 17% to 26.6% through 2015 to 2017. This may be lower for IUCD and higher for Implant when compared to 2008 EFY EDHS report of Addis Ababa CAR which was 8.5% for IUCD and 14.1% for Implant. The cumulative CAR of Woreda 6 in 2017 (56%) is higher than the last year EDHS report in case of Addis Ababa which was about 56%.

One of the Ethiopian MDG goal is decreasing maternal and child mortality and morbidity rate by increasing ANC coverage and institutional delivery. But ANC1 coverage in this woreda was decreased from 100% in 2015 to 96% in 2017, and Institutional delivery increased from 87% in 2015 to 100% in 2017. In the same manner equivalent to ANC and Institutional delivery, Postnatal care has a great role in reducing Infant and Maternal death and this also decreased from 94% in 2015 to 18% in 2017. This is not good indicator according to MDG goals and it needs further intervention to improve Institutional delivery and PNC.

The other child health indicator is Vaccination against vaccine preventable disease. Currently in our country there are around 10 types of vaccines being provided fee free for all children. Compared to EDHS report in 2016 in the case of Addis Ababa, vaccination coverage in woreda 6 is very low which ranges from 63% for BCG (94.6% in 2016 as EDHS) to 76.5% for Measles. Therefore, to decrease child morbidity and mortality rate, early prevention of disease is mandatory & thus it needs great efforts to increasing the coverage of Vaccine in woreda 6.

On the other hand, in Woreda 6, AURTI is the leading cause of morbidity both in pediatrics and adults through the last three years accounting 28.1%, 28.44%, 29.5% of the top 10 cause of morbidity respectively. Most of the time this case is claimed to be a result of crowded living condition and poor environmental sanitation specially sewerage system. Hence, this issue also needs intervention to decrease the problem. In addition to this, the prevalence of TB in this woreda was high in 2015 and 2016 compared to Addis Ababa prevalence which was 290/100,00, and 260/100,000 in this Woreda respectively while it was 211/100,000 and 192/100,000 Addis Ababa respectively. But in 2017 the prevalence of TB in this woreda is much less than Addis Ababa TB prevalence which was 160/100,000 in woreda 6 and 224/100,000 in Addis Ababa. This may be

not only because of decreasing of TB cases in Woreda but it also be because of low TB detection rate in Woreda. (annual Addis Ababa plan).

TB detection is a tool that plays a great role to decrease TB prevalence by increasing early initiation of TB treatment and in such a way that enables us to decrease TB transmission. In 2015 the national TB detection rate was about 67.3% and in 2017 it is targeted to scale up TB detection rate to 100%. But when we see TB detection rate of Woreda 6 in 2017 it was about 70% which is more than the 2015 performance and less than 2017 national target.

Nutritional assessment and support is being done in Woreda 6 and proportion of underweight babies is found to be low when compared to the previous year. The proportion of Moderate and Severe acute malnutrition is also decreasing in the past three years.

Finally, when we come to HIV status in the Woreda, the prevalence is increasing from 2015 to 2017 and HIV testing rate is higher among female which is 59% and this aligns with annual performance report of Ethiopian in 2016.

4.6. LIMITATIONS

- There were no vital statistics registration and to calculate the crude mortality rate, Infant mortality rate, and under five mortality rate there were no information.
- Most of the information was collected from One health center which is corresponded to all Woredas, Except Marry stops International clinic other private clinic did not contribute any health information.

4.7. CONCLUSION

- Multi sectorial Emergency response team is established in woreda level.
- URTI is the leading cause of morbidity among children and adult population in Woreda 6
- The crude birth rate of the woreda is increasing from 2015 to 2017
- The overall Contraceptive Acceptance Rate was declined in 2017, but there was some improvement in Long term method.
- The vital health service such as HIV testing and Treating, TB treatment, maternal health service (ANC, Delivery, PNC, PMTCT) and Immunization services are limited to one health center.
- There were poor liquid waste managements in Woreda

4.8. PROBLEM IDENTIFIED

Table 4. 23 Problem Identified and prioritized

S/N	Identified Problems	Relevance	Availability of information	Urgency of the problem	Feasibility	Political acceptance	Applicability	Ethical acceptability	Total	Rank
1	Poor sewerage system	3	2	3	2	3	3	3	19	1
2	Poor waste management	2	2	3	2	3	3	3	18	2
3	Low latrine coverage	2	2	2	2	3	2	3	16	3
4	Over crowdedness	2	2	2	1	2	2	2	13	4

Key: - Each indicator was graded out of three

4.9. RECOMMENDATION

- Depending on the above result & conclusion the following recommendations are stated.
- Social mobilization using different media may help to increase awareness of society about vital health indicators such as maternal health, child health, and environmental sanitation
- Expanding health services of HIV testing and treatment and TB screening and treating service to other private health facilities.
- Health education for mothers to attend ANC, PNC, and give births in health institute.
- Improving sewerage system and liquid waste management system which is highly affects human health.

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CHAPTER V DISASTER SITUATION ASSESSMENT

Meher/Karma Health and Nutritional Need assessment in Afar Region Ethiopia, 2017

ABSTRACT

Introduction**:** The Human health and nutrition need assessment is conducted twice in a year following harvesting seasons (Belg and Meher). On the assessments both government and nongovernmental organizations have been participated. The Meher/Karma 2017 assessment was aimed to assess the existing health and health related emergency events in Afar region and develop emergency response plans which covers the period from January to June 2018.

Methods**:** Nineteen Woredas was selected purposively by regional government. Semi structured check lists were used to collect primary and secondary data. PHEM officers, Nutrition officers and Emergency risk management officers were interviewed. Some areas of works were directly observed and community group discussion was conducted. All health and health related event was included in assessment.

Result**:** Non-bloody diarrhea and pneumonia were the first leading cause of morbidity in under five and above five populations respectively. In the last six months AWD outbreak was reported from 58% of assessed woreda with an average attack rate of 10 per 10,000 and CFR of 1.7%. The average incidence rate of Malaria in the woredas was about 22 per 1000 and many malaria risk factors was identified. About 2,096HHs were affected by Flooding in Meher season.

Nutritional screening modality in all assessed woreda is EOS and in patient nutritional treatment is being provided in 52 health facilities and outpatient service in 250 health facilities. The cure rate of the of all assessed woredas was above 75%, which is within acceptable range of CMAM performance.

Conclusion and Recommendation**:** Within the next coming six months Malaria AWD are prone to be occur as outbreak due to presence of many risk factors in assessed woredas. We recommended close follow up and further risk identification for early intervention for both malaria and AWD.

Key: Words: Meher Assessment, Health, Nutrition, Afar region, 2017

Word Count: 289

5.1. INTRODUCTION

Humanitarian need assessment/community risk assessment is a participatory process for assessing hazards, vulnerabilities, risks, ability to cope, preparing coping strategies and finally preparing a risk reduction options implementation plan by the local community. Humanitarian need assessments use scientific information and predictions and participatory debates to identify, analyze and evaluate risk environment of a particular community, reach consensus amongst the community on actions that are needed to manage the risks [1].

Good assessment practice is about having enough relevant information in order to make sound analysis and judgment. The data then informs decision-making in relation to four main questions: whether to intervene; the nature and scale of the intervention; prioritization and allocation of resource; and program design and planning. Formal needs assessments may also aim to force a decision by others, to influence the nature of others' decisions, or to verify or justify decision already taken. Humanitarian need assessment is a way of achieving a more consistent and accurate picture of the scale and nature of the problems people actually face in humanitarian crises, and how to ensure that decisions about response are properly informed by that understanding [2].

The government of Ethiopia has been conducting emergency health and nutrition assessment in the past years to address the emergency health and nutrition need of the country. Since the country is vulnerable to be exposed to potential natural disasters like floods and resulting displacement of population and related health and social problems with various degree of impact on the health sector the federal government has been allocating considerable resources to the response to Public Health Emergencies: from epidemics of diseases to widespread malnutrition resulting from drought.

The assessment is conducted twice in a year following harvesting seasons (Belg and Meher) and lead by Federal Disaster Response Management and Food Security Coordination Office. On the assessments both government and nongovernmental organizations were participated. During the assessment possible human health and nutrition risks were identified and numbers of beneficiaries were estimated. Finally using the results of the assessment humanitarian document developed and distributed to all partners to fill the gaps identified to avert and minimize public health consequences.

Significance of the study

Ethiopia is one of resource poor countries in which early identifying and instituting prevention activities are crucial strategies to respond to public health emergencies. Following the Meher rain fall, malaria outbreak is expected in many part of Ethiopia because of the suitable conditions formed for mosquito breeding. On the other hand, since Ethiopia is in meningitis belt the outbreak of meningitis is also suspected during the dry seasons. Not only this, but also internal displacement due to drought and flooding left too many Ethiopian populations vulnerable for diarrheal diseases, measles, severe acute malnutrition and the like from year to year. Shortage of drinking water during dry season is the major contributing risk factors for the occurrence of acute watery diarrhea across the country and due to topographic and climatic condition, afar region is the one which is prone to aforementioned health events.

Therefore, early vulnerability assessment and providing necessary resource for at risk population is very important to minimize loss of health budget, school drop rate, and production power due to health consequence of natural and manmade disasters and epidemic diseases. Hence, this assessment is very important to identify areas where emergency assistance (health & nutrition) might be needed due to acute problems and come up with reasonable estimates of the size of the population needing emergency assistance for the upcoming Six-month period. The result could also help interested researchers as a reference.

5.2. OBJECTIVE

5.2.1. General Objectives

- To assess the existing health and health related emergency events in Afar region and develop emergency response plans which covers the period from January to June 2018.

5.2.2. Specific Objectives

- To assess the likelihood of the occurrence of different health and nutrition emergency situations
- To identify at risk and most vulnerable population.
- To assess the existing capacity of the Woredas/zones and their future needs to address predicted health nutrition emergencies likely to occur in their respective areas.
- To develop emergency response plans for fostering preparedness

5.3. METHODS AND MATERIALS

Study Area and Period: Afar region is located in the north-eastern part of Ethiopia bordered by four National Regional States that is in the North and North-West; Tigray region, in the west and South-west; Amhara region, in the south; Oromia region and in South-east; Somalia region. The ARS also shares international borders with Djibouti and Eritrea to the east and North-east, respectively.

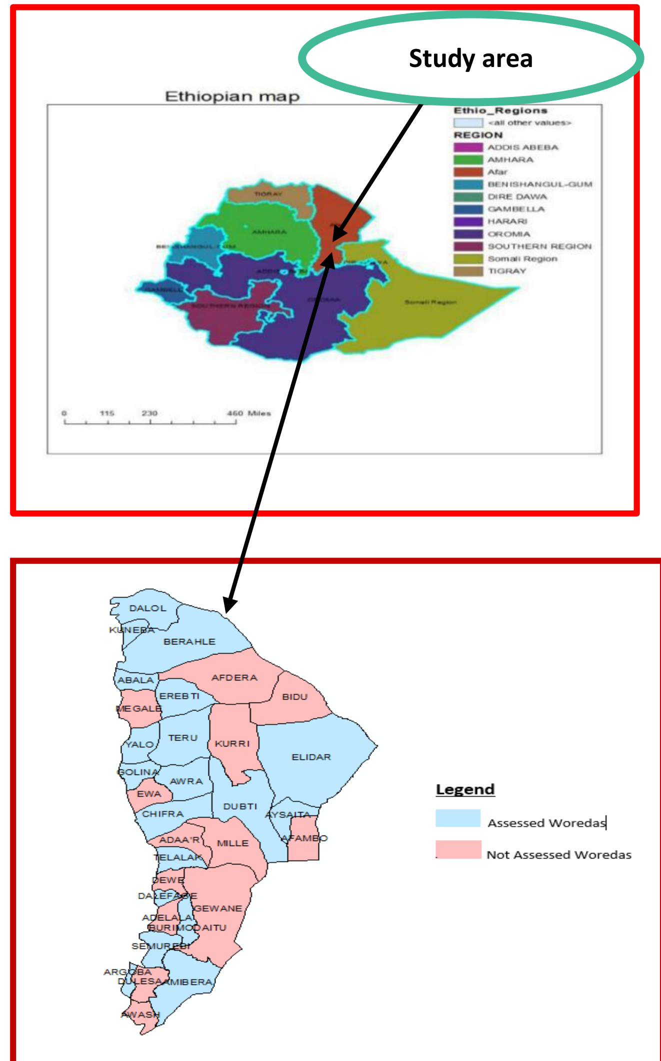

Figure 5. 1 Afar Regional state administrative Map

Administratively the region is divided in to 5 administrative zones (sub-regions), 32 woredas (administrative districts), 2 administrative towns, and 407 rural and urban Kebeles. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), the Afar Regional State has a population of 1,812,002 consisting of 991,000 men and 821,002 women and predominantly pastoralist community (90%); the population density of the region is 14.59 people per square kilometres.

Out of the total area of the region (estimated at 97,250km^2) much of the region is dry and rocky, unsuitable for cultivation. The region's altitude ranges from a maximum of 1500m above sea level to a minimum of 166m below sea level. Temperature varies from 25ºC during the wet season to 48ºC during the dry season. Rainfall is erratic and scarce, and annual precipitation ranges from 200mm to 600mm. The region is frequently exposed to persistent droughts and is classified as one of the drought-affected regions in Ethiopia. The health system of the region is leaded by the Regional Health Bureau, the Woreda Health Offices operate at the Woreda level which leads & supervises primary health care activities delivered through Primary health units. There are eight hospitals (Six, governmental, two private), around 106 health center and 408 health posts in 34 Woredas

found in the region. This Meher/Karma assessment was conducted from 18th November to 12th December.

Study design: A cross-sectional study design was used to assess and identify human health and nutrition emergency needs in the next six upcoming months.

Sampling technique: Purposive sampling techniques were employed to select 19 Woredas depending on their lively hood to represent the Woredas found in the Afar region.

Sample size: Nineteen Woredas was selected by Regional Disaster and Risk management office and Regional health bureau purposively on the base of relatedness and difference of their livelihood out of 34 woredas found in Afar region.

Assessment Team: The 2017 Meher/Karma assessment was carried out by different experts drawn from federal and regional government, non-governmental organizations and UN agencies. The team grouped as Food and Nonfood based on their working organization and collect data from respective sectors. Two and half day training was given for all assessment teams before deployment to regions on assessment tools by NDRMC and other stake holder. Again, a half day briefing on the previous health and health related situations of the region was given for the teams by the regional health bureau in collaboration with regional disaster and Risk management commission.

Assessment Tools: Semi structured questionnaires were used for data collection. Two different questioners were used to collect health and nutrition related data at district and zonal levels. The questioners address socio-demographic profile, health profile, top five cause of morbidity, status of epidemic prone disease in the last six months, existence of outbreak in the last six months and ongoing epidemic situation and check availability of emergency drug at zonal and district levels, status of epidemic prevention and control plan, existence of Multi sectoral coordination committee at all levels and Nutritional information (Annex V).

Source of Data: Both primary and secondary data were collected from district health offices. Documents was reviewed. In selected area, woreda health office, Health facilities and community was visited. Secondary data was collected by reviewing HMIS and Surveillance records. Primary data was obtained from woreda health office head, woreda disaster and risk management officer, Public health emergency management focal person, maternal and child health officers and nutrition

focal person using structured checklist. In addition, focus group discussion was conducted with community on health and health related events.

Ethical clearance: Before the team move to the study area, the NDRMC informed the region and legal permission was received from the region. The region health bureau and regional disaster risk management commission sends circular letter for all selected Woredas. Individuals participated in interview and community participated in Focus group discussion was informally asked for their willingness after briefing the aim of the assessment. Confidentiality kept through assessment.

5.4. RESULT

5.4.1. Socio-demographic Profile

Nineteen Woredas were visited among 34 woreda found in Afar regional state. The total population of assessed woredas was 1,289,395 among which 707,405 (55%) are male and 581,990(45%) are Female (Table 5.1).

Table 5. 1 Assessed woredas estimated Population by sex and age category, Afar region 2017

Zone	*Woreda*	*Total population*	*Male*	*Female*	*Under 5-year-old*	*Women 15-49yrs*	*No. of PLW*	*Under one*	*Special pop*
1	Elider	101,638	55032	46,606	4689	10640	1338	2,643	IDP
	Asayita	71,528	37924	33604	3381	7672	964	1,860	IDP & Ref
	Dubti	100,279	53513	46,766	4705	10677	1342	2,607	**MW/IDP**
	Chifra	114,962	62945	52017	5233	11875	1493	2,989	No
2	Berhale	98,345	55,679	42,666	9,893	22,452	2,822	2,645	IDP
	Kunaba	66,908	35,494	31,414	6,730	15,275	1,920	1,799	IDP
	Dalol	101,524	55,508	46,016	10,213	23,177	2,913	2,730	IDP
	Abala	52,301	27,760	24,541	5,261	11,940	1,501	1,406	No
	Erepti	42,103	23,115	18,988	4,236	9,613	1,208	1,132	IDP
3	Gewane	41470	22347	19123	1924	4366	549	1,078	IDP
	Amibara	94,718	52697	42,021	4227	9593	1206	2,463	IDP
	Argoba	27,535	14390	13,145	1322	3001	377	716	No
4	Awura	42,504	22,820	19,684	4,275	9,703	1,219	1,143	No
	Yalo	57,222	32,152	25,070	5,756	13,063	1,642	1,539	IDP
	Gulina	62,138	34,523	27,615	6,251	14,186	1,783	1,671	IDP
	Teru	82,111	47,073	35,038	8,260	18,745	2,356	2,208	IDP
5	Telalak	46,617	26866	19751	1987	4509	567	1,212	IDP
	Samurobi	38,950	20416	18534	1865	4231	532	1,013	No
	Dalifage	46,542	27151	19391	1951	4427	557	1,210	IDP
Total		**1,289,395**	**707,405**	**581,990**	**92,157**	**209,146**	**26,288**	**34,063**	

Key: PLW = Pregnant and lactating women Ref: refugee, Source: Ethiopian central statistics agency population projection from 2007 EFY and IOM

The majority of the populations in the assessed woreda are pastoralist and some are semi pastoralist. Among assessed woredas there are special population such as refugees in Asayita, internal displacement population in 14 Woredas and migrant workers in Dubti woreda (Table 5.2). The cause of internal displacement of the population was natural disasters (Flooding, Wind, Thunder storm and drought).

Table 5. 2 Internally displaced population with the cause and respective woreda, Afar Region 2017

Woredas	***No HHs displaced***	***Affected population***						***Cause of displacement***
		Male	Female	Total	PLW	**Reproductive Age**	**U5**	**Flood**
Asayita	600	1868	1492	3360	101	**767**	**338**	Flood
Elider	361	1124	898	2022	61	**462**	**203**	**Drought**
Dubti	250	778	622	1400	42	**320**	**141**	Flood
Dalol	338	1052	840	1893	57	**432**	**190**	Flood
Berhale	62	193	154	347	10	**79**	**35**	Drought
Erepti	45	140	112	252	8	**58**	**25**	Drought
Kunaba	160	498	398	896	27	**205**	**90**	76HHS Flood & 84 HHS drought
Gewane	400	1245	995	2240	67	**511**	**225**	Flood
Amibara	330	1027	821	1848	55	**422**	**186**	250 HHs FLOOD & 80 HHs droughts
Yalo	40	125	99	224	7	**51**	**23**	Wind
Teru	225	701	559	1260	38	**288**	**127**	FLOOD
Gulina	250	778	622	1400	42	**320**	**141**	FLOOD
Dalifage	211	657	525	1182	35	**270**	**119**	Drought
Telalak	80	249	199	448	13	**102**	**45**	50 HHs Drought and 30HHs thunderstorm
Total	3,352	10,437	8,334	18,771	563	4,285	1,888	

5.4.2. Health Profile

There was a total of 5 hospitals with hospital population ratio of 1:257,879 and 55 health centers with average health center to population ratio of 1: 23,443. Of a total 55 health centers, 29 (53%) have access to safe water while the rest 26 (47%) are no access to safe water. Primary health care service is being provided within 202 health posts and ten mobile health teams. In addition, about 427 health extension workers are providing disease prevention and health promotion services in all assessed woredas Kebeles with an average of 22 HEW per Woreda (Table 5.3).

Table 5. 3 Health facilities distribution and water availability in assessed health centers, Afar region, 2017

Zone	Woreda	# Hospitals	# of Health Center	# of HC with water	# of HC without water	No of Health Post	# of Health Extension Workers	# health care workers	Mobile Health team
1	Elider	0	3	0	3	10	24		1
	Asayita	1	1	1	0	13	21		0
	Dubti	1	3	1	2	11	31		2
	Chifra	0	4	2	2	18	38		0
2	Berhale	0	4	1	3	14	25		1
	Kunaba	0	3	1	2	11	14		0
	Dalol	0	4	3	1	11	34		1
	Abala	1	4	4	0	8	34		0
	Erepti	0	2	0	2	12	15		1
3	Gewane	0	3	1	2	8	33		0
	Amibara	1	4	4	0	20	34		0
	Argoba	0	1	1	0	12	24		0
4	Awura	0	2	2	0	7	9		1
	Yalo	1	3	2	1	7	9		0
	Gulina	0	2	2	0	11	10		0
	Teru	0	3	1	2	6	16		1
5	Telalak	0	3	2	1	7	16		0
	Samurobi	0	3	1	2	8	24		1
	Dalifage	0	3	0	3	8	16		1
Total		5	55	29	26	202	427		10

Source: Woreda health office and Afar regional health bureau

5.4.3. Coordination and management systems

In all assessed woredas and health centers there are public health emergency management (PHEM) officers and all woredas established Rapid response team (RRT) as well as in health center level. The reporting system is similar in all visited Woredas. Every health facility report data to Woreda every Monday till midday regularly. Woreda PHEM officer compile data received from corresponding health centers and reports regularly to the regional health bureau on Tuesday till midday (Figure 5.2).

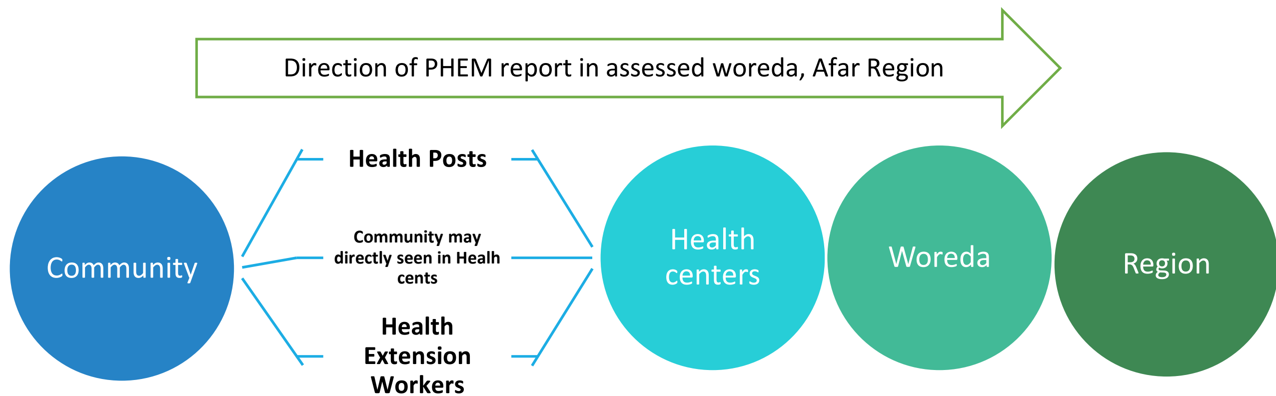

Figure 5. 2 Reporting direction of PHEM diseases in assessed woreda, Afar Region, 2017

Multi-sectoral epidemic control and prevention coordination committees were established at all assessed Woreda level. None of them have regular meeting schedule. However, most of the time they conduct meeting during emergency condition and some of them conduct every one to three months when there is no health emergency condition. Of those visited woredas only four (21%) of them (Erepti, Abala, Amibara, & Dalifage) have the Public Health Emergency Management preparedness and response plan, and none of them have accessible emergency response fund.

5.4.4. Morbidity and Mortality

Our assessment showed that there was higher morbidity attributed to Pneumonia (25%), Acute Febrile illness (AFI) 18% and Malaria (14%) than others diseases among above five populations in assessed Woredas. Pneumonia was the commonest morbidity in both under five children and adult age group. Non-bloody diarrhea (22%), Pneumonia (20%) Acute Febrile illness (17%) are the first three leading cause of morbidity among under five children (Figure 5.3).

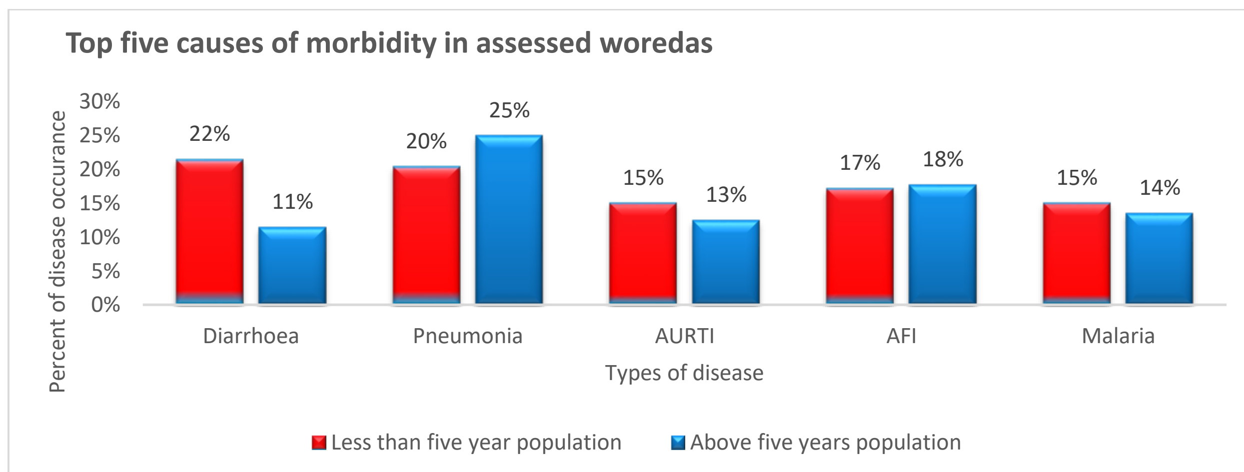

Figure 5. 3 Top five causes of morbidity in assessed woredas, afar region, July to September, 2017

5.4.5. Epidemic prone disease

Acute watery diarrhea: Within the last six months (May 2017 to October 2017) about 763 AWD cases were reported from 11(58%) of assessed woredas with an overall attack rate of 10 per 10,000 populations which is lower than the last year of same months (23 per 10,000 population). However, the distribution was very wider in 2017 than 2016 in which it covers only five woredas in 2016.The case report started in June 2017 and ended in October 2017 (Figure 5.4).

