ADDIS ABABA UNIVERSITY, SCHOOL OF PUBLIC HEALTH, DEPARTMENT OF PREVENTIVE MEDICINE

Ethiopian Field Epidemiology Training Program (EFETP)

Compiled Body of Works in field Epidemiology

By – Mulugeta Worku Merga

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

June 2019

Addis Ababa

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ADDIS ABABA UNIVERSITY, SCHOOL OF PUBLIC HEALTH, DEPARTMENT OF PREVENTIVE MEDICINE

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Examiner

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List of Acronyms and Abbreviations

AFP – Acute Flaccid Paralysis

ART – Anti Retro Viral Therapy

BCG – Bacillus Chalmette Guerin

BPR - Business Process Re-engineering

CBN – Community Based Nutrition

CHIS- Community Health Information System

CNS- Central Nervous System

CSF – Cerebro Spinal Fluid

DOT – Directly Observed Treatment

EDHS-Ethiopian Demographic and Health Survey

EPHI – Ethiopian Public Health Institute

EPI – Expanded Program of Immunization

FANC- Focused Antenatal Care

FETP- Field Epidemiology Training Program

FMOH-Federal Ministry of Health

Glp Q- Glycerophosphodiester phosphodiestrase Q

HEWs – Health Extension Workers

HMIS - Health Management Information System

ICPD - United Nations International Conference on Population and Development

IDP – Internally Displaced Peoples

IDSR – Integrated Disease Surveillance and Response

IgM – Immuno globulin M

IHR – International Health Regulation

IUCD – Intrauterine contraceptive device

LBRF – Louse Borne Relapsing Fever

MCH-Maternal and Child Health

MDR – Multi drug resistance

MMR - Maternal Mortality Ratio

MOH – Ministry of Health

MPH – Master of Public Health

MUAC – Mid-upper Arm Circumference

NGO – Nongovernmental Organization

NNT – Neonatal Tetanus

ORHB – Oromia Regional Health Bureau

ORS – Oral Rehydration Salt

OTP – Oral Therapeutic Program

PAB – Protected at Birth

PCR – Polymerase Chain Reaction

PCV – Pneumococcal Congregate vaccine

PHEM- Public Health Emergency Management

PICT – Provider Initiated Counseling and Testing

PLWHA – people living with HIV/AIDS

PMTCT – Prevention of Mother to Child Transmission

SDGs - Sustainable Development Goals

STI – Sexually Transmitted Infection

TB - Tuberculosis

TTC - Tetracycline

VCT – Voluntary Counseling and Testing

WaSH – Water Sanitation and Hygiene

WHO – World Health Organization

Executive Summary

Many strategies and programs were set to enhance disease prevention activities. The Ethiopian Field Epidemiology Training Program adopted from the United States Centers for Disease Control and Prevention (CDC), Epidemic Intelligence Service (EIS) is one of the programs focusing on capacity building of public health practitioners. The training enables trainers to conduct disease surveillance and implement prevention and control measures of prioritized diseases.

From October, 2017 to April, 2019 I have stayed in the Field Epidemiology Training Program, School of Public Health-AAU, Addis Ababa City Health Bureau, Public Health Emergency Management Core Process and Ethiopian Public Health Institute field bases. During my stay, I have learnt a lot and carried out many public health activities. I carried out two outbreak investigations, one surveillance data analysis, one surveillance system evaluation, one Sub City health profile description; two scientific manuscript for peer reviewed journal, one abstracts for scientific conference, one disaster situational analysis and one epidemiological research proposal.

We have investigated two Measles outbreaks during field base residency. The investigations were performed by descriptive and analytical epidemiology methods to describe magnitude of the diseases and identify risk factors associated with the diseases. The investigation was conducted in Oromia Region, Bale Zone, Sewena District, Kiltu Kebele and SNNPR Gedio Zone, Gedeb Distrct.

We analyzed five years (2013 – 2017) Relapsing fever surveillance data in Addis Ababa City to know the burden and trends of the disease. A total of 2,517 Relapsing fever cases were reported to the Public Health Emergency Center from the Addis Ababa Regional Health Bureau from 2013 – 2017. Among the reported cases, 2,256 (89.67%) were treated as outpatient and 261 (10.33%) were treated as inpatient. The data collected from 814 government and private health facilities in 2017, show 24% increment of reporting health facilities, compared to the 2013.

Surveillance system evaluation was conducted from November 26 to December 20, 2018 in Gulele Sub City, Addis Ababa, Ethiopia. The surveillance system of the Sub City was simple, flexible and useful. However, attributes like; data quality, acceptability, timeliness, and stability require attention for improvement of surveillance process. The system needs to be improved through training, supervisions and feedbacks.

We have collected and summarized health and other health related events, demographic, socio-economic, political and cultural aspect of the Gulele Sub City of Addis Ababa from March 17, 2018 to April 15, 2018. Acute upper respiratory tract infection was the leading cause of adult and under five children morbidity in the Sub City. Five hundred thirty two all forms of TB cases were detected which is low compared to 207/100,000 detection rate according to the National TB guide line.

We have also prepared scientific manuscript for peer reviewed journals on Relapsing fever data analyses in Addis Ababa City and measles outbreak investigation and response at Kiltu kebele, Sewena District, Bale Zone, Oromia Region. One abstract was prepared for scientific conference on Measles outbreak investigation in Kiltu Kebele, Sewena District, Bale Zone, Orormia Region, Ethiopia.

Narrative summary of disaster situation was conducted in SNNPR, Gedio Zone, Gedeb District. Diarrhea and scabies were the leading cause of morbidity. Water and latrine were the main IDP site problems.

Epidemiological research project proposal on Husband's knowledge on obstetric danger signs and associated factors in Holeta Town, Oromia Region was prepared. A Cross-sectional descriptive study will be used for this study. A sample of 422 married men whose wives have given birth in the past 12 months prior to study period will be selected randomly and included in the study. The aim of the study will be to determine husband's knowledge on obstetrics danger signs and identify associated factors. The total estimated budget required for the study is 16,565.85 ETB.

CHAPTER ONE
OUTBREAK INVESTIGATION

1.1 Measles Outbreak Investigation in Kiltu Kebele,Sewena District, Bale Zone, Oromia Region, Ethiopia, 2019

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Abstract

Introduction - Measles is a highly contagious, acute, viral illness caused by a member of the genus *morbilli* virus of the *Paramyxoviridae.*. In Africa, 450 000 cases were reported and in Sub Saharan Africa with 250, 000 deaths in 2009. In Ethiopia, measles cases usually come late to health facilities and often after they have developed complications. Investigation was done to verify the existence of an outbreak, to determine the magnitude and identify associated risk factors contributing for the occurrence of the outbreak.

Methods - A cross-sectional descriptive study followed by a one to two unmatched case control study was conducted from January 7 to February 3, 2019. Interview using structured questionnaire was used to collect data from cases and controls. Data were managed and analyzed using Microsoft Excel 2007 and Epi-Info 7.2.1.0.

Results - Over the period of the outbreak, 23 measles cases were identified. The age of cases ranged from 1 to 12 years old, with median age of 5 years. Of the total cases, 13(57%) were under five years and 10(43 %) of them were above five years. The overall attack rate of the disease was 7 per 1000 inhabitants of the kebele, with no death. Having contact with a person suspected to have measles during the last weeks OR: 6.4 (95% CI, 12. 6 – 44.3) and presence of measles case in the family OR: 6.5 (95% CI, 4.4 – 13.22) were significantly associated with contracting measles. Moreover, absence of measles vaccination was a risk factor for developing measles (OR: 2.53, (95% CI 1.7 – 14.67).

Conclusion and Recommendations- The outbreak occurred in a remote pocket Kebele of the Sewena District with extremely low immunization coverage. Multiple factors contributed for the occurrence of the outbreak. We recommend enhanced routine immunization service, and awareness creation to the community on mode of transmission, prevention and health seeking behavior. **Key Words**: measles, outbreak, Kiltu, Sewena

1.1.1 Introduction

Measles is a highly contagious, acute, viral illness caused by a member of the genus *morbilli* virus of the *Paramyxoviridae* (1). Humans are the only natural hosts of the measles virus. Although monkeys may become infected, transmission among them in the wild does not appear to be a mechanism by which the virus persists in nature. The virus appears to be antigenically stable, there is no evidence that the viral antigens have significantly changed over time. However, sequence analysis of viral genes has shown that there are distinct lineages (genotypes) of wild type measles viruses. When considered along with epidemiological information, identification of a specific virus genotype can suggest the origin of an outbreak (1).

The measles virus is sensitive to ultraviolet light, heat and drying. The virus has a short survival time (< 2 hours in air or on objects and surfaces. Patients are contagious from 1 or 2 days before symptom onset until 4 days after the rash appears. Infectivity peaks during the prodromal phase. The mean intervals from infection to symptom onset and rash appearance are 10 and 14 days, respectively (1). The signs and symptoms of measles, include fever, lack of appetite, cough, coryza, red eyes, and maculopapular rash, with complications, such as pneumonia, blindness, brain damage, diarrhoea and croup (1).

The complications of measles can be divided into three groups, according to sites involved: the respiratory tract, the central nervous system (CNS), and the gastrointestinal tract. Respiratory tract involvement is manifested as laryngitis, croup, or bronchitis, occurs in the majority of cases of uncomplicated measles. In young children, otitis media is the most common complication. Pneumonia is a frequent reason for hospitalization, especially of adults(1). The pneumonia is of viral origin in the majority of cases, but secondary bacterial infection (most commonly caused by streptococci, pneumococci, or staphylococci) also develops with some frequency (2).

Measles is one of the vaccine preventable disease that are targeted for elimination and with half of the world close to eliminating measles, many countries in sub Saharan Africa, including Ethiopia are still struggling to control the disease (2). In 2006, countries in the World Health Organization (WHO) African Region adopted a goal to achieve 90% measles mortality reduction by 2010 compared with the estimate for 2000. By 2008 the African Region, reported measles cases decreased 93% and estimated measles mortality decreased 92%, compared with 2000.

Since 2002, Ethiopia adopted these regional goals and strategies and has been taking important steps to control and ultimately to eliminate measles by 2020 (2, 3).

Measles vaccination is one of the most cost-effective interventions available. Since measles vaccine was developed in 1958, it has saved the lives of millions of children throughout the world. The history of immunization services in Ethiopia prior to 1980 has not been documented very well although the smallpox eradication activities have left some legendary memories. The Expanded Programme on Immunization (EPI) was launched in Ethiopia in 1980 based on the international, as well as national, experiences and resources gained during the smallpox eradication activities in the late 1970s. Currently, the service is delivered through static and outreach sites nationwide. The current Ethiopian routine immunization schedule recommends measles vaccination at 9 months of age (4).

Globally, more than 20 million cases are reported yearly and 345,000 deaths were recorded in 2005. Fifty to sixty percent of 1.6 million global deaths attributed to vaccine preventable diseases are attributed to measles. In Africa, 450, 000 cases were reported and in Sub Saharan Africa 250, 000 deaths were reported in 2009 (5).

Measles is the commonest of vaccine preventable diseases that occur in Ethiopia; where parents recognize it as a self-limited common childhood illness for which no medical care is often sought. In Ethiopia, measles cases usually come late to health facilities and often after they have developed complications. Measles surveillance in a few selected administrative zones of Ethiopia in 2002 revealed age shift of measles cases from children under five to those above five years of age (6).

In Oromia Region, measles outbreak is still a main public health concern. During the period of 2018/2019, measles epidemics were reported from eleven zones namely; East Harerge, West Harerge, East Wollega, Arsi, Bale, Borena, Guji, Horro Guduru Wollega, Illubabor, Kellam Wollega, and West Shewa Zones of the Region. Unpublished outbreak investigation report by Field Epidemiology Training Program Residents showed that the possible factors associated with the disease were low immunization coverage, malnutrition, poor cold chain management and community attitude toward measles control.

1.1.2 Objectives

1.1.2.1 General Objective

The overall objective of the investigation was to verify the existence of an outbreak, to describe the outbreak and identify associated risk factors that contributed for the occurrence of the outbreak and ensure that virus transmission is interrupted as soon as possible in Kiltu Kebele, 2019.

1.1.2.2 Specific Objectives

- To verify existence of measles outbreak in the District
- To describe the outbreak by time, place and person
- To identify risk factors contributing for contracting the disease

1.1.3 Methods

1.1.3.1 Study area

Sewena District is one of the Districts found in Bale Zone, Oromia Region of Ethiopia. Sewena District is bordered on the North by Lege Hida District, on the South Rayitu District, on the West Gololcha District and on the East Somali Regional State. The administrative center of the District is Micha Town, which is about 610 kms away from Addis Ababa to the South. The total population of the District projected from 2007 E.C census was 91,195. In Sewena District there were 28 rural Kebeles and one urban Kebele. The District had five health centers and 29 health posts.

The health service coverage of the District both by health centers and health posts is 100%. Kiltu is one of the kebeles found in Sewena District and affected by measles outbreak since January, 2019. The total population of the Kebele was 3,384 and it has one health post staffed with one health extension worker. The Kebele shares boundary with Ginir District on the West, Wangaya on the North, Somali Region in the East, Arele in the South. We conducted the investigation in Kiltu Kebele, Sewena District, Bale Zone, Oromia Region (Figure 1).

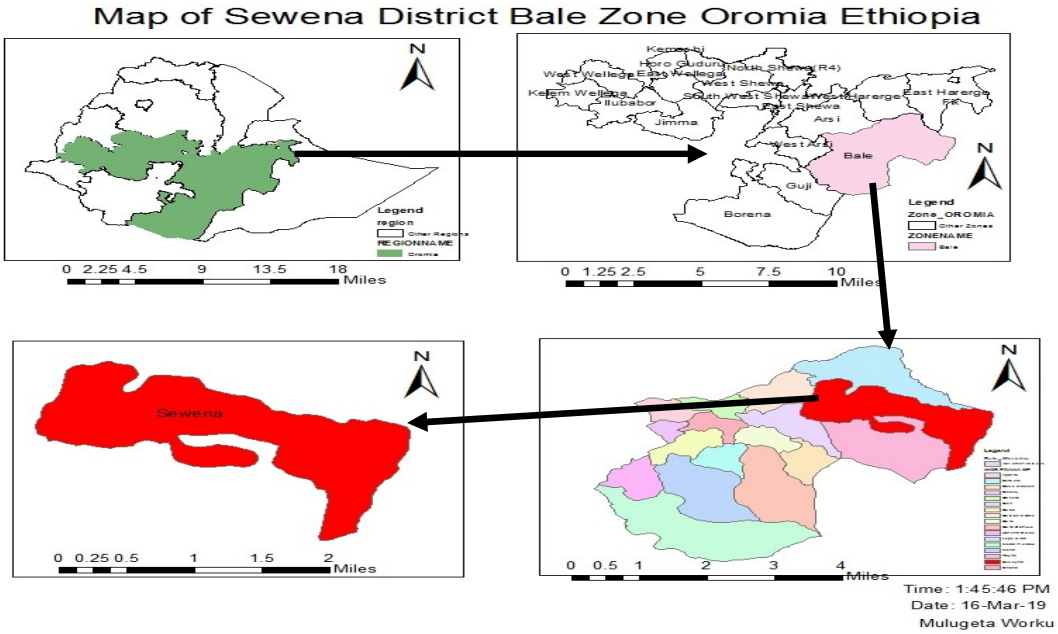


Figure 1: Map of Sewena District, Bale Zone, Oromia Region, Ethiopia, 2019

1.1.3.2 Study Period

We conducted unmatched case- control study from January 7 to February 3, 2019 in Kiltu Kebele, Sewena District, Bale Zone, Oromia, Ethiopia.

1.1.3.3 Study Design

A one to two unmatched case control study design and descriptive analysis was done on the measles cases identified during the epidemic. The previous three years EPI coverage was reviewed and collected from Sewena District Health Office.

The uni-variate analysis included the calculation of means and medians for quantitative (numerical) variables, and frequencies and percentages for qualitative (categorical) variables. Attack rates per 1,000 inhabitants of the community and by age group were also calculated. Moreover, Bi-variate and multi- variate analysis were performed to determine associated risk factors for contracting the illness.

A WHO working case definition was used to actively search for the cases in the community and the active case search was done at house to house level.

1.1.3.4 Study Source population

All population of the Kiltu Kebele was the source population for measles outbreak investigation.

1.1.3.5 Target population

During the outbreak investigation, all confirmed and suspected measles cases, deaths and selected community controls were target population of this study.

1.1.3.6 Sample size determination and Sampling

All measles case of the District was included and two controls for each case were selected based on geographical accessibility.

1.1.3.7 Inclusion criteria

Cases: Any resident of Kiltu Kebele who tested and positive for IgM or those who fulfilled measles case definition from January 7 – February 3, 2019 and who agreed to participate in the study was included.

Controls: A control was any resident of Kiltu Kebele during the study who did not develop sign and symptoms of measles and agreed to participate was included.

1.1.3.8 Exclusion criteria

Case: Those who refused to participate or were unconscious were excluded.

Controls: Those who refused to participate and family members from the same household were excluded.

1.1.3.9 Case Definition

Suspected measles case:

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 (2).

Confirmed measles case:

A suspected case with laboratory confirmation (positive IgM antibody) or epidemiologically linked to confirmed cases in an outbreak (2).

Measles Community case definitions:

A community member should report any person with fever and rash to a health worker and also advise the person to go to a health facility (2).

Measles Outbreak:

In Ethiopia, a measles outbreak is defined when three or more laboratory confirmed measles IgM- positive cases occur in a health facility or District within 30 days (2).

Epidemiologically linked cases:

A suspected measles case that has not had a specimen taken for serologic confirmation and is linked (in place, person and time) to a laboratory confirmed case; i.e., living in the same or in an adjacent district with a laboratory confirmed case where there is a likelihood of transmission; onset of rash of the two cases being within 30 days of each other (2).

Measles Death:

For surveillance purposes, a measles death is defined as any death from an illness that occurs in a confirmed case or epidemiologically linked case of measles within 30 days of the onset of rash (2).

1.1.3.10 Operational definition

Literate: for this investigation we labeled literate those study subjects that have the skill to read and write.

Illiterate: study subjects who were not capable to read and write were labeled illiterate.

Nutritionally normal: For under five aged children mid-upper arm circumference (MUAC) measurement over 135 mm indicates that the child is well nourished.

Moderately Acute Malnutrition: For under five aged children MUAC measurement between 110 mm and 135 mm indicates Moderately Acute Malnutrition.

Severely Acute Malnutrition: For under five aged children MUAC measurement less than 110 mm (11 cm) indicates severe acute malnutrition.

1.1.3.11 Data processing and analysis

Data were collected, entered, summarized and analyzed using Epi-info version 7.2.1.0 and Microsoft office Excel 2007 software. Results were presented using graph, figures and tables. Attack rate, frequencies and case fatality rate were also calculated. Estimated odds ratio and 95% confidence interval for risk factors were determined through bi-variate and multi-variate analysis.

1.1.3.12 Data quality control

We used line listing for describing measles cases in term of time, place and person. However, all data were checked for completeness before entry and analysis.

1.1.3.13 Ethical consideration

Ethical clearance and support letter were obtained from the Federal Ministry of Health and also support letter were obtained from Bale Zone Health Office to conduct the study. Moreover, objectives of the study were briefly mentioned and oral informed consent was obtained from the study participants or their parents to participate in the study. Participants were treated with respect and willingness in the study without payment or cohesion. Confidentiality and no personal details were recorded or produced on this documentation.

1.1.3.14 Data dissemination

Findings of this investigation in both soft and hard copy were communicated with Oromia Regional Health Bureau, Bale Zone Health Office, Sewena District Health Office and Addis Ababa University. Soft copy of the document was sent to FETP mentors, resident advisors and coordinators.

1.1.4 Results

1.1.4.1 Descriptive analysis

Over the period of outbreak (January 7, 2019 - January 16, 2019) we identified 23 suspected measles cases. From five of the cases, blood samples were collected for laboratory confirmation, and tested at Ethiopian Public Health Institute (EPHI). All of the five samples were positive IgM antibody. Among the total cases, 13(57%) of them were males. The age of the case ranged from 1 to 12 years old with the median age of 5 years. Of the total cases, 13(57%) of them were under five years and 10(43 %) of them were above five years (figure 2).

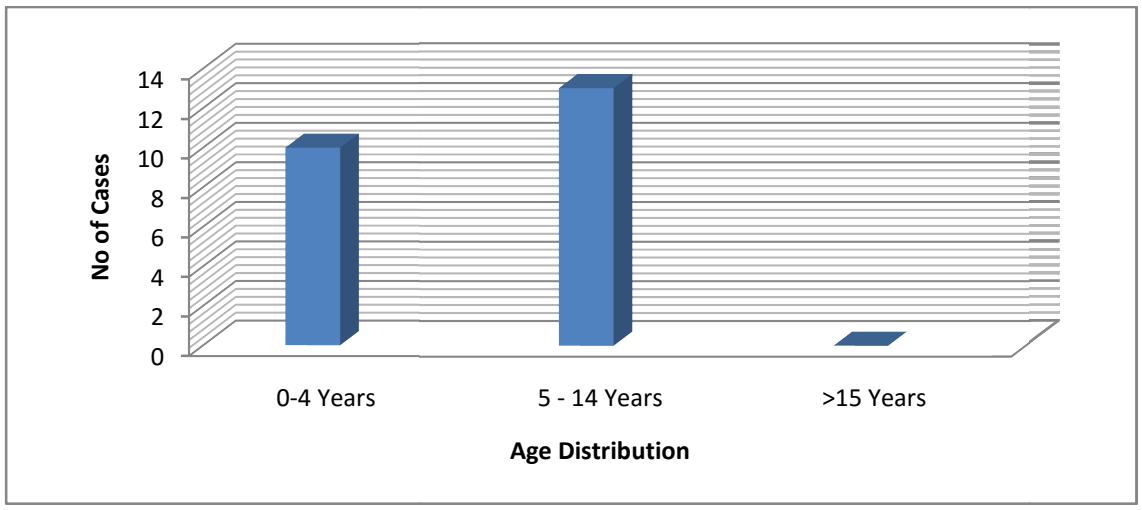


Figure 2: Age Distribution of measles cases in Sewena District, Bale Zone, Oromia Region, 2019

The outbreak started in 2nd WHO epidemiological week of 2019 and ended in the early 3rd week of 2019. The outbreak was detected by health extension workers and reported to the District Health Office on January 8, 2019. The District Health Office notified to Zonal Public Health Emergency Management Department. The Zone immediately notified the suspected measles outbreak to Oromia Regional Health Bureau (Figure 3). On January 9, 2019 five blood samples were collected from suspected cases and sent to the Ethiopian Public Health Institute for confirmation. The detection, notification and response were early due to the rumor of the cases from neighboring Region/Somali and District/ Dawe Serer.

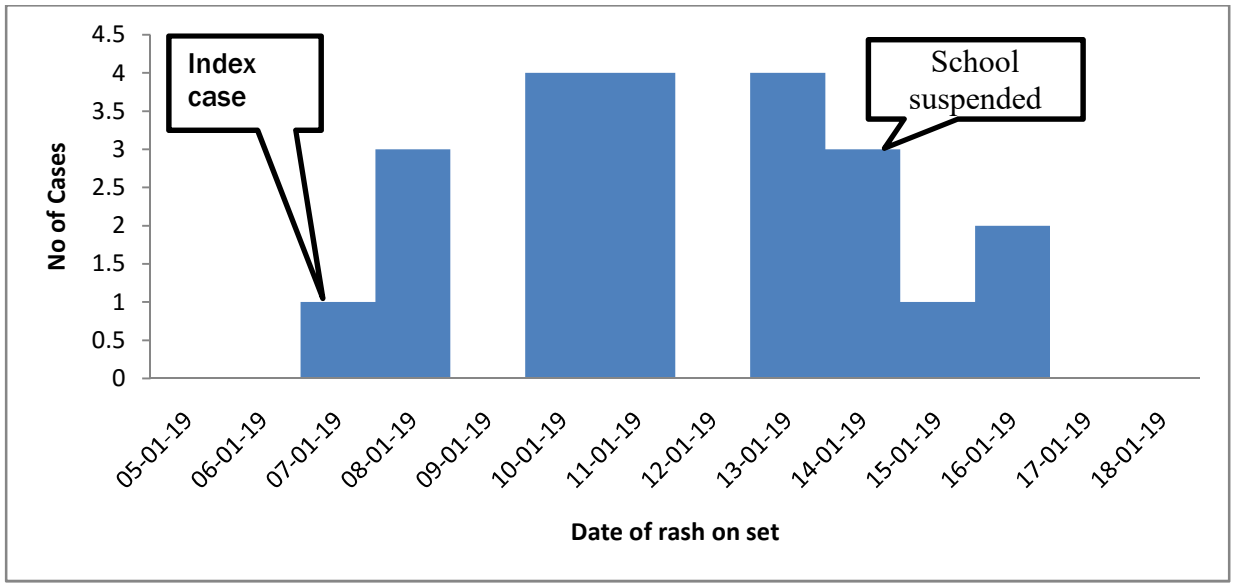


Figure 3: Number of measles cases by date of rash on set in Kiltu Kebele, Sewena District, Bale Zone, Oromia Region, Ethiopia, 2019

Regarding the Vaccination status of the cases, 18(78%) of them did not receive any dose of measles vaccine prior to the outbreak period, while only 5(22%) of them reported to have received at least one dose of measles vaccine and 3(60%) of them has shown vaccination card (figure 4). The main reason the respondent complaining were the long distance of the health facility from their village to get vaccination service; it takes more than one hour to reach Health post.

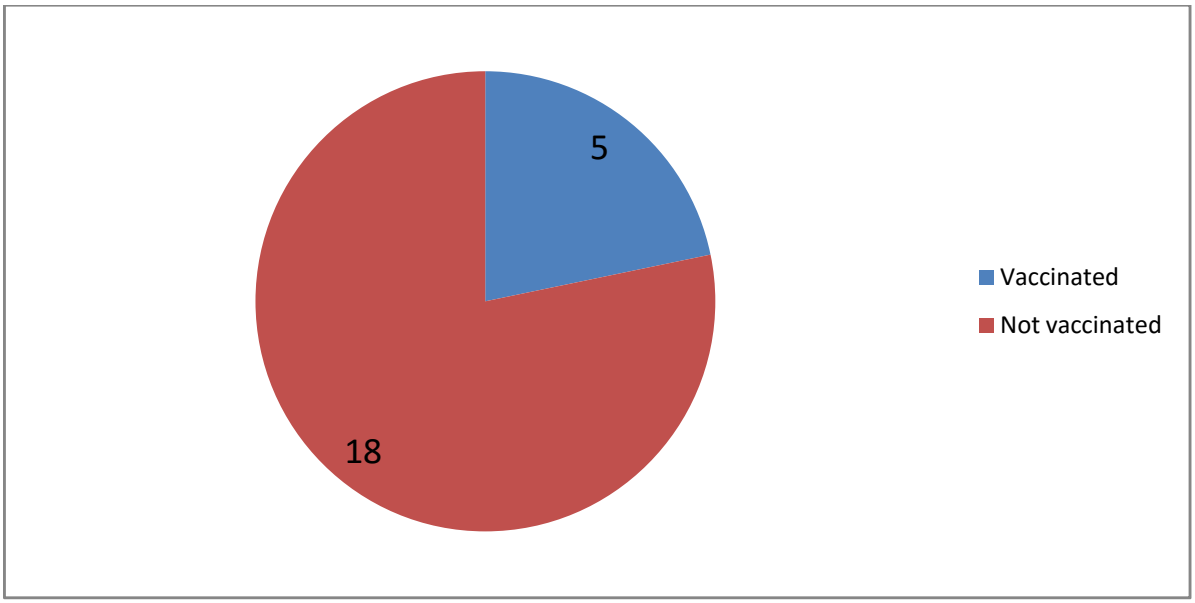


Figure 4: Vaccination status of measles cases in Sewena District, Bale Zone, Oromia Region, Ethiopia, 2019

The overall attack rate of the disease was 7 per 1000 inhabitants of the kebele with no death. The highest attack rate 20 per 1000 was among children of age group 0-4 years. Children in the age group of 5-14 were the least affected with an attack rate of 8 per 1000 inhabitants of this age group (Table 1).

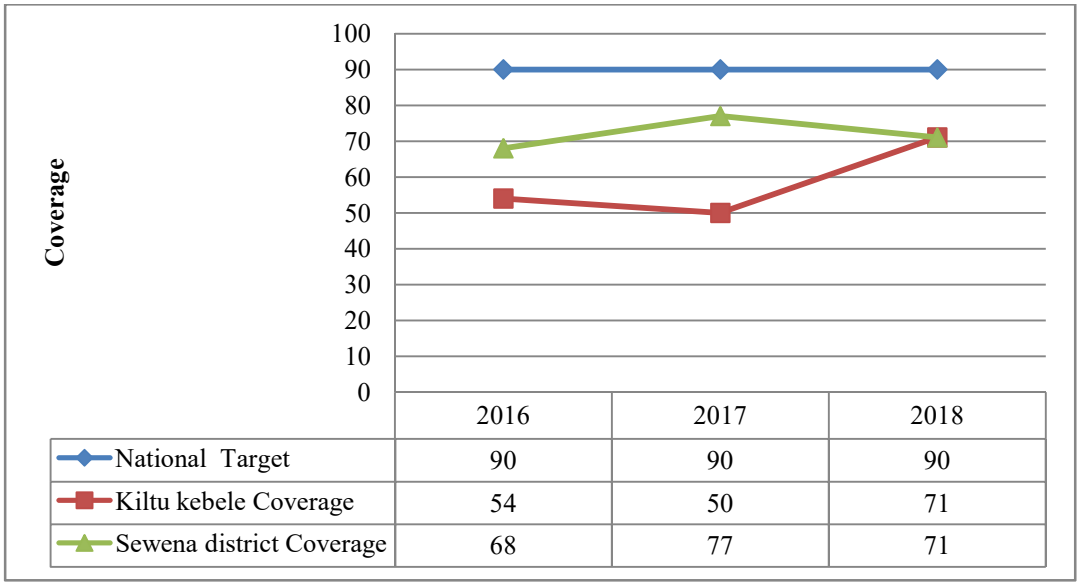
Table 1: Distribution of measles case attack rate by age group in Kiltu Kebele, Sewena District, Bale Zone, Oromia Region, Ethiopia, 2019

Variables	Total Population	Total No of Cases (%)	ASAR/ 1,000	CFR%
0-4 Years	507	10 (43)	20	0
5-14	1,627	13(57)	8	0
Total	2,134	23	7	0

1.1.4.2Vaccination Coverage

Kiltu Kebele health post didn't have functional refrigerators for the storage of vaccines for the last two years; as a result there is no regular routine immunization service. The immunization service in the kebele is provided on irregular period by transporting the vaccine from the District health office.

In the past three years, the measles vaccination coverage report of Sewena District shows (2016 - 2018), the coverage was 68%, 77% and 71% respectively. Similarly, Kiltu kebele achieved below the District measles vaccination coverage i.e 54%, 50 and 43% respectively.



	2016	2017	2018
National Target	90	90	90
Kiltu kebele Coverage	54	50	71
Sewena district Coverage	68	77	71

Figure 5: Trends of measles vaccination coverage of Kiltu Kebele and Sewena District, Bale Zone, Oromia Region, Ethiopia, 2019

1.1.4.3 Analytic Epidemiology

In this investigation, a total of 23 cases and 46 healthy controls who resided in the same kebele with the cases were selected for analytical study, with a ratio of one to two controls. Among the total 23 interviewed cases 13(57%) were males and among the total 46 controls 23 (50%) of them were males. The age of the cases ranged from 1 year to 12 years with the mean age of 5.3 years and median age of 5 years, whereas the age of the controls ranged from 1- 14 years with the mean age of 6.3 years and median age of 5 years.

In bivariate analysis; having contact with a person suspected to have measles during the last weeks OR: 6.4 (95% CI, 12. 6 – 44.3, P: 0.033), presence of measles cases in the family OR: 6.5 (95% CI, 4.4 – 13.22, 0.037) were significantly associated with contracting measles. Moreover, absence of measles vaccination was risk factor for developing with (OR: 2.53, (95% CI 1.7 – 14.67, P ; 0.043) (Table 2).

Table 2: List of risk factors for contracting measles in Kiltu Kebele, Sewena District, Bale Zone, Oromia Region, Ethiopia, 2019

Variable		Case (%)	Control (%)	COR (95%CI)	P-Value
Sex	Female	10(56)	23(50)		
	Male	13 (44)	23(50)	0.769 (0.281-2.10)	0.609
Age	1-4	11(48)	21(46)		
	5-14	12(52)	24(52)	1.6(0.456 – 12.124)	0.346
	>15	0(0)	1(2)		
Religion	Muslims	23(100)	46(100)		
Ethnicity	Oromo	23(100)	46(100)		
Educational Status of the family	Literate	6(26)	9(20)		
	Illiterate	17(74)	36(80)	1.4(0.432 – 4.611)	0.567
Family Size	< 5	10(43)	25(54)		
	≥5	13(57)	21(46)	0.65 (1.4 – 7.6)	0.261
Housing Condition	Ventilated	6 (26)	17 (37)		
	Non-ventilated	17 (74)	29 (63)	1.6 (0.546 -5)	0.366
Unvaccinated children for measles	Yes	19(83)	30(65)		
	No	4(13)	16(35)	2.5(1.7 – 14.6)	0.043
Presence of sick person in the family	Yes	21(91)	41(89)		
	No	2(9)	5(11)	1.3(4.4 – 13.2)	0.037
Travel history to the area with active measles	Yes	11(48)	7(15)		
	No	12(52)	39(85)	5.1 (2.5 -19.3)	0.892
Contact history with measles case patients	Yes	14(61)	9(20)		
	No	9(39)	37(80)	6.4 (12. 6 – 44.3)	0.033

In Multivariable analysis, we have identified three risk factors that remained independently associated with contracting measles infection in Kiltu kebele outbreak; presence of sick individuals among the family members, unvaccinated children and having contact with measles infected cases in the past two to three weeks (Table 3).

Table 3: Independent risk factors associated with contracting measles illness in Kiltu Kebele, Sewena District, Bale Zone, Oromia Region, Ethiopia, 2019

Independent risk factors		Case (%)	Control (%)	OR (95%CI)	AOR (95%CI)	P-value
Having contact history	Yes	14(61)	9(20)	6.4 (12. 6 – 44.3)	5.3 (11.7 – 39.8)	0.047
	No	9(39)	37(80)			
Presence of sick person in the family	Yes	21(91)	41(89)	1.3(4.4 – 13.2)	1.6 (5.2 – 14.4)	0.039
	No	2(9)	5(11)			
Unvaccinated children for measles	Yes	19(83)	30(65)	2.5(1.7 – 14.6)	2.8(2.2 – 15.6)	0.045
	No	4(13)	16(35)			

1.1.4.4 Cold Chain Management

The cold chain management of the Zonal Health Department was good, while that of the Sewena District Health Office, Areda Gelma Health Center and Kiltu kebele health post vaccine storage was very poor. The temperature monitoring chart for cold chain was also not followed and recorded on regular manner. During the time of visit at Areda Gelma Health Center and Kiltu Kebele health post; the refrigerator was non functional for the past two weeks and there were damaged vaccines inside the refrigerator.

1.1.4.5 Laboratory Result of the outbreak

Five blood samples were collected from suspected measles patients in Kiltu kebele of Sewena District Bale Zone and sent to EPHI for confirmation. All specimens tested were positive for measles IgM. Hence, based on the result of the laboratory test in the District, typical measles clinical manifestation and epidemiologically linked with laboratory confirmed cases, the outbreak was confirmed and cases were treated as measles.

1.1.4.6 Public Health intervention

We identified and characterized measles outbreak. Technical assistance was given for health workers on case management, active and passive surveillance and recording and reporting situations. Cases were treated to prevent further spread and reduce morbidity and mortality attributed to measles using (Antibiotics, ORS, TTC, Vitamin A) both at house hold and health facility levels.

In collaboration with the District Education Office Kiltu elementary school was suspended to educate students for two weeks to stop the transmission of cases. We gave health education for students, kebele officials and at public gatherings during the outbreak investigation period. The community residents were informed and mobilized to take individuals sick of measles to health facilities for medical care as soon as possible.

The Zone has started working closely with the affected and the entire neighboring districts to prevent/control the outbreak from spreading to other areas, and alarming the community, health extension worker and community leader to strength the local surveillance system. In addition, active surveillance has been conducted in neighboring kebeles of the District.

1.1.5 Discussion

According to the national measles guide line, three or more laboratory confirmed cases are needed to declare an outbreak of measles (2). To prevent measles outbreaks or Interrupt transmission and hence eliminate measles, 95% population immunity is needed. At the end of 2017, Sewena District and Kiltu Kebele measles vaccine coverage was 77% and 50 % respectively; which is very far from the national measles vaccination target. Therefore, the occurrence of this outbreak may be due to the presence of susceptible persons for measles infection (2).

Literatures supports that a number of factors contribute for the occurrence of measles outbreak in an area, which mainly occurs when the accumulated number of susceptible individuals is greater than the critical number of susceptible individuals, or epidemic threshold, for a given population to sustain transmission (5).