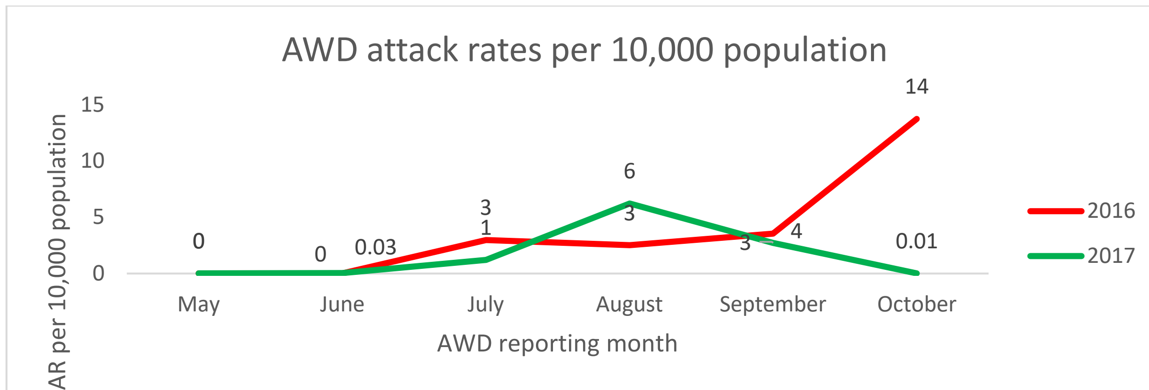

Figure 5. 4 AWD trends in assessed woreda, Afar region 2016 and 2017

The higher AWD attack rate was reported from Dubti woreda (42 cases per 10,000 population) in 2017 followed by Abala with 15 cases per 10,000 populations while it was from Gewane (44 cases per 10,000 population) in 2016. A total of 14 AWD deaths (CFR=18/1000) were reported from the assessed Woredas in the assessment period (May to October 2017) (Figure 5.5).

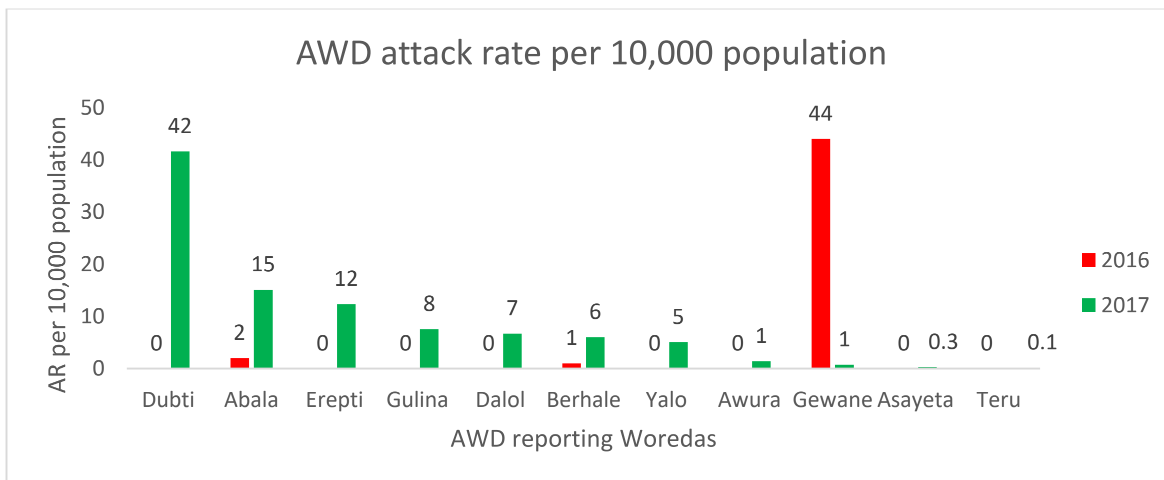

Figure 5. 5 AWD distribution in assessed woredas, Afar Region, 2017

Malaria: Malaria was one of the most prevalent diseases in the region. The average malaria incidence rate in the visited Woredas in 2017 was 22 cases per 1000 population with zero death

rates which is lower than the same months of the last year which was 34 cases per 1000 population. High attack rate of malaria was observed in June in contrast to the last (2016) year which was in August. The trend of malaria shows slight decrements from May to October. However, it is still hyper endemic in some of assessed woredas (Kunaba, Teru …...etc) and prone to be occurred as an outbreak unless controlling measures in implemented early (Figure 5.6).

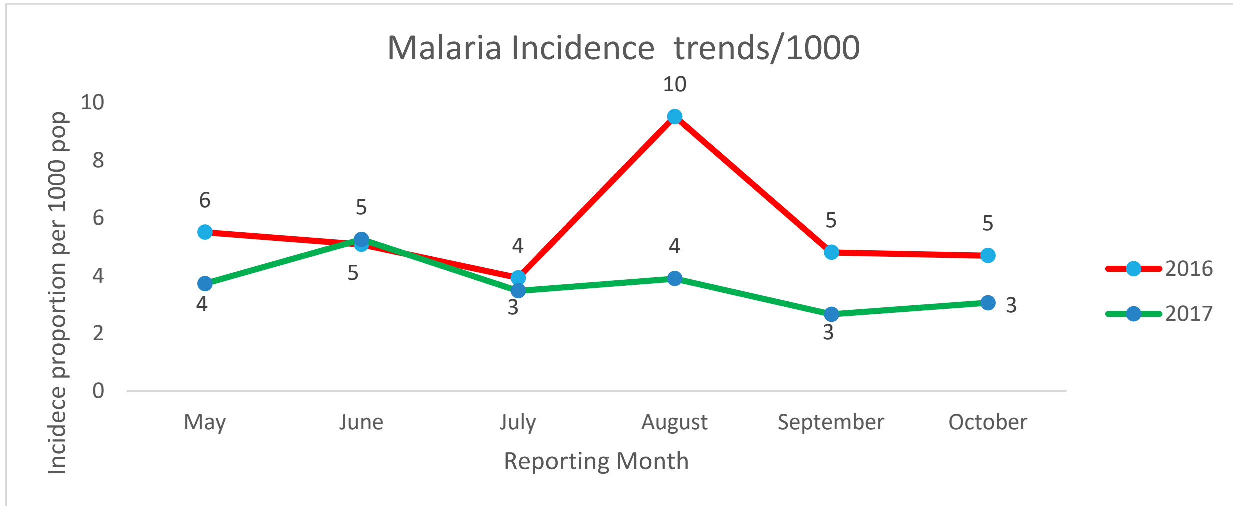

Figure 5. 6 Trends of malaria in assessed Woredas of Afar Region, 2016 and 2017

In each assessed woredas the incidence of malaria was higher in 2016 than in 2017 except in Gewane. The higher incidence of Malaria cases was reported from Gewane (60 cases per 1000 population) followed by Amibara (58 per 1000 population) (Figure 5.7)

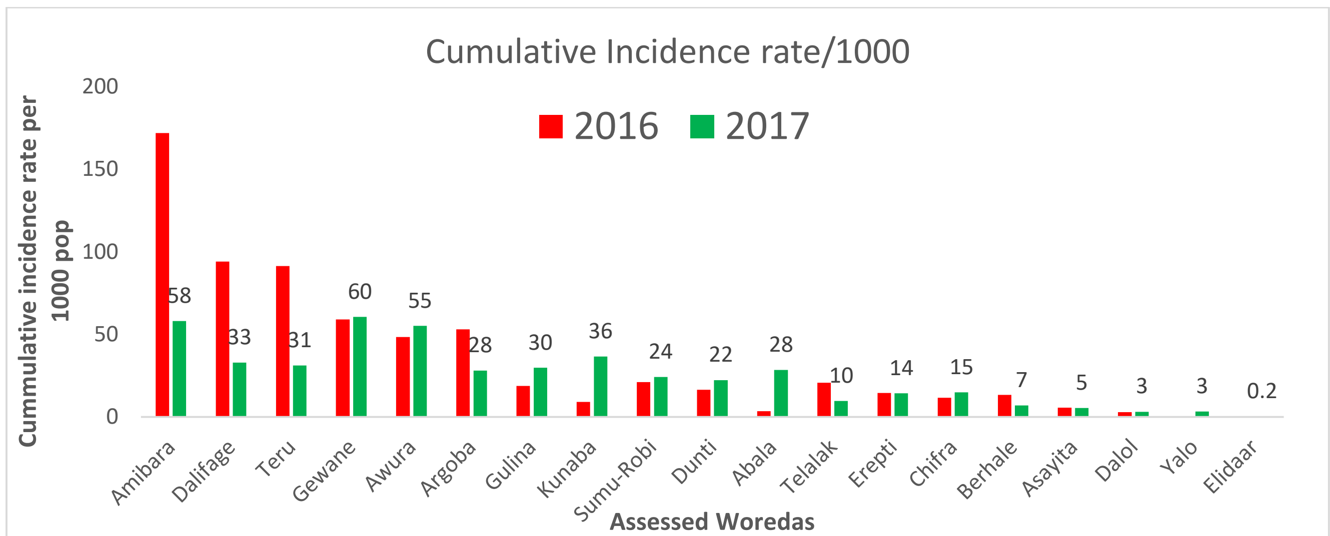

Figure 5. 7 Malaria cases distribution among assessed woredas, Afar region 2017

Measles: In the past six months (May to October 2017) there was no either case or death of Measles in all assessed woredas.

Meningitis: In the last six months there were about 13 meningitis cases (Erepti one, Gewane six, and Chifra six cases) were reported with zero death rates.

5.4.6. Outbreaks

In most of assessed Woredas in the region 11 (58%), Acute Watery diarrhea outbreak was occurred with a total attack rate of 10 per 10,000 populations which was almost started in August and ended in September 2017. Many controlling intervention (Treating the case early, contact tracing, distributing water guards/purifiers, health educations…etc) was done by region and woredas to control the outbreak. In the last six months there were about 14 deaths from AWD outbreak with a case Fatality rate of 1.8%. Most of AWD cases (57%) was reported from Zone one (Dubti Woredas and Hospital) with attack rate of 11 per 10,000 populations (Figure5.8).

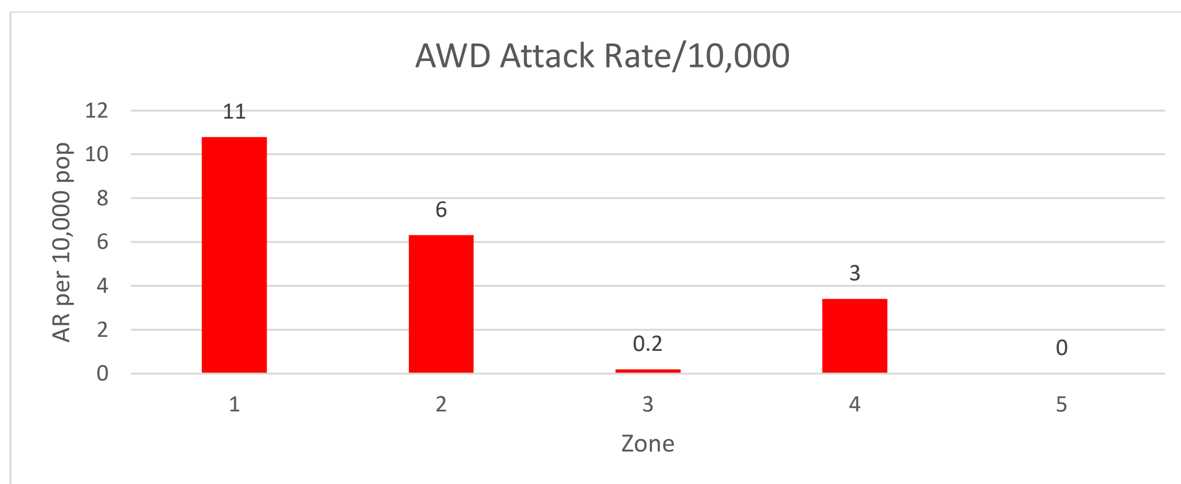

Figure 5. 8 Six months AWD outbreak distribution among zones, Afar region 2017

In addition to AWD, among assessed woredas, even though it is less than the previous year, there were a marked high number of malaria cases reported from two woredas (Kunaba & Teru). In Kunaba the attack rate was 365 per 10,000 populations and in Teru the attack rate was 311 per 10,000 populations (Table 5.4)

Table 5. 4 Outbreak history in the last six months among assessed woredas, Afar region, 2017

S/n	Reporting woredas	Total Population	Types of outbreak	Reporting period	Ongoing outbreak	Number of cases	Death	Incidence rate/10,000
1.	Kunaba	66,908	Malaria*	June to date	No*	2,439	0	365
2.	Teru	82,111	Malaria*	Through the year	No*	2,555	0	311
3.	Dubti	**100,279**	AWD	August to September	No	417	0	42
4.	Erepti	42,103	AWD	August & September	No	52	0	12
5.	Abala	52,301	AWD	August & September	No	49	2	9
6.	Gulina	62,138	AWD	August & September	No	47	0	8
7.	Dalol	101,524	AWD	August	No	68	8	7
8.	Berhale	98,345	AWD	August to September	No	59	3	6
9.	Yalo	57,222	AWD	September	No	29	0	5
10.	Awura	42,504	AWD	August & September	No	6	0	1
11.	Gewane	41470	AWD	August	No	3	0	1
12.	Asayita	71,528	AWD	September & October	No	2	0	0.3
13.	Teru	82,111	AWD	August & September	No	1	0	0.1

*Hyper-endemic malaria cases present

5.4.7. Preparedness and Response Capacity of the Region

Management of public health emergencies like disease outbreaks requires strong coordination system at all levels. All studied Woredas have reported to have organized epidemic prevention and control committee lead by the chief Woreda administrator and rapid response team composed of mix of health professionals. However, in all visited Woredas, the committee and teams have never been made meetings recently become active whenever epidemic is reported (Table 5.5).

Availability of contingency drugs, medical supplies, logistics and budget has an effect on the effectiveness of outbreak control measures. Reviews of the Woredas' drugs and supply stocks have shown that, there is emergency stock specifically kept for emergency response in above 75% of assessed woredas. However, in all visited woredas there were no separately allocated budgets for emergency rapid response in woreda level. There were Shortage of some emergency drugs and diagnostic test supplies for management of Measles complication, Malnutrition and meningitis in some woredas. Availability of water at Stabilization center is a major problem in 42% of Woredas (Table 5.5).

In general, Woredas status of preparedness and capacity respond to public health emergencies with regard to keeping stocks of emergency drugs and medical supplies, securing contingency budget,

medical staff experience in management of other outbreaks other than AWD and coordination, are observed to be inadequate.

Table 5. 5 Stock of Emergency drugs and Supplies for next coming one month, Afar region, Ethiopia, 2017

Description	Yes	No	Total woreda	%
Ringer Lactate in bag	16	3	19	84%
ORS in sachets	16	3	19	84%
Doxycycline in capsules	17	3	19	89%
Consumable Supplies	15	4	19	79%
Amoxil Susp. In bottles	15	4	19	79%
Tetracycline Oint. In tubes	8	11	19	42%
Vitamin A in tin	15	4	19	79%
Coartem for Malaria in strips	16	3	19	84%
RDT for Malaria in test	15	4	19	79%
RDT for Meningitis	0	19	19	0%
LP Set	0	19	19	0%
CTC Kit	9	10	19	47%
RUTF	13	6	19	68%
F-100 in sachet	15	4	19	79%
F-75 in sachet	15	4	19	79%
2nd Line drugs	13	6	19	68%
Sufficiency of storage at woreda level for SAM treatment	12	7	19	63%
Water availability at SC	11	8	19	58%

5.4.8. Epidemic prone Disease Risk factors

Malaria risk factors: All of assessed Woredas are malaria endemic areas with different distribution among Woredas. Of the assessed woredas 84% of Kebeles are malarious Kebele and there are a number of malaria risk factors in those woredas which could contribute for the occurrence of malaria cases. Among others presence of malaria breeding sites such as stagnant water, interrupted or potentially interrupting rivers during the dry season, unseasonal rain, and unprotected traditional irrigation are the main contributing risk factors. On the other hand, among Malaria vector control methods, LLINs and IRS are internationally recommended methods. In assessed Woredas, LLINs distribution was conducted before three years ago with an average coverage of 78%. The average IRS coverage in 2017 was very low in all assessed woredas (Figure 5.9).

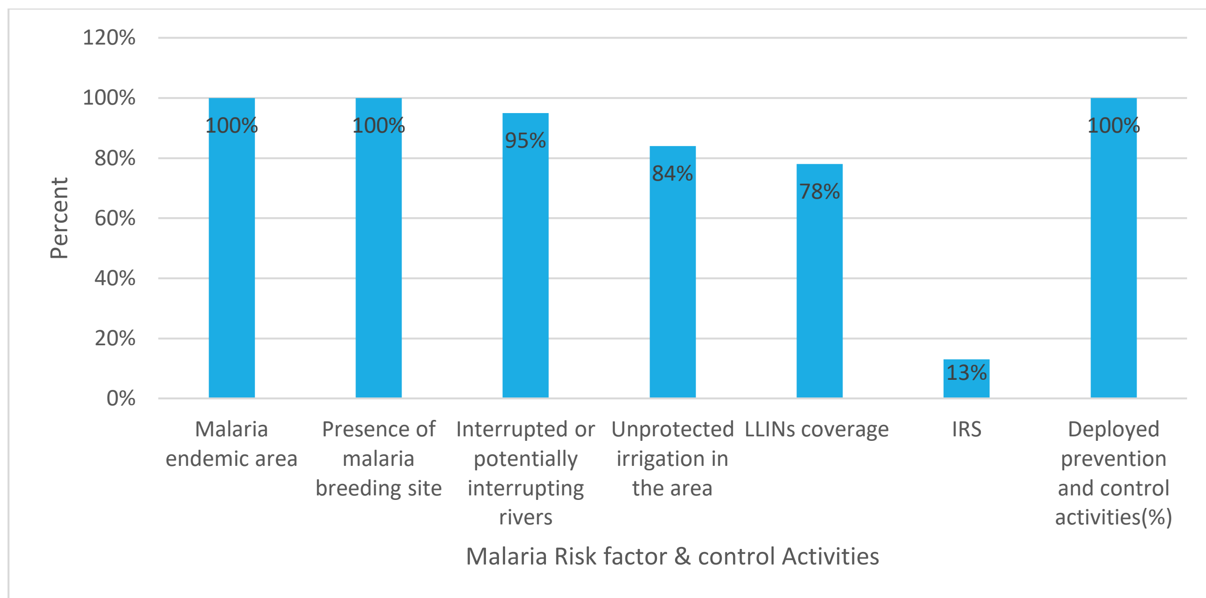

Figure 5. 9 Malaria risk Factors and controlling Activities in Assessed woredas, Afar region 2017

Depending on the risk factors, the distribution of malaria differs among woredas and Kebeles. Elider, Dalol and Abala are the three woredas with list malaria epidemic Kebele in ascending order (Figure 5.10).

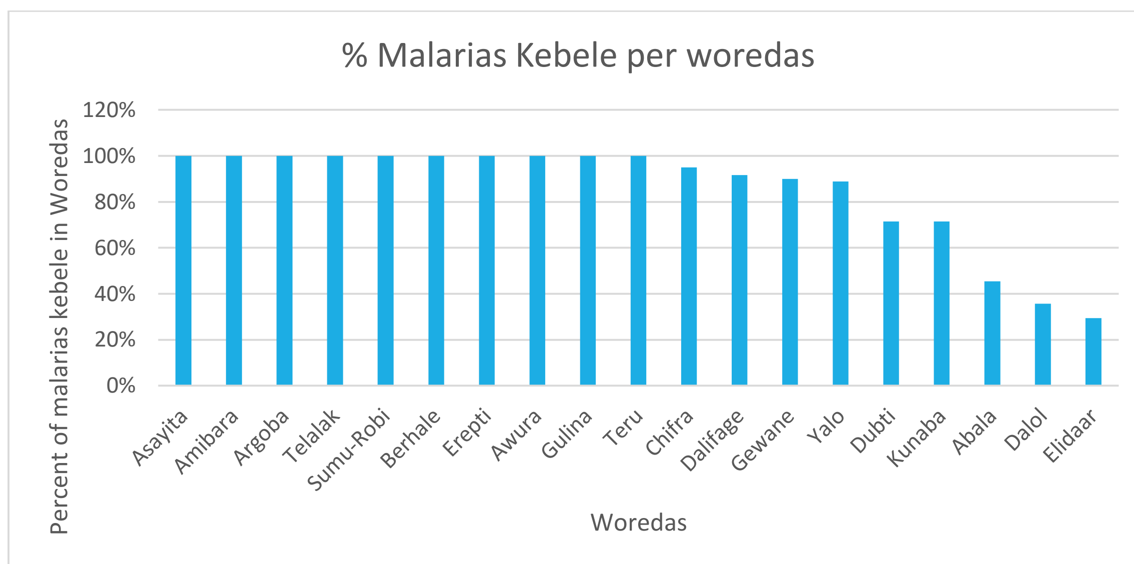

Figure 5. 10 Percent of malarias Kebeles among assessed Woredas, Afar region 2017

Meningitis risk factors: In the past three years there were no Meningitis Epidemics in all visited Woredas and Vaccine was given in October, 2015 in all woredas for an average of 97% of target population (Figure 5.11).

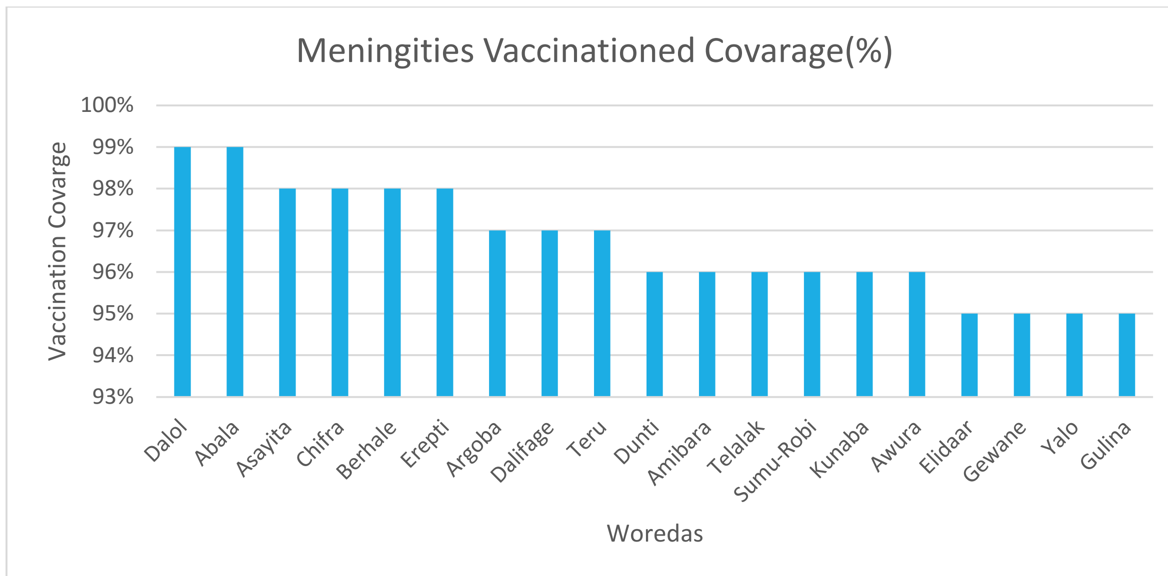

Figure 5. 11 Meningitis vaccine coverage in 2015 in assessed woredas, Afar Region

AWD risk factors: Of 19 assessed Woredas Acute Watery Diarrhea was reported from 13 (68%) woredas in 2017**.** In our assessment we identified the shortage of safe water source for drinking and other domestic uses in those woredas**.** Most of Kebeles move long distance to either the area where they can get water or they obligated to use locally found unprotected water (river or pond water) which is accumulated for long period of time and vulnerable for contamination. This may expose the population to AWD outbreak in the proceedings month. The overall average safe water coverage in assessed woredas was 43% (Figure 5.12).