Therefore, we confirmed the existence of measles outbreak by collecting five blood samples and sent to national laboratory and all tested samples were IgM positive. The prevalence of kiltu kebele was 7/1000 population. The prevalence was higher compared to the national health policy of FMoH that targeted as one measles case per 1000 populations (2). However, it was near the same compared to the outbreak of measles that occurred in South Africa with an incidence of 6.1/1000 for infants from 2009- 2011 (3), and the attack rate reported in rural India, 6.2/ 1000 population (6).

In multivariate analysis of Kiltu Kebele outbreak investigation shows, being unvaccinated for measles and presence of sick person in the family were a risk factor for developing measles with an adjusted odd ratio (AOR) of 2.8 (95% CI = 2.2 – 15.6, P =0.045) and 1.6 (95% CI =5.2 – 14.4, P = 0.039) respectively which is similar with the study finding of Dera Woreda and Pakistan (7).

The cold chain management of the Zonal Health Department was good, while that of Sewena District Health office, Arada Gelma Health Center and Kiltu kebele heath post were stored damaged vaccine and improperly put vaccines on refrigerator shelves. Measles vaccines were heat sensitive and should be put on the first shelf of the refrigerator to prevent from high temperature (8).

1.1.6 Limitation

Absence of vaccination card that was difficult to determine the vaccination status, exact date of vaccination which could cause information bias.

1.1.7Conclusion

This outbreak occurred in a remote pocket Kebele of Sewena District with low immunization coverage. Factors that contributed for the occurrence of this outbreak include; having contact history with measles cases, unvaccinated children for measles and Presence of sick person in the family. High proportion of unvaccinated children for measles in the Kebele contributed for the accumulation of susceptible individuals and weak supplementary immunization activities that aim to provide a second opportunity for measles immunization.

1.1.8 Recommendations

- Improving health service coverage of the Kebele specifically routine and supplementary immunization can reduce outbreak in the District particularly in Kiltu Kebele.
- Children less than 15 years old in the Kebele have to be targeted for mass vaccination for measles
- Strengthening of routine measles vaccination
- Strengthening surveillance system
- Early detection of cases that develop sign and symptoms of measles.

1.1.9 References

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1.2 Measles outbreak investigation in SNNPR, Gedio Zone, Gedeb District, 2019

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Abstract

Introduction- Measles is a highly contagious, acute, viral illness caused by a member of the genus *morbilli* virus of the *Paramyxoviridae.*. In Africa 450, 000 cases were reported and in Sub Saharan Africa with 250, 000 deaths in 2009. In Ethiopia, measles cases usually come late to health facilities and often after they have developed complications. Investigation was done to verify the existence of an outbreak, to determine the magnitude, describe distribution of the outbreak and to recommend prevention and control measures.

Methods – Descriptive investigation was conducted from April 3, to April 25, 2019. All population of Banko Tatatu, Haro Jitu, Halo Bariti and Korke kebele were the source population of measles outbreak investigation. All measles cases reported to the District were included into the study. The collected data were entered and analyzed using Microsoft Excel 2007.

Results - During the outbreak, less than five years were highly affected age group 67(46%) cases with an attack rate of 3.4% followed by 5- 14 years age group, 53 (36%) cases with an attack rate of 1.3% and generally 120 (82%) of the case were under 15 years old children. No measles cases were reported from those above 45 years old. Regarding the distribution of suspected measles cases by vaccination status, majority of the cases were unvaccinated 102 (70%), 23 (16%) were vaccinated at least once and 21 (14%) of the cases their vaccination status was not known.

Conclusions and recommendations - There were four laboratory confirmed measles cases, affecting mainly unvaccinated under five children. Strengthening routine immunization, providing health education to the community and strengthening of active case search surveillance have to be enhanced. **Keywords**: Outbreak, Measles, Gedio, SNNPR

1.2.1 Introduction

Measles is a highly contagious, acute, viral illness caused by a member of the genus *morbilli* virus of the *Paramyxoviridae* (1). Humans are the only natural hosts of measles virus. Although monkeys may become infected, transmission among them in the wild does not appear to be a mechanism by which the virus persists in nature. The virus appears to be antigenically stable, there is no evidence that the viral antigens have significantly changed over time. However, sequence analysis of viral genes has shown that there are distinct lineages (genotypes) of wild type measles viruses. When considered along with epidemiological information, identification of a specific virus genotype can suggest the origin of an outbreak (1).

The measles virus is sensitive to ultraviolet light, heat and drying. The virus has a short survival time (< 2 hours in air or on objects and surfaces. Patients are contagious from 1 or 2 days before symptom onset until 4 days after the rash appears. Infectivity peaks during the prodromal phase. The mean intervals from infection to symptom onset and rash appearance are 10 and 14 days, respectively (1). The signs and symptoms of measles include fever, lack of appetite, cough, coryza, red eyes, and maculopapular rash, with complications such as pneumonia, blindness, brain damage, diarrhoea and croup (1).

The complications of measles can be divided into three groups, according to the site involved: the respiratory tract, the central nervous system (CNS), and the gastrointestinal tract. Respiratory tract involvement, manifested as laryngitis, croup, or bronchitis, occurs in the majority of cases of uncomplicated measles. In young children, otitis media is the most common complication. Pneumonia is a frequent reason for hospitalization, especially of adults (1). The pneumonia is of viral origin in the majority of cases, but secondary bacterial infection (most commonly caused by streptococci, pneumococci, or staphylococci) also develops with some frequency (2).

Measles is one of the vaccine preventable disease that are targeted for elimination and with half of the world close to eliminating measles, many countries in sub Saharan Africa including Ethiopia are still struggling to control the disease (2). In 2006, countries in the World Health Organization (WHO) African Region adopted a goal to achieve 90% measles mortality reduction

by 2010 compared with the estimate for 2000. By 2008 in the African Region, reported measles cases decreased 93% and estimated measles mortality decreased 92% compared with 2000.Since 2002, Ethiopia adopted these regional goals and strategies and has been taking important steps to control and ultimately to eliminate measles by 2020 (2, 6) .

Measles vaccination is one of the most cost-effective interventions available. Since measles vaccine was developed in 1958, it has saved the lives of millions of children throughout the world. The history of immunization services in Ethiopia prior to 1980 has not been documented very well although the smallpox eradication activities have left some legendary memories. The Expanded Programme on Immunization (EPI) was launched in Ethiopia in 1980 based on the international, as well as national, experiences and resources gained during the smallpox eradication activities in the late 1970s. Currently the service is delivered through static and outreach sites nationwide. The current Ethiopian routine immunization schedule recommends measles vaccination at 9 months of age (4) .

Globally, more than 20 million cases are reported yearly and 345, 000 deaths were recorded in 2005. Fifty to sixty percent of 1.6 million global deaths attributed to vaccine preventable diseases are attributed to measles. In Africa 450 000 cases were reported and in Sub Saharan Africa 250, 000 deaths were reported in 2009 (5) .

Measles is the commonest of vaccine preventable diseases that occur in Ethiopia; where parents recognize it as a self-limited common childhood illness for which no medical care is often sought. In Ethiopia measles cases usually come late to health facilities and often after they have developed complications. Measles surveillance in a few selected administrative zones of Ethiopia in 2002 revealed age shift of measles cases from children under five to those above five years of age (4, 5).

In 2019 measles outbreak occurred in many Districts of the Region and neighboring Districts of Oromia Region. Gedeb, Gerba, Yirgachefe Bule Hora District were among the most affected communities in the Region.

Up to, 2019 Rumors' about suspected Measles Outbreak were received by the Regional Health Bureau Public Health Emergency Management (RHB-PHEM) from Banko Tatatu Health Center. The District Rapid Response Team composed of Health Officer, Nurse and Environmental

Health professionals went to the kebeles to verify the rumor and identify the extent of the problem and to give technical support to the Banko Tatatu Health Center staffs and undertake appropriate intervention measures based on the findings.

1.2.2 Justification

Measles outbreak has been reported since January 2019 in Gedeb District, Gedio Zone of SNNP Region. The outbreak occurred in some District of Gedio Zone and later expanded to Gedeb District. The District is one of the eight District found in Gedio Zone and there were high movement of people through the District from the same Zone and Oromia Region. The probability of the cases to expand to other areas is high, unless appropriate control and intervention was undertaken timely.

1.2.3 Objective

1.2.3.1 General Objective

To verify and determine the magnitude of the outbreak and to undertake appropriate public health control measures in Gedeb District, Gedio Zone, SNNP Region, Ethiopia.

1.2.3.2 Specific Objectives

To confirm the existence of measles outbreak in Gedeb District.

To describe distribution of the outbreak in Gedeb District by person, place and time

To recommend prevention and control measures in Gedeb District.

1.2.4 Methods

1.2.4.1 Study area and population

Gedeb District is located in the Southern part of the Country. It is located 402 kms away from Addis Ababa and is one of the Districts of Gedio Zone, SNNPR. It consists of seven rural and one urban kebeles. The total population of the District, projected from 2007 census was estimated to be 91,397 in 2019. In terms of health delivery system, the District has one primary hospital, two health centers, eight health posts, privately owned two primary clinics and two medium clinics.

The District shares boundary with Gerba in the North, Oromia Region in the South - West and Abaya District in the East. We conducted the investigation in Gedeb District, Gedio Zone, SNNPR.

1.2.4.2 Study Period

The investigation was carried out from April 3 to April 25, 2019

1.2.4.3 Source Population

All population of Banko Tatatu, Haro Jitu, Halo Bariti and Korke kebeles were the source population of measles outbreak investigation.

1.2.4.4 Study Design

Cross sectional descriptive investigation was conducted. A WHO working case definition was used for passive case search on line list and registers.

1.2.4.5 Sampling procedure

All measles cases of reported to the District were included into the study.

1.2.4.6 Target Population

During the outbreak investigation, all confirmed and suspected measles cases and deaths were target population of the study.

1.2.4.7 Case Definition

Suspected measles case

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 (2).

Confirmed measles case:

A suspected case with laboratory confirmation (positive IgM antibody) or epidemiologically linked to confirmed cases in an outbreak (2).

Measles community case definitions

A community member should report any person with fever and rash to a health worker and also advise the person to go to a health facility (2).

Measles outbreak

In Ethiopia, a measles outbreak is defined when three or more laboratory confirmed measles IgM- positive cases occur in a health facility or district within 30 days (2).

Epidemiologically linked cases:

A suspected measles case that has not had a specimen taken for serologic confirmation and is linked (in place, person and time) to a laboratory confirmed case; i.e., living in the same or in an adjacent district with a laboratory confirmed case where there is a likelihood of transmission; onset of rash of the two cases being within 30 days of each other (2).

Measles Death

For surveillance purposes, a measles death is defined as any death from an illness that occurs in a confirmed case or epidemiologically linked case of measles within 30 days of the onset of rash (2).

1.2.4.8 Data Processing and analyses

Data were collected, entered, summarized and analyzed using Microsoft office Excel 2007 software. Results were presented using graph, figures and tables and frequencies were calculated.

1.2.4.9 Ethical Consideration

Ethical clearance and support letter were obtained from the Federal Ministry of Health and also support letter were obtained from Gedeb Health Office to conduct the study. Moreover, objectives of the study were briefly mentioned and discussed with the District Health Office.

1.2.4.10 Data dissemination

Findings of this investigation in both soft and hard copy were communicated to SNNPR, Gedio Zone Health Office, Gedeb District Health Office and Addis Ababa University. Soft copy of the document was sent to FETP mentors, resident advisors and coordinators.

1.2.5 Results

1.2.5.1 Distribution by person

From January 22, 2019 – March 2, 2019, 146 measles cases were reported from Banko Tatatu Health Center to Gedeb District Health Office. From the reported cases 84 (58%) were females and 39 (46%) of the cases were female and under five years old female children. Similarly, 28 (45%) of male under five children were reported. The overall attack rate was 1.2% and no deaths were reported (Figure 6 and Table 4).

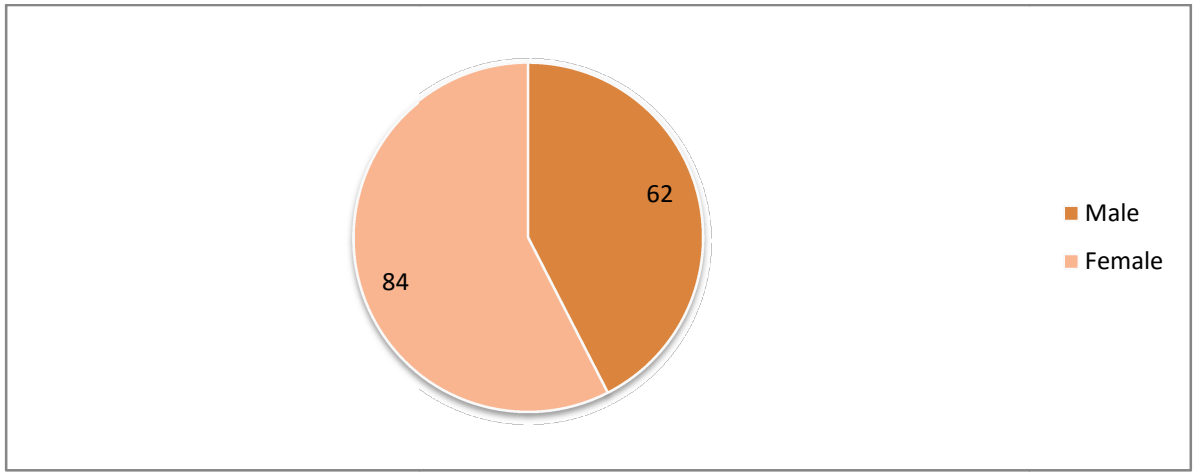

Figure 6: Sex distribution of measles cases in Gedeb District, Gedio Zone, SNNPR, Ethiopia, 2019

During the outbreak, under five years were highly affected age group 67 (46%) cases with the attack rate of 3.4% followed by 5- 14 years age group 53 (36%) cases with an attack rate of 1.3% and no measles cases were reported from those above 45 years old (Table 4).

Table 4: Distribution of measles cases by age group and attack rate in SNNPR, Gedio Zone, Gedeb District, 2019

Age Group	Population	Number of cases		Total (%)	Age Specific Attack Rate	CFR
		Male (%)	Female (%)			
0- 4	1,964	28(45)	39(46)	67(46)	3.4	0
5- 14 Years	4,321	24(39)	29(35)	53(36)	1.3	0
15- 44 Years	3,929	10(16)	16(19)	26(18)	0.7	0
45+ Years	2,881	0(0)	0(0)	0(0)	0	0
Total	13,095	62(42)	84(58)	146(100)	1.2	0

1.2.5.2 Distribution of cases by place

Four kebele were affected by the outbreak and Banko Tatau kebele contributed the highest cases 49 (34%) and Haro Jitu contributed 41(28%) cases (figure 7).

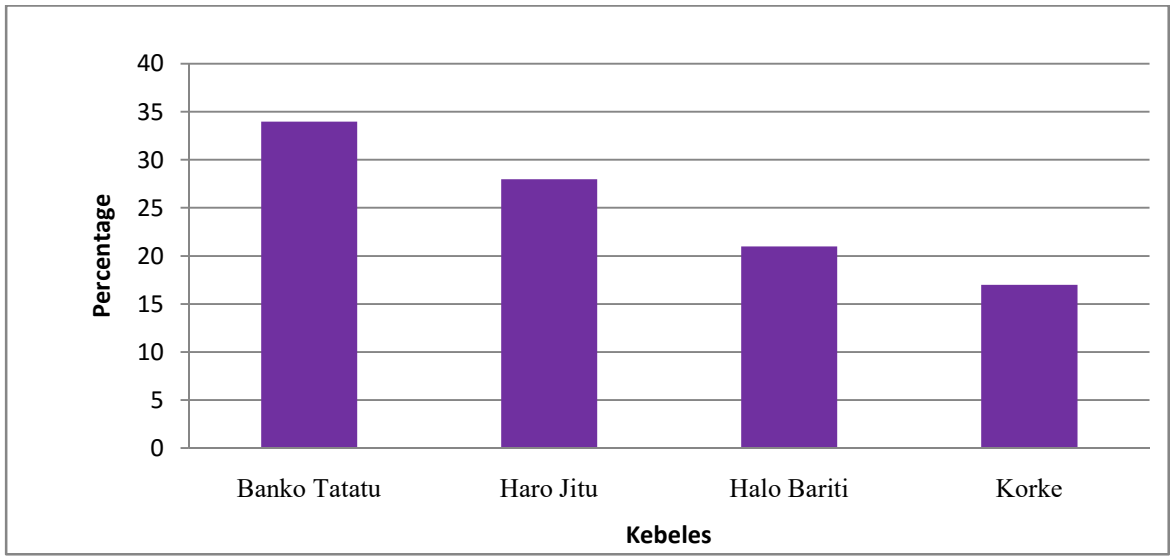

Figure 7: Measles case distribution by Kebele in Gedeb district, Gedio Zone, SNNPR, Ethiopia, 2019

1.2.5.3 Distribution of cases by time

Unvaccinated 8 years old girl who comes from Haro Jitu Kebele to Banko Tatatu Health Center on January 22, 2019 and other six suspected measles cases were come to the Health Center on the same day in the afternoon. The cases were continuously reported and peak on January 31, 2019. Zero cases were reported for four consecutive days and again started to report suspected measles cases on February 6, 2019. The last cases were reported on March 2, 2019 (Figure 8).

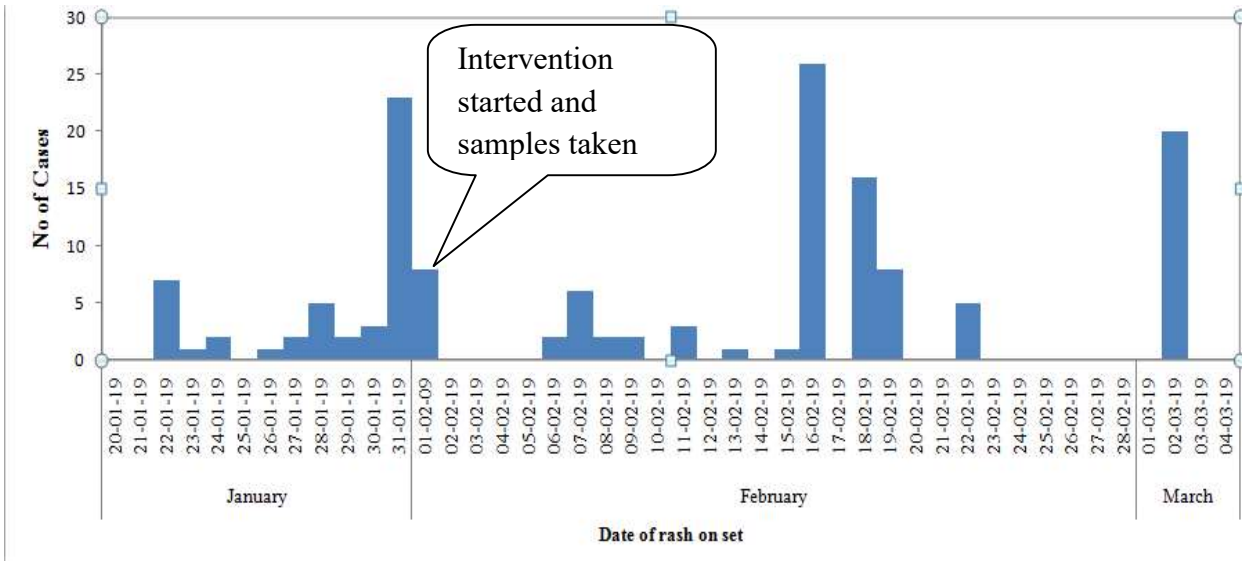

Figure 8: Distribution of measles cases by time in Gedeb District, Gedio Zone, SNNPR, Ethiopia, 2019

The distribution of suspected measles cases by vaccination status, majority of the cases were unvaccinated 102 (70%), 23 (16%) were vaccinated at least once and 21 (14%) of the cases did not know their vaccination status (Figure 9).

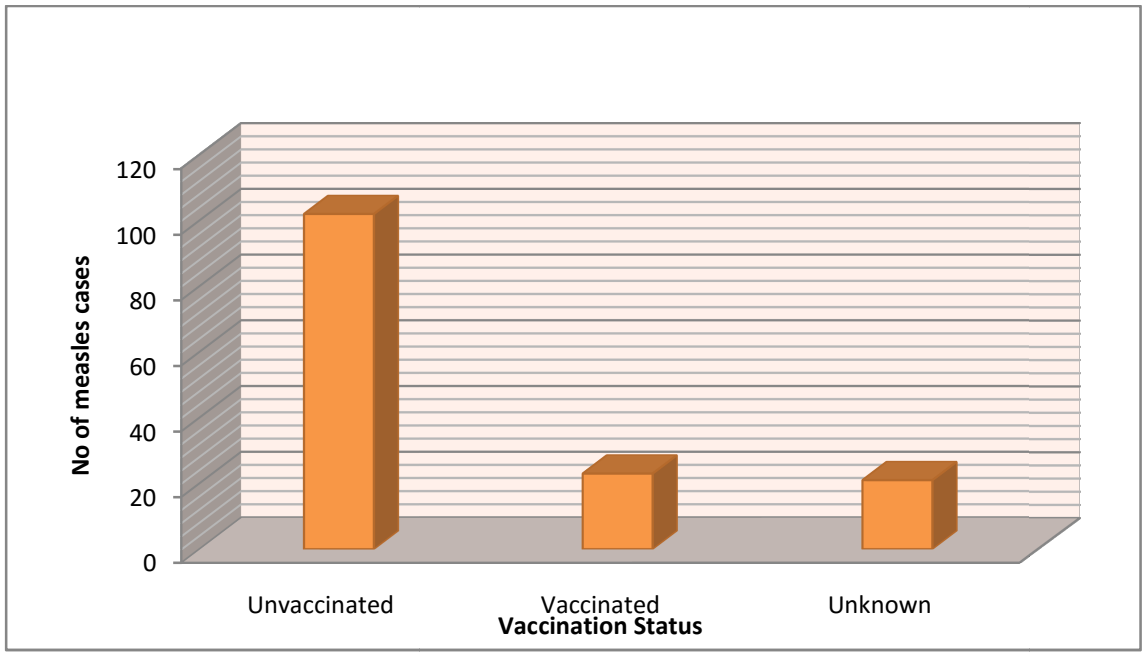

Figure 9: Immunization status of measles cases in Gedeb District, Gedio Zone, SNNPR, Ethiopia, 2019

In the past six month, the measles vaccination coverage report of Gedeb District shows 78%. Similarly, all kebele's achieved below the District measles vaccination coverage. Halo Bariti 71% , Haro Jitu 65%, Banko Tatatu 58% and Korke 55% were achieved (Figure 10).

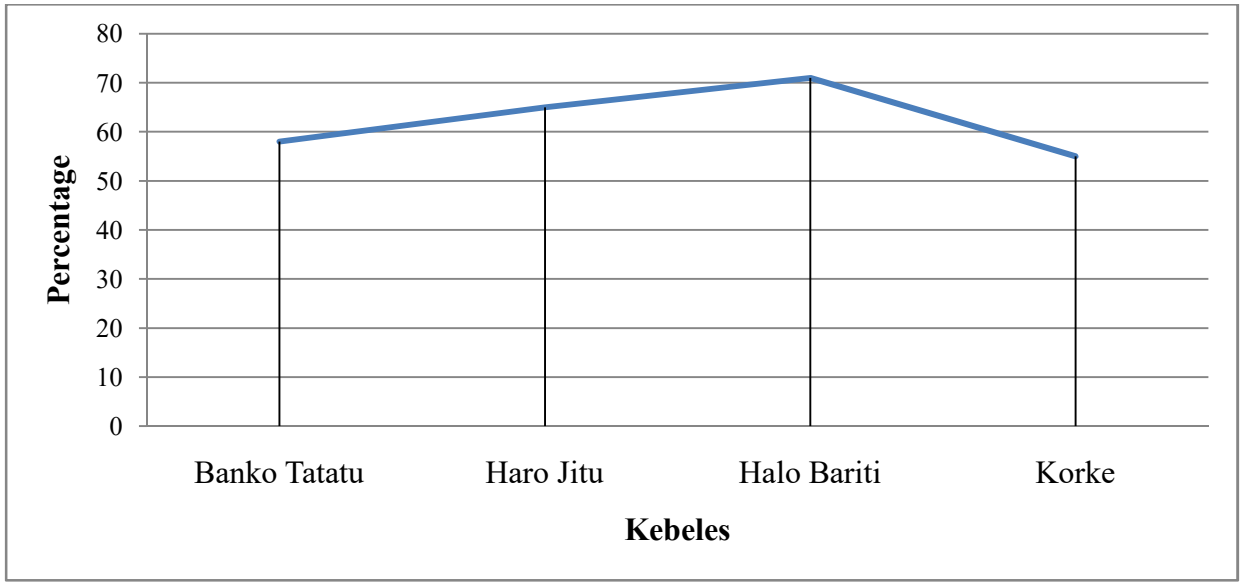

Figure 10: Six months measles vaccination coverage by Kebeles in Gedeb District, SNNPR, Ethiopia, 2019

1.2.5.4 Laboratory Investigation

Five blood samples were collected from suspected measles cases in Banko Tatatu Kebele of Gedeb District, Gedio Zone and sent to the Ethiopian Public Health Institute for confirmation and four samples were positive for measles IgM. Hence, based on the results of the laboratory test in the District, typical measles clinical manifestation and epidemiologically linked with laboratory confirmed cases, the outbreak was confirmed and cases were treated as measles.

1.2.5.5 Public Health Intervention

- Orientation was given to all health professionals in the District
- Sensitization of teachers, community and religious leaders
- Active case search was performed by Health Extension Workers on daily basis
- Case management
- Health education was given for community and students at school

1.2.6 Discussion

Measles is one of the world's most contagious diseases, with the potential to be extremely severe. In 2017, the most recent year for which estimates are available, it caused close to 110, 000 deaths (6). Even in high-income countries, complications result in hospitalization in up to a quarter of cases, and can lead to lifelong disability, from brain damage and blindness to hearing loss (9).

The disease is almost entirely preventable through two doses of a safe and effective vaccine. For several years, however, global coverage with the first dose of measles vaccine has stalled at 85% (9).

From the collected five blood samples, four of them were positive for measles virus specific IgM at Ethiopian Public Health Institute, which is enough to confirm the measles outbreak according to the measles surveillance and outbreak management guide line of Ethiopia (2) . All other cases were confirmed by Epidemiological linkage (2). The overall attack rate and case fatality rate was 1.2% and 0.0% respectively. The case fatality was acceptable, compared to the National measles guideline 3%-6% case fatality rate and vaccination coverage of Kebele's measles were all below the national target 90% (2) .

The index case was reported from Haro Jitu Kebele and unvaccinated child, that child may be the source of the outbreak. The outbreak was distributed throughout Haro Jitu Kebele and expanded to the rest three kebele's, this is may be due to late responses, which is important to limit the spread of the cases.

The most affected age group in current outbreak was among the age group of under five 67 (46%). There were 102 (70%) unvaccinated cases in this investigation, reports revealed that 93% of measles cases decreased by measles vaccination and vaccinated at least one dose for measles were 23 (16%) and literature supports 15% of vaccinated children at the age of nine to eleven month of age may develop the disease (2).

1.2.7 Conclusions and recommendations

There were four laboratory confirmed measles cases in the District, affecting mainly unvaccinated under five children. The index case was reported from Haro Jitu Kebele and

unvaccinated child, that child may be the source of the outbreak. Majority of the cases were unvaccinated. The outbreak was distributed throughout the Kebele and this is may be due to late responses, which is important to limit the spread of the cases.

The District should implement all the measles elimination strategies, including the introduction of measles second dose to accelerate and achieve the goal of measles elimination. Strengthening routine immunization, providing health education to the community and strengthening of active case search surveillance have to be enhanced.

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CHAPTER TWO

SURVEILLANCE DATA ANALYSIS

2.1 Relapsing fever Surveillance data analysis of Addis Ababa City (2013 – 2017), Ethiopia, 2018

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Abstract

Background - Louse-borne relapsing fever is a vector-borne disease caused by the spirochaete *Borrelia recurrentis*, a human-restricted pathogen transmitted by the body louse, *Pediculus humanus corporis*. Major outbreaks of louse-borne relapsing fever have occurred in Eurasia and Africa. It is important to analyze the magnitude of the disease to strengthening the control mechanisms and/or to fill the gaps in the intervention mechanism. The purpose of this assessment was to examine trend of relapsing fever in Addis Ababa, Ethiopia from 2013 - 2017.

Methodology - A retrospective five years (2013 – 2017) record review of Relapsing fever was conducted in Addis Ababa. Data were officially requested and received from the Public Health Emergency Management core process and Health Management Information System of the Addis Ababa regional Health bureau. Data cleaning and analysis were conducted using Microsoft Excel 2007.

Results – A total of 2,517 relapsing fever cases were reported to the Public Health Emergency Center from Addis Ababa Regional Health Bureau from 2013 to 2017. Among the reported cases, 2,256, (89.7%) were treated as outpatient and 261, (10.3%) were treated as inpatient. The data collected from 814 government and private health facilities in 2017, shows 24% increment of reporting health facilities, compared to the 2013. Majority of the cases were reported from the Arada Sub City 45.6%, Akaki Kality Sub City15.21% and Addis Ketema Sub City 14.38%.

Conclusion and Recommendation - There was a significance increase in the number of Relapsing fever cases every year. Strengthening of routine surveillance by improving quality, capacity and coverage of the surveillance system and also incorporating the health facilities, to the PHEM network system are important for improving assessment of Relapsing fever and special attention should be given to Arada, Addis Ketema and Akaki Kality Sub Cities.

Key words: Relapsing fever, Surveillance, Addis Ababa

2.2 Introduction

Louse-borne relapsing fever (LBRF) is a vector-borne disease caused by the spirochaete *Borrelia recurrentis*, a human-restricted pathogen transmitted by the body louse *Pediculus humanus corporis*. Transmission occurs when the louse is crushed and the infected haemocoel is released onto the human skin. Subsequently, *Borrelia recurrentis* is able to penetrate intact mucosa and skin. The incubation period is usually between four and eight days (range: 2–15) (10).

The onset of symptoms is generally sudden, associated with circulation of bacteria in the blood, and include high-grade fever, malaise, chills and sweats, headache, meningism, myalgia/arthralgia and non-specific gastrointestinal symptoms (nausea and vomiting). The symptoms increase in intensity over five days on average, 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 10 relapses are usually observed among untreated patients (10). Relapses can occur after delousing. The disease can be severe and death occurs in 10–40% of symptomatic cases in the absence of appropriate treatment, and in 2–5% of treated patients (11).

The antibiotic of choice is doxycycline (tetracycline group), although other antibiotic treatments are also effective (penicillin G, erythromycin, chloramphenicol). A potentially severe or fatal Jarisch–Herxheimer reaction can be induced by antibiotic treatment. The diagnostic test of choice is the direct identification of spirochaetes in the blood by stained blood films (Giemsa), especially during the symptomatic febrile phase. Nucleic acid detection is carried out for species identification and to support the clinical diagnosis. Malaria, typhoid fever, viral haemorrhagic fever, leptospirosis, typhus, tick-borne relapsing fever, non-typhoidal salmonellosis, meningococcal septicaemia and meningitis need to be considered in the differential diagnosis (12).

Antibodies to Borrelia recurrentis were detected in homeless populations in Marseille between 2000 and 2003, suggesting that a small, unnoticed outbreak occurred in this particular homeless population. Primary prevention of louse-borne relapsing fever relies on measures for avoiding infestation with body lice. Such infestations are linked with low socioeconomic

status, over-crowding and poor personal hygiene. Detection of a clinical case should lead to source tracing and it is necessary to investigate and treat infected contact(s). Treatment of clothing for LBRF is necessary as infected lice can remains in the clothes (12). Historically, major outbreaks of louse-borne relapsing fever have occurred in Eurasia and Africa. The geographical distribution of louse-borne relapsing fever has declined due to improvements in living standards (13).

This paper assesses and presents the five year Relapsing fever reports of Addis Ababa, including the Sub Cities 2013 to 2017. This study aimed to analyze the trends and the level of the magnitude of Relapsing fever. It highlights the changes, the current status and the magnitude of the problem. The goals are to determine the Relapsing fever determinants by sub cities; to find out the current status of the Relapsing fever burden; to be able to scale up the Relapsing fever control efforts in Addis Ababa.

2.2.1 Rationale of the Study

Ongoing analysis of surveillance data are important for detecting outbreaks and unexpected increases or decreases in disease occurrence, monitoring disease trends, and evaluating the effectiveness of disease control programs and policies (14). Surveillance data analysis information is also needed to determine the most appropriate and efficient allocation of public health resources and personnel. Continuous surveillance and data analysis is an important measure to evaluate the trends of relapsing fever related to intervention measures in controlling and preventing of the disease. Results from surveillance data can indicate public health action.

2.3 Objective

2.3.1 General Objective

- To assess five years (2013 – 2017 G.C) data of Relapsing fever and to understand trends of morbidity and mortality in Addis Ababa Region, Ethiopia.

2.3.2 Specific Objective

- To describe and interpret the surveillance data in terms of time, place and person characteristics
- To compare the burden of Relapsing fever within the Sub City

2.4 Methodology

2.4.1 Study Area

The Surveillance data analysis was conducted in Addis Ababa. Addis Ababa is the Capital City of Ethiopia, located in central part of the Country with a total population of 3,654,569, with an altitude of 2,355 meters above sea level. The area covers 527km^2 (203 sq miles), the most densely populated City in Ethiopia 5,165.1/km^2. There are 662,728 households with 5.3 persons per household. Addis Ababa is divided in 10 Sub Cities and 118 woredas. Addis Ababa is often referred to as the political capital of Africa because of its historical, diplomatic, and political significance for the Continent. The City is bounded by the special zone of Oromia Regional Towns in all directions.

2.4.2 Study Period

Secondary data of Relapsing fever case for the past five years (2013-2017 G.C) were collected from weekly IDSR and analyzed and interpreted from February 11, 2018 to March 5/2018.

2.4.3 Study Design

A retrospective five year data were used by reviewing weekly PHEM data to analyze the data of Relapsing fever in Addis Ababa by person, time, and place.

2.4.4 Data Source

Five years secondary data were obtained from the Addis Ababa Regional PHEM core process from 2013 -2017.

2.4.5 Sample size and sampling method

All Relapsing fever cases, including inpatient, outpatient and deaths during 2013 – 2017 reported to PHEM center were included in this study. All Sub Cities are included in the study.

2.4.6 Data collection

All Relapsing fever cases and deaths from 2013 to 2017 recorded in the Regional PHEM core process were identified. The data include reports of health facilities of all Sub Cities and administrative cities. Health posts, health centers and hospitals were included in the PHEM

network in the respective Sub Cities and Districts. All reported Relapsing fever cases of outpatient, inpatient and deaths were included in the study.

2.4.7 Data Management and Analysis

Data cleaning were done on the initial secondary data stored in Microsoft Excel. Descriptive analyses were computed, using Microsoft office Excel 2007. Finally, the data were described using figures and tables.

2.4.8 Case Definitions

Suspected: Any person presenting with an abrupt onset of rigors with fever, usually remittent, headache, arthralgia, myalgia, dry cough and epistaxis (15).

Confirmed -A suspected case with demonstration of Borrelia in peripheral blood film (15).

2.4.9 Laboratory Criteria for Diagnosis

Identification of spirochetes by dark field microscopy, or Giemsa-, Wright-, or acridine orange-preparations of peripheral blood, bone marrow, or cerebral spinal fluid (15).

Clinical Criteria for Diagnosis

A febrile illness with temperature $\geq$ 100.5°F (38.0°C). A typical clinical presentation occurs following exposure to a rural setting and is characterized by a relapsing pattern of fever, chills, headache, and myalgia (15).

2.5 Results

Within the last five years (2013 - 2017), a total of 2,517 relapsing fever cases were reported from the Addis Ababa City Administration PHEM core process to the EPHI. The reports were collected from 92 Health Centers and 9 government Hospitals, 814 private hospitals and clinics and 16 NGO facilities with a total of 931 health facilities reported in 2017. When we compared to 2013 the reporting facilities increased by 24% in 2017. Among the total cases, 2,257(89.7%) cases treated as outpatient, 260 (10.3%) were treated as inpatient and 3 (0.12%) deaths were reported (figure 11).