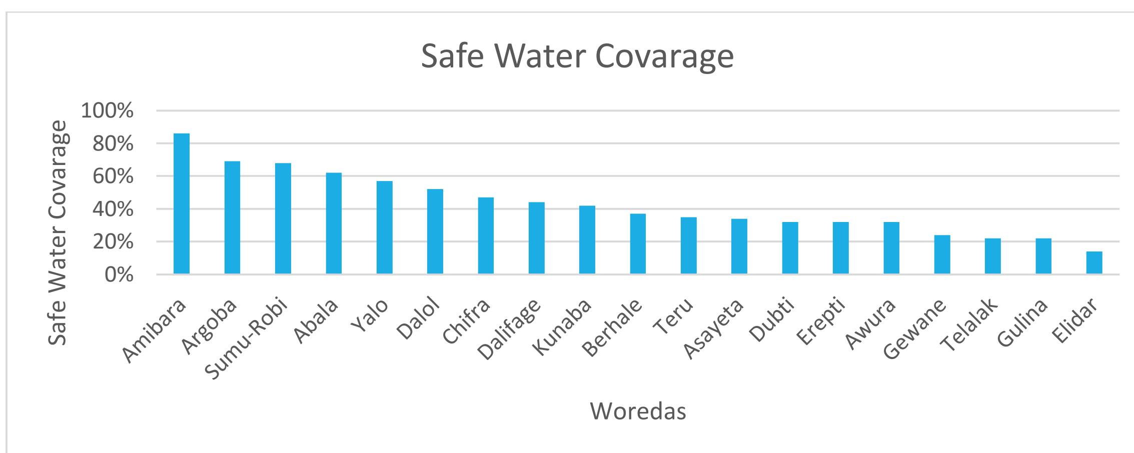

Figure 5. 12 Safe Water Coverage in 19 assessed Woredas, Afar region, 2017

On the other hand, poor latrine coverage and utilization has great contribution for occurrence of AWD outbreaks due to open defecation has highly potential to contaminate water where there is open water system. In our assessment we identify low latrine coverages (43%) and open defecation

is very common. Also, where there is a latrine, still the utilization status was about 64% in average. These may potentially predispose the population to get infected by AWD secondary to contaminated water (Figure 5.13).

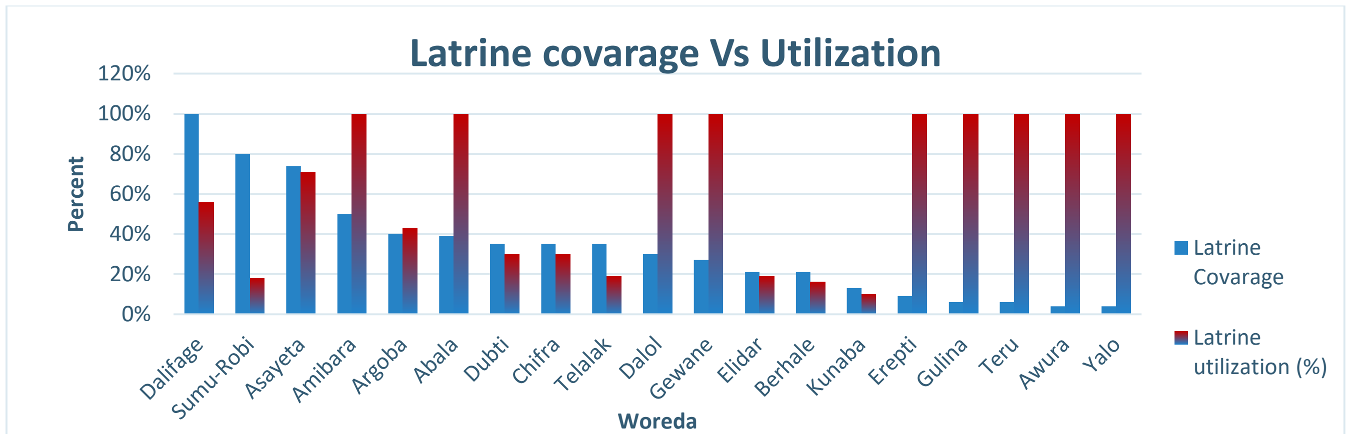

Figure 5. 13 Latrine coverage & Utilization practice in assessed woredas, Afar region, 2017

Measles Risk factors: In all assessed Woredas there were no measles epidemics currently. The Average vaccination coverage against measles antigen was 85% in the last three months of 2017. Among visited woredas in Meher/Karma assessment, 12 (63%) of them achieved the regional measles vaccination target in the first quarter of Ethiopian time table. Other than routine vaccination, in 2017 there was no measles vaccination campaign (SIA) in all assessed Woredas (Figure 5.14).

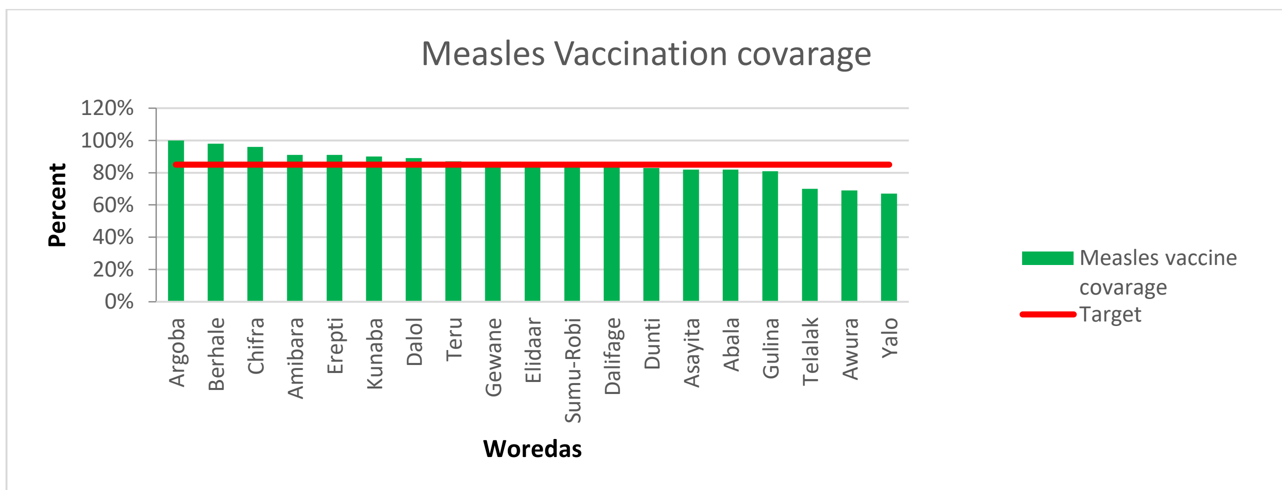

Figure 5. 14 Routine measles vaccine coverage in assessed woredas, afar region, 2017

5.4.9. Nutritional assessment

SAM and MAM management: There is a total of 52 health facilities (47 health centres +5 hospitals) providing inpatient service for those who have been admitted as Severely Acute Malnourished (SAM) children who failed adequate appetite test and/or a major medical complication. From all health facilities (HSPs + HCs+ HPs) 250 (95.4%) of them are providing Out-patient Therapeutic Programme Service (OTP) to the community in the assessed woredas (Table 5.6).

Table 5. 6 Health Facilities and Nutrition Profile of assessed woredas, Afar Region 2017

Zone	Woreda	Total # of HSP	Total # of HC	Total # of HPs	# of HC with SC	# of SC	% of HC/HSP with SC	# of HP with OTP	# of OTP	% of HP with an OTP	Reporting rate
	Elidar	0	3	10	2	2	67%	10	13	100%	100%
	Asayeta	1	1	13	1	2	100%	13	15	100%	100%
	Dubti	1	3	11	3	4	100%	6	9	55%	100%
1	Chifra	0	4	18	3	3	75%	18	22	100%	100%
	Koneba	0	3	11	2	2	67%	11	14	100%	100%
	Dalol	0	4	11	3	3	75%	11	15	100%	100%
	Abaala	1	4	8	4	5	100%	8	13	100%	100%
	Erebti	0	2	12	1	1	50%	12	14	100%	100%
2	Berahle	0	4	14	4	4	100%	12	16	86%	100%
	Gewane	0	3	8	3	3	100%	8	11	100%	100%
	Amibara	0	4	20	3	3	75%	20	24	100%	100%
3	Argoba	0	1	12	1	1	100%	12	13	100%	100%
	Awra	0	2	7	2	2	100%	7	9	100%	100%
	Yalo	0	3	7	3	3	100%	6	9	86%	100%
	Gulina	1	2	11	2	3	100%	9	12	82%	100%
4	Teru	0	3	6	3	3	100%	5	8	83%	100%
	Telalak	0	3	7	3	3	100%	7	10	100%	100%
	Sumu-Robi	0	3	8	3	3	100%	8	11	100%	100%
5	Dalifage	1	3	8	1	2	50%	8	12	100%	100%
	Total	5	55	202	47	52	87	191	250	94%	100%

SAM Admission: In the assessed woredas a total of 7583 SAM cases were admitted to TFU from May –Oct of 2016 and 6482 cases were admitted in the same months of 2017 (Figure 5.15). The overall prevalence trends of SAM admission were lower in this year (2017) through the month except slight increment in October.

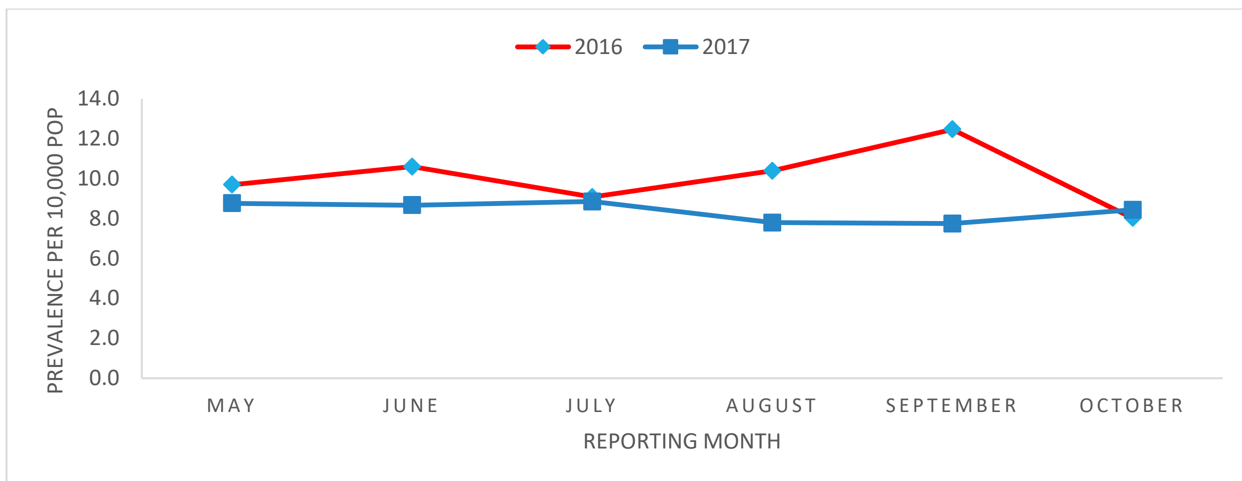

Figure 5. 15 Monthly SAM Admission trends of assessed Woredas from May-October in 2016 and 2017

In 2017 Meher/Karma season (May -October), among 19 assessed woredas high number of SAM cases were admitted in Dalol Woreda (15 per 1000 population) followed by Chifra and Teru (13.2 and 12.8 per 1000 population respectively) while the least cases were admitted in Abala and Argoba special woreda (1.6 and 1.8 per 1000 population respectively). Compared to the same months of last year (2016) except in Gewane, Erepti, and Berhale Woredas the prevalence of SAM was slightly decreased in 2017 (Figure 5.16).

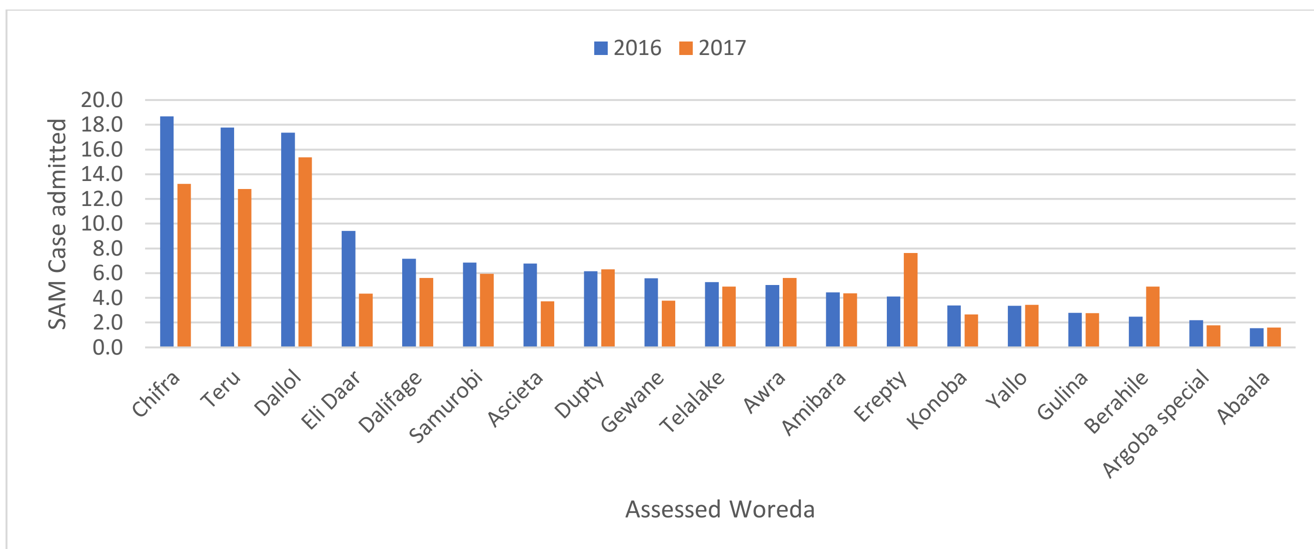

Figure 5. 16 Number of SAM cases Admitted per woredas, Afar Region 2016 & 2017

5.4.10. Performance of the therapeutic feeding program for SAM

The highest cure rate during the assessed season was in Erepti woreda for 2016 and Kunaba woreda for 2017, the cure rate of both woredas were 100%. The overall cure rate of assessed woredas were found to be 91% and 93% for the assessed months of 2016 and 2017 respectively (Table 5.7).

Table 5. 7 *CMAM performance of assessed woredas from May-Oct 2016 and 2017*

Woreda	Cure Rate 2016	Cure Rate 2017	Defaulter Rate 2016	Defaulter Rate 2017	Non-respondent Rate 2016	Non-respondent Rate 2017	Death Rate 2016	Death Rate 2017
Abala	91%	81%	3%	18%	0%	0%	0%	0
Amibara	79%	84%	4%	2%	0%	1%	0%	0
Argoba special	98%	95%	0%	4%	0%	0%	0%	0
Assita	87%	97%	1%	2%	1%	0%	1%	0
Awra	84%	88%	9%	5%	0%	1%	0%	0
Berhale	98%	96%	2%	0%	0%	0%	0%	0
Chifra	90%	87%	5%	4%	2%	3%	0%	0
Dalifage	91%	91%	6%	3%	0%	5%	0%	0
Dalol	97%	99%	1%	0%	0%	0%	0%	0
Dupty	91%	92%	9%	4%	0%	1%	0%	0
Eli Daar	96%	93%	3%	7%	0%	0%	0%	0
Erepti	100%	99%	0%	0%	0%	0%	0%	0
Gewane	74%	91%	11%	6%	0%	1%	1%	0
Gulina	94%	88%	3%	2%	0%	3%	0%	0
Kunaba	98%	100%	0%	0%	0%	0%	0%	0
Samurobi	99%	95%	1%	5%	0%	0%	0%	0
Telalak	92%	96%	3%	1%	2%	3%	0%	0
Teru	95%	96%	5%	2%	0%	0%	0%	0
Yalo	93%	93%	2%	0%	1%	0%	0%	0
Total	**91%**	**93%**	**4%**	**3%**	**0%**	**1%**	**0%**	0

The assessment considers the CMAM performance indicators mainly cure rate, defaulter rate, non-responder rate and death rate to measure the performance of assessed Woredas during Meher/Karma. The overall cure rate of assessed woredas were found to be 91% and 93% for the assessed months of 2016 and 2017 respectively. The defaulter rate in 2016 and 2017 is assessed woredas is very low which is 4% and 3% respectively (Table 5.8).

Table 5. 8 Summary of CMAM performance of assessed woredas for same months of May- Oct in 2016 and 2017

Performance Indicator	2016	2017	Acceptable	Alarming
Cure Rate	91%	93%	> 75%	< 50%
Defaulter Rate	4%	3%	< 15%	> 25%
Death Rate	0%	0%	<10%	>15%
Non-responder Rate	0%	1%	-	-

5.4.11. Availability of therapeutic supplies

In all selected woredas the availability of nutrition supplies and routine drugs for treatment of malnutrition was assessed based on the availability and sufficiency of the items for coming three months. The assessment team couldn't get any report of shortage in nutrition supplies and routine

drugs for the treatment of severe acute malnutrition. All woredas have nutrition supplies and routine drugs which they can use for the next 2-3 months.

5.4.12. Reporting system of Malnutrition

Recording and reporting system was the area where the team identified as a big challenge both at woreda health office and facility level. Most woreda health offices don't have compiled reports of each month. The team as observed discrepancies of data at health facility woreda and regional level.

5.4.13. Training

As the assessment is mainly emergency focused only training related to emergency are considered for analysis by the team. From all 427 HEWs who are found in 19 assessed woredas 305 (73.5%) and 264 (63%) of HEWs received SAM management on OTP and IYCF-E training respectively (Table 5.9).

Table 5. 9 Proportion of HEW workers who trained on SAM and IYCF-E in assessed woredas

Woreda	Training on SAM Management				Training on IYCF		
	# of HEWs	# of HEWs received SAM training	%HEWs received SAM training	Total # of HCWs received SAM tarining	# of HEWs received IYCF training	% of HEWs received IYCF training	Total # of HCWs received IYCF training
Elidar	24	20	83%	15	6	25%	8
Asayeta	21	14	67%	13	21	100%	7
Dubti	31	9	29%	12	12	39%	7
Chifra	38	30	79%	24	34	89%	13
Koneba	14	14	100%	20	5	36%	0
Dalol	34	17	50%	17	21	62%	5
Abaala	34	34	100%	13	34	100%	7
Erebti	15	15	100%	17	14	93%	14
Berahle	25	15	60%	8	10	40%	13
Gewane	33	23	70%	25	15	45%	6
Amibara	34	18	53%	24	20	59%	13
Argoba	24	17	71%	8	24	100%	9
Awra	9	6	67%	10	9	100%	8
Yalo	9	9	100%	13	9	100%	13
Gulina	10	10	100%	13	10	100%	13
Teru	16	16	100%	11	1	6%	9
Telalak	16	11	69%	2	2	13%	6
Sumu-Robi	24	19	79%	12	7	29%	7
Dalifage	16	14	88%	18	16	100%	8
Total	427	311	73%	275	270	63%	138

5.4.14. TSFP program

The TSFP program in the region is mainly supported by WFP in collaboration with RHB and UNICEF only in hot spot priority one woredas. There is also routine link of MAM cases in hard to reach areas covered by UNICEF supported MHNT. The assessment team analysed the

admission of MAM cases from May to October 2017 both for children and pregnant and lactating women (PLW).

5.4.15. MAM admission

From May 2016 -October 2017, 80 % of PLW and 83% of children 6-59 months were admitted to TSFP program in all assessed woredas. In priority one woredas TSFP admission rate was 100% both for children 6-59 months and PLW (Figure 5.17)

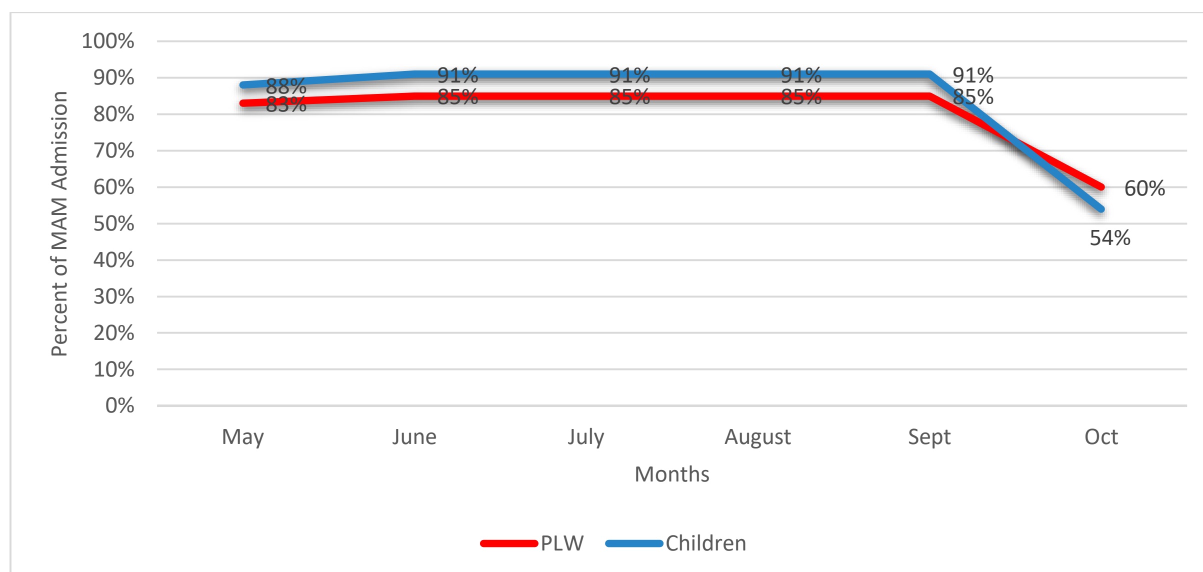

Figure 5. 17 Summary of MAM admission in assessed woredas from May to October 2017

5.4.16. Screening and screening Performance for Children and PLW

To monitor the Elnino driven drought Federal MoH in collaboration with RHB were conducting monthly nutritional screening across the region since early-2016. The screening Modality of all assessed Woredas was mass screening biannually in all woredas as EOS. The assessment team used mass screening result of EOS which was conducted in September 2016 and September 2017 in the assessed woredas. Based on the screening result of the assessed woredas in September, the screening coverage for children 6-59months was 97 % and 96% for pregnant and lactating women. The coverage in the same month of 2016 was also 97% and 95% for children and PLW respectively (Table 5.10).

Table 5. 10 Mass screening coverage of assessed woredas in September 2017 and same month of 2016

Woreda	2016 screening coverage		2017 screening coverage	
	Children 6-59 months	PLW	Children 6-59 months	PLW
Abala	90%	97%	85%	108%
Amibara	98%	64%	99%	65%
Argoba	98%	98%	99%	98%
Asayita	99%	107%	100%	100%
Awura	99%	85%	97%	97%
Berhale	98%	95%	99%	98%
Chifra	97%	95%	98%	96%
Dalifage	97%	98%	99%	100%
Dalol	98%	97%	98%	98%
Dubti	97%	86%	94%	92%
Elider	97%	97%	97%	96%
Erepti	84%	113%	98%	99%
Gewane	97%	97%	96%	97%
Gulina	97%	97%	97%	101%
Kunaba	100%	99%	100%	102%
Samurobi	97%	97%	98%	97%
Telalak	98%	98%	99%	100%
Teru	99%	98%	98%	92%
Yalo	100%	97%	99%	94%
Grand Total	97%	95%	97%	96%

Percent of Proxy Global Acute Malnutrition and percent of proxy Sever Acute Malnutrition are the major indicators of Acute malnutrition in children aged between 6 months and 59 months. It indicates Short term(recent) nutritional history. Accordingly, during our assessment, we tried to identify the percent proxy GAM and % proxy SAM among screened Children and Pregnant and Lactating Women. In assessed Woredas the average percent of proxy GAM was 17% for under five children and 40% for PLW. In 2016 the same months of this assessment year the percent proxy GAM was 18% and 2% for children and PLW respectively (Table 5.12).

Table 5. 11 Proxy malnutrition rate of children and PLW based on September 2016 mass screening result conducted in assessed woredas

Woreda	Proxy SAM of children 6-59 months		Proxy MAM of children 6-59 months		Proxy GAM of children 6-59 months		Proxy GAM for PLW-2016	
	2016	2017	2016	2017	2016	2017	2016	2017
Abala	2%	2%	11%	27%	13%	29%	4%	74%
Amibara	1%	0%	3%	2%	4%	2%	1%	17%
Argoba	1%	0%	15%	16%	15%	17%	1%	11%
Asayita	1%	0%	13%	11%	14%	11%	2%	38%
Awura	2%	1%	19%	14%	21%	14%	2%	18%
Berhale	1%	1%	15%	14%	16%	15%	1%	48%
Chifra	1%	0%	21%	23%	22%	23%	0%	12%
Dalifage	1%	0%	20%	16%	20%	16%	5%	73%
Dalol	2%	1%	20%	21%	22%	22%	0%	34%
Dubti	2%	1%	24%	18%	27%	20%	0%	26%
Elider	1%	1%	18%	24%	19%	25%	1%	27%
Erepti	3%	3%	19%	21%	21%	25%	1%	40%
Gewane	2%	1%	6%	10%	8%	11%	5%	61%
Gulina	0%	0%	22%	14%	22%	14%	1%	48%
Kunaba	2%	1%	18%	18%	19%	19%	2%	59%
Samurobi	1%	0%	15%	13%	16%	13%	4%	31%
Telalak	1%	0%	17%	9%	17%	9%	2%	83%
Teru	1%	1%	17%	11%	18%	12%	0%	17%
Yalo	1%	0%	15%	12%	16%	13%	2%	50%
Grand Total	**1%**	1%	**17%**	16%	**18%**	17%	**2%**	**40%**

5.4.17. Flooding

During the Meher/Karma season, in some Woredas in Afar region flooding is normally expected. An analysis of the trend and especially looking at the most recent Flooding happen on the region; two types of floods affect the region: Flashing flood and River over flow flood. Among 19 assessed woredas in Eight of them there were Kebeles affected by flooding (Table 5.13).