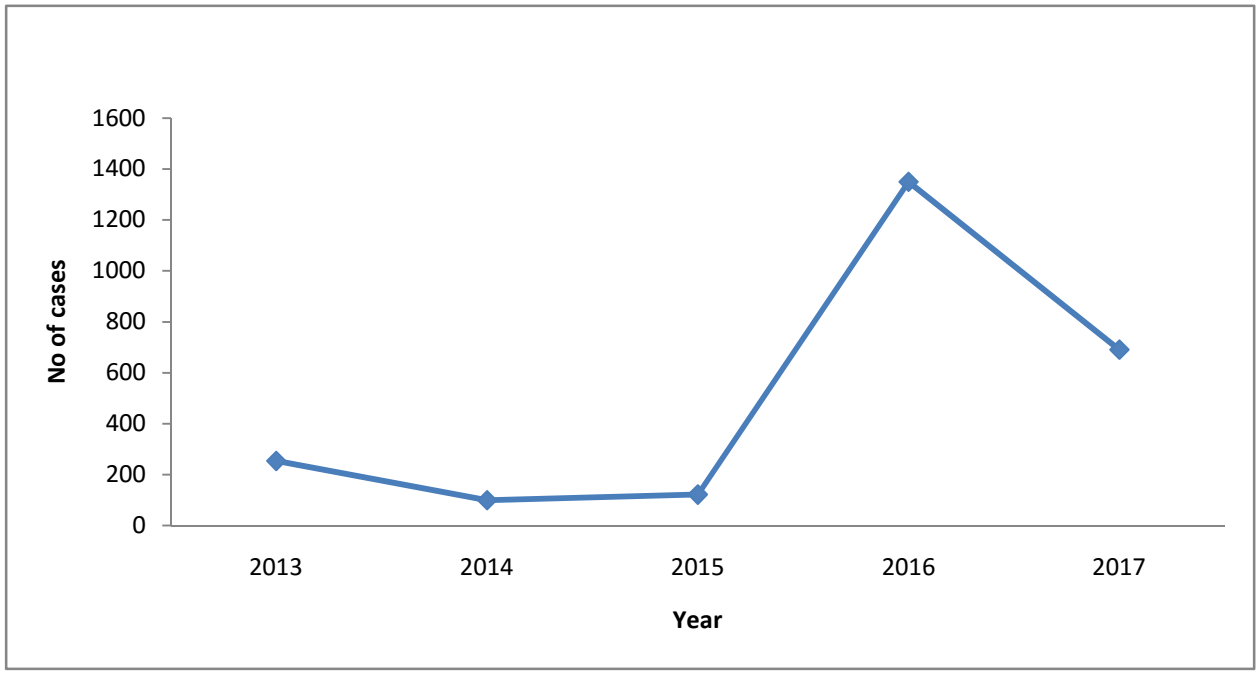

Figure 11: Number of relapsing fever cases by year in Addis Ababa, Ethiopia, 2018

Sub City reports show that different magnitude of relapsing fever cases indifferent year. Arada Sub City contribute the highest number of cases in 2016, 683 (50.59%) followed by Addis Ketema 236 (17.48%) and Akaki Kality 224 (16.59%) Sub City. Arada and Akaki Kality were the only Sub City which has the greatest number of relapsing fever cases in 2017, 333 (68.2%) and 112 (16.2%) (Figure12).

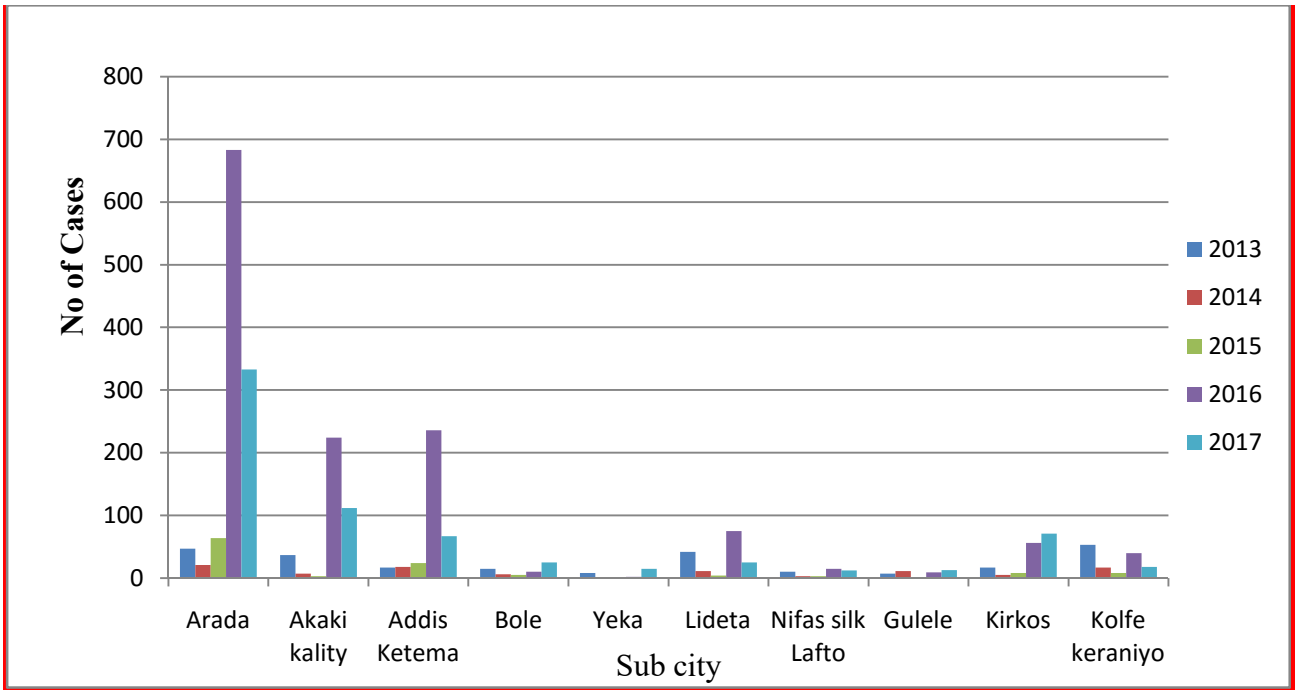

Figure 12: Distribution of relapsing fever cases morbidity by Sub City and year in Addis Ababa, Ethiopia, 2018

According to WHO epidemic week of 2013 and 2017, there was a significant increase of Relapsing fever in May, June and July months. The least cases were reported in February and March (Figure 13).

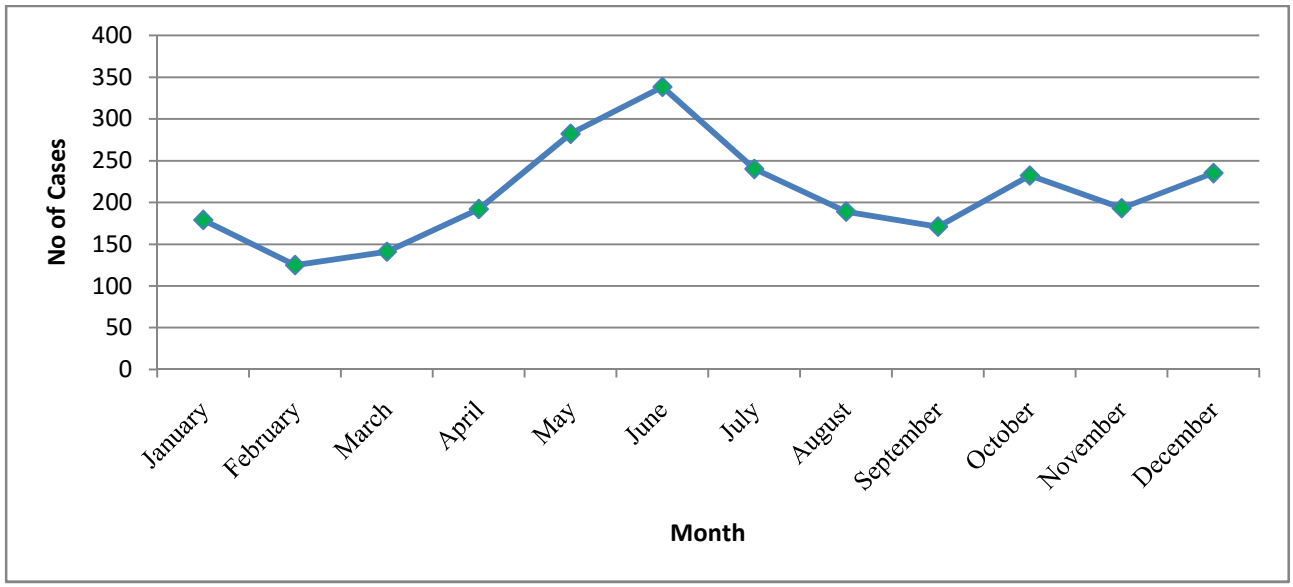

Figure 13: Distribution of relapsing fever cases by month in Addis Ababa, Ethiopia, 2018

There were an increase of relapsing fever cases in the recent two years 2016, 1,350 (54%) and 2017, 691 (27%) compared to the first three years. The least number of relapsing fever cases were reported in 2014, 100 (3.97%). Similarly, there were an increase in outpatient cases of relapsing fever in 2016 and 2107, 1,274 (56%) and 634 (28%) respectively. The report shows an increase in relapsing fever cases (figure 14).

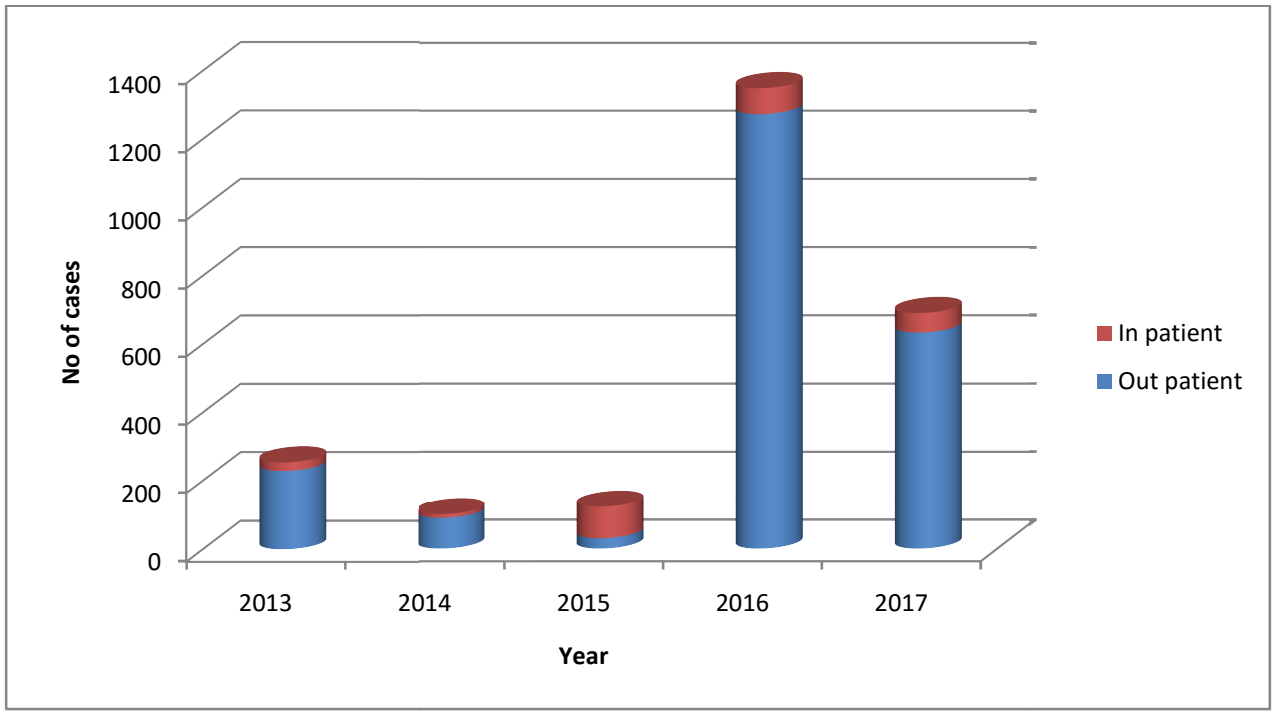

Figure 14: Outpatient and Inpatient cases of relapsing fever by year in Addis Ababa, Ethiopia, 2018

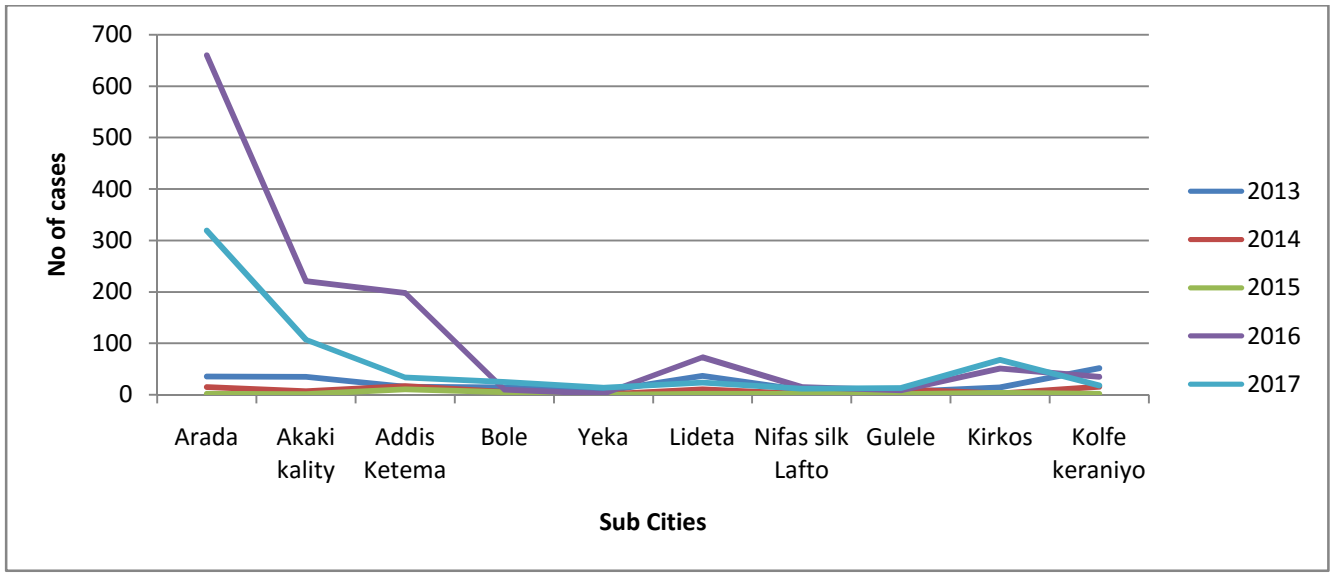

Figure 15: Relapsing fever outpatient cases by year and Sub City, Addis Ababa, Ethiopia, 2018

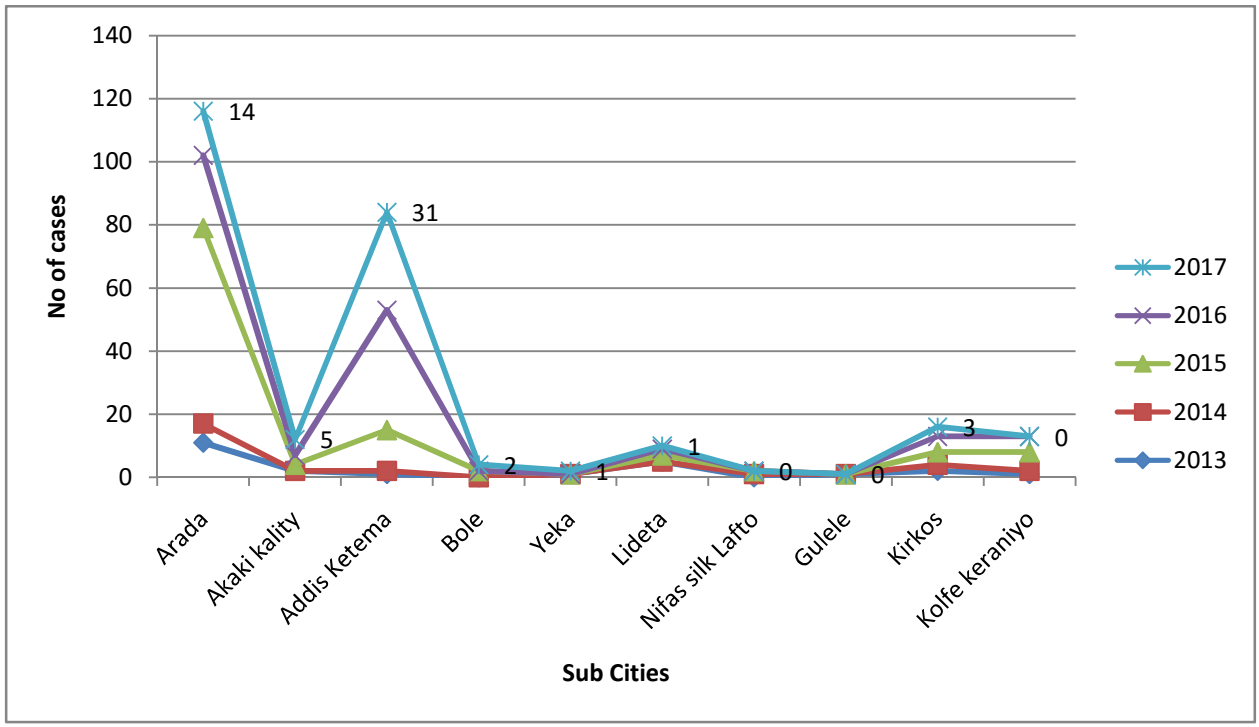

Figure 16: Relapsing fever inpatient cases by year and Sub City, Addis Ababa, Ethiopia 2018

Five year trends of Relapsing fever cases are different every month ranges from 125 cases at February and 338 relapsing fever cases at June. The mean of relapsing fever cases of monthly reported cases were 210, the standard deviation of monthly reported cases were 15.8 (Table 5).

Table 5: Distribution of relapsing fever cases by month and year in Addis Ababa, Ethiopia, 2018

Year	Month												Total
	Jan.	Feb.	Mar.	Apr	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	
2017	130	75	74	93	90	77	77	67	8	0	0	0	691
2016	7	21	53	60	149	226	119	61	135	177	155	187	1350
2015	1	6	3	9	4	5	5	16	9	29	21	14	122
2014	19	9	7	10	4	11	21	2	3	2	4	8	100
2013	22	14	4	20	35	19	18	43	16	24	13	26	254
Total	179	125	141	192	282	338	240	189	171	232	193	235	2517

Three deaths were reported due to Relapsing fever cases in the past five year period (2103 – 2017). Three of them are reported from Arada Sub City, Dagmawi Minilik Hospital, on 21 WHO weeks of 2016. Other than this there were no reports of death registered.

The highest incidence of Relapsing fever cases in the past five year were reported from Arada Sub City 5/1000 followed by Akaki kality Sub City 1.96/1000 and the least incidence were occurred in Yeka Sub City 0.08/1000 (Table 6).

Table 6: Incidence of relapsing fever per 1000 population in Addis Ababa, Ethiopia, 2018

S.No	Sub Cities	Estimated Total population	Number of cases	Incidence rate/1000
1	Arada	225,999	1148	5
2	Akaki kality	195,273	383	1.96
3	Addis Ketema	271,644	362	1.33
4	Bole	328,900	61	0.18
5	Yeka	337,575	26	0.08
6	Lideta	214,769	157	0.73
7	Nifas silk Lafto	335,740	43	0.13
8	Gulele	284,865	41	0.14
9	Kirkos	235,441	157	0.67
10	Kolfe keraniyo	546,219	136	0.25

2.6 Discussion

The report shows increasing of magnitude of relapsing fever from year to year according to the PHEM report. . This may be due to the improvement of reporting system rather than increasing of the Relapsing fever cases. Completeness of the PHEM report shows significant improvement, that is, from the least of about 40 % in 2013 to the peak of 95% in 2017. The year 2016 was the transitional period to introduce PHEM to regions before that year the Surveillance system was run by a single surveillance focal person. In Addis Ababa the burden of Relapsing fever cases was highly concentrated within Arada and Akaki Kality Sub Cities. In 2017, 92 public health center, 9 government hospital, 16 NGO health facilities and 814 private clinics and hospitals were incorporated in the reporting system.

A clinic based study conducted in Togo to investigate the presence of relapsing fever shows about 10% of the patients were positive by PCR and 13% had antibodies to GlpQ (10).

Ethiopian Department of Health report as being the seventh most common cause of hospital admission (2.5% of total; 3,777 cases) and 5th most common cause of death (0.9%, 42 cases) in 2004 (11). The study shows Addis Ababa is one of the Cities with similar magnitude of relapsing fever cases with other Ethiopian big City. A cross sectional study conducted in Bahir Dar City indicates that the prevalence of LBRF was 2.5% and the positivity rate of LBRF was highest in yekolotemaries (6.1%) followed by street children (4.9%) (12). Five year relapsing fever incidence of Arada Sub City shows 5/1000 and 1.96/1000 in Akaki Kality Sub City. And the study shows five year (2013 – 2017) incidence of relapsing fever cases of Addis Ababa was 0.88/1000.

2.7 Limitation

The weekly PHEM report did not incorporate the prison, defense and police health facilities, this may under estimate the magnitude of the case.

Lack of completeness of data which could result in under estimate of the magnitude

Lack of individual age on HMIS and PHEM data

2.8 Conclusion and recommendation

Magnitude of relapsing fever cases in Addis Ababa City administration showed an increasing trend during the past five years. And Arada Sub City was one of the Sub City that reported more relapsing fever cases followed by Akaki Kality and Addis Ketema Sub Cities respectively. The cases were distributed throughout the Sub City with different magnitude. Community surveillance and regular delousing of cases should be strengthened.

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CHAPTER THREE

SURVEILLANCE SYSTEM EVALUATION

3.1 Measles surveillance system evaluation in Gulele Sub City, Addis Ababa, Ethiopia, 2019

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Abstract

Introduction - An epidemiological surveillance system is the set of interconnected elements and activities which contribute to the achievement of the surveillance objectives. Proper understanding and use of this essential epidemiological tool helps health workers at the district and health units to set priorities, plan interventions, mobilize and allocate resources, detect epidemics early, initiate prompt response to epidemics and evaluate and monitor health interventions. The purpose of evaluating public health surveillance system is to ensure that problems of public health importance are being monitored efficiently and effectively.

Methodology – A Surveillance system evaluation was conducted in Gullele Sub City which is one of the ten sub cities of Addis Ababa, with an estimated total population of 335,319. The Sub City has 10 administrative Districts and it was selected by the Regional Health Bureau Public Health Emergency Core Process due to measles epidemic in the Sub City before one year. Descriptive cross-sectional study conducted using semi structured questionnaire from November 26- December 20, 2018 in Gulele Sub City. Data were collected using semi-structured questionnaire, interview, observation of some practical tools for surveillance and secondary data review. Data were entered and analyzed by using the Microsoft Office excels.

Results - All assessed District Health Offices had no written emergency preparedness and response plan, except woreda 8 and woreda 10. All Districts and the Sub City had no specific budget for emergency management and response. Regarding existence of epidemic management committee, six of the Districts and the Sub City Health Office have established the committee and all assessed Districts, including the Sub City responded that they have rapid response team. However, there were no documents or meeting minutes found at the time of the evaluation that showed the existence and activities of the committee except at woreda 8 and Sub City Health Office.

Conclusion and recommendations - The preparedness level of Gulele Sub City was poor as all assessed Districts and health facilities didn't have written emergency preparedness and response plans. Regarding attributes the surveillance system of the sub city was simple, flexible and

useful. Attributes that require attention for improvements of surveillance were data quality and timeliness.

3.2 Introduction

Public health surveillance is the ongoing and systematic collection, analysis, and interpretation of health data in the process of describing and monitoring a health event" with the objective of supporting the planning, implementation and evaluation of public health interventions and programmes(16). An epidemiological surveillance system is the set of interconnected elements and activities which contribute to the achievement of surveillance objectives (16).

The public health surveillance system is continually challenged by recurrent and unexpected disease outbreaks and is facing the challenge of managing health consequences of natural and manmade disasters, emergencies, crisis and conflicts(17). A functional disease surveillance system is essential for defining problems and taking action. Proper understanding and the use of this essential epidemiological tool helps health workers at the district and health units to set priorities, plan interventions, mobilize and allocate resources, detect epidemics early, initiate prompt response to epidemics and evaluate and monitor health interventions(17).

Ethiopia underwent different strategies to have a functioning and effective surveillance system. Ethiopia introduced integrated disease surveillance and reporting (IDSR) strategy in 1996 as part of the response to growing public health problems with communicable diseases focusing on 17 priority diseases (2). Ethiopia adopted the WHO IDSR strategy in 1998 and frequently revised the list of priority diseases. Since 2008 the Federal Ministry of Health (FMoH) launched a reform and restructuring of the health sector aimed at bringing effectiveness and efficiency in execution of various works using business process re-engineering (BPR) as a tool (17).

Globally, an estimated number of 20 million cases and 164,000 deaths occur from measles each year and in 2013 there were 145,700 deaths globally, with majority of under 5 and about 400 deaths every day or 16 deaths every hour and approximately two to three deaths may occur for every 1,000 reported measles cases, even though a safe and cost-effective vaccine is available (18). Measles vaccination resulted in a 75% drop in measles deaths between 2000 and 2013 worldwide (3). In 2013, about 84% of the world's children received one dose of measles vaccine by their first birthday through routine health services – up from 73% in 2000. During 2000-2013,

measles vaccination prevented an estimated 15.6 million deaths, making measles vaccine one of the best buys in the public health domain (18, 19).

Measles is an acute, highly contagious viral disease caused by measles virus. In 2001, countries in the World Health Organization Africa Region began accelerated measles control activities to reduce measles deaths by half by 2005 compared to the estimated number of measles deaths in 1999 (20). Implementation of the recommended strategies led to a 75% reduction in estimated measles mortality in the African Region by 2005. In Ethiopia, the expected case fatality rate is between 3% and 6%, the highest case fatality rate occurs in infants 6 to 11 months of age (20). In certain high risk populations, case fatality rates as high as 30% have been reported in infants aged less than 1 year of age (21).

To determine how well a public health surveillance system operates, it needs to be evaluated periodically. The purpose of evaluating public health surveillance system is to ensure that problems of public health importance are being monitored efficiently and effectively. Hence, evaluation finding would yield specific recommendations for improving surveillance quality, efficiency, and usefulness. In addition to periodic evaluation, public health surveillance system should be monitored routinely to ensure continuity to meet their objectives (22).

3.2.1 Rationale

Measles is one of the priority immediately reportable diseases of the sub city with high frequency of epidemic and public health concern. But there is relatively a delay in detection and reporting system. Measles could be used as proxy indicator of the surveillance system of the sub City. Use of the collected data at the local level as evidence for public health decision making is not well known; Evaluation of surveillance system is not done in the sub City and little is known about the effectiveness and efficiency of the system. Therefore, the findings of this evaluation can be used as an input to strengthen the overall surveillance system activities of the sub City to achieve its intended objectives and purposes.

3.3 Objectives

3.3.1 General objective

To evaluate the surveillance system of measles in Gulele Sub City, Addis Ababa, Ethiopia, 2018

3.3.2 Specific Objectives

To assess the resources available for surveillance system

To assess and describe key attributes of the surveillance system

Assess major gaps, challenges and strength of the surveillance system

3.4 Methods and Materials

3.4.1 Study area

Surveillance system evaluation was conducted in Gullele Sub City which is one of the ten Sub Cities of Addis Ababa, with an estimated total population of 335,319. The Sub City has 10 administrative Districts and it was selected by the discussion made with the Regional Health Bureau Public Health Emergency Core Process because of measles epidemic in the Sub City before one year.

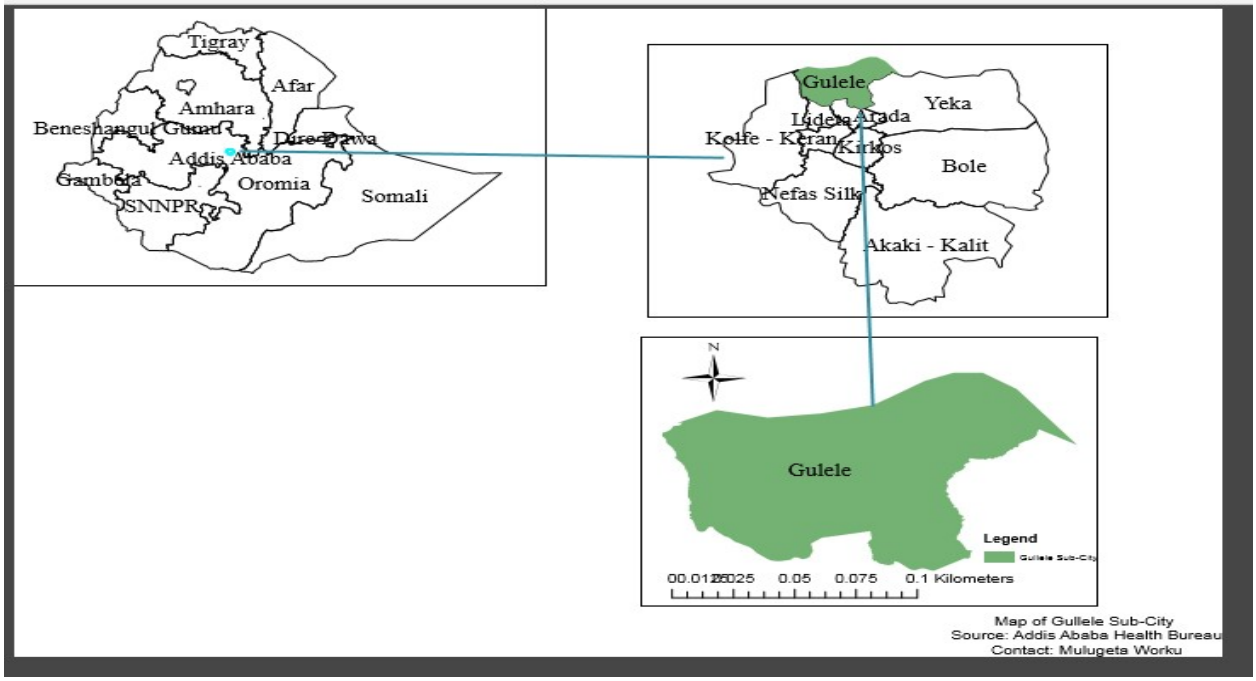


Figure 17: Map of Gulele Sub City, Addis Ababa, Ethiopia, 2018

3.4.2 Study Design

Descriptive cross-sectional study conducted using semi structured questionnaire from November 26- January 20, 2018 in Gulele Sub City.

3.4.3 Sample subjects

The study subjects were health centers and health offices (District Health Offices and Sub City Health Offices).

3.4.4 Sample size and sampling

Gulele Sub City Health office, six woreda health offices, and six health centers were included in the sample. Selection of the woredas and health facilities were done as follows:

1. From the total woredas in the Sub City, six woredas were selected by simple random sampling method.
2. From each selected woreda one health center was included. Finally, a total of 13 sites were assessed during the study period.

3.4.5 Data collection technique

Data were collected using semi-structured questionnaire, interview, observation of some practical tools for surveillance and secondary data review was as well conducted.

3.4.6 Data analysis

Data were entered and analyze using the Microsoft Office excels.

3.4.7 Data quality control

The obtained data were cross-checked at different levels (i.e. Sub City Health Department, District Health Offices and health facilities) with each other before summarizing at each level for its accuracy and consistency.

3.4.8 Disseminations of the study finding

The finding of the study was submitted in both hard and soft copy to the AAU- SPH, Sub City Health Offices and Addis Ababa and other stakeholders. In addition the report will also be submitted to EFETP resident coordinators, Mentors and advisors in soft copy.

3.5 Results

3.5.1 Involvement of stake holders

Before the start of the evaluation activities, discussions were conducted with the Addis Ababa Regional Health Bureau, Public Health Emergency Management Core Process on selection of the Sub City to be included in the study and to ensure that the evaluation of the system addresses appropriate questions and attributes to produce useful and acceptable findings. Moreover, we discussed the objectives and purpose of the evaluation with Gulele Sub City Health Office deputy head and PHEM focal persons; selected district health offices heads and surveillance focal persons and selected health facilities heads and surveillance focal persons. All individuals

assigned and engaged on surveillance system of the selected organization participated in the evaluation process.

3.5.2 Overview of surveillance system

In Ethiopia public health emergency management is one of the core processes identified by the Ethiopian Ministry of Health following the 2008 health sector reform and restructuring based on business reengineering process 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, chemical spills, and bioterrorism (17).

Public Health Emergency Management (PHEM) is defined as the process of anticipating, preventing, preparing for, responding to and recovering from the impact of epidemics and health consequences of natural and manmade disasters (17). This core process is comprised of four sub-processes namely; Public Health Emergency Preparedness, Early Warning, Response, and Recovery. The early warning sub-process mainly involved in the integrated disease surveillance and reporting activities. The purpose of warning is to enable the provision of timely and effective information to the public and to responders through identified institutions that allow preparing for effective response or taking action to avoid or reduce risk(17).

The FMOH currently identified 21 top priority diseases and health conditions (13 are immediately reportable and 8 weekly reportable) for surveillance activities that are epidemic prone, internationally required under IHR 2005, and diseases targeted for eradication and elimination(17). The overall purpose of surveillance of these priority diseases is to monitor the trends against the pre seated tolerance limits, and pick any deviation from the limit at the earliest point in time and have prompt response (22). In addition as early warning system, it guides prevention, control and risk aversion actions like immunization, vector control and so on (17).

3.5.3 Public health importance of health events targeted for surveillance in Ethiopia

The 21 top priority diseases and health conditions identified by the FMOH to be reported by the surveillance system are important public health events that fulfill one or more of the following conditions; have high epidemic potential (measles, cholera, meningitis, smallpox, SARS, yellow

fever, avian human influenza, malaria), required internationally under IHR 2005 (smallpox, SARS, wild type poliomyelitis, human influenza), disease targeted for eradication or elimination (wild type poliomyelitis, dracunculiasis, neonatal tetanus), diseases that have a significant public health importance (rabies, dysentery, relapsing fever, malnutrition, typhoid fever) and diseases that have effective control and prevention measures (18).

This surveillance system evaluation assessed immediately reportable disease (measles). Measles is important public health problems of the Sub City that caused significant amount of morbidity and mortality. The disease has potential to cause outbreaks/epidemics in the Sub City if the surveillance system not operates properly. To detect and report these important public health problems the surveillance system uses two types of case definitions (standard and community case definitions) for each events.

3.5.4 Description of selected disease

Measles is one of the communicable diseases still causing preventable mortality and morbidity in Ethiopia (20). In Addis Ababa Region measles outbreak is still a public health concern. In 2010 Ethiopian fiscal year, 580 suspected cases of measles and 4 deaths were reported. In the same year Gulele Sub city has reported 118 suspected cases of measles and 0 deaths from 10 different Districts (Figure 18).

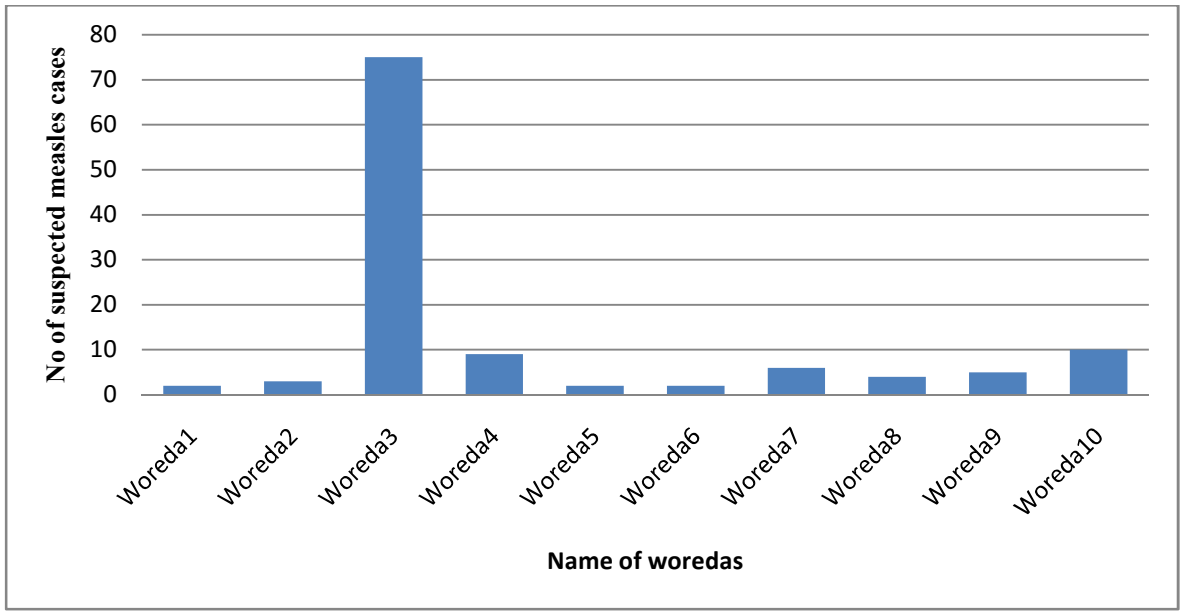


Figure 18: Suspected measles cases reported in Gulele Sub City, Addis Ababa, 2018

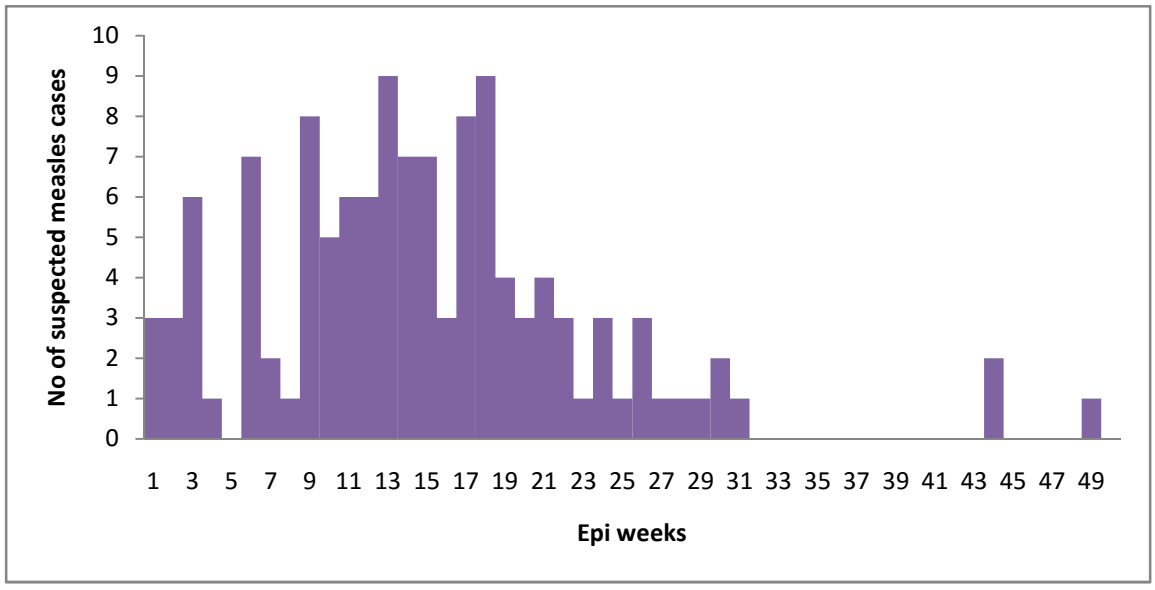


Figure 19: Weekly trends of suspected measles cases reported in 2017, Gulele Sub City, Addis Ababa, 2018

3.5.5 Case definition of measles

The use of a standard case definition increases the specificity of reporting and improves the comparability of the health-related events reported from different sources of data, including geographic areas (17). Case definitions of the selected disease for evaluation of the system are:

Standard case definition

Suspected - 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(21).