Table 5. 12 House hold and population affected by Meher/Karma rain fall

Woredas	#HHs displaced	Affected population						Consequences	
		Male	Female	Total	PLW	Reproductive Age	Under 5yrs	Out break	Human death
Asayita	600	1,868	1,492	3,360	101	**767**	**338**	**No**	**No**
Dubti	250	778	622	1,400	42	**320**	**141**	**No**	**No**
Erepti	45	140	112	252	8	**58**	**25**	**No**	**No**
Kunaba	76	237	189	426	13	**97**	**43**	**No**	**No**
Gewane	400	1,245	995	2,240	67	**511**	**225**	**No**	**No**
Amibara	250	778	622	1,400	42	**320**	**141**	**No**	**No**
Teru	225	701	559	1,260	38	**288**	**127**	**No**	**No**
Gulina	250	778	622	1,400	42	**320**	**141**	**No**	**No**
Total	2,096	6,526	5,211	11,738	352	2,680	1,181	**No**	**No**

Key: HHs- Households, PLW- pregnant and Lactating women

5.4.18. Challenges in epidemic responses

There were a number of challenges in epidemic preparedness and response activities which are pointed out by some woredas. Among them the most common were,

- Lack of preparedness and response plan
- Unavailability of budget
- Shortage of drugs and other medical supplies
- Limited number of qualified trained personnel
- Lack of quality data and delay of support from higher levels

5.5. DISCUSSION

The 2017 Meher/Karma health and Nutritional need assessment which was conducted in Afar region by multi sectorial agencies and leaded by NDRMC was ended with different results as stated above. The health service is the highly emphasized issue in our assessment and this service was structured nationally as primary health care, secondary health care and tertiary health care service. In Afar region assessed Woredas one hospital is serving more than 200,000 which is above recommended range and one health center is serving about 23,000 which is in between recommended ranges. As the fourth Ethiopian health sector development program (HSDP IV)

recommends to improve community health, one Health Post have to serve 3000-5000 population, one Health Centre have to serve 15,000-25,000 population (rural), 40,000 urban Primary Hospital 60,000-100,000 population and General Hospital 1,000,000-1,500,000 population.

Afar region is among health emergency prone region in Ethiopia due to natural weather condition. To handle such conditions well organized emergency handler sector is very important and in our assessment the team able to identify the presence of established multi sectoral public health emergency manager in all levels (From woreda level to Health center level) which indicates readiness of the sectors to handle emergency situations as national guide lines.

Malaria, Acute watery diarrhea, Measles, and Meningitis are the most expected epidemic prone disease in the region. Even though it is little bit less than the last year the case of malaria is high in all assessed woredas indicating high risk of malaria epidemics in the region. In the same manner AWD outbreak was reported in many of assessed woredas (68% 0of woredas) in large scale of distribution than the last year. Malaria breeding sites, irregular rail falls, unprotected irrigations, interrupted river leading to low water coverage and poor hygiene, flooding from highlands of neighboring region, low latrine coverage and low utilization are the most rick factors for malaria and AWD in assessed woredas which needs prompt intervention.

On the other hand, as the consequence of natural environmental change (short rainy season, dryness, flooding) there may be problem of malnutrition in the region. However, when we compare the admission load of malnourished children in 2016 and 2017, the trend shows that there is decline in 2017 except slight increment in October 2017. But this may not guarantee the nutritional security rather it is bad sign as the cases start to increase in just first month of the dry season.
After screening at risk population for nutritional problem and admission the Nutritional service performance is measured by the cure rate, defaulter rate, death rate and non-responder rate of service receiver. In assessed woredas the cure rate of the of all assessed woredas was above 75%, which is within acceptable range of CMAM performance according to FMoH guideline for treatment of SAM and defaulter rate was 3% which is fewer than 2016 of the same months (4%).

This shows there is very good adherence to the treatment of SAM in therapeutic feeding program in health facilities, MHNT and outreach programs. The death rate is also insignificant when compared to the standards. There is slight increment in non-responder rate in 2017 which needs further study on the basic cause of non-despondency. When we compare the proxy malnutrition

prevalence of this year and same month of last year, the total acute malnutrition rate has no significant variation except minor differences among woredas. But there is increment of proxy GAM of pregnant and lactating women.

5.6. CONCLUSION

- Diarrhea and pneumonia are the major leading cause of morbidity among children and adult respectively
- Malaria is prone to be occurred as epidemic due to existence of malaria breeding sites, low LLITN coverage and IRS coverage
- Poor access to water supply and sanitation, and un hygienic practices, both in native communities and investment camps are identified to be an immediate risk factors for the occurrence and distribution of AWD in the region
- Inadequate Preparedness and response capacity with regard to keeping stocks of emergency drugs and medical supplies, securing contingency budget, and coordination.
- The CMAM performance and service coverage of all assessed woredas is more than the standard recommended by national guideline and the sphere project. This good work should be to be strengthened
- The training coverage of HEW and HCW on management of severe acute malnutrition and IYCF-E helps for proper management and good performance.
- There is decline in severe malnutrition cases of Children for the assessed months when compared to same months of previous year. But there is slight increment in October 2017 when compared to October 2016.
- There is indication of increased Prevalence of malnutrition among PLW in months under consideration of this assessment and same months of last year.

5.7. RECOMMENDATIONS

Immediate recommendation

- Expanding Health services to pastoralist areas (Regional Health Bureau)
- Capacitating the health staffs on case management (Woreda health office, Partners, RHB)
- Increasing Safe water coverage at health center and health post level (Regional Water Bureau, RHB, Partners)

- Implementing malaria control measures as soon as possible to prevent possible occurrence of Malaria outbreak (ITN & IRS distribution, strengthening case management, removing malaria breading sites) (Health facility, Woreda Health office)
- Develop emergency preparedness response plan including Reproductive health and allocate separate educate budget (Health centers and woreda Health office)

Routine

- Strengthening surveillance system (Health center, Woreda health office, RHB, partners)
- Continuous community awareness creation /health education on water sanitation and hygiene (Health posts, health centers, HEW)
- Establish Health Emergency committee and create a coordination forum to meet regularly (Woreda health office, health centers)
- Community education on nutrition improvement / feeding practices ((Health posts, health centers, HEW, community)
- Increasing latrine coverage to prevent open defecation and create awareness on utilization practice (Woreda health office, health centers, Health posts, HEW, community)
- Strengthen the good performance of community management of acute malnutrition (CMAM) through close follow up and supportive supervision.
- Close follow up and surveillance in the coming dry months as there is indication of increment in cases of malnutrition of pregnant and lactating women and more focus on PLW malnutrition.
- Continue the pre-dispositioning of nutrition supplies at woreda and health facility level
- Strengthen nutrition sensitive activities.
- Efforts need to be made in more responsible and coordinated way by RHB and partners to strengthen the recording and reporting system at all level.

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Relapsing Fever Outbreak investigation and Response in Addis Ketema Sub-city, Addis Ababa, Ethiopia, 2017

ABSTRACT

Background: -Louse born Relapsing Fever is endemic in the mountains of Ethiopia and it accounts 27% of hospital admission. Most of the times it occurs in form of outbreak. In January 2017, a rise of louse-born Relapsing Fever cases was reported to Addis Ababa Health Bureau from Addis Ketema Sub-city. We investigated to identify the source of infection, risk factors and recommend preventive measures to tackle the problem.

Methods: - We defined suspected cases as abrupt onset of rigors with remittent fever, headache, arthralgia and myalgia and compared each of them to two unmatched Controls randomly selected from health facilities based on screening result. A total of 112 cases and 223 Controls (screened negative and tested Negative for Relapsing Fever clinically and by the laboratory) were interviewed from February 1 -June 30, 2017. We run a Bivariate and Multivariate test to identify risk factors. We assessed the residency place, living condition, environmental sanitation and personal hygiene of the participants.

Results: -We identified 153 total cases and interviewed 112 cases with 223 Controls. The median age of cases and control was 20 (IQR=9) and 23 (IQR=8) respectively. Majority of cases (96%) were Male. The attack rate was 5/10,000 population. Mass sleeping (AOR=9 ,95% CI [3.7-10.5]), living on street (AOR= 14, 95% CI (4.8, 43), Living in Bedroom daily (AOR= 16, 95%CI [9, 21.8) and not changing clothes at night (AOR=3.1, 95%CI [1.3-7.5] were the independent predictors for Relapsing Fever.

Conclusion: We identified Cases are most likely to be exposed to mass sleeping than controls. Mass gathering of people and poor personal hygiene were source and risk factor for the outbreak. Education on the transmission of Relapsing Fever was given to homeless people. It is recommended the Sub city and Addis Ababa health office has to do on delousing of public bedrooms.

Key Words: Outbreak, Relapsing Fever, Risk factor, case-control study, Addis Ababa, Ethiopia

Word count: 300

6.1. INTRODUCTION

Relapsing Fever is a recurrent febrile infection caused by various Borriella spirochetes transmitted either by lice (epidemic relapsing fever) or by ticks (endemic relapsing fever) in which periods of fever lasting 2–7 days, alternate with afebrile periods of 4–14 days and the number of relapses varies from 1 to 10 without treatment [1]. Louse born Relapsing fever is transmitted when an infected louse is crashed or scratched while feeding in the human host [2]. It has an incubation period of between four and eight days (which range: 2–15) and the symptoms appear suddenly which is associated with circulation of bacteria in the blood [3,4]. Death from Relapsing Fever may occur in 10–40% of symptomatic cases in the absence of appropriate treatment, and in 2–5% of treated patients. Relapsing Fever is diagnosed by identification of spirochetes on a peripheral blood smear (either by dark field microscopy or microscopic examination of a stained thick or thin blood film) [4, 5].

Relapsing fever was a disease of global epidemic importance. However, widely as a result of the decrease of the clothing louse Pediculus humanus, it is now restricted to areas where clothing lice are still commonplace, such as Ethiopia [6].

The highlands region of Ethiopia has hundreds to thousands of cases of LBRF annually. The highest incidence in this region is during the rainy season when poor gather together in shelters [7].

The thresh hold level for declaring an epidemic of Relapsing fever in Ethiopia is an unusual increase of the case or doubling of Relapsing Fever cases in subsequent weeks [8]. Accordingly, as different reports show there were repeated and continuous LBRF outbreaks in different parts of Ethiopian country. Very currently in 2012, there were LBRF outbreaks in Bahir Dar Amhara region (attack ratios of 0.26/1000 population [2] in Mekele city, Tigray in 2016 (Attack rate of 8 cases per 100,000 populations [9]. In January 2017, rise of louse-born Relapsing Fever cases was reported to Addis Ababa Health Bureau from Addis Ketema Sub-city. We conducted this study to identify source of infection, risk factors and recommend preventive measures to tackle the problem.

6.2. METHODS & MATERIALS

6.2.1. Descriptive Epidemiology

We conducted this study in Addis Ketema Sub-city which located in northwestern of Addis. We reviewed OPD logbooks and line lists of Relapsing Fever in all health facilities in sub-city from January 1 to 30,2017. We defined Suspected case as person presented with an abrupt onset of rigors with remittent fever, headache, arthralgia and myalgia, confirmed case as suspected cases with demonstration of Borriella recurrentus in peripheral blood film and Epidemiologically linked case as a suspected case, which has contacts (possibly got B. recurrentus) with laboratory-confirmed case or another epidemiologically confirmed case. We reviewed OPD logbooks, line lists and medical records of suspected/confirmed cases to collect information regarding demographic characteristics, residency status, signs and symptoms, number of household members present and affected, laboratory investigations and outcome from January 1 – 30, 2017 and generate Hypothesis about source and risk factors of the disease. From our reviews, we stated mass sleeping, lack shelter and poor personal hygiene as our hypothesis.

6.2.2. Environmental investigations

We moved to the community and observed different places where the suspected cases are living. Community bedrooms, streets, and some shelters were assessed where mass sleeping is common. We conducted open interviews with suspected case-patients, Bedroom owners, health workers and local leaders to collect information regarding the practice of delousing, chemical spray and sanitation of living area.

6.2.3. Laboratory investigation

We reviewed laboratory test log book and compared it with medical records of suspected cases for the lab result. All participants (cases and controls) were clinically screened according to case definition and Blood Film test was performed.

6.2.4. Case-control study

We defined Cases as ***Suspected*** (person presented with an abrupt onset of rigors with remittent fever, headache, arthralgia and myalgia), ***Confirmed*** (suspected cases with demonstration of Borriella recurrentus in peripheral blood film) and ***Epidemiologically linked*** (suspected case, which has contacts (possibly got B. recurrentus) with laboratory-confirmed case or another epidemiologically confirmed case) [8] and compared each of them to two unmatched controls recruited in Health Facilities. We interviewed randomly selected 112 Relapsing fever cases and

223 controls (who have no contact with the cases, have no history of Relapsing Fever before, clinically screened negative and blood film tested negative) during February 1, 2017, to June 30, 2017. We used Epi Info version 7.1.1 to calculate sample size (***Assumptions***: - 95% CI level, 80% power, 1:2 case to control ratio, Percent of cases exposed 74.4% and percent of controls exposed 64) [2,9]**.** We designed a structured questionnaire, translated it into Amharic version (the local language). We trained field workers in data collectors. We collected information regarding demographic characteristics, Residence area, and practice, Personal and environmental Hygiene/sanitation practices in the last 15 days (prior to recruitment).

Collected data were checked for completeness and inconsistencies. Then coded and entered to We analyzed data using Epi Info Version 7.1.1 and SPSS version 23 software. Mean and the standard deviation was calculated for cases and controls groups. First Bivariate analysis was done and the sets of independent variables that have p-value greater than 0.2 in the bivariate logistic regression analysis were entered in multiple logistic regressions analysis using forward stepwise method. All statistical tests were two-sided and significant association was declared at a p-value less than 0.05. We used Adjusted OR to indicate associations. We protected the confidentiality of participants through codes and obtained written and oral consent before interviews.

6.3. RESULT

6.3.1. Descriptive epidemiology

We identified 153 confirmed Relapsing Fever cases with an overall attack rate of 5 out of 10,000 among which 147 (96 %) were Males and only 6 (4%) were Females. These accounts 24.5 folds of cases among Male compared to Females. Greater than half of the cases, 69 (62%), were age group of 15-24yrs.

Among Ten District, in Addis Ketema Sub-city the highest cases of Relapsing fever during the study period was reported from District Seven with the attack rate of 26/10,000 followed by District One with an attack rate of 10/10,000, District Four (Attack rate of 5/10,000) and District Eight with an attack rate of 4/10,000. These four areas are those share boundaries with Addis Merkato and National Bus station (Table 6.1).

Table 6. 1 Relapsing Fever distribution by District, Addis Ketema Sub-city Addis Ababa, Ethiopia, 2017

District	Total population	Total RF cases			Attach Rate/10,000
		Male	Female	Total	
1	27,183	26	1	27	10
2	31,959	2	0	2	0.3
3	34,338	0	0	0	-
4	40,001	18	1	19	5
5	31,312	1	0	1	-
6	29,309	0	0	0	-
7	35,272	87	4	91	26
8	35,444	13	0	13	4
9	34,096	0	0	0	-
10	20,843	0	0	0	-
Total		147	6	153	5

The index case was reported in the third weeks of December from Woreda seven who are living on the street and the cases are quickly raised. Woreda PHEM officers reported this to sub-city after three weeks. The investigation started after a month.

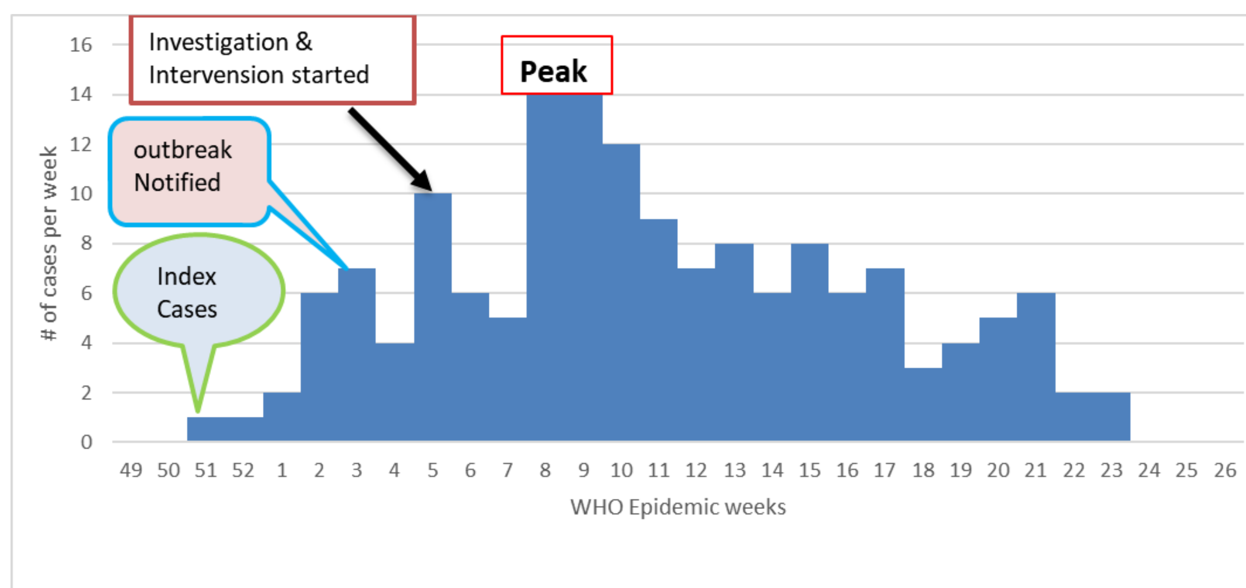

Figure 6. 1 Epi-curve of Relapsing fever by Epidemic week in Addis Ketema Sub-city, 2017

6.3.2. Environmental Investigation

We investigated the environment and observed around Addis Merkato and National Bus stations there were mass gathering of daily laborer for the sake of their daily food. At night time, they sleep in mass on the street and others sleep in a member of 10-40 in small room. Cases are more likely to exposed to mass sleeping than controls since 53.57% of cases are living in the bedroom and 5.3% of controls were using Bed Room. Accordingly, we did risk mapping and provide to Sub city for intervention (Figure 6.2).

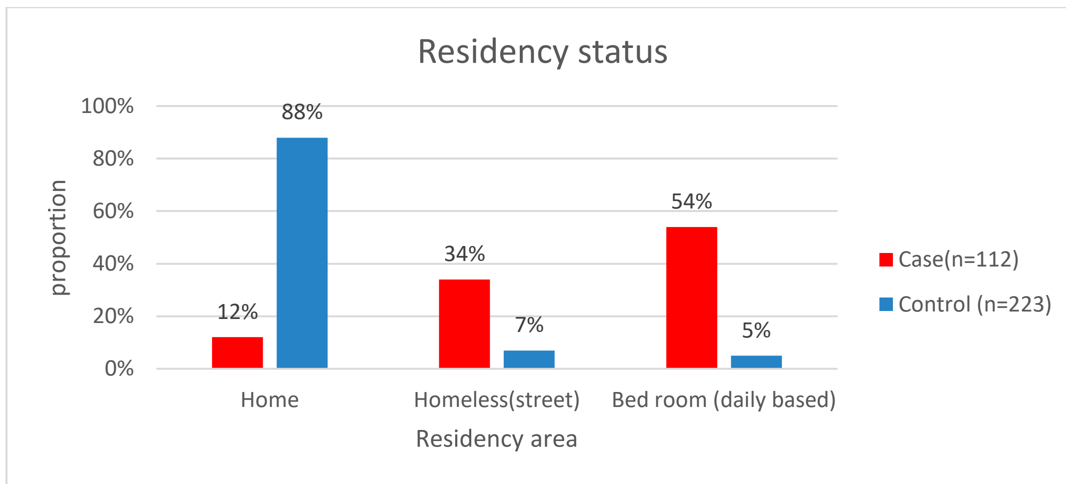

Figure 6. 2 Residence status (Place) of Participants

6.3.3. Laboratory Investigation

Retrospectively starting from January 2017, we reviewed laboratory log book and for all cases who were included in this investigation and as well treated as Relapsing fever, Blood film was done and was confirmed to have Borriella species. All controls were clinically screened and blood tested Borriella negative.

6.3.4. Case-Control Study

We recruited 112 Cases and 223 controls (screened negative and tested negative) with a Median age of 20 (IQR = 9) and 23 (IQR=8) respectively**.** One Hundred six (94.6%) of cases and 190 (85.2%) of controls were male and 6 (5.36%) of case and 33 (14.8%) of controls were female. Among Participants, 67 (60%) of cases and 112 (50%) of controls were age group of 15-24yrs. All of cases 112 (100%) and 148 (99%) of them were experiencing *Headache and Fever* respectively. One Hundred (89.29%) of the case participant were daily laborer (Table 6.2).

Table 6. 2 Socio demographic information of participants

Variables		Case (n=112)		Control (n=223)	
		Frequency	**Percent**	**Frequency**	**Percent**
Age group	**<15**	**15**	**13%**	**88**	**39%**
	15-24	**67**	**60%**	**112**	**50%**
	25-34	**25**	**22%**	**15**	**7%**
	>34	**5**	**4%**	**8**	**3.5%**
Sex	Male	106	95%	**190**	**85%**
	Female	6	5%	**33**	**15%**
Educational status	Illiterate	7	6.25 %	41	18%
	Elementary	92	82.14 %	86	38.5%
	Secondary	9	8.04 %	84	37.6%
	Preparatory	2	1.79 %	5	2.2%
	Higher education	2	1.79 %	7	3%
Occupation	Employed	6	5.36 %	68	30%
	Private owner	0	0	44	19.7%
	Daily Laborer	100	89.29 %	76	34%
	Housewife	0	0	11	4.9%
	Student	1	0.89 %	16	7%
	No occupation	5	4.46 %	8	3.5%
Clinical futures	Fever	111	99%		
	Headache	112	100%		
	Vomiting	48	42.8%		
	Nausea	48	42.8%		

Multivariate analysis of mass sleeping (AOR = 8.2, 95% CI [3.4-19.9], Living in bed room (AOR=12.2, 95% CI [4.0-37.4], Living on street (AOR=8.8, 95% CI [2.6,30.1], and not changing clothes at night (AOR = 4.4, 95% CI [1.7- 11.8] showed a statistically significant association. The Odds of acquiring relapsing fever for those sleep in a mass was about 8.2 times and that of not changing clothes at night was 4.4 times higher compared to sleeping in a member of fewer than six people and changing clothes at night (Table 6.3).

Table 6. 3 Multivariate logistic regression analysis of factors for relapsing fever

Variables		Case(n=112)	Control (n=223)	Crude OR, 95% CIL	Adjusted OR, 95% CIL	P -value
Sex	Male	106 (95%)	190 (85%)	0.3 (0.13,0.8)	1.9 (0.5, 7)	0.3014
	Female	6 (5%)	33 (15%)	1	1	
Residence status	Bed room	60(54%)	12(5%)	70(30,159)	12.2 (4.0-37.4)	0.0000*
	Street	38 (34%)	15 (7%)	35.5 (16,79)	8.8 (2.6,30.1)	0.0005*
	Home	14(12%)	196(89%)	1	1	
Not Taking body bath at least	Yes	44 (39%)	24 (11%)	**5.4 (3,9)**	1.4 (0.5,4.0)	0.5375
	No	68 (61%)	199 (89%)	1	1	
Not Washing Clothes at least weekly	Yes	58 (52%)	84 (38%)	1.8, (1.1,2.8)	0.4 (0.1,1.0)	0.0705
	No	54 (48%)	139 (62%)	1	1	
Mass sleeping	Yes	93 (83%)	28 (13%)	34(18,64)	8.2(3.4,19.9)	0.0000*
	No	19 (17%)	195 (87%)	1	1	
Not changing cloth at night	Yes	81 (72%)	31 (14%)	**16 (9,28)**	4.4 (1.7,11.8)	0.0028*
	No	31 (28%)	192 (86%)	1	**1**	

*Significantly associated factors

6.3.5. Public health Intervention undertaken to control the outbreak

- Intervention area was Identification according to risk mapping (Public Bedrooms, Streets, shelters)
- We provide Health education on personal/environmental sanitation and disease for daily laborer and most prone populations including Bedroom owners.
- Bed Rooms were sprayed by malathion
- Mass delousing was done

6.4. DISCUSSION

In our investigation, we reveal that the presence of Relapsing fever outbreak in Addis Ketema sub city. The index cases were reported in November 2016 from woreda 7 and woreda 4. Within a month, it was distributed to other Woredas especially those shares the border of Merkato and Autobistera (National Bus station), such as Woreda 1, woreda 2, Woreda 8 and woreda 9. As different literature and studies show mass sleeping and crowded shelters are the major predisposing conditions for relapsing fever outbreak [7]. Our study also aligns with this assumption as we observed cases life condition during our assessment and mass sleeping is common among them.

Males (96% of the total case) are more affected than Females which is about 24.5 folds compared to female populations. This may be due to the probability that Males are more prone to street life and exposed to mass sleeping. In the same manner age group of 15-24yrs population were more affected (62% of the total case) than the other age groups which is the same result with the case-control study done in Bahir - Dar, Amhara region [2]. This age group is a time when one person

may be affected by peer pressure to go out of the family member and try to produce their own property. Due to this, most of the adolescent are prone to live on the street or daily based payment Bedroom and most of the time they prefer to sleep in a mass to minimize the cost. Living in daily based payment Bedrooms were 10 folds (54%) among cases than control where mass sleeping and not changing cloth is common.

The death rate from relapsing fever in this sub city was zero and the attack rate was 5 out of 10,000 populations which are 2 folds than Bahir Dar as a case-control outbreak investigation study done in 2012 which shows attack rate of 2.6 out of 10,000 populations [2], and 6 folds than Mekele, Tigray which was 8/100,000 population in 2016.

Relapsing Fever is highly incident in the woredas those are bordering Addis Merkato open market center and National bus station locally known as "Autobistera". These woredas are woreda 7, Woreda 1, woreda 4, and Woreda 8 in decreasing order. Due to the sake of Daily food and income from Marketing process and transportation system, most of the population (children of old age) migrates towards this area which makes it an overcrowded place in the town. Closer to Merkato and bus station Mass sleeping houses for renting with low cost were also identified in this area where many peoples were using for sleeping at night after they performing their daily job. This type of lifestyle may highly contribute to transmission of Relapsing Fever infection through body louse because of possible presence of mass sleeping and poor hygiene. Our study shows the odds of acquiring relapsing fever for those sleep-in mass (more than six-member) and not changing clothes at night is 8.2 times and 4.4 times higher compared to those not sleep in mass (sleeping in a member of less than six) and changing clothes at night respectively. This finding aligns with the study done in Mekele, Tigray in 2016 [9]. Those people who are commonly living on street and in Bed Room are 12.2 times and 8.8 times more affected than those who were living in their House respectively. However, unlike the study done in Bahir Dar in 2012 [3], Not washing closes at least weakly and Not taking Body bath at least weekly has no direct associated with louse born Relapsing Fever outbreaks in Addis Ketema Sub-city. The difference may be due to the sampling method which is Community based sampling method in Bahir Dar and hospital Based in case of our study.

6.5. CONCLUSION AND RECOMMENDATION

We confirmed the presence of louse-born Relapsing Fever outbreak in Addis Ketema sub city. Mass sleeping and poor Hygiene are found to be associated risk factors for the occurrence of outbreak of Relapsing fever. Accordingly, we recommended Districts and sub-city have to follow closely the identified risk area to keep bedrooms clean and safe for human life. Health facilities have to continue giving health education on the cause transmission, and prevention of Relapsing Fever.

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CHAPTER VII ABSTRACTS FOR SCIENTIFIC PRESENTATION

7.1. An Outbreak investigation of Louse born Relapsing Fever in Addis Ketema Sub City of Addis Ababa, Ethiopia 2017

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ABSTRACT

Background: -Louse born Relapsing Fever is endemic in the mountains of Ethiopia and it accounts 27% of hospital admission. Most of times it occurs in form of outbreak. In January 2017, rise of louse born Relapsing Fever cases were reported to Addis Ababa Health bureau from Addis Ketema Sub city. We investigated to identify source of infection, risk factors and recommend preventive measures to tackle the problem.

Methods: -We defined suspected cases as abrupt onset of rigors with remittent fever, headache, arthralgia and myalgia. We conducted a 1:2 unmatched Hospital based case control study design. We selected Cases and Controls randomly based on screening result. A total of 112 cases (screened positive and tested positive for Relapsing fever) and 223 Controls (screened negative and tested Negative for Relapsing Fever clinically and by laboratory) were interviewed from February 1 - June 30, 2017. We assessed the residency place, living condition, environmental sanitation and personal hygiene. We run Bivariate and Multivariate test to identify risk factors.

Results: -We identified 153 total cases and interviewed 112 cases with 223 Controls. Median age of cases and control was 20 (IQR=9) and 23 (IQR=8) respectively. Majority of cases (96%) were Male. Attack rate was 5/10,000 population. Sixty-one (54%) of cases and 12 (5%) of controls were living in public bed rooms daily based rent. Mass sleeping (AOR=9.0,95% CI [3.8-11]) and not changing cloths (AOR=3.2, 95%CI [1.3-7.8] were the independent predictors for Relapsing Fever.

Conclusion: - We identified Cases are most likely to be exposed to mass sleeping than controls. Mass gathering of people and poor personal hygiene were source and risk factor for the outbreak. Education on transmission of Relapsing Fever was given to homeless people. It is recommended the Sub city and Addis Ababa health office has to do on delousing of public bed rooms.

Key Words: Outbreak, Relapsing Fever, Risk factor, case control study, Addis Ababa, Ethiopia
Word Count: 300

7.2. Dysentery outbreak investigation & Response in Woreda Nine, Akaki Kality Sub city, Addis Ababa Ethiopia, 2018

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ABSTRACT

Introduction: Dysentery is an infectious gastrointestinal disorder, characterized blood in loose stool. Shigellosis is the most common cause of outbreak of bloody diarrhea worldwide. Worldwide, the incidence of shigellosis is estimated to be 164.7 million cases per year. In Ethiopia total of 267,489 dysentery cases and 229 deaths were reported in 2015/2016. This study was aimed to investigate diarrheal dysentery outbreak in Woreda Nine, Akaki Kality Sub city, Addis Ababa, 2018 from Feb 19 to March 11.

Methods: We conducted unmatched Case control study by recruiting 21 cases and 42 controls. The sample size was calculated by Epi info 7.1.1 using case control ratio of 1:2 with an assumption of proportion of controls with exposure 53.7% and Cases with exposure 14.8% at 95% CI and 80% power. Bivariate analysis was done and variables with p value of 0.2 or less was run in Multivariate logistic regression. Variables with P value of less than 0.05 was reported as independent determinants of dysentery outbreak.

Result: A total of 57 dysentery cases were identified with overall attack rate of 9 per 1000 population. Female were more affected than males with SSAR of 10 and under five children were more affected with ASAR of 35 per 1000 populations. Unprotected water source for domestic use (AOR=6.2 95% CI [1.1-34.7]), eating vegetables/Fruits (AOR=8.8, 95% CI 1.3-60.7), and eating uncooked food (AOR=6.2, 95% CI 1.1-35.4), were found to be risk Factors

Conclusion and Recommendation: Unprotected water source is suspected to be the common source for dysentery outbreak. Maintaining damaged water pipes and improving the water coverage of the area with expected quality is important to prevent is recommended to prevent similar problem.

Key Words: Dysentery diarrhea; Case Control; Outbreak Investigation, Akaki Kality, 2018

Word Count: 294

7.3. Surveillance data analysis of Relapsing Fever in Addis Ketema Sub-city from 2012-2016, Addis Ababa, Ethiopia: Surveillance data analysis

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ABSTRACT

Back ground: - Relapsing fever is a recurrent febrile infection caused by various Borriella spirochetes transmitted either by lice (epidemic relapsing fever) or by ticks (endemic relapsing fever). In both forms, the interval between fevers ranges from 4 to 14 days. This surveillance data analysis study could help to identify the trends of Relapsing fever in Addis Ketema Sub City with in the past five years and compare it with the current status of disease which may give information on the trends of Relapsing fever. This study is aimed to describing magnitude and distribution of relapsing fever from 2012-2016.

Methods: - This retrospective record review of surveillance data was conducted in Addis Ketema sub city by using secondary data that was recorded in sub-city from 2012-2016 and analysis was done within one month (Jan 16/2017- Feb 15/2017). Data was collected from documented PHEM report in Sub city. The result was presented as narration, tables and graphs.

Result: -Three hundred eighty-one Relapsing Fever cases were reported in the past five years (2012-2016) with Zero Case Fatality rate. The overall prevalence rate of relapsing fever in Addis Ketema sub city in the past five years (2012-2016) was 13 cases per 10,000 cases. The trend of Relapsing fever was increasing from 2012 to 2016 from 10 cases per 100,000 to 83 cases per 100,000 populations. High incidence rate was recorded in the area adjacent to Addis Merkato Market center and National Bus Station (District Seven 48/10,000, District 8 20/10,000, and District one 11/10,000 population)

Conclusion: - The trend of Relapsing Fever was increasing and there were Outbreaks in Addis Ketema Sub-city in 2016. Therefore, it is recommended to follow the trend of Relapsing Fever in sub-city closely and give appropriate interventions giving special attention for Woredas those identified as high-risk areas.

Key Words: *- Surveillance data analysis, Relapsing fever, Addis Ketema Sub city, 2012-2016.*

Word count: 298

CHAPTER VIII: PROTOCOL/PROPOSAL FOR EPIDEMIOLOGIC RESEARCH PROJECT

Assessment of community LLITNs ownership, Knowledge and Utilization in Kunaba woreda, Northern Afar, 2018

SUMMARY

***Background*:** About 75% landmass of Ethiopia is malaria-endemic, and 65% (58.5 million) of the population is estimated to be at risk of malaria infection. Malarious areas are targeted to receive key malaria control interventions (LLITNs and IRS). Therefore, this study aims to assess the Community owner ship, Knowledge, and utilization of LLITN in Kunaba district, Northern Afar, Ethiopia 2018.

***Methods:* -** We will conduct Community based Cross sectional study design in Kunabe district from April 2,2018 to June 14,2018 among 382 households. We will use Simple random sampling followed by systematic sampling system among Households to select participants. Structured questionnaire which is adopted from different literature and converted to Oromic language will be used to collect information by face to face interview. Data will be analyzed using Epi Info Version 7.1.1. The association between Knowledge and LLINs Ownership, Knowledge and LLINs Utilization and Owner ship and Utilization will be calculated. Frequency distribution, Measures of central location and dispersion such as Mean, SD, Median, IQR, and measures of association such as X^2 and p value will be used to define the variables. Informed consent will be obtained from each participant. At the end the result will be communicated to Addis Ababa University School of public health and Woreda Health department. To complete this study **103,075.5** Eth.birr will be required.

Project outcome: This study will provide important information on the status of Community awareness about malaria transmission and control measures, LLITNs Coverage and malaria vector control utilizations. The result contributes for district, regional and national malaria vector control strategy improvement.

***Work Plan**:* This study will take Eight-months duration and be completed in September, 2018.

Key Words: LLITNs, Owner ship, Utilization, Knowledge, Kunaba District, 2018

Word Count: 250

8.1. INTRODUCTION

Malaria is a life-threatening disease caused by plasmodium parasites. The parasites transmitted from people to people through infected anopheles' mosquitoes bite, mostly at night [1]. Warm climates with high humidity and abundant rain create favorable conditions for mosquitoes by increasing breeding areas and prolonging survival, thereby facilitating transmission [2]. The most common symptoms of the disease are fever, headache, chills, muscle and joint pain, nausea, and general malaise. Untreated malaria can result in anemia, kidney failure, coma, and death [3].

According to World Health Organization report, in 2016, an estimated 216 million cases of malaria occurred worldwide in which 90% was from the WHO African Region followed by the WHO South-East Asia Region (7%) and the WHO Eastern Mediterranean Region (2%). Of the 91 countries that had an indigenous malaria case in 2016, a decrease in malaria cases of more than 20% compared with 2015 was estimated in 16 countries, while an increase of a similar magnitude was estimated in 25 countries. The WHO regions of the Americas and Africa accounted for nearly 70% of the countries that had increases of more than 20% in 2016 compared with 2015. It was estimated that 445 000 deaths due to malaria had occurred globally, of which 407 000 deaths (approximately 91%) were in the WHO African Region in 2016 [4].

In Ethiopia, due to several predisposing factors such as the interaction of mountainous terrain with variable winds, seasonal rains, and ambient temperatures, there is a diverse micro-climate for malaria transmission. When a micro-climate creates local puddles, flooding conditions, and warm ambient temperatures that persist for several weeks within a malarious area with low population immunity, the resulting *Anopheles* mosquito proliferation may cause focal malaria transmission to accelerate, sometimes explosively. In Ethiopia, malaria is highly seasonal in many communities, but may have nearly constant transmission in some other areas; at the district level, malaria outpatient caseloads may vary several-fold from year to year in an "unstable" epidemic-prone transmission pattern. Peak malaria transmission occurs between September and December in most parts of Ethiopia, after the main rainy season from June to August. Certain areas experience a second minor malaria transmission period from April to June, following a short rainy season from February to March [5].

Due to the topographic location and weather condition (erratic rain fall), Afar region is a malarious region. Malaria transmission in the Region is generally unstable, with perennial transmission in areas along the Awash River valley. In 2014/2015, there were a total of 289,852 cases of all types of malaria in Afar Region [6].

Insecticide Treated Nets (ITNs) for personal protection of vulnerable groups and community protection has been employed as main vector control tools in Ethiopia. The use of ITNs is a cost-effective intervention to reduce child mortality and maternal anemia where malaria imposes an important disease burden [7]. In Ethiopia, Long Lasting Insecticidal Nets were being distributed based on the average number of sleeping spaces per household. As per the 2015 National Malaria Guidelines, the aim of LLIN distribution was to cover all sleeping spaces in households in malaria-endemic areas so that universal coverage—one LLIN for every two persons in a household—could be ensured [8].

Along with universal coverage of ITN, awareness creation for perfect and proper utilization is the most promising malaria prevention technique. Afar region is among malarious area in Ethiopia and as Afar regional health bureau report in 2015 shows, in Zone two of Afar Region a total of 116,704 nets were distributed out of 210,067 LLINs required in 2014 and 180,650 nets were distributed in 2015 out of 73,570 needed with percentage of coverage of 96%. Despite this much coverage, still Malaria remains one of the major health problems in the region. Especially in our study area (Kunaba district) currently some Kebeles those were not known to be malarious Kebele were reporting high number of malaria cases. Hence, assessing the risk factors, LLITNs coverage Utilization and community awareness about LLITNs is very important to tackle the spreading of malaria infection easily.

Statement of the problem

Malaria remains a killing tropical disease in the most of Ethiopian region including Afar region. According to the last six-month health facility report, Malaria is among the top five causes of morbidity in Kunaba District. LLINs were being distributed based on the average number of sleeping spaces per household in the whole country. As per the 2015 National Malaria Guidelines, the aim of LLIN distribution was to cover all sleeping spaces in households in malaria-endemic areas so that universal coverage—one LLIN for every two persons in a household—could be ensured **[8].** Malaria prevention and control efforts in Ethiopia have focused on the ownership and use of long-lasting insecticide-treated nets (LLINs) and indoor residual spraying (IRS). From November 18 to December 12, 2017 nationally Meher assessment was conducted. Among visited regions during Meher assessment Afar region is the one and Kunaba woreda was selected with other 18 districts in this region. According to the findings, in this District 5 Kebeles were known to be malarious Kebeles and the rest two was malaria free Kebeles one year before the assessment.

However, during this Meher assessment, the Woreda health office reported that unlike the usual, those Kebeles who were known to be malaria free were reported high number of malaria cases. Therefore, this study will help to identify the existing malaria risk factors in this woreda, the level of awareness of the community on Malaria prevention, LLITNs coverage and the level of LLITNs utilization.

Significance of the study

The main objective of malaria program is to stop local transmission of malaria, and proper use of vector control methods is very important. In different time national, or regional government in collaboration with different non-governmental stakeholder, distributes ITN/IRS for population at risk. Furthermore, risk identification, working on the knowledge of the community about malaria and control methods are the prerequisite to achieve the ultimate goal of malaria prevention. Despite a considerable works done by FMoH on LLITNs distribution still now in different part of the Ethiopian region malaria, transmission is continued and many populations are being affected by malaria. In our study area as stated above some non malarious Kebeles were reporting high malaria cases in the last year. So, this study is important to provoke the federal government, regional government, and other stakeholders to tackle the further malaria infection in the district by providing relevant information on malaria risk factors, gap of vector control measures utilization in community and the level of community awareness on malaria transmission, prevention and control. Furthermore, this study may provide relevant information on the focus area for Malaria prevention in Kunabe District there by identifying risk factors in the area and may help as a reference for another researcher.

Research question

- What is the level of awareness of community about malaria transmission, prevention and control measures?
- Does the community have the minimum required amount of LLITNs as per national recommendation?
- Does the community those owned LLITNs utilize it properly?
- What are the main risk factors existing in Kunaba District, especially in those were known to be non malarious Kebeles but reported high numbers of malaria case in 2017?
- Is there any association b/n Knowledge, ITN owner ship, and utilization?

8.2. LITERATURE REVIEW

Worldwide, about 104 countries and territories are considered malaria endemic [10]. Malaria is an entirely preventable and treatable mosquito-borne illness. However, it remains a huge public health problem throughout the world. According to the annual global report of 2014, 97 countries and territories had ongoing malaria transmission with an estimated 3.2 billion people at risk of malaria, of whom 1.2 billion are at high risk [5].

Malaria occurs mostly in poor tropical and subtropical areas of the world. In many of the countries affected by malaria, it is a leading cause of illness and death. The most vulnerable people for malaria are persons with no or little immunity against the disease. These are young children who have not yet developed partial immunity to malaria, pregnant women whose immunity is decreased by pregnancy especially during the first and second pregnancies and travelers or migrants coming from areas with little or no malaria transmission who lack immunity [11,12].

The problem of malaria is very severe in Ethiopia where it has been the major cause of illness and death for many years. In Ethiopia malaria transmission are unstable. Because of it, malaria epidemic is serious public health emergencies. According to records from the Ethiopian Federal Ministry of Health, 75% of the country is malarias with about 52 million people (68%) of the total population living in areas at risk of malaria [10]. The epidemiology of malaria in Ethiopia contrasts with that of many other countries in Africa with high malaria transmission where malaria morbidity and mortality mainly affect young children. The 2015 MIS data indicated that parasite prevalence in Ethiopia was 0.5% by microscopy and 1.2% by RDTs for areas below 2,000 meters and less than 0.1% prevalence above 2,000 meters [10].

In Ethiopia there are about 835 districts with different levels of malaria risk with an estimated at-risk population of 50.5 million people as per the new stratification. However, the estimates of at risk population from the official projected population size for the year 2016 is 55.3 million. The best available proxy for local malaria transmission risk in Ethiopia is household altitude below 2,000 meters (above sea level), since malaria is rarely transmitted at higher elevations (unless there are weather abnormalities and widespread epidemics). Hence, those districts with malaria high risk needs proper vector control interventions to tackle malaria transmission [5].

Among the most malaria epidemic-prone countries in Africa, Ethiopia is the one of the few African countries that have a history of malaria control strategies for more than 40 years. To combat the burden of Malaria, globally as well in Ethiopia, different strategies were developed. Among these the two major malaria prevention services implemented in Ethiopia are targeted IRS with

insecticides and distribution of LLINs for universal coverage. Other vector control activities, mainly larval control through environmental management and chemical larviciding, are also practiced in areas where such interventions are appropriate and expected to have significant impact [14]. Moreover, ITNs are the cornerstone of malaria prevention efforts, particularly in sub-Saharan Africa. Over the last 5 years the use of treated nets in the region has increased significantly: in 2015, an estimated 53% of the population at risk slept under a treated net compared to 30% in 2010 [8].

Even though the national target is to sustain 100% LLINs coverage in malaria risk areas, as Ethiopian national malaria survey report of 2015 shows, the percentage of households in malarious areas owning at least one LLIN in EMIS 2015 was 64% in Ethiopia, while it was about 60.6% in Afar Region [8]. However, merely the presence of LLITN in House hold do not guarantee the prevention of malaria vectors because proper utilization, Community awareness regarding malaria prevention method and LLITN is crucial.

Cross sectional study done in Tape town in 2014 reported 83.1% of the community knows Bed net as preventive method and 75.5% knows draining stagnant water as malaria preventive methods. In this area, Bed net utilization was 69.9% as this study reveals [15]. In 2015 community based cross sectional study was done in Areka, Southern Ethiopia and it shows 75.3% of the respondents utilize Bed nets always to prevent Malaria infection [9]. Similar study was conducted in Gambella Region Itang district in 2016 and shows, the awareness of the community about malaria preventability was about 65.8% and about ITN was about 67.6%. In addition, this study also reports 81.7% of households owns at least one ITN in their home and only 28.41% HHs were fully covered with ITNs according to the family size [16]. Other study done in Dembele Kebele, southern Ethiopia in 2017 shows 86.7% of the community knows the transmission of Malaria and 76.1% uses mosquito nets to prevent Malaria infection [17].

8.3. OBJECTIVES

8.3.1. General objective

- To Assess the Community Ownership, Knowledge and Utilization of LLTINs in Kunaba woreda Northern Afar,2018

8.3.2. Specific objective

- To assess household level LLTINs coverage in Kunaba woreda
- To measure the level of awareness of communities about Malaria and LLITNs
- To measure LLITNs utilization of the community in Kunaba Woreda
- To identify the association between Knowledge, ITN Owner ship and Utilization

8.4. METHODS & MATERIALS

8.4.1. Study area and Period

The Afar Regional State (ARS) is located in North-Eastern part of the country. The region borders four National Regional States that is in the North and North-West; Tigray region, in the west and South-west; Amhara region, in the south; Oromia region and in South-east; Somalia region. The ARS also shares international borders with Djibouti and Eritrea to the east and North-east, respectively.

According to official statistics, the region's population is about 1.5 million; of which 90% are pastoralists and 10% are agro-pastoralists. Samara is the administrative capital of the region. According to the 2014/2015 Regional Health Bureau data, there are 4 hospitals, 68 health centers, 251 health posts and 88 health stations in the region. These are run by the government. In addition, there are 25 small and medium level privately-owned clinics and only one hospital which operated by a non-governmental organization. Administratively, the region is divided in to five zones, which are further subdivided in to 34 woredas (32 administrative District and two Administrative Towns) and 407 Kebeles. This study will be conducted in Kunaba Woreda which is among Administrative District and located on the north part of the region in Zone two and bordered by Dalol woreda on the northern part, Berhale woreda on the East and south part and Tigray region on the west part. Kunaba Woreda has seven Kebeles among which five of them were malarious Kebele and two of them were non malarious Kebele. According to the population projection from Ethiopian CSA 2007, the has a total population of 66,908 (53% Male population and 47% Female population). The population in Woreda are agro pastoralist. The health services in this woreda has being provided in three health centers and 11 Health posts. Malaria transmission in the Region is generally unstable, with perennial transmission in areas along the Awash River valley. This study will be conducted from April 2,2018 to September 30,2018.

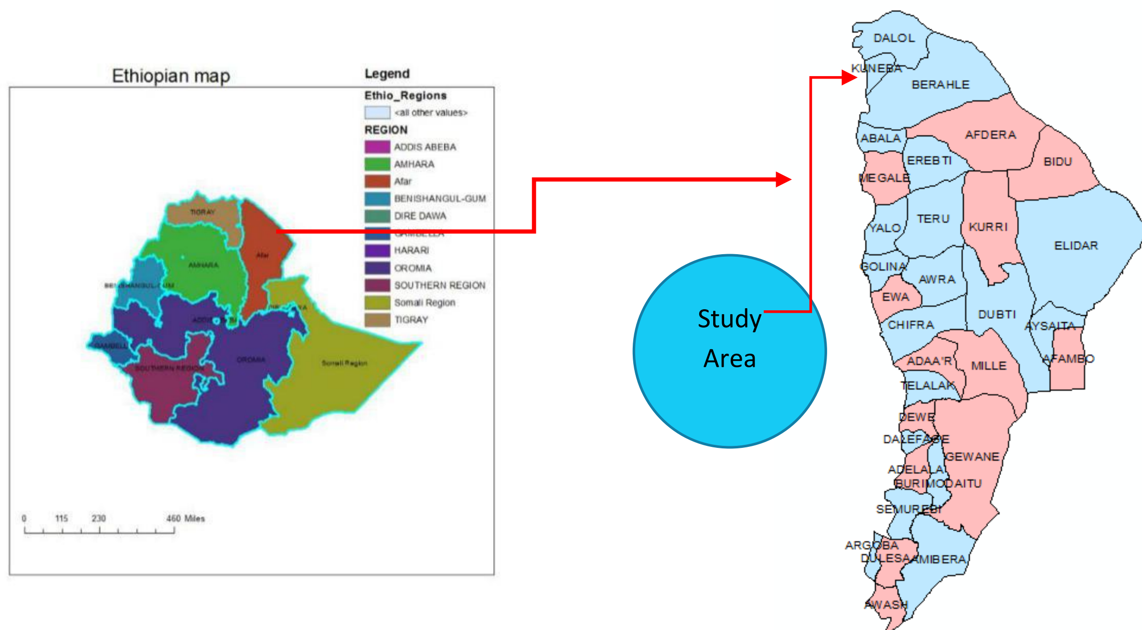

Figure 8. 1 *Study area map*

8.4.2. Study design

A community based home to home cross-sectional study will be conducted to assess the Awareness of Community about Malaria transmission and prevention methods, LLITN ownership, and level of community LLITN utilization. Environmental assessment will also be done to identify the existing malaria risk factors in Woreda.

8.4.3. Target population

The source population will be all households which are found in Seven Kebeles of Kunaba District

8.4.4. Study Subject

One person/head of households from Systematically selected household from each Kebeles in Kunaba district will be participated in interview and households will be selected proportionally.

8.4.5. Sample size calculation

The sample size will be calculated based on a single population proportion formula

$$N = \frac{(Za)^2[p*q]}{d^2}$$

p: The prevalence of the condition/ health state

q: When p is in percentage terms: (100-p)

d: The precision of the estimate. This could be either the relative precision, or the absolute precision 95%.

Za [Z alpha]: The value of z from the probability tables. The value of z corresponding to this is 1.96 (from the standard normal variate tables).

By using different assumptions from different prior studies, we get the following sample size:

Table 8. 1 Different assumptions used in sample size calculation

S.n	Study finding Variables	P	Q	Z	D	Single-population proportion formula	Sample size	NRR (10% of calculated	Total sample size
1	LLINs Utilization (in Afar region 2015)	0.51	0.49	1.96	0.05	$n=Z^2 (p\times q)/w^2$	384	38	**422**
2	LLITNs utilization among children (Afar region 2015)	0.9	0.1	1.96	0.05	$n=Z^2 (p\times q)/w^2$	138	14	**152**
3	LLITNs ownership (in Afar region 2015)	0.61	0.39	1.96	0.05	$n=Z^2 (p\times q)/w^2$	366	37	**403**
4	LLITNs utilization among pregnant women (Afar region 2015)	0.91	0.09	1.96	0.05	$n=Z^2 (p\times q)/w^2$	126	13	**139**
5	Good Knowledge about Malaria transmission and prevention	0.5	0.5	1.96	0.05	$n=Z^2 (p\times q)/w^2$	384	38	**422**

Among the Five indicator, to address all, we will use the variables with larger sample size which is 422. Since the total Household of the study area is less than 10,000 the final sample size ($N_{f)}$ will be calculated using population adjusting formula: -

$$N_f = n/(1+n/N) = 422+ (1+422/3616) = 347$$

Finally, adding the 10% of Non-respondent rate the total sample size will be 382.