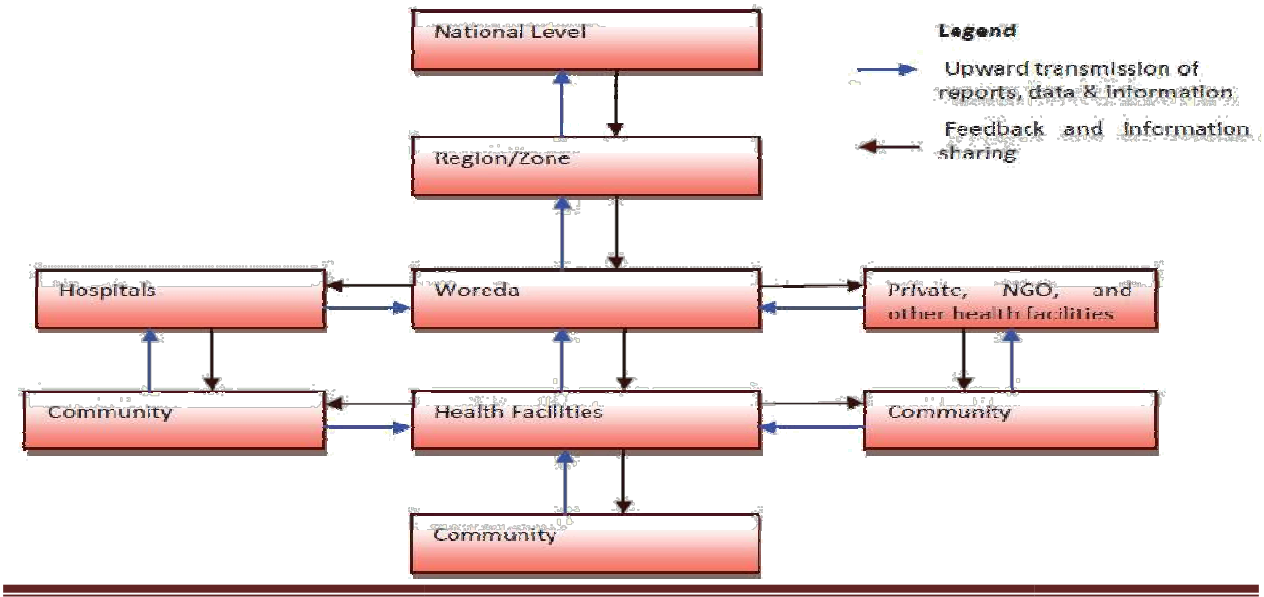
Confirmed -a suspected case with laboratory confirmation (positive IgM antibody) or epidemiological link to confirmed cases in an epidemic(21).

Community case definitions

Any person with fever and rash(21).

Operation and reporting of surveillance system

The formal flow of surveillance data is usually from reporting site to the next level up to the national level and to WHO. The community and health facilities at the lowest level particularly health posts are the main source of information about the occurrence of health related events. The information collected from this site is compiled in standardized forms, analyzed and then forwarded to the district health office by health centers. The district level compiles, analyzes and sends the data to the sub city level, using a standard form. Similarly, the Sub City level compiles and analyzes the report and sends the compiled data to the region using a standard form and internet, from which the national level receives the compiled data. The sub city and regional levels usually send the report to the next level by email. Feedback and information sharing follows the same route, but in the reverse direction (Figure 20).



Source: Ethiopian National PHEM Guideline, 2012

Figure 20: Data and Information flow chart of surveillance system

3.5.6 Reporting periodicity

The identified 21 diseases and health conditions under surveillance of Ethiopia are classified in to two reporting periods (14 immediately reportable and 7 weekly reportable) depending on their epidemic potential, diseases targeted for elimination and eradication (Table 7).

Table 7: Immediately and Weekly reportable diseases and condition in Ethiopia

	Immediately reportable diseases and conditions		Weekly reportable diseases an d conditions
1	Acute flaccid paralysis (AFP)	15	Malaria
2	Anthrax	16	Meningococcal meningitis
3	Avian human influenza	17	Dysentery
4	Cholera	18	Typhoid fever
5	Dracunculiasis	19	Typhus
6	Measles	20	Relapsing fever
7	Rabies	21	Severe acute malnutrition
8	Small pox		
9	Neonatal tetanus		
10	Pandemic influenza A		
11	Viral hemorrhagic fever		
12	SARS		
13	Yellow fever		
14	Maternal death		

Source: Ethiopian National PHEM guide line 2012

3.5.7 Immediately reporting

Currently 14 diseases are identified to be reported immediately to the next reporting level. For the immediately reportable diseases, a single suspected case is considered as a suspected outbreak. A single occurrence of these diseases needs to be reported from the community, health post or health center to district health office within 30 minutes, from the district health office to sub city/region level within 30 minutes, similarly from sub city health office to region within another 30 minutes, then from the regional health bureau to the national within another 30 minutes and finally from the FMOH to the WHO within 24 hours. The information can be reported by means of available convenient methods; like telephone, radiophone, email, fax or mobile short message service (17).

3.5.8 Weekly reporting

Currently, seven diseases and health conditions are identified to be reported weekly to the next reporting level. The total number of cases and deaths occurring within the week (Monday to Sunday) needs to be reported; from the health facilities to district health office every Monday till mid-day, from the district health office to Sub city/region level every Tuesday till mid-day, from sub city health office to region every Wednesday till midday, then from the regional health bureau to national PHEM every Thursday and finally, from the FMoH to stakeholders every Friday (17).

3.5.9 Population under surveillance

The Ethiopian Ministry of Health PHEM targeted all the population of the country to be under surveillance for all 21 public health important health events. Hence, the Addis Ababa Regional Health Bureau follow the same strategy and targeted all population of the Region which is estimated to be about 3.7 million in 2018 based on the projection from 2007 Ethiopian census, to be under surveillance. Similarly, all populations of Gulele Sub City are under surveillance for all reportable health events. The population of Gulele Sub City is estimated to be about 335,319 in 2018 based on the projection from the 2007 Ethiopian Census.

Administratively, Gulele Sub City is divided into 10 districts. Gullele Sub City there were 2 and 10 government hospitals and health centers respectively. Additionally, there were

privately owned 20 medium clinics, 7 primary clinics and two NGO health centers which participated in surveillance system. According to the Sub City Health Office report, the primary health service coverage of the Sub City was 100% in 2018. During the evaluation of the sub city, surveillance system I have assessed; sub city health office, six district health offices and six health centers (Table 8).

Table 8: Number of health facilities and health service coverage, Gulele Sub City, Addis Ababa, Ethiopia, 2018

S.No	Assessed facilities	2018 Population	Number of Hospitals	No of health centers	No of health extension workers	Health service coverage (%)
1	Gulele Sub City Health Office	335,319	2	12		100
2	Woreda 1	35,421	0	1	12	100
3	Woreda 3	34,854	0	1	12	100
4	Woreda 4	19,090	0	1	8	100
5	Woreda 6	32,359	0	1	12	100
6	Woreda 8	42,706	0	1	14	100
7	Woreda 10	30,473	0	1	11	100

3.5.10 Case detection and registration

To detect and report reportable public health problems appropriately, the surveillance system uses two types of case definitions (standard and community case definitions) for each event. During the assessment period, I observed standard case definitions for 21 reportable diseases in the assessed health centers. The standard case definitions for measles and Acute Flaccid Paralysis (AFP) were observed in all assessed health facilities and Districts except woreda 4.

However, the case definitions for immediately and weekly reportable disease were observed in only woreda 8. All assessed health facilities didn't have the case definition for severe acute malnutrition.

Among the assessed health centers all six (100%) of them have no capacity to collected CSF specimen due to absence of expertise (clinician for CSF) capable of collecting the specimens. However, all of the facilities are capable to collect blood, stool and sputum specimens. Specimen collection, handling and transportation guidelines were found in six (100 %) of the health centers. All health facilities were capable to transport specimen to reference laboratory and have the necessary materials (cold box, packaging materials and cold chain) to handle and transport the specimens.

3.5.11 Data Reporting

The national public health emergency management and its partners are responsible for preparing and distributing different reporting forms to regional health bureaus to be used for reporting by all levels of the system. At the time of the assessment, one (16.6%) of the health centers lacked the reporting form. All the facilities used hand prepared and photo copied forms to report the data. Health posts were using mobile SMS and hard copy to send report to the health centers and health centers also send the report to the District health office by the same means. All District Health Offices are using mobile SMS (100%) and additionally use hard copy to send the report to the Sub City health office. Gulele Health Office sends the report to the Region through email. Regarding the periodicity of the report, I have observed that all health facilities and heath posts and 100 % of District Health Offices follow dates of the week (Monday to Sunday) to be included on weekly reportable health conditions as described in the National PHEM Guideline.

3.5.12 Data analysis

Surveillance data collection either by immediately or weekly reporting system is not an end by itself. The collected data needs to be analyzed (by time, place person), interpreted and used for action and decision making starting from local to the central level in order for the values of the data to be realized. Surveillance data were analyzed on weekly basis by time, place and person at Sub City and woreda level but not at health posts, health center and hospital. According to the respondents the responsible person for surveillance data analysis is PHEM focal person at all level of the health

system. All assessed Districts, including the Sub City, one of health center have established action threshold for reportable diseases according to the national PHEM guideline recommendation. All of the assessed health facilities and health offices have appropriate denominators needed for surveillance data analysis.

3.5.13 Outbreak investigation

Investigating and managing an outbreak appropriately is essential to minimize morbidity and mortality by aborting the outbreak early before it spreads in the area. The Sub City Health Office responded that they had investigated one measles outbreak at woreda four and used the findings for intervention; however, there was no written report or document seen at district about outbreak investigation during the assessment.

3.5.14 Epidemic Preparedness and Management

The Sub City Health Office has emergency preparedness and response plan for epidemic prone diseases. All assessed District Health Offices have written not emergency preparedness and response plan, except woreda 4 and woreda 10. Among the assessed District Health Offices, four (67%) of them have no drugs and supplies necessary for emergency management during the assessment. Moreover, all Districts, including the Sub City Health Office have experienced shortage of drugs and supplies necessary for emergency management. All Districts and the Sub City have no specific budget line for emergency management and response. Regarding existence of epidemic management committee, four of the Districts and the sub city health office have established the committee and all assessed districts, including the sub city responded that they have rapid response team. However, there were no documents or meeting minutes found at the time of the evaluation that shows the existence and activities of the committee except woreda 8 and sub city health office.

3.5.15 Availability of Budget and Resources for Surveillance Activities

Availability of critical resources and budget is important for executing surveillance activities and epidemic preparedness effectively. There is no specific budget line or allocated budget from government source for public health emergency activities at Sub City and District level. Resources needed for data management, communication, and logistics were all available at the regional level. However, they all became very scarce or absence down in the hierarchy.

Availability of essential materials and resources to undertake surveillance activities at all levels in the hierarchy of the system are indicated in the table below (Table 9).

Table 9: Availability of resources needed for surveillance activities,Gulele Sub City Health Office, Addis Ababa, Ethiopia, 2018

S.No	Material	Sub City n= 1	District level n=6	Health center level n= 6
1	Electricity	1(100%)	6(100%)	6(100%)
2	Computers	1(100%)	6(100%)	6(100%)
3	Printers	1(100%)	6(100%)	4(67%)
4	Stationary	1(100%)	6(100%)	6(100%)
5	Ambulance	0(0%)	0(0%)	6(100%)
6	Motorcycle	0(0%)	0(0%)	0(0%)
7	Telephone	1(100%)	6(100%)	6(100%)
8	Fax	0(0%)	0(0%)	0(0%)
9	Calculator	1(100%)	6(100%)	6(100%)

3.5.16 Feedbacks

Gulele Sub City Health Office has provided a bulletin and feedback on surveillance activities to the Districts, but it has given feedback on integrated activities every quarter of a year that didn't contain comments on surveillance activities. All the assessed District Health Offices have provided surveillance specific feedback to their respective reporting facilities.

3.5.17 Supportive Supervision

During the past six months, prior to this assessment, the Sub City health office conducted the first quarter supportive supervisions on surveillance activities for the districts and health facilities. Among the assessed District health offices, 4 of them were supervised two times by Sub City. All of the woreda health office conducted supportive supervision for their respective health centers.

3.5.17 Description of attributes of the surveillance system

3.5.17.1 Usefulness

All assessed health sectors responded that the surveillance is useful for early detection of outbreaks of diseases and health events under surveillance. In addition, they responded that it helps to determine the burden of morbidity and mortality of the reportable health events and to determine the risk factors related to those diseases and to permit assessment of the effect of the prevention and control program. Government and non-government organizations have used surveillance data to make decisions and take actions.

3.5.17.2 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 (22). Respondents from all visited District health offices, including Sub City health office, from all health facilities understand the case definitions for selected priority diseases (measles, AFP, malaria and malnutrition). In addition, they believe that community case definitions are easy to understand at community level. Regarding the route of data flow, all respondents agree that it is simple and clear as it was indicated in the PHEM guideline and were familiar with when and to whom they send the report. In addition, all participants of the evaluation responded that surveillance reporting formats are also clear and simple. Among the assessed District health offices, 83 % of them said, it takes 5-10 minutes to fill the weekly reporting format.

3.5.17.3 Flexibility

As the current reporting format contains additional spaces named others at the end for both weekly and immediately reportable diseases, it can make it flexible to accommodate newly occurring health events/diseases to fill on without any difficulty. Existing reporting format was

updated in 2009 during the time IDSR was changed to the current PHEM to include newly emerged diseases, such as Avian Influenza, Pandemic Influenza and SARS. All Sub City and District level respondents agreed that implementation of National PHEM guideline will not be difficult with changes in existing procedure of case detection, case definition and report forms.

3.5.17.4 Data Quality

Even though the reporting formats for weekly and immediately reportable diseases are well understood at all levels of the surveillance system, during the evaluation we have observed common data quality problems in all levels; mostly of blank spaces on the reported formats.

Common surveillance data quality problems identified on filled reporting formats during the assessment were; address of reporting sites not recorded, the starting and ending dates of the week not recorded, date report sent, report prepared by and zero reports were not recorded. In addition, most health centers and district health offices didn't record number of sites expected to report and number of sites reported on time on the form that are important variables to determine completeness and timeliness of the reporting. The main reasons for poor data quality were lack of training for health extension workers and health facility focal persons, work overload, lack of commitment, and feedbacks specific to surveillance.

3.5.17.5 Acceptability

Acceptability of surveillance reflects the willingness of persons and organizations to participate in the surveillance system. Acceptability is a largely subjective attribute that encompasses the willingness of persons on whom the public health surveillance system depends on to provide accurate, consistent, complete, and timely data (22). Among the health sectors available in Gulele sub city and all District health offices were 100% active participants. Whereas, health posts, health centers, other private and NGO health facilities participation on average were 95.7%, 95.9%, 93.8% and 98.0% respectively in the past 12 weeks prior to the evaluation. Overall participation rate of all health sectors found in the sub city were 96%. However, there were factors influencing sites to participate in the surveillance system like; lack of understanding on relevance of data by these facilities, competing priorities, lack feedbacks and poor monitoring system of governmental organizations.

3.5.17.6 Representativeness

In Addis Ababa Region, there were more than 1,149 health extension workers and over 102 functional health centers. During the assessment in Gulele Sub City there were 141 health extension workers, 12 health centers, two hospitals and about 71 private and NGO health facilities. The primary health service coverage of the Sub City was 100% and the health service coverage of the visited Districts was 100%.

3.5.17.7 Timeliness and Completeness

Timely report of surveillance data is important for early public health interventions. Timeliness of the public health surveillance is usually considered that time interval between the onset of health-related event and the reporting of the event within the time period specified in national PHEM guideline to the public health agency responsible for immediate control effort, prevention of continued exposure or program planning. The minimum expected reporting timeliness is 80% as per recommendation of the national PHEM guideline. The 2010 EFY weekly report timeliness of the Sub City was all above 80%. However we couldn't determine the timeliness of visited health facilities due to incompleteness of data on reporting period. The average weekly reporting rate/completeness of the zone was 94.6% in the past three months prior to the assessment (figure 21 and 22).

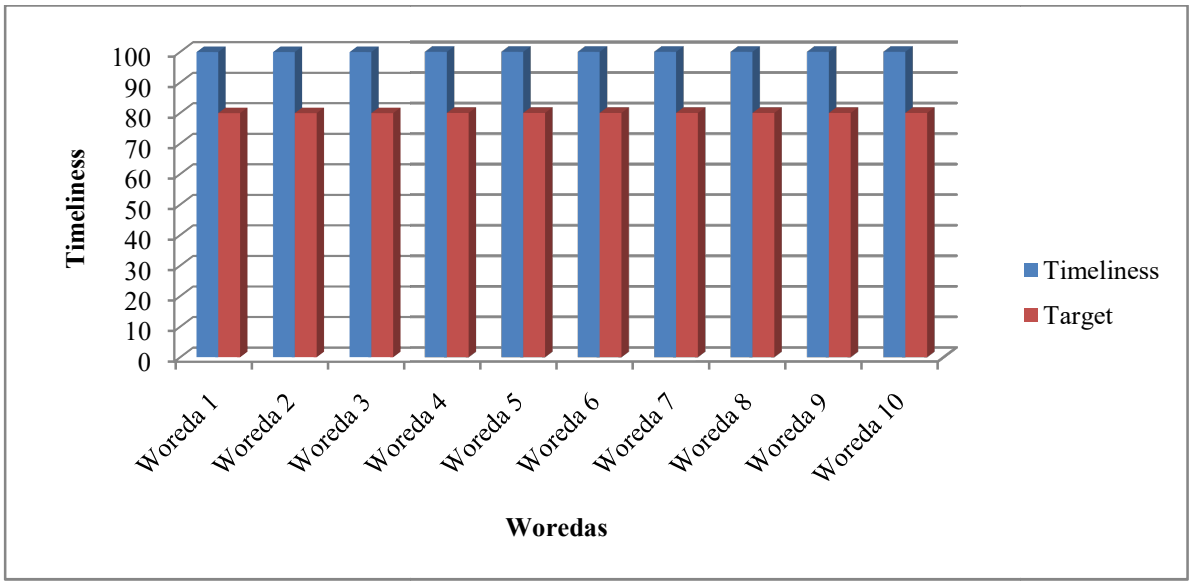


Figure 21: Report timeliness of woreda's , Gulele Sub City Health Office, Addis Ababa, 2018

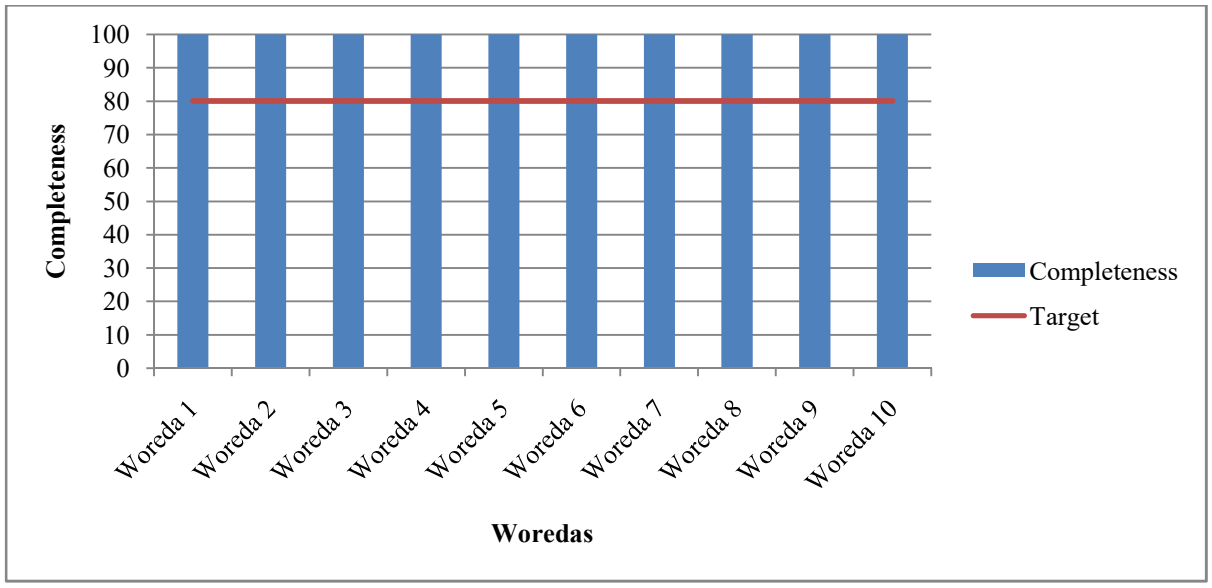


Figure 22: Report completeness of Woreda's, Gulele Sub City Health Office, Addis Ababa, 2018

3.5.17.8 Sensitivity

The sensitivity of a surveillance system can be considered at two levels. At the level of case reporting, sensitivity refers to the proportion of cases of a disease (or other health-related events) 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 (22). However, in this evaluation it was difficult to evaluate sensitivity of the system quantitatively, without knowing false negatives and true positives that are identified by the system, which requires collection or access to data external to the system (Eg. population survey) to determine the true frequency of reported health conditions and validation of data collected by the system.

3.5.17.9 Stability

Stability of surveillance system is the reliability and availability (ability to be operational when needed) of the surveillance system, without interruption. I assessed the stability of the system based on the cost required to undertake, the desired and actual amount of time required for the system to collect or receive data, manage the data, including transfer, entry, editing, storage and release of data. Availability of PHEM officers at Sub City, District and at all Health facility level is a good opportunity for running surveillance system even with limited resources. However, shortage of budget and logistics specific to the system is hindering supervision and capacity

building activity at sub city and district level. Moreover, being engaged on activities other than surveillance of PHEM focal persons at all levels were also affected the stability and proper functioning of the system to achieve its intended objectives and purposes.

3.6 Discussion

Since the establishment of PHEM as core process at all levels of the health sectors during the reconstruction of health system by business process reengineering significant achievements were recorded on surveillance activities. A surveillance system evaluation is an important tool to assess the capacity of the system to meet its intended purposes and objectives; to improve its operation and to optimize the available resources utilization (17). The findings of this evaluation can be used as an input to strengthen the overall surveillance system activities of the Gulele Sub City to achieve its intended purposes.

Epidemic preparedness and response is existing level of preparedness for potential epidemics and includes availability of preparedness plans, stock keeping, designation of isolation facilities, and response activities(17). However, the preparedness level of Gulele Sub City was poor as all assessed districts and health facilities didn't have written emergency preparedness and response plan. Additionally, there were no documents8 that show the existence and activities of emergency management team and rapid response team in all assessed facilities of the sub city.

Supervision is a process of helping to improve work performance. Supervision is not an inspection, rather, good supervision aims to sustain good quality services rather than finding things that are wrong (17). However, due to shortage of budget and vehicle, the sub city health office has conducted supportive supervision once in 2018.

A public health surveillance system is dependent on a clear case definition to detect and report the health related event under surveillance. Using standard case definition ensures that every case is diagnosed in the same way, regardless of where or when it occurred, or who identified it. This allows for comparing the number of cases of the disease or condition that occurred in one time or place with the number occurring in another time or place (17). During the assessment, I observed standard case definition for measles, AFP, maternal death, Cholera and NNT in all visited sites, but only woreda 8 and the sub city (15%) of the visited sites posted all weekly and immediately reportable diseases.

The minimum expected reporting timeliness is 80% as per recommendation of the national PHEM guideline. The 2018 weekly report timeliness of the sub city was above 80%. However, the report completeness of both at sub city and districts level were above the national minimum expected reporting rate(80%), but copy of reported data were not available at Guto meda health center and woreda 4 health office.

The simplicity of a public health surveillance system refers to its structure and ease of operation (22).All respondents agreed on the simplicity of the surveillance formats. It was also agreed by all respondents that surveillance system is flexible for newly occurring health related events.

Stability of Surveillance system is the reliability and availability of the surveillance system without interruption (22). Shortage of budget and logistics specific to the system is hindering supervision and capacity building activity at sub city level. Moreover, being engaged on activities other than surveillance of PHEM focal person at health center levels also affected the stability and proper functioning of the system to achieve its intended objectives and purposes.

3.7 Limitation

- Written emergency preparedness and response plans were not prepared at all levels except Sub City and woreda 8 health offices.
- No written document of rapid response team was observed at all levels.
- Police officers clinic report was not included in the system
- Laboratory result feedbacks were not found for suspected measles cases sent to EPHI

3.8 Conclusion

There was no written emergency preparedness and response plan to strengthen capacity in recognizing and responding to public health emergencies. Although there was an integrated supportive supervision that helps to identify and fill gaps related to the overall activities in the Sub City, I identified lack of supervision specific to surveillance particularly at District level.

Although case definition of few diseases under surveillance were seen at some facilities, only the Sub City Health Office and woreda 8 health office posted all diseases under surveillance. Regarding attributes, the surveillance system of the Sub City was simple, flexible and useful.

Attributes that require attention for improvements of surveillance were data quality, acceptability, timeliness, representativeness and stability.

3.9 Recommendation

Written emergency preparedness and response plans should have to be prepared at all levels of the surveillance system. Additionally, active rapid response team should have to be established with identified roles and responsibilities. All health facilities should be included in the report and data quality should be improved. Laboratory result feedbacks should be followed and received and sent to respective concerned bodies.

3.10 References

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CHAPTER FOUR
HEALTH PROFILE DESCRIPTION

4.1 Health profile description of Gulele Sub City, Addis Ababa, Ethiopia, 2018

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Abstract

Background- Health profile assessment is both a process and a product. It is a process of gathering and interpreting information from multiple and diverse sources in order to develop a deep understanding of the health of a community. A community health profile includes both previously identified health issues and the identification of new, emerging issues. The main sources of data used to develop health profile documents are Gulele Sub City administration, Health, Educational, Water Resource, culture and tourism, energy office and Finance office. The purpose of this health description is to develop health profile of Gullele Sub City.

Methodology - Health profile description was conducted in Gullele Sub City. All required data were collected, analyzed and interpreted from March 17/2018 to April 15/2018. Hard and softcopies were reviewed to generate different data. Data were collected from the Sub City Health Office, education office, water & energy office, administrative office, Culture and tourism office, finance and economy development office, different literature and publications were used to incorporate other missed information.

Results - The total population of the sub City was 335,319, 163,971 with male and 171,378 female which is projected from 2007 census. Acute upper respiratory tract infection has been the leading causes of morbidity among adult 68,315, (42.8%) adults and 21,984, (78.5%) under five children in outpatient departments in the sub City. A total of 36,871 people were screened for HIV from different departments. VCT department contributes 15,819, and outpatient department contributes 13,655 the rest of the tests were done at antenatal care and TB clinic. Out of the total tests 590 HIV positive cases were identified. Five hundred twenty seven TB cases were screened for HIV and 134, (25%) patients were positive for HIV.

Conclusions and Recommendations - Acute upper respiratory tract infection has been the leading causes of morbidity among adult and under five children. TB cases detection and cure rate was low. TB case detection should be strengthened through community awareness, and defaulter tracing mechanisms and strict DOT program enhanced.

4.2 Introduction

Health profile assessment is both a process and a product. It is a process of gathering and interpreting information from multiple and diverse sources in order to develop a deep understanding of the health of a community. It is also a process that uses this result to develop strategies to improve the health status of the community (23).

A health profile is a comprehensive compilation of information about a community. The data in a profile reflects the health of a given community from many different angles. The information may include data already collected and published about a community or information collected by organizations or individuals creating the profile. Community health assessment also includes products, such as a community heath profile and a community health improvement plan. An assessment that covers an entire community will necessarily be broad and include a wide range of data. A community health profile includes both previously identified health issues and the identification of new, emerging issues(23).

A description of community systems can be limited to health and medical care systems, but it also can be broad enough to include educational, family, political, and religious systems operating within that community. The process of developing Health profile document may include such activities as: Gathering published data with respect to demographics, socio-economic characteristics, health status, health care access, and services available, identifying the unique strengths and resources of a given community, summarizing, presenting, and interpreting data(23).

The health profile provides an overview of the situation and trends of priority health problems and the health systems profile, including a description of different institutional frameworks, key issues and challenges of the Sub city. It is important to obtain enough, accurate and reliable data of particular geographic area in order to develop meaningful developmental plan .Organizing, summarizing and analyzing of health and health related data of the Sub city is important to prioritize problems of studied area and plan on identified problems. These summarized and prioritized data are important for public health surveillance officials for planning, implementation and evaluation of public health surveillance programs. Interpretation and analysis of health data in a profile are critically important. The interpretation and analysis of

health trends and patterns in the data can be included throughout the profile, with summaries at the end of each profile section, or at the end of the profile (23).

As of 2011, study done in California shows that health profiles provide quick and easy access to the most commonly requested health indicators from the California Health Interview Survey (24). The profiles present estimates to track changes in insurance status, disease prevalence, health behaviors and overall health status over time and enables frequent release of health estimates that will help policy makers, media, health advocates and others better respond to current events and the impact of a changing economic and social climate on health (24).

The purpose of health profile description is to promote evidence-based health policy making through a comprehensive and rigorous analysis of the dynamics of health situations and health systems in the sub city. Therefore, the main objectives of this document are to present compiled information concerning physical and socio-economic condition of the sub city and its health profile constraints.

The main sources of data used to develop health profile documents are Gulele sub city administration, Health, Educational, Water Resource, culture and tourism, energy office and Finance office. The document covers the data and activities for the period of July 2016- June 2017 or 2009 Ethiopian fiscal year.

4.3 Objectives

4.3.1 General objective

- To develop health profile description of Gullele Sub City, Addis Ababa City administration, Ethiopia 2017.

4.3.2 Specific objectives

- To describe the health status of the Sub City.
- To identify health service status of the Sub City.
- To determine disease burden of the Sub City.

4.4 Methodology

4.4.1 Study Area

Health profile description was conducted in Gullele Sub City which is one of the ten Sub Cities of Addis Ababa, Ethiopia.

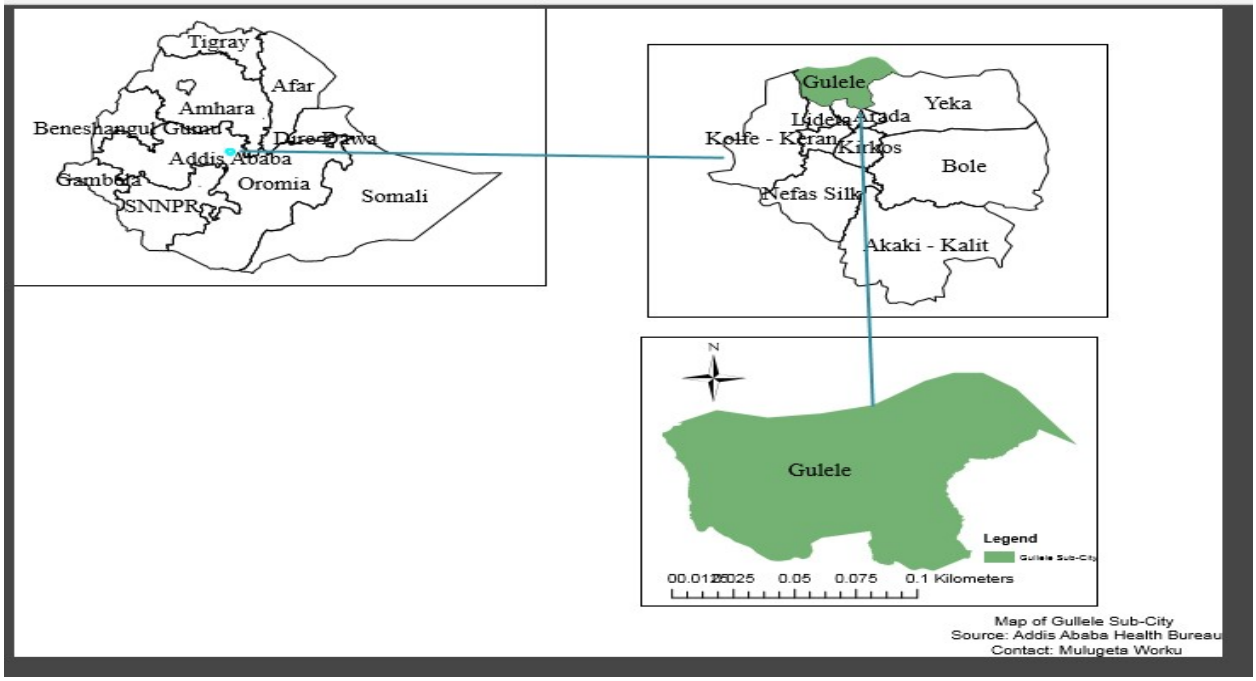

Figure 23: Map of Gulele Sub City, Addis Ababa, Ethiopia, 2018

4.4.2 Study Period

All required data of July 2016 – June 2017 (2009 Ethiopian fiscal year) were collected, analyzed and interpreted from March 17/2018 to April 15/2018.

4.4.3 Study Design

Descriptive cross-sectional study was conducted using a standard questionnaire. Hard and softcopies were reviewed to generate different data. In addition, interviewing and discussion with concerned bodies also be conducted.

4.4.4 Data collection methods

Health and other health related data of July 2016 – June 2017 or (2009 Ethiopian fiscal year) were collected and reviewed from the Sub City health office, education office, water & energy office, administrative office, Culture and tourism office, finance and economy development

office, different literature and publications to incorporate other missed information. The data was collected by using face to face interview, document review and documentary videos prepared by the Sub City culture and tourism office.

4.4.5 Data analysis procedures

Data were analyzed by using Microsoft office Excel 2007 to organize and analyze the data appropriately.

4.5 Result

4.5.1 Historical Background

Gulele is one of the ten Sub Cities of Addis Ababa, the capital of Ethiopia. The Sub City is located in the northern part of the City, near the mount Entoto and Entoto Natural Park. As the culture and tourism office the name Gullele came from the local Oromo governor called Gullele, previously there was small village called "mene Gullele "means the house of Gullele. Gullele Sub City is bordered on the north by Sululta Town and Sululta woreda of Oromia Region, on Southeast by Yeka Yekb City, on the South by Arada Sub City, on the Southwest by Kolfe Keranio and Addis Ketema Sub City. Gullele Sub City is the oldest and the first place to be established by emperor Menelik II in 1887 at entoto mariam church. There are old age institutions like Yekatit 12 preparatory School, before 1974 called Itege Menen girls school, Debire Elias church cave and the current Ethiopian Public Health Institute (25).

4.5.2 Geography and Climate

The area of the Sub City is 30.18 square kilometer. The average altitude of the Sub City is 2408 meters above sea level, but mount entoto Peaks the elevation to 3,200 meter above sea level. The climatic condition is 100% highland. Annual average temperature of the Sub City is 15^0c (59^0 F) with high temperature of 23^0c (73^0F) and with low temperature of 10 – 15^0c (50 -59^0F) (25).

4.5.3 Administrative and political structure

Administratively the Sub City has 10 woredas, there are 35 government offices in the Sub City, and all the offices are located at Addisu Gebeya. Entoto Mariam museum is one of the oldest museums in the sub city and using for tourism purpose, there are also four other museums registered as a museum in the sub City, there are 8 orthodox churches and five mosques in the sub city. The Sub City also known by its traditional cloth market of Shiro Meda, which is one of the tourist attraction place in Addis Ababa (25).

4.5.4 Demographic Information

The total population of the Sub City as projected from 2007 population and house census, estimated to be 335,319, among which majority 51.1% them were female. The land density of the Sub City was 9,439 per square kilometer. Among the total population under one year, less than five year and less than 15 years constitute 7,511 (2.24%), 24,009 (7.16%) and 80,376 (23.97%) respectively. There were also 7,813 estimated pregnancies and 6,745 deliveries.

Women of reproductive age in the sub City accounts for 116,154 (34.64%) of the total population. The productive age group (15 -59 years) accounts about two third of the total population 237,708 (70.89%) (Table10 and figure 24).

Table 10: Projected population by woreda and sex in Gulele Sub City, Addis Ababa, 2018

S.No	Name of Woredas	Total population	Percentage	Male 48.9%	Female 51.1%
1	Entoto Fana	35,421	10.56	17,321	18,100
2	Maychew	26,513	7.9	12,965	13,548
3	Shiro Meda	34,854	10.4	17,044	17,810
4	Guto Meda	18,124	5.4	8,863	9,261
5	Tibeb Bekechene	30,357	9	14,844	15,513
6	Addis Hiwot	32,359	9.6	15,823	16,536
7	Hidase	46,978	14	22,972	24,006
8	Addisu Gebeya	39,593	11.8	19361	20,232
9	Selam	40,647	12	19,876	20,771
10	Shegole	30,473	9	14,901	15,572
	Sub City total	335,319	100	163,970	171,349

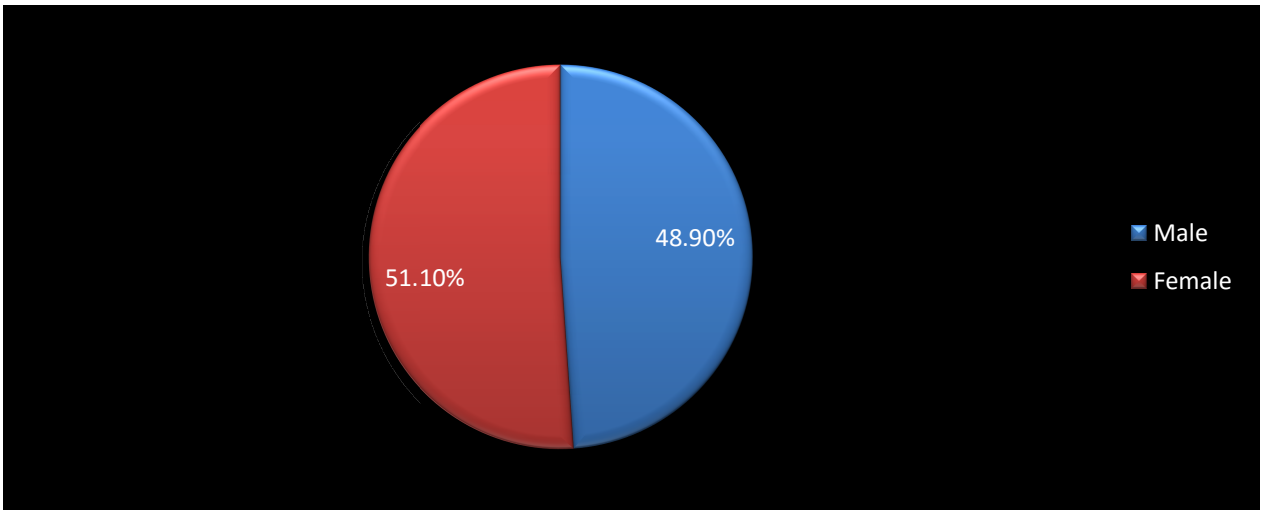

Figure 24: Sex Distribution of Gulele Sub City, Addis Ababa, Ethiopia, 2018

Hidase is the largest populous woreda (46,978, 14%) followed by Selam woreda(40,674, 12%) in the sub City. Guto Meda and Mychew are the least populous woreda (18,124, 5.4%) and (26,513, 7.9%) respectively (Table 11).

Table 11: Projected population by woreda and age category, Gulele Sub City, Addis Ababa, 2018

S.No	Woredas	Total population	House hold (4.1%)	<1 years (2.33%)	<5years (7.16%)	<15 years (23.97%)	15-59years (70.89%)	Women 15-49 years (34.64%)
1	Entoto Fana	35,421	1,452	825	2,536	8,490	25,110	12,270
2	Maychew	26,513	1,087	618	1,898	6,355	18,795	9,184
3	Shiro Meda	34,854	1,429	812	2,495	8,354	24,708	12,073
4	Guto Meda	18,124	743	422	1,297	4,344	12,848	6,278
5	Tibeb Bekechene	30,357	1,245	707	2,173	7,276	21,520	10,516
6	Addis Hiwot	32,359	1,327	754	2,314	7,756	22,939	11,209
7	Hidase	46,978	1,926	1,094	3,364	11,260	33,302	16,273
8	Addisu Gebeya	39,593	1,623	922	2,835	9,490	28,067	13,715
9	Selam	40,647	1,668	947	2,910	9,743	28,815	14,080
10	Shegole	30,473	1,249	710	2,182	7,304	21,602	10,556
	Sub City total	335,319	13,749	7,813	24,004	80,376	237,708	116,154

4.5.5 Education

Currently, there are 18 government and 36 private kindergartens, 20 government and 36 private a total of 56 primary schools (both 1st and 2nd cycle) were on service. Additionally, there were 4 and 16 government and private secondary schools respectively. Finally, 2 government and 16 private preparatory schools were registered in the sub city. A total of 44 government and 104 private schools were registered and given services for the student during the study period in the Sub City (Table 12).

Table 12: Number of Schools by owne in Gulele Sub City, Addis Ababa,2018

S. No	Schools	Owner		Total
		Government	Private	
1	Kindergarten	18	36	54
2	1 - 8	20	36	56
3	9-10	4	16	20
4	11-12	2	16	18
	Total	44	104	148

According to Gullele Sub City education office, out of 148 schools 146 have latrines separately for male and female. About 147 schools have access to water supply. Fifty nine schools established and actively participate on HIV/AIDS club. There were 5,010 school age children and 4,722 enrolments (94%) with 1.1% school dropout.

There were a total of 51,015 students 23,633 male and 27,382 female. Kindergarten students registered and attended school were 3,799, of which 1,933 were male and 1,866 female. The highest number of students were in the second cycle (5-8) contributes 17,071 followed by first cycle students 16,716. The secondary (9-10) and preparatory (11-12) schools students were 7,754 and 5,675 respectively (Table 13).

Table 13: Number of Students by sex and Grade in Gulele Sub City, Addis Ababa, 2018

S. No	Grade	Male student	Female student	Total
1	Kindergarten	1,933	1,866	3,799
2	1-4	7,783	8,933	16,716
3	5-8	7,819	9,252	17,071
4	9-10	3,530	4,224	7,754
5	11-12	2,568	3,107	5,675
	Total	23,633	27,382	51,015

Out of 2,781 teachers, 1,428 were first degree holder, 1,027 graduated with diploma, 243 teachers were certificate and 83 teachers have master's degree (Figure 25).

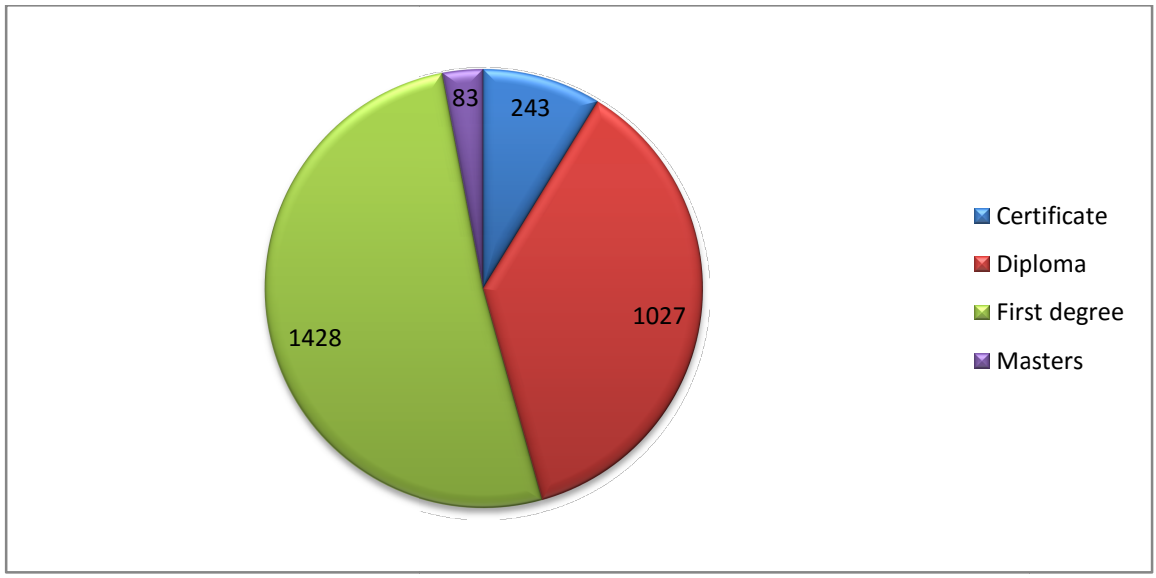

Figure 25: Number of teachers by educational status in Gulele Sub City, Addis Ababa, Ethiopia, 2018

4.5.6 Facilities and Infrastructure

All Schools and health centers in Gullele Sub City has all weather road and electric power supply. Two woredas were supplied by Legedadi drinking water dam, four woredas supplied by Gefersa drinking water dam and the rest six woredas supplied by deep well found on the foot of mount entoto. There are mobile network in all woredas of the Sub City. It was difficult to find latrine coverage and utilization data of the Sub City.

4.5.7 Income

The main source of income in the Sub City is business. According to business and industry office of the sub city, there are 76 juice and vegetable shops, 196 male and 237 female and children boutique, 57 bakery house, 37 butcher shops, 169 bar and restaurants, 47 bars, 56 hotels, 3 star hotels, 96 male barber, 71 female beauty salon, 21 medium clinic, 8 primary clinic, 6 dental clinic, 16 pharmacy, 18 drug store, 104 private schools, 36 furniture shops and 829 small microfinance and enterprise on different businesses. The report from social affair office of the sub city shows, there were 3,780 unemployed individuals during July 2016 – July 2017. The average income of individuals in the sub city is not known.

4.5.8 Health system of the sub City

4.5.8.1 Organogram

The recent Sub City Health Office structure is divided into five core process; namely disease prevention and care core process, HIV/AIDS prevention and control core process, curative health care core process, human resource core process and community insurance service core process. Under disease prevention and care core process there are health extension program case team, communicable disease control case team, maternal and child health case team and public health emergency management case team. The health office head is politically assigned individual (Table 26).

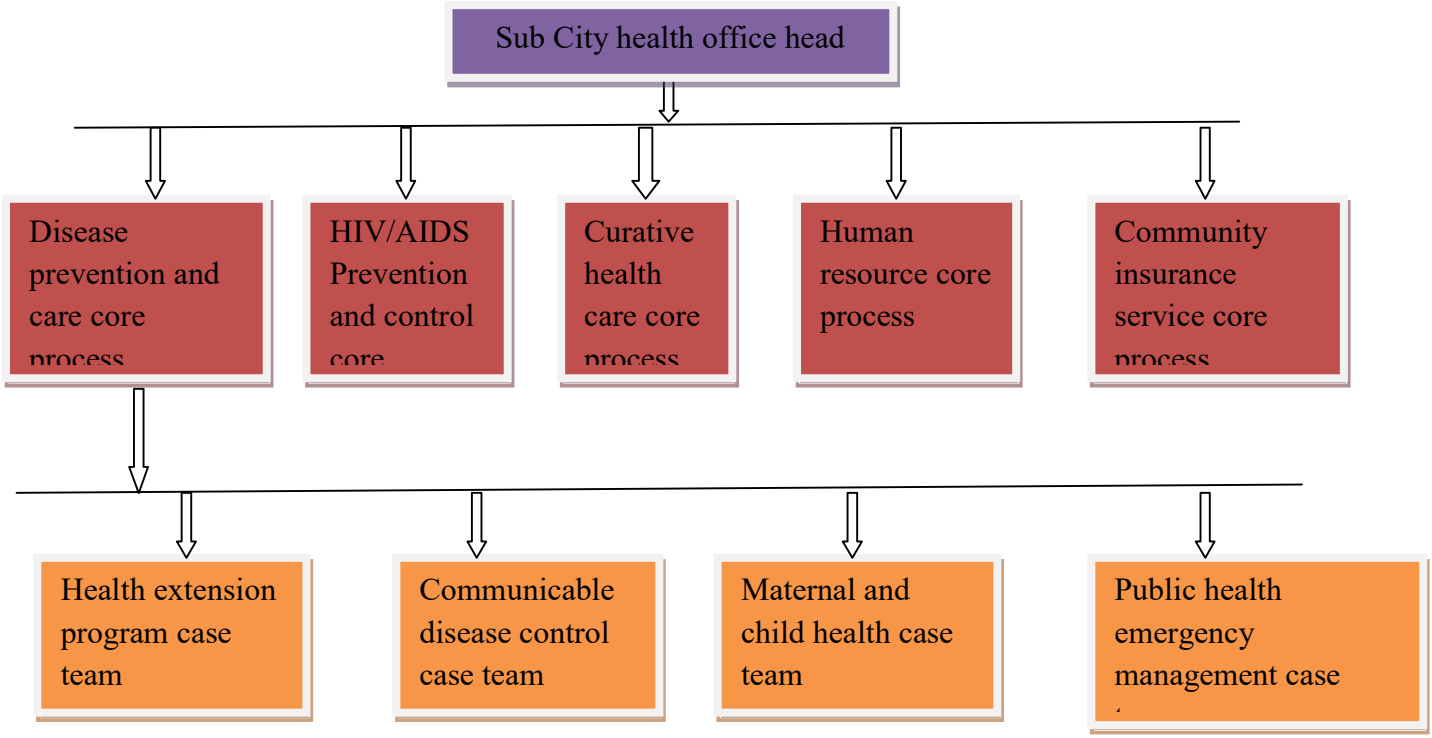

Figure 26: Organizational structure of Gulele Sub City Health Office, Addis Ababa, Ethiopia

4.5.8.2 Health facilities

According to food, medicine and health care control administration of Gullele Sub City there were 2 and 10 government hospitals and health centers respectively. Additionally, there were

privately owned 20 medium clinics, 7 primary clinics, 6 dental clinics, 18 drug stores and 16 pharmacies. And also there were 2 NGO health centers (Table 14).

Table 14: Types and number of health facilities in Gulele Sub City, Addis Ababa, 2018

S.No	Health Facility by type	Owner			Total
		Government	private	NGO	
1	Hospital	2	0	0	2
2	Health center	10	0	2	12
3	Medium clinic	0	20	1	21
4	Primary clinic	0	7	1	8
5	Dental clinic	0	6	0	6
6	Drug store	0	18	0	18
7	Pharmacy	0	16	0	16

4.5.8.3 Human resource

During the study period there were 745 different types of health professionals in governmental health facilities, 198 in private health facilities and 80 in NGO health facilities, totally 1,023 health professionals were given services for the community. There were 360 nurses (both first degree and diploma), 20 general medical practitioners, 136 health officers, 120 midwifery (both first degree and diploma), 141 health extension workers, 112 laboratory professionals (both first degree and diploma), 8 Environmental health sciences, 108 pharmacy professionals (both first degree and diploma) and 15 health management information system officers were on service at different health facilities in the sub city. Medical doctors to population ratio were 1:16,766 and nurse to population ratio were 1:931 (Table 15).

Table 15: Health professionals found in Government, private and NGO health facilities in Gulele Sub City, Addis Ababa, 2018

S.No	Category	Government	Private	NGO	Total
1	General medical practitioner	16	4	0	20
2	Health officer	98	27	11	136
3	Nurse (first degree)	30	6	7	43
4	Clinical nurse (level IV)	211	69	37	317
5	Midwifery (first degree)	18	2	3	23
6	Midwifery (level IV)	76	13	8	97
7	Laboratory technologist (first degree)	25	22	3	50
8	Laboratory technician (level IV)	37	21	4	62
9	Pharmacy (first degree)	24	4	2	30
10	Pharmacy (level IV)	43	30	5	78
11	Environmental health Science	8	0	0	8
12	Master of public health	3	0	0	3
13	Health extension worker	141	0	0	141
14	Health management information system officer	15	0	0	15
	Total	745	198	80	1,023

4.5.8.4 Health indicators and vital statistics

Vital statistics and health indicators are important to evaluate the performance of health activities and for future plan. Most of the vital statistics and health indicators of Gullele Sub City were used directly from the Addis Ababa Region Health Bureau conversion factors given from the national to the Regions. There are also vital statistics and health indicators compiled from health facilities report. Infant mortality rate, neonatal mortality rate and crude death rate are some of the missed data in Gullele Sub City Health Office (Table 16).

Table 16: Population and vital statistics of Gulele Sub City, Addis Ababa, 2018

S.No	Indicator	Number	%
1	Total population	335,319	100
2	Male population	163971	48.9
3	Female population	171378	51.1
4	Total live birth	7813	2.33
5	Still birth/100,000	3	
6	Under one year old population	7511	2.24
7	Under five year old population	24009	7.16
8	Women 15 -49 years old	116154	34.64
9	Pregnant Mothers	7813	2.33
10	Infant mortality rate	No data	-
11	Neonatal mortality	No data	-
12	Crude death rate	No data	-
13	Under 5 mortality	No data	-

4.5.8.5 Maternal and child health

Immunization programmes provide opportunities to promote integrated services and improve the overall health recipients (26). Gullele Sub City provide ten types of antigen for under one years old children targeted for 7,813 and planned to achieve more than 95% coverage for all types of antigen in ten health centers. The Sub City failed to achieve the planned coverage for all vaccines, BCG 73%, pentavalent$_1$ 82.6%, pentavalent$_3$ 85.5%, rota$_2$ 84%, PCV$_3$ 86%, and measles 81% (figure 27 and Table 17).

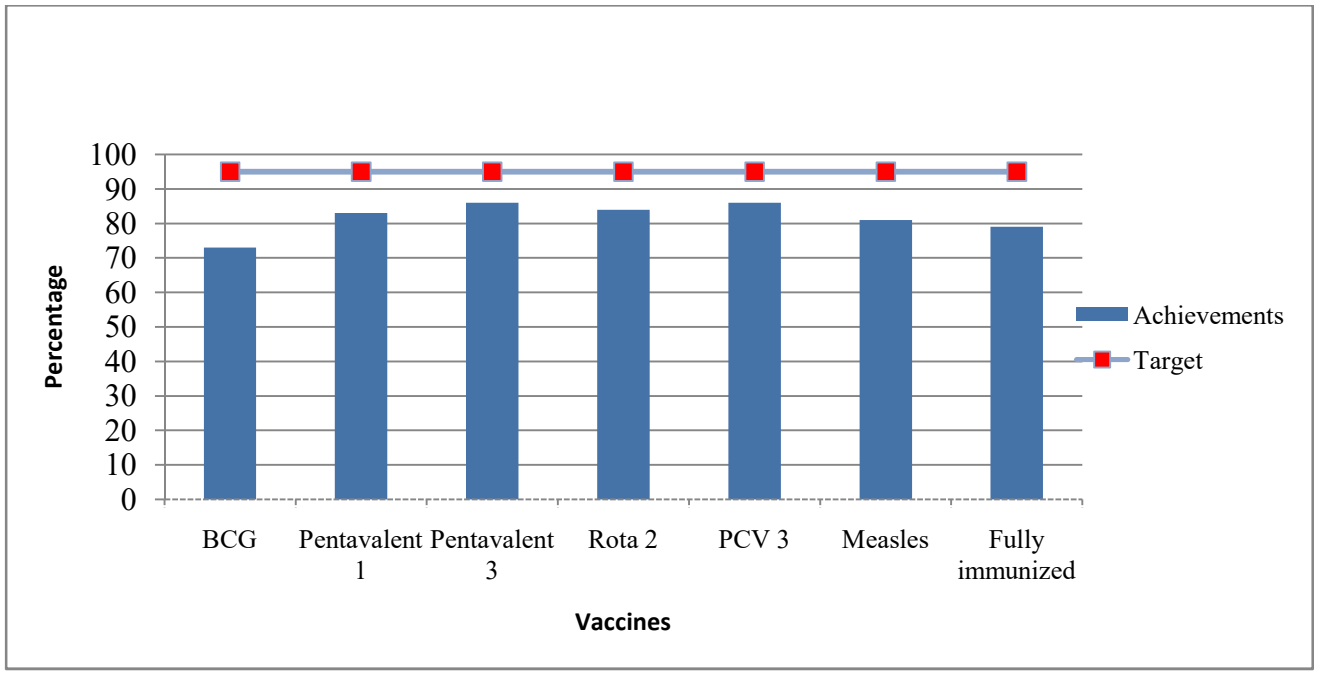

Figure 27: Vaccination Coverage of Gulele Sub City, Addis Ababa, Ethiopia, 2018

Table 17: Vaccination coverage of Gulele Sub City Health Office, Addis Ababa, 2018

S.No	Antigen	Target	Coverage	percentage
1	BCG	7,813	5,709	73
2	Pentavalent 1	7,511	6,204	82.6
3	Pentavalent 3	7,511	6,426	85.5
4	Rota 2	7,511	6,315	84
5	PCV 3	7,511	6,473	86
6	Measles	7,511	6,071	81
7	Fully immunized	7,511	5,925	79
8	PAB	7,813	5,842	75

Family planning is one of the components from MCH service provided at health facility of the sub city. The Sub City provides different types of family planning method for new and repeat acceptor and provides the services for 23,427 women. In 2016/2017 or in 2009 Ethiopian fiscal year the Sub City health office provides family planning service for 5,561 women of new acceptor both long term and short term method i.e oral contraceptive, depo provera, implant, IUCD, and others. Similarly 17,866 women serviced family planning as repeat acceptor. Depo provera contributes the highest 8,364, (35.7%) method followed by 8,026 (34.25%) implant and IUCD contributes 2,306 (9.84%) (Table18).

Table 18: Family Planning Users in Gulele Sub City, Addis Ababa, 2018

S.No	Methods	Number of new acceptor	Number of repeat acceptor	Total	%
1	Oral contraceptive	1,063	2,271	3,334	14.23
2	Injectable	1,894	6,470	8,364	35.7
3	Implant	1,676	6,350	8,026	34.25
4	IUCD	445	1,861	2,306	9.84
5	Others	488	914	1,402	5.98
	Total	5,561	17,866	23,427	100

4.5.8.6 Top leading causes of outpatient

Acute upper respiratory infection was the leading cause of morbidity among adult and children, contributing 68,315(42.8%) and 21,984(78.5%) of the total morbidity (Table 19 and 20).

Table 19: Top ten leading causes of adult morbidity in Gulele Sub City, Addis Ababa, 2018

Rank	Disease	Number	%
1	Acute Upper respiratory Infection	68,315	42.8
2	Acute Febrile Illness	24,121	15.11
3	Urinary tract infection	21,240	13.3
4	Typhoid fever	11,639	7.3
5	Trauma (injury, fracture	10,600	6.6
6	Pneumonia	6,596	4
7	Helmenthiasis	5,816	3.6
8	Diabetes Mellitus	4,794	3.19
9	Epidemic Typhus	4,439	2.8
10	STI (Vaginal Discharge syndrome)	2,003	1.3
	Total	159,563	100

Table 20: Top five leading causes of under five morbidity in Gulele sub City, Addis Ababa, 2018

Rank	Disease	Number	%
1	Acute Upper respiratory Infection	21,984	78.5
2	Pneumonia	3,106	11
3	Acute Febrile Illness	1474	5.3
4	Trauma (injury, fracture)	763	2.7
5	Helmenthiasis	676	2.4
	Total	28,003	100

4.5.8.7 HIV/AIDS

A total of 36,871 people were screened for HIV from different department. VCT department contributes 15,819, and outpatient department contributes 13,655 the rest tests were done at antenatal care and TB clinic. Out of the total test 590 HIV positive cases were identified. From 590 HIV positive cases 338 were from VCT and 252 Positive cases were found from PITC. PMTCT services were provided for 168 mothers. There were 4,504 PLWHA were enrolled in ART clinic (Table 21).

Table 21: HIV/AIDS tested and HIV positive cases in Gulele Sub City, Addis Ababa, 2018

S.No		Tested	Positive
1	VCT	15,819	338
2	PITC	13,655	252
3	PMTCT	168	
4	On ART	4,164	
5	Pre ART	340	
6	Total PLWHA	4,504	
7	Total people screened for HIV	36,871	590

4.5.8.8 TB

TB case detection was below the recommended detection rate of Ethiopia 532/694 (77%). Among 532 all form TB cases 150 (28%) of them were pulmonary tuberculosis. TB cure rate was 130/150 (86%) and there were 28(5%) deaths due to TB. And 21(4%) of them not evaluated (Table 22). A total of 527 TB case screened for HIV and 134(25%) patients were positive for HIV

Table 22: TB case detection and treatment outcome of Gulele Sub City, Addis Ababa, 2018

S.No	Category	Enrolled	Cured	Treatment Completed	Moved to MDR	Death	Treatment failure	Lost to follow up	Not evaluated
1	PTB	150	130	4	1	7	1	4	3
2	P.Neg. TB	178	0	160	1	8	2	5	2
3	EPTB	205	0	184	0	13	1	5	2
	Total	532	130	344	2	28	4	14	7

4.6 Discussion

Acute upper respiratory tract infection is the leading causes of morbidity among adult 68,315, (42.8%) and under five children 21,984, (78.5%) outpatient departments in the Sub City. Trauma, Diabetes mellitus and sexually transmitted infections are among ten top causes of morbidity in adult in the sub City.

HIV/AIDS tests were reported from VCT, PMTCT, PITC, ANC and TB clinic 36,817, out of tested 590 (1.6%) positive cases were identified. The highest number of HIV positive cases was reported from VCT 338 and PITC 252. The incidence of HIV/AIDS was 0.18% which is low as compared to 0.29% of the national and 6% the capital Addis Ababa (27). All forms of TB cases detection were 532/694 (77%) which is low compared to 207/100,000 detection rate according to the national TB guide line (28). The treatment outcome of pulmonary tuberculosis was 86 % below the recommended standard of national TB guide line which is 100%(28). Deaths due to TB were 28(5%).

Immunization coverage of the Sub City was below WHO minimum standard which is 95% Coverage(26). The Sub City targeted 7,813 children in 2009 Ethiopian fiscal year and achieved 73% BCG, 81% measles, 85.5% Pentavalent 3, 84% Rota 2 and 79% fully immunized. Family planning services were provided for 23,427 women. Inject able and implant methods contributes 8,364 and 8,026 respectively.

Medical Doctors to population ratio were 1: 16,766 and the National Human Resource for Health Strategic Plan of Ethiopia revealed that the country achieved one Medical Doctors to 17,000 population and plan to achieve for 10,000 populations in 2025 (29). The Sub City Nurse populations ratio were 1: 931, it is greater than the country nurse to population ratio of 2,132 and WHO recommends one nurse to 5000 populations in Sub Saharan Africa (29).

4.7 Limitation

Absence of certain health related data particularly mortality data and incompleteness of malnutrition data.

4.8 Conclusion

Acute upper respiratory tract infection was the leading causes of adult and under five children morbidity in the sub City, during 2016/2017 or 2009 Ethiopian fiscal year period. Acute febrile illness, urinary tract infection, trauma, diabetes mellitus and STI are among the top ten cause of morbidity in adults and pneumonia and acute febrile illness are among the top five causes of under five year children. Regarding Tuberculosis, the case detection and cure rate are below the WHO recommendation. And also Immunization coverage of the Sub City was below 95% coverage of WHO recommendation.

4.9 Recommendation

TB case detection should be strengthened through community awareness, and cure rate of pulmonary positive tuberculosis should be increased to the recommended standard through defaulter tracing mechanisms and strict DOT program, and thus helps to prevent and control MDR tuberculosis. Immunization activities should be strengthened to increase the coverage of the Sub City for all antigens based on WHO recommendations. Mortality data should be compiled from their respective government, private and NGO health facilities.

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CHAPTER FIVE

SCIENTIFIC MANUSCRIPT FOR PEER REVIEWED JOURNALS

5.1 Measles outbreak Investigation in Kiltu Kebele, Sewena District, Bale Zone, Oromia Region, Ethiopia, 2019

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Abstract

Introduction - Measles is a highly contagious, acute, viral illness caused by a member of the genus *morbilli* virus of the *Paramyxoviridae.*. In Africa 450 000 cases were reported and in Sub Saharan Africa 250, 000 deaths were reported in 2009. In Ethiopia measles cases usually come late to health facilities and often after they have developed complications. Investigation was done to verify the existence of an outbreak, to determine the magnitude and identify associated risk factors contributed for the occurrence of the outbreak.

Methods - A cross-sectional descriptive study followed by a one to two unmatched case control study was conducted from January 7 to February 3, 2019. Interview by using structured questionnaire was used to collect data from cases and controls. Data was managed and analyzed by using Microsoft Excel 2007 and Epi-Info 7.2.1.0.

Results - Over the period of outbreak 23 measles cases identified. The age of the case patients ranged from 1 to 12 years old with the median age of 5 years. Of the total cases, 13(57%) of them were under five years and 10(43 %) of them were above five years. The overall attack rate of the disease was 7 per 1000 inhabitants of the kebele with no death. Having contact with a person suspected to have measles during the last weeks OR: 6.4 (95% CI, 12. 6 – 44.3) and presence of measles case patient in the family OR: 6.5 (95% CI, 4.4 – 13.22) were significantly associated with contracting measles. Moreover absence of measles vaccination risk factor for developing with (OR: 2.53, (95% CI 1.7 – 14.67).

Conclusion and Recommendations- This outbreak occurred in remote pocket kebele of the Sewena District with extremely low immunization coverage. Multiple factors contributed for the occurrence of the outbreak. We recommend enhanced routine immunization service, and awareness creation to the community on mode of transmission, prevention and health seeking behavior. **Key Words**: measles, outbreak, Kiltu, sewena

5.2 Introduction

Measles is a highly contagious, acute, viral illness caused by a member of the genus *morbilli* virus of the *Paramyxoviridae* (1). Humans are the only natural hosts of measles virus. Although monkeys may become infected, transmission among them in the wild does not appear to be a mechanism by which the virus persists in nature. Measles is one of the vaccine preventable disease that are targeted for elimination and with half of the world close to eliminating measles, many countries in sub Saharan Africa including Ethiopia are still struggling to control the disease(2).

In 2006, countries in the World Health Organization (WHO) African Region adopted a goal to achieve 90% measles mortality reduction by 2010 compared with the estimate for 2000. By 2008 in the African Region, reported measles cases decreased 93% and estimated measles mortality decreased 92% compared with 2000.Since 2002, Ethiopia adopted these regional goals and strategies and has been taking important steps to control and ultimately to eliminate measles by 2020 (2, 5).

Globally, more than 20 million cases are reported yearly and 345 000 deaths were recorded in 2005. Fifty to sixty percent of 1.6 million global deaths attributed to vaccine preventable diseases are attributed to measles. In Africa 450 000 cases were reported and in Sub Saharan Africa 250, 000 deaths were reported in 2009 (4).

Measles is the commonest of vaccine preventable diseases that occur in Ethiopia; where parents recognize it as a self-limited common childhood illness for which no medical care is often sought. Measles surveillance in a few selected administrative zones of Ethiopia in 2002 revealed age shift of measles cases from children under five to those above five years of age (6). In Oromia region measles outbreak is still a main public health concern. During the period of 2018/2019, measles epidemics were reported from eleven zones namely; East Harerge, West Harerge, East Wollega, Arsi, Bale, Borena, Guji, Horro Guduru Wollega, Illubabor, Kellam Wollega, and West Shewa Zones of the region.

The overall objective of the investigation was to verify the existence of an outbreak, to describe the outbreak and identify associated risk factors contributed for the occurrence of the outbreak and ensure that virus transmission is interrupted as soon as possible in Kiltu kebele, 2019.

5.3 Methodology

We conducted the investigation in Kiltu kebele, Sewena district, Bale zone, Oromia Region. Sewena woreda is one of the districts found in Bale Zone. The total population of the district projected from 2007 E.C census is 91,195. In Sewena district there are 28 rural kebele and one urban kebele. The total population of the Kiltu kebele is 3,384 and it has one health post staffed with one health extension worker.

A one to two unmatched case control study design and descriptive analysis was done on the measles cases identified during the epidemic period. The uni-variate analysis included the calculation of means and medians for quantitative (numerical) variables, and frequencies and percentages for qualitative (categorical) variables.

All population of the Kiltu kebele was the source population of measles outbreak investigation from January 7 to February 3, 2019. During the outbreak investigation, all confirmed and suspected measles cases, deaths and selected community controls were target population of this study.

All measles case of the district was included and two controls for each case were selected based on geographical accessibility.

Inclusion criteria

Cases : Any resident of Kiltu kebele who tested positive for IgM or those who fulfill measles case definition from January 7 – February 3, 2019 and who agreed to participate in the study was included.

Controls: A control was any resident of Kiltu kebele during the study who did not develop sign and symptoms of measles and agreed to participate was included.

Exclusion criteria

Case: Those who refused to participate or were unconscious.

Controls: Those who refused to participate and family members from the same household were excluded.

Data was collected, entered, summarized and analyzed using Epi-info version 7.2.1.0 and Microsoft office Excel 2007 software. Results were presented using graph, figures and tables. Attack rate, frequencies and case fatality rate were also calculated. Estimated

odds ratio and 95% confidence interval for risk factors were determined through bi-variate and multi-variate analysis.

Participants were treated with respect and willingness in the study without payment or cohesion. Confidentiality and no personal details was recorded or produced on this documentation.

5.4 Results

5.4.1 Descriptive Analyses

Over the period of outbreak (January 7, 2019 - January 16, 2019) we identified 23 suspected measles cases. From five of the cases, blood samples were collected for laboratory confirmation, and tested at Ethiopian Public Health Institute (EPHI). All of the five samples were positive for samples IgM antibody. Among the total cases 13(56.5%) of them were males. The age of the case patients ranged from 1 to 12 years old with the median age of 5 years. Of the total cases, 13(57%) of them were under five years and 10(43 %) of them were above five years (fig 28).

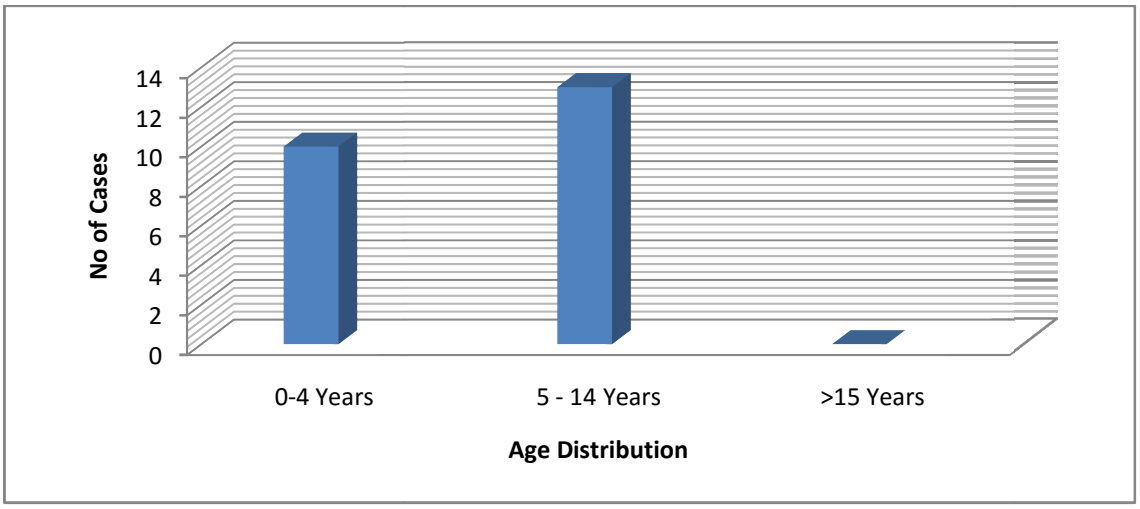


Figure 28: Age distribution of measles cases in Sewena District, Bale Zone, Oromia Region, 2019

The outbreak started in 2nd WHO epidemiological week of 2019 and ended in the early 3rd week of 2019. The outbreak was detected by health extension workers and reported to district health office on January 8, 2019. The District Health Office notified to Zonal Public Health Emergency Management Department. The Zone

immediately notified the suspected measles outbreak to Oromia Regional Health Bureau (Figure 29). On January 9, 2019 five blood samples were collected from suspected cases and sent to Ethiopian Public Health Institute for confirmation. The detection, notification and response were early due to the rumor of the cases from neighboring region/Somali and district/ Dawe Serer.