8.4.6. Sampling technique and procedure

The study units will be identified by Simple random sampling technique followed by Systematic Sampling method. The first house hold will be selected by simple random sampling and the others will be selected systematically by counting every Nine houses. In cases when the selected Household is not fulfilled inclusion criteria of the study the next house will be selected.

The number of households which will be selected from each Kebeles will determined by the households (population) proportion of respective Kebeles (Table 8.2).

Table 8. 2 Sampling techniques from each Kebele in Kunabe District

Name of Kebeles	a) **Total Population**	b) **#HH**	c) **Proportion (b/3616*100)**	d) **Sample size**
Kunaba	7458	425	12%	45
Balbal	7177	409	11%	43
Gua & Kadhara	12768	728	20%	77
Uruh & Edegahnu	11365	648	18%	68
Adad & Faras Adage	6460	368	10%	39
Wahdes	6422	366	10%	39
Effisho	5953	339	9%	36
Alhena	5837	333	9%	35
Total	63440	3616	100%	382

8.4.7. Data collection procedure

Data will be collected using structured questionnaire which is adopted from different literatures and edited as it helps us to achieve our objectives. It will be translated to Afar language (Local Language) from English Version. The data collectors will be selected from each Kebeles and half day training will be given. To avoid data collectors bias they will be exchanged among the adjacent Kebeles. Important information will be collected house to house. Family head or Family members who are constantly living in the house and above 18ysr old will be selected for face to face interview. The following findings will be expected to be obtained; proportions of HH owned at least one LLITNs, Proportion of households who utilized ITN the night prior to the survey day, pregnant women and children under five who slept under ITN the previous night and awareness level of the community about Malaria transmission and Prevention method.

8.4.8. Data analysis and presentation

After data collection is completed questionnaire will be revised for completeness and consistency of data. Then data will be entered into Epi Info 7 and analysis will be done. We will perform descriptive epidemiology on Community awareness about Malaria transmission and control methods, LLITNs owner ship and utilization. In addition, the association between Knowledge and LLINs Ownership, Knowledge and LLINs Utilization and LLINs Owner ship and Utilization will be measured. Frequency distribution, Measures of dispersion and Central tendency such as Mean

Median, IQR, and measures of association such as X^2 and p value will be used to define the variables. The result will be presented using frequency tables and Graphs,

8.4.9. Variables

- Age
- Sex
- Religious
- Monthly income
- ITN/IRS utilization
- ITN owner ship
- Knowledge
- Shape of ITN
- Family size
- Sleeping behavior on one bed
- Number of ITN in HH

8.4.10. Exclusion and Inclusion Criteria

Inclusion criteria

- All households with in the District

Exclusion criteria

- All households those are found closed or no Family head and/or above 18 yrs. old family members at the survey date will be excluded

8.4.11. Ethical consideration

Ethical clearance will be obtained from Addis Ababa University, Afar regional Health Bureau and Kunaba District Health office prior to data collection. Verbal informed consent will be received from all participants. Confidentiality of the participants will be kept through data collection.

8.4.12. Project outcome

This study will provide important information on the status of Community awareness about malaria transmission and control measures, LLITNs Coverage and utilizations, the association between Knowledge and LLITNs Owner Ship/Utilization and the association between LLITNs Owner ship and Utilizations. The result may contribute for district, regional and national malaria vector control strategy improvement.

8.4.13. Result Dissemination Plan

The study result will be communicated and submitted to the corresponding local health department and community leaders, Kunaba District Health office, regional health bureau of Afar and Addis Ababa University School of public health, Field Epidemiology department. Furthermore, the result of this study will be published, presented on national/international scientific conferences when funds are available.

8.4.14. Operational definition

ITN Utilization: The observation of proper hanging ITN above a bed or sleeping place and the HH response of any of their family members who slept under any ITN at the night prior to the survey was considered as utilized.

Knowledge: Good: The responder scores equals to or greater than the mean score of the series knowledge question compared to each other is considered as have good knowledge on malaria transmission and control measures.

Knowledge: Poor: - The responder scores less than the mean score of the series knowledge question compared to each other is considered as have good knowledge on malaria transmission and control measures.

8.5.WORK PLAN

Table 8. 3 Tentative action plan for assessment of community LLTNs ownership, knowledge and utilization in Kunaba woreda, northern afar, 2018

s/n	**Tasks**	**Responsible body**	**Time frame**																			
			February				March				April				May				June	July	Augu	Sept
			Weeks				Weeks				Weeks				Weeks							
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
1.	Title selection and approval	Investigator & mentors																				
1.	Proposal writing	Investigator																				
2.	Submission to Mentors	Investigator																				
3.	Proposal commented & correction	Mentors & Investigator																				
4.	Resubmission of proposal	Investigator																				
5.	Editing & preparation for defense	Investigator																				
6.	Proposal defense	Investigator																				
7.	Approval	AAUEC																				
8.	Ethical clearance	AAUEC																				
9.	Budget rise	AAU																				
10.	Moving to study area	Investigator																				
11.	Pretest	Investigator																				
12.	Data collection	Investigator, collectors																				
13.	Data analysis	Investigator																				
14.	Writing first draft narration	Investigator																				
15.	Submission of first draft narration	Investigator																				
16.	Rewriting final Narration	Investigator																				
17.	Submission of result	Investigator																				
18.	Result presentation	Investigator																				

8.6.BUDGET BREAKDOWN

Table 8. 4 Project budget break down

Items	Titles	Quantity (Q)	Rate by Birr (R)	Date of duration (D)	Required birr =Q*R*D	Remark
Man power	Data collectors	7	250	14	24,500	
	Supervisor	2	250	14	7,000	
	Principal investigator	1	290	18	5,220	
	Translation (questionnaire)	6pgs	1000		6000	
Transportation	Car rent for transportation	1	2000	18	36,000	
	Fuel	500 lit	16.47	-	8,235	
Stationary	Questionnaire print	2,500pgs	2	-	5000	
	Pen (Bic)	20pcs	5		100	
	Pencil	10pcs	3	-	30	
	Eraser	10pcs	5	-	50	
	Note book	10pcs	12	-	120	
	Bag	10pcs	70	-	700	
	A4 size papers	5 pack	150		750	
Total	Ground Total				93,705	
	Contingency 10%				9370.5	
	Grand total				103,075.5	

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9.1. Public Health Emergency Management Weekly bulletin

WEEK 2 BULLETIN, ADDIS KETEMA SUB CITY, 2018

Highlights of the week 2 (8-14/1/2018)

- Addis ketema sub city surveillance report completeness rates in week 2 for health facilities under all woredas were 100%.
- Completeness and Timeliness for woredas were 100% and 89.33% consecutively.
- Four new MAM cases in week 2 of 2018.
- From 4 malaria suspected cases 4 were confirmed in week 2.
- One relapsing fever cases were reported in week 2 of 2018.
- Numbers of typhoid cases were 286 in week 2.
- Numbers of epidemic typhus cases were 240 in week 2.
- Two measles case was reported in this week.
- No AWD case was reported in this week.

Introduction

This weekly epidemiological bulletin serves to provide key information on public health emergency management activities, and summarizes surveillance data and performance on epidemic prone diseases and other public health emergencies. The bulletin mainly includes surveillance data of week 2 of 2018 received from woredas through SMS and telephone call. It highlights the surveillance completeness and timeliness across all woredas, trends of diseases under surveillance, cluster of cases and events, ongoing outbreak and responses undertaken at all levels in the sub city.

Surveillance report completeness and timeliness.

In week 2 the aggregated surveillance result of completeness and timeliness rate for health facilities under each woreda were 100% and 89.3%. It shows some decrement as compared to week 1. The completeness in all woredas were above the standard value except woreda 2 and 10 (Figure 8.9) Timeliness and completeness for woredas were100% and 80% respectively.

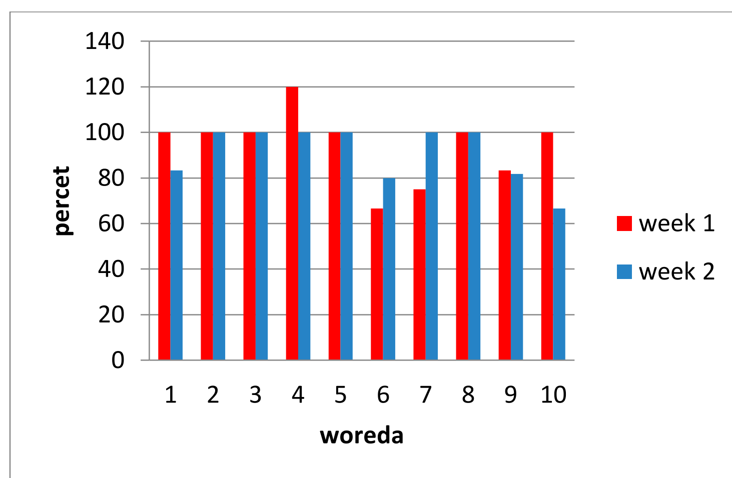

Figure 9. 1 Week 1 and 2 surveillance data completeness by woreda, Addis Ketema Sub city

Diseases and conditions

A. Malaria

From 4 suspected malaria cases four were confirmed by lab in week 2. All of them were p. vivex. The number of cases in this week was the same as compared to previous week. Woreda 4 and 6 each of them reported 1 case and woreda 5 were report 2 cases.

B. Typhoid fever

A total of 286 typhoid fever cases with no death were reported in week 2. The numbers of cases were the same to the previous week. When we try to see the distribution of these cases higher number of cases were reported from woreda 8 was 63(22%), followed by woreda10 48(16.78%). (Figure 9.10)

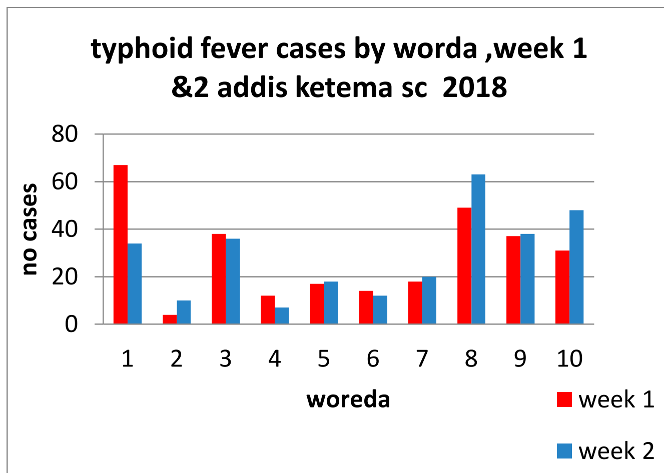

Figure 9. 2 *Trends of Typhoid fever cases by woreda, Addis Ketema sub city, week 1 and 2, 2018.*

C. Meningitis

No meningococcal meningitis case was reported in week 2 of 2018.

D. Dysentery

A total of 39 dysentery cases were reported during week 2. Of which woreda 1 contributed 43.58% of total cases and woreda 4 reported 18% of all cases. (Figure 9.11)

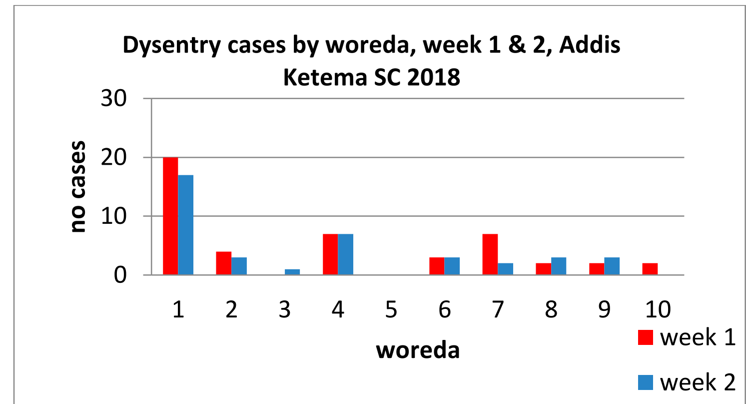

Figure 9. 3 Trends of Dysentery cases in Addis Ketema sub city, week 1 and 2, 2018

E. Relapsing Fever

One relapsing fever cases were reported in week 2 of 2018.

F. Epidemic Typhus

A total of 240 Epidemic Typhus cases were reported during week 2. The numbers of cases were decreased as previous week by 70 cases. Higher numbers of cases were reported from woreda 5, 9 followed by woreda 8. Figure 9.12)

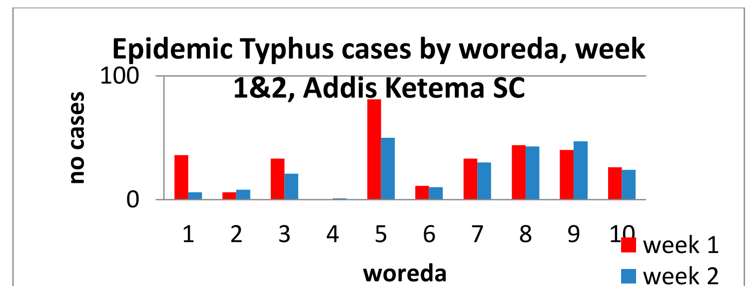

Figure 9. 4 Trends of Epidemic Typhus Cases by woreda, Addis Ketema sub city, week 1 and 2, 2018

G. Malnutrition

A total of four cases with nutritional deficiency were reported in this week. Among them four were diagnosed as MAM.

H. Maternal Death

No maternal death was reported in week 2 of 2018.

I. AWD

No AWD cases were reported in this week.

J. Measles

Two measles case was reported in this week from woreda.

In week 2 AFP, NNT, SARS, Anthrax, rabies, Guinea worm, VHF, Yellow fever and other immediately reportable diseases were reported 0.

Recommendations

- The completeness and timeliness of report in all woredas were above the WHO cut off value requirement of 80% except woreda 2 and 10. This should be kept up in strengthened manner and be consistent.
- The surveillance system should be strengthened by continuous monitoring of non-reporting sites.
- Some woredas are reporting the three highly prevalent diseases for several weeks for instance woreda 1 contribute high number of dysentery, and woreda 5 high numbers of malaria, epidemic typhus and measles cases. Therefore, the specific woredas should investigate and take action accordingly.
- Active surveillance by involving women development army should be strengthened.
- Health extension professionals should encourage and remind women development armies about maternal death identification based on the community case definition.
- The community surveillance should be strengthened, every health extension professional should give special attention and report daily including weekends and holidays to the woreda PHEM, woreda PHEM officers should report timely to sub city PHEM officers since timely reporting is crucial for timely action.

Community Based Surveillance

- In week 2 community based surveillance report completeness for all extension professionals under all woredas were 83.5% that is out of 91 health extension professionals 76 reported weekly report, this may be due to the absence of urban health extension professionals for personal problem.
- In the current week based on the report the community surveillance all immediately and weekly reportable diseases were zero.
- In Addis Ababa context the completeness of report from community should be 100% like that of facility surveillance because there are a lots of opportunities present for instance the women development army structure.

Recommendation for the CBS

- In week 2 the completeness of report of UHEPs were over the WHO cut off value. It should be strengthened by continuous monitoring of non-reporting sites

For correspondence Addis Ketema Sub City EFETP resident

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9.2. Research conducted and Abstract Submitted

- Proposal for malaria mini grant was sent for FMOH and accepted. It was by funded by CDC and we conducted study entitled "assessment of malaria vector control measures (ITNs/IRS) and affecting factors in Adama District, 2017)". The result is waiting for opportunity to be presented on National or International conference.
- In response to call from TEPHINET, one Proposal entitled "Incidence of Birth Defect and Associated Risk Factors in Addis Ababa,2017", "a case control study" was sent for TEPHINET on September 8/2017
- Abstracts entitled "Relapsing Fever Outbreak Investigation in Addis Ketema Sub city, Addis Ababa, Ethiopia, 2017" was sent for Scientific conference in response to call from:
    - 2018 EIS CONFERENCE MIS, FETP International Night 2018 which will be held on April 16–19, 2018 in Atlanta, Georgia.
    - The 7th AFENET Scientific Conference which will be held at the Joachim Chissano Conference Center in Maputo, Mozambique during the week of November 11-16, 2018.

9.3. Conference attended

The first EFELTP annual conference was held in June, 2017 at EPHI, Addis Ababa for three days and all EFELTP residency were invited to submit abstract and to attend the conference. On this conference different scientific writing was presented by residents. Training on Scientific Writing, Arc GIS, etc-------was given for residents by invited guests and I attended the session of scientific writing and presentations.

In addition, other scientific conference was held in February 26-28,2018 at UNCC, Addis Ababa by EPHA for three days. There were very interesting scientific presentations on this conference and I attended and captured good experiences from this conference.

ANNEXES: DATA COLLECTION TOOLS

Annex I Relapsing Fever Outbreak Investigation Structured Questionnaire

Consent form

My name is------------------------------------. I am first year field epidemiology resident in Addis Ababa University School of public health and I interested to investigate relapsing Fever outbreak in Addis Ketema Sub city by identifying predisposing factors. This study, after investigation, will provide recommendation on the place of control method and concerned body will intervene to control further infection. Therefore, your participation has a great role for the success of controlling Relapsing Fever.

While collecting data no one will be wanted to specify her name on the questionnaire paper and no one will be forced to participate in the study. Through all process the confidentiality of interviewee is highly kept. Hence no one can enforce to answer the questioners & you can stop at anywhere even after answering some of questions.

Do you agree?

- Yes
- No

If yes proceed to the question on the next page. Since your answer has great value on my study, while answering the question, please, answer as per your feeling.

Thank you for your willingness!!!!!

Principal investigators Name Dechasa Nesga Phone Number: 0913462418/0924001924

Code --------------------------Date of data collection -----------------------MRN ------------------

Data collector name -----------------------------Signature -----------------

Name of principal investigator------------------------------------

Data collection Place (Name of HF) ------------------ Location of Woreda HF -----------

S/n	Questions	Multiple choice	Skip
	Part I Socio-demographic data		
1.	Age	------------------------------	
8.	Sex	1 Male 2 Female	
9.	Former address		
10.	Woreda(Current)		
11.	Kebele(Ketena) - specific name		
12.	Residency	1 Home 2 Homeless(street) 3 Bed room(daily) 4 Shelter	
13.	House Nº (if any)	------------------	Skip if homeless
14.	Phone number	-------------------------	Optional
15.	How long you live in your current address?	---------------------------------	
16.	If you are living on street, Mention the specific area	---------------------------------	
17.	Religion	1. Orthodox 4. Muslim 2. Protestant 5. Catholic 3. Others	
18.	Ethnic group	1 Amhara 2 Oromo 3 Tigray 4 SNNP 5 Other(specify)------	

19.	Respondent's educational status	1. Illiterate 4. Preparatory 2. Elementary 5. Higher level 3. Secondary	
20.	Respondent's occupation	1. Employed 2. Private owner 3. Daily laborer 4. House wife 5. Student 6. No Occupation	If Student or No occupation skip Q 15 & 16
21.	Working place	----------------------	
22.	Respondent's monthly in come	-----------------------	
23.	Respondent category	1 Case 2. Control	
Part II Participant status and clinical description			
24.	Referral information	1. Self-referral 2. Private Hospital/clinic 3. Government Health facility	
25.	Patients status at arrival	1. Walking by him/her self 2. Supported by others 3. By Ambulance/ any car	
26.	Patient first seen in	1. Emergency OPD 2. OPD (normal OPD)	
27.	Date of Onset of illness	------------------------------------	
28.	Date visit Health facility	----------------------------	
29.	Duration of illness	-----------------------	
30.	Was the patient admitted (treated as IP)?	1. YES 2. NO	If No Skip to Q № 29
31.	If YES, which hospital (HF)?	---------------------------------	
32.	Date of admission:	------------------------------------	
33.	Date of discharge	--------------------------------------	
34.	Discharge diagnosis	---------------------------------------	
35.	Does the patient delouse before discharge	1. Yes 2. No	NA for Controls

36.	What is the symptoms that the patient experiencing? (History + PE) **(Circle all that applies)**	1. Fever 6. Chilling 2. Headache 7. Skin rash 3. Nausea or Vomiting 4. Malaise Myalgia 5. Nosebleeds 8. Joint Pain	
37.	Did the patient experience rash	1. Yes 2. No	If No Skip Q 33
38.	Describe the rash	----------------	
	Part III Laboratory test and Treatment		
39.	Did the Patient tested for blood film	1. Yes 2. No	If No Skip to Q no 37
40.	If yes, Date of specimen taken	----------------------	
41.	What was the result?	1. No hemo parasite seen 2. Borrella species seen	
42.	Laboratory Name	----------------------	
43.	Did the patient get medication?	1. Yes 2. No	If no go to Q. № 39
44.	Types of Drug given for the patient	---------------------------	
Part IV Knowledge questions			
45.	Do you know RF?	1. Yes 2. No	
46.	How RF can be transmitted?	1. Through body louse 2. Sleeping with RF ill person 3. Sleeping in overcrowded house(place) 4. Other(specify)______ 5. I don't know	
47.	How RF can be prevented	1. Keeping personal hygiene 2. Keeping environment clean 3. I don't know 4. Other ___	

48.	Where did you go first when you get ill?	1. Health facility 2. Traditional healer 3. Holy water 4. stays at home 5. Other(Specify)____________	
49.	Which method do you think is best for RF treatment?	1. Modern medicine 2. Traditional medicine 3. Holly water 4. Nutritious food 5. Stays indoor 6. Delousing	
Part V EXPOSURE: - Risk or exposure of louse born relapsing fever			
50.	How many peoples sleep together?	--------------------------	
51.	How frequent do you groom your hair?	1. Every two week 2. Every month 3. Every two to three month 4. More than three month	
52.	How frequent do you take body bath?	1. At least once a week 2. Twice a week 3. Every two to three weeks 4. Other ---------	
53.	How frequent you wash your clothes	1. Once a week 2. Every two week 3. Every three week 4. Once a month 5. Not wash at all	
54.	Do you change your cloths at night?	1. Yes 2. No	
55.	Have you Contact with LBRF ill person	1. Yes 2. No	

Annex II Dysentery disease outbreak investigation and response Questionnaire

Code ----------------------------MRN -----------------Date of data collection-------------

S/n	Variables	Category	Skip
1.	Participants(diseased person) Sex	1) Male 2) Female	
2.	Age		
3.	Woreda	--------------------------	
4.	Specific Kebele	-------------------------------	
5.	Residence	1) Urban 2) Rural	
6.	Occupation (if the patient is child, care giver occupation)	1) Farmer 2) Employed 3) Daily laborer 4) Private owner/merchant 5) House wife/No work	
7.	Religion	1) Orthodox 2) Muslim 3) Protestant 4) Catholic 5) Others(specify)	
8.	Educational status (of care givers for under 15 children)	1) Illiterate 2) Preschool(KG) 3) Primary (1-8) 4) Secondary (9-12) 5) Higher education	
9.	Marital status (of care giver for under 18 participant)	1)Single 2)Married 3)Widowed 4)Divorced	
10.	Family size	----------------------	
11.	Source of information	1) Diseased person 2) Father 3) Mother 4) Other care taker	
12.	Respondent status	1) Case 2) Control	
13.	Family monthly income	------------------------	

B) Epidemiological linkage

S/n	**Variables**	**Category**	**Skip**
14.	Have you travelled out of your village in this week?	1) Yes 2) No	If no skip to Q 16
15.	If yes, Where?	----------------------	
16.	Is there any person who have diarrhea in your home 7 days back?	1) Yes 2) No	
17.	Have you contact with other diarrheal cases 7 days back?	1) Yes 2) No	If no skip to Q 19

18.	If yes who is he/she	1) Family member 2) Friends outside 3) Other relatives	
19.	Did you attend any gatherings or events (wedding receptions, festivals, funerals, church gatherings, etc.) within 10 days back?	1) Yes 2) No	If no skip to Q 21
20.	If yes specify times and location	-----------------------	

C) Clinical information

S/n	Variables	Category	Skip
21.	Clinical features of the cases on presentation	1) Diarrhea 2) Vomiting 3) Fever 4) Headache 5) Other(specify)	
22.	If diarrhea is present types of diarrhea?	1) Bloody 3. Mucoid 2) Watery	
23.	Frequency of defecation per day?	1) Twice and less 2) 3-4 times 3) More than 4 times	
24.	Date of onset?	---------------------------	
25.	Duration of illness?	-------------------------------	
26.	Date visit health facility?	-----------------------------	
27.	Complication seen/dehydration level	1) No dehydration 2) Some dehydration 3) Severe dehydration	
28.	Treatment(anti biotics given)?	1) Yes 2) No	
29.	Discharge diagnoses?	1) Improved 2) Worsen 3) Referred 4) Died	

D) Laboratory data

S/n	Variables	Category	Skip
30.	Stool sample taken	1) Yes 2) No	If no skip to Q 33
31.	Date taken and tested	-------------------------	
32.	Result	------------------------	

E) **Transmission to other**

S/n	Variables	Category	Skip
33.	Is there any person develop diarrhea in your home after you?	1) Yes 2) No	If no skip to Q 37
34.	Is there any person develop diarrhea in your neighbors after you?	1) Yes 2) No	
35.	If yes, have you close contact with he/she?	1) Yes 2) No	
36.	How many people develop this sign after you?	----------------	

F) Sanitation and Hygiene practices

S/n	Variables	Category	Skip
37.	Do you have access to latrine?	1) Yes 2) No	If no skip to Q 40
38.	Do you use it regularly?	1) Yes 2) No	
39.	What types of latrine do you use?	1) Community 2) Private	
40.	Do you/your families Have habits of open defecation?	1) Yes 2) No	
41.	Do you wash your hands after defecation?	1) Yes, always 2) Yes, some times 3) No at all	
42.	Do you wash your hands before meal or preparing food/feeding your child?	1) Yes, always 2) Yes, Some times 3) No at all	
43.	Do you use soaps/any detergents to wash your hands?	1) Yes, always 2) Yes, sometimes 3) No at all	
44.	Do cooked foods be stored for later use in your house?	1) Yes 2) No	If no skip to Q 46
45.	Where do you store?	1)Room temperature (open air) 2)Refrigerator	
46.	What do you/your family use to clean utensils/food container	1) Water only 2) Water with Soap/ detergents 3) Ash	
47.	Where do you/your family dispose of house hold garbage?	1) Pit 2) Open field 3) Garbage box	