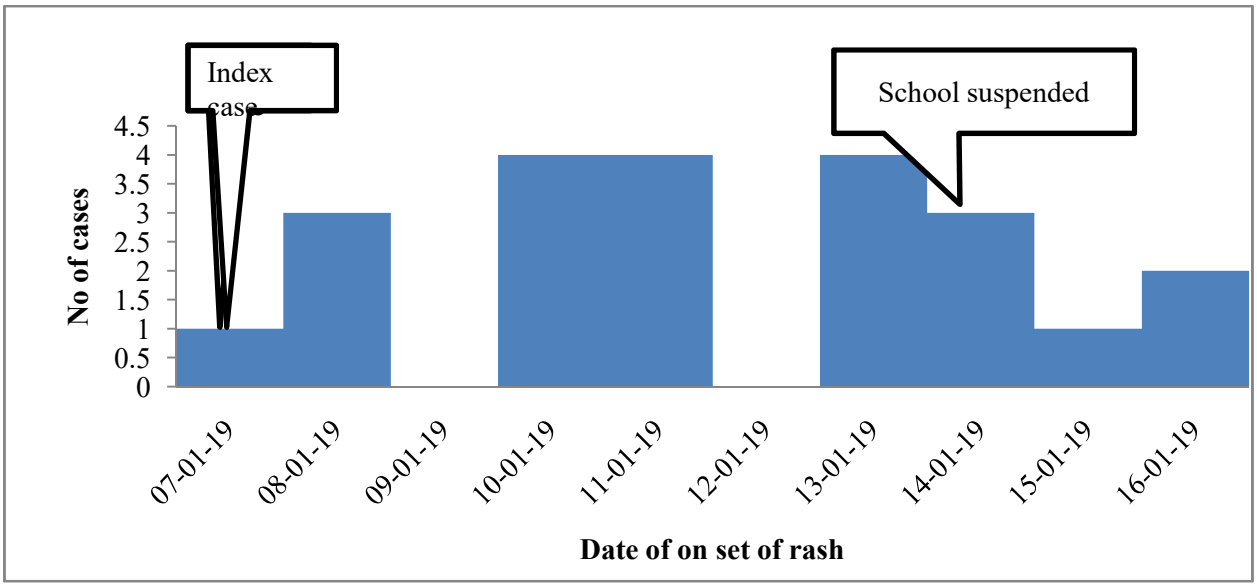


Figure 29: Number of measles cases by date of rash on set in Kiltu Kebele, Sewena District, Bale Zone, Oromia Region, 2019

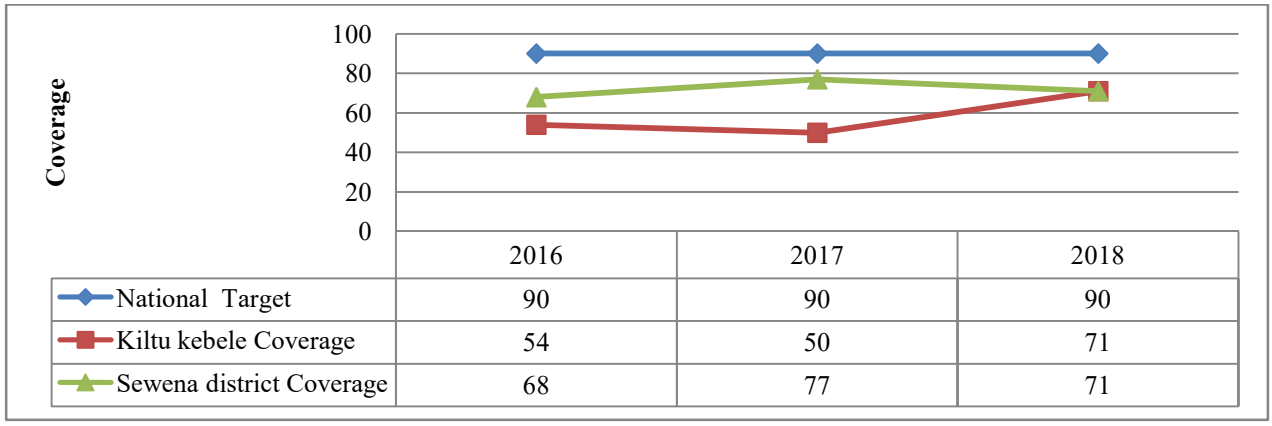
The overall attack rate of the disease was 7 per 1000 inhabitants of the kebele with no death. The highest attack rate 20 per 1000 was among children of age group 1-4 years. Children in the age group of 5-14 were the least affected with an attack rate of 8 per 1000 inhabitants of this age group (Table 23).

Table 23: Distribution of measles cases by age group and attack rate in Kiltu Kebele, Sewena District, Bale Zone, Oromia Region, Ethiopia,

Age Category	Population	Total No of Cases (%)	AR/ 1,000	CFR%
0-4 Years	507	10 (43)	20	0
5-14	1627	13(57)	8	0
Total	2134	23	7	0

5.4.2 Vaccination Coverage

In the past three years the measles vaccination coverage report of Sewena District shows (2016 -2018), the coverage was 68%, 77% and 71% respectively. Similarly, Kiltu kebele achieved below the district measles vaccination coverage i.e 54%, 50 and 43% respectively (Figure 30).



	2016	2017	2018
National Target	90	90	90
Kiltu kebele Coverage	54	50	71
Sewena district Coverage	68	77	71

Figure 30: Trends of measles vaccination coverage of Kiltu Kebele and Sewena district, Bale Zone, Oromia Region, Ethiopia, 2019

5.4.3 Analytic Epidemiology

In this investigation a total of 23 cases and 46 healthy controls who resided in the same kebele with the cases were selected for analytical study with a ratio of one to two controls. Among the total 23 interviewed cases 13(%) of them were males and among the total 46 controls (%) of them were males. The age of the case patients ranged from 1 year to 12 years with the mean age of 5.3 years and median age of 5 years, whereas the age of the controls ranged from 1- 14 years with the mean age of 6.3 years and median age of 5 years.

In bivariate analysis; having contact with a person suspected to have measles during the last weeks OR: 6.4 (95% CI, 12. 6 – 44.3, P: 0.033) , presence of measles case patient in the family OR: 6.5 (95% CI, 4.4 – 13.22, 0.037) were significantly associated with contracting measles. Moreover, absence of measles vaccination risk factor for developing with (OR: 2.53, (95% CI 1.7 – 14.67, P ; 0.043) (Table 24).

Table 24: Risk factors for contracting measles in Kiltu Kebeble, Sewena District, Bale Zone, Oromia Region, Ethiopia, 2018

Variable		Case (%)	Control (%)	COR (95%CI)	P- Value
Sex	Female	10(56)	23(50)	0.769 (0.281-2.10)	0.609
	Male	13 (44)	23(50)		
Age	1-4	11(48)	21(46)	1.6(0.456 – 2.124)	0.346
	5-14	12(52)	24(52)		
	>15	0(0)	1(2)		
Religion	Muslims	23(100)	46(100)		
Ethnicity	Oromo	23(100)	46(100)		
Educational Status of the family	Literate	6(26)	9(20)	1.4(0.432 – 4.611)	0.567
	Illiterate	17(74)	36(80)		
Family Size	< 5	10(43)	25(54)	0.65 (1.4 – 7.6)	0.261
	≥5	13(57)	21(46)		
Housing Condition	Ventilated	6 (26)	17 (37)	1.6 (0.546 -5)	0.366
	Non-ventilated	17 (74)	29 (63)		
Unvaccinated children for measles	Yes	19(83)	30(65)	2.5(1.7 – 14.6)	0.043
	No	4(13)	16(35)		
Presence of sick person in the family	Yes	21(91)	41(89)	1.3(4.4 – 13.2)	0.037
	No	2(9)	5(11)		
Travel history to the area with active measles	Yes	11(48)	7(15)	5.1 (2.5 -19.3)	0.892
	No	12(52)	39(85)		
Contact history with measles case patients	Yes	14(61)	9(20)	6.4 (12. 6 – 44.3)	0.033
	No	9(39)	37(80)		

In Multivariate analysis we have identified three risk factors that remained independently associated with contracting measles infection in Kiltu kebele outbreak; presence of sick individuals among the family members, unvaccinated children and having contact with measles infected cases in the past two to three weeks (Table 25).

Table 25: Independent risk factors associated with contracting measles illness in Kiltu Kebele, Sewena District, Bale Zone, Oromia Region, Ethiopia, 2018

Independent risk factors		Case (%)	Control (%)	OR (95%CI)	AOR (95%CI)	P-value
Having contact history	Yes	14(61)	9(20)	6.4 (12. 6 – 44.3)	5.3 (11.7 – 39.8)	0.047
	No	9(39)	37(80)			
Presence of sick person in the family	Yes	21(91)	41(89)	1.3(4.4 – 13.2)	1.6 (5.2 – 14.4)	0.039
	No	2(9)	5(11)			
Unvaccinated children for measles	Yes	19(83)	30(65)	2.5(1.7 – 14.6)	2.8(2.2 – 15.6)	0.045
	No	4(13)	16(35)			

5.4.4 Public Health Intervention

In collaboration with District Education Office Kiltu elementary school was suspended to educate students for two weeks to stop the transmission of cases. We gave health education for the students, kebele officials and at public gatherings during the outbreak investigation period. The community residents were informed and mobilized to take individuals sick of measles to health facilities for medical care as soon as possible.

The zone has started working closely with the affected and the entire neighboring districts to prevent/control the outbreak from spreading to other areas, and alarming the community, health extension worker and community leader to strength the local surveillance system. In addition active surveillance has been conducted in neighboring Kebeles of the District.

5.5 Discussion

According to the national measles guide line three or more laboratory confirmed cases were needed to declare an outbreak of measles (2). To prevent measles outbreaks or Interrupt transmission and hence eliminate measles, 95% population

immunity is needed. At the end of 2017 Sewena district and kiltu kebele measles vaccine coverage was 77% and 50 % respectively; which is very far from the national measles vaccination target. Therefore, the occurrence of this outbreak may be due to the presence of susceptible persons for measles infection (2).

We confirmed the existence of measles outbreak by collecting five blood samples and sent to national laboratory and all tested samples were IgM positive. The prevalence of kiltu kebele was 7/1000 population. The prevalence was higher as compared to the national health policy of FMoH that targeted as one measles case per 1000 populations. However, it was near the same compared to the outbreak of measles occurred in South Africa with an incidence of 6.1/1000 for infants from 2009- 2011 (5), and the attack rate reported in rural India, 6.2/ 1000 population (6).

In multivariate analysis of Kiltu Kebele outbreak investigation shows, being unvaccinated for measles and presence of sick person in the family were a risk factor for developing measles with an adjusted odd ratio (AOR) of 2.8 (95% CI = 2.2 – 15.6, P =0.045) and 1.6 (95% CI =5.2 – 14.4, P = 0.039) respectively which is similar with the study finding of Dera Woreda and Pakistan (7). The cold chain management of the Zonal Health Department was good, while that of Sewena district Health office, Arada Gelma Health Center and Kiltu kebele heath post was very poor.

5.6 Conclusion and Recommendations

Factors contributed for the occurrence of this outbreak include; having contact history with measles cases, unvaccinated children for measles and Presence of sick person in the family. High proportion of unvaccinated children for measles in the kebele contributed the accumulation of susceptible individuals. Improving health service coverage of the kebele specifically routine and supplementary immunization can reduce outbreak in the District particularly in Kiltu kebele.

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5.2 Relapsing Fever Surveillance Data Analysis, Addis Ababa, Ethiopia from 2013 to 2017

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Abstract

Background- Louse-borne relapsing fever is a vector-borne disease caused by the spirochaete Borrelia recurrentis, a human-restricted pathogen transmitted by the body louse, *Pediculus humanus humanus.* Major outbreaks of louse-borne relapsing fever have occurred in Eurasia and Africa. . The purpose of this assessment was to examine trend of relapsing fever in Addis Ababa, Ethiopia between 2013- 2017.

Methodology- A retrospective five years (2013 – 2017) record review of Relapsing fever was conducted in Addis Ababa. Data were officially requested and received from the Public Health Emergency Management Core Process and Health Management Information System of the Addis Ababa Regional Health Bureau. Data cleaning and analysis were conducted using Microsoft Excel 2007.

Results- A total of 2,517 relapsing fever cases were reported to the Public Health Emergency Center from Addis Ababa Regional Health Bureau from 2013 to 2017. Among the reported cases, 2256, (89.67%) were treated as outpatient and 261, (10.33%) were treated as inpatient. The data collected from 814 government and private health facilities in 2017, shows 24% increment of reporting health facilities, compared to the 2013. Majority of the cases were reported from the Arada Sub City 45.6%, Akaki Kality Sub City15.21% and Addis Ketema Sub City 14.38%.

Conclusion and Recommendation - There was a significance increase in the number of Relapsing fever cases every year. Strengthening of routine surveillance by improving quality, capacity and coverage of the surveillance system and also incorporating the health facilities, to the PHEM network system are important for improving assessment of Relapsing fever.

Key words: Relapsing fever, Surveillance, Addis Ababa

5.3 Introduction

Louse-borne relapsing fever (LBRF) is a vector-borne disease caused by the spirochaete *Borrelia recurrentis*, a human-restricted pathogen transmitted by the body louse *Pediculus humanus humanus.* Transmission occurs when the louse is crushed and the infected haemocoel is released onto the human skin. Subsequently, *Borrelia recurrentis* is able to penetrate intact mucosa and skin (1). The onset of symptoms is generally sudden, associated with circulation of bacteria in the blood, and include high-grade fever, malaise, chills and sweats, headache, meningism, myalgia/arthralgia and non-specific gastrointestinal symptoms (nausea and vomiting). The disease can be severe and death occurs in 10–40% of symptomatic cases in the absence of appropriate treatment, and in 2–5% of treated patients (2).

Historically, major outbreaks of louse-borne relapsing fever have occurred in Eurasia and Africa. The geographical distribution of louse-borne relapsing fever has declined due to improvements in living standards (5).

This paper assesses and presents the five year Relapsing fever reports of Addis Ababa, including the sub cities from 2013 to 2017. This study aimed to analyze the trends and the level of the magnitude of Relapsing fever. It highlights the changes, the current status and the magnitude of the problem. The goals are to determine the Relapsing fever determinants by sub cities; to find out the current status of the Relapsing fever burden; to be able scale up the Relapsing fever control efforts in Addis Ababa.

5.4 Methodology

The Surveillance data analysis was conducted in Addis Ababa. Addis Ababa is the capital city of Ethiopia, located in central part of the country with a total population of 3,654,569, with an altitude of 2355 meters above sea level. Secondary data of Relapsing fever cases for the past five years (2013-2017 G.C) were collected from weekly integrated disease surveillance and report and monthly health management information system report, analyzed and interpreted from February 11, 2018 to April 30, 2018.

A retrospective five years data were used by reviewing weekly public health emergency management and monthly health management information systems. Inpatient, outpatient and deaths during 2013 – 2017 reported to the public health

emergency management center were included in this study. Ten sub cities are included in the study.

The data include reports of health facilities of all sub cities and administrative cities. Health centers and hospitals were included in the PHEM network in the respective sub cities and districts. Data cleaning were done on the initial secondary data stored in Microsoft Excel. Descriptive analyses were computed, using Microsoft office Excel 2007. Finally, the data were described using figures and tables.

5.4.1Case Definitions

Suspected: Any person presenting with an abrupt onset of rigors with fever, usually remittent, headache, arthralgia and myalgia, dry cough, epistaxis (6).

Confirmed -A suspected case with demonstration of Borrelia in peripheral blood film (6).

5.4.2 Laboratory Criteria for Diagnosis

Identification of spirochetes by dark field microscopy,or Giemsa-, Wright-, or acridine orange-preparations of peripheral blood, bone marrow, or cerebral spinal fluid (6).

Clinical Criteria for Diagnosis

A febrile illness with temperature ≥ 100.5°F (38.0°C).A typical clinical presentation occurs following exposure to a rural setting and is characterized by a relapsing pattern of fever, chills, headache, and myalgia (6).

5.5 Results

Within the last five years (2013 - 2017), a total of 2517 Relapsing fever cases were reported from the Addis Ababa City Administration Public Health Emergency Core Process to the Ethiopian Public Health Institute. The reports were collected from 92 Health Centers and 9 government Hospitals, 814 private hospitals and clinics and 16 NGO facilities with a total of 931 health facilities reported in 2017. When we compared to 2013 the reporting facilities increased by 24% in 2017. Among the total cases, 2,257(89.67%) cases treated as outpatient, 260(10.33%) were treated as inpatient and 3 (0.12%) deaths were reported.

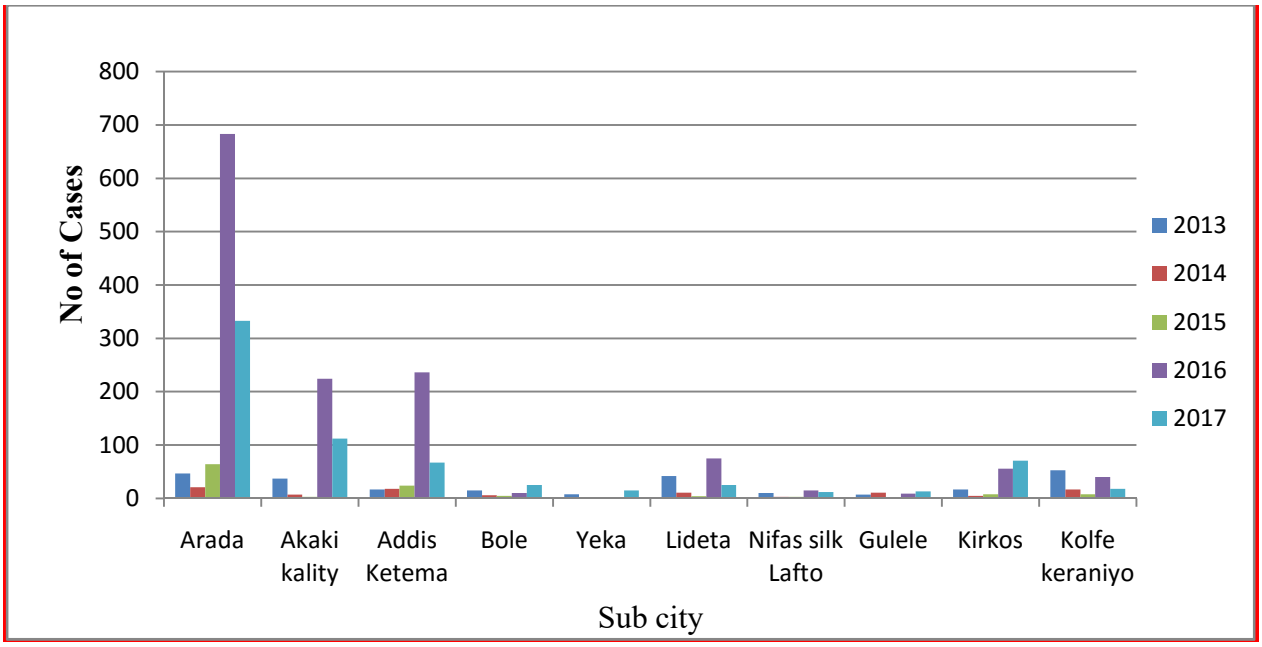

Figure 31: Distribution of relapsing fever morbidity by Sub City and year, Addis Ababa, 2018

There was an increase of Relapsing fever cases in the recent two years 2016 (1350, 53.63%) and 2017(691, 27.45%) compared to the first three years. The least number of relapsing fever cases were reported in 2014, (100, 3.97%). Similarly, there were an increase in outpatient cases of relapsing fever in 2016 and 2107, (1274, 56.47%) and (634, 28.1%) respectively. The report shows an increase in relapsing fever cases. (figure 32).

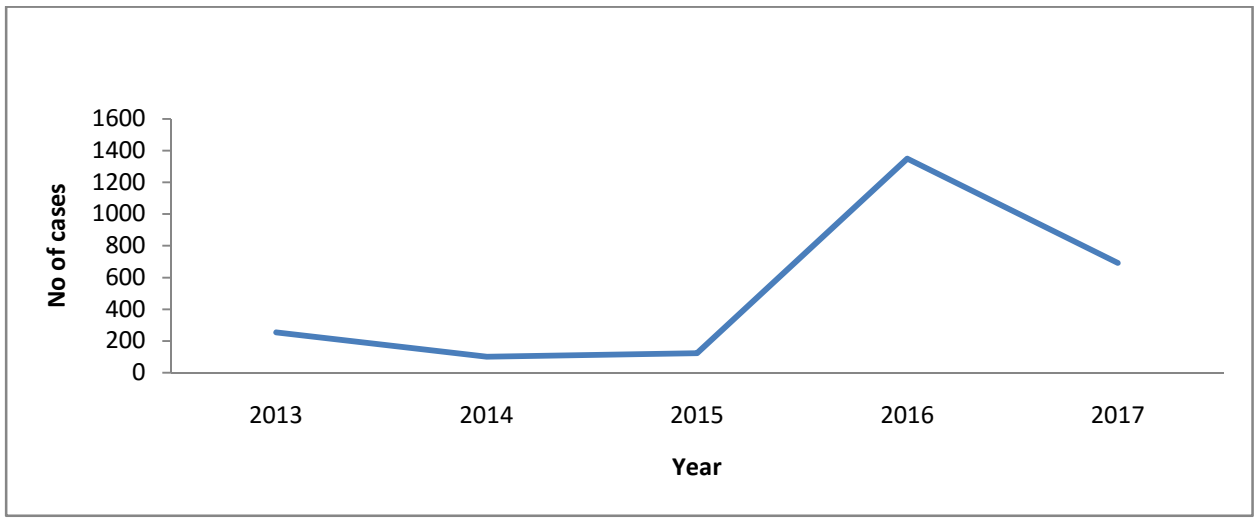

Figure 32: Number of relapsing fever cases by year in Addis Ababa, Ethiopia, 2018

Sub City reports show that different magnitude of relapsing fever cases in different years. Arada Sub City contributed the highest number of cases in 2016, 683(50.59%) followed by Akaki Kality 224 (16.59%) Sub City and Addis Ketema(683,17.48%) . Arada and Akaki Kality were the only sub city which has the greatest number of relapsing fever cases in 2017, 333 (68.2%) and 112 (16.2%) (figure33).

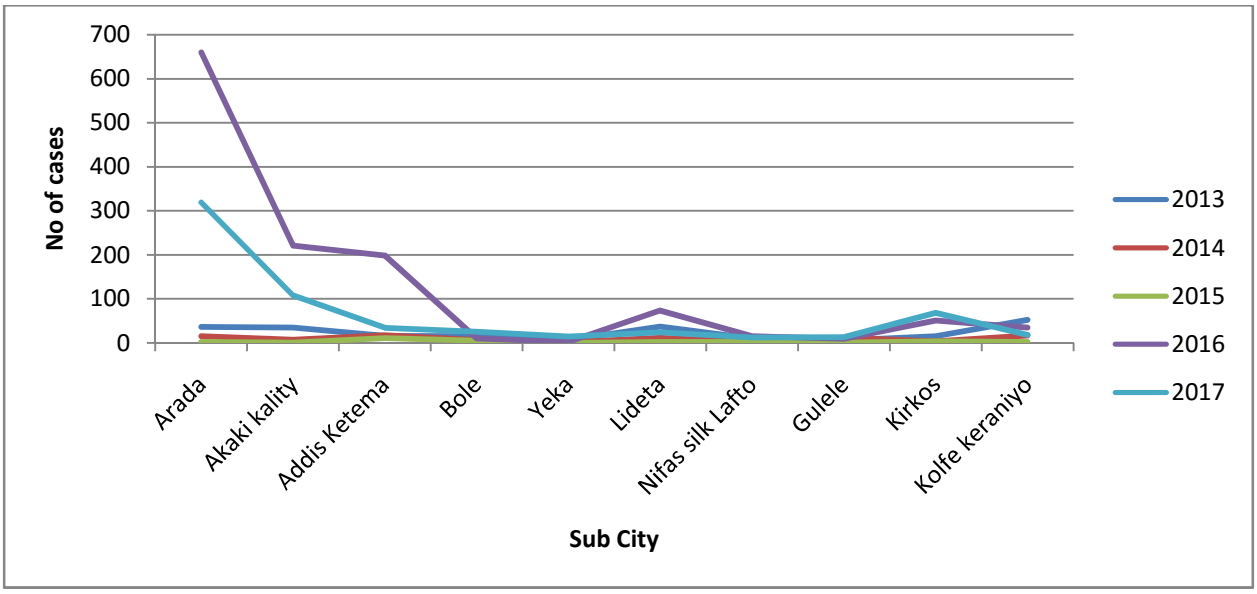

Figure 33: Relapsing fever outpatient cases by year and Sub City, Addis Ababa, Ethiopia, 2018

Five year trends of Relapsing fever cases are different every month ranges from 125cases in February and 338 relapsing fever cases at June (Table 26).

Table 26: Relapsing fever outpatient cases by year and Sub City, Addis Ababa, Ethiopia,

Year	Month												Total
	January	February	March	April	May	June	July	August	September	October	November	December	
2017	130	75	74	93	90	77	77	67	8	0	0	0	691
2016	7	21	53	60	149	226	119	61	135	177	155	187	1350
2015	1	6	3	9	4	5	5	16	9	29	21	14	122
2014	19	9	7	10	4	11	21	2	3	2	4	8	100
2013	22	14	4	20	35	19	18	43	16	24	13	26	254
Total	179	125	141	192	282	338	240	189	171	232	193	235	2517

Three deaths were reported due to Relapsing fever cases in the past five years (2103 – 2017). Three of them are reported from Arada Sub City, Dagmawi Minilik Hospital, on 21 WHO weeks of 2016. Other than this there was no report of death. The highest incidence of Relapsing fever cases in the past five year reported from Arada sub city 5/1000 followed by Akaki kality Sub City 1.96/1000 and the least incidence were occurred in Yeka Sub City 0.08/1000 (Table 27).

Table 27: Prevalence of relapsing fever per 1000 population in Addis Ababa, 2018

S.No	Sub city	Estimated Total population	Number of cases	Incidence rate/1000
1	Arada	225,999	1148	5
2	Akaki kality	195,273	383	1.96
3	Addis Ketema	271,644	362	1.33
4	Bole	328,900	61	0.18
5	Yeka	337,575	26	0.08
6	Lideta	214,769	157	0.73
7	Nifas silk Lafto	335,740	43	0.13
8	Gulele	284,865	41	0.14
9	Kirkos	235,441	157	0.67
10	Kolfe keraniyo	546,219	136	0.25

5.6 Discussion

A clinic based study conducted in Togo to investigate the presence of Relapsing fever shows about 10% of the patients were positive by Polymerase Chain Reaction and 13% had antibodies to Glycerophosphodiester phosphodiestrase Q (1) . Ethiopian Department of Health report as being the seventh most common cause of hospital admission (2.5% of total; 3,777 cases) and fifth most common cause of death (0.9%, 42 cases) in 2004 (2). A cross sectional study conducted in Bahir Dar City indicates that the prevalence of LBRF was 2.5% and the positivity rate of LBRF was highest in yekolotemaries (6.1%) followed by street children (4.9%) (3). The five year Relapsing fever incidence of Arada sub City shows 5/1000 and 1.96/1000 in Akaki Kality sub city. And the study shows five year (2013 – 2017) incidence of relapsing fever cases of Addis Ababa were 0.88/1000

.

The major limitation of the data analysis was weekly public health emergency management report did not incorporate the prison, defense and police health facilities,

this may under estimate the magnitude of the case and lack of individual age on health management information system and public health emergency management data.

To conclude magnitude of relapsing fever cases in Addis Ababa region showed an increasing trend during the past five years. And Arada sub city was one of the sub city that reported more relapsing fever cases followed by Akaki kality and Addis Ketema sub cities respectively. The cases were distributed throughout the Sub Cities with different magnitude. The highest cases were reported in 2016, and the least cases were reported in 2014.

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CHAPTER SIX

ABSTRACT FOR SCIENTIFIC PRESENTATION

6.1 Measles Outbreak Investigation in Kiltu Kebele, Sewena District, Bale Zone, Oromia Region, Ethiopia, 2019

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Abstract

Introduction - Measles is a highly contagious, acute, viral illness caused by a member of the genus *morbilli* virus of the *Paramyxoviridae.*. In Africa, 450 000 cases were reported and in Sub Saharan Africa with 250, 000 deaths in 2009. In Ethiopia, measles cases usually come late to health facilities and often after they have developed complications. Investigation was done to verify the existence of an outbreak, to determine the magnitude and identify associated risk factors contributing for the occurrence of the outbreak.

Methods - A cross-sectional descriptive study followed by a one to two unmatched case control study was conducted from January 7 to February 3, 2019. Interview using structured questionnaire was used to collect data from cases and controls. Data were managed and analyzed using Microsoft Excel 2007 and Epi-Info 7.2.1.0.

Results - Over the period of the outbreak, 23 measles cases were identified. The age of cases ranged from 1 to 12 years old, with median age of 5 years. Of the total cases, 13(57%) were under five years and 10(43 %) of them were above five years. The overall attack rate of the disease was 7 per 1000 inhabitants of the kebele, with no death. Having contact with a person suspected to have measles during the last weeks OR: 6.4 (95% CI, 12. 6 – 44.3) and presence of measles case in the family OR: 6.5 (95% CI, 4.4 – 13.22) were significantly associated with contracting measles. Moreover, absence of measles vaccination was a risk factor for developing measles (OR: 2.53, (95% CI 1.7 – 14.67).

Conclusion and Recommendations- The outbreak occurred in a remote pocket Kebele of the Sewena District with extremely low immunization coverage. Multiple factors contributed for the occurrence of the outbreak. We recommend enhanced routine immunization service, and awareness creation to the community on mode of transmission, prevention and health seeking behavior. **Key Words**: measles, outbreak, Kiltu, Sewena

CHAPTER SEVEN

IDP ASSESSMENT REPORT

7.1 Internally Displaced Population Assessment Report of Gedeb District,Gedio Zone, SNNPR Ethiopia March 2019

Abstract

Back ground: - An internally displaced person is someone who has forced to flee their home but never cross international border. At the end of 2017, some 40 million people were internally displaced due to armed conflict, generalized violence or human rights violations. In Ethiopia there are 3.19 million IDPs and IDP returnees most of them 47% are in Oromia followed by Somali 32% and SNNP regions 13%. Gedeb District of Gedio Zone is one of the areas hosting many Internally Displaced Populations since June 2018 due to border conflict. The purpose of this study is to assess the health situation of IDPs in the District from March 3 to 22, 2019.

Methods: community based cross sectional study was conducted at Gedeb District from March 3-22, 2019 by using assessment checklist adopted from EPHI and Sphere project by interview and observation.

Results:- We identified 132,356 IDPs of them 15,283 (52%) are females and 18,848 Households lives at 12 sites. The shelter renewal is needed by 17,545 (93%) among total households. Diarrhea was the leading cause of morbidity 13,456 (47%) and Scabies the second 8,720 (31.5%) in the last six month. There were 2 trench latrines, 8 water trucks and 8 tankers. Eight mobile health team, two health centers and 8 health posts were providing health service. The water supplied is not fulfilling standard both in quantity and quality.

Conclusion and recommendations:- There are 132,356 IDPs in the District due to border conflict between West Guji Zone, Oromia Region of which 17,545 (93%) households need immediate shelter support. They were at high risk of diarrheal disease outbreak due to low and contaminated water supply as well as open defecation in the area. We highly recommend the stakeholders to supply materials for shelter construction and water treatment kits, conduct health education and enhance surveillance system.

7.2 Introduction

An internally displaced person, or IDP, is someone who has forced to flee their home but never cross international border. These individuals seek safety anywhere they can find it in nearby towns, schools, settlements, internal camps, even forests and fields. IDPs which include people displaced by internal strife and natural disasters are the largest group that UNHCR assists. Unlike refugees, IDPs are not protected by international law or eligible to receive many types of aid because they are legally under the protection of their own government even if that government is the reason for their displacement. Countries with the largest internally displaced populations are Colombia, Syria, Democratic Republic of Congo and Somalia (30).

At the end of 2017, some 40 million people were internally displaced due to armed conflict, generalized violence or human rights violations, according to internal displacement centre. To coordinate assistance to IDPs, a cluster approach is used. A cluster is when a group of agencies work together to set up and deliver an area of assistance such as a shelter, health care, Water, sanitation and hygiene (WASH), camp management or protection (31).

All internally displaced persons have the right to an adequate standard of living; at the minimum, regardless of the circumstances, and without discrimination, competent authorities shall provide internally displaced persons with and ensure safe access to: Essential food and potable water; basic shelter and housing, appropriate clothing; and essential medical services and sanitation (32).

Ethiopia is one of the countries experiencing large numbers of internal displacement. Consequences of climate change combined with inter-ethnic and inter-regional violence has caused a multiplication of internal displacement in the country over the last six years a tenfold rise since 2012. IOM, along with governments and international organizations, promotes three durable solutions for displaced populations: integration in areas where they settle, relocation to a third location, or, ideally, return home after the crises they fled are resolved (33).

There are 3.19 million IDPs and IDP returnees in need of assistance, out of which 30 percent are in acute need. Most of the IDPs and IDP returnees are in Oromia 47%, Somali 32% and SNNP regions 13%. Most sever areas are in Oromia and Somali regions (34).

In Oromia Region there are around 1.4 million IDPs in 8 zones, 70 woredas and 160 IDP sites. These are in West Wollega and East Wollega due to border conflict with Benishangul Gumuz Region; in East Harerge, West Harerge, Borena, Bale and Guji due to border conflict with Somali Region and in Guji and West Guji due to conflict with Gedeo Zone. Gedeb District of Bale zone is one of the areas affected by border conflict and hosting many Internally Displaced Populations since June 2018 (35).

7.2.1 Rationale of the study

In SNNPR there are two types of internally displaced populations: those who displaced from different areas outside of Oromia Region. Majority of the populations displaced from different Districts of Oromia Region mainly from Kercha District were resettled in different Towns found in Gedio Zone. Frequent conflict between Guji and Gedio community causes threat in the population. So, this caused the community to stay for a longer period in temporary camps and expose them to different health and other problems. We tried to assess the overall condition of these populations in Gedeb District of Gedio Zone from March 3 to 22, 2019.

7.3 Objective

7.3.1 General objective

To assess the health condition of internally displaced population in Gedeb District of Gedio Zone SNNPR Ethiopia April 2019

7.3.2 Specific objective

- To characterize internally displaced population by person and place in Gedeb District of Gedio Zone, SNNPR, Ethiopia, April 2019
- To describe WASH situation of IDP sites in Gedeb District of Gedio Zone, SNNPR Region, Ethiopia, April 2019
- To assess health and nutritional status of internally displaced population in Gedeb District of Gedio Zone, SNNPR, Ethiopia, April 2019

7.4 Methods

7.4.1 Study area and period

The study was conducted in Gedeb District of Gedio Zone SNNPR from April 2- 22, 2019. Gedeb is one of the Districts found in Gedio Zone; its administrative capital Gedeb Town found 484 kms from Addis Ababa. It is bounded by North Kercha District of Oromia Region, West Guji; by south Gerba District of Oromia Region, West Guji Zone, by East Abaya District of Oromia Region, West Guji Zone and by West direction Yirgachef District. The District has 8 kebeles (7 rural and 1 urban kebeles). In 2019 the District is the home of 93,620 populations projected from 2007 census among these 48,682 (52%) females and 44,938 (48%) are males living in 14,403 households. There are 1 hospital, 2 health centers, 8 health posts, 2 primaries and 1 medium clinic privately owned and 2 drug stores serving the populations of the District.

7.4.2 The study design

Descriptive community based cross sectional study was conducted

7.4.3 Study population

All internally displaced population found in Gedeb District of Gedio Zone

7.4.4 Sample size

All IDP sites in the District

7.4.5 Data collection tools and methods

The assessment check list which adopted from Ethiopian public health Institute and Sphere project was used to collect necessary information. The data was collected by observation of the IDP site, key informant interview at community level as well as representative of different government sectors (Administration office, Disaster Risk Management Office, Water Office, Health Office and others), service providers (Teachers, Health workers, Water Delivering Drivers) and nongovernmental organizations, and review of records for secondary data.

7.4.6 Ethical consideration

Recommendation letter was written from AACAHB to SNNPR Health Bureau to conduct the study. SNNPR Health Bureau also wrote letter to Gedeb District Health Office to support the team.

7.4.7 Result Dissemination

The finding of the study was disseminated to AAU School of Public Health, SNNPR Health Bureau, Gedio Zone Health office and Gedeb Dstrict Health office.

7.5 Results

There are 132,356 displaced population of which 68,825 (52%) are females and 18,848 households at 12 IDP sites in Gedeb District (Table 28).

Table 28: Internally Displaced population by sex and IDP sites in Gedeb District of Gedio Zone, SNNPR, Ethiopia, 2019

S. No	IDP Site	Kebele	No of HH	Population displaced		
				Male	Female	Total
1	Gotiti	Gotiti	4,843	16,301	17,660	33,961
2	Banko Tatatu	Banko Tatatu	2,506	8,465	9,203	17,698
3	Haro Jitu	Banko Tatatu	1,435	4,810	5,233	10,063
4	Korke	Banko Tatatu	789	2,678	2,901	5,579
5	FTC	Banko Tatatu	348	1,153	1,249	2,402
6	Warko	Kedida	1007	3,347	3,615	6,952
7	Kedida	Kedida	694	2,388	2,577	4,955
8	Stadium	Gedeb 01	862	2,896	3,138	6,034
9	Banko Gotiti	Gotiti	1,711	5,750	6,230	11,980
10	Halo Bariti	Banko Tatatu	2,789	9,453	10,221	19,654
11	Gubeta	Kedida	881	2,975	3,222	6,197
12	Sakaro	Kedida	983	3,396	3,575	6,881
	Total		18,848	63,531	68,825	132,356

There are 4,207 pregnant and lactating mothers, 19,853 less than 5 years old children and 5,294 under one year's old infant in the area (Figure 34).

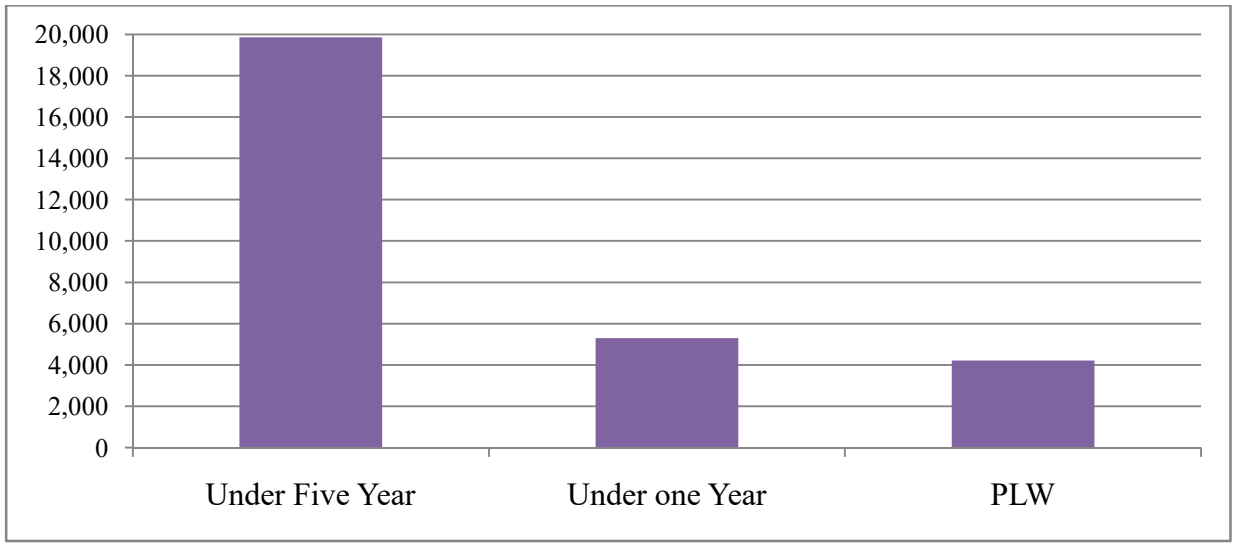

Figure 34: Number of under five years old, number of under one years old children and PLW in Gedeb District IDP site, Gedio Zone, SNNPR, Ethiopia, 2019

From 18, 848 households 17,545 (93%) of them needs material for shelter renewal or construction except FTC and Stadium IDP sites 1,210(7%). There are only 2 (0.6%) trench latrines of 331 trench latrines were needed in the IDP sites. The number of latrines required is based on Sphere project criteria 1 latrine for 20 people. There are 2 water trucks which transports water to the IDP sites and stores water in 8 tankers only for two IDP sites that serves for 1,210 (7%) households (FTC and Stadium) (Table 29).

Table 29: Shelter renewal, latrine and drinking water requirement of affected population by IDP sites in Gedeb District of Gedio Zone, SNNPR Ethiopia March 2019

S. No	IDP Site	Kebele	No of HH	HH needs Shelter renewal	No of trench latrines	No of trench latrines on construction	HH without safe drinking water
1	Gotiti	Gotiti	4,843	4,843	0	5	4,843
2	Banko Tatatu	Banko Tatatu	2,506	2,422	0	0	2,506
3	Haro Jitu	Banko Tatatu	1,435	1,435	2	0	1,435
4	Korke	Banko Tatatu	789	789	0	4	789
5	FTC	Banko Tatatu	348	0	0	1	0
6	Warko	Kedida	1007	1007	0	0	1,007
7	Kedida	Kedida	694	694	0	1	694
8	Stadium	Gedeb 01	862	0	0	3	0
9	Banko Gotiti	Gotiti	1,711	1,711	0	3	1,711
10	Halo Bariti	Banko Tatatu	2,789	2,789	0	3	2,789
11	Gubeta	Kedida	881	881	0	0	881
12	Sakaro	Kedida	983	983	0	2	983
	Total		18,848	17,545	2	22	17,848

Figure 35: Korke IDP site shelter, Gedeb District, Gedio Zone, SNNPR, Ethiopia, 2019

Figure 36: Drinking Water source of Halo Bariti IDP site in Gedeb District, Gedio Zone SNNPR, Ethiopia, 2019

There are two Health centers, 8 health posts and 8 mobile clinics available around IDP sites (Table 30).

Table 30: Health facilities availability at IDP sites in Gedeb District, Gedio Zone, SNNPR, Ethiopia, 2019

S. No	IDP Site	Kebele	No of HH	No of Existing Health centers	No of Mobile clinics	No of Existing Health Posts
1	Gotiti	Gotiti	4,843	1		1
2	Banko Tatatu	Banko Tatatu	2,506	1		1
3	Haro Jitu	Banko Tatatu	1,435	0	1	
4	Korke	Banko Tatatu	789	0	1	1
5	FTC	Banko Tatatu	348	0	1	
6	Warko	Kedida	1007	0	1	1
7	Kedida	Kedida	694	0	1	
8	Stadium	Gedeb 01	862	0		1
9	Banko Gotiti	Gotiti	1,711	0	1	1
10	Halo Bariti	Banko Tatatu	2,789	0	1	1
11	Gubeta	Kedida	881	0		
12	Sakaro	Kedida	983	0	1	1
	Total		18,848	2	8	8

7.5.1 Observation of the areas

7.5.1.1 Environmental sanitation

The compounds of the residents in all 12 IDP sites were not clean there is a drop of household dusts and there is no waste disposal pit. There was open defecation around the residential area and in the bush areas which is due to absence of latrine.

7.5.1.2 Hand washing

There are two hand washing facilities in Haro Jitu IDP site next to the latrine. Other than these no constructed hand washing facilities available compound around latrines.

7.5.1.3 Health service

Of total 12 IDP sites 5 of them have access to Health Centers while the other 7 get service only via Mobile health and Nutrition team supported by Non Governmental organizations. The registration review shows that none of them is utilizing family planning service and HIV test is not performed due to shortage of kit.

7.5.1.4 Nutrition screening

The nutrition screening of under 5 years old children and pregnant and lactating mothers is conducted every month. During the last six month screening of sever acute malnutrition were 980 (5%) children, moderate acute malnutrition 2001 (10%) children.

7.5.1.5 Morbidity

During the last six month 13,456 (49%) Diarrhea, 8,720 (31.5%) Scabies, 4,533 (16%) Typhoid fever and 980 (3.5%) sever acute malnutrition cases were reported. Gotiti and Banko Tatatu IDP sites contributes 13,291 (48%) of the total morbidity (Figure 37).

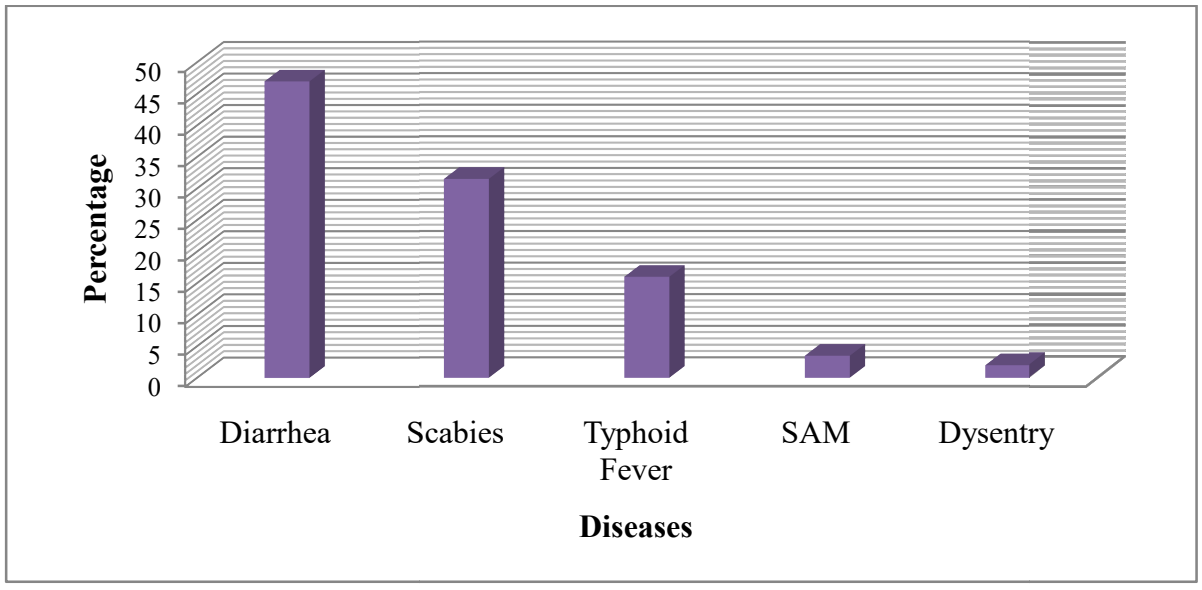

Figure 37: Five Top causes of morbidity in Gedeb District IDP site, Gedio Zone, SNNPR, Ethiopia, 2019

7.6 Discussion

There are 132,356 peoples of 18,848 households displaced from their usual residence and forced to live at 12 IDP sites in three kebeles of Gedeb District due to ongoing border conflict with West Guji Zone of Oromia Region starting from June 2018 up to now. They need different humanitarian and health related supports.

The shelter of 17,545 (93%) households has to be renewed or reconstructed so materials like Plastic (roof) or tent has to be supplied urgently for them since the rainy season is coming by concerned bodies to fulfill their basic needs (32).

The water supplied to the population is fetched from unprotected source and distributed to them by truck to the site. At the distribution point it is not stored in tankers rather it is drawn into hand dug hole covered by plastic then they fetch from it. The amount of water supplied is on average 8 liters per person per day which less than half of expected amount is of water needed 15 liters per person per day according to Sphere project (36).

There were 2 (0.6%) trench latrines each with 10 seats constructed for the community in the IDP sites but 331 trench latrines of ten seats is required according to Sphere project criteria so it needs huge efforts to fulfill the latrine requirements. There is no separate latrine for girls and women in the sites but the agreed standard is 3 to 1 ratio for females to males which have to be improved by stakeholders (32, 36).

There was open defecation in the compound and surrounding bushes which is a risk factor for different communicable diseases like diarrheal diseases. Since there were previous history of acute watery diarrhea in the district it is important to stop open defecation by bringing behavioral change in the community towards latrine utilization (36).

The absence of hand washing facilities and water shortage hinders them from washing their hands after using toilets, cleaning the bottom of a child who has defecated.

The medical service is mainly given by eight mobile health and nutrition team supported by nongovernmental organization to all sites. The essential drugs were supplied from the Federal Government following the formal procedure as emergency drug kits to the service delivery point.

Nutrition screening of under five years children and pregnant & lactating mothers were conducted every month in the sites as a campaign but children come for treatment at any time were checked for their nutritional status as per guidelines. Those found to be malnourished were treated as inpatient in stabilization center.

7.7 Conclusion

There are 132,356 internally displaced populations in Gedeb District of Gedio Zone SNNPR due to border conflict between West Guji Zone of Oromia Region. They were at high risk of diarrheal disease due to low and contaminated water supply as well as open defecation in the area. Additionally, Scabies is the second top five diseases in IDP sites this is also due to lack of enough amount of water.

7.8 Recommendation

The quantity and quality of water supplied should be improved as gaining safe and enough water is basic human right. The number of water trucks should be increased to supply them with enough amount of water. The water source should be protected and the water treatment chemicals should be provided in enough amounts to the household.

Latrines should be constructed to meet minimum standard of latrine to population ratio as well as ensure safety of women and girls by availing separate latrine for them.

Health education should be given to the community members on latrine utilization, hand washing, and household water treatment service utilization during water and food rationing time, clinic visit and any community gatherings.

CHAPTER EIGHT

EPIDEMIOLOGIC RESEARCH PROPOSAL

8.1 Assessment of Husband's Knowledge on obstetric danger signs and associated factors in Holeta Town, Oromia Region, Ethiopia, 2019

Summary

Background: According to the World Health Organization, each year, approximately 287,000 women die worldwide from complications related to pregnancy and childbirth. In many developing countries men are the key decision-makers and chief providers, often determining women's access of receiving emergency obstetrics care, which is vital in averting maternal mortality. Maternal mortality could be prevented significantly if men and their families recognize obstetrics danger signs and promptly seek obstetric care. However, in Ethiopia little is known about the level of knowledge of husbands about obstetrics danger signs.

Objective: This study aims to determine husband's knowledge on obstetrics danger signs and identify associated factors in Holeta Town, Oromia Regional State; Ethiopia.

Methods: A community based cross sectional study design will be used. A sample of 422 married men whose wives have given birth in the past 12 months prior to study period will be selected randomly and included in the study. List of women who are married and had given birth during the last one year prior to study period in six kebeles will be obtained from the log book register of Health Extension workers to prepare sampling frame. Study participants in each kebele will be selected using computer generated random numbers. Data will be collected by face to face interview using structured questionnaire. Six diploma holder male midwifes/nurses will be data collectors. Descriptive measures that include (frequencies, percentages, means and standard deviations) will be computed to describe study subjects with respect to socio demographic and other variables. Bivariate analysis using chi square test will be done to see the relationship between dependent and independent variables and to identify candidate variables for multivariate analysis at $p \leq 0.25$ and multivariate analysis using binary logistic regression will be done to identify the independent predictor variables of the outcome variables. Odds ratios together with their corresponding 95% confidence intervals will be used to assess the strength of the association.

Work plan and budget: Data collection will be started on the fourth week of June 2019 and the study will be conducted with an estimated cost of 16,565.85 ETH birr.

8.2 Introduction

Every day hundreds of women die from pregnancy and child birth related complications in which most of those deaths occur in developing Regions (37). Decreasing maternal mortality has got recognition at global level as evidenced by the inclusion of reducing maternal mortality in the Millennium Development Goals (MDG), which was to reduce maternal mortality by three fourth by the year 2015, but no MDG region, including Ethiopia achieved the target. Currently, the Sustainable Development Goals (SDGs) call for an acceleration of current progress in order to achieve a global MMR of 70 maternal deaths per 100,000 live births, or less, by 2030(37).

Maternal mortality in Ethiopia is among the highest in the world (412/100 00 LB) (38). About 85% of maternal deaths in Ethiopia are caused by direct obstetric complication which include abortion 32%, obstructed labour 22%, sepsis 12%, hemorrhage 10% and hypertension 9%, associated with adolescent pregnancy and neglected prolonged labour (38, 39).

The 1994 International Conference on Population and Development (ICPD), advocated for the active inclusion and shared responsibility of men in reproductive health. When they learn about pregnancy and childbirth risks and complications, and how they can help their partners in these circumstances, men will become more responsive to women's health needs(40).

Obstetric danger signs are not the actual obstetric complications, but symptoms of obstetric complication that are easily identified by non-clinical personnel and occur during pregnancy, childbirth and within 42 days after delivery (post-partum). Some danger signs during pregnancy include, severe vaginal bleeding, swollen hands/ face, blurred vision, severe headache, convulsion, high fever and loss of consciousness. Danger signs during, labour and childbirth include severe vaginal bleeding, prolonged labour (>12 hours), Convulsions, retained placenta (>30 minute), and high fever. Some danger signs during the postpartum period include severe vaginal bleeding, foul-smelling vaginal discharge, difficulty of breathing and fever.

Maternal mortality could be prevented significantly if men and their families recognize obstetrics danger signs and promptly seek health care. Knowledge of danger signs ensures early detection

of complication and thereby prevents delay in seeking medical care which ultimately helps to reduce maternal mortality (41).

8.3 Statement of the problem

According to the World Health Organization (WHO) each year, approximately 287,000 women die worldwide from complications related to pregnancy and childbirth (37). An estimated global total of 13.6 million women have died in the past 25 years between 1990 and 2015 due to maternal causes(37). Almost all (99 percent) of these maternal deaths occur in developing countries, with sub-Saharan Africa alone accounting for roughly 66% (37).

In developing countries, pregnancy and childbirth related deaths are still the leading causes of death and disability among women of reproductive age (42). The situation is most severe for women in Sub-Saharan Africa, where one of every 36 women dies of pregnancy related causes during her lifetime, compared to only 1 in 4,900 women in developed Regions (37).According to the 2005 World Health Organization Report, 20 million women each year will experience maternal disability, which can range from fever and depression to severe complications, such as obstetric fistula and uterine prolapsed (43).

Ethiopia is one of the Sub-Saharan African countries with the highest maternal mortality ratio and very slow progress (38). The MMR in the Ethiopia Demographic and Health Survey (EDHS) 2016 was 412 per 100,000 live births which had shown non-significant decline compared to 673 and 676 per 100,000 live births in EDHS 2005 and 2011, respectively (38, 44). As a result, improving maternal health status to achieve the intended target is among the top priority areas of the Country.

Maternal deaths can result from direct and indirect causes. Around 80% of maternal deaths worldwide is brought by direct obstetric complications (45). The five major global obstetric causes that lead to maternal death include severe bleeding, infections, unsafe induced abortion, hypertensive disorders in pregnancy (eclampsia) and obstructed labour (46). Most of these maternal deaths can be prevented and controlled partially by increasing knowledge of the signs and symptoms of obstetric complications and by timely access to appropriate emergency obstetric care, even in the poorest communities (46).

A mother's death has bad consequences for her family, particularly for children left without care taker. Research indicates that the health of mothers is closely linked to the health of their

newborns and the well-being of entire societies (47). In less developed countries, if the mother dies the risk of death for her children under age five can increase by as much as 50 percent (47).

Obstetric complications can occur any time from conception to the postpartum period. Fortunately, many obstetric complications can be effectively managed if warning signs are detected early and acted upon promptly. Knowledge of danger signs of obstetric complications is the first essential step for appropriate and timely referral. It is also strategy aimed at enhancing the utilization of skilled care during low risk births and emergency obstetric care in complicated cases in low income countries raising awareness of women on the obstetric danger signs would improve early detection of problems and reduces the delay in deciding to seek obstetric care (48, 49).

However, It is not only the woman herself who decides whether to seek professional care or not. In many developing countries, men are the key decision-makers and chief providers, often determining women's access to economic resources. Similarly, in countries like Ethiopia, where conservative gender norms prevail, the husband is the one to have the most powerful decision say even to woman´s health care use. In EDHS 2011 it was found out that the man has a more powerful say also regarding to his wife's (partner´s) health care use: the man decides about woman´s health care in 25 % of the households, whereas the woman decides independently about this issue just in 13 % of the households. In the remaining cases, the decision is made together (38, 50).

This practice has implications for maternal health as it determines women's chances of receiving emergency obstetrics care, which makes the difference between life and death. Hence, this situation makes husbands involvement critical if improvement in maternal health and reduction of maternal morbidity and mortality is to be realized. Strategies for involving men in maternal health services should aim at raising their awareness about emergency obstetric conditions (50, 51).

In Ethiopia, one study conducted among men showed that men's awareness of obstetric dangers sign is low and affected by factors such as, paternal and maternal occupation, number of children, place of delivery and role in health development army (52).The low level of knowledge on obstetric danger signs can be regarded as a contributory factor for the first level of delay, in deciding to take obstetric care, which plays a role in high level of maternal mortality observed in

many developing countries, including Ethiopia (53). It will also hinder their ability to judge when emergency actions must be taken. There is a general agreement that men who know the danger signs of pregnancy are more likely to act fast to save the lives of their wife (54).

With understanding of unacceptable death due to common pregnancy complications, the Ethiopian government has expressed its commitment to improving maternal health and reduce maternal mortality by three-quarters (MDG5) by launching innovative health extension program (55). Since the Government's introduction of this new health Program in 2003, individual counseling about danger signs of obstetric complications have been emphasized (55).

Women die from a wide range of complications in pregnancy, childbirth or the postpartum period. These life threatening complications are treatable, and thus most of these deaths are avoidable if danger signs of obstetric complications are identified and appropriate emergency obstetric care is obtained, which makes a difference between life and death. Lack of awareness of the significance of symptoms of obstetric complications is one of the reasons for failure to identify and seek appropriate emergency obstetric care (56).

The researcher observed that pregnant women in Holeta Town failed to reach healthcare facilities before severe forms of obstetric complications occur in which both mother and baby become at risk of dying from obstetric complications. Since men are the main decision makers and chief providers, often determining women's access to economic resources, decision making lies on men whose participation and effectiveness of their decisions depend on their knowledge of obstetric danger signs (50).Therefore, there is a need to know their level of knowledge on obstetric danger signs and associated factors

Despite the fact that husband's knowledge of obstetric danger signs is very important for women's health, as of investigators knowledge there are only few studies conducted in Ethiopia that describe the current level of husbands knowledge on obstetric danger signs and associated factors and most of the studies done in Africa and Ethiopia focus on women's perspective, so little is known on men's side. Besides, this study shall include many variables which were not included in previous studies. Therefore, this study will fill the gap by assessing husband's status of knowledge on obstetric danger signs and associated factors in Holeta Town.

8.4 Significance of the study

As there is no adequate information on level of knowledge of obstetric danger signs and associated factors among men, the information generated from this study generally is important for policy makers, planners &other stakeholders to design well timed & contextual based interventions for the study area that help to increase knowledge of men on obstetric danger signs. It can be an input for Maternal and Child Health programs to produce information education communication intervention that help to increase knowledge about obstetric danger signs among men and thus facilitate early detection of obstetric complication that help them to seek obstetric care urgently. This will help the efforts of reducing maternal morbidities and mortalities thus ultimately help in reduction of maternal mortality ratio in the study area.

8.5 Literature review

According to WHO, Sub Saharan Africa has one of the highest maternal mortality ratios in the world and much of this is attributed to failure to recognize danger signs in pregnancy, leading to delay in seeking obstetric care (57).

Studies conducted among women in Ethiopia were reviewed to examine the potential contribution of men to reduce maternal mortality in Ethiopia and other developing countries.

Knowledge status on obstetric danger signs

Studies conducted in Africa and in Ethiopia revealed that there is low level of knowledge of obstetric danger signs among both in women and men (58). A cross sectional study conducted in Tanzania has found that 53% could mention at least one danger sign during pregnancy, 43.9% during delivery and 34.6% during the postpartum period (58). Another study done in West Nigeria among men in 2009, have found that majority (60.6%) of men had poor knowledge about danger signs in pregnancy (59).

A cross sectional study conducted among women of child bearing age in Goba District in 2013, also found that there was low level of knowledge 31.9%, 27% and 22.1% of study participants knew at least three key danger signs during pregnancy, delivery and postpartum period respectively (48). Severe vaginal bleeding, prolonged labour and retained placenta were the most frequently mentioned complications by women during pregnancy, labour and postpartum period (48). A community based cross sectional study conducted among men in Southern Ethiopia, in 2014, revealed low level of awareness of obstetric danger signs among men which is 42% (52). Severe abdominal pain (87%) was the most recognized danger sign (52). Another cross sectional study done in Arba Minch Town among mothers in 2014 revealed that only 24.1% of mothers were knowledgeable about obstetric danger signs that occurred during pregnancy, labour and postnatal period (60).

A community based cross sectional study conducted among mothers in Thege District Tigray, 2013, found that 58.8% and 61.6% of respondents mentioned at least two danger signs of pregnancy and childbirth respectively (61). Vaginal bleeding was the most commonly mentioned danger signs of pregnancy (49.1%) and childbirth (52.8%) (61).

Another study conducted in Debaytilatgin District, North West Ethiopia among pregnant women in 2013 showed that only 56.8% of women were knowledgeable about obstetric danger signs (62). The study found that (53.7%), (11.3%) and (6.4%) of the respondents spontaneously mentioned vaginal bleeding, blurred vision and severe abdominal pain as danger signs during pregnancy respectively. Regarding the knowledge of respondents on danger signs during labour and delivery, excessive vaginal bleeding (54%), labour lasting more than 12 hours (42.3%) and water break without labour (30.6%) were the commonest mentioned (62). Regarding danger signs during post-natal period, the respondents cited retained placenta (41.5%), vaginal bleeding 364 (40.6%), convulsion 89 (9.9%) as the commonest problems (62).

Factors associated with husband knowledge of pregnancy danger signs

Socio demographic factors

Community based cross sectional study conducted among mothers in Thege District, Tigrai Region in 2013 revealed that level of education have strong statistical association with the mentioning of at least two danger signs during pregnancy (61). Mothers with formal educational were about 2 times and 4times more likely to have higher knowledge of danger signs of pregnancy and childbirth compared to their counterparts (61). Similarly, the study revealed that as respondents age increase the likelihood of being knowledgeable about the danger signs of pregnancy increase (61).

A community based cross sectional study conducted in Arba Minch Town among mothers, 2014 found that in multivariate logistic regression analysis, age, educational status and income were significantly associated with knowledge of obstetric danger signs (60). Fifteen to nineteen years of age mothers were about 13 times more knowledgeable than 20 year and above. Similarly, the odds of educated mother's increases level of knowledge about obstetric danger signs by three fold .Mothers that earning 500 Ethiopian birr and above were two times more likely to have knowledge on obstetric danger signs (60).

Another cross sectional study done in Debaytilatgin District, North West Ethiopia among pregnant women in 2013 also showed that educational status was significantly associated with of knowledge on danger signs during pregnancy, labour and post-partum (62). Similarly, community based cross-sectional study conducted among men in Southern Ethiopia 2014, revealed that maternal and paternal occupations were independently associated with awareness

of obstetric danger signs (52). Accordingly, compared to wives whose occupation was housewife, women whose occupation was weaver had 6 times higher odd of being aware of danger signs (52). Husbands whose occupation weaver and government employees were 2 times more knowledgeable than farmer counterparts, respectively. This study also shows that households with one child were by 50% less aware of the danger signs than those who had two or more alive children (52).

Study conducted in South West Nigeria 2014on men's knowledge of obstetric danger signs showed that there was no significant difference in knowledge between respondent's age groups, occupation, and educational levels (59).

Wife's Reproductive related factors

Parity, gravidity, place of delivery, ANC follow up, past history of obstetric complication were found to be predictors of knowledge about obstetric danger signs in different studies (61). In a study conducted among mothers in Tigray, mothers who previously gave birth in health institutions were about12 times more likely to be knowledgeable about the danger signs of pregnancy and child birth respectively compared to those who gave birth at home (61). Similarly, a study conducted among men in southern Ethiopia showed that husbands whose wives gave birth in hospital, health center and health post were positively associated with men's awareness of danger signs of obstetric complications (52).

Study conducted among child bearing age women in Goba District,2013 revealed that as compared to women who did not attended ANC service during their pregnancy, those who attend ANC were 2.56 and 2.54 times more likely to know obstetric danger signs during pregnancy and child birth (48). Similarly study done in Debaytilatgin, District, North West Ethiopia, showed that women who had ANC follow up were 3.5 times more likely to have knowledge about obstetric danger signs compared to those who do not have follow up (62). That study also showed that parity was significantly associated factor. Those who gave birth of more than one child were 2.87 times more likely to know about obstetric danger signs when it compared to parity one (62).

Communication related factors

Study conducted among mothers in Tigrai 2013, found that having a functional radio and/or television has indicated a significant association with the mentioning of at least two danger signs of pregnancy (61). Cross sectional study conducted among men in southern Ethiopia, 2014, show that role in health development army is significantly associated with men's awareness about obstetric danger signs (52). Husbands who did not involve themselves in the health development army were by 57% less knowledgeable than leaders of health development army (52).

Individual factors

A cross sectional study conducted among men in Tanzania , show that, the likelihood of knowledge of danger signs of obstetric complications increased two folds higher for men who accompanied their spouses to the post-natal clinics (57).

Health facility related factors

Cross sectional study conducted among men in Southern Ethiopia, showed that time taken to reach health facility were significant factors of men's awareness of danger signs of obstetric complications (52).

As a summary different studies conducted in Ethiopia reveal that the level of knowledge of obstetric danger sign in Ethiopia is low and affected by factors such as paternal and maternal occupation and level of education, participation in health development army, number of children, place of delivery and having functional radio/TV.

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8.6 Objective

8.6.1 General objective

- To determine knowledge status about obstetric danger signs and identify associated factors among married men in Holeta Town, Oromia Regional state 2019.

8.6.2 Specific objectives

- To determine husband's status of knowledge on pregnancy danger signs.
- To determine husband's status of knowledge about danger signs of labour and delivery.
- To determine husband's status of knowledge about danger signs of post partum period.

8.7 Methodology

8.7.1 Study area

The study will be conducted in Holeta Town, Finfine surrounding special Zone of Oromia Regional State Ethiopia, which is located 30 kilometers West of Addis Ababa. The Town has 6 kebeles. As projected from the 2007 census, the population of the Town is estimated to be 76,045, among which 37,262 are males, 38,783 are females. Several governmental and nongovernmental health organizations provide services to the community. In the Town there are two governmental health centers.

8.7.2 Study Period

The study will be conducted from July to September, 2019

8.7.3 Study design

A community based cross-sectional study design will be used

8.7.4 Source population

All resident married men whose wife had given at least one birth.

8.7.5 The study population

Married men whose wives had given birth in the past 12 months prior to the study period and live in Holeta Town for at least 6 months.

8.7.6 Inclusion and Exclusion Criteria

Inclusion criteria - Married men who lived in the kebele for at least six month.

Exclusion Criteria – Married men who are not volunteers to be included in the Study

8.7.7 Sample size determination

To determine husband's knowledge, about obstetric danger signs, sample size calculation will be based on single population proportion formula. By considering proportion of men who have knowledge on at least one key danger sign during pregnancy (53 %), delivery (41.3 %) and post partum (37.7 %) and taking proportion during pregnancy which is 53% since it give largest sample size, sample size will be,

$$n = \frac{z^2 \alpha/2\, P(1-P)}{d^2} \qquad n = \frac{(1.96)^2 \times 0.50 (1- 0.50)}{(0.05)^2} = 384$$

Where:

Z: is reliability coefficient with 0.05 level of confidence (i.e. Z=1.96)

d: is degree of accuracy desired setting at 5% (i.e. d=0.05)

P: proportion assumed to have knowledge on obstetric danger sign (50%) (Since there is no study done in the area including 10% none response rate final sample size will be = 422

8.7.8 Sampling technique & procedure

Simple random sampling technique will be used to select study participants from six kebele. Husbands who fulfill the eligibility criteria will be identified using list of married women which will be obtained from health extension log book register. The list of women who are married and had given birth during the last one year prior to study period in six kebeles will be obtained from logbook register of Health Extension workers (HEW) to be used as sampling frame. Study participants in six kebeles will be selected by computer generated random numbers using MS-Excel. Finally, the selected study participant will be located in collaboration with Health Extension workers by their address before actual data collection, to facilitate data collection.

8.7.9 Variables

Dependent variables

- Husbands Knowledge about obstetric danger signs of pregnancy
- Husbands Knowledge about danger signs of labour and delivery
- Husband's knowledge about danger signs of postpartum period.

Independent variables

- Socio demographic & economic factors (age, religion, educational level, monthly income, occupation)
- Reproductive factors (number of children, place of last child delivery, distance of health facility from home)
- Health Facility related Factors:- time taken to reach nearby health facility from living place

8.7.10 Operational definitions

- **Knowledgeable about pregnancy danger signs:** husbands are considered as knowledgeable if they spontaneously mention at least three key danger signs during pregnancy.
- **Knowledgeable about the danger signs of labor and childbirth**: husbands are considered as knowledgeable if they can spontaneously mention at least three key danger signs of labor and childbirth
- **Knowledgeable about the danger signs of post partum:** husbands considered as knowledgeable if they can spontaneously mention at least three key danger signs of post partum.
- **Key/major obstetric danger signs**: are common danger signs which can easily be recognized by non-clinical personnel and are signs of serious complications which occur during pregnancy, labor and delivery and postpartum.
- **Key danger signs during pregnancy:** include severe vaginal bleeding, high fever, convulsions, severe headache, swollen hand/face and blurred vision.
- **Key danger signs during labour and delivery:** include severe vaginal bleeding, prolonged labour >12 hour, high fever, convulsion and retained placenta (>30minute).
- **Key danger signs during postpartum period:** include severe vaginal bleeding, foul smelling of vaginal discharge and high fever.

8.7.11 Data collection procedures

Structured questionnaire that is adapted from the Ethiopian Demographic and Health Survey and JHPIEGO, an affiliate of John Hopkins University, Maternal and Neonatal Health Program (38, 41) will be used to collect data using face-to-face interview technique. The questionnaire will be prepared in English and translated to local language (Afaan Oromo and Amharic). Six diploma holder male midwifes/nurses will be data collectors and two degree holder male midwives/nurses will be supervisors. During data collection if the eligible respondent is not present in the house, revisiting will be done for three times.

8.7.12 Data entry, analysis and presentation

Data will be first checked manually for completeness and consistencies. Data will be entered to Epi-data version 3.1data base with double entry verification and will be exported to SPSS

version 20.0 for analysis. Descriptive measures that include (frequencies, percentages, means and standard deviations) will be computed to describe study subjects with respect to socio demographic and other variables. Bivariate analysis, using chi square test will be done to see the relationship between dependent and independent variables and to identify candidate variables for multivariate analysis at $p < 0.25$ and multivariate analysis using binary logistic regression will be done to identify the independent predictor variables of the outcome variables. Odds ratios together with their corresponding 95% confidence intervals will be used to assess the strength of the association.

8.7.13 Data quality Monitoring

The questionnaire which is originally prepared in English will be translated to Afaan Oromo and Amharic and back translated to English to increase its validity and check for any inconsistencies and distortion in the meaning of words and concepts . Data collectors will be trained intensively for two days on how to conduct the interview. The questionnaire will be pre-tested in five percent of the total sample size in adjacent kebeles found outside the study area which have similar characteristics with sample population to check its consistency and to standardize the survey tool locally. After pre-test, adjustment and correction will be made based on the gap identified. At the end of each day of data collection, the collected data will be reviewed and checked for completeness, and consistency by supervisors and investigator and corrective discussion will be made with all the research team members. Additionally, during data entry using Epi data to ensure the consistency of data, double entry of data will be employed.

8.7.14 Ethical Consideration

Ethical clearance will be obtained from the Ethical Review Committee of the School of Public Health, Department of Preventive Medicine, Addis Ababa University. Written permission will also obtain from Holeta Town Health Office. Verbal consent will be obtained from study participants. Study participants will be assured of the confidentiality of their responses throughout the research process.

8.7.15 Plan for dissemination of findings

After the research paper is approved by advisors and other responsible bodies of the Addis Ababa University, It will be disseminated to the graduate coordinator of the department, and to

those governmental (MOH, ORHB, Holeta Town Health office) and nongovernmental organizations that potentially could benefit from the study.