G) Water source and food related Exposure

S/n	Variables	Category	Skip
48.	Where is your common source of water for domestic use?	1) Pipe 2) River 3) Well	
49.	Is there shortage of water/interruption of water in your residency area?	1) Yes 2) No	If no skip to Q 51
50.	Where do you get alternative water when your common source is interrupted?	1) Store water for long period before interruption 2) Bought from peoples who fetch from unprotected source 3) River or well	
51.	What type of container are you using to fetch water from the source and for storage in your house?	1) Jerry cane 2) Bucket 3) Ensira (Gan) 4) Other(specify)_______	
52.	For how long do you keep the stored water?	-----------------------days	
53.	Have you ever bought water fetched from unprotected source for domestic use?	1) Yes 2) No	

54.	Do you treat/boil water before use?	1) Yes 2) No	
55.	How often you clean your water storage?	1) Daily 4) Monthly 2) Weekly 5) Not at all 3) Twice a week	
56.	Did you eat/drinking the following foods 48hrs before today? (48hrs before onset of diarrhea for patients those have diarrhea)?	1) Enjera with wat 2) Meat 3) Vegetables 4) Fruits 5) Milk/Milk product 6) Other specify--------	
57.	Have you ever eaten any food or drink outside your home within the past 7 days?	1) Yes 2) No	If no skip to Q 59
58.	If Yes, What type of food/drink do you consumed?	--------------------	
59.	Had you eat raw/uncooked food in the past 48 hours (48 hrs before the onset of diarrhea for cases)?	1) Yes 2) No	If no skip to Q 61
60.	If yes, What types of food or drinking you eat/drink?	------------------	
61.	Did you eat any leftover foods with in the last 48hrs (48hrs before onset of diarrhea?)	1) Yes 2) No	

Data collectors' Name ------------------------Signatures -------------------
Date data collected ---------------------
Investigator's contact address: Decahasa Nesga 0924001924

Annex III Measles case based surveillance system evaluation Questionnaire

No.	Question	Coding Classification
1. Background Information		
1.1	Region	Addis Ababa
1.2	Zone/Sub-city	Addis Ketema
1.3	Woreda	
1.4	Name of Health Facility	
1.5	Respondent Name:	
1.6	Catchment total Population	___________________________
1.7	Date of data collection	
2. Case Detection and Registration		
2.1	Is there national manual/guide line for surveillance at your office?	1.Yes 2. No
2.2	Do you have **Measles** case definition?	1.Yes 2. No
2.3	If yes, is it posted?	1.Yes 2. No
2.4	Does all professionals are aware of it?	1.Yes 2. No
2.5	Do you have rumor log book?	1. Yes 2. No
2.6	If answer for 2.5 is **yes** did you register rumor and did verification?	1. Yes 2. No
3. **Case confirmation**		
3.1.	Do your health facility/health office have the capacity to collect sputum, blood/serum, stool or other specimens?	1.Yes 2. No
3.2	Does your Woreda/HC have the capacity to transport specimens to a higher-level lab?	1.Yes 2. No
3.3	Does your Woreda/HC have guide line for specimen collection, handling and Transportation?	1.Yes 2. No
4. Reporting		
4.1	Did you send Measles surveillance data to the next level?	1.Yes 2. No
4.2	Did you know national time dead line report for immediately and weekly reportable disease?	1.Yes 2. No

4.3	If answer for 4.2 is **Yes**, in what time and when did you report to the next level respectively?	______________________
4.4	Does your Woreda/HC have access to communication facility?	1.Internet 2. Fax 3. Phone
4.5	How do you send the data to the next level?	1.mail 2. phone 3. others
4.6	When do you expected to send surveillance data to next level?	------------------------
4.7	Have you lacked a recommended format in last 6 months?	1.Yes 2. No
5. Data analysis and interpretation		
5.1	Have you trained on Measles surveillance system?	1.Yes 2. No
5.2	Do you have computer?	1.Yes 2. No
5.3	Is it functional?	1.Yes 2. No
5.4	Do you have computer skill?	1.Yes 2. No
5.5	Did you analyze Measles surveillance data?	1.Yes 2. No
5.6	Did you use computer to analyze Measles surveillance data?	1.Yes 2. No
5.7	If answer for 5.6 is **yes**, did you describe data by time, place and person?	1.Yes 2. No
5.8	Did you perform trend analysis of case by time (line graph)	1.Yes 2. No
5.9	Did you have appropriate **denominator** for data analysis?	1.Yes 2. No
5.10	Did you notify the results of your analysis to the sub-city?	1.Yes 2. No
5.11	Do you have an action threshold for any of country priority disease?	1. Yes 2. No
5.12	If answer for 5.11 is **yes**, what is it? (Ask 2 priority disease)	_______case _______% increase
5.13	How often did you analyze collected data? (Daily, weekly, monthly, Quarterly, as needed_____________)	_____________________
6. Outbreak investigation		
6.1	Is there suspected outbreak of Measles in the last 6months? (**Obs**. Report and take copies if possible)	1.Yes 2. No
6.2	If answer for 6.1 is **Yes,** has your Woreda/HC investigated the outbreak?	1.Yes 2. No
7. Epidemic preparedness		
7.1	Did your Woreda/HC have written plan for Epidemic preparedness and response?	1.Yes 2. No

7.2	Did your Woreda/HC have emergency stocks of drugs and supplies at all time in the last 1 year?	1.Yes 2. No
7.3	Has your Woreda/HC experienced shortage of drugs, Vaccines or supplies during the most recent Epidemic/outbreak?	1.Yes 2. No
7.4	Is there a budget line or access to funds for epidemic response?	1.Yes 2. No
7.5	Does your Woreda/HC have rapid response team for epidemics?	1.Yes 2. No
8.Responses and Controls		
8.1	Has your Woreda/HC have implemented prevention and control measures based on local data for Measles? **(at least for 1 disease)**	1.Yes 2. No
8.2	Does your Woreda /HC respond within 48 hrs. Of notification of most recently reported out break?	1.Yes 2. No
8.3	Does your Woreda's/HC's rapid response team /Epidemic management committee have evaluated their preparedness and response activities in the last year? (Obs. written report to conform)	1.Yes 2. No
9. Feedback		
9.1	Did you provide Feedback to lower level in the last 6 months?	1.Yes 2. No
9.2	How did you give your feedback?	1.Oral 2. Written
9.3	If answer for 9.1 is yes, how often did you provide? (weekly, monthly quarterly biannually, annually)	______________________
9.4	Did you receive feedback from higher level in the last 6 months on the data you provided?	1. Yes 2. No
10. Training		
10.1	Did you take training on Measles surveillance within the last year?	1.Yes 2. No
10.2	How many staffs were trained?	______________________
11. Supervision		
11.1	Did you conduct supervision in the last 6 months?	1.Yes 2. No
11.2	If answer for 11.1 is **yes,** how many times did you supervise?	______________________
11.3	How often you supervise? (Weekly, monthly, quarterly …)	______________________
11.4	Did you have supervision checklist?	1.Yes 2. No
Surveillance Attribute		

12. Completeness		
12.1	Number of sites expected to report and reported in the last 1month respectively	Exp. Reported _____ _____
12.2	Are all Measles cases in the last one month from registry was reported?	1.Yes 2. No
12.3	Number of Measles & RF cases from registry and report format in the last 1 month respectively	______ ______ ______ _______
13. Timeliness		
13.1	Is the surveillance data Send/come on time?	1.Yes 2. No
13.2	Percentages of HF submit their report on time?	________________
14. Usefulness		
14.1	Did the suspected outbreaks were detected early by the surveillance system?	1.Yes 2. No
14.2	Did the response initiate in a timely manner?	1.Yes 2. No
14.3	Did any epidemiological investigation conduct?	1.Yes 2. No
14.4	For what purposes do you use the surveillance data? (E.g. early warning and routine program monitoring)	______________________________
15. Simplicity of the system		
15.1	Is the case definition easy?	1.Yes 2. No
15.2	Does the system allow all levels of professionals to fill data?	1.Yes 2. No
15.3	Does the system help to record and report data on time?	1.Yes 2. No
15.4	How long does it take to fill the format?	________________________
15.5	How long does it take to have laboratory confirmation?	_________________________
16. Acceptability		
16.1	Did you believe the surveillance is important for public health intervention?	1.Yes 2. No
16.2	Did you accept the Measles surveillance system?	1.Yes 2. No
16.3	Do you think the reporting agents accept and well engaged to Measles and RF surveillance activities?	1.Yes 2. No

16.4	If yes, how many are active participants in your health center/Woreda	________________________
16.5	If No, what is the reason for their poor participation in the surveillance activity?	_________________________
16.6	Were all participants using the standard case definition to identify cases?	1.Yes 2. No
16.7	Were all the reporting agents send their report using the current and appropriate surveillance reporting format?	1.Yes 2. No
17. Flexibility		
17.1	Can the current reporting formats be used for other newly occurring health event (disease) without much difficulty?	1.Yes 2. No
17.2	Did you think that any change in the existing procedure of case detection and reporting format will be difficult to implement?	1.Yes 2. No
17.3	Is the system easy to add new variables?	1.Yes 2. No
17.4	Is the system easy to integrate with other systems?	1.Yes 2. No
18. Data quality		
18.1	Are all reported forms Complete?	1.Yes 2. No
18.2	Is the recorded data clear to read and understand?	1.Yes 2. No
19. Representativeness		
19.1	Was the surveillance system enabled to follow the health and health related events in the whole community?	1.Yes 2. No
20. Stability		
20.1	Was any new restructuring affected the procedures & activities of the surveillance?	1.Yes 2. No
20.2	Was there lack of resources that interrupt the surveillance system?	1.Yes 2. No
20.3	Was there any time /condition in which the surveillance is not fully operating?	1.Yes 2. No

Annex IV Health Profile Data Collection tool

Part one

1. **Historical Aspects of the area (if available) (from woreda administrator)**
   1.1. The name, how and why_______________________
   1.2. How was the district formed_____________________?
   1.3. Any other historical aspect_______________________
2. **Geography and Climate (From woreda Administrator)**
   2.1. Area of the district(KM^2)?
   2.2. Woreda Boundaries
   - South ----------------------?
   - North -----------------------?
   - West ------------------------?
   - East -------------------------?

   2.3. Altitude _________________?
   2.4. Latitude___________________?
   2.5. Average Annual rain fall?
   2.6. Average Annual temp?
   2.7. Land bodies?
   2.8. Water bodies?
3. **Population & population Structures (From woreda Administrator)**
   3.1. Demographic information (From woreda Administrator)
   - Total Population size-------------------------------?
   - Total number of Kebeles/Ketenas----------------?
   - Male ______________________________________?
   - Female ____________________________________?
   - Urban __________________________________?
   - Rural___________________________________?
   - Sex ratio _______________________________?
   - Age structure: - percentage of children < 1yrs ____<5yrs ______< 15 yrs. -------
   - Women child bearing age(15-49yrs)?
   - Percentage of pregnant women?
   - Dependency ratio (under 18 + above 65)?

   3.2. Religion
   - Orthodox________ (------- %)
   - Catholic___________ (------- %)
   - Protestant__________ (------ %)
   - Muslim_________(_____ %)
   - Others__________(______ %)

   3.3. Ethnic groups/language
   - ☐ Wolayeta---------(------- %)
   - ☐ Tigre--------------- (-------- %)
   - ☐ Oromo-----------(-------- %)
   - ☐ Amhara------------ (-------%)
   - ☐ Gurage------------- (------ %)
   - ☐ Other----------- (-------- %)

   3.4. Marital status
   - Single ------------- (__________%)
   - Married----------- (__________ %)
   - Widowed---------- (_________ %)
   - Separate ----------- (________%)

4. Population Distribution

Population distribution by Kebele/Ketena in woreda 06

Serial	Name of "Ketena"	Male Population	Female population	Total	Total House Hold
1					
2					
3					
4					
5					
6					
7					
	TOTAL				

Population distribution by age in woreda -06 administration, Addis ketema sub city, Addis Ababa, 2017

Age group	Male	Female	Total	Percent (%)
0-4				
5-9				
10-14				
15-19				
20-24				
25-29				
30-34				
35-39				
40-44				
45-49				
50-54				
55-59				
60-64				
+69				

5. Educational coverage

Educational coverage in Addis Ketema Sub city, Woreda 06, 2017

S/No	Type of School	Number School	Owners of school		Number of student			No of Teachers by their title			
			P	G	M	F	Total	Diplo	Degree	Master and above	Total
1.	KG										
2.	Primary										
3.	Secondary.										
4.	Tertiary.										
5.	College										
6.	University										
	Total										

6. *Socio economic conditions*

6.1. Employment

- Number of people employed____________
- Number of people un employed______________
- Ratio of Employed to un employed____________
- Number of factories in woreda-------------------

6.2. Main source of income

- Agriculture ______ Civil servant _______ Others (specify)_________
- Yearly income per house hold_______
- Average income per capita _______________

7. *Communication and Utilities*

- How many of the health facilities have access to transportation_________ (%)?
- Telecommunication__________ (%)
- Electric power____________ (%)

8. *Health sector expenditure and financing resource*

From Government

- Annual woreda budget ---------------------
- Annual budget Allocated to health sector ----------------------------
- Total per capital health expenditure ------------------------
- Annual budget allocation increment percent comparing to the previous year (%)____

From internal --------------------------

Funds from NGOs

Total ------------------------------------Purpose________________________

9. *Water supply*

- Total safe water coverage of woreda --------------------- (------ %)
- Safe water supply coverage by Keble ------------------------
- Kebeles getting safe water ---------------- (--- -----%)

Part Two

2. Health System

2.1. General Information

- The general health system structure of the woreda (flow chart)

- Is there health management team (HMT) at woreda level? Yes/No

----

- If yes, describe the HMT composition and function

- Do you have NGOs working on health and health related issues? Yes/No
- List the NGOs and their work in related to health------------------------

Number of Health Facility

Types of health facility which is found in woreda -06 of Addis ketema sub city, Addis Ababa regional state, 2017

S/N	Type		Number		Remark
			Governmental	Private	
1	Hospital				
2	Health Center				
3	Pharmacy				
4	Drug stores				
5	Diagnostic laboratory				
6	Clinics	Small			
		Medium			
		Higher/specialty			
Total					

2.2. Top 10 causes of Morbidity

S/no	Adult	Number	%	Pediatrics	Number	%
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

2.3. Top ten causes of deaths (mortality)

S/no	**Adult**	**number**	**%**	**Pediatrics**	**number**	**%**
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

2.4. Vital statistics

S/n	Vital statistics		2015	2016	2017	Remark
1.	Infant Mortality Rate (IMR) (total <1 yr deaths	Pop				
		Death				
		%				
2.	Child Mortality Rate (this year's total <15 yr deaths)	Pop				
		Death				
		%				
3.	Crude Birth Rate	Pop				
		Birth				
		%				
4.	Crude Death Rate (total deaths)	Pop. size				
		Death				
		%				
5.	Maternal Mortality Rate (total maternal deaths)	Pop				
		Death				
		%				

2.5. Health Human resource

S/no	Type	Number		Total	Ratio
1	Physicians	M	F		
2	Health officer				
3	Laboratory technician/technologist				
4	Pharmacy technician/pharmacist				
5	Nurse				
6	Midwife				
7	Radiologists				
8	Sanitarian				
9	HEWS				
10	Other health workers				
11	Supportive staffs.				

2.6. MCH service

2.6.1. ANC, FP and delivery Service

Maternal Health service in Addis Ketema sub city, woreda 06, 2017

S/no	Description.	Percentage (coverage)				Remark
		2014	2015	2016	2017	
1.	ANC FIST					
2.	ANC 4TH					
Delivery						
3.	Total Delivery					
4.	Delivery attended by skilled BA					
5.	Delivery attended TBA					
6.	PMTCT					
7.	Option B+					
8.	PNC					
Family planning						
9.	Contraceptive short term					
10.	Contraceptive long term					
11.	Natural method					

2.7. EPI Coverage

Immunization service in Addis Ketama Sub city Woreda 06, 2017

S/no	Description.	Percentage (coverage)				Remark
		2014	2015	2016	2017	
1.	BCG					
2.	MEASLES					
3.	OPV O					
4.	PENTA 1					
5.	PENTA 3					
6.	ROTA					
7.	PCV1					
8.	PCV 3					
9.	FULLY VACCINATED					
10.	TT2+ PW					
11.	TT2+ NPW					

2.8. Environmental sanitation

- Latrine coverage ----------------------- (%)
- Number of house hold with latrine----------------------.
- Solid waste management---
- Liquid waste management --

2.9. Prevalence of TB/Leprosy

TB/Leprosy in Addis Ketama Sub city Woreda 06, 2017

S/No	Description		Population No. (%)
1	Prevalence of TB		
2	Pulmonary TB -	Smear positive	
		Smear negative	
3	Extra PTB		
4	TB detection rate		
5	TB Rx completion rate		
6	TB cure rate		
7	TB Rx success rate		
8	TB defaulter rate		
9	Death on TB Rx		
10	Total TB patients screened for HIV		
11	HIV prevalence rate among TB cases		
12	Prevalence of Leprosy		

2.10. HIV/AIDS

HIV/AIDS treatment and prevention status in Addis Ketama Sub city, Woreda 06, 2017

S/no	Activities	Male	Female	Total	Remark
1.	Total people screened for HIV				
2.	VCT				
3.	PICT				
4.	PMTCT				
5.	HIV Prevalence				
6.	Total PLWHIV				
7.	On ART				
8.	ON PRE-ART				
9.	Condom Distribution				
10.	Health education coverage				

2.11. Disaster situation in the Woreda 06

Was there any disaster (natural or manmade) in the woreda in the last one year?

- YES (specify) ______________________________
- No___________

Any recent disease outbreak/other public health emergency

- Yes (specify) ____________
- No________________________

✓ If yes cases_________ and deaths_______

✓ If yes control method taken----------------------

19. What do you think the major Health problem/s of the district? _____________

20. What do you think solutions of the addressed problems? ______________

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

22. Problem Identification and Priority Setting health problems based on the public health importance, magnitude, seriousness, community concern, feasibilities.

23. What are the main zoonotic diseases in the woreda?

Annex V Rapid Meher Assessment- Health and Nutrition Sector

Interviewer name ______________________________ Institution: __________________________

Interview Date: (dd) ____/(mm)________/2017_______ Region: ______________________________

Zone: _______________Woreda____________

Main contact at this location: Name: ______________________ Position: __________ Tel: ______________

SECTION I: SOCIO- DEMOGRAPHIC PROFILE				
Population: Woreda total population	M: ___________F:___________		Under 5_______	Total: _________
	No. of women of reproductive age (age 15-49 yrs.) __________			
	No. of pregnant and lactating women: _______________			
Special Population *(if any)*	Pastorals____	Refugees____	IDPs____	Migrant Workers___
Number of HCs_______ Number of HPs_______ Number of Mobile health teams _______Number of HEWs_______				
Water availability at health centers (HC)	No. of health centers ______	No. of HC with water access__________	No. of HC without water access__________	

SECTION II: HEALTH PROFILE	
2.1. Coordination and management systems	
Is there a PHEM Officer at Woreda Health Office level? How money PHEM officers are there____________________	Yes□ No□
Is there RRT in Woreda health office	Yes□ No□
Are there RRTs at HCs? If yes no. ________	Yes□ No□
Are there PHEM Officers/focal persons at HCs? If yes No. ________	Yes□ No□
Does the Woreda Health Office regularly report PHEM report as scheduled dates? If yes, Observe copies and comment ____	Yes□ No□
Do the health facilities and HEWs regularly report PHEM report as scheduled dates? If yes, Observe copies and comment _____________________________	Yes□ No□
Is there a multi sector Health Emergency/PHEM coordination forum? If yes, how frequently meet? ____________________	Yes□ No□
Is there a Public Health Emergency preparedness and response plan? Does it include reproductive health? Observe and comment ____	Yes□ No□
Is there accessible emergency response fund? If yes, how much allocated and/or by whom allocated____________________,________________	Yes□ No□

2.2. Morbidity (List top 5 causes of Morbidity) in the year August 2009 to September 2010 EFY (first Quarter)

a. Morbidity below 5 yrs.	b. Morbidity above 5yrs	
1.	1.	
2.	2.	
3.	3.	
4.	4.	
5.	5.	

2.3. List number of cases/deaths from May 2009 to October 2010 (May- October 2017)

Month	AWD				Malaria				Measles				Meningitis				Other (specify)
	Cases		Deaths		Cases		Deaths		Cases		Death		Cases		Death		
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	
May																	
June																	
July																	

August																	
	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	
September																	
October																	

2.4. Outbreak?

Was there any outbreak in the last 3 months? YES________ NO_____________

If yes, specify the type of disease

Type of outbreak _________________Number of cases _______Deaths ______(specify the time period)_________

Type of outbreak _________________Number of cases _______Deaths ______(specify the time period)_________

Type of outbreak _________________Number of cases _______Deaths ______(specify the time period)_________

Type of outbreak _________________Number of cases _______Deaths ______(specify the time period)_________

Type of outbreak _________________Number of cases _______Deaths ______(specify the time period)_________

Is there any ongoing outbreak of any disease? YES________ NO_____________

Type of outbreak _________________Number of cases _______Deaths ______(specify the time period)_________

Type of outbreak _________________Number of cases _______Deaths ______(specify the time period)_________

Type of outbreak _________________Number of cases _______Deaths ______(specify the time period)_________

2.5. Preparedness: Is there emergency drugs and supplies enough for 1 month? Or easily accessible on need?		**Comments**
Ringer Lactate (to treat AWD cases)	Yes□ No□	
ORS (to treat AWD cases):	Yes□ No□	
Doxycycline *(to treat AWD cases)*:	Yes□ No□	
Consumables : Syringes, Gloves *(for AWD management)*:	Yes□ No□	
Amoxil susp (measles)	Yes□ No□	
Tetracycline ointment (measles)	Yes□ No□	
Vit A (measles)	Yes□ No□	
Coartem for Malaria	Yes□ No□	
Lab supply: RDT for Malaria	Yes□ No□	
Lab supply: RDT (pastorex) for Meningitis LP set	Yes□ No□ Yes□ No□	
Number of CTC kit available: (for AWD)	Yes□ No□	
Are there emergency reproductive health kits in health facilities to provide Basic Emergency Obstetric and New Born Care? (If No, list the missing medicines and supplies)		Yes□ No□
Are there emergency medicines and supplies to support care of rape survivors? (Main shortage (if any): Specify)__________________________________		Yes□ No□
Is budget allocated for emergency rapid response by the woreda? How much allocated_________________		Yes□ No□

SECTION III: RISK FACTORS

Diseases	**Risk factors for epidemics to occur**	
Malaria	Malaria endemic area	Yes□ No□
	Presence of malaria breeding site	Yes□ No□
	Interrupted or potentially interrupting rivers	Yes□ No□
	Unprotected irrigation in the area	Yes□ No□
	LLINs coverage No_________%_____________	
	Indicate the coverage of IRS 2010. No_________%_____________	

	Was there any prevention and control activities? If yes, what intervention was taken ___________	Yes□ No□
	Number of malarious kebeles and total population in these Kebeles	Keb_____ Pop_____
Meningitis	Was there Meningitis epidemic in the last 3 years (If yes specify date) If yes, No_________%______________	Yes□ No□
	Has vaccination been conducted in the past 3 years If yes, No______________%______________	Yes□ No□
	If yes: Indicate the date and number of people vaccinated Date ______________________No_________%______________	
AWD	Was there AWD epidemic in the last three years (If yes specify date)	Yes□ No□
	Latrine coverage No_________%______________	
	Latrine utilization No_________%______________	
	Safe water coverage percentage %____________	
Measles	Is there ongoing measles outbreak	Yes□ No□
	What is the measles vaccination coverage of 2010 first quarter, less than one year No_____%_____	
	Has SIA been conducted in from May 2009- to October 2010 EFY	Yes□ No□
	If yes, Indicate the month and number/coverage% of children vaccinated including the age group Month_________ Number_________ Age group_________ Coverage (%) ______	

Any other observations you made or any risks of epidemics?

____

____

What were the major challenges in your Epidemic response experience?

____

____

____

1.15 Are there systems in place to make referral to relevant service providers when cases are identified with protection concerns? --

1.16 SECTION IV: NUTRITION– SAM and MAM Management in the woreda – May to Oct 2017

SAM Management

4.1. Facilities with SAM management in the woreda

Month	Total Number of Hospitals	Total Number of Health centers	Total Number of Health posts	Number of SC.	% of health centers/ hospitals with a SC.	Number of OTP.	% of health posts with an OTP	Total Number of OTP/SC reported	% of OTP/SC who have reported
May									
June									
July									
August									
September									
October									

4.2 Admission and performance of the therapeutic feeding program for SAM management

Month	Total number of new admission of SAM		% of SAM children cured		% of SAM children defaulted		% of SAM children died		% of SAM children non-respondent		% of SAM children other	
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009
May												
June												
July												
	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
August												
September												
October												

4.3. Availability of therapeutic supplies

	Yes	No
Is there sufficient supplies for 3 months of:		
RUTF		
F100		
F75		
2nd line drugs		
Is there sufficient woreda level storage for SAM treatment at woreda level?		
water availability at stabilization center (SC)		

4.4. Reporting

Is there weekly SAM report? Yes _____ No_______ (if yes observe)

4.5. Training

How many HWs have been trained on SAM management in the Woreda? ______
How many HWs have been trained on IYCF Emergency in the Woreda? ______
How many HEWs are there in the woreda? No______, % _____
How many HEWs have been trained in SAM management? No ______, %_____
How many HEWs have been trained in IYCF Emergency? No ______, %_____

4.6. MAM Management
TSFP programme in the woreda

Questions	Yes	No
Is this a priority 1 woreda?		
Was there a TSFP distribution last month?		
Is there sufficient TSFP supplies for the next 1 month (RUSF, CSB+/oil or CSB++) ?		
Is there woreda level storage of TSFP supplies for at least 2 months of supplies?		
Are children discharged from OTP referred to TSFP		
Is this a pilot (2nd generation) TSFP woreda?		
Has the Woreda been supported by an NGO in the last 3 months?		

4.7. MAM admission

Is this Priority 1 woreda? Yes□ No□ I don't Know□

Month	MAM admission		Total MAM Cases		Total Number of Food Distribution point in the woreda
	2008 E.C.	2009 E.C.	2008 E.C.	2009 E.C.	
May					
June					
July					
August					
	2009 E.C.	2010 E.C.	2009 E.C.	2010 E.C.	
September					
October					

4.8. Screening

When was the last screening conducted in the woreda? ______

What screening modality is used in the woredas? EOS ______, CHD _____, Routine_____, vitamin A and Screening coverage __________________ Vitamin A coverage De-worming coverage _______

4.9. Screening performance for children in the woreda

Month	Target Children 6-59 months	# of screened children	Screening Coverage (%)	# of Children with odema and MUAC <11cm			# of children with no oedema and MUAC 11 to 11.9CM	% Proxy GAM for children	% Proxy SAM for children
				#SAM			#MAM		
				MUAC <11 cm	Odema	Total			
May									
June									
July									
August									
September									
October									

4.10. Screening performance for Pregnant and lactating Women (PLW) in the woreda

Month	Target PLW	# of screened PLW	Screening Coverage (%)	# of PLW MUAC below 23.0 cm*	% Proxy GAM for PLW
May					
June					
July					
August					
September					
October					

4.11 Any other observations you made or any risks of emergency nutrition?

____
____
____

4.12 What were the major challenges in your emergency nutrition response experience?

____
____

4.13 Are the services accessible particularly for disabled and elderly? If not, why not? ----------------------
--

SECTION V: FLOODING

4.1. Was there flood disaster in the last 6 months in the **Region /Zone**? Yes□ No□
4.1.1. If yes, how many Kebeles affected _____________,
4.1.2. Names of kebeles _____________, _______________, _______________,_________________
4.1.3. Population affected_________
4.1.4. Human death due to flooding Yes□ No□,
4.1.5. If yes, how many in number_________
4.1.6 Are there displaced people due to flooding? Yes□ No□
4.1.7. If Yes, how many PLW___________
4.1.8 If Yes, how many reproductive age women__
4.1.9 Children<5yrs________________<2 yrs. ________ <6months________ 6-23 months _________
4.1.10. Was there outbreak in the flood affected area Yes□ No□

If yes, Type of outbreak ________________Number of cases _______Deaths ______(specify the time period)_________
Type of outbreak ________________Number of cases _______Deaths ______(specify the time period)_________
Type of outbreak ________________Number of cases _______Deaths ______(specify the time period)_________
Type of outbreak ________________Number of cases _______Deaths ______(specify the time period)_________
Type of outbreak ________________Number of cases _______Deaths ______(specify the time period)_________

Any comments on flooding

____
____
____
____

Annex VI Assessment of Community Knowledge, Owner ship and utilization of LLITNs in Kunaba District, Northern Afar, Ethiopia, 2018.

Greeting: -

Hello, I am ________________________________. I am Field epidemiologist from Addis Ababa University. Also Introduce yourself that, you came from woreda /Zonal health office. Then explain the purpose of the study for the respondent by saying that "the reason why I came here is to ask you some questions related to malaria. The purpose of this interview is to have your opinion on the bed nets. This in turn will help to design the intervention to tackle the transmission of malaria." After the explanation, identify the presence of any household member whose age is greater than 18 years old and select the proper respondent.

II. Informed consent

Read the following paragraph for the selected person." To conduct our study, I would like to ask you some questions. I kindly request you to give me your sincere and truthful answer. All the information that you are going to give me will remain confidential and you don't need to mention your name."

Are you willing to participate in the interview?

Yes___________ (continue the interview). No___________ (Thank and stop)

Signature___________________________ Date__________________

Signature of the supervisor _________________Date______________________

Participant Code----------------- Kebele---------------------Date--------------------

A. Socio-demographic Characteristics

No	Question	Response	Skip
01	Sex of the Head of HH	1. Male 2. Female	
02	Age of the head of Family (In years)	....	
03	Household Residence	1. Urban 2. Rural	
04	Marital status of Family Head	1. Married 2. Single 3. Divorced 4. Widowed	
05	Educational status of family Head	1. Illiterate 2. Primary 3. Secondary 4. Preparatory 5. Higher	
06	Religion	1. Orthodox 2. Protestant 3. Muslim 4. Catholic 5. Others (specify......1)	
07	Source of Family income (Occupation)	1. Agrarian 2. Pastoralist 3. Agro pastoralist 4. Employed 5. Daily laborer 6. Merchant 7. No income	
08	Average Monthly income (Eth birr)	....................birr	
09	Family size (constantly who shares the same house)	....	

B. Housing Condition and sleeping patterns of the HH

No	Question	Response	Skip
10	House-roof construction material	1. Thatch/Leaf 2. Corrugated iron 3. Plastic	
11	Does the HH member have habits of sharing one bed/sleeping area?	1. Yes 2. No	If no, skip to Q13
12	Persons sharing one bed	1. Two and less people share one bed 2. 3-5 people share one bed 3. More than 5 people share one bed	
13	How many Sleeping rooms are there?	1. One 2. Two 3. Three and above	
14	How many Beds/sleeping area available in the HH?	1. One 2. Two 3. Three and above	
15	Sleeping pattern of children <5 years' old	1. All children under 5years together 2. They sleep with both parents 3. They sleep with other family member	
16	Bed Room status	1. Separate from other room 2. Shared with other room	

C. Knowledge and practice of the respondent

No	Question	Response	Skip
18.	Could malaria transmit to another person from infected person?	1. Yes 2. No	If no, skip to Q20
19.	If Yes, how could it be transmitted?	1. Mosquito bite 2. Body contact/sleeping with infected person 3. Living in one room 4. I don't know 5. Other(specify------2)	

No	Question	Response	Skip
20.	Where could malaria Vector (transmitting mosquito) breed?	1. Stagnant water 2. Swampy areas 3. Running water 4. Waste material 5. I don't know 6. Others (specify-----3)	
21.	When do mosquitoes mostly bite?	1. Day 2. Night 3. Any time 4. I don't know	
22.	Do you think malaria is preventable?	1. Yes 2. No	If no, skip to Q 24
23.	How can we prevent malaria transmission	1. Using ITNs /IRS 2. Source reduction 3. Drugs(prophylaxis) 4. Close the doors and windows at night 5. Not known	
24.	Does sleeping under bed net cause any problem?	1. Yes 2. No	If no, skip to Q 26
25.	If YES, to Q 20 above, what are the major problems?	1. No comfort 2. Cause heat 3. Air hanger 4. If other, specify------4	
26.	Who are at high risk of malaria in the household? (Multiple answer is possible)	1. Under five children 2. Pregnant women 3. Adults 4. Old age 5. I don't know	
27.	Who should be given priority in malaria infection in the household? (Multiple answer is possible)	1. Under five children 2. Pregnant women 3. Adults 4. Old age 5. I don't know	
28.	How frequent and when should one use ITN?	1. Every night 2. Seasonally 3. When Mosquito seen in the house 4. I don't know	

No	Question	Response	Skip
29.	Who should have to uses the ITNs? (Multiple answer possible)	1. Children only 2. Mother only 3. Father only 4. Father and mother only 5. The whole family 6. Children and mother	

D. ITN ownership and Utilization

No	Question	Response	Skip
30.	Do you have any types of ITN in house?	1. Yes 2. No	If no, skip to Q 46
31.	How many ITN (any types) are there in the house hold?	1. One 2. Two 3. Three and above	
32.	Who provide ITN for you?	1. Bought/gift from relatives 2. Kebele/health bureau 3. NGO	
33.	When you bought/provided (the very recent one) ITN	1. One year and less (2017) 2. Two years ago (2016) 3. More than two years ago (before 2016)	
34.	Number of beds /places of sleep observed with bed nets	1. One 2. Two 3. Three and above	
35.	The type of bed net that household owned	1. Re treatable 2. Permanently treated	
36.	If it is retreat able and used more than one year have you retreated it as recommended (per year)	1. Yes 2. No	
37.	If no, why?	1. No K-O tab 2. Lack of information 3. Forgotten 4. Other(Specify------5)	
38.	Is the bed net hanged(placed) properly over the bed or sleeping area?	1. Yes 2. No	
39.	Is there any hole(throne) in the bed net?	1. Yes 2. No	

No	Question	Response	Skip
40.	Shape of Bed net	1. Conical 2. Rectangular	
41.	Are there any Family members of the family slept under any ITN last night	1. Yes 2. No	
42.	Do you use ITN every night continuously?	1. Yes 2. No	
43.	If no, Why?	1. I don't think it is important 2. We use it when the mosquito seen the house 3. To save the bed net from damage 4. It is not comfortable	
44.	Did you ever wash your ITN	1. Yes 2. No	
45.	If Yes, how frequent you wash it?	1. Once a week 2. Every two weeks 3. Every month 4. Every 2-3 month 5. Every 4-6 months and above	
46.	Was the house sprayed with insecticide (IRS) in the last 6 months?	1. Yes 2. No	
47.	Have you ever seen or heard any messages about bed net from any source?	1. Yes 2. No	
48.	Is there <5 child in the household?	1. Yes 2. No	If no, skip to Q 50
49.	If **YES**, did he/she sleep under bed net previous night? (For those who own)	1. Yes 2. No	
50.	Is there a pregnant woman in the house hold?	1. Yes 2. No	If no, skip to Q 52
51.	Did she sleep under bed net the previous night? (For those who own bed net)	1. Yes 2. No	

E. Family history of Malaria illness

No	Question	Response	Skip
52.	Did any of family members diagnosed of Malaria in this year?	1. Yes 2. No	If no, skip to Q 55
53.	Who was he/she?	1. Father 2. Mother 3. < 5ys child 4. 5-10yr children 5. Adult children(>10yr)	
54.	What was its outcome?	1. Improved 2. Died 3. Unknown	

F. Malaria Risk Factors in local area

No	Question	Response	Skip
55.	Is there any malaria predisposing factors in your Kebele/Local area	1. Yes 2. No	
56.	Is there any of the following risk factors found in your Kebele (living area)?	1. Malaria endemic area(Yes/No) 2. Presence of malaria breeding site(Yes/No) 3. Interrupted or potentially interrupting rivers(Yes/No) 4. Unprotected irrigation(Yes/No)	
57.	Is there any action taken to reduce this source by you/government?	1. Yes 2. No	If no, skip to Q59
58.	What action was taken?	1. Draining stagnant water 2. Health education given 3. Chemical spray on the source 4. Entomological test done 5. Restricting travel	
59.	Is malaria common disease for your Kebele?	1. Yes 2. No	
60.	Is there any probability of traveling to any area where malaria is common, among your family?	1. Yes 2. No	

Annex VII Preparedness plan for AWD, Afar region, 2018

Assumptions					
Assumptions	At risk woredas = different	Adult = 85%	ORS = 650 sachet per 100 cases	CTC = 1 CTC with 10 beds. Bed occupancy rate 3 days	
	Attack Rate = 2%	Children U5 = 15%	RL = 10 bags per severe patient	Wastage factor = 15%	
	Severe cases= 50%	Pregnancy = 2%	Doxycycline = 3 capsules per patient	Operational cost = 3 USD per cases	

Zone	Woreda	At risk population	Expected cases	Severe DHN	RL/100ml	ORS(sachets)	Doxycycline 100mg(1000/tin)	PNGT	ANGT	IV cannula	Scalp vein	Erythromycin 250 mg tab, 1000/T	Amoxicillin 250mg/5ml susp,100	CTC	Operational cost	RDT kit	Total cost
Zone 1	Asayita	71,526	1,431	715	7,153	9,298	4	16	91	608	54	0	215	1	98,706	5	**3,579,157**
	Chifra	115,022	2,300	1,150	11,502	14,953	7	26	147	978	86	1	345	1	158,730	5	
	Dubti	100,279	2,006	1,003	10,028	13,036	6	23	128	852	75	0	301	1	138,385	5	
	Elider	101,638	2,033	1,016	10,164	13,213	6	23	130	864	76	0	305	1	140,260	5	
	Mile	117,960	2,359	1,180	11,796	15,335	7	27	150	1,003	88	1	354	1	162,785	5	
	Kori	36,662	733	367	3,666	4,766	2	8	47	312	27	0	110		50,594	5	
	Afambo	29,444	589	294	2,944	3,828	2	7	38	250	22	0	88	1	40,633	5	
Sub – Total		572,531	11,451	5725	57,253	74,429	34	129	730	4,867	429	3	1,718	6	790,093	35	
Unit Cost (ETB)					32	4	480	14	16	5	4	480	20	94,941	1		
Total Cost (ETB)					1,832,099	297,716	16,489	1,855	11,680	22,191	1,718	1,319	34,352	569,646	790,093	0	
Zone 2	Afdera	40,960	819	410	4,096	5,325	2	9	52	348	31	0	123	1	2,458	5	**2,286,922**
	Berhale	98,345	1,967	983	9,835	12,785	6	22	125	836	74	0	295	1	5,901	5	
	Abala	52,301	1,046	523	5,230	6,799	3	12	67	445	39	0	157	1	3,138	5	
	Erepti	42,103	842	421	4,210	5,473	3	9	54	358	32	0	126	1	2,526	5	
	Kunaba	66,908	1,338	669	6,691	8,698	4	15	85	569	50	0	201	1	4,014	5	
	Dalol	101,524	2,030	1,015	10,152	13,198	6	23	129	863	76	0	305		6,091		
	Mogale	34,103	682	341	3,410	4,433	2	8	43	290	26	0	102	1	2,046	5	
Sub – Total		**436,244**	**8,725**	**4,362**	**43,624**	**56,712**	**26**	**98**	**556**	**3,708**	**327**	**2**	**1,309**	**6**	**26,175**	**30**	
Unit Cost (ETB)					32	4	480	14	16	5	4	480	20	94,941	1		
Total Cost (ETB)					1,395,981	226,847	12,564	1,413	8,899	16,909	1,309	1,005	26,175	569,646	26,175	0	

Zone 3	Amibara	94,718	1,894	947	9,472	12,313	6	21	121	805	71	0	284	1	5,683	5	**1,553,953**
	Awash Fentale	46,909	938	469	4,691	6,098	3	11	60	399	35	0	141	1	2,815	5	
	Buremudaitu	37,981	760	380	3,798	4,938	2	9	48	323	28	0	114	1	2,279	5	
	Gewane	41,470	829	415	4,147	5,391	2	9	53	352	31	0	124	1	2,488	0	
	Argoba	27,535	551	275	2,754	3,580	2	6	35	234	21	0	83		1,652		
	Dulecha	25,551	511	256	2,555	3,322	2	6	33	217	19	0	77	1	1,533	5	
Sub – Total		274,164	5,483	2,742	27,416	35,641	16	62	350	2,330	206	1	822	5	16,450	20	
Unit Cost (ETB)					32	4	480	14	16	5	4	480	20	94,941	1		**1,660,486**
Total Cost (ETB)					877,325	142,565	7,896	888	5,593	10,627	822	632	16,450	474,705	16,450	0	
Zone 4	Awra	42,504	850	425	4,250	5,526	3	10	54	361	32	0	128	1	2,550	5	
	Ewa	57,252	1,145	573	5,725	7,443	3	13	73	487	43	0	172	1	3,435	5	
	Gulina	62,138	1,243	621	6,214	8,078	4	14	79	528	47	0	186	1	3,728	5	
	Yalo	57,222	1,144	572	5,722	7,439	3	13	73	486	43	0	172	1	3,433	5	
	Teru	82,111	1,642	821	8,211	10,674	5	18	105	698	62	0	246	1	4,927	5	
Sub – Total		301,227	6,025	3,012	30,123	39,160	18	68	384	2,560	226	1	904	5	18,074	25	
Unit Cost (ETB)					32	4	480	14	16	5	4	480	20	94,941	1		
Total Cost (ETB)					963,926	156,638	8,675	976	6,145	11,676	904	694	18,074	474,705	18,074	0	
Zone 5	Telalak	46,617	932	466	4,662	6,060	3	10	59	396	35	0	140	1	2,797	5	**1,371,582**
	Samurobi	38,950	779	390	3,895	5,064	2	9	50	331	29	0	117	1	2,337	5	
	Hadele'ela	43,591	872	436	4,359	5,667	3	10	56	371	33	0	131	1	2,615	5	
	Dalifage	46,542	931	465	4,654	6,050	3	10	59	396	35	0	140	1	2,793	5	
	Dawa	52,136	1,043	521	5,214	6,778	3	12	66	443	39	0	156	1	3,128	5	
Sub – Total		227,836	4,557	2,278	22,784	29,619	14	51	290	1,937	171	1	684	5	13,670	25	
Unit Cost (ETB)					32	4	480	14	16	5	4	480	20	94,941	1		
Total Cost (ETB)					729,075	118,475	6,562	738	4,648	8,831	684	525	13,670	474,705	13,670	0	
Grand total of Pop. and ED		**1,812,002**	**36,240**	**18,120**	**5,798,406**	**942,241**	**52,186**	**5,871**	**36,965**	**70,233**	**5,436**	**4,175**	**108,720**	**2,563,407**	**864,461**	**0**	**8,165,179**
Contingency					**869,761**	**141,336**	**7,828**	**881**	**42,510**	**80,768**	**6,251**	**4,801**	**125,028**	**384,511**	**129,669**		**1,224,777**
Grand total of cost					6,668,167	1,083,577	60,014	6,752	79,474	151,001	11,687	8,976	233,748	2,947,918	994,130	135	**9,389,956**

Annex VIII Preparedness plan for Malaria, Afar region 2018

General Assumptions				
	At risk woredas = Total population of the Woreda	Attack Rate = 0.2%	Severe cases= 15%	3 days admission
	RL = 5 bags x 0.2% of total population	Pregnancy = 4% of total population		
			Wastage factor = 15% included	5 Health workers (HWs)per woreda trained on management of
	30% cases (P. Vivax)	Under-five = 10% of total population	Quinine = 10 ampule per sever case	Sever and complicated malaria for five days
	70% cases (P. falciparum)	Coartem	Dextrose 40% = 4 ampule per severe case	

Zone	Woreda	At risk population	Expected cases	Sever cases	RL/DW bag of 1000ml	Coartem 24-tab blister/pack	Chloroquine 250mg tin of 1000 tab	Quinine injection (of 10 ampule) Pack	Quinine 300mg tab tin of 1000	Chloroquine syrup of 60ml bottle	Dextrose 40% of 20ml (ampule 20), pack	Paracetamol 500mg tab (tin of 1000)	Paracetamol suspension 100ml/bottle	RDT KIT	Total Cost of drugs, and supplies	Operational cost
		A	B	C = 15% * B	D = B * 5 * 0.7	E = B	F = 10 * B * 0.3	G = C * 10	H = 0.7 * B *10	I = B * 0.3*1*2 bottles	J = 5*C	K = 10*A	L = B*0.16*1.15*1	M = B * 1.15		25 ETB/Sever Cases/day
Zone 1	Asayita	71,526	1,431	215	5,007	1,431	5	2,146	12	99	62	16	263	1,645	**1,992,350**	**94,691**
	Dubti	100,279	2,006	301	7,020	2,006	7	3,008	16	138	86	23	369	2,306		
	Elider	101,638	2,033	305	7,115	2,033	7	3,049	16	140	88	23	374	2,338		
	Mile	117,960	2,359	354	8,257	2,359	8	3,539	19	163	102	27	434	2,713		
	Afambo	29,444	589	88	2,061	589	2	883	5	41	25	7	108	677		
Sub – Total		420,847	8,417	1,263	29,459	8,417	29	12,625	68	581	363	97	1,549	9,679		
Unit Cost (ETB)				0	32	16	25	40	81	9	201	25	5	32		
Total Cost (ETB)					942,697	136,354	732	505,016	5,496	5,169	73,133	2,393	7,744	313,615		
Zone 2	Berhale	98,345	1,967	295	6,884	1,967	7	2,950	16	136	85	23	362	2,262	**826,349**	**39,274**
	Erepti	42,103	842	126	2,947	842	3	1,263	7	58	36	10	155	968		
	Megale	34,103	682	102	2,387	682	2	1,023	5	47	29	8	125	784		
Sub – Total		174,551	3,491	524	12,219	3,491	12	5,237	28	241	151	40	642	4,015		
Unit Cost (ETB)					32	16	25	40	81	9	201	25	5	32		

Total Cost (ETB)					390,994	56,555	304	209,461	2,280	2,144	30,333	992	3,212	130,075		
Zone 3	Amibara	94,718	1,894	284	6,630	1,894	7	2,842	15	131	82	22	349	2,179	**1,297,932**	**61,687**
	Awash Fentale	46,909	938	141	3,284	938	3	1,407	8	65	40	11	173	1,079		
	Buremudait	37,981	760	114	2,659	760	3	1,139	6	52	33	9	140	874		
	Gewane	41,470	829	124	2,903	829	3	1,244	7	57	36	10	153	954		
	Argoba	27,535	551	83	1,927	551	2	826	4	38	24	6	101	633		
	Dulecha	25,551	511	77	1,789	511	2	767	4	35	22	6	94	588		
Sub – Total		274,164	5,483	822	19,191	5,483	19	8,225	44	378	236	63	1,009	6,306		
Unit Cost (ETB)					32	16	25	40	81	9	201	25	5	32		
Total Cost (ETB)					614,127	88,829	477	328,997	3,581	3,367	47,643	1,559	5,045	204,307		
	Ewa	57,252	1,145	172	4,008	1,145	4	1,718	9	79	49	13	211	1,317	**953,935**	**45,338**
	Gulina	62,138	1,243	186	4,350	1,243	4	1,864	10	86	54	14	229	1,429		
	Teru	82,111	1,642	246	5,748	1,642	6	2,463	13	113	71	19	302	1,889		
Sub – Total		201,501	4,030	605	14,105	4,030	14	6,045	32	278	174	46	742	4,635		
Unit Cost (ETB)					32	16	25	40	81	9	201	25	5	32		
Total Cost (ETB)					451,362	65,286	350	241,801	2,632	2,475	35,016	1,146	3,708	150,159		
Zone 5	Telalak	46,617	932	140	3,263	932	3	1,399	8	64	40	11	172	1,072	**1,078,608**	**51,263**
	Samurobi	38,950	779	117	2,727	779	3	1,169	6	54	34	9	143	896		
	Hadele'ela	43,591	872	131	3,051	872	3	1,308	7	60	38	10	160	1,003		
	Dalifage	46,542	931	140	3,258	931	3	1,396	7	64	40	11	171	1,070		
	Dawe	52,136	1,043	156	3,650	1,043	4	1,564	8	72	45	12	192	1,199		
Sub – Total		227,836	4,557	684	15,949	4,557	16	6,835	37	314	197	52	838	5,240		
Unit Cost (ETB)					32	16	25	40	81	9	201	25	5	32		
Total Cost (ETB)					510,352.64	73,818.86	396.16	273,403.20	2,975.61	2,798.28	39,592.54	1,295.38	4,192.18	169,783.39	**6,149,173.89**	**292,252.28**
Tot. Pop. and supplies		**1,298,899**	25,978	3,897	90,923	25,978	77,934	38,967	1,818,459	15,587	19,483	12,988,990	4,780	29,875	**922,376.08**	**43,837.84**
		Total													**7,071,549.98**	**336,090.12**
		G. Total													**7,407,640.09**	

Declaration

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

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Signature: ______________________________

Place: Addis Ababa City Administration Regional Health Bureau

Date of Submission: May,2018

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

Name of Mentors

Dr. Adamu Addissie (MD, MPH, PHD)

Signature: _______________________

Date: ____________________________

Mr. Sofonias Getachew (MPH, PHD Fellow)

Signature: _______________________

Date: _________________________

PERSONAL INFORMATION

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WORK EXPERIENCE

1. **Dates (from - to) May 23, 2012 – September,2016**
   a) Name and address of employer: Kirkos Health Center, Kirkos Sub city, Addis Ababa, Ethiopia
   b) Type of organization: Governmental Health Facility
   c) ART prescriber, ART focal person and health promotion case team sub process owner at kirkos health center
2. **Dates (from - to) February 8,2011 to May 22, 2012**
   a) Name and address of employer Kirkos Health Center, Kirkos Sub city, Addis Ababa, Ethiopia
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   c) Occupation or position held: EPI Room focal person
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   a. Name and address of employer: Kirkos Health Center, Kirkos Sub city, Addis Ababa, Ethiopia
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   c. Occupation or position held Acting as a Clinician in OPD

Educational Background: Higher education

1. **Dates (from - to) October 2007 to July 2010**
   a) Name and type of organization: Arba Minch University, Health Sciences College
   b) Principal subjects/ occupational skills: BSC **in Nursing**
   c) Title of qualification awarded: BSC Degree
   d) Level in national classification: 1st Degree

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   c. Title of qualification awarded: Degree of masters
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LANGUAGE SKILLS

Language	Listening	Speaking	Reading	Writing
English	**Excellent**	**Very good**	**Excellent**	**Excellent**
Amharic	**Excellent**	**Excellent**	**Excellent**	**Excellent**
Oromic	**Excellent**	**Excellent**	**Excellent**	**Excellent**

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