8.8 Work Plan

Table 31: Work plan prepared to assess husband's knowledge on obstetric danger signs and associated factors in Holeta Town, Oromia Region, Ethiopia, 2019

S.No		Responsible body	February, 2019	March, 2019	March, 2109	March, 2019	May, 2019	June, 2019	July, 2019	August, 2109	Sep., 2019
1	Developing the thesis proposal	Researcher									
2	Proposal defense	Researcher									
3	Approval of Ethical clearance	AAU,ORHB									
4	Budget securing	Researcher									
5	Pretesting the questionnaire	Researcher									
6	Data collection	Researcher and data collectors									
7	Data coding, entry and analysis	Researcher									
8	Report writing	Researcher									
9	Submission of draft	Researcher									
10	Thesis Defense	Researcher									

8.9 Budget Break down

Table 32: Budget break down of husband's knowledge on obstetric danger signs and associated factors assessment in Holeta Town, Oromia Region, Ethiopia, 2019

8.9.1 Personnel cost

S.N	Budget category		Quantity	Unit	Unit cost	Duration in days	Total cost
1	Training	Data collectors	8	No	50	2	800 ETB
		Supervisor	2	,,	50	2	200 ETB
		Tea break	11	,,	20	2	440 ETB
		Stationary	11		20	-	220ETB
	Subtotal 1						1660 ETB
2	**Actual data collection** Data collectors		8	No.	100	10	8,000 ETB
	Supervisors		2	,,	150	10	3000ETB
	Data enters		1	,,	100	5	500 ETB
	Subtotal 2						11,500 ETB

8.9.2 Supplies and stationeries

S. No	Budget category	Quantity	Unit	Unit cost	Total cost	Remark
1	Duplication paper	5	Ream	90	450 ETB	
2	Computer paper	5	Ream	120	600 ETB	
3	Pencil	11	Each	2	22 ETB	
4	Pen	11	Each	5	55 ETB	
5	Binding	11	Page	90	540 ETB	
7	Log book	11	No	50	550 ETB	
	Sub Total				**2,217ETB**	

8.9.3Transport

S.N^{o}	Titles of expense	Unit cost in birr	Total cost
1.	Holeta – Addis Ababa, two round transportation.	200	400
	Sub Total		**400 ETB**
TOTAL			**15,777 ETB**
Contingency (5%)			**788.85 ETB**
GRAND TOTAL			**16,565.85 ETB**

CHAPTER NINE

9.1 References

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CHAPTER TEN

ANNEXES

10.1 Questionnaires for Case - control study on Measles Outbreak Investigation

Region _____Zone_____ District_____

Date of Data collection_____

Respondent status: Case _____ Control _____ ID_____

Kebele _____

Socio-demographic Characteristics

1. Sex A. Male B. Female
2. Age _____
3. Occupation of the patient

   A. Farmer B. Student C. Unemployed D. Daily laborer E. Merchant

   F. Government Employed G. Other (specify)_____
4. Family Occupation

   A. Farmer B. Student C. Unemployed D. Daily laborer E. Merchant

   F. Government Employed G. Other (specify) _____
5. Religion A. Muslim B. Orthodox C. Protestant D. Catholic

   E. Other (specify) _____
6. Ethnic group

A. Oromo B. Amhara C. Tigre D. Gurage E. (specify)_____

7. Educational level of the Case/Control

   A. Illiterate B. Read and write C. Elementary D. Secondary E. Above secondary
8. Educational level of the family

   A. Illiterate B. Read and write C. Elementary D. Secondary E. AboveSecondary
9. Marital status of the case/Control

   A. Single B. Married C. Divorced D. Widowed
10. Family size _____

11. Is there any sick person with rash, fever, running nose in the family?

A. Yes B. No

12. If yes Q (11), How many _____

II. History of Diseases:

13. What was the sign and symptom of measles?

A. Fever B. Rash C. coughs D. coryza (runny nose) E. conjunctivitis (red eyes) F. Pneumonia G. Vomiting H. Others_____

14. Does the patient have complications? A. yes B.no

15. If yes select complication

A) Pneumonia B) Cornea C) Blindness D) Convolution E) Otitis media (ear discharge) F) diarrhea G) Feeding problem H) Others ____

16. Date of rash on set _____

17. Location when rash started ? District _____Kebele _____

Others Specify _____

18. Duration of rash _____

19. Date seen at health facility _____

20. Illness duration before coming to the health facility _____

21. Did you (he/she) take treatment? A. Yes B.No

22. If No, Why? _____

23. If yes, what treatment taken? A.ORS B. Antibiotics C. VitaminA

D. Supplementary food E. TTC ointment F. Others given_____

24. Result after the treatment? A. cured B. partially C. deteriorated D. disabled

III. Risk factor for out break

25. Did you ever vaccinated for measles? A. Yes B. No C. Unknown (If no skip to question number 26)

26. Is there vaccination card A. Yes B. No

27. If yes last vaccination date _____

28. Number of vaccine doses received A. one dose B. two dose C.three and above

29. Age at first vaccination_____

30. If not vaccinated why? _____

31. Did you have any travel history before diseased by measles? A. Yes B.No

32. If Yes where _____

33 Did you contact with a person with measles symptoms within the last 6 months?

A. Yes B. No

33. Do you have any travel history four days before and after rash onset

A. Yes B. No

34. If Yes to question 33 place of travel A. School B. Neighbor C. Market

D. Other_____

35. Do you have any contact history with someone else four days before and after rash onset

A. yes B. No

36. Do you think measles is transmissible diseases? A. Yes B. No.

37. If yes, list ways of transmission

_____

38. Nutritional status of the cases A. Normal B. Moderate C. malnourished

D. Severely malnourished

39. What are conditions of House? A. ventilated B. not-ventilated

40. Distance of house from Health Center? A. Less than 10 km B. equal or greater than 10 km

41. Where did you go first when you get ill?

A. Government Health Facility B. Private Health Facility C. Traditional Healers D. Holy Water E. Sleep at home F. Other :(Specify)___

42. Did you think measles is vaccine preventable? A. Yes B. No C. Don't Know

43. Which age group is highly affected by measles?

A. Children of aged less than 5 years B. Children of aged less than 15 years C. Any age groups of Populations D. Other (specify):___

44. Do you think measles is curable? A. yes B. No

10.2 Surveillance system Evaluation Questionnaire

Sub City Level Questionnaire

Respondent_____

Interviewer: _____

Date_____

General

1. Is there a national manual for surveillance? Yes/ No
2. ***If yes***, describe (last update, diseases included, case definitions, surveillance and control,

   Integrated or different for each disease):_____.

3. Do you have standard case definitions for the Country's priority diseases like AWD,

   AFP polio), malaria, RF, typhoid fever, Epidemic fever and measles? Yes / No

4. If yes, **Obs** [1 to n priority diseases] is the standard case definition for each priority disease_____
5. Is the central level responsible for providing surveillance forms to the health facilities?

   Yes/ No

6. ***If yes***, have you lacked appropriate surveillance formats at any time during the last 6 months? Yes / No
7. What are the reporting health facilities for the surveillance system?

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

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

   Weekly: ___/12 times the number of districts

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

9. Number of weekly reports received on time: ____/12 times the number of districts
10. Was there any report of the immediately reportable diseases in the past 1 month?

Yes/ No

11. If yes, with in what time is the report received after detection of the Case/ diseases? a. Less than 1 hour b. 2-24 hour c. 1- 2 days

d. 3- 7 days e. After 1 week

12. How do you report to the next high level? a. Mail b. Fax C. telephone d. Radio e. Electronic Other
13. Does the Sub city level describe data by person (case based, outbreaks, and sentinel)?

Yes/ No

If yes, (Obs) Observed description of data by age and sex

14. Describe data by place, time and person? Yes/No
15. Perform trend analysis? Yes/ No

If yes, Obs , line graph of cases by time and list disease(s) for which line graph is

16. Observed a._____ b._____ c._____ d._____ e._____
17. Does the sub city have an action threshold defined for AWD, Measles, AFP (polio),

and malaria? Yes / No

18. Who is responsible for the analysis of the collected data? _____
19. How often do you analyze the collected data?
a. Daily b. Weekly c. Every 2 weeks d. Monthly e. Quarterly f. As needed……..
20. Do you have an appropriate denominators establish the threshold? Yes / No
21. **If yes, Obs** presence of demographic data (E.g. population by district and prioritized)

<u>Outbreak Investigation</u>

22. Was there any outbreak in the sub city last year? Yes/No

If yes, number of outbreaks investigated:_____

23. List of diseases:_____
24. Number of outbreaks investigated and in which risk factors were looked for:_____
_____

25. Number of outbreaks in which findings were used for action:_____

[Observe report]

26. Number of districts that looked for risk factors [observe in reports]
27. Number of districts that used the data for action [observe in final report] _____

Epidemic preparedness(relevant for epidemic prone diseases

28. Does the Sub city established epidemic management committee? Yes/No
29. Do you have plan for epidemic preparedness and response? Yes/No

If yes, Obs, a written plan of epidemic preparedness and response

30. Has the sub city had emergency stocks of drugs, vaccines, and supplies at all

times in past 1 year? Yes/ No

31. Has the sub city experienced shortage of drugs, vaccines or supplies during

the most recent epidemic (or outbreak)? Yes/ No

32. Is there standard case management protocol for AWD, Malaria,

AFP (polio), measles and others exists in all health facilities? Yes/No

33. Is there a budget line for epidemic response? Yes / No

If **yes, Obs**. minutes (or report) of meetings of epidemic management committee

34. Does the sub city have a rapid response team for epidemic? Yes/No

Response to epidemics

35. Was the epidemic responded within 48 hours of notification from zone level? Yes/No

If yes, Obs (from written reports with trend and intervention)

Feedback

36. Is the report regularly produced to disseminate surveillance data from the sub city?

Yes/No

If, yes Obs: the presence of a report of **s**urveillance data

37. How many feedback reports has the sub city level produced in the last year?_____

Supervision

38. Did you conduct supervision last 6month? Yes/No
39. If yes, how many supervisory visits have you made in the last 6 months?____
40. If no , what is the reasons for not making all required supervisory visits.

(Text)_____

_____

Training

41. Have you received any post-basic training in epidemic management? Yes/No

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

_____

_____

42. How many of your staffs are trained in surveillance? _____

Resources

43. For data management

a) Computer & Printer Yes/No
b) Photocopier Yes/No
c) Data manager Yes/No
d) Statistical package Yes/No

44. Communications availability

a) Telephone service Yes/No
b) Fax Yes/No
c) Radio call Yes/No
d) Internet Yes/No

Surveillance

45. Is there a budget line for surveillance in the sub city ? Yes/No

If yes, is it sufficient Yes/No

46. If No, what option did you use at ?_____

How could surveillance be improved? _____

_____.

47. What opportunities are there for integration of surveillance activities and

Functions (Core activities, training, supervision, guidelines, resources etc.)?

a._____

b._____

c. _____

Attributes and level of

a) Usefulness:

48. Total population under surveillance in the zone_____
49. How many cases and deaths reported in the zone last year?

Measles cases _____Deaths _____

50. Does the surveillance system help?

a) To detect outbreaks of these selected priority diseases early? Yes / No
b) To estimate the magnitude of morbidity, mortality and factors related to these diseases? Yes/ No
c) Permit assessment of the effect of prevention and control programs? Yes/ No

b) Simplicity:

51. Do you feel that additional data collected on a case are time consuming? Yes/No
52. How long it takes to fill the format? a, <5 minute b-10-15minuts c- >15 minutes

c) Flexibility:

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

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

Ifyes, how?_____

d) Data Quality:

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

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

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

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

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

e) Acceptability:

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

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

60. **If no**, what is the reason for their poor participation in the surveillance activity?

a) Lack of understanding of the relevance of the data to be collected
b) No feedback / or recognition given by the higher bodies for their contribution; i.e. no dissemination of the analysis data back to reporting facilities
c) Reporting formats are difficult to understand
d) Report formats are time consuming

f) If Others: _____.

g) Representativeness:

61. What is the health service coverage of the Sub city? _____%
62. Do you think, the populations under surveillance have good health seeking behavior for these diseases? Yes/ No

h) Timeliness:

63. What proportion of sub cities reports in acceptable time? ----------%

i) Stability

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

District (Intermediate Level) Questionnaire

District_____

Respondent_____

Date _____

Interviewer _____

General Information

1. Is there a national PHEM /IDSR Guide line or manual at this site? Yes/No

   If yes, **Obs** national PHEM /IDSR Guide line/manual:_____

2. Does the district have the **capacity** to transport specimens to a higher level lab? Yes/No

   If No, Reason _____

3. Does the district have guidelines Or SOP for specimen collection, handling and transportation to the next level? Yes / No
4. Have you lacked forms recommended for the country at any time during the last 6 months? Yes/ No
5. Number of reports received in the last 3 months compared to expected number

   Weekly: _____ /12 times the number of health facilities

   Immediately: _____/ times the number of health facilities

6. Number of weekly reports submitted on time: ____/12 times the number of health facilities (**On Monday)**
7. Number of immediately reports submitted on time: _____/3 times the number of health facilities (**within 30minutes of events)**
8. How do you report Weekly or immediately to the next level?

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

9. How can reporting system be improved?

_____

_____

10. Did you analysis IDSR data? Yes/No

a) If yes, Is data describe by person for any case based, outbreaks or sentinel? Yes/No

If yes, Obs description of data by age and sex

j) Is description of data by place (locality, village, work site etc)? Yes / No

If yes, Obs. description of data by Place.

k) Is the description of data by time? Yes/ No

If yes, **Obs** observed description of data by time?

11. Is there a trend analysis for the following disease?

a) Malaria Yes/ No
b) AWD Yes/No
c) Measles Yes/No
d) Polio Yes/No

If yes, **Obs**. line graph of cases by time

12. Do you have an action threshold for any of the country priority diseases? Yes/ No
If yes, what is it? _____cases _____% increase _____rate
(Obs for 2 priority diseases)_____
13. Did you have appropriate denominators? Yes/ No
If yes, Obs. demographic data at site (E.g. total population by village, <5 yrs,---)
14. Who is responsible for IDSR data analysis? _____ ___
15. How often do you analyze the IDSR data?
a. Daily b. Weekly c. Every 2 weeks
d. Monthly e. Quarterly f. As needed……..

Outbreak investigation

16. Is there any Outbreak or suspected in the district in the past year6 months? Yes/No

If yes, number investigated_____ (Observe reports and take copies if possible)

Epidemic preparedness

17. Dose the district epidemic preparedness plan? Yes/No

If, yes,(**Obs)** a written plan of epidemic preparedness and response.

18. Has the district had emergency stocks of drugs and supplies at all times in past 1 year? Yes/No

If yes, Obs, Observed the stocks of drugs and supplies at time of assessment

19. Has the district experienced shortage of drugs, vaccines or supplies during the most recent epidemic (or outbreak)? Yes/ No
20. Is there a budget line or access of funds for epidemic response? Yes/ No
21. Does the district have a rapid response team for epidemics? Yes/No

If yes, **Obs** Observed minutes (or report) of meetings of epidemic management

22. Did epidemic response team evaluated their preparedness and response activities during the past year? Yes/ No

If yes, (observe written report to confirm)

Responses

23. Has the district implemented prevention and control measures based on local data

for at least one reportable disease or syndrome? Yes/No

24. Present of epidemic that responded by districts within 48 hours of notification of

most recently reported outbreak?_____

Feedback

25. How many feedback written reports has the district produced in the last

year?_____

Obs Observed the presence of a written report that is regularly produced to disseminate

Supervision

26. Did you supervise the health facilities in the last 6 month? Yes/No

If yes, how many times have you been supervised in the last 6 months?_____

(Obs supervision report)

27. If No, the most usual reasons for not making all required supervisory visits.

(Text)

Reason 1_____

Reason 2_____

Reason 3_____

Training

28. Have you trained PHEM/IDSR disease surveillance? Yes/No

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

29. What percent of your staffs in the district trained on PHEM/IDSR surveillance?____%

Resources

30. Logistics Available

a)	Bicycles	Yes/No
b)	Motor cycles	Yes/No
c)	Vehicles	Yes/No
d)	Stationery	Yes/No
e)	Computer & Printer	Yes/No

31. Communication available

a)	Telephone service	Yes/No
b)	Fax	Yes/No
c)	Radio	Yes/No
d)	Computers that have modems	Yes/No

32. Information education and communication materials

a)	Posters	Yes/No
b)	Megaphone	Yes/No
c)	TV Screen	Yes/No
d)	Projector (Movie)	Yes/No

39. Availability of hygiene and sanitation materials

a)	Spray pump	Yes/No
b)	Disinfectant	Yes/No

Surveillance

40. Is there a IDSR focal person in the district epidemic management committee? Yes/ No
41. Are you satisfied with the current surveillance system? Yes /No

If no, why? _____.

Attributes

a) Usefulness

42. Total population of the district under surveillance_____
43. How many cases and deaths reported in the district from the following disease past 6month?

    a) AWD cases _____Deaths _____
    b) Malaria cases _____Deaths _____
    c) Measles cases _____Deaths _____

44. Does the surveillance system help?

    a) To detect outbreaks of these selected priority diseases early? Yes / No
    b) To estimate the magnitude of morbidity, mortality and factors related to these diseases? Yes/ No
    c) Permit assessment of the effect of prevention and control programs? Yes/ No

b) Simplicity:

45. Do you feel that data collections on a case report form are time consuming? Yes/No
46. If yes, how long it takes to fill the format? a, <5 minute b- 10-15minuts c- >15 minutes

c) Flexibility:

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

If yes, how_____.

d) Data Quality:

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

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

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

51. Average number of ***unknown or blank responses*** to variables in

each of the reported forms _____

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

e) Acceptability:

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

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

53. **If no**, what is the reason for their poor participation in the surveillance activity?

a) Lack of understanding of the relevance of the data to be collected
b) No feedback / or recognition given by the higher bodies.
c) Reporting formats are difficult to understand
d) Report formats are time consuming
e) If Others: _____.

f) Representativeness:

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

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

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

g) Timeliness:

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

h) Stability:

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

If yes, how did you manage it?_____

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

Health facility Questionnaire (Health center)

District_____

Name of health facility_____

Type of health facility _____

Respondent_____

Date _____

General Information

1. Is there PHEM/IDSR national Guide line or manual at this site? Yes / No

If yes, Obs; for the existence **PHEM/IDSR** national guide line or manual

2. Is there a clinical register in health facilities? Yes/ No
If yes, **Obs** the existence of a clinical register

3. Is there the health facilities correctly register cases during the previous 30 days? Yes/No
If yes, **Obs**; the clinical register

4. Do you have a standard case definition for: (each priority disease)
   a) AWD, Yes/No
   b) AFP (polio) Yes/No
   c) Measles Yes/No
   d) Malaria Yes/No

If yes, Obs the standard case definition for: (each priority disease)

5. Does of health facilities use standardized case definitions for the country's priority diseases**.** Yes/ No
If yes, Obs; the respondent correctly diagnosing one of the country's priority diseases using a standard case definition (Interview about of these)

6. Does the health facility have the capacity to collect the following specimens?
   a) sputum Y N N/A
   b) Stool Y N N/A
   c) Blood Y N N/A
   d) CSF Y N N/A

7. If yes, Obs the presence of materials required to collect
   a) Stool Yes No N/A
   b) blood/serum Yes No N/A
   c) CSF Yes No N/A

8. Do you have the capacity to handle sputum, stool, blood/serum and CSF until shipment at this facility? Yes No N/A

If yes, Obs presence of status cold chain at health facility.

9. Does the health facility that have the capacity to transport specimens to a higher level Laboratory? Yes No N/A

If yes, Obs presence of transport media for stool at health facility.

10. Have you lacked appropriate surveillance forms at any time during the last 6 months? Yes No N/A

If yes, what the reason?_____

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

a. **Obs** Measles Yes No N/A
b. **Obs** Malaria Yes No N/A
c. **Obs** AFP (polio) Yes No N/A
d. **Obs** AWD Yes No N/A

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

Obs Weekly: _____ /12 times the number of health post sites
Obs immediately: _____/--- times the number of health post sites

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

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

14. How do you report?

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

15. How can reporting be improved? Your suggestion

_____
_____
_____

16. Describe data by person, place and time (outbreaks, sentinel) Yes No N/A

If yes, Obs data

17. Is there trend analysis Performed? Yes No N/A

If yes, Obs line graph of cases by time

18. Do you have an action threshold for any of the priority diseases? Yes No N/A

If yes, what is it (Ask for 2 priority diseases)?

Malaria cases ____ % increase
Measles cases____ % increase

19. Who is responsible for data analysis? _____

20. How often do you analyze the collected data?

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

21. Presence of demographic data at site (E.g. population <5 yr., population by village, total Population) Yes / No

Epidemic preparedness

22. Is there standard case management protocol for epidemic prone diseases at health facilities? Yes No N/A

If yes, Obs the existence of a written case management protocol for 1 epidemic prone disease

Epidemic response

23. Has the health facility implemented prevention and control measures based on local data for at least one epidemic prone disease? Yes No N/A

Feedback

24. Have you received feedback report in the last year from higher level? Yes/No
If yes, how many feedback reports has the health facility received in the last year? ___
Obs; at least 1 report received

25. Have you conduct meeting with community in the last 6 month? Yes No N/A
If yes, how often? a) weekly b)every two weeks c) monthly d) quarterly e) as needed

Supervision

26. Did you supervise health posts in the last 6months? Yes No N/A

27. If yes, how many times have you been supervised in the last 6 months?_____
Obs; supervision report or any evidence of supervision in last 6 months

28. Did you get any supportive supervision from higher level in the last 6 months? Yes No N/A

If yes, Obs; supervision report or any evidence for appropriate review of surveillance

Training

29. Have you trained in disease surveillance and epidemic management? Yes No N/A
If yes, specify when, where, how long, by whom?_____
_____.

30. Number of Staffs trained in disease surveillance and epidemic management_____.

Resources

31. Logistics

a)	Electricity	Yes/No
b)	Bicycles	Yes/No
c)	Motor cycles	Yes/No
d)	Vehicles	Yes/No

32. For data management

a)	Stationery	Yes/No
b)	Calculator	Yes/No
c)	Computer	Yes/No
d)	Software	Yes/No
e)	Printer	Yes/No

33. Communications available

a) Telephone service Yes/No
b) Fax Yes/No
c) Radio call Yes/No
d) Computers Yes/No

34. Information education and communication materials
a) Posters Yes/No
b) Megaphone Yes/No
c) TV Yes/No
d) Other: Yes/No

35. Hygiene and sanitation materials
a) Spray pump Yes/No
b) Disinfectant Yes/No

36. List Personal Protection materials (PPE) available in health facility

_____ _____ _____
_____.

Attributes

a) Usefulness

49. Total population of the district under surveillance_____

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

Measles cases _____Deaths _____

51. Does the surveillance system help?

d) To detect outbreaks of these selected priority diseases early? Yes / No
e) To estimate the magnitude of morbidity , mortality and factors related to these diseases? Yes/ No

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

b) Simplicity

52. Do you feel that data collections on a case report form are time consuming? Yes/No
53. If yes, how long it takes to fill the format? a, <5 minute b- 10-15minuts c- >15 minutes

c) Flexibility

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

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

If yes , how_____.

d) Data Quality

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

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

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

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

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

e) Acceptability

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

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

55. **If no**, what is the reason for their poor participation in the surveillance activity?

f) Lack of understanding of the relevance of the data to be collected
g) No feedback / or recognition given by the higher bodies.
h) Reporting formats are difficult to understand
i) Report formats are time consuming
j) If Others: _____.

f) Representativeness

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

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

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

g) Timeliness

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

h) Stability

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

If yes, how did you manage it?_____

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

10.3 Data collection tool of Health profile Assessment Gulele Sub city, Addis Ababa , February 2018

1. **Historical Aspects of the area (Culture & Truism office).**
   1.1. Sub city at a glance: where it is_____
   1.2. The name (how& why) _____
   1.3. How the Sub city was formed_____
   1.4. Any other historical aspect_____
2. **Geography and Climate (including map, altitudes, agro ecological zones etc…)**
   2.1.Sub city map_____
   2.2.Location (direction) _____ _____
   2.3.Altitude _____
   2.4.Annual rain fall (average)_____ Max _____Min_____
   2.5. Annual temp(average)_____High _____Low_____
   2.6.Climatic zones Highland_____% Midland _____% Lowland _____%
   2.7.Accessibility to main roads_____
3. **Administrative setup**
   3.1.Total number of woredas_____
   3.2. Sub city boundaries North_____ South_____

   East_____ West_____

4. **Demographic information**
   4.1. Population: Total_____
   4.2. Male Popn _____Female Popn _____ sex ratio_____
   4.3. < 1yrs_____, < 5 yrs_____, < 15 years_____, >64 years_____, Women 15-49 yrs of age_____.
   4.4.Total population by Woreda (each woreda pop)_____Ethnic composition/language _____ _____ _____
5. **Economy(mainstay of the economy, average income levels etc)**
   5.1. Main source of the economy_____

   5.1.1. Land density _____
   5.1.2. _____
   5.1.3. _____
   5.1.4. _____
   5.1.5. _____
   5.1.6. _____

   5.2.House hold income source(average)
   5.2.1. Different business_____(No.)
   5.2.2. Employee_____(No.)
   5.2.3. Jobless _____(No.)
   5.2.4. Average income per HH/year_____

6. Education and school Health

6.1.Distribution of Schools and teachers

Grade	N° schools	Type	No or teachers						No of students		
			Kindergarten	TTI	Dip	1st Degree	Masters	Total	M	F	Total
Kindergarten											
1-4											
5-8											
9-10											
Preparatory											
Total											

6.2.**Educational status of the community**

6.2.1. Total School Age Children (target)_____

6.2.2. Total Enrolment _____(_____%)

6.2.3. School dropout in 2009 E.C _____

6.2.4. If there is school dropout ,why _____

6.2.5. Total Educated people as a whole, _____ Male _____ Female _____

6.3.School health activities:

6.3.1. Water supply: schools with water supply_____

6.3.2. Toilets: schools with functional latrines (Male& Female)_____

6.3.3. Schools with HIV/other Health clubs_____

7. Facilities (Transport, Telecommunication, Power supply, Water supply…)

7.1. How many of the **health posts** have access to transportation_____(_____%) , Telecommunication_____(_____%) ,Electric power_____(_____%) ,Water supply _____(_____%)

7.2.How many of the **health centers** have access to transportation_____(_____%) , Telecommunication_____(_____%) ,Electric power_____(_____%) ,Water supply _____(_____%)

7.3.How many of the **Hospitals** have access to transportation_____(_____%) , Telecommunication_____(_____%) ,Electric power_____(_____%) ,Water supply _____(_____%)

8. Health delivery system(Sub city Health Structure/organogram)

8.1. Health Facility

S/N	TYPE		NUMBER		REMARK
			Governmental	Private	
1	Hospital				
2	Health Center				
3	Health posts (HPs)				
4	Pharmacy				
5	Drug stores				
6	Rural drug venders				
7	Clinics	Primary			
		Medium			
		Higher			
8	Special clinics	Dental Clinic			
		Maternity clinic			
		Pediatric clinic			
9	Laboratories				

8.2.Health institution to pop ratio:

8.3.Hospital: Pop _____. HC: Pop _____ HP: Pop _____

8.4.Health service coverage _____

8.5. Human resource for health (all type)

S/N	Category	Gov.	Non-Gov.	Total	Remarks
1.	Specialist (with type)				
2.	Physicians				
3.	Health officers				
4.	Bsc. Nurse				
5.	Clinical Nurse (IV)				
6.	Midwife IV				
7.	Midwife (Bsc)				
8.	Lab. Technologist				
9.	Lab. Technician (IV)				
10.	Drugist				
11.	Pharmacy				
12.	Environmental Health				
13.	MPH				
14.	HEWS				
15.	Others(HMIS)				
Total					

MPH = Master of Public Health HEW = Health Extension Worker

Doctor: pop ratio_____, Nurse: pop ratio_____ HEW: pop ratio_____

8.6. Top causes of morbidity and mortality

8.6.1. **Top ten leading causes of OPD visit (morbidity):**

Adult		Pediatrics
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

8.7. **Vital Statistics and Health Indicators**

8.7.1. Infant Mortality Rate (IMR) _____(total <1 yr deaths in 2009 E. C. _____)

8.7.2. Total live births_____

8.7.3. Total still births_____

8.7.4. Total neonatal deaths_____

8.7.5. Child Mortality Rate_____(total <15 yr deaths in 2009 E.C. _____)

8.7.6. Crude Birth Rate_____

8.7.7. Crude Death Rate_____ (total deaths 2009E.|C. ____)

8.7.8. Maternal Mortality Rate_____(total maternal deaths in 2009 E.C._____)

8.7.9. Contraceptive Prevalence rate_____

8.7.10. Contraceptive acceptance rate _____

8.7.11. ANC rate (how many of the total expected pregnancies attended 1st ANC) _____

8.7.12. ANC rate (how many of the total expected pregnancies attended 4th ANC) _____

8.7.13. Percentage of deliveries attended by skilled birth attendants_____

9. Immunization Coverage (for children); target children _____

9.1. BCG - No _____(_____%)

9.2. OPV-0 -No _____(____%)

OPV -1- No _____ (____%)

OPV-3 -No _____ (____%)

9.3. Penta-1- No _____ (____%)

Penta-3- No _____ (____%)

9.4. PCV -1 - No_____(_____%)

PCV -3 - No _____(____%)

9.5. Measles - No _____(____%)

9.6. Fully immunized – No _____(____%)

9.7. PW TT2+ - No _____ (_____%)

NPW TT2+ - No _____(_____%)

10. Health budget allocation:

10.1. **Government**

10.1.1. Total budget allocated for the Sub city _____

10.1.2. Total budget allocated for health _____(____%)

10.2. **Funds from NGO**

10.2.1. Total _____ (purpose/programs)_____

11. Disaster situation in the sub city

11.1. Was there any disaster (natural or manmade) in the sub city in the last one year?_____

11.2. Any recent disease outbreak/other public health emergency in the last year?_____

11.3. If yes, cases_____ and deaths_____

12. Community Health Services:

12.1. **Status of services provided by community health workers namely**

12.1.1. No. of TBAs/TTBA_____ and their responsibility

_____

12.1.2. No. of CHWs/CHPs_____ and their responsibility

_____

12.1.3. Responsibility of HEWs_____

12.1.4. Others_____

12.2. **Environmental Health, Sanitation Hygiene . (Urban WASH)**

12.2.1. Latrine coverage_____(____%) & utilization rate_____(_____%)

12.2.2. Total safe water supply coverage_____ (_____%)

12.2.3. Safe water supply coverage _____

12.2.4. Main source of water supply _____

12.2.5. Others_____

12.3. **Health education**_____

13. Endemic diseases ; (in No & % for all questions)

13.1. **TB**

13.1.1. Total TB cases_____

13.1.2. PTB negative_____

13.1.3. PTB positive____

13.1.4. Extra PTB _____

13.1.5. TB detection rate _____

13.1.6. TB Rx completion rate _____

13.1.7. TB cure rate _____

13.1.8. TB Rx success rate _____

13.1.9. TB defaulter_____

13.1.10. Death on TB Rx_____

13.1.11. Total TB patients screened for HIV_____

13.2. **HIV/AIDS;**

13.2.1. Total people screened for HIV (last one year)_____

13.2.2. VCT_____

13.2.3. PITC_____

13.2.4. PMTCT_____

13.2.5. HIV prevalence_____

13.2.6. HIV Incidence (new cases/yr)_____

13.2.7. Total PLWHA_____

13.2.8. On ART_____

13.2.9. On Pre-ART_____

13.2.10. Other HIV prevention activities_____

13.3. **Nutrition (malnutrition related OTPs, SC,TSF, CBN and PSNP activities)/HO & Early warning**

13.4. Total OTP sites_____,

13.5. Total admissions to OTP/yr_____

13.6. Total SC sites,_____

13.7. Newly opened/yr_____

13.8. Total admissions to SC/yr_____

13.9. Is there TSF (Targeted Supplementary Feeding) program in the woreda? ____

13.10. If yes children in the program, _____ (No & %)

13.11. CBN program_____

13.12. If yes children in the program, _____ (No & %)

13.13. PSNP_____ other_____

13.14. If yes children in the program, _____ (No & %)

13.15. General food security condition_____
_____
_____
_____
_____
_____
_____.

13.16. Shortage of Essential and Vital drugs

_____
_____
_
_____
_____
_____
_____.

13.17. What do you think the major Health problem/s of the Sub city?_____
_____
_____
_____
_____.

14. Discussion of the highlights and the main findings of the health profile assessment and description_____
_____
_____
_____
_____

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

10.4 IDP assessment checklist

Identification

Region _____ Zone _____ Woreda _____ Kebele _____ IDP site _____

1. **Basic data**

1.1. Number Of Internally displaced population

Male _____ Female _____ Total _____

House Hold _____

1.2. Number of pregnant and lactating women _____

1.3. Number of under one year _____

1.4. Number of Under five years old children _____

1.5. Number of water truck available _____

1.6. Number of water tankers available _____

1.7. Source of water _____

1.8. Amount of water supplied per day in liters _____

1.9. Number and type of latrine constructed Type _____ Number_____

1.10. Number of Hand washing facilities _____

1.11. Hand washing materials distributed_____

1.12. Health facilities available

Hospital _____

Health center _____

Health post _____

Mobile Health and Nutrition Team (MHNT)_____

1.13. Number of Stabilization center (SC) _____

1.14. Number of OTP sites _____

2. **Observation check list**

2.1. Observe the overall situation of the IDP site (environmental sanitation, latrine utilization, open defecation, waste disposal situation, etc)

2.2. Observe source of water and determine its situation

2.3. Observe distribution condition of water at delivery point (fair distribution, queue times, priority for elderly and disability, distance from homes, etc)

2.4. Observe utilization of hand washing facilities (presence of hand washing facilities, soap, utilization status, etc)

2.5. Observe Health service delivery condition (number of teams, professional mix, frequency and composition of service, etc)

2.6. Observe the availability of essential drugs and emergency drug kits at store and service delivery point or dispensary

2.7. Observe registration and report formats

2.8. Ask about general condition of the site (Local leader, community members, service providers, etc)

10.5 Assessment of Husband's Knowledge on Obstetric Danger Signs and Associated Factors in Holeta Town, Oromia Regional State, Ethiopia

Questionnaire

Questioner Identification Number ……Household Identification Number……..…

Name of Kebele …… House No.……Date-----/----/-----, DD/MM/YY

Name of interviewer _____ Signature_____

Part 1: Socio Demographic Characteristics of Respondents			
S No.	***Question***	***Possible réponses***	***Skip patterns***
001	How old are you?	Years_____ I don't know……98	
002	What is your religion?	Orthodox……1 Muslim……2 Protestant……3 Catholic……4 Other (specify)……96	
003	What is your ethnicity?	Oromo……..1 Amhara……2 Gurage……...3 Welayita……4 Tigre……....5 Other (specify)……96	
004	What is your educational status?	Informal (cannot read and write)----------1 Informal (can read and write)----------2 Primary (1-4)----------3 Primary (5-8)----------4 Secondary(9-10)----------5 Secondary(11-12)----------6 College diploma/certificate----------7 Degree and above----------8	
005	What is your wife's educational status?	Informal (cannot read and write)----------1 Informal (can read and write)----------2 Primary (1-4)----------3 Primary (5-8)----------4 Secondary(9-10)----------5 Secondary(11-12)----------6 College diploma/certificate----------7 Degree and above----------8	
006	What is your occupation?	Employed by government……1 Employed private for profit sector……2 Employed by NGO……3 Daily laborer……4 Merchant……..5 Pupil/ student……6	

		Farmer……..7 Unemployed……8 Other (specify)…….96	

007	What is your wife's occupation?	House wife……..1 Employed by government…….2 Employed private for profit sector……3 Employed by NGO……....4 Daily laborer……..5 Merchant……6 Student……..7 Farmer……8 Unemployed……..9 Other (specify)……..96	
008	Family size		
009	What is the average family income per months?	…… ETB	
Part- 2 Wife's reproductive Health related factors			
010	How many times in total did your wife became pregnant?	----------	
011	How many times in total did your wife gave birth?	----------	
012	How many children do you have currently? (alive children)	----------	
013	Did your wife attended ANC follow up during the last pregnancy?	Yes----------1 No ----------2 Don't know----------98	**If no/don't know go to Q.015**
014	Did you accompanied your wife when she attends antenatal care clinic during the last pregnancy?	Yes----------1 No ----------2	
015	Where did your wife gave birth during the last child delivery?	Home----------1 Public health center……...2 public hospital……3 other(specify)----------4 Don't know----------98	**If home/don't know, go to Q.017**
016	If delivered in health facility, Did you accompanied your wife during labour /delivery?	Yes----------1 No ----------2	
017	Did your wife received care at health facility within six weeks after last	Yes----------1 No ----------2	**If no/don't know go to**

	child delivery?	Don't know----------98	**Q.019**
018	Did you accompanied your wife when she use care within six weeks after delivery?	Yes----------1 No ----------2	
Part- 3 Health facility related information			
019	How long ……it take to reach the nearest health facility from your home by foot? ***If less than 2 hours, record it in minute; otherwise record it in hour.***	……. Minute ……. Hour	
Part-4 Communication related factors			
020	Do you have functional electronic media like TV, Radio?	Yes----------1 No ----------2	
021	Do you participate in health development army?	Yes----------1 No ----------2	**If no go to Q.023**
022	If yes what is your role?	Leader……1 Member……2 Other (specify)……96	
Part-5 knowledge about obstetric danger sign			
023	Have you ever heard about obstetric danger signs that can occur during pregnancy?	Yes----------1 No ----------2	**If no go to Q. 028**
024	What is the source of your information about obstetric danger sign during Pregnancy? ***(multiple response can be possible)***	Health personnel……1 Media ……2 Friends ……....3 Spouse……4 Relatives……5 Personal experience……6 Other (specify) ……..96	

025	Name the danger signs that can occur during **PREGNANCY** that you know ***(do not read responses**, Please tick if any of these signs are mentioned or any signs that are closely related to these)* ***(multiple response can be possible)*** PROBE: Any others?	Vaginal bleeding .....01 Swollen hand/face.....02 Blurred vision .....03 Severe headache .....04 Convulsion.....05 High fever.....06 Loss of consciousness.....07 Difficulty of breathing.....08 Severe weakness.....09 Severe abdominal pain.....10 Accelerated/ reduced Fetal movement….11 Water breaks without labor.....12 Persistent vomiting…….13 Other (specify) ……..96	
026		Yes----------1 No ----------2 Don't know----------98	
027	In your opinion, could a woman die from any of these problems?	Yes ……...1 No …….2 Don't know……98	
028	Did your wife experience any of these pregnancy danger signs during her last pregnancy?	Yes ……...1 No …….2 Don't know……98	